Code Review
2018 Changes to International Codes

IECC - COMMERCIAL - ENERGY TAC

FLORIDA BUILDING COMMISSION

"Stronger Codes Through Science and Consensus"

Florida dbpr Building Codes and Standards

Energy Conservation Code (IECC) – Commercial

Energy Technical Advisory Committee (TAC)

2018 International Energy Conservation Code – Commercial

Energy TAC

IECC-Energy Commercial Code Change No.	IECC Section	Change Summary b/t 2015 IECC and 2018 IECC	Change Summary b/t 2017 FECC and 2018 IECC.	Staff comments
CE3-16 Part I	C202	Modifies text of definition "AIR BARRIER". Deletes definition "CONTINUOUS AIR BARRIER". This proposal removes a redundant definition. **Cost Impact**: Will not increase the cost of construction. This proposal does not change code requirements, only updates definitions and reduces redundancy	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

IECC-Energy Commercial Code Change No.	IECC Section	Change Summary b/t 2015 IECC and 2018 IECC	Change Summary b/t 2017 FECC and 2018 IECC.	Staff comments
CE4-16, Part I	C202	Modifies text of definition "BUILDING THERMAL ENVELOPE". Revises text. Also Changes elements to element assemblies. **Cost Impact**: Will not increase the cost of construction. The proposal adds no additional mandatory requirements.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process The Reason listed doesn't seem to match the mod.

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		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE5-16, Part I	C202 (New)	Adds new definition of "Cavity Insulation". This proposal adds a definition for cavity insulation to complement the existing definition for continuous insulation. **Cost Impact**: Will not increase the cost of construction. The proposal only provides a new definition without any material impact to the code or cost.	Same as change between 2015 FEC-C and 2018 IECC	

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		☐ Overlapping provisions	☐	☐

CE6-16	C202	Modifies definition "COEFFICENT OF PERFORMANCE (COP) – COOLING". Per reasoning, this proposal will clarify and improve the existing definition, which is not clear or technically correct. **Cost Impact**: Will not increase the cost of construction. This change to the definition does not change the intent of the code and does not add any new requirements that would increase costs	Same as change between 2015 FEC-C and 2018 IECC	

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Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE9-16	C202	Modifies definition "COMPUTER ROOM". ASHRAE is developing a new standard for data centers, Standard 90.4. The proposed change will make the definition in the IECC match up with the definition changes that are occurring in ASHRAE Standard 90.1 and the new definitions for ASHRAE Standard 90.4. **Cost Impact**: Will not increase the cost of construction.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		This proposal represents **an update and a clarification** to a definition in this code, and does not create any new code requirements that would increase construction costs.		

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a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐	a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐	☐ Overlapping provisions	☐	☐
Others (Explain):	Others (Explain):			

CE11-16, Part I	C202	Modifies text of definitions “FENESTRATION”, “Skylights”, “Vertical fenestration”, “ENTRANCE DOOR”. Modifies text to to distinguish entrance doors from doors which are used trucks or other cargo or material movement. Also action proposed in this change to format the Fenestration, Skylights and Vertical Fenestration definitions found in R202 in the same manner as found in C202 **Cost Impact**: Will not increase the cost of construction. These revisions are intended **for editorial clarity**. There should be no impact on the cost of construction	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐	☐ No Action Needed	☐	☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐	a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐	☐ Overlapping provisions	☐	☐
Others (Explain):	Others (Explain):			

CE15-16	C202	Modifies text of definition “NAMEPLATE HORSEPOWER”, Change of horsepower terminology to “output power”. **Cost Impact**: Will not increase the cost of construction. This proposal is a **simple clarification** of a definition and results in no added construction cost	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**		**Commission Action** **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**			**TAC**	**Cmsn.**
				☐ **No Action Needed**	☐	☐
				☐ **Overlapping provisions**	☐	☐
CE16-16	C202	Modifies text of definition "ON-SITE RENEWABLE ENERGY". Biogas is another form of renewable energy that should be added to the definition. **Cost Impact**: Will not increase the cost of construction. This will not increase the cost of construction **as it only updates a definition,** and does not add any new requirements to the code	Same as change between 2015 FEC-C and 2018 IECC			
TAC Action **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**		**Commission Action** **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**			**TAC**	**Cmsn.**
				☐ **No Action Needed**	☐	☐
				☐ **Overlapping provisions**	☐	☐
CE20-16	C202	Deletes definition "SCREW LAMP HOLDERS". The term "screw lamp holder" is not used anywhere in the code. **Cost Impact**: Will not increase the cost of construction. The proposal is **editorial** in nature and does not have any impact on the technical requirements of the code.	Same as change between 2015 FEC-C and 2018 IECC			
TAC Action **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**		**Commission Action** **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**			**TAC**	**Cmsn.**
				☐ **No Action Needed**	☐	☐
				☐ **Overlapping provisions**	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE26-16, Part I	C303.1.1	Modifies text of Section C303.1.1 “Building thermal envelope insulation”. This change references IBC Table 1508.2, "Material Standards for Roof Insulation" and will require that above deck roof insulation products have R-value identification markings in accordance with the material standards already referenced in IBC **Cost Impact**: Will not increase the cost of construction. The proposed change is **a clarification** and does not change the stringency of existing code requirements so the cost of construction will be unchanged	Same as change between 2015 FEC-C and 2018 IECC	

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Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE29-16, Part I	C303.1.3	Modifies text of Section C303.1.3 “Fenestration product rating”. Changes to R303.1.3 (N1101.10.3) to make the format of garage doors and rolling doors similar. The code change was further modified by the Committee. The modification indicates that doors don't always need to have a determined U- factor rating. **Cost Impact**: Will not increase the cost of construction. This proposal is simply **an editorial clarification** of which standards apply to which fenestration products. There is no technical revision	Same as change between 2015 FEC-C and 2018 IECC	

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		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE30-16, Part I	C303.1.3	Modifies TABLE C303.1.3)(2) "DEFAULT OPAQUE DOOR U-FACTORS". TABLE C303.1.3(1) (1) "DEFAULT GLAZED FENESTRATION WINDOW, GLASS DOOR AND SKYLIGHT U-FACTORS". The default U-factor tables should distinguish opaque doors from glazed windows, doors and skylights. The headings in the Tables should be revised accordingly. **Cost Impact**: Will not increase the cost of construction. The proposal involves **clarifying default values** and editorially changing Table headings, and thus does not affect construction costs.	Same as change between 2015 FEC-C and 2018 IECC	

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		☐ Overlapping provisions	☐	☐

CE34-16	C303.3, C408, C408.1, C408.1.1 (New)	Modifies text of Section C408 "MAINTENANCE INFORMATION AND SYSTEM COMMISSIONING". Adds new Section C408.1.1 "Building operations and maintenance information". Deletes section C303.3 "Maintenance information". Per reasoning Section C408 covers commissioning requirements, but in several places it also addresses what type of operations and maintenance documents must be included in the information given to building owners and operators, thus locating C408.1.1 under this section. The code change was further modified by the Committee. The modification appropriately limits the application to buildings. **Cost Impact**: Will not increase the cost of construction. There is no additional cost as this **proposal merely relocates an existing requirement.**	Same as change between 2015 FEC-C and 2018 IECC	

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Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
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CE36-16	C401.2, C403.2.11, C404.11, C408.1, C408.2.5.2, C408.3, C408.3.1, C408.3.2, C408.3.2.1 (New), C408.3.2.2 (New), C408.3.2.3 (New)	Modifies text of Section C401.2 “Application”, C402.1.4 “Assembly U-factor, C-factor or F-factor-based method”, C402.4.4 “Doors”,C408.1 “General”, C408.2.5.2 “Manuals”, C408.3 “Lighting controls functional testing”, C408.3.1 “Functional testing”, C408.3.2 “Documentation requirements”. Adds new section C408.3.2.1 “Drawings”, C408.3.2.2 “Manuals”, C408.3.2.3 “Report”. Deletes Section C403.2.11 “Mechanical systems commissioning and completion requirements” and C404.11 “Service water-heating system commissioning and completion requirements”. **Cost Impact**: Will not increase the cost of construction. The documentation requirements for lighting controls functional testing are somewhat more robust than in the current code, but it is hard to see how that will have any meaningful impact on construction costs. The remainder of the proposal is simply editorial.	Same as change between 2015 FEC-C and 2018 IECC	

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		☐ Overlapping provisions	☐	☐

CE55-16	C402.1.3, C402.1.4, C402.2.4 (New), C402.4.4.	Modifies text of Section C402.1.3 “Insulation component R-value-based method”, C402.1.4 “Assembly U-factor, C-factor or F-factor-based method”, C402.4.4 “Doors”. Add new Section C402.2.4 “Below-grade walls”. This proposal is intended to take the code back to the way it was in previous version where you could find all of the requirements for a building envelope component by looking in the table plus the component's	Same as change between 2015 FEC-C and 2018 IECC	

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		corresponding code sections. The code change was further modified by public comment. **Cost Impact**: Will not increase the cost of construction. This is just a **reorganization of requirements** that are already in the code, so there for would not cause an increase of cost		

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		☐ Overlapping provisions	☐	☐

CE60-16	C402.1.3, C402.1.4	Modifies text of Table C402.1.3 "OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD", TABLE C402.1.4 "OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, U-FACTOR METHOD". The purpose of this proposal is primarily aimed at establishing appropriate U-Factors for garage doors. Accomplished by the proposed footnote to Table C402.1.3. Also window and glass door U-factors should be separated from garage door U-factors per changes to Table C402.1.4. **Cost Impact**: Will not increase the cost of construction. No effect on cost, because the affected products will simply have a better and more reliable means of complying with code requirements.	Same as change between 2015 FEC-C and 2018 IECC	

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CE61-16	C402.1.3, C402.1.4, C402.2.5	Modifies text of Section TABLE C402.1.3 “Opaque thermal envelope insulation component minimum requirements, r-value method”, TABLE C402.1.4 “Opaque thermal envelope assembly maximum requirements, u-factor method”. Modifies text of Section C402.2.5 “Slabs-on-grade perimeter insulation”. The R-value criteria in Table C402.1.3 for heated slab-on-grade floor insulation requirements for Climate Zone 7, all other, is being corrected to make it consistent with the other values for Climate Zones 7 and 8. It is being changed from R-20 for 24 in. to R-20 for 48 in. **Cost Impact**: **Will increase the cost of construction.** To the extent that the existing values were incorrect and the corrected values result in more insulation, then construction costs would be slightly higher.	Same as change between 2015 FEC-C and 2018 IECC	

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		☐ Overlapping provisions	☐	☐

CE65-16, Part I	C402.1.3	Modifies text of Section C402.1.3 “Insulation component R-value-based method”. Changes use of word “meet” for “comply”. The use of the word "comply" interjects code language more often found throughout the codes and clarifies the intent in a slightly stronger tone. **Cost Impact**: Will not increase the cost of construction. The proposal **only clarifies** the intent of the code section and does not cause any increases in materials or labor for constructing the building	Same as change between 2015 FEC-C and 2018 IECC	

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Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE68-16	C402.1.4	Modifies text of table C402.1.4 “Opaque thermal envelope assembly maximum requirements, u-factor method”. Proposal found footnotes a and b to Table C402.1.4 are written in a confusing manner, modification to clarify. **Cost Impact**: Will not increase the cost of construction. The intent of the proposal is as an **editorial clarification** of these 2 footnotes. There should be no impact on the cost of construction. Complete Revision History to the 2018 I-Codes: Successful Changes with Public Comments IECC-54 Copyright	Same as change between 2015 FEC-C and 2018 IECC	

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Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE69-16	C402.1.4	Modifies text of Table C402.1.4 “Opaque thermal envelope assembly maximum requirements, u-factor method”. This proposal corrects U-factor requirements in Table C402.1.4 to consistent with the R-value requirements in Table C402.1.3. **Cost Impact**: Will not increase the cost of construction. The proposal is **an editorial correlation** between Tables C402.1.3 and C402.1.4. There will be no impact on the cost of construction.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE72-16	C402.1.5, C502, C502.2, C502.2.1, C502.2.2, C503, C503.3, C503.3.1, C503.3.2, C503.3.3.C402. 1.4	Modifies text of Section C402.1.5 “Component performance alternative”, C502.2.1 “Vertical fenestration”, C502.2.2 “Skylight area”, C503.3.1 “Roof replacement”, C503.3.2 “Vertical fenestration” , C503.3.3 “Skylight area”. This proposal corrects an editorial oversight in Section C402.1.5, which allows compliance of the overall envelope based on the component U, C, and F-factors and areas. Although it includes all envelope components, the reference to Table C402.4 was inadvertently left out. Additionally, a statement is added to make it clear that fenestration must still meet the applicable SHGC requirements. **Cost Impact**: Will not increase the cost of construction. Because this proposal is **clarifying current language**, it does not impact the cost of construction. Furthermore, adding the envelope performance alternative to the additions and alterations sections could allow options to decrease cost of construction for those cases.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE74-16	C402.2.1	Modifies text of Section C303.2.2 “Multiple layers of continuous insulation board”. Moves Section C402.2.1 to C303.2.2. **Cost Impact**: Will not increase the cost of construction. This is an existing section within the code already, but where it was originally placed did not make sense. The entire section	Same as change between 2015 FEC-C and 2018 IECC	

		was moved to a section that it relates to.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE78-16	C402.2.2	Modifies text of Section C402.2.2 "Roof assembly". Per reasoning, the joints between boards in a single-layer rigid insulation board installation are gaps in the thermal layer and reduce energy efficiency. Modification to address this. Modified by the Committee to add exception. The Modification clarifies that in order to get R17, two layers of insulation are necessary. **Cost Impact**: **Will increase the cost of construction**. This will increase the cost of roofs intended to only use a single layer of rigid board insulation. However, because most roofs are currently installed with two-layers of insulation, the cost increases are negligible; eliminating less energy efficient roofs (those with single layer insulation) is desirable for the long-term outlook of energy efficiency of America's building stock.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE81-16	C402.2.2	Modifies text of Section C402.2.2 "Roof assembly". The purpose of this code change is to fix formatting. **Cost Impact**: Will not increase the cost of construction. The proposed change is a **clarification** and does not change the stringency of existing code requirements so the cost of construction will be unchanged.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):		**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):			**TAC** No Action Needed ☐ Overlapping provisions ☐	**Cmsn.** No Action Needed ☐ Overlapping provisions ☐
CE82-16	C402.2.2, C402.2.2.1 (New)	Modifies text of Section C402.2.2 "Roof assembly". Adds new section C402.2.2.1 "Skylight curbs". The purpose of this code change is to reorganize existing code language to improve clarity. **Cost Impact**: Will not increase the cost of construction. The proposed change is **a reorganization** of existing code language and does not change the stringency of existing code requirements so the cost of construction will be unchanged.	Same as change between 2015 FEC-C and 2018 IECC			
TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):		**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):			**TAC** No Action Needed ☐ Overlapping provisions ☐	**Cmsn.** No Action Needed ☐ Overlapping provisions ☐
CE83-16	C402.2.3	Modifies text of Section C402.2.3 "Above-grade walls". This is a clarification of the use of Table C402.1.3 on R-values and Table C402.1.4 on U-Factors. **Cost Impact**: Will not increase the cost of construction. This is a **clarification** of the use of Tables C402.1.3 and C402.1.4 and will not affect the cost of construction	Same as change between 2015 FEC-C and 2018 IECC			
TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):		**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):			**TAC** No Action Needed ☐ Overlapping provisions ☐	**Cmsn.** No Action Needed ☐ Overlapping provisions ☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE84-16, Part I	C402.1.3, C402.1.4	Modifies text of Section C402.2.3 "Thermal resistance of above-grade walls", C402.2.4 "Floors". Modifies Table C402.1.3 "Opaque thermal envelope insulation component minimum requirements, r-value method" and table c402.1.4 "Opaque thermal envelope assembly maximum requirements, u-factor method". The IECC as a result of changes approved for the 2015 addressed mass walls and mass floors differently. This proposal covers both Commercial and Residential portions and would treat the information on mass walls and mass floors as technical requirements and not as definitions. Therefore the proposal removes the technical requirements from the footnotes; and places each in the proper envelope section on floors or walls. **Cost Impact**: Will not increase the cost of construction. These **revisions are strictly editorial in nature**. They place the technical requirements for both mass walls and mass floors in the appropriate code sections.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐			
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐	a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐	☐ No Action Needed	☐	☐
Others (Explain):	Others (Explain):	☐ Overlapping provisions	☐	☐

CE87-16, Part I	C402.2.3	Adds new Section C402.2.7 "Airspaces". This proposal is address recent limitations placed on the thermal resistance application of reflective and nonreflective airspaces in SHRAE 90.1-2013 (Addenda Supplement, Addendum AC). To also provide an interim solution for the common case of enclosed airspaces located behind cladding or outside of the air barrier layer of the building, an allowance is provided to consider such airspaces as being roughly equivalent to that of an indoor air film (e.g., R-0.7). The code change was further modified by the Committee. The Modification introduces a test method rather than a using a random R-value that cannot be verified. It will also help prevent gaming.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Cost Impact: Will not increase the cost of construction. The energy code is currently silent on this matter. Consequently, this proposal provides **guidance and options** which can result in reduced construction costs where airspaces are appropriately used to help comply with the code.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE94-16	C402.4	Modifies text of Section C402.4 "BUILDING ENVELOPE FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS". This proposal decreases the maximum SHGC **requirement in climate zones 4 and 5.** This represents a reasonable increase in stringency for these zones with mixed heating and cooling, and is consistent with the SHGC values in addendum "ai" for ASHRAE 90.1-2016. **Cost Impact**: Will not increase the cost of construction. This proposal will not increase the cost of construction. The ASHRAE 90.1 analysis considered the incremental costs of 305 different fenestration assemblies including 42 double and triple glazing combinations covering different low-e glass technologies. While this proposal does restrict certain glazing products, the lowest cost low-e glazing products will comply, and therefore not significantly impact construction cost.	Same as change between 2015 FEC-C and 2018 IECC	**No action needed.** Code change impact only climate zones 4 and 5 which are not applicable to Florida.

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE97-16	C402.4.1.2	Modifies text of Section C402.4.1.2 “Increased skylight area with daylight responsive controls”. This proposal changes the maximum skylight area when daylighting controls are used from 5% to 6% of the roof area. **Cost Impact**: Will not increase the cost of construction. This proposal will not increase the cost of construction, as it simply changes the amount of skylight area allowed, but does not require skylights.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE98-16	C402.4.1.2, C402.4.2, C402.4.2.1, C405.2.3.2, C405.2.3.3	Modifies text of Section C402.4.1.2 “Increased skylight area with daylight responsive controls”, C402.4.2 “Minimum skylight fenestration area”, C402.4.2.1 “Lighting controls in toplight daylight zones”. Deletes Figure C405.2.3.2 (1) and Figure C405.2.3.3. The definition and the verbiage in the sections got changed in the last code cycle, but for some reason the section titles and figures still use the old names as found in the 2012 IECC code. The code change was further modified by the Committee. The Modifications clean up the terminology and eliminate redundant titles. **Cost Impact**: Will not increase the cost of construction. This change is **to correct the titles**, so will not impact cost.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE102-16	C402.4.4 (New), C405.2.3, C405.2.3.1, C405.2.3.2, C405.2.3.3	Modifies text of Section C402.4.4 Daylight Zones, Section C405.2.3.2 "Sidelit zone", C405.2.3.3 Toplit "daylight zone", 405.2.3 "Daylight-responsive controls", C405.2.3.1 "Daylight-responsive control function". Adds new text C402.4.4 "Daylight Zones". The proposal points out an important deficiency in the current code, namely that users of Section C402.4 may not know that there are clearly defined requirements for daylight zones in Section C405. This code change was further modified by the Committee. The Modification is Consistent with previous action on another proposal that changed the terminology. The code change was further modified by public comment. This comment deals only with the issue of where the content should be located. **Cost Impact**: Will not increase the cost of construction. There are no new requirements in this proposal, simply moved text from one section to another for ease of use.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE108-16	C402.5.1.1	Modifies text of C402.5.1.1 "Air barrier construction". This change simply allows for a mechanical sealing system for penetrations. Per reasoning Wrapping materials are not typically adhesive or sealing materials such that they can be used to seal a penetration against air leakage. Simply covering a penetration joint with such materials will not prevent air leakage. Thus, joints in an air barrier at penetrating elements must be sealed using tape or other sealing material. This code change was further modified by the Committee. The modification provides improved language regarding intent. Also, the code change was further modified by public comment provide for clarity in regards to the prevention of expansion and contraction on all metals; and not only dissimilar metals.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Cost Impact: Will not increase the cost of construction. Will not increase cost of construction as this change **simply allows an option for a mechanically sealed systems** which are already being used in construction		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE109-16	C402.5.1.1	Revises section C402.5.1.1 "Air barrier construction" to delete hyphen between vapor and permeable and move it between moisture and vapor. The code change was further modified by public comment to correct this problem and clarifies the code with respect to penetrations in an air barrier. **Cost Impact:** Will not increase the cost of construction **rewording existing text**	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE113-16	C402.5.2	Modifies text of Section C402.5.1.1 TABLE C402.5.2 "MAXIMUM AIR LEAKAGE RATE FOR FENESTRATION ASSEMBLIES". Differentiated the maximum air leakage rate for power-operated sliding doors and for power-operated folding doors, from "sliding" doors. The code change was further modified by public comment **Cost Impact**: Will not increase the cost of construction. **The cost could theoretically decrease** since a reduction in materials could occur, yet the building industry would be provided with an acceptable level of air leakage resistance.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):			**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):		**TAC**	**Cmsn.**
				☐ No Action Needed	☐	☐
				☐ Overlapping provisions	☐	☐
CE114-16 Part I	C402.5.3	Modifies text of Section C402.5.3 "Rooms containing fuel-burning appliances". The intent of this section was to deal with spaces where air comes in unrestricted to a place where the fuel burning appliance is located. The revised wording changes the focus from the appliance to the fact that air is penetrating the building envelope. **Cost Impact**: Will not increase the cost of construction. The proposal is **an editorial** repackaging of the requirement. There is no change to the technical requirements of the code.	Same as change between 2015 FEC-C and 2018 IECC	.		
TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):			**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):		**TAC**	**Cmsn.**
				☐ No Action Needed	☐	☐
				☐ Overlapping provisions	☐	☐
CE116-16	C402.5.6	Modifies text of Section C402.5.6 "Loading dock weatherseals". The proposed text is more understandable as to the actual intent of original language. It is not the door, rather the door opening. **Cost Impact**: **Will increase the cost of construction**. It is assumed that the loading dock seals needed to comply with this revised criteria will likely be more costly equipment than is often used today. This would be a first cost. Any increase in first cost of construction (or overall operating cost reductions due to the change over the life of the building or product) cannot be determined because the current criterion is subjective in nature so a baseline for establishing an air leakage rate under the current code and comparing it to what	Same as change between 2015 FEC-C and 2018 IECC			

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		results when the weather seal is in contact with the vehicle as proposed is not possible.		

TAC Action **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	**Commission Action** **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**		**TAC**	**Cmsn.**
		☐ **No Action Needed**	☐	☐
		☐ **Overlapping provisions**	☐	☐

CE119-16	C403, C403.1, C403.11 (New), C403.12 (New), C403.2, C403.2.1, C403.2.10, C403.2.10.1, C403.2.11, C403.2.12, C403.2.12.1, C403.2.12.2, C403.2.12.3, C403.2.13, C403.2.14, C403.2.15, C403.2.16, C403.2.17, C403.2.2, C403.2.3, C403.2.3.1, C403.2.3.2, C403.2.4, C403.2.4.1, C403.2.4.1.1, C403.2.4.1.2, C403.2.4.1.3, C403.2.4.2, C403.2.4.2.1, C403.2.4.2.2,	Modifies text of for most Sections in C403. Renumbering of Sections. Adds new Section “C403.3 Heating and cooling equipment efficiencies (Mandatory)”, C403.4 “Heating and cooling system controls (Mandatory)”, C403.7 Ventilation and exhaust systems, C403.8.1 Fans exceeding 5 hp”, C403.11 “Construction of HVAC system elements”, C403.12 “Mechanical systems located outside of the building thermal envelope”. Deletes Section C403.2.4 “HVAC system controls”, C403.4 “Hydronic and multiple-zone HVAC systems controls and equipment (Prescriptive)”. The intent of the proposal is to provide an organization that is more specific to equipment type. The intent of the reorganization is to provide a chapter that is easier to use. It allows placement of new requirements with like provisions rather than among a long list of requirements based on whether the proponent considered them mandatory or prescriptive. Overall the intent of the proposal is editorial. **Cost Impact**: Will not increase the cost of construction. There is no intent to change any technical requirement but to **reorganize Section** C403 into a more user friendly format.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

	C403.2.4.2.3, C403.2.4.3, C403.2.4.4, C403.2.4.5, C403.2.4.6, C403.2.4.7, C403.2.5, C403.2.6, C403.2.6.1, C403.2.6.2, C403.2.7, C403.2.8, C403.2.9, C403.2.9.1, C403.2.9.1.1, C403.2.9.1.2, C403.2.9.1.3, C403.3, C403.3 (New), C403.3.1, C403.3.2, C403.3.3, C403.3.3.1, C403.3.3.2, C403.3.3.3, C403.3.3.4, C403.3.3.5, C403.3.4, C403.3.4.1, C403.3.4.2, C403.4, C403.4 (New), C403.4.1, C403.4.1.1, C403.4.1.2, C403.4.1.3, C403.4.2, C403.4.2.1, C403.4.2.2, C403.4.2.3,			

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

	C403.4.2.3.1, C403.4.2.3.2, C403.4.2.3.2.1, C403.4.2.3.2.2, C403.4.2.3.3, C403.4.2.4, C403.4.2.5, C403.4.2.6, C403.4.3, C403.4.3.1, C403.4.3.2, C403.4.3.2.1, C403.4.3.2.2, C403.4.3.3, C403.4.3.4, C403.4.4, C403.4.4.1, C403.4.4.2, C403.4.4.3, C403.4.4.4, C403.4.4.5, C403.4.4.6, C403.4.5, C403.4.6, C403.5, C403.5.1, C403.5.2, C403.7 (New), C403.8.1 (New)			

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE122-16	C202, C403.2.12, C403.2.12.1, C403.2.12.2, C403.2.12.3, C403.4.1, C403.4.1.1, C403.4.1.2, C403.4.1.3, C403.4.4.4.	Modifies text of Section C403.2.12 “Air system design and control”, C403.2.12.1 “Allowable fan motor horsepower”, C403.2.12.2 “Motor nameplate horsepower”, C403.2.12.3 “Fan efficiency”, C403.2.12.4 “Fractional hp fan motors”, C403.2.12.5 “Fan control”, C403.4.1.1 “Fan airflow control”, C403.4.1.2 “Static pressure sensor location”, C403.4.1.3 “Set points for direct digital control”. Adds Table C403.2.12.5 “REQUIREMENTS FOR FAN CONTROL.” Modifies definition “FAN SYSTEM DESIGN CONDITIONS”. The proposal to the code for clarification and reorganization of the code. **Cost Impact**: Will not increase the cost of construction. The proposal primarily deals **with clarification and reorganization** of the code to improve understanding and compliance. The proposal does clarify that improved fan efficiencies are required on smaller motors; however, that was the original intention of a past proposal to 90.1 that was included in prior proposal CE239. In addition, the ECM motors called for are standard construction practice where they would be applied. There is not expected to be an increase in construction cost over normal construction practice.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	**Commission Action**		**TAC**	**Cmsn.**
Accommodate Florida Specific Need: **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	**Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	☐ **No Action Needed**	☐	☐
		☐ **Overlapping provisions**	☐	☐

CE126-16	C403.2.16, C403.2.16.1 (New), C403.2.16.1(1) (New), C403.2.16.1(2) (New), C403.2.16.1(3) (New)	Modifies text of Section C403.2.16 “Walk-in coolers and walk-in freezers”. Adds new text of TABLE C403.2.16.1(1) “Walk-in Cooler and Freezer Display Doors Efficiency Requirements”, TABLE C403.2.16.1(2) “Walk-in Cooler and Freezer Non-Display Doors Efficiency Requirements”, TABLE C403.2.16.1(3) “Walk-in Cooler and Freezer Refrigeration Systems Efficiency Requirements”. Adds new Section C403.2.16.1 “Performance standards”. This proposal updates the energy code with the June 2017 performance requirements which were to take effect per Federal Regulations. Modified by	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Committee to January 1, 2020. The code change was further modified by the Committee. The Modification corrects the effective date. **Cost Impact**: **Will increase the cost of construction**. It is likely that the new performance requirements will increase costs compared to the previous design requirements. However, the performance requirements may allow more technology and design flexibility for manufacturers such that they may reduce such costs.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE127-16	C403.2.2	Modifies text of Section C403.2.2 “Equipment sizing”. The proposal allows designers to select equipment that will do the job because now they can slightly oversize the equipment rather than try to match the load exactly. The code change was further modified by the Committee. The Modification restores the exceptions which were not intended to be deleted by the proponent. **Cost Impact**: Will not increase the cost of construction. Clarification - no cost impact. This proposal **clarifies** the common interpretation of the intent of the section. If anything it reduces cost, by changing an impossible standard to a reasonable standard.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE128-16	C403.2.16, C403.2.2, C403.2.4.1.2, C403.2.4.1.3, C403.2.4.2.1, C403.2.4.2.2, C403.2.4.2.3, C403.2.4.5, C403.2.4.7, C403.2.7, C403.2.8, C403.3.1, C403.3.3.1, C403.3.3.2, C403.3.3.3, C403.3.4.1, C403.4.1.3, C403.4.2, C403.4.2.3.1, C403.4.2.4, C403.4.2.6, C403.4.4, C403.4.4.1, C403.4.4.2, C403.4.4.5, C405.2.3.1, C405.2.4, C406.4	Modifies text of Section C403.2.2 “Equipment sizing”, C403.2.4.1.2 “Deadband”, C403.2.4.1.3 “Set point overlap restriction”, C403.2.4.2.1 “Thermostatic setback”, C403.2.4.2.2 “Automatic setback and shutdown”, C403.2.4.2.3 “Automatic start” , C403.2.4.5 “Snow- and ice-melt system controls”, C403.2.4.7 “Economizer fault detection and diagnostics (FDD)”, C403.2.7 “Energy recovery ventilation systems”, C403.2.8 “Kitchen exhaust systems”, C403.2.16 “Walk-in coolers and walk-in freezers”, C403.3.1 “Integrated economizer control”, C403.3.3.1 “Design capacity”, C403.3.3.2 “Control signal”, C403.3.3.3 “High-limit shutoff”, C403.3.4.1 “Design capacity”, C403.4.1.3 “Set points for direct digital control”, C403.4.2 “Hydronic systems controls”, C403.4.2.3.1 “Temperature dead band” , C403.4.2.4 “Part-load controls”, C403.4.2.6 “Pump isolation”, C403.4.4 “Requirements for complex mechanical systems serving multiple zones”, C403.4.4.1 “Single-duct VAV systems, terminal devices”, C403.4.4.2 “Dual-duct and mixing VAV systems, terminal devices”, C403.4.4.5 “Supply-air temperature reset controls”, C405.2.3.1 “Daylight-responsive control function”, C405.2.4 “Specific application controls”, C406.4 “Enhanced digital lighting controls”. Intent of this code change proposal is to increase the likelihood that energy savings intended by the energy code will be realized. Much of the savings from energy codes is dependent on the presence and functionality of building controls for HVAC and lighting systems. The word "capable" alone is not the best mandatory language for controls, as control equipment can be provided that could be said to be capable of achieving the desired result even though the required software, hardware, and programming is not present and the setpoint is not correct or the programming is not even complete. Using only the word "capable" in the code provides a potential loophole. This change generally replaces the term "capable of" with "configured to" where related to control requirements. In some instances it is appropriate to retain "capable of" and add "configured to". Requiring the equipment to be "configured" to achieve certain operation at the time of inspection provides assurance that the required operation is achievable while not	Same as change between 2015 FEC-C and 2018 IECC	

		mandating any specific post-occupancy operation. It should be noted that "configured to" is already used in many places in the code to achieve this objective including Sections C403.2.4.3, C403.2.4.4, C403.2.4.6, C405.2.5, C405.9.2 and C409.4.1. **Cost Impact**: Will not increase the cost of construction. The proposal is completely **editorial** in nature and does not alter any technical standard.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE130-16		Modifies text of table C403.2.3(2) (2) “MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS”. The proposed changes updates the footnotes to Table C403.2.3(2) for heat pumps. This table shows values for heat pumps, not air conditioners **Cost Impact**: Will not increase the cost of construction. This proposal **clarifies** footnotes in a table and eliminates language that is no longer applicable. It does not change any of the requirements in the table or create any new requirements in the code.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE131-16	C403.2.3	Modifies text of Section table C403.2.3(1) (1) "MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS". Based on the requirements shown in the table (as of 1/1/2016), and since this version of the IECC will be published in late 2016 or early 2017, The column and Footnote are no longer needed. **Cost Impact**: Will not increase the cost of construction. This proposal **updates the footnote in the table**, and does not change any of the requirements in the table, nor does it add any new requirements. .	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	**Commission Action** **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**		**TAC**	**Cmsn.**
		☐ **No Action Needed**	☐	☐
		☐ **Overlapping provisions**	☐	☐

CE132-16	C403.2.3	Modifies text of table C403.2.3(3) "MINIMUM E3FFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS, PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS, SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS". As of June 1, 2014, the federal efficiency requirements values for room air conditioners have been increased. In addition, the efficiency metric has been changed from EER (Energy Efficiency Ratio) to CEER (Combined Energy Efficiency Ratio), which is a metric that accounts for energy used in the "active" and "standby" modes of operation. This proposal updates the table to reflect the current federal minimum efficiency standards. **Cost Impact**: **Will increase the cost of construction.** The cost of room air conditioners that meet the most recent (2014) minimum standards is higher than the cost of room air	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		conditioners that met the previous federal minimum standard. The new room air conditioners are more energy efficient and will have lower operating costs than the air conditioners meeting the previous federal standard. According to a 2011 DOE analysis, the consumer median payback is between 2.1 and 10.1 years, depending on the product.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐			
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐	a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐	☐ No Action Needed	☐	☐
Others (Explain):	Others (Explain):	☐ Overlapping provisions	☐	☐

CE136-16	C403.2.4.1.4 (New)	Adds new Section 403.2.4.1.4 "Heated or cooled vestibules". The benefit of a vestibule is negated if the vestibule is heated or cooled to the set point of the adjacent space. The proposed change limits heating and cooling energy use associated with vestibules. **Cost Impact**: **Will increase the cost of construction**. If there is a heating or cooling system serving a vestibule, it will already have a thermostat based on requirements in section C403.2.4.1. The upgrade to a thermostat with setpoint limits or a locking cover is a modest cost ($20 to $45). In a DDC system, there would be no additional cost for the outside air lockout, and in an electromechanical control system the cost for an outside air lockout thermostat is modest ($40 to $70). These modest costs will be more than offset by reduced loss of heated or cooled air. If a transfer air fan into the vestibule were selected to condition the vestibule as allowed in the exception, that cost is likely to be less than the cost of providing a separate heating or cooling system for the vestibule.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE137-16, Part I	C104.1, C202, C202 (New), C303.3, C403.2.4.2, C403.2.4.7, C404.6, C404.9.1, C405.2.2.3, C405.2.3.1, C405.2.4, C408.3.1.3.	Adds new definitions "ACCESS (TO)", "READY ACCESS (TO)". Modifies text of Section C104.1 "General", C303.3 "Maintenance information", C403.2.4.7 "Economizer fault detection and diagnostics (FDD)", C403.2.4.7 "Economizer fault detection and diagnostics (FDD)", C404.6 "Heated-water circulating and temperature maintenance systems", C404.9.1 " Heaters", C405.2.2.3 "Manual controls", C405.2.3.1 "Daylight-responsive control function", C405.2.4 "Specific application controls", C408.3.1.3 "Daylight responsive controls", C403.2.4.2 "Off-hour controls", Deletes definitions "ACCESSIBLE", "READILY ACCESSIBLE". The intent of this proposal is for clarification of terminology. This proposal will clarify where the provisions are for access for repair, not accessibility for persons with disabilities. **Cost Impact**: Will not increase the cost of construction. This is **a clarification of terminology** that will not change any construction requirements.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE138-16	C202 (New), C403.2.4.3 (New), C403.2.4.3.1 (New), C403.2.4.3.2	Adds definitions "ISOLATION DEVICES", "NETWORKED GUEST ROOM CONTROL SYSTEM". Adds new Section C403.2.4.3 "Automatic control of HVAC systems serving guest rooms", C403.2.4.3.1 "Temperature setpoint controls", C403.2.4.3.2 "Ventilation controls". The proposed additional criteria to the IECC provides the ability to reduce building	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

	(New)	energy use through deeper thermostat setups and setbacks and ventilation control in unrented guestrooms without affecting occupant comfort or creating a conflict with the International Mechanical Code. For standalone controls, guest rooms are considered unrented if they are unoccupied for longer than 16 hours. For systems connected to a networked guest room control, the control can be configured to indicate whether the room is scheduled to be occupied and thus setbacks and ventilation can be turned off earlier when the guest room is scheduled to be unoccupied and the networked control can return set points to their default levels 60 minutes in advance of scheduled check-in. The code change was further modified by the Committee. The Modifications revise the text to use the correct terminology and fix an error in intent. Also, the code change was further modified by public comment. All this public comment is doing is changing has not been continuously for over 16 hours to has been continuously unoccupied for over 16 hours **Cost Impact**: **Will increase the cost of construction**. An analysis of the small hotel prototypes associated with the ASHRAE SSPC 90.1 activities indicates this change (which will be included in ASHRAE 90.1-2016 because this change was made via addendum j to ASHRAE 90.1-2013) results in savings and paybacks that meet ASHRAE SSPC 90.1 scalar thresholds for cost effectiveness for all climate zones for systems where the ventilation fan is simply switched off such as PTACs. For central ventilation and exhaust systems typically provided with fan coil units there is some additional cost for ventilation and exhaust dampers and pressure regulation devices. Even with these added costs the proposed measure meets the SSPC 90.1 cost effectiveness criteria. The situation where an energy recovery ventilation device is required was investigated, and it was also found that the measure meets the cost effective criteria even with reduced savings accounting for this measure. In the cost effectiveness analysis, added costs for a 77 room hotel or motel were estimated at $21,000 (single unit control) to $38,000 (central exhaust fan system control) with energy cost savings net of		

		maintenance ranging from $3263 to $12,432, depending on climate zone and to average $5,887 annually across all U.S. climate zones.		

TAC Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE139-16	C403.2.4.3	Modifies text of Section C403.2.4.3 "Shutoff dampers". This proposal restricts the exception allowing gravity dampers to exhaust and relief air streams. **Cost Impact**: **Will increase the cost of construction.** Based on an estimating, a typical 10" x 10" motorized vent damper with actuator costs around $111, installed. A gravity damper cost is expected to be around $44. The incremental cost is expected to be $67 for units affected by this code change proposal.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE141-16	C403.2.6.1	Modifies text of Section C403.2.6.1 "Demand controlled ventilation". The existing text is an absolute number, adds language to allow fractional numbers. **Cost Impact**: Will not increase the cost of construction. The proposal is **essentially editorial**. The existing code's absolute figure has been treated as the lower limit in past practices. Installing the figure now may result in application in situations which should have been covered previously, but due to	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		absolute figure may have been ignored.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE143-16	C403.2.6.3 (New)	Adds new Section C403.2.6.3 Ventilation air heating control. This addendum limits heating the DOAS supply air to 60°F when the majority of the building is expected to require cooling. This can be established based either on zone conditions or outside air temperature. **Cost Impact**: **Will increase the cost of construction**. This represents a control requirement rather than a requirement for additional equipment, so there is no anticipated cost increase and cost effectiveness analysis is not required.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE149-16	C403.2.9.1, C403.2.9.1.3	Modifies text of Section C403.2.9.1.3 "High-pressure duct systems". Section C403.2.9.1 has a gap with respect to whether a duct system with the exact static pressure of 3 inches of w.g. is a medium or high pressure duct. Traditional practice is to consider 3 inches w.g. or greater within the high pressure category. **Cost Impact**: Will not increase the cost of construction. No cost impact is expected as the change is primarily editorial clarification as to the appropriate category of regulation that applies to ducts with exactly 3 inches w.g. pressure. a requirement for additional equipment, so there is no	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		anticipated cost increase and cost effectiveness analysis is not required.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE150-16	C403.2.12.1	Modifies text of table C403.2.12.1 (2) "FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT". This proposal makes changes to be consistent with addenda G and Q to 90.1-2013. The proposed change related to addendum q limits the systems that can take advantage of the fan power pressure allowance for fully ducted return and/or exhaust air systems. **Cost Impact**: Will not increase the cost of construction. Generally, a plenum return is a lower cost construction option and is typically used in most building design. Where a ducted return is required for accreditation or pressure maintenance, there is no change in requirements. In the case where a designer elects to use a higher cost ducted return outside the excepted conditions, that choice of a higher cost system does incur additional costs for larger ductwork or a higher efficiency fan; however, selection of that higher cost path (ducted return vs. a plenum return) is the option of the designer and not a requirement of the energy code. Based on this, no added cost is estimated for this proposal.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE151-16	C403.2.3	Modifies text of table C403.2.3 (8) "MINIMUM EFFICIENCY REQUIREMENTS: HEAT REJECTION EQUIPMENT". Adds new standard "CTI STD-201 RS (15) Performance Rating of Evaporative Heat Rejection Equipment" and "CTI STD-201 OM (15) Operations Manual for Thermal Performance Certification of Evaporative Heat Rejection Equipment". Reference to CTI Standard 201 in Table C403.2.3 (8), Minimum Efficiency Requirements: Heat Rejection Equipment, has been updated. The standard has been divided into Standard 201 RS and Standard 201 OM. **Cost Impact**: Will not increase the cost of construction. This change will not increase the cost of construction**; change updates table to the most recent CTI Standard** for Performance Rating.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE152-16	C403.2.3	Modifies text of table C403.2.3 (8) "MINIMUM EFFICIENCY REQUIREMENTS: HEAT REJECTION EQUIPMENT". Proposal to address increase of the minimum efficiency of closed circuit axial fan cooling towers. The code change was further modified by the Committee. The Modification updates the table to match the ASHRAE table. **Cost Impact**: Will not increase the cost of construction. The impact of having to select more energy efficient models will have a negligible effect on the cost of construction.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE153-16	C403.2.3	Modifies text of Section C403.2.3(4) "WARM-AIR FURNACES AND COMBINATION WARM-AIR FURNACES/AIR-CONDITIONING UNITS, WARM-AIR DUCT FURNACES AND UNIT HEATERS, MINIMUM EFFICIENCY REQUIREMENTS". New (and increased) federal minimum efficiency standards went into effect for residential oil-fired warm-air furnaces in May, 2013. New and increased federal minimum efficiency standards for residential gas-fired warm-air furnaces went into effect in November, 2015. This proposal updates the table to reflect the new minimum federal standards. **Cost Impact**: **Will increase the cost of construction.** The furnaces that meet the new federal standards have a higher initial cost than the furnaces that met the previous standards. However, the furnaces that meet the new standards will have a lower operating cost.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE154-16	C403.2.3	Modifies text of Section C403.2.3(5) "MINIMUM EFFICIENCY REQUIREMENTS: GAS- AND OIL-FIRED BOILERS". updated standards for residential boilers were implemented for products that were manufactured (or imported) as of September 1, 2012. This proposal ensures that the table reflects the current minimum federal standards and design requirements for residential products that may be used in commercial buildings	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Cost Impact: **Will increase the cost of construction**. The boilers that meet the most recent federal efficiency standards and design requirements will have higher initial costs than the boilers that met the previous federal standards. However, they will have lower annual energy costs than the products meeting the previous standards.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE155-16	C403.2.7	Modifies text of Section C403.2.7(1) “ENERGY RECOVERY REQUIREMENT (Ventilation systems operating less than 8,000 hours per year)” and C403.2.7(2) “ENERGY RECOVERY REQUIREMENT (Ventilation systems operating not less than 8,000 hours per year)”. This addendum increases the minimum ERV requirements from zero to a reasonable minimum size for smaller units. **Cost Impact**: Will not increase the cost of construction. There is no increased cost, **as the need for heat recovery on smaller units is eliminated.**	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE156-16	C403.3, C403.3.3, C403.3.4	Modifies text of Section C403.3 “Economizers (Prescriptive)”, C403.3.3 “Air economizers”, C403.3.4 “Water-side economizers”. The proposal corrects gaps and conflicts in the economizer provisions which resulted from the confluence of changes approved for the 2015 edition. It attempts to move away from a provision that is dominated by a list of 9	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to these	Overlapping provision to be considered during step 2 of the code change process

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		exceptions. **Cost Impact**: Will not increase the cost of construction. The intent is **editorial correction** to existing provisions and changes approved in the 2015 code. The proponent believes there is no impact on the cost of construction. The one potential on impact of cost would depend on local interpretation of the overlap between Exceptions 1 and 2 to Section C403.3 where both Climate Zones 1A and 1B are exempt and Table C403.3(1) where only Climate zone 1A is exempt.	sections	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE157-16, Part I	C101.4.1, C101.5, C202, C202 (New), C403.3, C406.7, C407.5.1, C407.5.2.3	Modifies text of Section C101.4.1 “Mixed Residential and Commercial buildings”, C101.5 “Compliance”, C403.3 “Economizers (Prescriptive)”, C406.7 “Reduced energy use in service water heating”. Modifies Table C407.5.1 (2) “HVAC SYSTEMS MAP”, Modifies text of C407.5.2.3 “Group R-2 occupancy buildings”. Adds definition “STOREFRONT”, “GROUP R”. This proposal seeks to remove confusion concerning the terms Group R and Residential. By defining 'Group R' as those having one of the IBC Group R occupancies that can occur in a Commercial building and then it either removes or replaces the word 'residential' in various provisions. Group R is already used in various places in the code, most notably the building envelope (insulation) assembly tables. **Cost Impact**: Will not increase the cost of construction. The intent of the proposal is **editorial in nature**. To the extent that people had previously interpreted 'residential' to apply to hospital patient room and nursing home sleeping units, there may be some increase in cost for envelope insulation or HVAC systems.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to these sections	Overlapping provision to be considered during step 2 of the code change process

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE158-16	C403.3	Modifies text of Table 403.3(2) "EQUIPMENT EFFICIENCY PERFORMANCE EXCEPTION FOR ECONOMIZERS". This change proposal is to allow the prescriptive economizer to be replaced by more efficient cooling equipment in moist climates (climate zone suffix A) just as they are currently allowed in dry climates (climate zone suffix B). Table C403.3(2) is revised to add the moist climate zones to the existing dry climate zones. **Cost Impact**: Will not increase the cost of construction. Allowing the option of more energy efficient cooling equipment instead of an economizer does not increase the cost because the designer / builder / owner has the option of using either alternative. The decision can be made to use the cheaper option -economizer or higher efficiency equipment.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE160-16	C403.4.2.3.2, C403.4.2.3.2.1, C403.4.2.3.2.2	Modifies text of Section C403.4.2.3.2 "Heat rejection". Deletes Section C403.4.2.3.2.1 "Climate zones 3 and 4", C403.4.2.3.2.2 "Climate zones 5 through 8". Heat rejection requirements for hydronic heat pump systems for all three heat rejection types should apply equally to climate zones 3 through 8, rather than separate requirements for Climate Zones 3 and 4 and Climate Zones 5 through 8. Changes to address this reasoning.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Cost Impact: Will not increase the cost of construction. The code change proposal will not increase the cost of construction. In the case of a closed circuit cooling tower used in a water source heat pump loop, this code change will actually reduce the cost of construction for these systems in Climate Zones 5 through 8 by not requiring an unnecessary isolation heat exchanger. Note that a closed circuit cooling tower combines a heat exchanger and tower in one compact device. Heat loss is minimized by the use of positive closure dampers or by bypassing the flow around the closed circuit cooling tower in climate zones 3 through 8.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO:☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE162-16	C403.4.2.4, C403.4.2.4 (New)	Modifies text of Section C403.4.2.4 "Part-load controls". Adds Table C403.4.2.4 "VARIABLE SPEED DRIVE (VSD) REQUIREMENTS FOR DEMAND-CONTROLLED PUMPS". This proposal reduces the threshold where variable flow and variable speed drives (VSD) are required for pumping systems. The code change was further modified by the Committee to finely tune the proposed text to the climate zones. **Cost Impact**: **Will increase the cost of construction**. The cost of variable frequency drives continues to drop. Incremental cost for VSD and associated controls ranges from $5,101 to $3,920 for 10 to 2 horsepower pumps. Costs for larger pumps are proportional. There is no cost for reducing the threshold where variable flow systems are required, as 2-way valves that vary flow are less costly than 3-way valves used in a constant flow system. Cost-effectiveness: PNNL performed a cost-effectiveness analysis using the established DOE methodology.1 Results of the cost-effectiveness analysis	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		showed that at the requirement thresholds proposed, the savings-to-investment ratio (SIR) was greater than 1.2 in typical heating and cooling HVAC systems. A proposal is cost-effective when the SIR is greater than or equal to 1.0, indicating that the present value of savings is equal to or greater than the incremental cost. The complete cost-effectiveness analysis is available at: ttps://www.energycodes.gov/development/2018IECC.2		

TAC Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a.☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b.☐ c.☐ d.☐ e.☐ f. ☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE163-16	C403.4.2.6	Modifies text of Section C403.4.2.6 “Pump isolation”. To reduce confusion of application the proposal replaces boiler plant with boiler system in section text. **Cost Impact**: Will not increase the cost of construction. The change is **editorial** in nature in that it modernizes text to a currently defined term. There is no technical change to the code requirements.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a.☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b.☐ c.☐ d.☐ e.☐ f. ☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE165-16	C403.4.3, C403.4.3.1, C403.4.3.2, C403.4.3.2.1, C403.4.3.2.2	Modifies text of Section C403.4.3 “Heat rejection equipment”, C403.4.3.1 “Fan speed control”, C403.4.3.2 “Fan Multiple-cell heat rejection equipment”. Deletes Section C403.4.3.2.1 “Fan motors not less than 7.5 hp”, C403.4.3.2.2 “Multiple-cell heat rejection equipment”. This proposal reduces the threshold where variable speed drives (VSD) are required for heat rejection fan systems. The fan threshold is reduced from 7.5 to	Same as change between 2015 FEC-C and 2018 IECC	

		5 hp. It also revises the exceptions for variable frequency drives on tower fans and clarifies that the hp threshold applies to arrays of fans. For tower fans, the exception for climate zones 1 & 2 is eliminated. **Cost Impact**: **Will increase the cost of construction.** PNNL performed a cost-effectiveness analysis using DOE's methodology. The cost of variable frequency drives continues to drop. Incremental cost for VSD and associated controls is $3,670 for fans powered by 5.0 horsepower motors. Energy savings for the 5.0 horsepower motor with VSD is $407 per year for a simple payback of 9.02 years. The Savings to Investment Ratio (SIR) is 1.4 in typical HVAC&R systems indicating that the present value of the savings is greater than the incremental cost. The complete cost effectiveness analysis is attached with this proposal.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	**Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	☐ **No Action Needed**	☐	☐
		☐ **Overlapping provisions**	☐	☐

CE166-16	C403.4.4, C403.4.4 (New)	Adds new Section C403.4.4 "Requirements for complex mechanical systems serving multiple zones". Modifies text of Section C403.4.4.1 "Zone controls". Reorganizes text of C403.4.4 and changes to reflect advances in control strategies for VAV zone control. The code change was further modified by the Committee. The Modifications correct a typing error and make the section title match the code text. **Cost Impact**: Will not increase the cost of construction. The sequences listed in the exception are readily available as standard practice and do not add any costs to construction	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE167-16	C403.4.3, C403.4.3.1, C403.4.3.2, C403.4.3.2.1, C403.4.3.2.2	Modifies text of Section C403.4.4.6 "Multiple-zone VAV system ventilation optimization control". Change to remove the exception to the VAV system ventilation optimization when ERV is installed. **Cost Impact**: **Will increase the cost of construction.** Ventilation optimization is required only where an appropriate DDC system is already included in the building design. ERV is not required by this change, so the added cost is only to program the ventilation optimization into the DDC system. This is a standard protocol already required by code elsewhere, so the basic standard DDC programming is readily available and custom programming should not be required. The additional setup cost for four systems in a building with a total of 22 zones is estimated at $3,000. Additional analysis of the savings interaction between ventilation optimization and exhaust recovery ventilation (ERV) has determined that in all climates, having VAV system ventilation optimization in addition to ERV is cost effective. The annual savings for the prototype 22 zone office building was found to range from $406 to $7,039, depending on climate zone and to average $2,624 annually across all U.S. climate zones.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE168-16	C403.4.4.7 (New)	Adds new Section C403.4.4.7 "Parallel-flow fan-powered VAV air terminal control". This proposal addresses control of fans in fan powered parallel VAV boxes. The fan is only required during heating; however, these fans may be programmed to run continuously during occupied hours. **Cost Impact**: Will not increase the cost of construction. This represents a setup of controls and does not require new equipment, so there is no anticipated cost increase and cost effectiveness analysis is not required.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE171-16	C404.2	Modifies text of table C404.2 "MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT". New federal standards for residential type water heaters went into effect as of April 16, 2015. This proposal updates the values and equations in the table to reflect the new federal minimum standards for these products. The proposed modifications make table corrections and add explanatory footnotes for certain types of water heaters. . **Cost Impact**: **Will increase the cost of construction**. The new federal standard significantly increased the initial cost of residential water heaters, especially for large storage water heaters with a rated volume above 55 gallons.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE172-16	C404.2.1	Modifies text of Section C404.2.1 "High input-rated service water-heating systems". This proposal adds clarifications and updates to Exception 1 in Section C404.2.1. **Cost Impact**: Will not increase the cost of construction. This proposal **clarifies** and updates provisions in this exception, but it does not change the requirement. It also allows the use of alternate renewable technologies, or multiple renewable technologies, and may lower the cost of this exception.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE173-16	C404.3	Modifies text of Section C404.3 "Heat traps for hot water storage tanks". The existing text is confusing as to the intent of the Section proposal made to address this. **Cost Impact**: Will not increase the cost of construction. The intent is **editorial.** The existing text is unclear and the revision is intended to provide better, more enforceable provisions without changing the technical requirement.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO:☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE174-16, Part I	C202, C404.7	Modifies text of Section C404.7 “Demand recirculation controls”. Modifies definition of “DEMAND RECIRCULATION WATER SYSTEM”. Removes language from C404.7, R403.5.2 and N1103.5.2. Changes the requirement from the pump having to have controls to the system having to have the controls., Modifies Item 2 currently limits the water temperature of water entering the cold water piping to 'exactly' 104 degrees. **Cost Impact**: Will not increase the cost of construction. The proposal is **editorial** in nature. It will have no impact on the cost of construction.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO:☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE177-16, Part I	C404.9.3	Modifies text of Section C404.9.3 “Covers”. Proposal revises the exception from 70% to 75%. Add in parameters for "operating season". Allow the use of other on-site renewable energy systems. **Cost Impact**: Will increase the cost of construction. For this exception, since the requirement has been increased from 70% to 75%, the estimated increase in cost for this option would be approximately 7 percent.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action		Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):		Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
			☐ Overlapping provisions	☐	☐

CE179-16	C405.1, C405.2.2, C405.2.3, C405.2.4, C405.4.1	Modifies text of Section C405.1 "General (Mandatory)", C405.2.2 "Time-switch controls", C405.2.3 "Daylight-responsive controls", C405.2.4 "Specific application controls", C405.4.1 "Total connected interior lighting power". Language in the 2015 IECC for sleeping units was considered confusing, the proposal seeks to address. Also The proposed re-write in C405.2.4 eliminates the requirement for automatic controls in hospital patient rooms, and also allows captive key systems to be used in other types of sleeping units in lieu of occupant sensors. Dwelling units also have the choice of either complying with the lighting power density requirements in Tables C405.4.2(1) and C405.4.2(2) or complying with Section R404.1. **Cost Impact**: Will not increase the cost of construction. By eliminating some controls requirements in sleeping and dwelling units the **overall cost of construction would be reduced.**	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action		Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):		Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
			☐ Overlapping provisions	☐	☐

CE180-16	C405.1	Modifies text of Section C405.1 "General (Mandatory)". This proposal clarifies the language in Section C405.1 that pertains to the lighting that is installed in walk-in coolers, freezers, and other refrigeration equipment. **Cost Impact**: Will not increase the cost of construction.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		This is a **clarification** of the language and does not change or add any requirements to the code.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE182-16	C405.2, C405.2.4	Modifies text of Section C405.2 "Lighting controls (Mandatory)", C405.2.4 "Specific application controls". This proposal is an editorial simplification of the list of requirements of Section C405.2.4. **Cost Impact**: Will not increase the cost of construction. The proposal is **editorial** and should have no impact on the cost of construction.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE183-16	C202, C405.2	Adds new definition "LUMINAIRE LEVEL LIGHTING CONTROLS". Modifies text of Section C405.2 "Lighting controls (Mandatory)". The purpose of this code change proposal is to acknowledge lighting control technology that meets the intent of the provisions of the IECC if the control requirements have specific capabilities. Proposal provides guidance to cover LLLC technology. The code change was further modified by the Committee. The Modification to the terminology/definition matches the text with the acronym found in the reason statement. An additional Modification picks up the section for occupancy sensor controls to prevent rollback of requirements and to retain options.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Cost Impact: Will not increase the cost of construction. None. The LLLC is listed as an option in meeting the lighting control requirements and is not a required lighting control system.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE184-16	C405.2.1	Modifies text of Section C405.2.1 "Occupant sensor controls". Proposal revises this section for clarity, and for consistency with other parts of the code. **Cost Impact**: Will not increase the cost of construction. The proposal is **a clarification** of the intent of the current code requirements.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE185-16	C405.2.1, C405.2.1.1, C405.2.1.3 (New)	Modifies text of Section C405.2.1 "Occupant sensor controls", C405.2.1.1 "Occupant sensor control function". Adds new Section C405.2.1.3 "Occupant sensor control function in open plan office areas". This proposal adds occupant sensor control to open plan office areas. The code change was further modified by the Committee. The modification coordinates the threshold with other thresholds in the code. **Cost Impact**: **Will increase the cost of construction**. The cost for additional lighting controls in open office areas is expected to be about $250 per 400 square foot workstation area	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		for simple controls, or $0.95 per square foot for advanced wireless control systems; however, there are significant savings associated with these applications. Cost-effectiveness: PNNL performed a cost-effectiveness analysis using the established DOE methodology.1 Results of the cost-effectiveness analysis showed that the average savings-to-investment ratio (SIR) is 2.2 to 1.4 in typical offices, depending on the sophistication of the system installed. A proposal is cost-effective when the SIR is greater than 1.0, indicating that the present value of savings is greater than the incremental cost. The complete cost-effectiveness analysis is available at: https://www.energycodes.gov/development/2018IECC.		

TAC Action
Accommodate Florida Specific Need:
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a.☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE186-16	C405.2.1, C405.2.1.1, C405.2.1.2	Modifies text of Section C405.2.1.1 “Occupant sensor control function”. C405.2.1.2 “Occupant sensor control function in warehouses”. The text of C405.2.1.1 is slightly confusing. It doesn't clearly say that the section applies to all of the spaces listed in C405.2.1 EXCEPT warehouses. The proposed change solves the issue by providing two sentences with distinct direction for the code user. **Cost Impact**: Will not increase the cost of construction. This is **editorial clarification** and should have no impact on construction cost.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action
Accommodate Florida Specific Need:
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Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE187-16	C405.2.1.1	Modifies text of Section C405.2.1.1 "Occupant sensor control function. Proposal reducing the shutoff time for occupancy sensors will result in lights turning off sooner after occupants leave a room and increase savings. **Cost Impact**: Will not increase the cost of construction. There is no added cost, as this simply requires changing a simple setting on the occupancy sensor during installation. Cost-effectiveness: This change is cost-effective in that it provides significant savings with no anticipated cost increase	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE188-16	C405.2.2, C405.2.2.1	Modifies text of Section C405.2.2 "Time-switch controls", C405.2.2.1 "Time-switch control function". In Section C405.2.2.2 the use of the term "automatic control" is confusing, as occupant sensor controls, time switch controls, and daylight responsive controls are all "automatic" by definition, and this exception is clearly intended to apply to time switch controls only. Proposal is to clarify this. **Cost Impact**: Will not increase the cost of construction. The proposal **clarifies** code requirements only. No new requirements are added, and no existing requirements are eliminated.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE190-16	C202 (New), C405.2.2.1, C405.2.4	Adds new definition "CAPTIVE KEY OVERRIDE". Modifies text of Section C405.2.2.1 "Time-switch control function", C405.2.4 "Specific application controls". Added definition to the code for captive key devices. This code change was further modified by the Committee. The Modification clarifies the terminology. **Cost Impact**: Will not increase the cost of construction. This is **using the correct terminology**, so it will not increase cost.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE191-16	C405.2.2.3	Modifies text of Section C405.2.5 "Manual controls". Sections C405.2.1 and C405.2.2 both require manual controls, and yet this section is currently located within C405.2.2, the proposal is to renumber the sections to C405.2.5. **Cost Impact**: Will not increase the cost of construction. No additional requirements are being added to the code.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE192-16	C405.2.3, C405.4	Modifies text of Section C405.2.3 "Daylight-responsive controls", C405.4 "Interior lighting power requirements (Prescriptive)". This proposal allows the option for lighting power density (LPD) to be reduced by 40% in daylight areas in exchange for an exception to daylight responsive controls in daylit areas. Language from the committee to specify "New	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Buildings". **Cost Impact**: Will not increase the cost of construction. The LPD reduction option as an alternative to daylight responsive controls is an option that can be exercised at the discretion of the designer, so there is no change in actual code requirements. Should the option be taken, the higher efficiency lighting necessary to achieve the reduced LPD is expected to be less expensive than the cost of daylighting controls. A similar analysis was made for LPD reduction where it was found that LED lighting is a cost-effective way to reduce LPDs. That analysis can be reviewed in the documentation for proposal C-8 at: https://www.energycodes.gov/development/2018IECC.1 Cost-effectiveness: This change is cost-effective in that it either provides some savings or neutral energy impact, combined with an increase in savings reliability, at no anticipated cost increase. In addition, there is no change in requirements, as this code change proposal simply provides an optional alternative to daylight responsive controls.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE193-16	C405.2.3.2, C405.2.3.3	Modifies text of Section C405.2.3.2 "Sidelight daylight zone", C405.2.3.3 "Toplight daylight zone." Deletes the phrase "where located in existing buildings". Concerning fenestration as it relates to opaque doors in walls, and opaque rooftop access hatches. **Cost Impact**: Will not increase the cost of construction. By reducing the scope of daylight responsive controls requirements **this proposal would reduce the cost** of construction.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	**Commission Action** **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**		**TAC** / **Cmsn.**
		☐ **No Action Needed**	☐ / ☐
		☐ **Overlapping provisions**	☐ / ☐

CE195-16	C405.2.4	Modifies text of Section C405.2.4 "Specific application controls". **Editorial change.** Changes existing language from permissive. Removes use of "master" in exchange for control devices. The code change was further modified by the Committee. The Modification is for consistency with other committee action to do the same. **Cost Impact**: Will not increase the cost of construction. The proposal **is mainly editorial**, but by eliminating the "master" control and "system" phrases it is possible that some users will be able to install less expensive devices rather than more complicated networked systems, which would decrease the cost of construction without reducing the efficiency.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	**Commission Action** **Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**		**TAC** / **Cmsn.**
		☐ **No Action Needed**	☐ / ☐
		☐ **Overlapping provisions**	☐ / ☐

CE196-16	C405.2.5, C405.2.5.1 (New), C405.2.5.2 (New), C405.2.5.3 (New), C405.2.5.4 (New)	Modifies text of Section C405.2.5 "Exterior lighting controls", Add new Section C405.2.5.1 "Daylight shutoff", C405.2.5.2 "Decorative lighting shutoff", C405.2.5.3 "Lighting setback", C405.2.5.4 "Exterior time-switch control function". Adds more stringent requirements on timeswitch systems for exterior lighting. Also seeks to clarifiy existing code language that is not clear. The code change was further modified by the Committee. The modification eliminates unnecessary text. **Cost Impact**: **Will increase the cost of construction**. Many people interpret the current provisions of the code to require	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		that exterior lighting be dimmable by at least 30%. While technologically achievable, the additional wiring and controls are expensive, and in many instances the 30% reduction can be achieved by switching off lights which are not critical to safety and security. The existing code language is not clear on this point. On the other hand, by placing more stringent requirements on timeswitch systems for exterior lighting this proposal may require a more expensive control system to be used on some projects. But in reality, the big break point in time switch system pricing is from a mechanical device to a digital device, and the requirements in the 2015 IECC will already require you to use the more expensive digital device in almost all instances. Putting these two considerations together it appears that there will be a net reduction in construction costs, though this will vary from project to project.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE198-16	C405.3	Deletes section C405.3 Exit signs (Mandatory). This requirement is already mandated by U.S. Federal regulation and is commonly complied with. It is no longer needed in this code. **Cost Impact**: Will not increase the cost of construction. Exit signs that meet the deleted requirement are already the type of exit signs that are commonly installed, and are required by Federal regulations. Deleting this requirement from this code will have no impact on the cost of exit signs that must be installed.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

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Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE201-16	C405.4, C405.4.1, C405.4.2, C406.1, C406.3	Modifies text of Section C405.4 “Interior lighting power requirements (Prescriptive)”, C405.4.1 “Total connected interior lighting power”, C405.4.2 “Interior lighting power allowance”, C406.1 “Requirements”. Deleted Section C406.3 “Reduced lighting power density”. The proposal seeks to improve the language in C405 and C406 regarding lighting power budget. The intent is editorial providing consistent terms throughout the section. **Cost Impact**: Will not increase the cost of construction. The proposal is **editorial** and presents no technical change. There should be no impact on the cost of construction.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE202-16	C202, C405.4.1	Modifies text of Section C405.4.1 “Total connected interior lighting power”. Deletes definition “Low-Voltage Lighting”. this proposal will modernize terminology in the code to much more closely match lighting terminology which is currently in use. **Cost Impact**: Will not increase the cost of construction. The intent of this proposal is to **clarify** the language to result in a more consistent interpretation of the code. However, there may be a minor cost savings. When specifying a luminaire utilizing screw-base lamps in a commercial building, it has become common to require that a "wattage reduction label" be provided on the fixture. This label states that the maximum lamp wattage	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		that can be installed is limited to some smaller amount - typically 12W or 15W per socket - based on the LED retrofit lamp that is actually going to be used in the fixture, rather than the 60W - 150W that the incandescent socket is rated for. This has no impact on the lamps that are used (no commercial building owner will accept incandescent lamps anymore - they all want LED), but it does add a minor fee of typically \$5-\$15 per fixture for the label. The updated language above would end this practice, and result in some minor savings on the re-labeling fee.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE203-16	C405.4.1	Modifies text of Section C405.4.1 "Total connected interior lighting power". This is mostly an editorial reorganization that organizes all exceptions into one list. This code change was further modified by the Committee. The Modification is corrects an error in the submitted proposal to make the text consistent with what is expressed in the reason statement. **Cost Impact**: Will not increase the cost of construction. This is really an **editorial** modernizing and simplifying of this list of exceptions. The only change that might be construed as substantive changing is the playing field lighting which is simultaneously broadened (i.e. it is no longer limited to professional sports venues) and narrowed (it is limited to broadcast lighting only).	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

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Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE204-16	C405.4.1	Modifies text of Section C405.4.1 “Total connected interior lighting power”. Concerning wattage of line-voltage lighting tracks. **Cost Impact**: Will not increase the cost of construction. Overall this proposal will **reduce the cost** of construction because useless current limiters will no longer need to be installed to comply with the code.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE205-16	C405.4.2	Modifies text of table C405.4.2 (1) “INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD” and C405.4.2 (2) “INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD”. This proposal would add clarifying footnotes to the LPD Tables to result in a more consistent use and application of the code. **Cost Impact**: Will not increase the cost of construction. This proposal is a **clarification** which does not add any new requirements to the code or delete any existing requirements.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

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Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE206-16	C405.4.2	Modifies text of Section C405.4.2 (1) "INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD" and C405.4.2 (2) "INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD". This proposal revises the Lighting Power Density (LPD) allowances to be appropriate for currently available lighting technology. **Cost Impact**: **Will increase the cost of construction.** Currently, LED fixtures cost more than fluorescent fixtures. So as of today, this proposal would increase the cost of construction because it will require the use of more LED fixtures. But the effect on cost of construction when IECC-2018 goes into effect will be much less because we expect the cost of LED fixtures to continue to decline. Even though the initial cost of construction may be higher, the use of LED fixtures will be cost effective due to the lower energy use and reduced maintenance costs of LEDs. This is already the case today according to DOE analysis. It will only improve as LED costs come down.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE207-16	C405.4.2	Modifies text of Section C405.4.2 (2) "INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD". Adds classes of Facility for Sports Arena playing area Lighting Power Allowances which were not defined in this code.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Cost Impact: Will not increase the cost of construction. The proposal is a **clarification** of the intent of the current code requirements.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO:☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE209-16	C405.4.2.2.1	Modifies text of Section C405.4.2.2.1 "Additional interior lighting power". This proposal reduces allowance of display lighting in retail areas to encourage providing equivalent lighting levels with newer light emitting diode (LED) lamp technology. This proposal was then modified again by public comment for adopting the values recently developed by 90.1 for the following reasons: **Cost Impact**: **Will increase the cost of construction.** Will increase the cost of construction The LED fixtures for use in display light fixtures provide more lighting output at a lower energy use. LEDs have a higher cost per lamp, but their expected life is longer, so their overall cost is lower. A survey of typical lamps in the 200 to 800 lumen output range is shown in the following table, based on a review of online lamp prices from a national maintenance product supplier. (See table). LED prices are expected to continue to decrease, and will be lower by the time this code is adopted. Lamp costs are normalized to 500 lumens of output and 3000 hours of operation a year or about 10 hours per day for 6 days a week. The last column in the table is the lamp cost per 500 lumens per 3000 hours, but limits the LEDs to 5 years of use at 3000 hours per year. In both the full life and conservative 5-year case, the average lamp cost for LEDs is less once lamp life is considered. The costs shown do not include additional lamp replacement labor savings or any reduction in electrical distribution costs due to lower wattage lamps.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		From several points of view, the use of LED fixtures for display lighting represents a reduction in life cycle lamp costs to building owners. Cost-effectiveness: This change is cost-effective in that it provides significant savings with no anticipated life-cycle cost increase.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE210-16	C405.4.2.2.1	Modifies text of Section C405.4.2.2.1 "Additional interior lighting power". This proposal reduces allowance of decorative lighting n retail areas to encourage providing equivalent lighting levels with newer light emitting diode (LED) lamp technology. The code change was further modified by the Committee. The Modification eliminates words that were a moot point because those areas are already exempted elsewhere in the code. **Cost Impact**: **Will increase the cost of construction.** The LED fixtures for use in many decorative light fixtures provide more lighting output at a lower energy use. LEDs have a higher cost per lamp, but their expected life is longer, so their overall cost is lower. A survey of typical lamps in the 200 to 800 lumen output range is shown in the following table, based on a review of online lamp prices from a national maintenance product supplier. LED prices are expected to continue to decrease, and will be lower by the time this code is adopted. Lamp costs are normalized to 500 lumens of output and 3000 hours of operation a year or about 10 hours per day for 6 days a week. The last column in the table is the lamp cost per 500 lumens per 3000 hours, but limits the LEDs to 5 years of use at 3000 hours per year. In both the full life and conservative 5-year case, the average lamp cost for LEDs is less once lamp life is considered. The costs shown do not include additional lamp replacement labor savings or any reduction in electrical distribution costs due to lower wattage lamps. From several	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		points of view, the use of LED fixtures for decorative lighting represents a reduction in life cycle lamp costs to building owners.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE211-16	C405.5, C405.5.1, C405.5.2 (New), C405.5.2(3) (New), C405.5.2.1 (New)	Modifies text of Section C405.5 "Exterior lighting power requirements (Mandatory)", C405.5.1 "Total connected building lighting power". Add section C405.5.2 "Exterior lighting power allowance", C405.5.2.1 "Additional exterior lighting power". Modifies text of table C405.5.2(2) "INDIVIDUAL LIGHTING POWER ALOWANCES FOR BUILDING EXTERIORS", TABLE C405.5.2(3). **Cost Impact**: Will not increase the cost of construction. The intent of the proposal **is editorial**. While a substantial modernization of the text, there is no intent at substantive change.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE212-16	C405.5.1	Modifies text of Section C405.5.1 "Exterior building lighting". This proposal adds some minor types of lighting to be exempted from the exterior lighting power limits **Cost Impact**: Will not increase the cost of construction. This proposal **exempts some additional types of lighting** from the exterior lighting power requirements of this code.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE213-16	C405.5.2 (New)	Adds new Section C405.5.2 "Lighting equipment (Mandatory)". Adds section so that gas-fired lighting appliances shall not be equipped with continuously burning pilot ignition systems. **Cost Impact**: **Will increase the cost of construction.** The cost to install a gas light without continuously burning pilot lights is slightly higher (approximately $50-100), depending on the installation and wiring needs.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE215-16	C405.5.1	Modifies text of Section C405.5.1 (2) "INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS". This proposal revises the Lighting Power Density (LPD) allowances to be appropriate for currently available lighting technology. The values in this proposal are from those in Addendum cg to ASHRAE/IES Standard 90.1. **Cost Impact**: Will not increase the cost of construction. These reduced power allowances will likely require the use of LED fixtures, which in some cases are more expensive than HID fixtures. But LED fixtures are already the type of fixture commonly installed for exterior lighting. So the code would not require the purchase of more expensive fixtures than are already being used.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO:☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE220-16	C405.7	Modifies text of Section C405.7 "Electrical transformers (Mandatory)". Modifies text of table C405.7 "MINIMUM NOMINAL EFFICIENCY LEVELS FOR 10 CFR 431 LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS". This proposal is a simple editorial connection between Section C405.7 and Table C405.7. The transformers regulated by the section are only those listed in the table. The table is titled Low-voltage dry-type distribution transformers. The section's text implies coverage of all electric transformers. They should be consistent. **Cost Impact**: Will not increase the cost of construction. The change is **editorial** and changes no technical provisions.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO:☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE221-16	C405.7	Modifies text of Table C405.7 "MINIMUM NOMINAL EFFICIENCY LEVELS FOR 10 CFR 431 LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS". This proposal updates the minimum efficiency values required for newly purchased low-voltage dry-type transformers, and ensures that the 2018 IECC is updated with the latest information. **Cost Impact**: Will not increase the cost of construction. As these values represent the baseline minimum requirements for all new transformers, this proposal will not increase costs	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		for new transformers that have to meet the required increase in energy efficiency.		

TAC Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE223-16	C202 (New), C405.8	Modifies text of Section C405.8 "Electrical motors (Mandatory)". Modifies text of Table C405.8 (1) "MINIMUM NOMINAL FULL-LOAD EFFICIENCY FOR NEMA DESIGN A, NEMA GENERAL PURPOSE DESIGN B, AND IEC DESIGN N MOTORS AT 60 HZ", C405.8 (2) "MINIMUM NOMINAL FULL-LOAD EFFICIENCY FOR NEMA DESIGN C AND IEC DESIGN H MOTORS AT 60 HZ". Adds new definition "IEC DESIGN H MOTOR, IEC DESIGN N MOTOR, NEMA DESIGN A MOTOR, NEMA DESIGN B MOTOR, NEMA DESIGN C MOTOR". Deletes definition "GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE II)", "GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE I)". This proposal updates two motor efficiency tables to be consistent with the new federal standards. The scope of the federal standards has expanded, requiring an update to the table titles (and definitions) as well. **Cost Impact**: **Will increase the cost of construction.** The new standards for motors will increase the cost of motors, but will save energy costs compared to the previous federal standards. DOE estimated median payback periods on the order of 2.9 to 4.5 years, depending on the motor installed.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE224-16	C405.9.2	Modifies text of Section C405.9.2 "Escalators and moving walks". Adds exception dealing with Escalators that can benefit from a "power factor controller," that maintains a consistent speed but requires less energy while lightly loaded. This code change was further modified by public comment. Power factor control technologies only affect the power factor of the energy consuming systems. They do not affect the voltage of the motors. **Cost Impact**: Will not increase the cost of construction. Will in some cases **decrease the cost** of construction, as this exception permits an alternative that is generally less expensive.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: **YES (Select Criteria)** ☐ **NO:** ☐ **a.**☐ **b.**☐ **c.**☐ **d.**☐ **e.**☐ **f.** ☐ **Others (Explain):**	**Accommodate Florida Specific Need:** **YES (Select Criteria)** ☐ **NO:** ☐ **a.** ☐ **b.** ☐ **c.** ☐ **d.** ☐ **e.** ☐ **f.** ☐ **Others (Explain):**	☐ **No Action Needed**	☐	☐
		☐ **Overlapping provisions**	☐	☐

CE226-16	C202 (New), C405.10 (New)	Adds new definition "VOLTAGE DROP". Adds new Section C405.10 "Voltage drop in feeders and branch circuits". A limitation on the amount of allowed voltage drop will reduce the energy consumption of buildings and is currently in ASHRAE Standard 90.1-2016 due to addendum c to Standard 90.1-2013 **Cost Impact**: **Will increase the cost of construction.** While this proposed requirement has a theoretical impact on building cost, it is followed in most cases as standard practice; consequently there is not expected to be an overall cost increase.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to these sections	Overlapping provision to be considered during step 2 of the code change process

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE230-16	C406, C406.1, C406.8 (New), C406.9 (New)	Modifies text of Section C406 “EFFICIENCY PACKAGES”. Adds new Section C406.8 “Enhanced envelope performance”, C406.9 “Reduced air infiltration”, C406.10 “Increased lamp efficiency in dwelling unit”. This proposal adds new packages for additional efficiency, Section C406. The code change was further modified by the Committee. The Modification deletes a counter-intuitive provision and is consistent with the action taken by the IECC Residential committee to raise the requirement to 90% high efficacy lamps in dwellings. **Cost Impact**: Will not increase the cost of construction. None. This proposal **may reduce the first cost** in meeting the Additional Efficiency Package Options for certain occupancy types.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE235-16	C406.1.1	Modifies text of Section C406.1.1 “Tenant spaces”. This proposal clarifies that built-out tenant spaces that are or were occupied, and undergoing an alteration using the existing building provisions, do not need to comply with one or more of the packages in Section C406 **Cost Impact**: Will not increase the cost of construction. This proposal is a **clarification** that narrows the scope of the provision.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action		Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	NO: ☐	Accommodate Florida Specific Need: YES (Select Criteria) ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	NO:☐		
			☐ No Action Needed	☐	☐
			☐ Overlapping provisions	☐	☐

CE242-16	C406.5	Modifies text of Section C406.5 “On-site renewable energy”. Editorial change to correct language and unit of measurement for renewable energy. **Cost Impact**: Will not increase the cost of construction. The proposal is **editorial**. It provides equivalent threshold for equipment rated either in Btu/h or Watts	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action		Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	NO: ☐	Accommodate Florida Specific Need: YES (Select Criteria) ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	NO:☐		
			☐ No Action Needed	☐	☐
			☐ Overlapping provisions	☐	☐

CE246-16	406.7.1	Modifies text of Section C406.7.1 “Load fraction”. Proposal **clarifies** that the minimum percentage requirements are related to a building's annual hot water requirements and not simply to first hour rating. Removes combined heat and power system from the list of technologies that can be used to satisfy the section’s requirements. Expands the qualifying renewable energy technology from only solar energy to any on site renewable energy. **Cost Impact**: Will not increase the cost of construction. With respect adding the words "of the building's annual" before "hot water requirements," this change simply clarifies the original intent of the proposal when it was approved and would not impose any additional costs. With respect to removing CHP as a qualifying technology, such a change would not add any new requirements to the code. To the contrary, it would remove an expensive option that cannot be presumed without further	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		information to be cost effective. With respect to expanding the solar option to include other technologies, such a change would provide builders with more choices. More choices rather than less is preferred as it puts competitive pressure on the technology providers to keep prices reasonable.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE248-16, Part I	C407.1	Modifies text of Section C407.1 "Scope". Proposal provides an exception for energy used to recharge or refuel a vehicle that is used for on-road (and off-site) transportation purposes. This exception is limited to vehicles that are only used for off-site purposes that are obtaining their energy through the building energy infrastructure. **Cost Impact**: Will not increase the cost of construction. This does not change the requirements for total building performance, but **clarifies what** is to be excluded from scope of this section. Therefore, it will not increase the cost of construction.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE250-16	C407.3	Modifies text of Section C407.3 Performance-based compliance. The proposal replaces 'non-depletable energy' with the defined term 'on-site renewable' which is the defined term **Cost Impact**: Will not increase the cost of construction.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this	Overlapping provision to be considered during step 2 of the code change process

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		The proposal is **editorial** and makes no technical changes.	section	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE251-16	C407.3, C407.4.2	Modifies text of Section C407.3 “Performance-based compliance”, C407.4.2 “Additional documentation”. This closes a loophole that would allow building envelope performance to be be traded away for PV renewable energy. Energy production should not be substituted for energy conservation measures. The code change was further modified by the Committee. The Modification will align this text with the other path in C406 for renewables. 5% is still a sizable solar array, so this will not affect the solar industry **Cost Impact**: Will not increase the cost of construction. The relative cost of on-site renewable energy systems to the cost of meeting the requirements of the IECC is rapidly evolving. Certainly, in the preponderance of cases, the IECC requirements are less expensive, but there may be circumstances where the cost of on-site renewable systems does not exceed the cost of meeting IECC requirements. In either case, this code proposal would neither require the installation of a renewable energy system nor limit the size of an installed renewable energy system.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to these sections	Overlapping provision to be considered during step 2 of the code change process

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE256-16	C407.5.1	Modifies text of Table C407.5.1(1) "SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS". Adds new standard "ASHRAE 55-13 Thermal Environmental Conditions for Human Occupancy". Code change proposal to provide direction on set point and schedules requirements for modeling systems that provide occupant thermal comfort via means other than directly controlling the air dry-bulb and wet-bulb temperature (i.e., radiant cooling/heating, elevated air speed, etc. **Cost Impact**: Will not increase the cost of construction. There is no increase in the cost of construction since this code change proposal **only adds an exception**	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process

TAC Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a.☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE259-16, Part I	C407.5.1	Modifies text of table C407.5.1(1) "SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS". corrects an inconsistency in the treatment of skylights vs. vertical fenestration in the commercial provisions of the IECC. **Cost Impact**: Will not increase the cost of construction. The changes are **editorial** to add clarity and understanding to the definition. No new requirements are added and thus, costs are not impacted.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to this section	Overlapping provision to be considered during step 2 of the code change process

TAC Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a.☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

Commission Action
Accommodate Florida Specific Need:
YES (Select Criteria) ☐ NO: ☐
a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐
Others (Explain):

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE260-16	C408.1	Modifies text of Section C408.1 “General”. Added reference to Service Water Heating Systems and associated section C404. **Cost Impact**: Will not increase the cost of construction. This is a **clarification**	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE265-16	C408.2.4, C408.2.4.1 (New)	Modifies text of Section C408.2.4 Preliminary commissioning report. Adds new Table C408.2.4.1 “COMMISSIONING COMPLIANCE CHECKLIST”. Addition of a Commissioning Compliance Checklist to streamline the final inspection submission process as it relates to building system commissioning execution. **Cost Impact**: Will not increase the cost of construction. This will not effect the cost of design nor will is increase the cost of construction. It is a checklist provided for everyone involved to verify that all requirements have been completed. It is similar to the air barrier and insulation checklist found in the Residential Energy code. This is a tool to aid those involved with the process to verify for final inspection.	This change is not similar to that of the FEC-C. The FEC-C provides for Florida specific changes to these sections	Overlapping provision to be considered during step 2 of the code change process

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE266-16	C408.2.4	Modifies text of Section C408.2.4 “Preliminary commissioning report”. Testing results and testing procedures are required for the final commissioning report, this proposal would also mach them available for the preliminary commissioning report.	This change is not similar to that of the FEC-C. The FEC-C provides for	Overlapping provision to be considered during step 2 of the code change process

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		Cost Impact: Will not increase the cost of construction. Testing procedures will not increase the cost of design or construction.	Florida specific changes to this section	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO:☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE268-16	C103.6 (New), C103.6.1 (New), C103.6.3 (New), C103.6.4 (New), C408.2.5.1, C408.2.5.2, C408.2.5.3, C408.2.5.4	Adds new Section C103.6 “Building documentation and closeout submittal requirements”, C103.6.1 “Record documents”, C103.6.3 “Compliance documentation”, C103.6.4 “Systems operation control”. Modifies text of Section C408.2.5.1 “System balancing report”, C408.2.5.2 “Final commissioning report”. Deletes Section C408.2.5.1 “Drawings”. C408.2.5.2 “Manuals”. code change proposal moves the requirements from the commissioning requirements to the overall documentation requirements to ensure that the building owner receives all of the documentation related to energy code compliance and the operation and maintenance (O&M) manuals for the HVAC and lighting system within 90 days after the certificate of occupancy. The code change proposal also specifies the type of documentation that should be submitted to demonstrate documentation with the energy code **Cost Impact**: Will not increase the cost of construction. None. The documentation is already required for buildings that are commissioned. This expands the requirements to all buildings.	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):		**TAC**	**Cmsn.**
		☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE274-16, Part I	C501.4	Modifies text of Section C501.4 “Compliance”. Modifies text of Section to require compliance of Alterations, repairs etc, with the IECC and the Existing Building Code. **Cost Impact**: Will not increase the cost of construction. These were missing codes to the list.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f. ☐ Others (Explain):		**TAC**	**Cmsn.**
		☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE276-16	C502.1, C503.1	Modifies text of Section C502.1 “General”, C503.1 “General”. The code C502.1 was modified to require application of C405.2 without requiring the application of Sections C402, C403, C404 and C405. This proposal is to revert that change. Also to add requirement to C503 to Alterations. **Cost Impact**: Will not increase the cost of construction. This change **simply clarifies** how this code is intended to be applied to existing buildings. Greater clarification of when the code does and does not apply will most likely lower the cost of construction because planning and design can predictably provide direction	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):		

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE279-16	C503.1.	Modifies text of Section C503.1 General. The exception 7 of C503.1 in the 2015 IECC clearly conflicts with the language in GEW-4 that is now found at C503.6 of the 2015 IECC. Proposal to remove this exception. **Cost Impact**: Will not increase the cost of construction. This proposal is an **editorial** correction based on an action that occurred during the development of the 2015 IECC. The change to this portion of the code was not caught by staff during the publication of the 2015. There is no additional cost over the 2015 IECC.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	**Commission Action** Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c. ☐ d.☐ e.☐ f.☐ Others (Explain):		

	TAC	Cmsn.
☐ No Action Needed	☐	☐
☐ Overlapping provisions	☐	☐

CE285-16	C503.2, C505.1	Modifies text of Section C503.2 “Change in space conditioning”, C505.1 “General”. Where existing buildings undergo a change in space conditioning or change in occupancy or use, the current code requires "full compliance with this code." Such a stringent requirement is overly burdensome and in many cases unachievable, particularly for the building envelope. Per the reasoning proposal allows a limited amount of "wiggle room" for buildings undergoing a change in space conditioning or change in use, where they use either the component performance tradeoff method in Section C402.1.5 or the total building performance method in Section C407. **Cost Impact**: Will not increase the cost of construction. This	Same as change between 2015 FEC-C and 2018 IECC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following:
a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

		will decrease the cost of construction. Bringing any existing building into full compliance with every aspect of the current energy code would be expensive and impractical. This proposal provides a slightly less-stringent option, allowing more design flexibility, and will thus be less expensive.		

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

CE286-16	C503.3, C503.3.2, C503.3.3, C505.1	Modifies text of Section C503.3 “Building envelope”, C503.3.2 “Vertical fenestration”, C503.3.3 “Skylight area”, C505.1 “General”. To promote improvements to individual parts of buildings change clarifies that when a retrofit is done with no change in fenestration area, the true improvement is assessed on its own by comparing the building with its same window area. Proposal also clarified that fenestration added in buildings under the fenestration area limits shall comply with C402.4.3, not all of C402.4 which includes other unrelated requirements like minimum skylight area. The proposal also adds the option to use the performance path even for buildings under 40% window area, **Cost Impact**: Will not increase the cost of construction. This proposal **will decrease the cost of construction**, and encourage more cost effective partial improvements of existing buildings that are not undergoing deep retrofits.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

CE294-16	Appendix X (New)	Adds new Section "APPENDIX (X) SOLAR READY ZONE – COMMERCIAL". This proposal adds a new non-mandatory Appendix to the IECC – Commercial Code. **Cost Impact**: Will increase the cost of construction. The cost impact of this proposal is minimal, with increased cost due to the design professional's determination of the suitability of a solar ready zone on the building. The requirement for 5 psf collateral dead load in the solar ready zone could require a modest increase in strength of some bending members and some lateral design elements, resulting in some proportionately small incremental cost.	Same as change between 2015 FEC-C and 2018 IECC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a. ☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

Code Change No: CE3-16 Part I

Original Proposal

Section(s): IECC: C202

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Theresa Weston, representing DuPont Building Innovations (theresa.a.weston@dupont.com)

Revise as follows:

AIR BARRIER. Materials assembled and joined together to ~~provide a barrier to~~ restrict or prevent the passage of air ~~leakage~~ through the building thermal envelope. An air barrier ~~may~~ can be a single material or a combination of materials.

Delete without substitution:

~~**CONTINUOUS AIR BARRIER.** A combination of materials and assemblies that restrict or prevent the passage of air through the building thermal envelope.~~

Reason: This proposal removes a redundant definition. Air Barriers are already defined as "Materials assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials". Additionally, the definition for Air Barrier is updated.

Cost Impact: Will not increase the cost of construction
This proposal does not change code requirements, only updates definitions and reduces redundancy.

Report of Committee Action Hearings

Committee Action: **As Modified**

Modify as follows:

AIR BARRIER. ~~Materials assembled and~~ One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope. ~~An air barrier can be a single material or a combination of materials.~~

Committee Reason: Approval is based on the proponent's published reason statements. The modification simplifies and cleans up the definition and adds the criterion for "continuous."

Assembly Action: **None**

Public Comments

Public Comment 1:

Theresa Weston, DuPont Protective Solutions, representing DuPont Building Innovations (theresa.a.weston@dupont.com) requests Approve as Modified by this Public Comment.

Modify as follows:

AIR BARRIER. One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.

Commenter's Reason: At the committee hearing a consensus modification was developed by the proponents of CE1, CE2 & CE3 (all proposed changes to the Air Barrier definition) and proposed to both Part I & Part II. Unfortunately, the words "and its assemblies" were inadvertently left out of the modification proposed for part I. This public comment corrects this omission and makes the definition the same as that approved as modified in Part II.

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Final Action Results

CE3-16 Part I	**AMPC1**

BACK

2018 IECC (Commercial) Overlapping Provisions

CE3-16

AIR BARRIER. ~~Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials.~~ Relating to air distribution systems, a material object(s) which impedes or restricts the free movement of air under specified conditions. For fibrous glass duct, the air barrier is its foil cladding; for flexible non-metal duct, the air barrier is the non-porous core; and for sheet metal duct and air handling units, the air barrier is the metal in contact with the air stream. For mechanical closets, the air barrier may be a uniform panelized material such as gypsum wall board which meets ASTM C 36, or it may be a membrane which alone acts as an air barrier which is attached to a panel, such as the foil cladding of fibrous glass duct board. Relating to the building envelope, air barriers comprise the planes of primary resistance to air flow between the interior spaces of a building and the outdoors and the planes of primary air flow resistance between adjacent air zones of a building, including planes between adjacent conditioned and unconditioned air spaces of a building. To be classed as an air barrier, abuilding plane must be substantially leak free; that is, it shall have an air leakage rate not greater than 0.5 cfm/ft2 when subjected to an air pressure gradient of 25 pascal. In general, air barriers are made of durable, non-porous materials and are sealed to adjoining wall, ceiling or floor surfaces with a suitable long-life mastic. House wraps and taped and sealed drywall may constitute an air barrier but dropped acoustical tile ceilings (T-bar ceilings) may not. Batt insulation facings and asphalt-impregnated fiberboard and felt paper are not considered air barriers.

Code Change No: CE3-16 Part II

Original Proposal

Section: R202 (IRC N1101.6)

Proponent: Theresa Weston, representing DuPont Building Innovations (theresa.a.weston@dupont.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2015 International Energy Conservation Code

Revise as follows:

R202 (N1101.6)
GENERAL DEFINITIONS

AIR BARRIER. ~~Material(s)~~ Materials assembled and joined together to ~~provide a barrier to~~ restrict or prevent the passage of air ~~leakage~~ through the building thermal envelope. An air barrier ~~may~~ can be a single material or a combination of materials.

Delete without substitution:

~~**CONTINUOUS AIR BARRIER.** A combination of materials and assemblies that restrict or prevent the passage of air through the building thermal envelope.~~

Reason: This proposal removes a redundant definition. Air Barriers are already defined as "Materials assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials". Additionally, the definition for Air Barrier is updated.

Cost Impact: Will not increase the cost of construction
This proposal does not change code requirements, only updates definitions and reduces redundancy.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

AIR BARRIER. ~~Materials assembled and~~ One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies. ~~An air barrier can be a single material or a combination of materials.~~

Committee Reason: The modification brings clarity to the definition by eliminating an extraneous sentence.
The as-modified proposal was approved because the committee agreed with the published reason statement.

Assembly Action **None**

Final Action Results

CE3-16 Part II	**AM**

Code Change No: CE4-16 Part I

Original Proposal

Section: IECC: C202.

Proponent: Robert Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Revise as follows:

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, ~~floor~~ floors, ~~roof~~ ceilings, roofs and any other building ~~elements~~ element assemblies that enclose ~~*conditioned space*~~ conditioned space or provide a boundary between ~~*conditioned space*~~ conditioned space and exempt or unconditioned space.

Reason: The current code includes references to "approved manufacturer's instructions" which tends to indicate that it is addressing instructions from approved manufacturers. Since it is the instructions that are approved, not the manufacturer, the proposed text is grammatically correct. The proposal further removes the phrase regarding protection of "the building or structure" which is undefined and vague, and changes the term "moisture" (which could include water vapor) to "liquid water" to more correctly capture the role of flashing materials and assemblies.

Cost Impact: Will not increase the cost of construction
The proposal adds no additional mandatory requirements.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE4-16 Part I	**AS**

BACK

CE4-16 Part I

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floor, roof, and any other building element that enclose conditioned space. This boundary also includes the boundary between conditioned space and any exempt or unconditioned space. <u>See "Adjacent wall, ceiling or floor."</u>

Code Change No: CE4-16 Part II

Original Proposal

Section: R202 (IRC N1101.6)

Proponent: Robert Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2015 International Energy Conservation Code

Revise as follows:

R202 (N1101.6) BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, ~~floor~~ floors, ~~roof~~ ceilings, roofs and any other building ~~elements~~ element assemblies that enclose conditioned space or provide a boundary between conditioned space and exempt or unconditioned space.

2015 International Residential Code

Revise as follows:

[RE] BUILDING THERMAL ENVELOPE. The ~~*basement walls*~~ basement walls, ~~*exterior walls*~~ exterior walls, ~~floor~~ floors, ~~roof~~ ceilings, roofs and any other building element assemblies that enclose ~~*conditioned spaces*~~ conditioned space or provide a boundary between conditioned space and exempt or unconditioned space.

Reason: The Thermal envelope completely surrounds the house and the ceiling portion of the envelope was excluded from the previous definition. In addition, the envelope is not one element of the building but rather an **assembly** of materials that create it in each location that is described in the definition. We feel it is important to ensure a common understanding that the entirety of the assembly in each location must be understood in order to create the thermal envelope that functions as intended by the code.

Cost Impact: Will not increase the cost of construction
The changes are editorial to add clarity and understanding to the definition. No new requirements are added and thus, costs are not impacted.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This definition needs to be consistent throughout the I-codes.

Assembly Action **None**

Final Action Results

CE4-16 Part II	**AS**

Code Change No: CE5-16 Part I

Original Proposal

Section: IECC: C202 (New)

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Add new definition as follows:

CAVITY INSULATION. Insulating material located between framing members.

Reason: This proposal adds a definition for cavity insulation to complement the existing definition for continuous insulation. Cavity and continuous insulation relate to the location of insulation materials in or on an assembly, not specific types of insulation materials that may be used in these locations. Adding this definition will help clarify the code in regard to terms used to explain where insulation is located.

Cost Impact: Will not increase the cost of construction
The proposal only provides a new definition without any material impact to the code or cost.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The term is used in the code and the definition defines the term in the correct context as used in the code.

Assembly Action **None**

Final Action Results

CE5-16 Part I	**AS**

Code Change No: CE6-16

Original Proposal

Section: C202

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

COEFFICENT OF PERFORMANCE (COP) – COOLING. The ratio of the rate of heat removal to the rate of energy input, in consistent units, for a complete refrigerating system or some specific portion of that system under designated operating conditions.

Reason: This proposal will clarify and improve the existing definition, which is not clear or technically correct. It will also be consistent with the definition shown in ASHRAE 90.1.

Cost Impact: Will not increase the cost of construction
This change to the definition does not change the intent of the code and does not add any new requirements that would increase costs.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the first sentence of the proponent's published reason statement.

Assembly Action **None**

Final Action Results

CE6-16	**AS**

Code Change No: CE9-16

Original Proposal

Section: C202

Proponent: Steven Rosenstock (srosenstock@eei.org)

Revise as follows:

COMPUTER ROOM. A room whose primary function is to house equipment for the processing and storage of electronic data and that has a design electronic data equipment power density ~~exceeding~~ <u>of less than</u> 20 watts per square foot of conditioned floor area <u>or a connected design electronic data equipment load of less than 10 kW</u>.

Reason: ASHRAE is developing a new standard for data centers, Standard 90.4, under the ASHRAE consensus process. It is very likely that the new 90.4 standard will be published by mid to late 2016. As a part of this effort, there are specific definitions for computer rooms, which can be part of many commercial buildings, and data centers, which are buildings designed specifically for the remote storage, processing, or distribution of large amounts of data. Data centers provide physical (or virtual) infrastructure for housing computers, servers, networking systems, and components for the information technology needs of one company/organization or multiple companies/organizations.

The proposed change will make the definition in the IECC with the definition changes that are occurring in ASHRAE Standard 90.1 and the new definitions for ASHRAE Standard 90.4. It provides the delineation of coverage that has been agreed to by a consensus process at ASHRAE that includes representatives from the data center industry and other interested stakeholders.
In the future, after changes are made, computer rooms will be subject to the provisions of the IECC or ASHRAE 90.1, and data centers will be subject to the provisions or ASHRAE Standard 90.4 or an ICC equivalent.

Cost Impact: Will not increase the cost of construction
This proposal represents an update and a clarification to a definition in this code, and does not create any new code requirements that would increase construction costs.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE9-16	**AS**

Code Change No: CE11-16 Part I

Original Proposal

Section: IECC: C202

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee; Joseph Hetzel (Jhetzel@thomasamc.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Revise as follows:

FENESTRATION. Products classified as either skylights or vertical fenestration ~~or skylights~~.

~~Skylight~~ Skylights. Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.

Vertical fenestration. Windows ~~(~~that are fixed or ~~moveable)~~ operable, opaque doors, glazed doors, glazed block and combination opaque~~/~~ and glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of ~~at least~~ not less than 60 degrees (1.05 rad) from horizontal.

ENTRANCE DOOR. ~~Fenestration products~~ A vertical fenestration product used for occupant ingress, egress and access in nonresidential buildings, including, but not limited to, exterior entrances ~~that utilize~~ utilizing latching hardware and automatic closers and ~~contain~~ containing over 50-percent ~~glass~~ glazing specifically designed to withstand heavy ~~use and possibly abuse~~ duty usage .

Reason: The definition of entrance doors needs grammatical improvements as shown in the proposal. The key change is adding the word 'occupant' before the purposes of the door. This is to distinguish entrance doors from doors which are used trucks or other cargo or material movement. Changes in the last cycles as well as companion proposals to this proposal in this cycle provide better standards specific to garage doors. As such they need to be distinguished from doors used by people 'not on vehicles' to enter or exit a building. The edit to the definition of Fenestration in the Commercial portion of the code is for consistency with Table C402.4 as well as some editorial clarity.

The final action proposed in this change is to format the Fenestration, Skylights and Vertical Fenestration definitions found in R202 in the same manner as found in C202. In C202 - Skylights and Vertical Fenestration are shown as subdefinitions to Fenestration. With the relocation there is also minor wording changes for consistency with the C202 provisions.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC).. In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
These revisions are intended for editorial clarity. There should be no impact on the cost of construction.

Analysis: In Part II, because IRC Section N1101.6 (definitions) does not include a standalone definition for vertical fenestration, the deletion indicated for that definition in Part II is not applicable for Section N1101.6.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE11-16 Part I	**AS**

BACK

CE11-16 Part I

FENESTRATION. Products classified as either vertical fenestration or skylights.

Skylight. Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal. Glazing materials in skylights, including unit skylights, tubular daylighting devices, solariums, sunrooms, roofs and sloped walls are included in this definition

Vertical fenestration. No change

Code Change No: CE11-16 Part II

Original Proposal

Section(s): R202 (IRC N1101.6), R202

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee; Joseph Hetzel (Jhetzel@thomasamc.com)

Revise as follows:

FENESTRATION. Products classified as either *skylights* or *vertical fenestration.*

> **Skylights.** Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.
>
> **Vertical fenestration.** Windows (fixed or operable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees (1.05 rad) from horizontal.

Delete without substitution:

~~**SKYLIGHT.** Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.~~

~~**VERTICAL FENESTRATION.** Windows (fixed or moveable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of a least 60 degrees (1.05 rad) from horizontal.~~

Reason: The definition of entrance doors needs grammatical improvements as shown in the proposal. The key change is adding the word 'occupant' before the purposes of the door. This is to distinguish entrance doors from doors which are used trucks or other cargo or material movement. Changes in the last cycles as well as companion proposals to this proposal in this cycle provide better standards specific to garage doors. As such they need to be distinguished from doors used by people 'not on vehicles' to enter or exit a building. The edit to the definition of Fenestration in the Commercial portion of the code is for consistency with Table C402.4 as well as some editorial clarity.

The final action proposed in this change is to format the Fenestration, Skylights and Vertical Fenestration definitions found in R202 in the same manner as found in C202. In C202 - Skylights and Vertical Fenestration are shown as subdefinitions to Fenestration. With the relocation there is also minor wording changes for consistency with the C202 provisions.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC).. In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
These revisions are intended for editorial clarity. There should be no impact on the cost of construction.

Analysis: In Part II, because IRC Section N1101.6 (definitions) does not include a standalone definition for vertical fenestration, the deletion indicated for that definition in Part II is not applicable for Section N1101.6.

Report of Committee Action Hearings

Committee Action: **As Submitted**

Committee Reason: There always seems to be an issue about whether the window is vertical fenestration or a skylight. This change makes it clear and makes the definitions consistent with the commercial side of the codes.

Assembly Action: **None**

Public Comments

Public Comment 1:

Hugo Aguilar, representing American Supply Association (haguilar@asa.net) requests Approve as Modified by this Public Comment.

Modify as follows:

FENESTRATION. Products classified as either *skylights* or *vertical fenestration.*

> **Skylights.** Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.
>
> **Vertical fenestration.** Windows ~~(~~that are fixed or operable~~)~~, opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of ~~at least~~ not less than 60 degrees (1.05 rad) from horizontal.

Commenter's Reason: The original proposal intended to correlate the skylights and vertical fenestration definitions between Section C202 and Section R202. However, the definition for "vertical fenestration" in Section R202 does not correlate completely with the definition in Section C202 for "vertical fenestration" as the language "at least" in Section R202 was changed to "not less than." Furthermore, the language "that are" was not added to R202 either. This is required for correlation.

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Final Action Results

CE11-16 Part II	**AMPC1**

Code Change No: CE15-16

Original Proposal

Section: C202

Proponent: Steven Rosenstock (srosenstock@eei.org)

Revise as follows:

NAMEPLATE HORSEPOWER. The nominal motor ~~horsepower~~ output power rating stamped on the motor nameplate.

Reason: Many small motors that are covered in Tables C405.8(3) and C405.8(4) provide information on the input and output power. This can be confusing for SI units where the input and output power are both stated in kW. The revision to the definition will clarify the power rating that is intended to be used (e.g. output) for efficiency requirements of small (and large) electric motors. Approval of this code change proposal will ensure consistency with ASHRAE Standard 90.1-2016, which will be adopted by reference as an alternative path to the 2018 IECC Commercial Provisions

Cost Impact: Will not increase the cost of construction
This proposal is a simple clarification of a definition and results in no added construction cost.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements. The revision prevents the definition from using the same word as being defined.

Assembly Action **None**

Final Action Results

CE15-16	**AS**

Code Change No: CE16-16

Original Proposal

Section: C202

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

ON-SITE RENEWABLE ENERGY. Energy derived from solar radiation, wind, waves, tides, landfill gas, biogas, biomass or the internal heat of the earth. The energy system providing on-site renewable energy shall be located on the project site.

Reason: Biogas is another form of renewable energy that should be added to the definition. It can be used for thermal energy needs (such as space/water heating) or to produce electricity.

As described by the Department of Energy, "Biogas is produced from various biomass sources through a biochemical process, such as anaerobic digestion, or through thermochemical means, such as gasification."
Biogas can be produced from raw materials such as agricultural waste, manure, plant material, waste water sewage, or food waste.

See the following web sites for more information:
http://www.afdc.energy.gov/fuels/natural_gas_renewable.html
https://www.americanbiogascouncil.org/
According to DOE. "As of January 2015, there were about 247 anaerobic digester systems operating at commercial livestock farms in the United States" and "about 1,500 [Waste water treatment plants] employ anaerobic digestion to produce biogas that is used on site"

Cost Impact: Will not increase the cost of construction
This will not increase the cost of construction as it only updates a definition, and does not add any new requirements to the code.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE16-16	**AS**

Code Change No: CE20-16

Original Proposal

Section: C202

Proponent: Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Delete without substitution:

~~**SCREW LAMP HOLDERS.** A lamp base that requires a screw-in-type lamp, such as a compact-fluorescent, incandescent or tungsten-halogen bulb.~~

Reason: The term "screw lamp holder" is not used anywhere in this code. The index indicates that it is used in C405.4.1 but the term "screw lamp holder" is not used there (the term used there is "screw-in lamps".

Cost Impact: Will not increase the cost of construction
The proposal is editorial in nature and does not have any impact on the technical requirements of the code.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE20-16	**AS**

Code Change No: CE26-16 Part I

Original Proposal

Section: C303.1.1

Proponent: Jason Wilen AIA CDT RRO, National Roofing Contractors Association (NRCA), representing National Roofing Contractors Association (NRCA) (jwilen@nrca.net)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Revise as follows:

C303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. For insulated siding, the R-value shall be labeled on the product's package and shall be listed on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

> <u>**Exception:** For roof insulation installed above the deck, the *R*-value shall be labeled as required by the material standards specified in Table 1508.2 of the *International Building Code.*</u>

Reason: The purpose of this change is to clarify how R-values for above deck roof insulation products are identified. For insulation installed above a roof deck, *R*-value identification markings on individual insulation pieces are not practical because products installed above roof decks are covered by other roof system components almost immediately after installation due to the need to quickly achieve a weathertight condition. Because of this, material standards for above deck roof insulation do not require marking individual pieces of insulation; rather R-value information is included on product packaging. This change references IBC Table 1508.2, "Material Standards for Roof Insulation" and will require that above deck roof insulation products have *R*-value identification markings in accordance with the material standards already referenced in IBC. For those buildings covered by the IRC, the residential part of the change also refers to Table R906.2 of the IRC.

Cost Impact: Will not increase the cost of construction
The proposed change is a clarification and does not change the stringency of existing code requirements so the cost of construction will be unchanged.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE26-16 Part I	**AS**

Code Change No: CE26-16 Part II

Original Proposal

Section: C303.1.1

Proponent: Jason Wilen AIA CDT RRO, National Roofing Contractors Association (NRCA), representing National Roofing Contractors Association (NRCA) (jwilen@nrca.net)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Revise as follows:

R303.1.1 <u>(N1101.10.1)</u> Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. For insulated siding, the *R*-value shall be labeled on the product's package and shall be listed on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

> <u>**Exception:** For roof insulation installed above the deck, the *R*-value shall be labeled as required by the material standards specified in Table 1508.2 of the *International Building Code* or Table R906.2 of the *International Residential Code,* as applicable.</u>

Reason: The purpose of this change is to clarify how R-values for above deck roof insulation products are identified. For insulation installed above a roof deck, *R*-value identification markings on individual insulation pieces are not practical because products installed above roof decks are covered by other roof system components almost immediately after installation due to the need to quickly achieve a weathertight condition. Because of this, material standards for above deck roof insulation do not require marking individual pieces of insulation; rather R-value information is included on product packaging. This change references IBC Table 1508.2, "Material Standards for Roof Insulation" and will require that above deck roof insulation products have *R*-value identification markings in accordance with the material standards already referenced in IBC. For those buildings covered by the IRC, the residential part of the change also refers to Table R906.2 of the IRC.

Cost Impact: Will not increase the cost of construction
The proposed change is a clarification and does not change the stringency of existing code requirements so the cost of construction will be unchanged.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: There are other ways to certify roof deck insulation and this added exception will allow those other ways.

Assembly Action **None**

Final Action Results

CE26-16 Part II	**AS**

Code Change No: CE29-16 Part I

Original Proposal

Section: IECC: C303.1.3

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee; Joseph Hetzel (Jhetzel@thomasamc.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2015 International Energy Conservation Code

Revise as follows:

C303.1.3 Fenestration product rating. *U*-factors of fenestration products ~~(~~shall be determined as follows:

1. For windows, doors and skylights~~)~~, *U*-factor ratings shall be determined in accordance with NFRC 100.

   Exception~~: Where required, garage door U-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.~~

2. For garage doors and rolling doors, *U*-factor ratings shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and *labeled* and certified by the manufacturer.

Products lacking such a *labeled* *U*-factor shall be assigned a default *U*-factor from Table C303.1.3(1) or C303.1.3(2). The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer. Products lacking such a *labeled* SHGC or VT shall be assigned a default SHGC or VT from Table C303.1.3(3).

Reason: The scope of ANSI/DASMA 105 includes both garage doors and rolling doors which are within the scope of the IECC content. The reformatting of Section C403.1.3 is in acknowledging that there are two categories of criteria. The current format wrongly places the door criteria as an exception. Changes to R303.1.3 (N1101.10.3) are to make the format of the two sections identical. Rolling doors are not found in Residential Buildings.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
This proposal is simply an editorial clarification of which standards apply to which fenestration products. There is no technical revision.

Report of Committee Action Hearings

Committee Action: Approved as Modified

Modify as follows:

C303.1.3 Fenestration product rating. *U*-factors of fenestration products shall be determined as follows:

1. For windows, doors and skylights, *U*-factor ratings shall be determined in accordance with NFRC 100.
2. ~~For~~ Where required for garage doors and rolling doors, *U*-factor ratings shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and *labeled* and certified by the manufacturer.

Products lacking such a *labeled U*-factor shall be assigned a default *U*-factor from Table C303.1.3(1) or C303.1.3(2). The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer. Products lacking such a *labeled* SHGC or VT shall be assigned a default SHGC or VT from Table C303.1.3(3).

Committee Reason: Approval is based on the proponent's published reason statements. The modification indicates that doors don't always need to have a determined U- factor rating.

Assembly Action None

Final Action Results

CE29-16 Part I AM

Code Change No: CE30-16 Part I

Original Proposal

Section: C303.1.3

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org); Joseph Hetzel (Jhetzel@thomasamc.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Revise as follows:

TABLE ~~C303.1.3~~C303.1.3(2) (2)
DEFAULT OPAQUE DOOR *U*-FACTORS

DOOR TYPE	OPAQUE *U*-FACTOR
Uninsulated Metal	1.20
Insulated Metal (Rolling)	0.90
Insulated Metal (Other)	0.60
Wood	0.50
Insulated, nonmetal edge, max 45% glazing, any glazing double pane	0.35

TABLE ~~C303.1.3~~C303.1.3(1) (1)
DEFAULT GLAZED ~~FENESTRATION~~ WINDOW, GLASS DOOR AND SKYLIGHT *U*-FACTORS

FRAME TYPE	WINDOW AND GLASS DOOR		SKYLIGHT	
	SINGLE PANE	DOUBLE PANE	Single	Double
Metal	1.20	0.80	2.00	1.30
Metal with Thermal Break	1.10	0.65	1.90	1.10
Nonmetal or Metal Clad	0.95	0.55	1.75	1.05
Glazed Block	0.60			

Reason: The default U-factor tables should distinguish opaque doors from glazed windows, doors and skylights. The headings in the Tables should be revised accordingly. The proposed insulated metal value is approximately 25% higher than the DASMA research tested value of 0.82.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal involves clarifying default values and editorially changing Table headings, and thus does not affect construction costs.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE30-16 Part I	**AS**

Code Change No: CE30-16 Part II

Original Proposal

Section: C303.1.3

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org); Joseph Hetzel (Jhetzel@thomasamc.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Revise as follows:

TABLE R303.1.3(2) [N1103.10.3(2)]
DEFAULT OPAQUE DOOR *U*-FACTORS

DOOR TYPE	OPAQUE *U*-FACTOR
Uninsulated Metal	1.20
Insulated Metal	0.60
Wood	0.50
Insulated, nonmetal edge, max 45% glazing, any glazing double pane	0.35

TABLE ~~R303.1.3~~R303.1.3(1) (1)
DEFAULT GLAZED ~~FENESTRATION~~ WINDOW, GLASS DOOR AND SKYLIGHT *U*-FACTORS

FRAME TYPE	WINDOW OR GLASS DOOR		SKYLIGHT	
	Single pane	Double Pane	Single	Double
Metal	1.20	0.80	2.00	1.30
Metal with Thermal Break	1.10	0.65	1.90	1.10
Nonmetal or Metal Clad	0.95	0.55	1.75	1.05
Glazed Block	0.60			

Reason: The default U-factor tables should distinguish opaque doors from glazed windows, doors and skylights. The headings in the Tables should be revised accordingly. The proposed insulated metal value is approximately 25% higher than the DASMA research tested value of 0.82.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal involves clarifying default values and editorially changing Table headings, and thus does not affect construction costs.

Report of Committee Action Hearings

Committee Action:	**Approved as Submitted**

Committee Reason: The word OPAQUE is very helpful for finding the correct table in the code.

Assembly Action	**None**

Final Action Results

CE30-16 Part II	**AS**

Code Change No: CE34-16

Original Proposal

Section: C303.3, C408, C408.1, C408.1.1 (New)

Proponent: jim edelson, representing new building institute (jim@newbuildings.org)

Delete without substitution:

~~**C303.3 Maintenance information.** Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a readily accessible label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.~~

Revise as follows:

SECTION C408
MAINTENANCE INFORMATION AND SYSTEM COMMISSIONING

C408.1 General. This section covers the provison of maintenance information and the commissioning of ~~the~~ building ~~mechanical~~ systems ~~in Section C403 and electrical power and lighting systems in Section C405~~.

Add new text as follows:

C408.1.1 Building operations and maintenance information. The buildings operations and maintenance documents shall be provided to the owner and shall consist of manufacturer's information, specifications, and recommendations, programming procedures and data points, narratives, and other mean of illustrating to the owner how the building, site, equipment and systems are intended to be installed, maintained and operated. Required regular maintenance actions for equipment and systems shall be clearly stated on a readily accessible label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

Reason: The operations and documentation requirements in Section C303 were written prior to the IECC having section C408. Section C408 covers commissioning requirements, but in several places it also addresses what type of operations and maintenance documents must be included in the information given to building owners and operators. As C408 is the new section that embraces those activities that occur as the building is "turned over" to the occupants, it is the proper place to locate this measure.

Cost Impact: Will not increase the cost of construction

There is no additional cost as this proposal merely relocates an existing requirement.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C408.1.1 Building operations and maintenance information. The buildings operations and maintenance documents shall be provided to the owner and shall consist of manufacturer's information, specifications, and recommendations, programming procedures and data points, narratives, and other mean of illustrating to the owner how the building~~, site,~~ equipment and systems are intended to be installed, maintained and operated. Required regular maintenance actions for equipment and systems shall be clearly stated on a readily accessible label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

Committee Reason: The proposal moves the text to a location where it will be readily seen. These manuals/documents are already required by the code. Labels won't get lost or overlooked like the manual/documents will. The modification appropriately limits the application to buildings.

Assembly Action **None**

Final Action Results

CE34-16	**AM**

Code Change No: CE36-16

Original Proposal

Section: C401.2, C403.2.11, C404.11, C408.1, C408.2.5.2, C408.3, C408.3.1, C408.3.2, C408.3.2.1 (New), C408.3.2.2 (New), C408.3.2.3 (New)

Proponent: Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections C402 through C405 and Section C408. In addition, commercial buildings shall comply with Section C406 and tenant spaces shall comply with Section C406.1.1.
3. The requirements of Sections C402.5, C403.2, C404, C405.2, C405.3, C405.5, C405.6, C407, and ~~C407~~ Section C408. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

Delete without substitution:

~~**C403.2.11 Mechanical systems commissioning and completion requirements.** Mechanical systems shall be commissioned and completed in accordance with Section C408.2.~~

~~**C404.11 Service water-heating system commissioning and completion requirements.** *Service water-heating systems*, swimming pool water-heating systems, spa water-heating systems and the controls for those systems shall be commissioned and completed in accordance with Section C408.2.~~

Revise as follows:

C408.1 General. This section covers the commissioning ~~of the~~ and functional testing requirements for building ~~mechanical~~ systems ~~in Section C403 and electrical power and lighting systems in Section C405~~.

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC and service hot water controls system maintenance and calibration information, including wiring diagrams, schematics and control sequence descriptions. Desired or field-determined set points shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. ~~Submittal data indicating all selected options for~~ a narrative of how each ~~piece of lighting equipment and lighting controls~~ system is intended to operate, including recommended set points.

6. ~~Operation and maintenance manuals for each piece of lighting equipment. Required routine maintenance actions, cleaning and recommended relamping shall be clearly identified.~~
7. ~~A schedule for inspecting and recalibrating all lighting controls.~~
8. ~~A narrative of how each system is intended to operate, including recommended set points.~~

C408.3 Lighting ~~system~~ controls functional testing. ~~Controls for automatic~~ Automatic lighting ~~systems~~ controls required by this code shall comply with this section.

C408.3.1 Functional testing. Prior to passing final inspection, the *registered design professional* shall provide evidence that the lighting control systems have been tested to ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the *construction documents* and manufacturer's instructions. Functional testing shall be in accordance with Sections C408.3.1.1 ~~and C408.3.1.2~~ through C408.3.1.3 for the applicable control type.

C408.3.2 Documentation requirements. The *construction documents* shall specify that the documents ~~certifying that the installed lighting controls meet documented performance criteria of Section C405 are to~~ described in this section be provided to the building owner or owner's authorized agent within 90 days ~~from~~ of the date of receipt of the *certificate of occupancy*.

Add new text as follows:

C408.3.2.1 Drawings. *Construction documents* shall include the location and catalogue number of each piece of equipment.

C408.3.2.2 Manuals. An operating and maintenance manual shall be provided and include the following:

1. Name and address of not less than one service agency for installed equipment.
2. A narrative of how each system is intended to operate, including recommended set points.
3. Submittal data indicating all selected options for each piece of lighting equipment and lighting controls.
4. Operation and maintenance manuals for each piece of lighting equipment. Required routine maintenance actions, cleaning and recommended relamping shall be clearly identified.
5. A schedule for inspecting and recalibrating all lighting controls.

C408.3.2.3 Report. A report of test results shall be provided and include the following:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.

Reason: This proposal is editorial in nature, and is intended to solve two problems with the existing code:
First, charging language is provided for the mechanical and service hot water heating sections indicating that the commissioning requirements of Section C408 are mandatory, but similar language has not been provided for the lighting section. Rather than including this language separately in C403, C404, and C405, it makes more sense to simply add Section C408 to the list of applicable sections in C401.2, and delete the charging language from C403.2.1 and C404.11.

Second, functional testing requirements for lighting controls have been split between the mechanical and lighting sections C408.2 and C408.3. This proposal relocates all of the lighting requirements in C408.3, where they belong.

The documentation requirements for lighting functional testing have also been clarified.

Cost Impact: Will not increase the cost of construction
The documentation requirements for lighting controls functional testing are somewhat more robust than in the current code, but it is hard to see how that will have any meaningful impact on construction costs. The remainder of the proposal is simply editorial.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE36-16	**AS**

Code Change No: CE55-16

Original Proposal

Section(s): C402.1.3, C402.1.4, C402.2.4 (New), C402.4.4.

Proponent: Hope Medina, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Revise as follows:

C402.1.3 Insulation component *R*-value-based method. *Building thermal envelope* opaque assemblies shall meet the requirements of Sections C402.2 and C402.4 based on the *climate zone* specified in Chapter 3. For opaque portions of the *building thermal envelope* intended to comply on an insulation component *R-value* basis, the *R*-values for insulation ~~in framing cavities, where required, and for continuous insulation, where required,~~ shall be not less than that specified in Table C402.1.3~~, based on the climate zone specified in Chapter 3~~. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.1.3.~~ The thermal resistance or R-value of the insulating material installed continuously within or on the below-grade exterior walls of the building envelope required in accordance with Table C402.1.3 shall extend to a depth of not less than 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor of the conditioned space enclosed by the below grade wall, whichever is less. Opaque swinging doors shall comply with Table C402.1.4 and opaque nonswinging doors shall comply with Table C402.1.3.~~

C402.1.4 Assembly *U*-factor, *C*-factor or *F*-factor-based method. Building thermal envelope opaque assemblies intended to comply on an assembly *U*-, *C*- or F-factor basis shall have a U-, *C*- or *F*-factor not greater than that specified in Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-, *C*- or *F*-factor from the "Group R" column of Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-, *C*- or *F*-factor from the "All other" column of Table C402.1.4.~~ The C-factor for the below-grade exterior walls of the building envelope, as required in accordance with Table C402.1.4, shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less. Opaque swinging doors shall comply with Table C402.1.4 and opaque nonswinging doors shall comply with Table C402.1.3.~~

Add new text as follows:

<u>**C402.2.4** **Below-grade walls** The C-factor for the below grade exterior walls shall be in accordance with Table C402.1.4. The R-value of the insulating material installed continuously within or on the below grade exterior walls of the building envelope shall be in accordance with Table C402.1.3. The C- factor or R-value required shall extend to a depth of not less than 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor of the conditioned space enclosed by the below grade wall, whichever is less.</u>

Revise as follows:

C402.4.4 Doors. ~~Opaque doors~~ <u>Opaque swinging doors</u> shall comply with ~~the applicable requirements for doors as specified in Tables C402.1.3 and~~ <u>Table</u> C402.1.4 and <u>*opaque roll-up or sliding doors* shall comply with Table C402.1.3. All opaque doors shall</u> be considered part of the gross area of above-grade walls that are part of the building *thermal envelope*. Other doors shall comply with the provisions of Section C402.4.3 for vertical fenestration.

Reason: Prior to the 2015 edition fo the Energy Code it was understood by the code user that each component of the building's thermal envelope that is found in current Tables C402.1.3 and C402.1.4 had their own code section in addition to the table so you knew to find all additional requirements for the components in those individual code sections. In the 2015 the code section for below grade walls went away and is buried deep within Sections C402.1.3 and C402.1.4 along with some duplicative information for opaque doors. No other envelope components are dealt with in these sections so why did we do away with the code section on below grade walls all together and bury it in a code section that just covers general information.

This proposal is intended to take the code back to the way it was in previous version where you could find all of the requirements for a building envelope component by looking in the table plus the component's corresponding code sections. As it reads now, very few people will find what they are looking for regarding below grade walls because the section was removed and they would not think to look in the general "method" section, which just tells people which table to be used based on which method they chose.

The information on opaque doors was removed because it was duplicative. The code section on doors, C402.4.4, already specified the requirement for the opaque doors. We did change C402.4.4 to include the wording from C402.1.3 and C402.1.4 as it was a little more specific.

When you look for the requirements of a building envelope component you should be able to find a code section specifically addressing that component, as has always been the case in past editions. It should not be buried in a code section that is addressing something else.

Our Theme: A Code for the End User
Is the code section completely understandable to the end user?
Is the code section or requirement easy to find?
Is the code requirement even doable in the real world?
Will the code requirement really save energy or only on paper?

Cost Impact: Will not increase the cost of construction
This is just a reorganization of requirements that are already in the code, so there for would not cause an increase of cost.

Report of Committee Action Hearings

Committee Action: **Disapprove**

Committee Reason: Charging text is needed to state when to use the C-factor or the R-factor. The terminology "non-swinging" needs to be retained. The text regarding framing cavities and continuous insulation in Section 402.1.3 needs to be retained. The proposal omits overhead folding doors.

Assembly Action: **None**

Public Comments

Public Comment 2:

Hope Medina, representing self (hmedina@coloradocode.net) requests Approve as Modified by this Public Comment.

Modify as follows:

C402.1.3 Insulation component *R*-value-based method. *Building thermal envelope* opaque assemblies shall meet the requirements of Sections C402.2 and C402.4 based on the *climate zone* specified in Chapter 3. For opaque portions of the *building thermal envelope* intended to comply on an insulation component *R-value* basis, the *R*-values for insulation shall be not less than that specified in Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.1.3.

C402.1.4 Assembly *U*-factor, *C*-factor or *F*-factor-based method. Building thermal envelope opaque assemblies shall meet the requirements of Sections C402.2 and C402.4 based on the climate zone specified in Chapter 3. Building thermal envelope opaque assemblies intended to comply on an assembly *U*-, *C*- or F-factor basis shall have a U-, *C*- or *F*-factor not greater than that specified in Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-, *C*- or *F*-factor from the "Group R" column of Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-, *C*- or *F*-factor from the "All other" column of Table C402.1.4.

C402.4.4 Doors. Opaque swinging doors shall comply with Table C402.1.4 and *opaque* ~~*roll up or sliding*~~ *non-swinging doors s*hall comply with Table C402.1.3. All opaque doors shall be considered part of the gross area of above-grade walls that are part of the building *thermal envelope*. Other doors shall comply with the provisions of Section C402.4.3 for vertical fenestration.

Commenter's Reason: The changes made to this change incorporated the comments provided by the committee. Prior to the 2015 edition of the energy code it was understood by the code user that each component of the building thermal envelope that is found in current Tables C402.1.3 and C402.1.4 had their own code section in addition to the tables. You knew to find the additional requirements for the components in those individual code sections. In the 2015 the code section for below grade walls went away and is buried deep within section C402.1.3 and C402.1.4 along with some duplicative information for opaque doors. No other envelope components are dealt within these sections, so why did we do away with the code section on below grade walls all together and bury it within these sections that cover general information.

The information on opaque doors was removed because it was duplicative. The code section on doors already specified the requirements for opaque doors. The wording has been changed to address the issue of nonswinging doors.

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Final Action Results

CE55-16	**AMPC2**

Code Change No: CE60-16 Part I

Original Proposal

Section: C402.1.3, C402.1.4

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee; Joseph Hetzel (Jhetzel@thomasamc.com)

Revise as follows:

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD[a, g]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal building [b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, above grade																
Mass	R-5.7ci [c]	R-5.7ci [c]	R-5.7ci [c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13+ R-19.5ci	R-13 + R-13ci	R-13+ R-19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R13 + R-15.6ci or R-20 + R-10ci	R13 + R-15.6ci or R-20 + R-10ci

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, below grade																
Below-grade wall [d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass [e]	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30 [f]	R-30 [f]	R-30 [f]	R-30 [f]	R-30 [f]
Slab-on-grade floors																
Unheated slabs	NR	NR	NR	NR	NR	NR	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-20 for 24″ below
Heated slabs	R-7.5 for 12″ below	R-7.5 for 12″ below	R-7.5 for 12″ below	R-7.5 for 12″ below	R-10 for 24″ below	R-10 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 36″ below	R-15 for 36″ below	R-15 for 36″ below	R-20 for 48″ below	R-20 for 24″ below	R-20 for 48″ below	R-20 for 48²″below	R-20 for 48″ below
Opaque doors																
Nonswinging	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.

ci = Continuous insulation, NR = No requirement, LS = Liner system.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.4.

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

e. "Mass floors" shall include floors weighing not less than:

1. 35 pounds per square foot of floor surface area; or
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.

f. Steel floor joist systems shall be insulated to R-38.

g. Not applicable to garage doors. See Table C402.1.4.

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, b]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, above grade																

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	U-0.151	U-0.151	U-0.151	U-0.123	U-0.123	U-0.104	U-0.104	U-0.090	U-0.090	U-0.080	U-0.080	U-0.071	U-0.071	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and otherc	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, below grade																
Below-grade wall[c]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass[d]	U-0.322[e]	U-0.322[e]	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066[e]	U-0.066[e]	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-grade floors																
Unheated slabs	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs[f]	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.65	F-0.65	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55
Opaque doors																
Swinging door	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Garage door <14% glazing	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31

For SI: 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.
ci = Continuous insulation, NR = No requirement, LS = Liner system.
a. Use of Opaque assembly *U*-factors, C-factors, and *F*-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/ISNEA 90.1 Appendix A.
b. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 shall be permitted. The *R*-value of continuous insulation shall be permitted to be added to or subtracted from the original tested design.
c. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
d. "Mass floors" shall include floors weighing not less than:
1. 35 pounds per square foot of floor surface area; or
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.
e. These C-, F- and U-factors are based on assemblies that are not required to contain insulation.
f. Evidence of compliance with the F-factors indicated in the table for heated slabs shall be demonstrated by the application of the unheated slab F-factors and R-values derived from ASHRAE 90.1 Appendix A.

Reason: The purpose of this proposal is primarily aimed at establishing appropriate *U*-Factors for garage doors.

* Garage doors should be subjected to assembly U-factor requirements, therefore component R-value should not apply to such doors - This is accomplished, in part, by the proposed footnote to Table C402.1.3..

* Window and glass door U-factors should be separated from garage door U-factors - this is accomplished in Table C402.1.4 by establishing 2 separate rows.

* The new garage door maximum U-factor values with the glazing percentage limitation are intended to address garage doors without glazing, in their own category separate and distinct from windows and glass doors. The 0.31 maximum value encompasses the common use of either polystyrene or polyurethane foam insulation in garage door sections, and is based on ASHRAE and DASMA research testing conducted since 2004. Garage doors with one full row or more of door section glazing typically constitute 14% or more in door glazing and should be subject to the fenestration U-factor requirements.

* The title change to Table R402.1.2 (N1102.1.2) is to clarify the application of the entire Table content as charged in Section R402.1 (N1102.1). The title change is also intended for consistency with non-residential applications.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).
The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
No effect on cost, because the affected products will simply have a better and more reliable means of complying with code requirements.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE60-16 Part I	**AS**

Code Change No: CE61-16

Original Proposal

Section(s): C402.1.3, C402.1.4, C402.2.5

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD[a,]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal building [b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, above grade																
Mass	R-5.7ci [c]	R-5.7ci [c]	R-5.7ci [c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13+ R-19.5ci	R-13 + R-13ci	R-13+ R-19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R13 + R-15.6ci or R-20 + R-10ci	R13 + R-15.6ci or R-20 + R-10ci
Walls, below grade																
Below-grade wall [d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci

Floors																
Mass [e]	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30 [f]	R-30 [f]	R-30 [f]	R-30 [f]	R-30 [f]
Slab-on-grade floors																
Unheated slabs	NR	NR	NR	NR	NR	NR	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-20 for 24″ below
Heated slabs	R-7.5 for 12″ below	R-7.5 for 12″ below	R-7.5 for 12″ below	R-7.5 for 12″ below	R-10 for 24″ below	R-10 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 36″ below	R-15 for 36″ below	R-15 for 36″ below	R-20 for 48″ below	R-20 for ~~24~~48″ below	R-20 for 48″ below	R-20 for 48²″below	R-20 for 48″ below
Opaque doors																
Non-swinging	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.

ci = Continuous insulation, NR = No requirement, LS = Liner system.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.4.

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

e. "Mass floors" shall include floors weighing not less than:

1. 35 pounds per square foot of floor surface area; or

2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.

f. Steel floor joist systems shall be insulated to R-38.

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, b]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, above grade																
Mass	U-0.151	U-0.151	U-0.151	U-0.123	U-0.123	U-0.104	U-0.104	U-0.090	U-0.090	U-0.080	U-0.080	U-0.071	U-0.071	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and otherc	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, below grade																
Below-grade wall[c]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass[d]	U-0.322[e]	U-0.322[e]	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066[e]	U-0.066[e]	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-grade floors																
Unheated slabs	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-~~0.40~~ 0.52	F-~~0.40~~ 0.52	F-~~0.40~~ 0.52	F-~~0.40~~ 0.51
Heated slabs[f]	F-1.02 ~~0.70~~	F-1.02 ~~0.70~~	F-1.02 ~~0.70~~	F-1.02 ~~0.70~~	F-0.90 ~~0.70~~	F-0.90 ~~0.70~~	F-0.86 ~~0.65~~	F-0.86 ~~0.65~~	F-0.79 ~~0.65~~	F-0.79 ~~0.65~~	F-0.79 ~~0.58~~	F-0.69 ~~0.58~~	F-0.69 ~~0.55~~	F-0.69 ~~0.55~~	F-0.69 ~~0.55~~	F-0.69 ~~0.55~~
Opaque doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37

For SI: 1 pound per square foot = 4.88 kg/m ^{2} , 1 pound per cubic foot = 16 kg/m ^{3} .
ci = Continuous insulation, NR = No requirement, LS = Liner system.
a. Use of Opaque assembly *U* -factors, C-factors, and *F* -factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/ISNEA 90.1 Appendix A.
b. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 shall be permitted. The *R* -value of

continuous insulation shall be permitted to be added to or subtracted from the original tested design.
c. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
d. "Mass floors" shall include floors weighing not less than:
1. 35 pounds per square foot of floor surface area; or
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.
e. These C-, F- and U-factors are based on assemblies that are not required to contain insulation.
~~f. Evidence of compliance with the F-factors indicated in the table for heated slabs shall be demonstrated by the application of the unheated slab F-factors and R-values derived from ASHRAE 90.1 Appendix A.~~

Reason: The R-value criteria in Table C402.1.3 for heated slab-on-grade floor insulation requirements for Climate Zone 7, all other, is being corrected to make it consistent with the other values for Climate Zones 7 and 8. It is being changed from R-20 for 24 in. to R-20 for 48 in.

The F-factors for unheated slabs and heated slabs in Table C402.1.4 have been corrected.

- For unheated slabs, the values for R-15 for 24 in. from Table C402.1.3 have been corrected to 0.52. Note that for Climate Zone 6, Group R this was correct. For R-20 for 24 in. in Table C402.1.3 the value has been corrected to 0.51.
- For heated slabs, all of the F-factors were incorrect when compared to the R-value requirements in Table C402.1.3. Note that footnote (f) indicated that unheated slab F-factors shall be used rather than heated slab F-factors. This is not technically correct and is therefore confusing; heated slab F-factors should be used for heated slabs. Therefore, footnote (f) is being deleted. The corrected values are the heated slab F-factors that match the heated slab R-values in Table C402.1.3. Note that these values had to be corrected with or without footnote (f); they were incorrect either way. Heated slab F-factors are greater than unheated slab F-factors due to the greater heat loss through heated slabs.

R-values and their corresponding F-factors can be found in Table A6.3.1 in ASHRAE 90.1-2013. The values used here are for vertical insulation. This is consistent with the requirements in C402.2.5 which explains slab-on-grade perimeter insulation requirements.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will increase the cost of construction
To the extent that the existing values were incorrect and the corrected values result in more insulation, then construction costs would be slightly higher.

Report of Committee Action Hearings

Committee Action: **As Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action: **None**

Public Comments

Public Comment 2:

Martha VanGeem, representing self requests Approve as Modified by this Public Comment.

Modify as follows:

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD[a,]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal building [b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, above grade																
Mass	R-5.7ci [c]	R-5.7ci [c]	R-5.7ci [c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13+ R-19.5ci	R-13 + R-13ci	R-13+ R-19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R13 + R-15.6ci or R-20 + R-10ci	R13 + R-15.6ci or R-20 + R-10ci
Walls, below grade																
Below-grade wall [d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass [e]	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist/ framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30 [f]	R-30 [f]	R-30 [f]	R-30 [f]	R-30 [f]
Slab-on-grade floors																
Unheated slabs	NR	NR	NR	NR	NR	NR	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-20 for 24″ below
Heated slabs [g]	R-7.5 for 12″ below	R-7.5 for 12″ below +	R-7.5 for 12″	R-7.5 for 12″ below +	R-10 for 24″	R-10 for 24″ below	R-15 for 24″	R-15 for 24″ below	R-15 for 36″	R-15 for 36″ below	R-15 for 36″	R-20 for 48″ below	R-20 for 48″	R-20 for 48″ below	R-20 for 48″below + R-5 full	R-20 for 48″ below

	+ R-5 full slab	R-5 full slab	below + R-5 full slab	R-5 full slab	below + R-5 full slab	+ R-5 full slab	below + R-5 full slab	+ R-5 full slab	below + R-5 full slab	+ R-5 full slab	below + R-5 full slab	+ R-5 full slab	below + R-5 full slab	+ R-5 full slab	slab	+ R-5 full slab
Opaque doors																
Non-swinging	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m ^{2} , 1 pound per cubic foot = 16 kg/m ^{3} .
ci = Continuous insulation, NR = No requirement, LS = Liner system.
a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.
b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.4.
c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f ^{2} °F.
d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
e. "Mass floors" shall include floors weighing not less than:
1. 35 pounds per square foot of floor surface area; or
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.
f. Steel floor joist systems shall be insulated to R-38.
~~g. The first value is for perimeter insulation and the second value is for full slab insulation. Perimeter insulation is not requirede to extend below the bottom of the slab.~~
g. The first value is for perimeter insulation and the second value is for full slab insulation. Perimeter insulation is not required to extend below the bottom of the slab.

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, b]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, above grade																
Mass	U-0.151	U-0.151	U-0.151	U-0.123	U-0.123	U-0.104	U-0.104	U-0.090	U-0.090	U-0.080	U-0.080	U-0.071	U-0.071	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and otherc	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, below grade																
Below-grade wall[c]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass[d]	U-0.322[e]	U-0.322[e]	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066[e]	U-0.066[e]	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-grade floors																

Unheated slabs	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.52	F-0.52	F-0.52	F-0.51
Heated slabs[f]	F-1.02 + F-0.74	F-1.02 + F-0.74	F-1.02 + F-0.74	F-1.02 + F-0.74	F-0.90 + F-0.74	F-0.90 + F-0.74	F-0.86 + F-0.74	F-0.86 + F-0.74	F-0.79 + F-0.74	F-0.79 + F-0.74	F-0.79 + F-0.74	F-0.69 + F-0.74	F-0.69 + F-0.74	F-0.69 + F-0.74	F-0.69 + F-0.74	F-0.69 + F-0.74
Opaque doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37

For SI: 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.

ci = Continuous insulation, NR = No requirement, LS = Liner system.

a. Use of Opaque assembly *U*-factors, C-factors, and *F*-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/ISNEA 90.1 Appendix A.

b. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 shall be permitted. The *R*-value of continuous insulation shall be permitted to be added to or subtracted from the original tested design.

c. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.

d. "Mass floors" shall include floors weighing not less than:

1. 35 pounds per square foot of floor surface area; or
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.

e. These C-, F- and U-factors are based on assemblies that are not required to contain insulation.

f. The first value is for perimeter insulation and the second value is for full slab insulation.

C402.2.5 Slabs-on-grade perimeter insulation. Where the slab on grade is in contact with the ground, the minimum thermal resistance (*R*-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors designed in accordance with the *R*-value method of Section C402.1.3 shall be as specified in Table C402.1.3. The perimeter insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The perimeter insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by not less than of 10 inches (254 mm) of soil.

Exception: Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.

Commenter's Reason: This modification is a compromise between this proposal and CE62. This modification adds the R-5 full slab requirement from the mechanical code for heated slabs. The mechanical code states: **"1209.5.1 Slab-on-grade installation.** Radiant piping utilized in slab-on-grade applications shall be provided with insulating materials installed beneath the piping having a minimum *R*-value of 5." It is convenient for the user to show this requirement in the IECC.

This modification also includes perimeter insulation to minimize heat loss around heated slabs. CE62 requires only full slab insulation and does not include this perimeter insulation. Generally, most heat loss from slabs is around the perimeter of slabs due to the insulating and thermal mass properties of the soil beneath the slab.

For heated slabs, the first value is for the perimeter insulation and the second value is for the full slab insulation. An F-0.74 is equivalent to R-5 full slab insulation for heated slabs.

.

Final Action Results

CE61-16 **AMPC2**

Code Change No: CE65-16 Part I

Original Proposal

Section: C402.1.3

Proponent: Michael Gieszler, City of Hillsboro, Oregon Building Dept., representing Oregon Building Officials Association (mike.gieszler@hillsboro-oregon.gov)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Revise as follows:

C402.1.3 Insulation component *R*-value-based method. *Building thermal envelope* opaque assemblies shall ~~meet~~ comply with the requirements of Sections C402.2 and C402.4 based on the *climate zone* specified in Chapter 3. For opaque portions of the *building thermal envelope* intended to comply on an insulation component *R-value* basis, the *R*-values for insulation in framing cavities, where required, and for continuous insulation, where required, shall be not less than that specified in Table C402.1.3, based on the *climate zone* specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.1.3. The thermal resistance or *R*-value of the insulating material installed continuously within or on the below-grade exterior walls of the building envelope required in accordance with Table C402.1.3 shall extend to a depth of not less than 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor of the conditioned space enclosed by the below grade wall, whichever is less. Opaque swinging doors shall comply with Table C402.1.4 and opaque nonswinging doors shall comply with Table C402.1.3.

Reason: The use of the word "comply" interjects code language more often found throughout the codes and clarifies the intent in a slightly stronger tone. The term "comply" infers something that has to be done or obeyed. The word "meet" establishes an expectation.
There is no additional cost

Cost Impact: Will not increase the cost of construction
The proposal only clarifies the intent of the code section and does not cause any increases in materials or labor for constructing the building.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE65-16 Part I **AS**

Code Change No: CE65-16 Part II

Original Proposal

Section: R402.2.6 (IRC N1102.2.6)

Proponent: Michael Gieszler, City of Hillsboro, Oregon Building Dept., representing Oregon Building Officials Association (mike.gieszler@hillsboro-oregon.gov)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Revise as follows:

R402.2.6 (N1102.2.6) Steel-frame ceilings, walls and floors. Steel-frame ceilings, walls, and floors shall ~~meet~~ comply with the insulation requirements of Table R402.2.6 or ~~shall meet~~ the *U*-factor requirements of Table R402.1.4. The calculation of the *U*-factor for a steel-frame envelope assembly shall use a series-parallel path calculation method.

Reason: The use of the word "comply" interjects code language more often found throughout the codes and clarifies the intent in a slightly stronger tone. The term "comply" infers something that has to be done or obeyed. The word "meet" establishes an expectation.

There is no additional cost

Cost Impact: Will not increase the cost of construction
The proposal only clarifies the intent of the code section and does not cause any increases in materials or labor for constructing the building.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the published reason statement.

Assembly Action **None**

Final Action Results

CE65-16 Part II	**AS**

Code Change No: CE68-16

Original Proposal

Section: C402.1.4

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, b]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, above grade																
Mass	U-0.151	U-0.151	U-0.151	U-0.123	U-0.123	U-0.104	U-0.104	U-0.090	U-0.090	U-0.080	U-0.080	U-0.071	U-0.071	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and otherc	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, below grade																
Below-	C-	C-	C-	C-	C-	C-	C-	C-	C-	C-	C-	C-	C-	C-	C-	C-0.092

grade wall[c]	1.140[e]	1.140[e]	1.140[e]	1.140[e]	1.140[e]	1.140[e]	0.119	0.119	0.119	0.119	0.119	0.119	0.092	0.092	0.092	
Floors																
Mass[d]	U-0.322[e]	U-0.322[e]	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066[e]	U-0.066[e]	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-grade floors																
Unheated slabs	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs[f]	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.65	F-0.65	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55
Opaque doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37

For SI: 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3. ci = Continuous insulation, NR = No requirement, LS = Liner system.

a. ~~Use of Opaque~~ Where assembly *U*-factors, C-factors, and *F*-factors ~~from~~ are established in ANSI/ASHRAE/IESNA 90.1 Appendix A such opaque assemblies shall be ~~permitted~~ a compliance alternative where those values meet the criteria of this table, and provided that the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/ISNEA 90.1 Appendix A.
b. ~~Opaque assembly U-factors based on designs tested~~ Where *U*-factors have been established by testing in accordance with ASTM C1363, such opaque assemblies shall be ~~permitted~~ a compliance alternative where those values meet the criteria of this table. The *R*-value of continuous insulation shall be permitted to be added to or subtracted from the original tested design.
c. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
d. "Mass floors" shall include floors weighing not less than:
   1. 35 pounds per square foot of floor surface area; or
   2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.
e. These C-, F- and U-factors are based on assemblies that are not required to contain insulation.
f. Evidence of compliance with the F-factors indicated in the table for heated slabs shall be demonstrated by the application of the unheated slab F-factors and R-values derived from ASHRAE 90.1 Appendix A.

Reason: The SEHPCAC found that footnotes a and b to Table C402.1.4 are written in a confusing manner and should be clarified. The clarification is that the intent of these footnotes is that, when found in ASHRAE 90.1 Appendix A or per test results in accordance with ASTM C1363, an assembly which meets the thermal requirements of the like assembly in the IECC, then such assemblies comply. The intent is within the same type of assembly, for example comparing a mass wall to a mass wall – and not a mass wall to a cavity wall.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost impact: Will not increase the cost of construction
The intent of the proposal is as an editorial clarification of these 2 footnotes. There should be no impact on the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE68-16	**AS**

BACK

Code Change No: CE69-16

Original Proposal

Section: C402.1.4

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, b]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, above grade																
Mass	U-0.151	U-0.151	U-0.151	U-0.123	U-0.123	U-0.104	U-0.104	U-0.090	U-0.090	U-0.080	U-0.080	U-0.071	U-0.071	U-0.071 ~~0.061~~	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064 ~~0.057~~	U-0.064	U-0.052	U-0.064 ~~0.045~~	U-0.045
Wood framed and otherc	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, below grade																
Below-grade wall[c]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass[d]	U-0.322[e]	U-0.322[e]	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.064 ~~0.057~~	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066[e]	U-0.066[e]	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-grade floors																
Unheated	F-	F-	F-	F-	F-	F-	F-	F-0.54	F-	F-0.54	F-	F-0.52	F-	F-0.40	F-	F-0.40

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
slabs	0.73[e]	0.73[e]	0.73[e]	0.73[e]	0.73[e]	0.73[e]	0.54		0.54		0.54		0.40		0.40	
Heated slabs[f]	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.65	F-0.65	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55
Opaque doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37

For SI: 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.
ci = Continuous insulation, NR = No requirement, LS = Liner system.
a. Use of Opaque assembly *U*-factors, C-factors, and *F*-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/ISNEA 90.1 Appendix A.
b. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 shall be permitted. The *R*-value of continuous insulation shall be permitted to be added to or subtracted from the original tested design.
c. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
d. "Mass floors" shall include floors weighing not less than:
1. 35 pounds per square foot of floor surface area; or
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.
e. These C-, F- and U-factors are based on assemblies that are not required to contain insulation.
f. Evidence of compliance with the F-factors indicated in the table for heated slabs shall be demonstrated by the application of the unheated slab F-factors and R-values derived from ASHRAE 90.1 Appendix A.

Reason: This proposal corrects U-factor requirements in Table C402.1.4 to consistent with the R-value requirements in Table C402.1.3. Table C402.1.3 is shown in the reason statement, below

The U-factor criteria in Table C402.1.4 for mass wall requirements for Climate Zone 7, Group R, is being corrected to make it consistent with the other values for R-15.2 c.i. in Table C402.1.3. It should be 0.71 as can be seen from the other cases where R-15.2 c.i. is prescribed.

The U-factor criteria in Table C402.1.4 for metal framed wall requirements for Climate Zone 6, Group R, is being corrected to make it consistent with the other values for R-13+7.5 c.i. in Table C402.1.3. It should be 0.64 as can be seen from the other cases where R-13+7.5 c.i. is prescribed.

The U-factor criteria in Table C402.1.4 for mass floor requirements for Climate Zone 6, Group R, is being corrected to make it consistent with the other values for R-12.5 c.i. in Table C402.1.3. It should be 0.64 as can be seen from the other cases where R-12.5 c.i. is prescribed.

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, above grade																
Mass	R-5.7cic	R-5.7cic	R-5.7cic	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13+ R-19.5ci	R-13 + R-13ci	R-13+ R-19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R13 + R-15.6ci or R-20 + R-10ci	R13 + R-15.6ci or R-20 + R-10ci
Floors																
Mass[e]	NR	NR	R-	R-8.3ci	R-	R-10ci	R-	R-	R-10ci	R-	R-	R-	R-15ci	R-	R-15ci	R-

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
			6.3ci		10ci		10ci	10.4ci		12.5ci	12.5ci	12.5ci		16.7ci		16.7ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30f	R-30f	R-30f	R-30f	R-30f

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal is an editorial correlation between Tables C402.1.3 and C402.1.4. There will be no impact on the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE69-16 **AS**

Code Change No: CE72-16

Original Proposal

Section: C402.1.5, C502, C502.2, C502.2.1, C502.2.2, C503, C503.3, C503.3.1, C503.3.2, C503.3.3.C402.1.4

Proponent: Thomas Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee and Aluminum Extruders Council (culp@birchpointconsulting.com)

Revise as follows:

C402.1.5 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-2 shall be permitted in lieu of compliance with the *U*-, *F*- and *C*-factors in Tables C402.1.3, C402.1.4, and ~~C402.1.4~~ C402.4 and the maximum allowable fenestration areas in Section C402.4.1. *Fenestration* shall meet the applicable SHGC requirements of Section C402.4.3.

A + B + C + D + E ≤ Zero **(Equation 4-2)**

where:

A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade and below-grade walls.

UA Dif	=	UA Proposed - UA Table.
UA Proposed	=	Proposed *U* -value · Area.
UA Table	=	*U* -factor from ~~Table~~ Tables C402.1.3, C402.1.4, or ~~Table C402.1.4~~ C402.4) · Area.

B = Sum of the (FL Dif) values for each distinct slab-ongrade perimeter condition of the building thermal envelope.

FL Dif	=	FL Proposed - FL Table.
FL Proposed	=	Proposed *F* -value · Perimeter length.
FL Table	=	(F-factor specified in Table C402.1.4) · Perimeter length.

C = Sum of the (CA Dif) values for each distinct belowgrade wall assembly type of the building thermal envelope.

CA Dif	=	CA Proposed - CA Table
CA Proposed	=	Proposed *C* -value · Area.
CA Table	=	(Maximum allowable C -factor specified in Table C402.1.4) · Area.

Where the proposed vertical glazing area is less than or equal to the maximum vertical glazing area allowed by Section C402.4.1, the value of D (Excess Vertical Glazing Value) shall be zero. Otherwise:

$D = (DA \cdot UV) - (DA \cdot U_{Wall})$, but not less than zero.

DA	=	(Proposed Vertical Glazing Area) - (Vertical Glazing Area allowed by Section C402.4.1).
UA Wall	=	Sum of the (UA Proposed) values f or each opaque assembly of the exterior wall.
U Wall	=	*Area-weighted average U -value of all above-grade wall assemblies.*
UAV	=	Sum of the (UA Proposed) values f or each vertical glazing assembly.
UV	=	UAV/total vertical glazing area.

Where the proposed skylight area is less than or equal to the skylight area allowed by Section value of E (Excess Skylight Value) shall be zero. Otherwise:
value of E (Excess Skylight Value) shall be zero. Otherwise:

$E = (EA \cdot US) - (EA \cdot U_{Roof})$, but not less than zero.

EA	=	(Proposed Sky light Area) - (Allowable Sky light Area as specified in Section C402.4.1)
U Roof	=	Area-weighted average U -value of all roof assemblies.
UAS	=	*Sum of the (UA Proposed) values f or each sky light assembly .*
US	=	UAS/total sky light area.

SECTION C502
ADDITIONS

C502.2 Prescriptive compliance. *Additions* shall comply with Sections C502.2.1 through C502.2.6.2.

C502.2.1 Vertical fenestration. New *vertical fenestration* area that results in a total building *fenestration* area less than or equal to that specified in Section C402.4.1 shall comply with Section ~~C402.4~~ C402.4.3, C402.1.5, or C407. *Additions* with *vertical fenestration* that result in a total building *fenestration* area greater than Section C402.4.1 or *additions* that exceed the fenestration area greater than Section C402.4.1 shall comply with Section C402.4.1.1 for the *addition* only. *Additions* that result in a total building ~~vertical glass~~ *vertical fenestration* area exceeding that specified in Section C402.4.1.1 shall comply with Section C407 or C402.1.5.

C502.2.2 Skylight area. New *skylight* area that results in a total building *fenestration* area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.4, C402.1.5, or C407. *Additions* with *skylight* area that result in a total building *skylight* area greater than C402.4.1 or additions that exceed the *skylight* area shall comply with Section C402.4.1.2 for the *addition* only. *Additions* that result in a total building *skylight* area exceeding that specified in Section C402.4.1.2 shall comply with Section C407 or C402.1.5.

SECTION C503
ALTERATIONS

C503.3 Building envelope. New building envelope assemblies that are part of the *alteration* shall comply with Sections C402.1 through C402.5.

C503.3.1 Roof replacement. *Roof replacements* shall comply with ~~Table~~ Section C402.1.3, C402.1.4, C402.1.5, or ~~C402.1.4~~ C407 where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above the roof deck.

C503.3.2 Vertical fenestration. The addition of *vertical fenestration* that results in a total building *fenestration* area less than or equal to that specified in Section C402.4.1 shall comply with Section ~~C402.4~~ C402.4.3, C402.1.5, or C407. The addition of *vertical fenestration* that results in a total building *fenestration* area greater than Section C402.4.1 shall comply with Section C402.4.1.1 for the space adjacent to the new fenestration only. *Alterations* that result in a total building ~~vertical glass~~ *vertical fenestration* area exceeding that specified in Section C402.4.1.1 shall comply with Section C407 or C402.1.5.

C503.3.3 Skylight area. ~~The addition of~~ New *skylight* area that results in a total building *skylight* area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.4, C402.1.5, or C407. The addition of *skylight* area that results in a total building skylight area greater than Section C402.4.1 shall comply with Section C402.4.1.2 for the space adjacent to the new skylights. *Alterations* that result in a total building skylight area exceeding that specified in Section C402.4.1.2 shall comply with Section C407 or C402.1.5.

Reason: This proposal corrects an editorial oversight in Section C402.1.5, which allows compliance of the overall envelope based on the component U, C, and F-factors and areas. Although it includes all envelope components, the reference to Table C402.4 was inadvertently left out. Additionally, a statement is added to make it clear that fenestration must still meet the applicable SHGC requirements.

Furthermore, references to C402.1.5 are added in the additions and alterations section as the current language only references the prescriptive values and the performance path, but not the component envelope performance alternative. Some editorial changes are also made to make the language consistent regarding new skylights in sections C502.2.2 and C503.3.3. (Note: similar to the other parts of the additions and alterations, these sections do not require existing windows or skylights to replaced, but if they are replaced, new fenestration must be up to code through one of the compliance paths.)

Cost Impact: Will not increase the cost of construction
Because this proposal is clarifying current language, it does not impact the cost of construction. Furthermore, adding the envelope performance alternative to the additions and alterations sections could allow options to decrease cost of construction for those cases.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE72-16	**AS**

Code Change No: CE74-16

Original Proposal

Section: C402.2.1

Proponent: Hope Medina, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Revise as follows:

~~C402.2.1~~ C303.2.2 Multiple layers of continuous insulation board. *No change to text.*

Reason: Section C402.2.1 is referencing how to install more than one layer of rigid insulation. Why is it in a prescriptive code section that now can be traded off? Section C303.2 deals with actual install requirements and that is where this section belongs. Can you just see a contractor installing insulation without staggering the joints or without following manufacturer's install instructions because they used a trade-off path and now can say that they don't have to do it? It wouldn't happen but this still belongs in the install section and not the prescriptive requirements section.

Cost Impact: Will not increase the cost of construction
This is an existing section within the code already, but where it was originally placed did not make sense. The entire section was moved to a section that it relates to.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE74-16	**AS**

Code Change No: CE78-16

Original Proposal

Section: C402.2.2

Proponent: James Kirby, representing Center for Environmental Innovation in Roofing, representing Center for Environmental Innovation in Roofing (jkirby@kellencompany.com)

Revise as follows:

C402.2.2 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.1.3, based on construction materials used in the roof assembly. Where the roof assembly contains insulation entirely above deck and the R-value is greater than 17, continuous insulation board shall be installed in not less than 2 layers and the edge joints between each layer of insulation shall be staggered. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.1.3.
2. Where tapered insulation is used with insulation entirely above deck, the *R*-value where the insulation thickness varies 1 inch (25 mm) or less from the minimum thickness of tapered insulation shall comply with the *R*-value specified in Table C402.1.3.
3. Unit skylight curbs included as a component of a skylight listed and labeled in accordance with NFRC 100 shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Reason: The joints between boards in a single-layer rigid insulation board installation are gaps in the thermal layer and reduce energy efficiency. A 3/8" gap between 2" thick (3ft x 4ft) boards results in a >10% loss of resistance. Data from "Thermal Evaluation of the Effects of Gaps Between Adjacent Roof Insulation Panels," by J. E. Lewis, Research and Development Division, Owens Corning. Adding a "greater than" R-value allows single layer insulation around drains for drain sumps and for other localized situations that may require a single layer of insulation.

Cost Impact: Will increase the cost of construction
This will increase the cost of roofs intended to only use a single layer of rigid board insulation. However, because most roofs are currently installed with two-layers of insulation, the cost increases are negligible; eliminating less energy efficient roofs (those with single layer insulation) is desirable for the long-term outlook of energy efficiency of America's building stock.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C402.2.2 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.1.3, based on construction materials used in the roof assembly. ~~Where the roof assembly contains insulation entirely above deck and the R-value is greater than 17, continuous~~ Continuous insulation board shall be installed in not less than 2 layers and the edge joints between each layer of insulation shall be staggered. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.1.3.
2. Where tapered insulation is used with insulation entirely above deck, the *R*-value where the insulation thickness varies 1 inch (25 mm) or less from the minimum thickness of tapered insulation shall comply with the *R*-value specified in Table C402.1.3.
3. Unit skylight curbs included as a component of a skylight listed and labeled in accordance with NFRC 100 shall not be required to be insulated.
4. Two layers of insulation are not required where insulation tapers to the roof deck, such as at roof drains.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Committee Reason: Now that 402.2.1 is moved to 303, the text will be specific to roof assemblies. Staggered joints are necessary to prevent discontinuities in the insulation. The Modification clarifies that in order to get R17, two layers of insulation are necessary.

Assembly Action None

Final Action Results

CE78-16	**AM**

Code Change No: CE81-16

Original Proposal

Section: C402.2.2

Proponent: Jason Wilen AIA CDT RRO, National Roofing Contractors Association (NRCA), representing National Roofing Contractors Association (NRCA) (jwilen@nrca.net)

Revise as follows:

C402.2.2 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.1.3, based on construction materials used in the roof assembly. <u>Insulation installed on a suspended ceiling having removable ceiling tiles shall not be considered as part of the minimum thermal resistance of the roof insulation.</u> Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.1.3.
2. Where tapered insulation is used with insulation entirely above deck, the *R*-value where the insulation thickness varies 1 inch (25 mm) or less from the minimum thickness of tapered insulation shall comply with the *R*-value specified in Table C402.1.3.
3. Unit skylight curbs included as a component of a skylight listed and labeled in accordance with NFRC 100 shall not be required to be insulated.

~~Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.~~

Reason: The purpose of this code change is to fix odd formatting in the code. The current section contains an additional provision after the exceptions. This type of formatting is not found elsewhere in the code and is easily fixed by moving the provision into the charging paragraph of Section C402.2.2.

Cost Impact: Will not increase the cost of construction
The proposed change is a clarification and does not change the stringency of existing code requirements so the cost of construction will be unchanged.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE81-16	**AS**

Code Change No: CE82-16

Original Proposal

Section: C402.2.2, C402.2.2.1 (New)

Proponent: Jason Wilen AIA CDT RRO, National Roofing Contractors Association (NRCA), representing National Roofing Contractors Association (NRCA) (jwilen@nrca.net)

Revise as follows:

C402.2.2 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.1.3, based on construction materials used in the roof assembly. ~~Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.~~

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.1.3.
2. Where tapered insulation is used with insulation entirely above deck, the *R*-value where the insulation thickness varies 1 inch (25 mm) or less from the minimum thickness of tapered insulation shall comply with the *R*-value specified in Table C402.1.3.
3. ~~Unit skylight curbs included as a component of a skylight listed and labeled in accordance with NFRC 100 shall not be required to be insulated.~~

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Add new text as follows:

C402.2.2.1 Skylight curbs. Skylight curbs shall be insulated to the level of roofs with insulation entirely above the deck or R-5, whichever is less.

Exception: Unit skylight curbs included as a component of a skylight listed and labeled in accordance with NFRC 100 shall not be required to be insulated.

Reason: The purpose of this code change is to reorganize existing code language to improve clarity. By moving skylight requirements into its own subsection and the corresponding exception below it, clarity is improved by grouping like subjects together.

Cost Impact: Will not increase the cost of construction
The proposed change is a reorganization of existing code language and does not change the stringency of existing code requirements so the cost of construction will be unchanged.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE82-16	AS

Code Change No: CE83-16

Original Proposal

Section: C402.2.3

Proponent: Martha VanGeem, self, representing Masonry Alliance for Codes and Standards

Revise as follows:

C402.2.3 ~~Thermal resistance of above-grade~~ Above-grade walls. The minimum thermal resistance (*R*-value) of materials installed in the wall cavity between framing members and continuously on the walls shall be as specified in Table C402.1.3, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units shall not be used in determining compliance with Table C402.1.3 except as otherwise noted in the table. In determining compliance with Table C402.1.4, the use of the *U*-factor of concrete masonry units with integral insulation shall not be prohibited.

"Mass walls" shall include walls:

1. Weighing not less than 35 psf (170 kg/m^2) of wall surface area.
2. Weighing not less than 25 psf (120 kg/m^2) of wall surface area where the material weight is not more than 120 pcf (1900 kg/m^3).
3. Having a heat capacity exceeding 7 Btu/ft^2• °F (144 kJ/m^2• K).
4. Having a heat capacity exceeding 5 Btu/ft^2• °F (103 kJ/m^2• K), where the material weight is not more than 120 pcf (1900 kg/m^3).

Reason: This is a clarification of the use of Table C402.1.3 on R-values and Table C402.1.4 on U-Factors.

First, "except as noted in the table" is added to the first sentence because integral insulation is allowed in Climate Zones 1 and 2 where there is a footnote "c" when it complies with footnote "c".

Second, the existing sentence is applicable to C402.1.3 on R-values. Since the code is silent on integral insulation in concrete masonry units in Table C402.1.4 on U-factors, this can be confusing. In reality, the U-factor of integral insulation in concrete masonry units can be included when determining the U-factor of walls when complying with Table C402.1.4.

Third, the title of the section was changed to remove "Thermal resistance of" and just read, "Above-grade walls." This is consistent with the sections on roofs and floors, sections C402.2.2 and C402.2.4, immediately before and after this section. This is required because the new sentence applies to U-factors and the mass wall definitions pertain to both R-values and U-factors.

Cost Impact: Will not increase the cost of construction
This is a clarification of the use of Tables C402.1.3 and C402.1.4 and will not afffect the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C402.2.3 Above-grade walls. The minimum thermal resistance (*R*-value) of materials installed in the wall cavity between framing members and continuously on the walls shall be as specified in Table C402.1.3, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units shall not be used in determining compliance with Table C402.1.3 except as otherwise noted in the table. In determining compliance with Table C402.1.4, the use of the *U*-factor of concrete masonry units with integral insulation shall ~~not~~ be ~~prohibited~~ permitted.
"Mass walls" shall include walls:

1. Weighing not less than 35 psf (170 kg/m^2) of wall surface area.
2. Weighing not less than 25 psf (120 kg/m^2) of wall surface area where the material weight is not more than 120 pcf (1900 kg/m^3).

3. Having a heat capacity exceeding 7 Btu/ft^2• °F (144 kJ/m^2• K).
4. Having a heat capacity exceeding 5 Btu/ft^2• °F (103 kJ/m^2• K), where the material weight is not more than 120 pcf (1900 kg/m^3).

Committee Reason: The proposal addresses concrete masonry units with integral insulation used in above grade walls, thereby allowing the U-factor to apply. The Modification removes a double negative.

Assembly Action None

Final Action Results

CE83-16	**AM**

Code Change No: CE84-16 Part I

Original Proposal

Section: C402.1.3, C402.1.4

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of materials installed in the wall cavity between framing members and continuously on the walls shall be as specified in Table C402.1.3, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units shall not be used in determining compliance with Table C402.1.3 except as noted in the table.

"Mass walls" where used as a component in the thermal envelope of a building shall ~~include walls:~~ comply with one of the following:

1. ~~Weighing~~ Weigh not less than 35 psf (170 kg/m^2) of wall surface area.
2. ~~Weighing~~ Weigh not less than 25 psf (120 kg/m^2) of wall surface area where the material weight is not more than 120 pcf (1900 kg/m^3).
3. ~~Having~~ Have a heat capacity exceeding 7 Btu/ft^2• °F (144 kJ/m^2• K).
4. ~~Having~~ Have a heat capacity exceeding 5 Btu/ft^2• °F (103 kJ/m^2• K), where the material weight is not more than 120 pcf (1900 kg/m^3).

C402.2.4 Floors. The thermal properties (component R-values or assembly *U*-, *C*- or *F*-factors) of floor assemblies over outdoor air or unconditioned space shall be as specified in Table C402.1.3 or C402.1.4 based on the construction materials used in the floor assembly. Floor framing cavity insulation or structural slab insulation shall be installed to maintain permanent contact with the underside of the subfloor decking or structural slabs.

"Mass floors" where used as a component of the thermal envelope of a building shall provide one of the following weights:

1. 35 pounds per square foot of floor surface area.
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.

Exceptions:

1. The floor framing cavity insulation or structural slab insulation shall be permitted to be in contact with the top side of sheathing or continuous insulation installed on the bottom side of floor assemblies where combined with insulation that meets or exceeds the minimum R-value in Table C402.1.3 for "Metal framed" or "Wood framed and other" values for "Walls, Above Grade" and extends from the bottom to the top of all perimeter floor framing or floor assembly members.

2. Insulation applied to the underside of concrete floor slabs shall be permitted an airspace of not more than 1 inch (25 mm) where it turns up and is in contact with the underside of the floor under walls associated with the *building thermal envelope.*

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD[a,]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal building [b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, above grade																
Mass [g]	R-5.7ci [c]	R-5.7ci [c]	R-5.7ci [c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13+ R-19.5ci	R-13 + R-13ci	R-13+ R-19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R13 + R-15.6ci or R-20 + R-10ci	R13 + R-15.6ci or R-20 + R-10ci
Walls, below grade																
Below-grade wall [d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass [e]	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30 [f]	R-30 [f]	R-30 [f]	R-30 [f]	R-30 [f]
Slab-on-grade floors																
Unheated slabs	NR	NR	NR	NR	NR	NR	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-10 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-15 for 24″ below	R-20 for 24″ below
Heated slabs	R-7.5 for 12″	R-7.5 for 12″ below	R-7.5 for 12″	R-7.5 for 12″ below	R-10 for 24″	R-10 for 24″ below	R-15 for 24″	R-15 for 24″ below	R-15 for 36″	R-15 for 36″ below	R-15 for 36″	R-20 for 48″ below	R-20 for 24″	R-20 for 48″ below	R-20 for 48²″below	R-20 for 48″ below

	below		below		below		below		below		below		below			
Opaque doors																
Nonswinging	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.
ci = Continuous insulation, NR = No requirement, LS = Liner system.
a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.
b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.4.
c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.
d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
e. "Mass floors" shall ~~include floors weighing not less than:~~be in accordance with Section C402.2.4.

1f. ~~35 pounds per square foot of surface area; or~~
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.
f. Steel floor joist systems shall be insulated to R-38.
g. "Mass walls" shall be in accordance with Section C402.2.3.

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, b]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, above grade																
Mass [g]	U-0.151	U-0.151	U-0.151	U-0.123	U-0.123	U-0.104	U-0.104	U-0.090	U-0.090	U-0.080	U-0.080	U-0.071	U-0.071	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and otherc	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, below grade																
Below-grade wall[c]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass[d]	U-0.322[e]	U-0.322[e]	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066[e]	U-0.066[e]	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-grade floors																
Unheated	F-	F-	F-	F-	F-	F-	F-	F-0.54	F-	F-0.54	F-	F-0.52	F-	F-0.40	F-	F-0.40

slabs	0.73[e]	0.73[e]	0.73[e]	0.73[e]	0.73[e]	0.73[e]	0.54		0.54		0.54		0.40		0.40	
Heated slabs[f]	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.65	F-0.65	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55
Opaque doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37

For SI: 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.
ci = Continuous insulation, NR = No requirement, LS = Liner system.
a. Use of Opaque assembly *U*-factors, C-factors, and *F*-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/ISNEA 90.1 Appendix A.
b. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 shall be permitted. The *R*-value of continuous insulation shall be permitted to be added to or subtracted from the original tested design.
c. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
d. "Mass floors" shall ~~include floors weighing not less than:~~be in accordance with Section C402.2.4

~~1. 25 pounds per square feet of floor surface area; or~~
~~2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic feet~~
e. These C-, F- and U-factors are based on assemblies that are not required to contain insulation.
f. Evidence of compliance with the F-factors indicated in the table for heated slabs shall be demonstrated by the application of the unheated slab F-factors and R-values derived from ASHRAE 90.1 Appendix A.
g. "Mass walls" shall be in accordance with Section C402.2.3.

Reason: The IECC as a result of changes approved for the 2015 addressed mass walls and mass floors differently. For one the details were found in a footnote to a table, for the other the details were found in the section text. One could read what was in either location as a definition of the terms. This proposal covers both Commercial and Residential portions and would treat the information on mass walls and mass floors as technical requirements and not as definitions. Therefore the proposal removes the technical requirements from the footnotes; and places each in the proper envelope section on floors or walls. The footnotes in the tables are reduced to being pointers to the regulating text. Finally while the existing text may appear to be a definition of the terms, mass floors and mass walls can be a variety of weights and densities, but the IECC requires specific weights when the mass wall or mass floor is going to be an element of the building's thermal envelope.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
These revisions are strictly editorial in nature. They place the technical requirements for both mass walls and mass floors in the appropriate code sections.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE84-16 Part I **AS**

Code Change No: CE84-16 Part II

Original Proposal

Section: C402.1.3, C402.1.4

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

R402.2.5 (N1102.1.4) Mass walls. Mass walls ~~for~~ where used as a component of the ~~purposes~~ thermal envelope of ~~this chapter~~ a building shall be ~~considered above-grade~~ one of the following:

1. Above-grade walls of concrete block, concrete, insulated concrete form ~~(ICF)~~, masonry cavity, brick ~~(~~other than brick veneer~~)~~, ~~earth (~~adobe, compressed earth block, rammed earth~~) and~~, solid timber~~/~~ or solid logs, ~~or any other walls~~
2. Any wall having a heat capacity greater than or equal to 6 Btu/ft^2 × °F (123 kJ/m^2 × K).

TABLE R402.1.2 (N1102.1.2)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR [b]	SKYLIGHT [b] *U*-FACTOR	GLAZED FENESTRATION SHGC [b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE [i]	FLOOR *R*-VALUE	BASEMENT [c] WALL *R*-VALUE	SLAB [d] *R*-VALUE & DEPTH	CRAWL SPACE [c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 [h]	8/13	19	5/13 [f]	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 [h]	8/13	19	10 /13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 [h]	13/17	30 [g]	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 [h]	15/20	30 [g]	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 [h]	19/21	38 [g]	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. *U* -factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R* -value of the insulation shall not be less than the *R* -value specified in the table.

b. The fenestration *U* -factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in climate zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

d. R-5 shall be added to the required slab edge *R* -values for heated slabs. Insulation depth shall be the depth of the footing or 2

feet, whichever is less in Climate Zones 1 through 3 for heated slabs.
e. There are no SHGC requirements in the Marine Zone.
f. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.
g. Or insulation sufficient to fill the framing cavity, R-19 minimum.
h. The first value is cavity insulation, the second value is continuous insulation, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation.
i. –Mass walls shall be in accordance with Section R402.2.5. The second *R* -value applies when more than half the insulation is on the interior of the mass wall.

TABLE R402.1.4 (N1102.1.4)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.060	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.045	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.045	0.057	0.028	0.050	0.055

a. Nonfenestration *U*- factors shall be obtained from measurement, calculation or an approved source.
b. Mass walls shall be in accordance with -Section R402.2.5. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Climate Zone 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
c. Basement wall *U*- factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

Reason: The IECC as a result of changes approved for the 2015 addressed mass walls and mass floors differently. For one the details were found in a footnote to a table, for the other the details were found in the section text. One could read what was in either location as a definition of the terms. This proposal covers both Commercial and Residential portions and would treat the information on mass walls and mass floors as technical requirements and not as definitions. Therefore the proposal removes the technical requirements from the footnotes; and places each in the proper envelope section on floors or walls. The footnotes in the tables are reduced to being pointers to the regulating text. Finally while the existing text may appear to be a definition of the terms, mass floors and mass walls can be a variety of weights and densities, but the IECC requires specific weights when the mass wall or mass floor is going to be an element of the building's thermal envelope.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
These revisions are strictly editorial in nature. They place the technical requirements for both mass walls and mass floors in the appropriate code sections.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the published reason statement.

Assembly Action **None**

Final Action Results

CE84-16 Part II **AS**

BACK

Code Change No: CE87-16 Part I

Original Proposal

Section: C402.2.3

Proponent: Martha VanGeem, self, representing Masonry Alliance for Codes and Standards

Add new as follows:

C402.2.7 Airspaces. Where the thermal properties of airspaces are u ed to comply with this code in accordance with Section C401.2, such airspaces shall be enclosed in an unventilated cavity constructed to minimize airflow into and out of the enclosed airspace. Airflow shall be deemed minimized where the enclosed airspace is located on the interior side of the continuous air barrier and is bounded on all sides by building components. Air spaces of not less than 1/2- inch thick (12.7 mm) that are located on the exterior side of the continuous air barrier and are adjacent to and behind the exterior wall covering material shall be assigned an R-value of not greater than R-0.7, provided that the R-values of the cladding material and the exterior air film are not included in the calculations demonstrating compliance with this code.

Reason: This proposal is consistent with recent limitations placed on the thermal resistance application of reflective and non-reflective airspaces in ASHRAE 90.1-2013 (Addenda Supplement, Addendum AC). The R-values of airspaces are based on the assumption of "no air leakage" (see 2013 ASHRAE Handbook of Fundamentals, Chapter 25, Table 3, footnote b). Air leakage into and out of an airspace can significantly degrade its R-value, yet there is currently no standard calculation method or test method to discern this impact. Until such a time that this effect is quantified (for which there is an ASHRAE research project request under consideration), Addendum AC to ASHRAE 90.1 has provided a rational interim solution based on extensive review of available research data and consensus regarding that data. To also provide an interim solution for the common case of enclosed airspaces located behind cladding or outside of the air barrier layer of the building, an allowance is provided to consider such airspaces as being roughly equivalent to that of an indoor air film (e.g., R-0.7). This is also needed because some cladding R-values used in design are based on the assumption of an ideal air space (no air leakage or airflow) which is unrealistic and inappropriate and results in inflated R-values for airspaces that are necessarily leaky and/or intended to provide ventilation behind claddings.

Cost Impact: Will not increase the cost of construction
The energy code is currently silent on this matter. Consequently, this proposal provides guidance and options which can result in reduced construction costs where airspaces are appropriately used to help comply with the code.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C402.2.7 Airspaces. Where the thermal properties of airspaces are used to comply with this code in accordance with Section R401.2, such airspaces shall be enclosed in an unventilated cavity constructed to minimize airflow into and out of the enclosed airspace. Airflow shall be deemed minimized where the enclosed airspace is located on the interior side of the continuous air barrier and is bounded on all sides by building components. ~~Air spaces~~

> **Exception:** The thermal resistance of ~~not less than 1/2-inch thick (12.7 mm) that are~~ air spaces located on the exterior side of the continuous air barrier and ~~are~~ adjacent to and behind the exterior wall covering material shall be ~~assigned~~ determined in accordance with ASTM C1363 modified with an ~~R-value not greater than R-0.7, provided that~~ air-flow entering the ~~R-values~~ bottom and exiting the top of the ~~cladding material and the exterior~~ air-space at a minimum air ~~film are not included in the calculations demonstrating compliance with this code~~ movement rate of 7 cm/sec.

Committee Reason: Air spaces are not being applied correctly and this proposal provides the necessary direction. The Modification introduces a test method rather than a using a random R-value that cannot be verified. It will also help prevent gaming.

Assembly Action **None**

Final Action Results

CE87-16 Part I	AM

Code Change No: CE94-16

Original Proposal

Section: C402.4

Proponent: Thomas Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

TABLE C402.4
BUILDING ENVELOPE FENESTRATION MAXIMUM *U*-FACTOR AND SHGC REQUIREMENTS

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
Vertical fenestration																
***U*-factor**																
Fixed fenestration	0.50		0.50		0.46		0.38		0.38		0.36		0.29		0.29	
Operable fenestration	0.65		0.65		0.60		0.45		0.45		0.43		0.37		0.37	
Entrance doors	1.10		0.83		0.77		0.77		0.77		0.77		0.77		0.77	
SHGC																
Orientation[a]	**SEW**	**N**	**SEW**	**N**	**SEW**	**N**	**SEW**	**N**	**SEW**	**N**	**SEW**	**N**	**SEW**	**N**	**SEW**	**N**
PF	0.25	0.33	0.25	0.33	0.25	0.33	~~0.40~~ 0.36	~~0.53~~ 0.48	~~0.40~~ 0.38	~~0.53~~ 0.51	0.40	0.53	0.45	NR	0.45	NR
0.2 ≤ PF	0.30	0.37	0.30	0.37	0.30	0.37	~~0.48~~ 0.43	~~0.58~~ 0.53	~~0.48~~ 0.46	~~0.58~~ 0.56	0.48	0.58	NR	NR	NR	NR
PF ≥ 0.5	0.40	0.40	0.40	0.40	0.40	0.40	~~0.64~~ 0.58	~~0.64~~ 0.58	~~0.64~~ 0.61	~~0.64~~ 0.61	0.64	0.64	NR	NR	NR	NR
Skylights																
U-factor	0.75		0.65		0.55		0.50		0.50		0.50		0.50		0.50	
SHGC	0.35		0.35		0.35		0.40		0.40		0.40		NR		NR	

NR = No requirement, PF = Projection factor.
a. "N" indicates vertical fenestration oriented within 45 degrees of true north. "SEW" indicates orientations other than "N." For buildings in the southern hemisphere, reverse south and north. Buildings located at less than 23.5 degrees latitude shall use SEW for all orientations.

Reason: This proposal decreases the maximum SHGC requirement in climate zones 4 and 5. This represents a reasonable increase in stringency for these zones with mixed heating and cooling, and is consistent with the SHGC values in addendum "ai" for ASHRAE 90.1-2016. As a basis for these values, the ASHRAE 90.1 committee reviewed energy modeling results for the prototype medium office building used by PNNL for DOE determinations, and also considered the range of other types of buildings covered by the standard, balance between heating and cooling, and product availability. The 10% and 5% reductions in SHGC will result in energy cost savings and tighten the energy budget for the performance path in these zones, and also smooth the progression in SHGC from southern to northern zones. While this reduction will restrict certain higher SHGC products, this level of reduction is practical and is supported by the glazing industry.

Both IECC and ASHRAE 90.1 include the combined effect of fenestration SHGC and shading by permanent projections for compliance, but in different formats. The 2015 IECC uses a simpler look-up table based on projection factor and orientation (and compliance can always be satisfied by simply using the most stringent value within each zone if the user doesn't want to consider shading and orientation), whereas ASHRAE 90.1 uses more complicated equations. For this table, the corresponding SHGC values with projection factors between 0.2 – 0.5 and greater than 0.5 were determined using the same shading multipliers from the 2012 IECC (which were based on ASHRAE 90.1 although slightly more conservative), and can also be derived by simple interpolation between the values for zones 3 and 6.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction. The ASHRAE 90.1 analysis considered the incremental costs of 305 different fenestration assemblies including 42 double and triple glazing combinations covering different low-e glass technologies. While this proposal does restrict certain glazing products, the lowest cost low-e glazing products will comply, and therefore not significantly impact construction cost.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE94-16	**AS**

Code Change No: CE97-16

Original Proposal

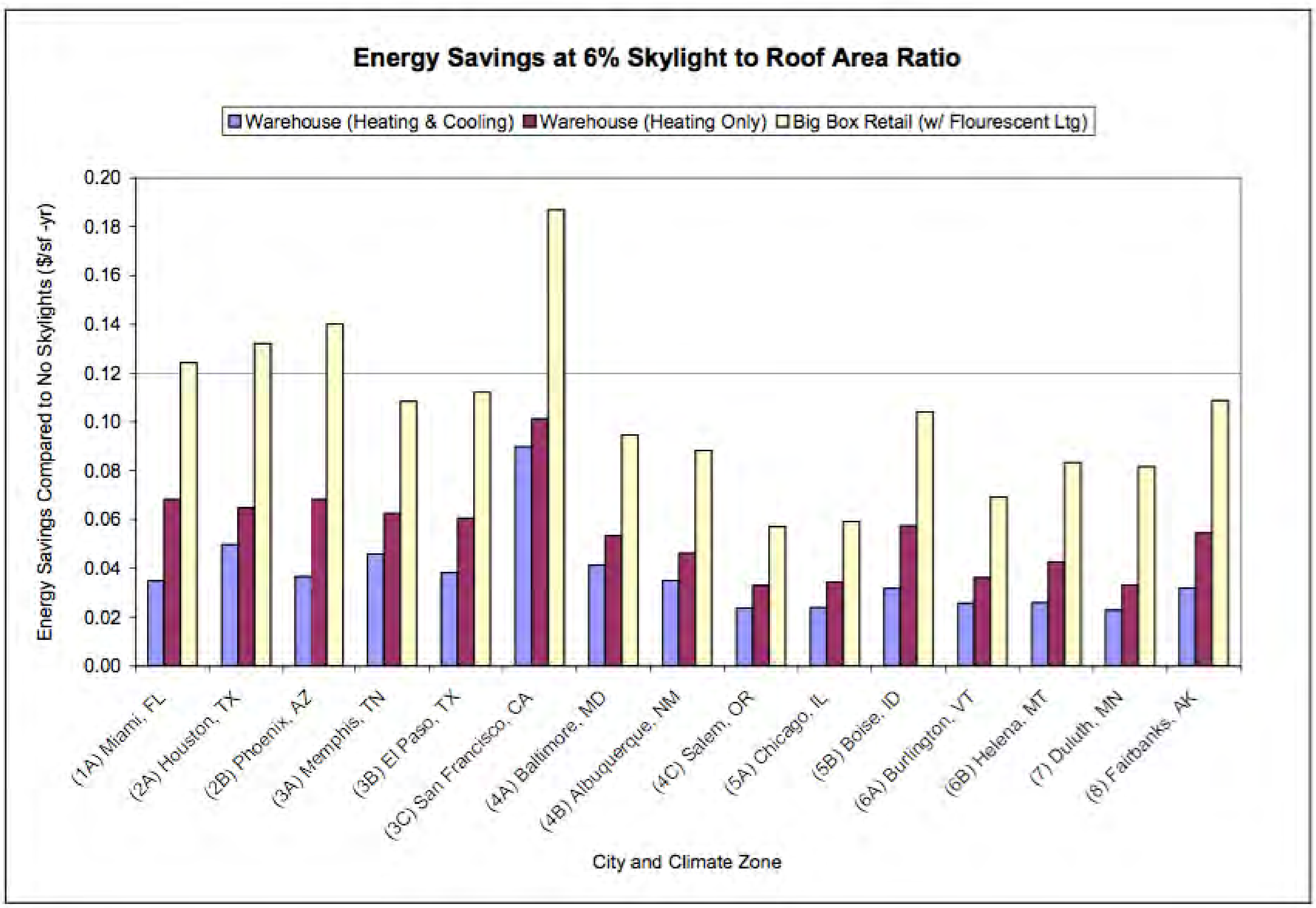
Section: C402.4.1.2

Proponent: Thomas Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee and Aluminum Extruders Council (culp@birchpointconsulting.com)

Revise as follows:

C402.4.1.2 Increased skylight area with daylight responsive controls. The skylight area shall be permitted to be not more than ~~5~~ 6 percent of the roof area provided that *daylight responsive controls* complying with Section C405.2.3.1 are installed in *daylight zones* under skylights.

Reason: This proposal changes the maximum skylight area when daylighting controls are used from 5% to 6% of the roof area. When the toplighting requirements were first added to ASHRAE 90.1-2010 and the 2012 IECC, the research studies they were based on showed positive energy savings for skylight areas > 6% in all climate zones (for example, see figure below). ASHRAE 90.1 has the same cap on skylight area as the IECC of 3% when no daylight controls are provided, but allows 6% with proper toplighting instead of 5%. This proposal updates the percentage allowed with daylight controls to the same 6%. This will also help reduce potential conflicts where the minimum toplighting requirement of C402.3.2 would require more skylight area than allowed by this section.



Heschong Mahone Group / AAMA, page 20.

Bibliography: "90.1 Skylighting Requirements Code Change Proposal" Heschong Mahone Group, Pacific Northwest National Laboratory, Project No: 0726 PNNL ASHRAE 90.1, 2008.

"Updates to Treatment of Skylighting in the IECC", Heschong Mahone Group for AAMA Skylight Council, 2005.

"Energy Study in Support of the Proposed Revision of the International Energy Conservation Code (IECC), Skylight Portion of Table 502.3", Carli Inc. for AAMA Skylight Council, 2006.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction, as it simply changes the amount of skylight area allowed, but does not require skylights.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE97-16	**AS**

Code Change No: CE98-16

Original Proposal

Section: C402.4.1.2, C402.4.2, C402.4.2.1, C405.2.3.2, C405.2.3.3

Proponent: Hope Medina, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Revise as follows:

C402.4.1.2 Increased skylight area with daylight responsive controls. The skylight area shall be permitted to be not more than 5 percent of the roof area provided *daylight responsive controls* complying with Section C405.2.3.1 are installed in *Toplight daylight zones*. ~~under skylights.~~

C402.4.2 Minimum skylight fenestration area. In an enclosed space greater than 2,500 square feet (232 m^2) in floor area, directly under a roof with not less than 75 percent of the ceiling area with a ceiling height greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage space, gymnasium/exercise center, convention center, automotive service area, space where manufacturing occurs, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation depot or workshop, the total *toplight daylight zone* ~~under skylights~~ shall be not less than half the floor area and shall provide one of the following:

1. A minimum skylight area to *toplight daylight zone* ~~under skylights~~ of not less than 3 percent where all skylights have a VT of at least 0.40 as determined in accordance with Section C303.1.3.
2. A minimum skylight effective aperture of at least 1 percent, determined in accordance with Equation 4-4.

$$\text{Skylight Effective Aperture} = \frac{0.85 \cdot \text{Skylight Area} \cdot \text{Skylight VT} \cdot \text{WF}}{\text{Daylight zone under skylight}} \quad \textbf{(Equation 4-4)}$$

where:

Skylight area	=	Total fenestration area of skylights.
Skylight VT	=	Area weighted average visible transmittance of skylights.
WF	=	Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.
Light well depth	=	Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in Climate Zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft^2 (5.4 W/m^2).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.
5. Spaces where the total area minus the area of sidelight daylight zones ~~adjacent to vertical fenestration~~ is less than 2,500 square feet (232 m^2), and where the lighting is controlled according to Section C405.2.3.

C402.4.2.1 Lighting controls in toplight daylight zones ~~under skylights.~~ *Daylight responsive controls* complying with Section C405.2.3.1 shall be provided to control all electric lights within ~~daylight zones under skylights~~ toplight daylight zones.

Reason: The section and figure titles need to the reflect the same names as the requirements within them do. That way people can find what they are looking for. The definition and the verbiage in the sections got changed in the last code cycle, but for some reason the section titles and figures still use the old names as found in the 2012 IECC code.

Our Theme: A Code for the End User
Is the code section completely understandable to the end user?
Is the code section or requirement easy to find?
Is the code requirement even doable in the real world?
Will the code requirement really save energy or only on paper?

Cost Impact: Will not increase the cost of construction
This change is to correct the titles, so will not impact cost.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C402.4.1.2 Increased skylight area with daylight responsive controls. The skylight area shall be permitted to be not more than 5 percent of the roof area provided *daylight responsive controls* complying with Section C405.2.3.1 are installed in ~~Toplight daylight~~ *Toplit zones*.

C402.4.2.1 Lighting controls in toplight daylight zones *Daylight responsive controls* complying with Section C405.2.3.1 shall be provided to control all electric lights within ~~toplight daylight~~ toplit zones.

Under Section C402.4.2, change the denominator of Equation 4-4 as follows: ~~Daylight~~ toplit zone ~~under skylight~~

FIGURE C405.2.3.2 (1)
~~DAYLIGHT~~ SIDELIT ZONE ~~ADJACENT TO FENESTRATION IN A WALL~~

FIGURE C405.2.3.3
~~DAYLIGHT~~ TOPLIT ZONE ~~UNDER A ROOF FENESTRATION ASSEMBLY~~

Committee Reason: Approval is based on the proponent's published reason statements. The Modifications clean up the terminology and eliminate redundant titles.

Assembly Action **None**

Final Action Results

CE98-16	**AM**

Code Change No: CE102-16

Original Proposal

Section(s): C402.4.4 (New), C405.2.3, C405.2.3.1, C405.2.3.2, C405.2.3.3

Proponent: Shaunna Mozingo, representing Colorado Chapter of ICC Energy Code Development Committee (smozingo@coloradocode.net)

Add new text as follows:

<u>**C402.4.4 Daylight Zones** Daylight zones referenced in Sections C402.4.1.1 through C402.4.3.2 or Section C405.2.3 shall comply with Section C402.4.4.1 and C402.4.4.2, as applicable.</u>

Revise as follows:

~~C405.2.3.2~~ <u>C402.4.4.1</u> Sidelight daylight zone. The sidelight *daylight zone* is the floor area adjacent to vertical *fenestration* which complies with all of the following:

1. Where the fenestration is located in a wall, the daylight zone shall extend laterally to the nearest full-height wall, or up to 1.0 times the height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest full-height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure ~~C405.2.3.2(1~~ <u>C402.4.4.1(1</u>).
2. Where the *fenestration* is located in a rooftop monitor, the *daylight zone* shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the *fenestration*, whichever is less, and longitudinally from the edge of the *fenestration* to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the *fenestration*, whichever is less, as indicated in Figures ~~C405.2.3.2(2~~ <u>C402.4.4.1(2</u>) and ~~C405.2.3.2(3~~ <u>C402.4.4.1(3</u>).
3. The area of the *fenestration* is not less than 24 square feet (2.23 m^2).
4. The distance from the *fenestration* to any building or geological formation which would block access to daylight is greater than the height from the bottom of the *fenestration* to the top of the building or geologic formation.
5. Where located in existing buildings, the *visible transmittance* of the *fenestration* is not less than 0.20.

~~C405.2.3.3~~ <u>C402.4.4.2</u> Toplight daylight zone. The toplight daylight zone is the floor area underneath a roof fenestration assembly which complies with all of the following:

1. The daylight zone shall extend laterally and longitudinally beyond the edge of the roof *fenestration* assembly to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.7 times the ceiling height, whichever is less, as indicated in Figure ~~C405.2.3.3~~ <u>C402.4.4.2</u>.
2. No building or geological formation blocks direct sunlight from hitting the roof *fenestration* assembly at the peak solar angle on the summer solstice.
3. Where located in existing buildings, the product of the visible *transmittance* of the roof *fenestration* assembly and the area of the rough opening of the roof *fenestration* assembly divided by the area of the *daylight zone* is not less than 008.

C405.2.3 Daylight-responsive controls. *Daylight-responsive controls* complying with Section C405.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with Section ~~C405.2.3.2~~ C402.4.4.1. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.4.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with Section ~~C405.2.3.3~~ C402.4.4.2.

Exceptions: Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.4.
4. Sidelight daylight zones on the first floor above grade in Group A-2 and Group M occupancies.

C405.2.3.1 Daylight-responsive control function. Where required, *daylight-responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in toplight *daylight zones* in accordance with Section ~~C405.2.3.3~~ C402.4.4.2 shall be controlled independently of lights in sidelight *daylight zones* in accordance with Section ~~C405.2.3.2~~ C402.4.4.1.
2. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel.
3. Calibration mechanisms shall be r*eadily accessible*.
4. Where located in offices, classrooms, laboratories and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to 15 percent of full light output or lower.
5. *Daylight responsive controls* shall be capable of a complete shutoff of all controlled lights.
6. Lights in sidelight *daylight zones* in accordance with Section ~~C405.2.3.2~~ C402.4.4.1 facing different cardinal orientations [i.e., within 45 degrees (0.79 rad) of due north, east, south, west] shall be controlled independently of each other.

Exception: Up to 150 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

Reason: When going through the code to do plan review and we get to Section C402.4.1.1 because they are trying to increase the allowed glazing area, we see this requirement for 50% of the net floor area to be within a *daylight zone*.

What does that mean? Well, daylight zone is italicized so that means there is a definition for it, let's go there.

The definition says that it is the portion of a building's interior floor area that is illuminated by natural light. Ok, that's helpful. So if half of my floor area is illuminated by natural light I'm good? Seems like it but how do I measure that at plan review? I look around the rest of this section and there is no where that it tells me what to do so I just forget about it for now.

It isn't until I'm nearing the end of my energy code plan review and get to the lighting controls section and all of the sudden there are these pictures and definitions of toplight daylight zone and sidelight daylight zone. Wait! Are these what they were talking about back in the envelope section in C402? Now I have to go back and re-evaluate my envelope compliance, now that I know what they were talking about.

That can't be the way it's done. So what are our options?

Option 1: go through all of C402.4 and every where it mentions *daylight zone,* add a reference to Sections C405.2.3.2 and C405.2.3.3. You would need to do that in 11 places.

Option 2: Bring the definitions and pictures from C405.2.3.2 and C405.2.3.3 over into C402.4 and then renumber everything after it.

Option 3: Bring the definitions and pictures from C405.2.3.2 and C405.2.3.3 over into the definitions chapter in its entirety, but some of that is not just definition, it's requirements that don't belong in a definition.

So what did we do?

Our first attempt was to redefine the terms without bringing all of the requirements into the definition and then putting a pointer to the place where the requirements were. We even had precedence where in the IBC a definition references a code section when talking about Wind Borne Debris. But after trying and trying to use the code for plan review it was determined that we needed to just go with option 2 and bring everything that dealt with what a daylight zone is and how to measure it over into the section of the code where it is needed. It was the harder option but the right one. Daylight Zones are a function of the thermal envelope and need to be

in the envelope section. Daylight Responsive Controls are a lighting control function and should remain in the lighting controls section. We changed the references in the lighting control section to point back to the new sections in the envelope.
We created a new Section C402.4.4, moving the existing one down and renumbering everything after that. The placement into C402.4.4 was made because these daylight zones are mentioned in Sections C402.4.2 and C402.4.3 and we couldn't determine which of those sections should actually receive the moved information so we put it after all of it and made cross references to the new section. It does seem complicated but once you actually see it and try to use it, we believe it will all make sense and be much easier.

NOTE: Our proposal moves the Figures too but I couldn't make it happen in CDP access.
Figure C405.2.3.2 (1) is now Figure C402.4.4.1(1)
Figure C405.2.3.2 (2) is now Figure C402.4.4.1(2)
Figure C405.2.3.2 (3) is now Figure C402.4.4.1(3)
Figure C405.2.3.3 is now Figure C402.4.4.2

Our Theme: A Code for the End User
Is the code section completely understandable to the end user?
Is the code section or requirement easy to find?
Is the code requirement even doable in the real world?
Will the code requirement really save energy or only on paper?

Cost Impact: Will not increase the cost of construction
There are no new requirements in this proposal, simply moved text from one section to another for ease of use.

Report of Committee Action Hearings

Committee Action: **As Modified**

Modify as follows:

C402.4.4 Daylight Zones Daylight zones referenced in Sections C402.4.1.1 through C402.4.3.2 or Section C405.2.3 shall comply with Section C402.4.4.1 and C402.4.4.2, as applicable. Daylight zones shall include toplit zones and sidelit zones.

C402.4.4.1 ~~Sidelight daylight~~ Sidelit zone. The ~~sidelight~~ sidelit ~~daylight~~ *zone* is the floor area adjacent to vertical *fenestration* which complies with all of the following:

1. Where the fenestration is located in a wall, the ~~daylight~~ sidelit zone shall extend laterally to the nearest full-height wall, or up to 1.0 times the height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest full-height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure C402.4.4.1(1).
2. ~~Where the *fenestration* is located in a rooftop monitor, the *daylight zone* shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the *fenestration*, whichever is less, and longitudinally from the edge of the *fenestration* to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the *fenestration*, whichever is less, as indicated in Figures C402.4.4.1(2) and C402.4.4.1(3).~~
3. The area of the *fenestration* is not less than 24 square feet (2.23 m^2).
4. The distance from the *fenestration* to any building or geological formation which would block access to daylight is greater than the height from the bottom of the *fenestration* to the top of the building or geologic formation.
5. Where located in existing buildings, the *visible transmittance* of the *fenestration* is not less than 0.20.

C402.4.4.2 ~~Toplight daylight~~ Toplit zone. The ~~toplight daylight~~ toplit zone is the floor area underneath a roof fenestration assembly which complies with all of the following:

1. The ~~daylight~~ toplit zone shall extend laterally and longitudinally beyond the edge of the roof *fenestration* assembly to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.7 times the ceiling height, whichever is less, as indicated in Figure C402.4.4.2.
2. Where the *fenestration* is located in a rooftop monitor, the toplit *zone* shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the *fenestration*, whichever is less, and longitudinally from the edge of the *fenestration* to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the *fenestration*, whichever is less, as indicated in Figures C402.4.4.1(2) and C402.4.4.1(3).
3. No building or geological formation blocks direct sunlight from hitting the roof *fenestration* assembly at the peak solar angle on the summer solstice.
4. Where located in existing buildings, the product of the visible *transmittance* of the roof *fenestration* assembly and the area of the rough opening of the roof *fenestration* assembly divided by the area of the toplit ~~daylight~~ *zone* is not less than 0.008.

C405.2.3 Daylight-responsive controls. *Daylight-responsive controls* complying with Section C405.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within ~~sidelight~~ sidelit ~~daylight~~ *zones* complying with Section C402.4.4.1. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.4.
2. Spaces with a total of more than 150 watts of *general lighting* within ~~toplight~~ toplit ~~daylight~~ *zones* complying with Section C402.4.4.2.

Exceptions: Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.4.
4. ~~Sidelight daylight~~ Sidelit zones on the first floor above grade in Group A-2 and Group M occupancies.

C405.2.3.1 Daylight-responsive control function. Where required, *daylight-responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in ~~toplight~~ toplit ~~daylight~~ *zones* in accordance with Section C402.4.4.2 shall be controlled independently of lights in ~~sidelight~~ sidelit ~~daylight~~ *zones* in accordance with Section C402.4.4.1.
2. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel.
3. Calibration mechanisms shall be r*eadily accessible*.
4. Where located in offices, classrooms, laboratories and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to 15 percent of full light output or lower.
5. *Daylight responsive controls* shall be capable of a complete shutoff of all controlled lights.
6. Lights in ~~sidelight~~ sidelit ~~daylight~~ *zones* in accordance with Section C402.4.4.1 facing different cardinal orientations [i.e., within 45 degrees (0.79 rad) of due north, east, south, west] shall be controlled independently of each other.

Exception: Up to 150 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

Committee Reason: The proposal reorganizes the text to place it in the envelope section where it belongs. The Modification is consistent with previous action on another proposal that changed the terminology.

Assembly Action: None

Public Comments

Public Comment 1:

Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com) requests Approve as Modified by this Public Comment.

Further modify as follows:

C402.4.4 Daylight Zones Daylight zones referenced in Sections C402.4.1.1 through C402.4.3.2 ~~or Section C405.2.3~~ shall comply with Section ~~C402.4.4.1~~ C405.2.3.2 and ~~C402.4.4.2~~ C405.2.3.3, as applicable. Daylight zones shall include toplit zones and sidelit zones.

C405.2.3 Daylight-responsive controls. *Daylight-responsive controls* complying with Section C405.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelit *zones* complying with Section ~~C402.4.4.1~~ C405.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.4.
2. Spaces with a total of more than 150 watts of *general lighting* within toplit *zones* complying with Section ~~C402.4.4.2~~ C405.2.3.3.

Exceptions: Daylight responsive controls are not required for the following:
1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.4.
4. Sidelit zones on the first floor above grade in Group A-2 and Group M occupancies.

C405.2.3.1 Daylight-responsive control function. Where required, *daylight-responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in toplit *zones* in accordance with Section ~~C402.4.4.2~~ C405.2.3.3 shall be controlled independently of lights in sidelit *zones* in accordance with Section ~~C402.4.4.1~~ C405.2.3.2.
2. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel.
3. Calibration mechanisms shall be r*eadily accessible*.
4. Where located in offices, classrooms, laboratories and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to 15 percent of full light output or lower.
5. *Daylight responsive controls* shall be capable of a complete shutoff of all controlled lights.
6. Lights in sidelit *zones* in accordance with Section ~~C402.4.4.1~~ C405.2.3.2 facing different cardinal orientations [i.e., within 45 degrees (0.79 rad) of due north, east, south, west] shall be controlled independently of each other.
   Exception: Up to 150 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

~~C402.4.4.1~~C405.2.3.2 Sidelit zone. *No change to text.*

~~C402.4.4.2~~C405.2.3.3 Toplit zone. *No change to text.*

Commenter's Reason: The proposal points out an important deficiency in the current code, namely that users of Section C402.4 may not know that there are clearly defined requirements for daylight zones in Section C405. However, there is a much easier fix than what is proposed. Rather than relocating all of the daylight zone content from the lighting section to the envelope section, we should just provide a reference in the envelope section to the appropriate requirements in the lighting section. This has several advantages:

1. By the time the 2018 code is published users will have had three years to learn that the daylight zone requirements are located in Section C405. Why move it and confuse them?
2. When users see 2 pages of new content (all marked as a revision in the code book) in the envelope section, they will need to read through it all carefully to see if it was changed at the same time it was moved. In this case, less change is better.
3. Most importantly, we should consider where this content belongs in the long run. Where is it most likely to be found by the people who need it? We would argue that for every new construction project where an envelope is being built, there are at least 5 alterations where lighting controls are being provided. People who design lighting control systems will be referring to these requirements vastly more frequently than people who design building envelopes.

The changes that were offered as a floor modification and approved by committee are good, and should remain in the proposal. This comment deals only with the issue of where the content should be located.

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Final Action Results

CE102-16	**AMPC1**

Code Change No: CE108-16

Original Proposal

Section(s): C402.5.1.1

Proponent: Howard Ahern, representing Airex Mfg. (howard.ahern@airexmfg.com)

Revise as follows:

C402.5.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. Sealing of concealed fire sprinklers, where required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings. Refrigerent piping penetrations shall be sealed by gasketing and mechanically secured.
4. Recessed lighting fixtures shall comply with Section C402.5.8. Where similar objects are installed that penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

Reason: This change simply allows for a mechanical sealing system for penetrations. Mechanical sealing system are used for some types of penetrations such as refrigerant piping which needs to specifically address vibration problems associated with sustainable sealing of the penetration and transfer of vibration energy.

Cost Impact: Will not increase the cost of construction
Will not increase cost of construction as this change simply allows an option for a mechanically sealed systems which are already being used in construction

Report of Committee Action Hearings

Committee Action: **As Modified**

Modify as follows:

C402.5.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Sealing shall allow for expansion and contraction of dissilimar materials and

mechanical vibration. Joints and seals associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. Sealing of concealed fire sprinklers, where required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.~~Refrigerent piping penetrations shall be sealed by gasketing and mechanically secured~~.
4. Recessed lighting fixtures shall comply with Section C402.5.8. Where similar objects are installed that penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

Committee Reason: Approval is based on the proponent's published reason statements. The modification provides improved language regarding intent.

Assembly Action: **None**

Public Comments

Public Comment 1:

Hugo Aguilar, representing American Supply Association (haguilar@asa.net) requests Approve as Modified by this Public Comment.

Further modify as follows:

C402.5.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Sealing shall allow for expansion and contraction~~ of dissimilar materials~~, and mechanical vibration. Joints and seals associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. Sealing of concealed fire sprinklers, where required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.
4. Recessed lighting fixtures shall comply with Section C402.5.8. Where similar objects are installed that penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

Commenter's Reason: The Committee modification added the language "dissimilar metals." However, there was no reason provided as to why this change was made. The submitter did not mentioned anything about dissimilar metals in the the reason statement. The proposed modification will provide clarity in regards to the prevention of expansion and contraction on all metals; and not only dissimilar metals.

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Final Action Results

CE108-16	AMPC1

Code Change No: CE109-16

Original Proposal

Section(s): C402.5.1.1

Proponent: Hope Medina, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Revise as follows:

C402.5.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and ~~seals~~ seams associated with penetrations shall be sealed in the same manner or taped or covered with ~~moisture vapor-permeable~~ moisture-vapor permeable wrapping material. Sealing materials ~~shall be appropriate to the construction materials being sealed and~~ shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. Sealing of concealed fire sprinklers, where required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.
4. Recessed lighting fixtures shall comply with Section C402.5.8. Where similar objects are installed that penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

Reason: Delete hyphen between vapor and permeable, move it between moisture and vapor. Already says in the first sentence that the sealing material has to be compatible with the construction material and location. Why say it again?

Cost Impact: Will not increase the cost of construction
rewording existing text

Report of Committee Action Hearings

Committee Action: **As Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action: **None**

Public Comments

Public Comment 1:

Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz) requests Approve as Modified by this Public Comment.

Modify as follows:

C402.5.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seams associated with penetrations shall be sealed in the same manner or taped ~~or covered with moisture vapor permeable wrapping material~~. Sealing materials shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. Sealing of concealed fire sprinklers, where required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.
4. Recessed lighting fixtures shall comply with Section C402.5.8. Where similar objects are installed that penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

Commenter's Reason: Wrapping materials are not typically adhesive or sealing materials such that they can be used to seal a penetration against air leakage. Simply covering a penetration joint with such materials will not prevent air leakage. Thus, joints in an air barrier at penetrating elements must be sealed using tape or other sealing material. This public comment corrects this problem and clarifies the code with respect to penetrations in an air barrier.

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Final Action Results

CE109-16	**AMPC1**

BACK

Code Change No: CE113-16

Original Proposal

Section: C402.5.2

Proponent: Joseph Hetzel, representing American Association of Automatic Door Manufacturers (Jhetzel@thomasamc.com); John Woestman, Kellen (jwoestman@kellencompany.com)

Revise as follows:

TABLE C402.5.2
MAXIMUM AIR LEAKAGE RATE FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE(CFM/FT^2)	TEST PROCEDURE
Windows	0.20 [a]	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Sliding doors	0.20 [a]	
Swinging doors	0.20 [a]	
Skylights – with condensation weepage openings	0.30	
Skylights – all other	0.20 [a]	
Curtain walls	0.06	NFRC 400 or ASTM E 283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	1.00	
Power-operated sliding doors and power-operated folding doors	1.00	
Revolving doors	1.00	
Garage doors	0.40	ANSI/DASMA 105, NFRC 400, or ASTM E 283 at 1.57 psf (75 Pa)
Rolling doors	1.00	
High-speed doors	1.30	

For SI: 1 cubic foot per minute = 0.47L/s, 1 square foot = 0.093 m^2.
a. The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).

Reason: Per the current Table, it can be interpreted that the value for "sliding doors" encompasses both manual sliding doors, used primarily in residential dwelling applications, and power-operated sliding doors, used primarily in non-residential applications. The maximum air leakage rate for power-operated sliding doors, and for power-operated folding doors, should be differentiated from "sliding doors" similar to how commercial glazed swinging entrance doors are differentiated from "swinging doors" for the following reasons:

- Power-operated sliding and power-operated folding door designs must accommodate a high number of repeated openings and closings similar to such accommodation for commercial glazed swinging entrance doors.
- For emergency egress situations, power-operated sliding and power-operated folding doors must be capable of "breakout" to allow emergency egress when the power is out. Breakout almost always entails designing the door panels of these doors to hinge similar to a swinging door (i.e. breakout) when adequate force is applied to the door panel. Thus, the perimeter air leakage sealing principles for commercial swinging entrance doors are similar to those for power-operated sliding and power-operated folding doors.
- Sealing any power-operated door at the floor is very difficult to achieve for commercial service durability because such doors must meet ADA / accessibility requirements. These requirements involve a low / flat threshold, and the requirement to allow for door breakout as required for egress.

Additionally, the IBC currently requires power-operated sliding doors and power-operated folding doors to comply with BHMA A156.10. Approved revisions to the 2018 IBC will require low-energy power-operated doors of these configurations to comply with

BHMA A156.38. Extensive technical requirements for breakout and other safety-related requirements are included in both of these standards.

Cost Impact: Will not increase the cost of construction
The cost could theoretically decrease since a reduction in materials could occur, yet the building industry would be provided with an acceptable level of air leakage resistance.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE113-16	**AS**

Code Change No: CE114-16 Part I

Original Proposal

Section: C402.5.3

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C402.5.3 Rooms containing fuel-burning appliances. In *Climate Zones* 3 through 8, where ~~open~~ combustion air ~~ducts provide combustion air~~ is supplied through openings in an exterior wall to ~~open combustion~~ a room or space ~~conditioning~~ containing a space-conditioning fuel-burning ~~appliances~~ appliance, one of the ~~appliances and combustion air openings~~ following shall apply:

1. The room or space containing the appliance shall be located outside of the *building thermal envelope*.
2. The room or space containing the appliance shall be enclosed ~~in a room~~ and isolated from conditioned spaces inside the building thermal envelope. Such rooms shall ~~be sealed and insulated in accordance~~ comply with ~~the envelope requirements~~ all of ~~Table C402.1.3 or C402.1.4, where~~ the following.
   - 2.1. The walls, floors and ceilings ~~shall meet~~ that separate the ~~minimum~~ enclosed room or space from conditioned spaces shall be insulated to be at least equivalent to the insulation requirement of below grade walls as specified in Table C402.1.3 or C402.1.4.
   - 2.2. The walls, floors and ceilings that separate the ~~below-grade wall *R*-value requirement~~ enclosed room or space from conditioned spaces shall be sealed in accordance with Section C402.5.1.1.
   - 2.3. The ~~door~~ doors into the enclosed room or space shall be fully gasketed~~, and any water~~.
   - 2.4. Water lines and ducts in the enclosed room or space shall be insulated in accordance with Section C403. ~~The~~
   - 2.5. Where the air duct supplying combustion air ~~duct shall be insulated, where it~~ to the enclosed room or space passes through conditioned space, the duct shall be insulated to ~~a minimum~~ an R-value of not less than R-8.

~~Exceptions~~ Exception:

~~1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.~~

2. Fireplaces and stoves complying with Sections 901 through 905 of the International Mechanical Code, and Section 2111.13 of the International Building Code.

Reason: The intent of this section as it was proposed for the 2015 edition of the code was to deal with spaces where air comes in unrestricted to a place where the fuel burning appliance is located. The section then outlines 2 ways you can deal with it - 1 - keep it outside the thermal envelope, or 2 - if you want it located in a space that is within the thermal envelope, you need to build an 'isolation' chamber - what the section calls an enclosed room or space. The intent of SEHPCAC was to revise this section so that these 2 options are clear. We don't find them clear in the single paragraph format currently found in the 2015 code. The revised wording changes the focus from the appliance to the fact that air is penetrating the building envelope.

There is one apparent substantive change which is removing of the exception for direct vent appliances. With the rewording of the section to focus on air coming through the walls unrestricted, the exception is not needed as a direct vent appliance has vents to the outdoors connected to the appliance.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal is an editorial repackaging of the requirement. There is no change to the technical requirements of the code.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The proposal restructures the text to make the intent more clear.

Assembly Motion: **Disapprove**

Online Vote Results: **Failed**
Support: 33.64% (73) Oppose: 66.36% (144)

Assembly Action **None**

Final Action Results

CE114-16 Part I	**AS**

Code Change No: CE116-16

Original Proposal

Section: C402.5.6

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C402.5.6 Loading dock weatherseals. Cargo doors and loading dock ~~doors~~ door openings shall be equipped with weatherseals ~~to~~ that restrict infiltration ~~when~~ and provide direct contact along the top and sides of vehicles ~~are~~ parked in the doorway.

Reason: This provision has been in the IECC for over 10 years and has posed challenges to enforcement because the term 'restrict infiltration' is somewhat subjective in that any weatherseal no matter how good or bad will restrict infiltration. Ideally there would be a test standard upon which to measure and express the air leakage of these products and then an acceptable/unacceptable limit as a function of door area, door perimeter, etc. could be established. In the absence of such a method of test and the ability to effectively study costs of such products as a function of some standardized method of test/leakage results the proposed change provides a more meaningful criterion to address the issue of air leakage at these doors. Specifically, we believe a criterion that the weatherseal provide continuous contact with the top and sides of the vehicle being serviced (along the bottom is not feasible for obvious reasons) supports the intent of reducing air leakage into or out of the space served than does a criterion to 'restrict infiltration'. Technically, compared to not installing a weatherseal at all one could be installed that had marginal contact across the top of the vehicle but nowhere else and considered as restricting infiltration (because it is better than nothing). The proposed change provides those who must document or verify compliance with the code with more specific and enforceable provisions.
This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will increase the cost of construction
It is assumed that the loading dock seals needed to comply with this revised criteria will likely be more costly equipment than is often used today. This would be a first cost. Any increase in first cost of construction (or overall operating cost reductions due to the change over the life of the building or product) cannot be determined because the current criterion is subjective in nature so a baseline for establishing an air leakage rate under the current code and comparing it to what results when the weather seal is in contact with the vehicle as proposed is not possible.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The proposed text is more understandable as to the actual intent. It is not the door, rather the door opening.

Assembly Action **None**

Final Action Results

CE116-16	**AS**

Code Change No: CE119-16

Original Proposal

Section: C403, C403.1, C403.11 (New), C403.12 (New), C403.2, C403.2.1, C403.2.10, C403.2.10.1, C403.2.11, C403.2.12, C403.2.12.1, C403.2.12.2, C403.2.12.3, C403.2.13, C403.2.14, C403.2.15, C403.2.16, C403.2.17, C403.2.2, C403.2.3, C403.2.3.1, C403.2.3.2, C403.2.4, C403.2.4.1, C403.2.4.1.1, C403.2.4.1.2, C403.2.4.1.3, C403.2.4.2, C403.2.4.2.1, C403.2.4.2.2, C403.2.4.2.3, C403.2.4.3, C403.2.4.4, C403.2.4.5, C403.2.4.6, C403.2.4.7, C403.2.5, C403.2.6, C403.2.6.1, C403.2.6.2, C403.2.7, C403.2.8, C403.2.9, C403.2.9.1, C403.2.9.1.1, C403.2.9.1.2, C403.2.9.1.3, C403.3, C403.3 (New), C403.3.1, C403.3.2, C403.3.3, C403.3.3.1, C403.3.3.2, C403.3.3.3, C403.3.3.4, C403.3.3.5, C403.3.4, C403.3.4.1, C403.3.4.2, C403.4, C403.4 (New), C403.4.1, C403.4.1.1, C403.4.1.2, C403.4.1.3, C403.4.2, C403.4.2.1, C403.4.2.2, C403.4.2.3, C403.4.2.3.1, C403.4.2.3.2, C403.4.2.3.2.1, C403.4.2.3.2.2, C403.4.2.3.3, C403.4.2.4, C403.4.2.5, C403.4.2.6, C403.4.3, C403.4.3.1, C403.4.3.2, C403.4.3.2.1, C403.4.3.2.2, C403.4.3.3, C403.4.3.4, C403.4.4, C403.4.4.1, C403.4.4.2, C403.4.4.3, C403.4.4.4, C403.4.4.5, C403.4.4.6, C403.4.5, C403.4.6, C403.5, C403.5.1, C403.5.2, C403.7 (New), C403.8.1 (New)

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

SECTION C403
BUILDING MECHANICAL SYSTEMS

Revise as follows:

C403.1 General. Mechanical systems and equipment serving the building heating, cooling, ventilating or ~~ventilating~~ refrigeration needs shall comply with ~~Section C403.2 and shall comply with Sections C403.3 and C403.4 based on the equipment and systems provided.~~

~~Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with~~ this Section ~~C403.2.15 or 403.2.16~~.

~~C403.2.11~~ C403.1.1 Mechanical systems commissioning and completion requirements. *No change to text.*

~~C403.2.1~~ C403.1.2 Calculation of heating and cooling loads. *No change to text.*

C403.2 ~~Provisions applicable to all mechanical systems (Mandatory).~~System design Mechanical systems ~~and equipment serving the building heating, cooling or ventilating needs~~ shall be designed to comply with Sections C403.2.1 and C403.2.2. Where elements of a building's mechanical systems are addressed in Sections C403.3 through ~~C403.2.16~~C403.12, such elements shall comply with the applicable provisions of those sections.

~~C403.2.4.4~~ C403.2.1 Zone isolation~~.~~ required.(Mandatory) HVAC systems serving *zones* that are over 25,000 square feet (2323 m^2) in floor area or that span more than one floor and are designed to operate or be occupied nonsimultaneously shall be divided into isolation areas. Each isolation area shall be equipped with isolation devices and controls configured to automatically shut off the supply of conditioned air and outdoor air to and exhaust air from the isolation area. Each isolation area shall be controlled independently by a device meeting the requirements of Section ~~C403.2.4.2.2~~ C403.4.2.2. Central systems and plants shall be provided with controls and devices that will allow system and equipment operation for any length of time while serving only the smallest isolation area served by the system or plant.

Exceptions:

1. Exhaust air and outdoor air connections to isolation areas where the fan system to which they connect is not greater than 5,000 cfm (2360 L/s).
2. Exhaust airflow from a single isolation area of less than 10 percent of the design airflow of the exhaust system to which it connects.
3. Isolation areas intended to operate continuously or intended to be inoperative only when all other isolation areas in a *zone* are inoperative.

~~C403.2.6~~ C403.2.2 Ventilation (Mandatory). *No change to text.*

Add new text as follows:

C403.3 Heating and cooling equipment efficiencies (Mandatory) Heating and cooling equipment installed in mechanical systems shall be sized in accordance with Section C403.3.1 and shall be not less efficient in the use of energy than as specified in Section C403.3.2.

Revise as follows:

~~C403.2.2~~ C403.3.1 Equipment sizing. The output capacity of heating and cooling equipment shall be not greater than the loads calculated in accordance with Section ~~C403.2.1~~ C403.1.2. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.

~~C403.2.3~~ C403.3.2 HVAC equipment performance requirements~~.~~.(Mandatory) Equipment shall meet the minimum efficiency requirements of Tables ~~C403.2.3(1)~~ C403.3,2(1), ~~C403.2.3(2)~~ C403.3.2(2), ~~C403.2.3(3)~~ C403.3.2(3), ~~C403.2.3(4)~~ C403.3.2(4), ~~C403.2.3(5)~~ C403.3.2(5), ~~C403.2.3(6)~~ C403.3.2(6), ~~C403.2.3(7)~~ C403.3.2(7), ~~C403.2.3(8)~~ C403.3.2(8) ~~and C403.2.3(9)~~ or C403.3.2(9) when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of Table ~~C403.2.3(10)~~ C403.3.2(10). The efficiency shall be verified through certification under an *approved* certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

TABLE ~~C403.2.3(1)~~ C403.3.2(1)
MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	As of 1/1/2016	
Air conditioners, air cooled	b	All	Split System	13.0 SEER	13.0 SEER	AHRI 210/240
			Single Package	13.0 SEER	14.0 SEER[c]	
Through-the-wall (air cooled)	≤ 30,000 Btu/h[b]	All	Split system	12.0 SEER	12.0 SEER	
			Single Package	12.0 SEER	12.0 SEER	
Small-duct high-velocity (air cooled)	b	All	Split System	11.0 SEER	11.0 SEER	
Air conditioners, air cooled	≥ 65,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	11.2 EER 11.4 IEER	11.2 EER 12.8 IEER	AHRI 340/360
		All other	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 12.6 IEER	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 12.4 IEER	
		All other	Split System and Single Package	10.8 EER 11.0 IEER	10.8 EER 12.2 IEER	
	≥ 240,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	10.0 EER 10.1 IEER	10.0 EER 11.6 IEER	
		All other	Split System and Single Package	9.8 EER 9.9 IEER	9.8 EER 11.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.7 EER 9.8 IEER	9.7 EER 11.2 IEER	
		All other	Split System and Single Package	9.5 EER 9.6 IEER	9.5 EER 11.0 IEER	
Air conditioners, water cooled	b	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 13.9 IEER	AHRI 340/360
		All other	Split System and Single Package	11.9 EER 12.1 IEER	11.9 EER 13.7 IEER	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	12.5 EER 12.5 IEER	12.5 EER 13.9 IEER	
		All other	Split System and Single Package	12.3 EER 12.5 IEER	12.3 EER 13.7 IEER	
	≥ 240,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	12.4 EER 12.6 IEER	12.4 EER 13.6 IEER	
		All other	Split System and Single Package	12.2 EER 12.4 IEER	12.2 EER 13.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.2 EER 12.4 IEER	12.2 EER 13.5 IEER	

		All other	Split System and Single Package	12.0 EER 12.2 IEER	12.0 EER 13.3 IEER	
Air conditioners, evaporatively cooled	b	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split System and Single Package	11.9 EER 12.1 IEER	11.9 EER 12.1 IEER	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	12.0 EER 12.2 IEER	12.0 EER 2.2 IEER	
		All other	Split System and Single Package	11.8 EER 12.0 IEER	11.8 EER 12.0 IEER	
	≥ 240,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	11.9 EER 12.1 IEER	11.9 EER 2.1 IEER	
		All other	Split System and Single Package	11.7 EER 11.9 IEER	11.7 EER 11.9 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.7 EER 11.9 IEER	11.7 EER 11.9 IEER	
		All other	Split System and Single Package	11.5 EER 11.7 IEER	11.5 EER 11.7 IEER	
Condensing units air cooled	≥ 135,000 Btu/h			10.5 EER 11.8 IEER	10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h			13.5 EER 14.0 IEER	13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h			13.5 EER 14.0 IEER	13.5 EER 14.0 IEER	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

c. Minimum efficiency as of January 1, 2015.

TABLE ~~C403.2.3(2)~~ C403.3.2(2)
MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	As of 1/1/2016	
Air cooled (cooling mode)	b	All	Split System	13.0 SEER[c]	14.0 SEER[c]	AHRI 210/240
			Single Package	13.0 SEER[c]	14.0 SEER[c]	
Through-the-wall, air cooled	≤ 30,000 Btu/h[b]	All	Split System	12.0 SEER	12.0 SEER	
			Single Package	12.0	12.0	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY Before 1/1/2016	MINIMUM EFFICIENCY As of 1/1/2016	TEST PROCEDURE[a]
				SEER	SEER	
Single-duct high-velocity air cooled	b	All	Split System	11.0 SEER	11.0 SEER	
Air cooled (cooling mode)	≥ 65,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 12.0 IEER	AHRI 340/360
		All other	Split System and Single Package	10.8 EER 11.0 IEER	10.8 EER 11.8 IEER	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	10.6 EER 10.7 IEER	10.6 EER 11.6 IEER	
		All other	Split System and Single Package	10.4 EER 10.5 IEER	10.4 EER 11.4 IEER	
	≥ 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.5 EER 9.6 IEER	9.5 EER 10.6 IEER	
		All other	Split System and Single Package	9.3 EER 9.4 IEER	9.3 EER 9.4 IEER	
Water to Air: Water Loop (cooling mode)		All	86°F entering water	12.2 EER	12.2 EER	ISO 13256-1
	≥ 17,000 Btu/h and	All	86°F entering water	13.0 EER	13.0 EER	
	≥ 65,000 Btu/h and	All	86°F entering water	13.0 EER	13.0 EER	
Water to Air: Ground Water (cooling mode)		All	59°F entering water	18.0 EER	18.0 EER	ISO 13256-1
Brine to Air: Ground Loop (cooling mode)		All	77°F entering water	14.1 EER	14.1 EER	ISO 13256-1
Water to Water: WaterLoop (cooling mode)		All	86°F entering water	10.6 EER	10.6 EER	ISO 13256-2
Water to Water: Ground Water (cooling mode)		All	59°F entering water	16.3 EER	16.3 EER	
Brine to Water: Ground Loop (cooling mode)		All	77°F entering fluid	12.1 EER	12.1 EER	
Air cooled (heating mode)	b	—	Split System	7.7 HSPF[c]	8.2 HSPF[c]	AHRI 210/240
		—	Single Package	7.7 HSPF[c]	8.0 HSPF[c]	
Through-the-wall, (air cooled, heating mode)	≤ 30,000 Btu/h[b]	—	Split System	7.4 HSPF	7.4 HSPF	

	(cooling capacity)	—	Single Package	7.4 HSPF	7.4 HSPF	
Small-duct high velocity (air cooled, heating mode)	b	—	Split System	6.8 HSPF	6.8 HSPF	
Air cooled (heating mode)	≥ 65,000 Btu/h and (cooling capacity)	—	47ºF db/43ºF wb outdoor air	3.3 COP	3.3 COP	AHRI 340/360
			17ºF db/15ºF wb outdoor air	2.25 COP	2.25 COP	
	≥ 135,000 Btu/h (cooling capacity)	—	47ºF db/43ºF wb outdoor air	3.2 COP	3.2 COP	
			17ºF db/15ºF wb outdoor air	2.05 COP	2.05 COP	
Water to Air: Water Loop (heating mode)	(cooling capacity)	—	68°F entering water	4.3 COP	4.3 COP	ISO 13256-1
Water to Air: Ground Water (heating mode)	(cooling capacity)	—	50°F entering water	3.7 COP	3.7 COP	
Brine to Air: Ground Loop (heating mode)	(cooling capacity)	—	32°F entering fluid	3.2 COP	3.2 COP	
Water to Water: Water Loop (heating mode)	(cooling capacity)	—	68°F entering water	3.7 COP	3.7 COP	ISO 13256-2
Water to Water: Ground Water (heating mode)	(cooling capacity)	—	50°F entering water	3.1 COP	3.1 COP	
Brine to Water: Ground Loop (heating mode)	(cooling capacity)	—	32°F entering fluid	2.5 COP 2.5 COP		

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

c. Minimum efficiency as of January 1, 2015.

TABLE ~~C403.2.3(3)~~ C403.3.2(3)

MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS, PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS. SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
PTAC (cooling mode) new construction	All Capacities	95°F db outdoor air	14.0 – (0.300 × Cap/1000) EER[c]	AHRI 310/380
PTAC (cooling mode) replacements[b]	All Capacities	95°F db outdoor air	10.9 - (0.213 × Cap/1000) EER	
PTHP (cooling mode) new construction	All Capacities	95°F db outdoor air	14.0 - (0.300 × Cap/1000) EER	
PTHP (cooling mode) replacements[b]	All Capacities	95°F db outdoor air	10.8 - (0.213 × Cap/1000) EER	
PTHP (heating mode) new construction	All Capacities	—	3.2 - (0.026 × Cap/1000) COP	
PTHP (heating mode) replacements[b]	All Capacities	—	2.9 - (0.026 × Cap/1000) COP	
SPVAC (cooling mode)		95°F db/ 75°F wb outdoor air	9.0 EER	AHRI 390
	≥ 65,000 Btu/h and	95°F db/ 75°F wb outdoor air	8.9 EER	
	≥ 135,000 Btu/h	95°F db/ 75°F wb outdoor	8.6 EER	

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
	and	air		
SPVHP (cooling mode)		95°F db/ 75°F wb outdoor air	9.0 EER	
	≥ 65,000 Btu/h and	95°F db/ 75°F wb outdoor air	8.9 EER	
	≥ 135,000 Btu/h and	95°F db/ 75°F wb outdoor air	8.6 EER	
SPVHP (heating mode)		47°F db/ 43°F wb outdoor air	3.0 COP	AHRI 390
	≥ 65,000 Btu/h and	47°F db/ 43°F wb outdoor air	3.0 COP	
	≥ 135,000 Btu/h and	47°F db/ 75°F wb outdoor air	2.9 COP	
Room air conditioners, with louvered sides		—	9.7 SEER	ANSI/ AHAM RAC-1
	≥ 6,000 Btu/h and	—	9.7 EER	
	≥ 8,000 Btu/h and	—	9.8 EER	
	≥ 14,000 Btu/h and	—	9.7 SEER	
	≥ 20,000 Btu/h	—	8.5 EER	
Room air conditioners, without louvered sides		—	9.0 EER	
	≥ 8,000 Btu/h and	—	8.5 EER	
	≥ 20,000 Btu/h	—	8.5 EER	
Room air-conditioner heat pumps with louvered sides		—	9.0 EER	
	≥ 20,000 Btu/h	—	8.5 EER	
Room air-conditioner heat pumps without louvered sides		—	8.5 EER	
	≥ 14,000 Btu/h	—	8.0 EER	
Room air conditioner casement only	All capacities	—	8.7 EER	ANSI/ AHAM RAC-1
Room air conditioner casement-slider	All capacities	—	9.5 EER	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8, wb = wet bulb, db = wet bulb.
"Cap" = The rated cooling capacity of the project in Btu/h. Where the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. Where the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculations.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Replacement unit shall be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY: NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches (406 mm) in height and less than 42 inches (1067 mm) in width.

c. Before January 1, 2015 the minimum efficiency shall be 13.8 - (0.300 x Cap/1000) EER.

TABLE ~~C403.2.3(4)~~ C403.3.2(4)
WARM-AIR FURNACES AND COMBINATION WARM-AIR FURNACES/AIR-CONDITIONING UNITS, WARM-AIR DUCT FURNACES AND UNIT HEATERS, MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[d, e]	TEST PROCEDURE[a]
Warm-air furnaces, gas fired		—	78% AFUE or 80%E_t[c]	DOE 10 CFR Part 430 or ANSI Z21.47
	≥ 225,000 Btu/h	Maximum capacity[b]	80%E_t[f]	ANSI Z21.47
Warm-air furnaces, oil fired		—	78% AFUE or 80%E_t[c]	DOE 10 CFR Part 430 or UL 727
	≥ 225,000 Btu/h	Maximum capacity[b]	81%E_t[g]	UL 727
Warm-air duct furnaces, gas fired	All capacities	Maximum capacity[b]	80%E_c	ANSI Z83.8
Warm-air unit heaters, gas fired	All capacities	Maximum capacity[b]	80%E_c	ANSI Z83.8
Warm-air unit heaters, oil fired	All capacities	Maximum capacity[b]	80%E_c	UL 731

For SI: 1 British thermal unit per hour = 0.2931 W.
a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Minimum and maximum ratings as provided for and allowed by the unit's controls.
c. Combination units not covered by the National Appliance Energy Conservation Act of 1987 (NAECA) (3-phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]) shall comply with either rating.
d. E_t = Thermal efficiency. See test procedure for detailed discussion.
e. E_c = Combustion efficiency (100% less flue losses). See test procedure for detailed discussion.
f. E_c = Combustion efficiency. Units shall also include an IID, have jackets not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.
g. E_t = Thermal efficiency. Units shall also include an IID, have jacket losses not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

TABLE ~~C403.2.3(5)~~ C403.3.2(5)
MINIMUM EFFICIENCY REQUIREMENTS: GAS- AND OIL-FIRED BOILERS

EQUIPMENT TYPE[a]	SUBCATEGORY OR RATING CONDITION	SIZE CATEGORY (INPUT)	MINIMUM EFFICIENCY[d, e]	TEST PROCEDURE
Boilers, hot water	Gas-fired		80% AFUE	10 CFR Part 430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	80% E_t	10 CFR Part 431
		> 2,500,000 Btu/h[a]	82% E_c	
	Oil-fired[c]		80% AFUE	10 CFR Part 430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	82% E_t	10 CFR Part 431
		> 2,500,000 Btu/h[a]	84% E_c	
Boilers, steam	Gas-fired		75% AFUE	10 CFR Part 430
	Gas-fired- all, except natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	79% E_t	10 CFR Part 431
		> 2,500,000 Btu/h[a]	79% E_t	
	Gas-fired-natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	77% E_t	
		> 2,500,000 Btu/h[a]	77% E_t	
	Oil-fired[c]		80% AFUE	10 CFR Part

EQUIPMENT TYPE[a]	SUBCATEGORY OR RATING CONDITION	SIZE CATEGORY (INPUT)	MINIMUM EFFICIENCY[d, e]	TEST PROCEDURE
				430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	81% E_t	10 CFR Part 431
		> 2,500,000 Btu/h[a]	81% E_t	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. These requirements apply to boilers with rated input of 8,000,000 Btu/h or less that are not packaged boilers and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers.

b. Maximum capacity – minimum and maximum ratings as provided for and allowed by the unit's controls.

c. Includes oil-fired (residual).

d. E_c = Combustion efficiency (100 percent less flue losses).

e. E_t = Thermal efficiency. See referenced standard for detailed information.

TABLE ~~C403.2.3(6)~~ C403.3.2(6)
MINIMUM EFFICIENCY REQUIREMENTS: CONDENSING UNITS, ELECTRICALLY OPERATED

EQUIPMENT TYPE	SIZE CATEGORY	MINIMUM EFFICIENCY[b]	TEST PROCEDURE[a]
Condensing units, air cooled	≥ 135,000 Btu/h	10.1 EER 11.2 IPLV	AHRI 365
Condensing units, water or evaporatively cooled	≥ 135,000 Btu/h	13.1 EER 13.1 IPLV	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. IPLVs are only applicable to equipment with capacity modulation.

TABLE ~~C403.2.3(7)~~ C403.3.2(7)
WATER CHILLING PACKAGES – EFFICIENCY REQUIREMENTS[a, b, d]

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	BEFORE 1/1/2015		AS OF 1/1/2015		TEST PROCEDURE[c]
			Path A	Path B	Path A	Path B	
Air-cooled chillers	< 150 Tons	EER (Btu/W)	≥ 9.562 FL	NA[c]	≥ 10.100 FL	≥ 9.700 FL	AHRI 550/590
			≥ 12.500 IPLV		≥ 13.700 IPLV	≥ 15,800 IPLV	
	≥ 150 Tons		≥ 9.562 FL	NA[c]	≥ 10.100 FL	≥ 9.700 FL	
			≥ 12.500 IPLV		≥ 14.000 IPLV	≥ 16.100 IPLV	
Air cooled without condenser, electrically operated	All capacities	EER (Btu/W)	Air-cooled chillers without condenser shall be rated with matching condensers and complying with air-cooled chiller efficiency requirements.				
Water cooled, electrically operated positive displacement		kW/ton	≤ 0.780 FL	≤ 0.800 FL	≤ 0.750 FL	≤ 0.780 FL	
			≤ 0.630 IPLV	≤ 0.600 IPLV	≤ 0.600 IPLV	≤ 0.500 IPLV	
	≥75 tons and		≤ 0.775 FL	≤ 0.790 FL	≤ 0.720 FL	≤ 0.750 FL	
			≤ 0.615 IPLV	≤ 0.586 IPLV	≤ 0.560 IPLV	≤ 0.490 IPLV	
	≥ 150 tons and		≤ 0.680 FL	≤ 0.718 FL	≤ 0.660 FL	≤ 0.680 FL	
			≤ 0.580 IPLV	≤ 0.540 IPLV	≤ 0.540 IPLV	≤ 0.440 IPLV	
	≥ 300 tons and		≤ 0.620 FL	≤ 0.639 FL	≤ 0.610 FL	≤ 0.625 FL	
			≤ 0.540 IPLV	≤ 0.490 IPLV	≤ 0.520 IPLV	≤ 0.410 IPLV	
	≥ 600 tons		≤ 0.620 FL	≤ 0.639 FL	≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.540 IPLV	≤ 0.490 IPLV	≤ 0.500 IPLV	≤ 0.380 IPLV	
Water cooled, electrically operated	< 150 Tons	kW/ton	≤ 0.634 FL	≤ 0.639 FL	≤ 0.610 FL	≤ 0.695 FL	
			≤ 0.596 IPLV	≤ 0.450	≤ 0.550 IPLV	≤ 0.440 IPLV	

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	BEFORE 1/1/2015		AS OF 1/1/2015		TEST PROCEDURE[c]
			Path A	Path B	Path A	Path B	
centrifugal				IPLV			
	≥ 150 tons and		≤ 0.634 FL	≤ 0.639 FL	≤ 0.610 FL	≤ 0.635 FL	
			≤ 0.596 IPLV	≤ 0.450 IPLV	≤ 0.550 IPLV	≤ 0.400 IPLV	
	≥ 300 tons and		≤ 0.576 FL	≤ 0.600 FL	≤ 0.560 FL	≤ 0.595 FL	
			≤ 0.549 IPLV	≤ 0.400 IPLV	≤ 0.520 IPLV	≤ 0.390 IPLV	
	≥ 400 tons and		≤ 0.576 FL	≤ 0.600 FL	≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.549 IPLV	≤ 0.400 IPLV	≤ 0.500 IPLV	≤ 0.380 IPLV	
	≥ 600 Tons		≤ 0.570 FL	≤ 0.590 FL	≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.539 IPLV	≤ 0.400 IPLV	≤ 0.500 IPLV	≤ 0.380 IPLV	
Air cooled, absorption, single effect	All capacities	COP	≥ 0.600 FL	NA[c]	≥ 0.600 FL	NA[c]	AHRI 560
Water cooled absorption, single effect	All capacities	COP	≥ 0.700 FL	NA[c]	≥ 0.700 FL	NA[c]	
Absorption, double effect, indirect fired	All capacities	COP	≥ 1.000 FL	NA[c]	≥ 1.000 FL	NA[c]	
			≥ 1.050 IPLV		≥ 1.050 IPLV		
Absorption double effect direct fired	All capacities	COP	≥ 1.000 FL	NA[c]	≥ 1.000 FL	NA[c]	
			≥ 1.000 IPLV		≥ 1.050 IPLV		

a. The requirements for centrifugal chiller shall be adjusted for nonstandard rating conditions in accordance with Section ~~C403.2.3.1~~C403.3.2.1 and are only applicable for the range of conditions listed in Section ~~C403.2.3.1~~C403.3.2.1. The requirements for air-cooled, water-cooled positive displacement and absorption chillers are at standard rating conditions defined in the reference test procedure.
b. Both the full-load and IPLV requirements shall be met or exceeded to comply with this standard. Where there is a Path B, compliance can be with either Path A or Path B for any application.
c. NA means the requirements are not applicable for Path B and only Path A can be used for compliance.
d. FL represents the full-load performance requirements and IPLV the part-load performance requirements.

TABLE ~~C403.2.3(8)~~ C403.3.2(8)
MINIMUM EFFICIENCY REQUIREMENTS: HEAT REJECTION EQUIPMENT

EQUIPMENT TYPE[a]	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION[i]	PERFORMANCE REQUIRED[b, c, d, g, h]	TEST PROCEDURE[e, f]
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 40.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 14.0 gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal fan closed- circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201
Propeller or axial fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan	All	Ammonia Test Fluid 140°F entering	≥ 110,000	CTI ATC-106

evaporative condensers		gas temperature 96.3°F condensing temperature 75°F entering wb	Btu/h·hp	
Propeller or axial fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 157,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 135,000 Btu/h·hp	CTI ATC-106
Air-cooled condensers	All	125°F Condensing Temperature 190°F Entering Gas Temperature 15°F subcooling 95°F entering db	≥ 176,000 Btu/h·hp	AHRI 460

For SI: °C = [(°F)-32]/1.8, L/s · kW = (gpm/hp)/(11.83), COP = (Btu/h · hp)/(2550.7),
db = dry bulb temperature, °F, wb = wet bulb temperature, °F.

a. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of wet and dry heat exchange sections.

b. For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the fan nameplate-rated motor power.

c. For purposes of this table, closed-circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the sum of the fan nameplate-rated motor power and the spray pump nameplate-rated motor power.

d. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate-rated motor power.

e. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. The certification requirements do not apply to field-erected cooling towers.

f. Where a certification program exists for a covered product and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program; or, where a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report.

g. Cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project-specific accessories and/or options included in the capacity of the cooling tower

h. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power

i. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A shall meet the minimum efficiency requirements listed in this table with R-507A as the test fluid.

TABLE ~~C403.2.3(9)~~ C403.3.2(9)
MINIMUM EFFICIENCY AIR CONDITIONERS AND CONDENSING UNITS SERVING COMPUTER ROOMS

EQUIPMENT TYPE	NET SENSIBLE COOLING CAPACITY[a]	MINIMUM SCOP-127[b] EFFICIENCY DOWNFLOW UNITS / UPFLOW UNITS	TEST PROCEDURE
Air conditioners, air cooled	< 65,000 Btu/h	2.20 / 2.09	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and	2.10 / 1.99	
	≥ 240,000 Btu/h	1.90 / 1.79	
Air conditioners, water cooled	< 65,000 Btu/h	2.60 / 2.49	
	≥ 65,000 Btu/h and	2.50 / 2.39	
	≥ 240,000 Btu/h	2.40 /2.29	
Air conditioners, water cooled with fluid economizer	< 65,000 Btu/h	2.55 /2.44	
	≥ 65,000 Btu/h and	2.45 / 2.34	
	≥ 240,000 Btu/h	2.35 / 2.24	
Air conditioners, glycol cooled (rated at 40% propylene glycol)	< 65,000 Btu/h	2.50 / 2.39	
	≥ 65,000 Btu/h and	2.15 / 2.04	
	≥ 240,000 Btu/h	2.10 / 1.99	
Air conditioners, glycol cooled (rated at	< 65,000 Btu/h	2.45 / 2.34	

EQUIPMENT TYPE	NET SENSIBLE COOLING CAPACITY[a]	MINIMUM SCOP-127[b] EFFICIENCY DOWNFLOW UNITS / UPFLOW UNITS	TEST PROCEDURE
40% propylene glycol) with fluid economizer	≥ 65,000 Btu/h and	2.10 / 1.99	
	≥ 240,000 Btu/h	2.05 / 1.94	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Net sensible cooling capacity: the total gross cooling capacity less the latent cooling less the energy to the air movement system. (Total Gross – latent – Fan Power).

b. Sensible coefficient of performance (SCOP-127): a ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watts (excluding reheaters and humidifiers) at conditions defined in ASHRAE Standard 127. The net sensible cooling capacity is the gross sensible capacity minus the energy dissipated into the cooled space by the fan system.

TABLE ~~C403.2.3(10)~~ C403.3.2(10)
HEAT TRANSFER EQUIPMENT

EQUIPMENT TYPE	SUBCATEGORY	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Liquid-to-liquid heat exchangers	Plate type	NR	AHRI 400

NR = No Requirement.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

~~C403.2.3.1~~ C403.3.2.1 Water-cooled centrifugal chilling packages~~.~~.(Mandatory) Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled-water temperature and 2.4 gpm/ton evaporator fluid flow and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 I/s • kW) condenser water flow shall have maximum full-load kW/ton (FL) and part-load ratings requirements adjusted using Equations 4-6 and 4-7.

$FL_{adj} = FL/K_{adj}$ **(Equation 4-6)**

$PLV_{adj} = \mathrm{IPLV}/K_{adj}$ **(Equation 4-7)**

where:

K_{adj} = $A \times B$

FL = Full-load kW/ton value as specified in Table ~~C403.2.3(7)~~ C403.3.2(7).

FL_{adj} = Maximum full-load kW/ton rating, adjusted for nonstandard conditions.

$IPLV$ = Value as specified in Table ~~C403.2.3(7)~~ C403.3.2(7).

PLV_{adj} = Maximum $NPLV$ rating, adjusted for nonstandard conditions.

A = $0.00000014592 \cdot (LIFT)^4 - 0.0000346496 \cdot (LIFT)^3 + 0.00314196 \cdot (LIFT)^2 - 0.147199 \cdot (LIFT) + 3.9302$

B = $0.0015 \cdot L_{vg}E_{vap} + 0.934$

$LIFT$ = $L_{vg}Cond - L_{vg}E_{vap}$

$L_{vg}Cond$ = Full-load condenser leaving fluid temperature (°F).

$L_{vg}E_{vap}$ = Full-load evaporator leaving temperature (°F).

The FL_{adj} and PLV_{adj} values are only applicable for centrifugal chillers meeting all of the following full-load design ranges:

1. Minimum evaporator leaving temperature: 36°F.
2. Maximum condenser leaving temperature: 115°F.
3. Tweenty°F ≤ $LIFT$ ≤ 80°F.

~~C403.2.3.2~~ C403.3.2.2. Positive displacement (air- and water-cooled) chilling packages (Mandatory). Equipment with a leaving fluid temperature higher than 32°F (0°C) and water-cooled positive displacement chilling packages with a condenser leaving fluid temperature below 115°F (46°C) shall meet the requirements of Table ~~C403.2.3(7)~~ C403.3.2(7) when tested or certified with water at standard rating conditions, in accordance with the referenced test procedure.

~~C403.4.6~~ C403.3.3 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table ~~C403.4.6~~ C403.3.3, as limited by Section ~~C403.3.1~~ C403.5.1..

TABLE ~~C403.4.6~~ C403.3.3
MAXIMUM HOT GAS BYPASS CAPACITY

RATED CAPACITY	MAXIMUM HOT GAS BYPASS CAPACITY (% of total capacity)
≤ 240,000 Btu/h	50
> 240,000 Btu/h	25

For SI: 1 British thermal unit per hour = 0.2931 W.

~~C403.4.2.5~~ C403.3.4 Boiler turndown. *Boiler systems* with design input of greater than 1,000,000 Btu/h (293 kW) shall comply with the turndown ratio specified in Table ~~C403.4.2.5~~ C403.3.4.

The system turndown requirement shall be met through the use of multiple single input boilers, one or more *modulating boilers* or a combination of single input and modulating boilers.

TABLE ~~C403.4.2.5~~ C403.3.4
BOILER TURNDOWN

BOILER SYSTEM DESIGN INPUT (Btu/h)	MINIMUM TURNDOWN RATIO
≥ 1,000,000 and less than or equal to 5,000,000	3 to 1
> 5,000,000 and less than or equal to 10,000,000	4 to 1
> 10,000,000	5 to 1

For SI: 1 British thermal unit per hour = 0.2931 W.

Delete without substitution:

~~**C403.2.4 HVAC system controls.** Each heating and cooling system shall be provided with thermostatic controls as specified in Section C403.2.4.1, C403.2.4.1.3, C403.2.4.2, C403.2.4.3, C403.3.1, C403.4, C403.4.1 or C403.4.4.~~

Add new text as follows:

C403.4 Heating and cooling system controls (Mandatory) Each heating and cooling system shall be provided with controls in accordance with Sections C403.4.1 through C403.4.5.

Revise as follows:

~~C403.2.4.1~~ C403.4.1 Thermostatic controls (Mandatory). The supply of heating and cooling energy to each *zone* shall be controlled by individual thermostatic controls capable of responding to temperature within the *zone*. Where humidification or dehumidification or both is provided, at least one humidity control device shall be provided for each humidity control system.

> **Exception:** Independent perimeter systems that are designed to offset only building envelope heat losses, gains or both serving one or more perimeter *zone*s also served by an interior system provided:
>
> 1. The perimeter system includes at least one thermostatic control *zone* for each building exposure having exterior walls facing only one orientation (within +/-45 degrees) (0.8 rad) for more than 50 contiguous feet (15 240 mm); and
> 2. The perimeter system heating and cooling supply is controlled by thermostats located within the *zones* served by the system.

~~C403.2.4.1.1~~ C403.4.1.1 Heat pump supplementary heat (Mandatory). *No change to text.*

~~C403.2.4.1.2~~C403.4.1.2 Deadband (Mandatory). Where used to control both heating and cooling, zone thermostatic controls shall be capable of providing a temperature range or deadband of at least 5°F (2.8°C) within which the supply of heating and cooling energy to the zone is capable of being shut off or reduced to a minimum.

Exceptions:

1. Thermostats requiring manual changeover between heating and cooling modes.
2. Occupancies or applications requiring precision in indoor temperature control as approved by the code official.

~~C403.2.4.1.3~~ C403.4.1.3 Set point overlap restriction (Mandatory). Where a *zone* has a separate heating and a separate cooling thermostatic control located within the *zone*, a limit switch, mechanical stop or direct digital control system with software programming shall be provided with the capability to prevent the heating set point from exceeding the cooling set point and to maintain a deadband in accordance with Section ~~C403.2.4.1.2~~ C403.4.1.2.

~~C403.2.5~~ C403.4.1.4 Hot water boiler outdoor temperature setback control (Mandatory). *No change to text.*

~~C403.2.4.2~~ C403.4.2 Off-hour controls (Mandatory). Each *zone* shall be provided with thermostatic setback controls that are controlled by either an automatic time clock or programmable control system.

Exceptions:

1. *Zones* that will be operated continuously.
2. *Zones* with a full HVAC load demand not exceeding 6,800 Btu/h (2 kW) and having a readily accessible manual shutoff switch.

~~C403.2.4.2.1~~ C403.4.2.1 Thermostatic setback capabilities (Mandatory). *No change to text.*

~~C403.2.4.2.2~~ C403.4.2.2 Automatic setback and shutdown capabilities (Mandatory). *No change to text.*

~~C403.2.4.2.3~~ C403.4.2.3 Automatic start capabilities (Mandatory) *No change to text.*

~~C403.4.2~~ C403.4.3 Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections ~~C403.4.2.1~~ C403.4.3.1 through ~~C403.4.2.3~~ C403.4.3.3. Hydronic heating systems comprised of multiple-packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers. Hydronic heating systems comprised of a single boiler and greater than 500,000 Btu/h (146.5 kW) input design capacity shall include either a multistaged or modulating burner.

~~C403.4.2.1~~ C403.4.3.1 Three-pipe system. *No change to text.*

~~C403.4.2.2~~ C403.4.3.2 Two-pipe changeover system. *No change to text.*

~~C403.4.2.3~~ C403.4.3.3 Hydronic (water loop) heat pump systems. Hydronic heat pump systems shall comply with Sections ~~C403.4.2.3.1 through C403.4.2.3.2~~ C403.4.3.3.1 and C403.4.3.3.2.

~~C403.4.2.3.1~~ C403.4.3.3.1 Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are capable of providing a heat pump water supply temperature dead band of not less than 20°F (11°C) between initiation of heat rejection and heat addition by the central devices.

Exception: Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on realtime conditions of demand and capacity, dead bands of less than 20°F (11°C) shall be permitted.

~~C403.4.2.3.2~~ C403.4.3.3.2 Heat rejection. Heat rejection equipment shall comply with Sections ~~C403.4.2.3.2.1~~ C403.4.3.3.2.1 and ~~C403.4.2.3.2.2~~ C403.4.3.3.2.2.

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

~~C403.4.2.3.2.1~~ C403.4.3.3.2.1 Climate zones 3 and 4. For *Climate Zones* 3 and 4:

1. Where a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.
2. Where an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.
3. Where an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

~~C403.4.2.3.2.2~~ C403.4.3.3.2.2 Climate zones 5 through 8. *No change to text.*

~~C403.4.2.3.3~~ C403.4.3.3.3 Two-position valve. *No change to text.*

~~C403.4.2.4~~ C403.4.4 Part-load controls. Hydronic systems greater than or equal to 500,000 Btu/h (146.5 kW) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to do all of the following:

1. Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using coil valve position, zone-return water temperature, building-return water temperature or outside air temperature. The temperature shall be capable of being reset by not less than 25 percent of the design supply-to-return water temperature difference.
2. Automatically vary fluid flow for hydronic systems with a combined motor capacity of 10 hp (7.5 kW) or larger with three or more control valves or other devices by reducing the system design flow rate by not less than 50 percent by designed valves that modulate or step open and close, or pumps that modulate or turn on and off as a function of load.
3. Automatically vary pump flow on chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners with a combined motor capacity of 10 hp (7.5 kW) or larger by reducing pump design flow by not less than 50 percent, utilizing adjustable speed drives on pumps, or multiple-staged pumps where not less than one-half of the total pump horsepower is capable of being automatically turned off. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

   Exceptions:

   1. Supply-water temperature reset for chilled-water systems supplied by off-site district chilled water or chilled water from ice storage systems.
   2. Minimum flow rates other than 50 percent as required by the equipment manufacturer for proper operation of equipment where using flow bypass or end-of-line 3-way valves.
   3. Variable pump flow on dedicated equipment circulation pumps where configured in primary/secondary design to provide the minimum flow requirements of the equipment manufacturer for proper operation of equipment.

~~C403.4.2.6~~ C403.4.5 **Pump isolation.** Chilled water plants including more than one chiller shall have the capability to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler plants including more than one boiler shall have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.

~~C403.3~~ C403.5 **Economizers (Prescriptive).** Each cooling system shall include either an air or water economizer complying with Sections ~~C403.3.1~~ C403.5.1 through ~~C403.3.4~~ C403.5.5.

Exceptions: Economizers are not required for the systems listed below.

1. In cooling systems for buildings located in Climate Zones 1A and 1B.
2. In climate zones other than 1A and 1B, where individual fan cooling units have a capacity of less than 54,000 Btu/h (15.8 kW) and meet one of the following:
   1 Have direct expansion cooling coils.
   2. The total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum specified in Table C403.3(1).
      2.1 The total supply capacity of all fan-cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan-cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.
3. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7°C) dew-point temperature to satisfy process needs.
4. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3(1).
5. Systems expected to operate less than 20 hours per week.
6. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
7. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3(2).
8. Chilled-water cooling systems that are passive (without a fan) or use induction where the total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum specified in Table C403.3(1).
9. Systems that include a heat recovery system in accordance with Section C403.4.5.

TABLE ~~C403.3(1)~~ C403.5(1)
MINIMUM CHILLED-WATER SYSTEM COOLING CAPACITY FOR DETERMINING ECONOMIZER COOLING REQUIREMENTS

CLIMATE ZONES (COOLING)	TOTAL CHILLED-WATER SYSTEM CAPACITY LESS CAPACITY OF COOLING UNITS WITH AIR ECONOMIZERS	
	Local Water-cooled Chilled-water Systems	Air-cooled Chilled-water Systems or District Chilled-Water Systems
1a	No economizer requirement	No economizer requirement
1b, 2a, 2b	960,000 Btu/h	1,250,000 Btu/h
3a, 3b, 3c, 4a, 4b, 4c	720,000 Btu/h	940,000 Btu/h
5a, 5b, 5c, 6a, 6b, 7, 8	1,320,000 Btu/h	1,720,000 Btu/h

For SI:1 British thermal unit per hour = 0.2931 W.

TABLE ~~C403.3(2)~~ C403.5(2) (2)
EQUIPMENT EFFICIENCY PERFORMANCE EXCEPTION FOR ECONOMIZERS

CLIMATE ZONES	COOLING EQUIPMENT PERFORMANCE IMPROVEMENT (EER OR IPLV)
2B	10% efficiency improvement
3B	15% efficiency improvement
4B	20% efficiency improvement

~~C403.3.1~~ C403.5.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to provide the remainder of the cooling load. Controls shall not be capable of creating a false load in the mechanical cooling systems by limiting or disabling the economizer or any other means, such as hot gas bypass, except at the lowest stage of mechanical cooling.

Units that include an air economizer shall comply with the following:

1. Unit controls shall have the mechanical cooling capacity control interlocked with the air economizer controls such that the outdoor air damper is at the 100-percent open position when mechanical cooling is on and the outdoor air damper does not begin to close to prevent coil freezing due to minimum compressor run time until the leaving air temperature is less than 45°F (7°C).
2. Direct expansion (DX) units that control 75,000 Btu/h (22 kW) or greater of rated capacity of the capacity of the mechanical cooling directly based on occupied space temperature shall have not fewer than two stages of mechanical cooling capacity
3. Other DX units, including those that control space temperature by modulating the airflow to the space, shall be in accordance with Table ~~C403.3.1~~C403.5.1.

TABLE ~~C403.3.1~~ C403.5.1
DX COOLING STAGE REQUIREMENTS FOR MODULATING AIRFLOW UNITS

RATING CAPACITY	MINIMUM NUMBER OF MECHANICAL COOLING STAGES	MINIMUM COMPRESSOR DISPLACEMENT[a]
≥ 65,000 Btu/h and < 240,000 Btu/h	3 stages	≤ 35% of full load
≥ 240,000 Btu/h	4 stages	≤ 25% full load

For SI: 1 British thermal unit per hour = 0.2931 W.
a. For *mechanical cooling stage* control that does not use variable compressor displacement, the percent displacement shall be equivalent to the mechanical cooling capacity reduction evaluated at the full load rating conditions for the compressor.

~~C403.3.2~~ C403.5.2 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase building heating energy use during normal operation.

- **Exception:** Economizers on variable air volume (VAV) systems that cause *zone* level heating to increase due to a reduction in supply air temperature.

~~C403.3.3~~ C403.5.3 Air economizers. Air economizers shall comply with Sections ~~C403.3.3.1~~ C403.5.3.1 through ~~C403.3.3.5~~ C403.5.3.5.

~~C403.3.3.1~~ C403.5.3.1 Design capacity. *No change to text.*

~~C403.3.3.2~~ C403.5.3.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed-air temperature.

Exception: The use of mixed-air temperature limit control shall be permitted for systems controlled from space temperature (such as single-*zone* systems).

~~C403.3.3.3~~ C403.5.3.3 **High-limit shutoff.** Air economizers shall be capable of automatically reducing *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table ~~C403.3.3.3~~ C403.5.3.3.. High-limit shutoff control settings for these control types shall be those specified in Table ~~C403.3.3.3~~ C403.5.3.3.

TABLE ~~C403.3.3.3~~ C403.5.3.3
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS[b]

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
		Equation	Description
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	$T_{OA} > 75°F$	Outdoor air temperature exceeds 75°F
	5A, 6A	$T_{OA} > 70°F$	Outdoor air temperature exceeds 70°F
	1A, 2A, 3A, 4A	$T_{OA} > 65°F$	Outdoor air temperature exceeds 65°F
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed enthalpy with fixed dry-bulb temperatures	All	$h_{OA} > 28$ Btu/lb[a] or $T_{OA} > 75°F$	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a] or Outdoor air temperature exceeds 75°F
Differential enthalpy with fixed dry-bulb temperature	All	$h_{OA} > h_{RA}$ or $T_{OA} > 75°F$	Outdoor air enthalpy exceeds return air enthalpy or Outdoor air temperature exceeds 75°F

For SI: 1 foot = 305 mm, °C = (°F - 32)/1.8, 1 Btu/lb = 2.33 kJ/kg.
a. At altitudes substantially different than sea level, the fixed enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation, the fixed enthalpy limit is approximately 30.7 Btu/lb.
b. Devices with selectable setpoints shall be capable of being set to within 2°F and 2 Btu/lb of the setpoint listed.

~~C403.3.3.4~~ C403.5.3.4 **Relief of excess outdoor air.** *No change to text.*

~~C403.3.3.5~~ C403.5.3.5 **Economizer dampers.** Return, exhaust/relief and outdoor air dampers used in economizers shall comply with Section ~~C403.2.4.3~~ C403.7.5.

~~C403.3.4~~ C403.5.4 **Water-side economizers.** Water-side economizers shall comply with Sections ~~C403.3.4.1~~ C403.5.4.1 and ~~C403.3.4.2~~ C403.5.4.2.

~~C403.3.4.1~~ C403.5.4.1 **Design capacity.** Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of not greater than 50°F (10°C) dry bulb/45°F (7°C) wet bulb.

Exceptions:

1. Systems primarily serving computer rooms in which 100 percent of the expected system cooling load at 40°F (4°C) dry bulb/35°F (1.7°C) wet bulb is met with evaporative water economizers.
2. Systems primarily serving computer rooms with dry cooler water economizers which satisfy 100 percent of the expected system cooling load at 35°F (1.7°C) dry bulb.
3. Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F (10°C) dry bulb/45°F (7°C) wet bulb and where 100 percent of the expected system cooling load at 45°F (7°C) dry bulb/40°F (4°C) wet bulb is met with evaporative water economizers.

~~**C403.3.4.2**~~ **C403.5.4.2 Maximum pressure drop.** *No change to text.*

~~**C403.2.4.7**~~ **C403.5.5 Economizer fault detection and diagnostics (FDD) (Mandatory).** Air-cooled unitary direct-expansion units listed in Tables ~~C403.2.3(1)~~ C403.3.2(1) through ~~C403.2.3(3~~C403.3.2(3) and variable refrigerant flow (VRF) units that are equipped with an economizer in accordance with Section ~~C403.3~~ C403.5 through C403.5.4 shall include a fault detection and diagnostics (FDD) system complying with the following:

1. The following temperature sensors shall be permanently installed to monitor system operation:
   1.1. Outside air.
   1.2. Supply air.
   1.3. Return air.
2. Temperature sensors shall have an accuracy of ±2°F (1.1°C) over the range of 40°F to 80°F (4°C to 26.7°C).
3. Refrigerant pressure sensors, where used, shall have an accuracy of ±3 percent of full scale.
4. The unit controller shall be capable of providing system status by indicating the following:
   4.1 Free cooling available.
   4.2 Economizer enabled.
   4.3 Compressor enabled.
   4.4 Heating enabled.
   4.5 Mixed air low limit cycle active.
   4.6 The current value of each sensor.
5. The unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans and the heating system can be independently tested and verified.
6. The unit shall be capable of reporting faults to a fault management application accessible by day-to-day operating or service personnel, or annunciated locally on zone thermostats.
7. The FDD system shall be capable of detecting the following faults:
   7.1 Air temperature sensor failure/fault.
   7.2 Not economizing when the unit should be economizing.
   7.3 Economizing when the unit should not be economizing.
   7.4 Damper not modulating.
   7.5 Excess outdoor air.

Delete without substitution:

~~**C403.4 Hydronic and multiple-zone HVAC systems controls and equipment. (Prescriptive).**~~ ~~Hydronic and multiple- zone HVAC system controls and equipment shall comply with this section~~
.

Revise as follows:

~~**C403.4.4**~~ **C403.6** ~~**Requirements for complex mechanical systems serving**~~ **Variable air volume (VA) and multiple** ~~**zones**~~ **zone systems.** ~~Sections C403.4.4.1 through C403.4.6.4 shall apply to complex mechanical systems serving multiple zones.~~ Supply air systems serving multiple zones shall be variable air volume (VAV) systems that, during periods of occupancy, are designed and capable of being controlled to reduce primary air supply to each *zone* to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each *zone*.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code.*
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in *outdoor air* intake for the system, as *approved* by the *code official*.

5. The airflow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

Exception: The following individual *zones* or entire air distribution systems are exempted from the requirement for VAV control:

1. *Zones* or supply air systems where not less than 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.
2. *Zones* where special humidity levels are required to satisfy process needs.
3. *Zones* with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.
4. *Zones* where the volume of air to be reheated, recooled or mixed is not greater than the volume of outside air required to provide the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
5. *Zones* or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the *zones* and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

~~C403.4.4.1~~ C403.6.1 Single-duct VAV systems, terminal devices. *No change to text.*

~~C403.4.4.2~~ C403.6.2 Dual-duct and mixing VAV systems, terminal devices. *No change to text.*

~~C403.4.4.3~~ C403.6.3 Single-fan dual-duct and mixing VAV systems, economizers. *No change to text.*

~~C403.4.4.5~~ C403.6.4 Supply-air temperature reset controls. Multiple-*zone* HVAC systems shall include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be capable of resetting the supply air temperature not less than 25 percent of the difference between the design supply-air temperature and the design room air temperature.

Exceptions:

1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.
2. Seventy-five percent of the energy for reheating is from site-recovered or site-solar energy sources.
3. *Zones* with peak supply air quantities of 300 cfm (142 L/s) or less.

~~C403.4.4.6~~ C403.6.5 Multiple-zone VAV system ventilation optimization control. Multiple-zone VAV systems with direct digital control of individual zone boxes reporting to a central control panel shall have automatic controls configured to reduce outdoor air intake flow below design rates in response to changes in system *ventilation* efficiency (*Ev*) as defined by the International Mechanical Code.

Exceptions:

1. VAV systems with zonal transfer fans that recirculate air from other zones without directly mixing it with outdoor air, dual-duct dual-fan VAV systems, and VAV systems with fan-powered terminal units.
2. Systems having exhaust air energy recovery complying with Section ~~C403.2.7~~ C403.7.3..
3. Systems where total design exhaust airflow is more than 70 percent of total design outdoor air intake flow requirements.

~~C403.4.1.3~~ C403.6.6 Set points for direct digital control. For systems with direct digital control of individual zones reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure. In such case, the set point is reset lower until one zone damper is nearly wide open. The direct digital controls shall be capable of monitoring *zone* damper positions or shall have an alternative method of indicating the need for static pressure that is capable of all of the following:

1. Automatically detecting any *zone* that excessively drives the reset logic.
2. Generating an alarm to the system operational location.
3. Allowing an operator to readily remove one or more zones from the reset algorithm.

~~C403.4.1.2~~ <u>C403.6.7</u> Static pressure sensor location. *No change to text.*

Add new text as follows:

<u>**C403.7 Ventilation and exhaust systems** In addition to other requirements of Section C403 applicable to the provision of ventilation air or the exhaust of air, ventilation and exhaust systsm shall be in accordance with Section C403.7.1 through C403.7.5.</u>

Revise as follows:

~~C403.2.6.1~~ <u>C403.7.1</u> Demand controlled ventilation <u>(Mandatory).</u> Demand control ventilation (DCV) shall be provided for spaces larger than 500 square feet (46.5 m^2) and with an average occupant load of 25 people per 1,000 square feet (93 m^2) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) and served by systems with one or more of the following:

1. An air-side economizer.
2. Automatic modulating control of the outdoor air damper.
3. A design outdoor airflow greater than 3,000 cfm (1416 L/s).

Exception: Demand control ventilation is not required for systems and spaces as follows:

1. Systems with energy recovery complying with Section ~~C403.2.7~~ <u>C403.7.3</u>.
2. Multiple-*zone* systems without direct digital control of individual *zones* communicating with a central control panel.
3. Systems with a design outdoor airflow less than 1,200 cfm (566 L/s).
4. Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1,200 cfm (566 L/s).
5. Ventilation provided for process loads only.

~~C403.2.6.2~~ <u>C403.7.2</u> Enclosed parking garage ventilation controls <u>(Mandatory).</u> Enclosed parking garages used for storing or handling automobiles operating under their own power shall employ contamination-sensing devices and automatic controls configured to stage fans or modulate fan average airflow rates to 50 percent or less of design capacity, or intermittently operate fans less than 20 percent of the occupied time or as required to maintain acceptable contaminant levels in accordance with *International Mechanical Code* provisions. Failure of contamination sensing devices shall cause the exhaust fans to operate continuously at design airflow.

Exceptions:

1. Garages with a total exhaust capacity less than 22,500 cfm (10 620 L/s) with ventilation systems that do not utilize heating or mechanical cooling.
2. Garages that have a garage area to ventilation system motor nameplate power ratio that exceeds 1125 cfm/hp (710 L/s/kW) and do not utilize heating or mechanical cooling.

~~C403.2.7~~ <u>C403.7.3</u> Energy recovery ventilation systems <u>(Mandatory).</u> Where the supply airflow rate of a fan system exceeds the values specified in Tables ~~C403.2.7(1)~~ <u>C403.7.3(1</u>) and ~~C403.2.7(2)~~ <u>C403.7.3(2</u>), the system shall include an energy recovery system. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section ~~C403.3~~ C403.5.

Exception: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include at least one of the following features:
   2.1 Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent or less of design values.
   2.2 Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated not warmer than 2°F (1.1°C) above room setpoint, cooled to not cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
9. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table ~~C403.2.7(1)~~ C403.7.3(1).
10. Systems exhausting toxic, flammable, paint or corrosive fumes or dust.
11. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

TABLE ~~C403.2.7(1)~~ C403.7.3(1) (1)
ENERGY RECOVERY REQUIREMENT (Ventilation systems operating less than 8,000 hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥10% and	**≥ 20% and**	**≥ 30% and**	**≥ 40% and 50%**	**≥ 50% and 60%**	**≥ 60% and 70%**	**≥ 70% and 80%**	**≥ 80%**
	DESIGN SUPPLY FAN AIRFLOW RATE (cfm)							
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	NR	NR	NR	NR
1B, 2B, 5C	NR	NR	NR	NR	≥ 26,000	≥ 12,000	≥ 5,000	≥ 4,000
6B	≥ 28,000	≥ 26,5000	≥ 11,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,500	≥ 1,500
1A, 2A, 3A, 4A, 5A, 6A	≥ 26,000	≥ 16,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,000	≥ 1,000	> 0
7, 8	≥ 4,500	≥ 4,000	≥ 2,500	≥ 1,000	> 0	> 0	> 0	> 0

For SI: 1 cfm = 0.4719 L/s.
NR = Not Required.

TABLE ~~C403.2.7(2)~~ C403.7.3(2)
ENERGY RECOVERY REQUIREMENT (Ventilation systems operating not less than 8,000 hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥ 10% and	≥ 20% and	≥ 30% and	≥ 40% and	≥ 50% and	≥ 60% and	≥ 70% and	≥ 80%
	Design Supply Fan Airflow Rate (cfm)							
3C	NR	NR	NR	NR	NR	NR	NR	NR
1B, 2B, 3B, 4C, 5C	NR	≥ 19,500	≥ 9,000	≥ 5,000	≥ 4,000	≥ 3,000	≥ 1,500	> 0
1A, 2A, 3A, 4B, 5B	≥ 2,500	≥ 2,000	≥ 1,000	≥ 500	> 0	> 0	> 0	> 0
4A, 5A, 6A, 6B, 7, 8	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0

For SI: 1 cfm = 0.4719 L/s.
NR = Not required

~~C403.2.8~~ C403.7.4 Kitchen exhaust systems (Mandatory). Replacement air introduced directly into the exhaust hood cavity shall not be greater than 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space shall not exceed the greater of the following:

1. The ventilation rate required to meet the space heating or cooling load.
2. The hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

Where total kitchen hood exhaust airflow rate is greater than 5,000 cfm (2360 L/s), each hood shall be a factory-built commercial exhaust hood listed by a nationally recognized testing laboratory in compliance with UL 710. Each hood shall have a maximum exhaust rate as specified in Table ~~C403.2.8~~ C403.7.4 and shall comply with one of the following:

1. Not less than 50 percent of all replacement air shall be transfer air that would otherwise be exhausted.
2. Demand ventilation systems on not less than 75 percent of the exhaust air that are capable of not less than a 50-percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.
3. Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40 percent on not less than 50 percent of the total exhaust airflow.

Where a single hood, or hood section, is installed over appliances with different duty ratings, the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

Exception: Where not less than 75 percent of all the replacement air is transfer air that would otherwise be exhausted

TABLE ~~C403.2.8~~ C403.7.4
MAXIMUM NET EXHAUST FLOW RATE, CFM PER LINEAR FOOT OF HOOD LENGTH

TYPE OF HOOD	LIGHT-DUTY EQUIPMENT	MEDIUM-DUTY EQUIPMENT	HEAVY-DUTY EQUIPMENT	EXTRA-HEAVY-DUTY EQUIPMENT
Wall-mounted canopy	140	210	280	385
Single island	280	350	420	490
Double island (per side)	175	210	280	385
Eyebrow	175	175	NA	NA
Backshelf/Pass-over	210	210	280	NA

For SI: 1 cfm = 0.4719 L/s; 1 foot = 305 mm.
NA = Not Allowed.

~~C403.2.4.3~~ C403.7.5 Shutoff dampers (Mandatory). Outdoor air intake and exhaust openings and stairway and shaft vents shall be provided with Class I motorized dampers. The dampers shall have an air leakage rate not greater than 4 cfm/ft² (20.3 L/s • m²) of damper surface area at 1.0 inch water gauge (249 Pa) and shall be labeled by an approved agency when tested in accordance with AMCA 500D for such purpose.

Outdoor air intake and exhaust dampers shall be installed with automatic controls configured to close when the systems or spaces served are not in use or during unoccupied period warm-up and setback operation, unless the systems served require outdoor or exhaust air in accordance with the *International Mechanical Code* or the dampers are opened to provide intentional economizer cooling.

Stairway and shaft vent dampers shall be installed with automatic controls configured to open upon the activation of any fire alarm initiating device of the building's fire alarm system or the interruption of power to the damper.

Exception: Gravity (nonmotorized) dampers shall be permitted to be used as follows:

1. In buildings less than three stories in height above grade plane.
2. In buildings of any height located in *Climate Zones* 1, 2 or 3.
3. Where the design exhaust capacity is not greater than 300 cfm (142 L/s).

Gravity (nonmotorized) dampers shall have an air leakage rate not greater than 20 cfm/ft² (101.6 L/s • m²) where not less than 24 inches (610 mm) in either dimension and 40 cfm/ft² (203.2 L/s • m²) where less than 24 inches (610 mm) in either dimension. The rate of air leakage shall be determined at 1.0 inch water gauge (249 Pa) when tested in accordance with AMCA 500D for such purpose. The dampers shall be labeled by an approved agency.

~~C403.2.12~~ C403.8 ~~Air system design~~ Fans and ~~control~~ fan controls (Mandatory). ~~Each~~ Fans in HVAC ~~system having a total fan system motor nameplate horsepower (hp) exceeding 5 hp (3.7 kW)~~systems shall comply with ~~the provisions of Sections C403.2.12.1 through C403.2.12.3~~ this section.

Add new text as follows:

C403.8.1 Fans exceeding 5 hp. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 hp (3.7 kW) shall comply with the provisions of Sections C403.8.1.1 through C403.8.1.3.

Revise as follows:

~~C403.2.12.1~~ C403.8.1.1 Allowable fan motor horsepower (Mandatory). Each HVAC system at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) as shown in Table ~~C403.2.12.1(1~~ C403.8.1.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single-*zone* variable air volume systems shall comply with the constant volume fan power limitation.

Exceptions:

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp (0.746 kW) or less are exempt from the allowable fan horsepower requirement.

TABLE ~~C403.2.12.1(1)~~ C403.8.1.1(1) (1)
FAN POWER LIMITATION

	LIMIT	CONSTANT VOLUME	VARIABLE VOLUME
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	hp ≤ CFM_S • 0.0011	hp ≤ CFM_S • 0.0015
Option 2: Fan system bhp	Allowable fan system bhp	bhp ≤ CFM_S · 0.00094 + *A*	bhp ≤ CFM_S • 0.0013 + *A*

For SI: 1 bhp = 735.5 W, 1 hp = 745.5 W, 1 cfm = 0.4719 L/s.
where:
CFM_S
CFM_S
CFM_S
=
=
The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.
The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.
hp
hp
=
=
The maximum combined motor nameplate horsepower.
The maximum combined motor nameplate horsepower.
Bhp
Bhp
=
=
The maximum combined fan brake horsepower.
The maximum combined fan brake horsepower.
A
A
=
=
Sum of [*PD* × CFM_D / 4131]
Sum of [*PD* × CFM_D / 4131]
where:
PD
PD
PD
=
=
Each applicable pressure drop adjustment from Table C403.2.12.1(2) in. w.c.
Each applicable pressure drop adjustment from Table C403.2.12.1(2) in. w.c.
CFM_D
CFM_D
=
=
The design airflow through each applicable device from Table C403.2.12.1(2) in cubic feet per minute.
The design airflow through each applicable device from Table C403.2.12.1(2) in cubic feet per minute.

TABLE ~~C403.2.12.1(2)~~ C403.8.1.1(2)
FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT

DEVICE	ADJUSTMENT
Credits	
Fully ducted return and/or exhaust air systems	0.5 inch w.c. (2.15 in w.c. for laboratory and vivarium systems)
Return and/or exhaust airflow control devices	0.5 inch w.c.
Exhaust filters, scrubbers or other exhaust treatment	The pressure drop of device calculated at fan system design condition
Particulate filtration credit: MERV 9 thru 12	0.5 inch w.c.
Particulate filtration credit: MERV 13 thru 15	0.9 inch. w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure drop calculated at 2x clean filter pressure drop at fan system design condition.

Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition.
Biosafety cabinet	Pressure drop of device at fan system design condition.
Energy recovery device, other than coil runaround loop	(2.2 × energy recovery effectiveness) – 0.5 inch w.c. for each airstream.
Coil runaround loop	0.6 inch w.c. for each airstream.
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design conditions.
Sound attenuation section (fans serving spaces with design background noise goals below NC35)	0.15 inch w.c.
Exhaust system serving fume hoods	0.35 inch w.c.
Laboratory and vivarium exhaust systems in high-rise buildings	0.25 inch w.c./100 feet of vertical duct exceeding 75 feet.
Deductions	
Systems without central cooling device	- 0.6 in. w.c.
Systems without central heating device	- 0.3 in. w.c.
Systems with central electric resistance heat	- 0.2 in. w.c.

For SI: 1 inch w.c. = 249 Pa, 1 inch = 25.4 mm.
w.c. = water column, NC = Noise criterion.

~~C403.2.12.2~~ C403.8.1.2 Motor nameplate horsepower (Mandatory). For each fan, the fan brake horsepower shall be indicated on the construction documents and the selected motor shall be not larger than the first available motor size greater than the following:

1. For fans less than 6 bhp (4413 W), 1.5 times the fan brake horsepower.
2. For fans 6 bhp (4413 W) and larger, 1.3 times the fan brake horsepower.
3. Systems complying with Section ~~C403.2.12.1~~ C403.8.1.1 *fan system motor nameplate hp* (Option 1).

~~C403.2.12.3~~ C403.8.1.3 Fan efficiency (Mandatory). Fans shall have a fan efficiency grade (FEG) of not less than 67 when determined in accordance with AMCA 205 by an *approved*, independent testing laboratory and labeled by the manufacturer. The total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

Exception: The following fans are not required to have a fan efficiency grade:

1. Fans of 5 hp (3.7 kW) or less as follows:
   - 1.1 Single fan with a motor nameplate horsepower of 5 hp (3.7 kW) or less, unless Exception 1.2 applies.
   - 1.2 Multiple fans in series or parallel that have a combined motor nameplate horsepower of 5 hp (3.7 kW) or less and are operated as the functional equivalent of a single fan.
   - 1.3 Fans that are part of equipment covered under Section ~~C403.2.3.~~ C403.3.2
   - 1.4 Fans included in an equipment package certified by an *approved agency* for air or energy performance.
   - 1.5 Powered wall/roof ventilators.
   - 1.6 Fans outside the scope of AMCA 205.
   - 1.7 Fans that are intended to operate only during emergency conditions.

~~C403.4.4.4~~ C403.8.2 Fractional hp fan motors. Motors for fans that are not less than $^{1}/_{12}$ hp (0.082 kW) and less than 1 hp (0.746 kW) shall be electronically commutated motors or shall have a minimum motor efficiency of 70 percent, rated in accordance with DOE 10 CFR 431. These motors shall also have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing instead of a varying motor speed shall be permitted.

Exceptions: The following motors are not required to comply with this section:

1. Motors in the airstream within fan coils and terminal units that only provide heating to the space served.
2. Motors in space-conditioning equipment that comply with 3. Section ~~403.2.3~~ C403.3.2 or ~~C403.2.12.~~Sections C403.8.1.1 through C403.8.1.3
3. Motors that comply with Section C405.8.

~~C403.4.1~~ C403.8.3 Fan control. Controls shall be provided for fans in accordance with ~~Sections C403.4.1.1 through C403.4.1.3~~Section C403.8.3.1 and as required for specific systems provided in Section C403..

~~C403.4.1.1~~ C403.8.3.1 Fan airflow control. Each cooling system listed in Table ~~C403.4.1.1~~ C403.8.3.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements:

1. Direct expansion (DX) and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have not fewer than two stages of fan control. Low or minimum speed shall not be greater than 66 percent of full speed. At low or minimum speed, the fan system shall draw not more than 40 percent of the fan power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
2. Other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall be not greater than 50 percent of full speed. At minimum speed the fan system shall draw not more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
3. Units that include an airside economizer in accordance with Section ~~C403.3~~C403.5 shall have not fewer than two speeds of fan control during economizer operation

Exceptions:

1. Modulating fan control is not required for chilled water and evaporative cooling units with fan motors of less than 1 hp (0.746 kW) where the units are not used to provide *ventilation* air and the indoor fan cycles with the load.
2. Where the volume of outdoor air required to comply with the *ventilation* requirements of the *International Mechanical Code* at low speed exceeds the air that would be delivered at the speed defined in Section ~~C403.4.1~~C403.8.3, the minimum speed shall be selected to provide the required *ventilation air*.

TABLE ~~C403.4.1.1~~ C403.8.3.1
EFFECTIVE DATES FOR FAN CONTROL

COOLING SYSTEM TYPE	FAN MOTOR SIZE	MECHANICAL COOLING CAPACITY
DX cooling	Any	≥ 75,000 Btu/h (before 1/1/2016)
		≥ 65,000 Btu/h (after 1/1/2016
Chilled water and evaporative cooling	≥ 5 hp	Any
	≥ $^{1}/_{4}$ hp	Any

For SI: 1 British thermal unit per hour = 0.2931 W; 1 hp = 0.746 kW.

~~C403.4.3~~ C403.9 Heat rejection equipment. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception: Factory-installed heat rejection devices within HVAC equipment tested and rated in accordance with Tables ~~C403.2.3(6)~~ C403.3.2(6) and ~~C403.2.3(7)~~ C403.3.2(7).

~~**C403.4.3.1**~~ **C403.9.1 General.** Heat rejection equipment such as air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers and evaporative condensers used for comfort cooling applications shall comply with this section.

Exception: Heat rejection devices where energy usage is included in the equipment efficiency ratings listed in Tables ~~C403.2.3(6)~~ C403.3.2(6) and ~~C403.2.3(7)~~ C403.3.2(7).

~~**C403.4.3.2**~~ **C403.9.2 Fan speed control.** The fan speed shall be controlled as provided in Sections ~~C403.4.3.2.1~~ C403.9.2.1 and ~~C403.4.3.2.2~~ C403.9.2.2..

~~**C403.4.3.2.1**~~ **C403.9.2.1 Fan motors not less than 7.5 hp.** Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception: The following fan motors over 7.5 hp (5.6 kW) are exempt:

1. Condenser fans serving multiple refrigerant circuits.
2. Condenser fans serving flooded condensers.
3. Installations located in *Climate Zones* 1 and 2.

~~**C403.4.3.2.2**~~ **C403.9.2.2 Multiple-cell heat rejection equipment.** Multiple-cell heat rejection equipment with variable speed fan drives shall be controlled in both of the following manners:

1. To operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components.
2. So all fans can operate at the same fan speed required for the instantaneous cooling duty, as opposed to staged (on/off) operation.

Minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations.

~~**C403.4.3.3**~~ **C403.9.3 Limitation on centrifugal fan open-circuit cooling towers.** Centrifugal fan open-circuit cooling towers with a combined rated capacity of 1,100 gpm (4164 L/m) or greater at 95°F (35°C) condenser water return, 85°F (29°C) condenser water supply, and 75°F (24°C) outdoor air wet-bulb temperature shall meet the energy efficiency requirement for axial fan open-circuit cooling towers listed in Table ~~C403.2.3(8)~~ C403.3.2(8).

Exception: Centrifugal open-circuit cooling towers that are designed with inlet or discharge ducts or require external sound attenuation.

C403.4.3.4 ~~ ~~ **C403.9.4 Tower flow turndown.** *No change to text.*

~~**C403.4.5**~~ **C403.9.5 Heat recovery for service water heating.** Condenser heat recovery shall be installed for heating or reheating of service hot water provided that the facility operates 24 hours a day, the total installed heat capacity of water-cooled systems exceeds 6,000,000 Btu/hr (1 758 kW) of heat rejection, and the design service water heating load exceeds 1,000,000 Btu/h (293 kW).

The required heat recovery system shall have the capacity to provide the smaller of the following:

1. Sixty percent of the peak heat rejection load at design conditions.
2. The preheating required to raise the peak service hot water draw to 85°F (29°C).

Exceptions:

1. Facilities that employ condenser heat recovery for space heating or reheat purposes with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.
2. Facilities that provide 60 percent of their service water heating from site solar or site recovered energy or from other sources.

~~C403.2.14~~ <u>C403.10</u> Refrigeration equipment performance <u>(Mandatory)</u>. Refrigeration equipment shall have an energy use in kWh/day not greater than the values of Tables ~~C403.2.14(1~~<u>C403.10.1(1</u>) and ~~C403.2.14(2~~<u>C403.10.1(2)</u> when tested and rated in accordance with AHRI Standard 1200. The energy use shall be verified through certification under an approved certification program or, where a certification program does not exist, the energy use shall be supported by data furnished by the equipment manufacturer.

~~C403.2.15~~ <u>C403.10.1</u> Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers <u>(Mandatory).</u> *Refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with this section. *Walk-in coolers* and *walk-in freezers* that are not either site assembled or site constructed shall comply with the following:

1. Be equipped with automatic door-closers that firmly close walk-in doors that have been closed to within 1 inch (25 mm) of full closure.
2. Doorways shall have strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when doors are open.
3. *Walk-in coolers* and *refrigerated warehouse coolers* shall contain wall, ceiling, and door insulation of not less than R-25 and *walk-in freezers* and *refrigerated warehouse freezers* shall contain wall, ceiling and door insulation of not less than R-32.

   Exception: Glazed portions of doors or structural members need not be insulated.

4. *Walk-in freezers* shall contain floor insulation of not less than R-28.
5. Transparent reach-in doors for *walk-in freezers* and windows in *walk-i freezer* doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.
6. Windows and transparent reach-in doors for *walk-in coolers* doors shall be of double-pane or triple-pane, inert gas-filled, heat-reflective treated glass.
7. Evaporator fan motors that are less than 1 hp (0.746 kW) and less than 460 volts shall use electronically commutated motors, brushless direct-current motors, or 3-phase motors.
8. Condenser fan motors that are less than 1 hp (0.746 kW) shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.
9. Where antisweat heaters without antisweat heater controls are provided, they shall have a total door rail, glass and frame heater power draw of not more than 7.1 W/ft^2 (76 W/m^2) of door opening for *walk-in freezers* and 3.0 W/ft^2 (32 W/m^2) of door opening for *walk-in coolers*.
10. Where antisweat heater controls are provided, they shall reduce the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.
11. Lights in *walk-in coolers, walk-in freezers, refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall either use light sources with an efficacy of not less than 40 lumens per watt, including ballast losses, or shall use light sources with an efficacy of not less than 40 lumens per watt, including ballast losses, in conjunction with a device that turns off the lights within 15 minutes when the space is not occupied.

   Exception: Automatic closers are not required for doors more than 45 inches (1143 mm) in width or more than 7 feet (2134 mm) in height.

TABLE ~~C403.2.14(1)~~ C403.10.1(1)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATION

EQUIPMENT TYPE	APPLICATION	ENERGY USE LIMITS (kWh per day)[a]	TEST PROCEDURE
Refrigerator with solid doors	Holding Temperature	0.10 · V + 2.04	AHRI 1200
Refrigerator with transparent doors		0.12 · V + 3.34	
Freezers with solid doors		0.40 · V + 1.38	
Freezers with transparent doors		0.75 · V + 4.10	
Refrigerators/freezers with solid doors		the greater of 0.12 · V + 3.34 or 0.70	
Commercial refrigerators	Pulldown	0.126 · V + 3.51	

a. V = volume of the chiller or frozen compartment as defined in AHAM-HRF-1.

TABLE ~~C403.2.14(2)~~ C403.10.1(2)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATORS AND FREEZERS

EQUIPMENT TYPE				ENERGY USE LIMITS (kWh/day)[a,b]	TEST PROCEDURE
Equipment Class[c]	Family Code	Operating Mode	Rating Temperature		
VOP.RC.M	Vertical open	Remote condensing	Medium	0.82 · TDA + 4.07	AHRI 1200
SVO.RC.M	Semivertical open	Remote condensing	Medium	0.83 · TDA + 3.18	
HZO.RC.M	Horizontal open	Remote condensing	Medium	0.35 · TDA + 2.88	
VOP.RC.L	Vertical open	Remote condensing	Low	2.27 · TDA + 6.85	
HZO.RC.L	Horizontal open	Remote condensing	Low	0.57 · TDA + 6.88	
VCT.RC.M	Vertical transparent door	Remote condensing	Medium	0.22 TDA + 1.95	
VCT.RC.L	Vertical transparent door	Remote condensing	Low	0.56 · TDA + 2.61	
SOC.RC.M	Service over counter	Remote condensing	Medium	0.51 · TDA + 0.11	
VOP.SC.M	Vertical open	Self-contained	Medium	1.74 · TDA + 4.71	
SVO.SC.M	Semivertical open	Self-contained	Medium	1.73 · TDA + 4.59	
HZO.SC.M	Horizontal open	Self-contained	Medium	0.77 · TDA + 5.55	
HZO.SC.L	Horizontal open	Self-contained	Low	1.92 · TDA + 7.08	
VCT.SC.I	Vertical transparent door	Self-contained	Ice cream	0.67 · TDA + 3.29	
VCS.SC.I	Vertical solid door	Self-contained	Ice cream	0.38 · V + 0.88	
HCT.SC.I	Horizontal transparent door	Self-contained	Ice cream	0.56 · TDA + 0.43	
SVO.RC.L	Semivertical open	Remote condensing	Low	2.27 · TDA + 6.85	
VOP.RC.I	Vertical open	Remote condensing	Ice cream	2.89 · TDA + 8.7	
SVO.RC.I	Semivertical open	Remote condensing	Ice cream	2.89 · TDA + 8.7	
HZO.RC.I	Horizontal open	Remote condensing	Ice cream	0.72 · TDA + 8.74	
VCT.RC.I	Vertical transparent	Remote	Ice cream	0.66 · TDA + 3.05	

EQUIPMENT TYPE				ENERGY USE LIMITS (kWh/day)[a,b]	TEST PROCEDURE
Equipment Class[c]	Family Code	Operating Mode	Rating Temperature		
	door	condensing			
HCT.RC.M	Horizontal transparent door	Remote condensing	Medium	0.16 · TDA + 0.13	
HCT.RC.L	Horizontal transparent door	Remote condensing	Low	0.34 · TDA + 0.26	AHRI 1200
HCT.RC.I	Horizontal transparent door	Remote condensing	Ice cream	0.4 · TDA + 0.31	
VCS.RC.M	Vertical solid door	Remote condensing	Medium	0.11 · V + 0.26	
VCS.RC.L	Vertical solid door	Remote condensing	Low	0.23 · V + 0.54	
VCS.RC.I	Vertical solid door	Remote condensing	Ice cream	0.27 · V + 0.63	
HCS.RC.M	Horizontal solid door	Remote condensing	Medium	0.11 · V + 0.26	
HCS.RC.L	Horizontal solid door	Remote condensing	Low	0.23 · V + 0.54	
HCS.RC.I	Horizontal solid door	Remote condensing	Ice cream	0.27 · V + 0.63	
HCS.RC.I	Horizontal solid door	Remote condensing	Ice cream	0.27 · V + 0.63	
SOC.RC.L	Service over counter	Remote condensing	Low	1.08 · TDA + 0.22	
SOC.RC.I	Service over counter	Remote condensing	Ice cream	1.26 · TDA + 0.26	
VOP.SC.L	Vertical open	Self-contained	Low	4.37 · TDA + 11.82	
VOP.SC.I	Vertical open	Self-contained	Ice cream	5.55 · TDA + 15.02	
SVO.SC.L	Semivertical open	Self-contained	Low	4.34 · TDA + 11.51	
SVO.SC.I	Semivertical open	Self-contained	Ice cream	5.52 · TDA + 14.63	
HZO.SC.I	Horizontal open	Self-contained	Ice cream	2.44 · TDA + 9.0	
SOC.SC.I	Service over counter	Self-contained	Ice cream	1.76 · TDA + 0.36	
HCS.SC.I	Horizontal solid door	Self-contained	Ice cream	0.38 · V + 0.88	

a. V = Volume of the case, as measured in accordance with Appendix C of AHRI 1200.
b. TDA = Total display area of the case, as measured in accordance with Appendix D of AHRI 1200.
c. Equipment class designations consist of a combination [(in sequential order separated by periods (AAA).(BB).(C))] of:

(AAA)

(AAA)
(AAA)
An equipment family code where:
An equipment family code where:
VOP = vertical open
VOP = vertical open
SVO = semivertical open
SVO = semivertical open
HZO = horizontal open
HZO = horizontal open
VCT = vertical transparent doors
VCT = vertical transparent doors
VCS = vertical solid doors
VCS = vertical solid doors
HCT = horizontal transparent doors

HCT = horizontal transparent doors
HCS = horizontal solid doors
HCS = horizontal solid doors
SOC = service over counter
SOC = service over counter
(BB)
(BB)
An operating mode code:
An operating mode code:
RC = remote condensing
RC = remote condensing
SC = self-contained
SC = self-contained
(C)
(C)
A rating temperature code:
A rating temperature code:
M = medium temperature (38°F)
M = medium temperature (38°F)
L = low temperature (0°F)
L = low temperature (0°F)
I = ice-cream temperature (15°F)
I = ice-cream temperature (15°F)
For example, "VOP.RC.M" refers to the "vertical-open, remote-condensing, medium-temperature" equipment class.

~~C403.2.16~~ C403.10.2 Walk-in coolers and walk-in freezers (Mandatory). Site- assembled or site-constructed *walk-in coolers* and *walk-in freezers* shall comply with the following:

1. Automatic door closers shall be provided that fully close walk-in doors that have been closed to within 1 inch (25 mm) of full closure.

   Exception: Closers are not required for doors more than 45 inches (1143 mm) in width or more than 7 feet (2134 mm) in height.

2. Doorways shall be provided with strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when the doors are open.
3. Walls shall be provided with insulation having a thermal resistance of not less than R-25, ceilings shall be provided with insulation having a thermal resistance of not less than R-25 and doors of *walk-in coolers* and *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R-32.

   Exception: Insulation is not required for glazed portions of doors or at structural members associated with the walls, ceiling or door frame.

4. The floor of *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R-28.
5. Transparent reach-in doors for and windows in opaque *walk-in freezer* doors shall be provided with triple-pane glass having the interstitial spaces filled with inert gas or provided with heat-reflective treated glass.
6. Transparent reach-in doors for and windows in opaque walk-in cooler doors shall be double-pane heat-reflective treated glass having the interstitial space gas filled.
7. Evaporator fan motors that are less than 1 hp (0.746 kW) and less than 460 volts shall be electronically commutated motors or 3-phase motors.
8. Condenser fan motors that are less than 1 hp (0.746 kW) in capacity shall be of the electronically commutated or permanent split capacitor-type or shall be 3-phase motors.

   Exception: Fan motors in *walk-in coolers* and *walk-in freezers* combined in a single enclosure greater than 3,000 square feet (279 m^2) in floor area are exempt.

9. Antisweat heaters that are not provided with anti-sweat heater controls shall have a total door rail, glass and frame heater power draw not greater than 7.1 W/ft^2 (76 W/m^2) of door opening for *walk-in freezers*, and not greater than 3.0 W/ft^2 (32 W/m^2) of door opening for *walk-in coolers*.
10. Antisweat heater controls shall be capable of reducing the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.
11. Light sources shall have an efficacy of not less than 40 lumens per Watt, including any ballast losses, or shall be provided with a device that automatically turns off the lights within 15 minutes of when the *walk-in cooler* or *walk-in freezer* was last occupied.

~~C403.2.17~~ C403.10.3 Refrigerated display cases (Mandatory). Site-assembled or site-constructed refrigerated display cases shall comply with the following:

1. Lighting and glass doors in refrigerated display cases shall be controlled by one of the following:
    1.1 Time switch controls to turn off lights during nonbusiness hours. Timed overrides for display cases shall turn the lights on for up to 1 hour and shall automatically time out to turn the lights off.
    1.2 Motion sensor controls on each display case section that reduce lighting power by at least 50 percent within 3 minutes after the area within the sensor range is vacated.
2. Low-temperature display cases shall incorporate temperature-based defrost termination control with a time-limit default. The defrost cycle shall terminate first on an upper temperature limit breach and second upon a time limit breach.
3. Antisweat heater controls shall reduce the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

~~C403.5~~ C403.10.4 Refrigeration systems. Refrigerated display cases, *walk-in coolers* or *walk-in freezers* that are served by remote compressors and remote condensers not located in a *condensing unit*, shall comply with Sections ~~C403.5.1~~ C403.10.4.1 and ~~C403.5.2~~ C403.10.4.2.

Exception: Systems where the working fluid in the refrigeration cycle goes through both subcritical and supercritical states (transcritical) or that use ammonia refrigerant are exempt.

~~C403.5.1~~ C403.10.4.1 Condensers serving refrigeration systems. Fan-powered condensers shall comply with the following:

1. The design *saturated condensing temperatures* for air-cooled condensers shall not exceed the design dry-bulb temperature plus 10°F (5.6°C) for low-*temperature refrigeration systems*, and the design dry- bulb temperature plus 15°F (8°C) for *medium temperature refrigeration systems* where the *saturated condensing temperature* for blend refrigerants shall be determined using the average of liquid and vapor temperatures as converted from the condenser drain pressure.
2. Condenser fan motors that are less than 1 hp (0.75 kW) shall use electronically commutated motors, permanent split-capacitor-type motors or 3-phase motors.
3. Condenser fans for air-cooled condensers, evaporatively cooled condensers, air- or water-cooled fluid coolers or cooling towers shall reduce fan motor demand to not more than 30 percent of design wattage at 50 percent of design air volume, and incorporate one of the following continuous variable speed fan control approaches:
    3.1 Refrigeration system condenser control for air-cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient dry-bulb temperature.
    3.2 Refrigeration system condenser control for evaporatively cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient wet-bulb temperature.
4. Multiple fan condensers shall be controlled in unison.
5. The minimum condensing temperature setpoint shall be not greater than 70°F (21°C).

~~C403.5.2~~ <u>C403.10.4.2</u> **Compressor systems.** Refrigeration compressor systems shall comply with the following:

1. Compressors and multiple-compressor system suction groups shall include control systems that use floating suction pressure control logic to reset the target suction pressure temperature based on the temperature requirements of the attached refrigeration display cases or walk-ins.

   Exception: Controls are not required for the following:

   1. Single-compressor systems that do not have variable capacity capability.
   2. Suction groups that have a design saturated suction temperature of 30°F (-1.1°C) or higher, suction groups that comprise the high stage of a two-stage or cascade system, or suction groups that primarily serve chillers for secondary cooling fluids.

2. Liquid subcooling shall be provided for all low-temperature compressor systems with a design cooling capacity equal to or greater than 100,000 Btu/hr (29.3 kW) with a design-saturated suction temperature of -10°F (-23°C) or lower. The sub-cooled liquid temperature shall be controlled at a maximum temperature setpoint of 50°F (10°C) at the exit of the subcooler using either compressor economizer (interstage) ports or a separate compressor suction group operating at a saturated suction temperature of 18°F (-7.8°C) or higher.
   2.1 Insulation for liquid lines with a fluid operating temperature less than 60°F (15.6°C) shall comply with Table C403.2.10.
3. Compressors that incorporate internal or external crankcase heaters shall provide a means to cycle the heaters off during compressor operation.

Add new text as follows:

<u>**C403.11 Construction of HVAC system elements** Ducts, plenums, piping and other elements that are part of an HVAC system shall be constructed and insulated in accordance with Sections C403.11.1 through C403.11.3.1.</u>

Revise as follows:

~~C403.2.9~~ <u>C403.11.1</u> **Duct and plenum insulation and sealing <u>(Mandatory).</u>** Supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and where located outside the building with a minimum of R-8 insulation in *Climate Zones* 1 through 4 and a minimum of R-12 insulation in *Climate Zones* 5 through 8. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation in *Climate Zones* 1 through 4 and a minimum of R-12 insulation in *Climate Zones* 5 through 8.

Exceptions:

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum is not greater than 15°F (8°C).

Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

~~C403.2.9.1~~ <u>C403.11.2</u> **Duct construction <u>(Mandatory).</u>** *No change to text.*

~~C403.2.9.1.1~~ <u>C403.11.2.1</u> **Low-pressure duct systems <u>(Mandatory).</u>** Longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (498 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

Exception: Locking-type longitudinal joints and seams, other than the snap-lock and button-lock types, need not be sealed as specified in this section.

~~C403.2.9.1.2~~ C403.11.2.2 Medium-pressure duct systems (Mandatory). *No change to text.*

~~C403.2.9.1.3~~ C403.11.2.3 High-pressure duct systems (Mandatory). Ducts and plenums designed to operate at static pressures greater than 3 inches water gauge (747 Pa) shall be insulated and sealed in accordance with Section ~~C403.2.9~~C403.11.2. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual and shown to have a rate of air leakage (CL) less than or equal to 4.0 as determined in accordance with Equation 4-8.

$CL = F/P^{0.65}$ **(Equation 4-8)**

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.
P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections comply with the requirements of this section.

~~C403.2.10~~ C403.11.3 Piping insulation ~~(Mandatory).~~ Piping serving as part of a heating or cooling system shall be thermally insulated in accordance with Table ~~C403.2.10~~ C403.11.3.

Exceptions:

1. Factory-installed piping within HVAC equipment tested and rated in accordance with a test procedure referenced by this code.
2. Factory-installed piping within room fan-coils and unit ventilators tested and rated according to AHRI 440 (except that the sampling and variation provisions of Section 6.5 shall not apply) and AHRI 840, respectively.
3. Piping that conveys fluids that have a design operating temperature range between 60°F (15°C) and 105°F (41°C).
4. Piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power.
5. Strainers, control valves, and balancing valves associated with piping 1 inch (25 mm) or less in diameter.
6. Direct buried piping that conveys fluids at or below 60°F (15°C).

TABLE ~~C403.2.10~~ C403.11.3
[c] MINIMUM PIPE INSULATION THICKNESS (in inches)[a], [c]

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (inches)				
	Conductivity Btu · in./(h · ft^2 · °F)[b]	Mean Rating Temperature, °F	< 1	1 to < $1^1/_2$	$1^1/_2$ to < 4	4 to < 8	≥ 8
> 350	0.32 – 0.34	250	4.5	5.0	5.0	5.0	5.0
251 – 350	0.29 – 0.32	200	3.0	4.0	4.5	4.5	4.5
201 – 250	0.27 – 0.30	150	2.5	2.5	2.5	3.0	3.0
141 – 200	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105 – 140	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5

40 – 60	0.21 – 0.27	75	0.5	0.5	1.0	1.0	1.0
	0.20 – 0.26	50	0.5	1.0	1.0	1.0	1.5

For SI: 1 inch = 25.4 mm, °C = [(°F) - 32]/1.8.

a. For piping smaller than $1^1/_2$ inches and located in partitions within conditioned spaces, reduction of these thicknesses by 1 inch shall be permitted (before thickness adjustment required in footnote b) but not to a thickness less than 1 inch.

b For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows:

$T = r\{(1 + t/r)K/k - 1\}$

$T = r\{(1 + t/r)K/k - 1\}$

$T = r\{(1 + t/r)K/k - 1\}$

where:

T

T

T

=

=

minimum insulation thickness,

minimum insulation thickness,

r

r

=

=

actual outside radius of pipe,

actual outside radius of pipe,

t

t

=

=

insulation thickness listed in the table for applicable fluid temperature and pipe size,

insulation thickness listed in the table for applicable fluid temperature and pipe size,

K

K

=

=

conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu · in/h · ft^2 · °F) and

conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu · in/h · ft^2 · °F) and

k

k

=

=

the upper value of the conductivity range listed in the table for the applicable fluid temperature.

the upper value of the conductivity range listed in the table for the applicable fluid temperature.

c. For direct-buried heating and hot water system piping, reduction of these thicknesses by $1^1/_2$ inches (38 mm) shall be permitted (before thickness adjustment required in footnote b but not to thicknesses less than 1 inch (25 mm).

~~C403.2.10.1~~ <u>C403.11.3.1</u> Protection of piping insulation <u>(Mandatory).</u> *No change to text.*

Add new text as follows:

<u>**C403.12 Mechanical systems located outside of the building thermal envelope.** Mechanical systems providing heat outside of the thermal envelope of a building shall comply with Sections C403.12.1 through C403.12.3.</u>

Revise as follows:

~~C403.2.13~~ <u>C403.12.1</u> Heating outside a building <u>(Mandatory).</u> Systems installed to provide heat outside a building shall be radiant systems.

Such heating systems shall be controlled by an occupancy sensing device or a timer switch, so that the system is automatically deenergized when no occupants are present.

~~C403.2.4.5~~ <u>C403.12.2</u> Snow- and ice-melt system controls <u>(Mandatory).</u> *No change to text.*

~~C403.2.4.6~~ <u>C403.12.3</u> Freeze protection system controls <u>(Mandatory).</u> *No change to text.*

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Currently C403 has 5 subsections
C403.1 General
C403.2 Provisions applicable to all systems (Mandatory)
C403.3 Economizers (Prescriptive)
C403.4 Hydronic and multi-zone controls/equipment (Prescriptive)
C403.5 Refrigeration systems
The attached proposal has 12 sections as follows:
C403.1 General
C403.2 System Design
C403.3 Heating and Cooling Equipment Efficiencies
C403.4 Heating and cooling system controls
C403.5 Economizers
C403.6 VAV and multi-zone systems
C403.7 Ventilation and exhaust systems
C403.8 Fans and fan controls
C403.9 Heat rejection equipment
C403.10 Refrigeration systems
C403.11 Construction of HVAC system elements
C403.12 "Outdoor' HVAC systems

The existing Section C403 organization was based on a historic split between mandatory versus prescriptive provisions. The mandatory versus prescriptive is only needed as a distinction when C407 is used to for compliance. In previous editions Sections C403.3 and C403.4 were a single section which was split into simple versus complex systems. In the 2015 edition, Economizer regulations were split out, and the importance of simple/complex distinction was reduced. In addition, there were many new provisions added to the section C403 in 2015 which resulted in less cohesion of the requirements. In general there are very few 'requirements' for the HVAC systems under Section C403. However, where an HVAC systems includes equipment, then requirements for efficiency and provision of controls comes into play. The intent of the proposal is to provide an organization that is more specific to equipment type. The intent of the reorganization is to provide a chapter that is easier to use. It allows placement of new requirements with like provisions rather than among a long list of requirements based on whether the proponent considered them mandatory or prescriptive.

In a few places the code requires specific elements – for example Section C403.5 requires your HVAC system to have an economizer…unless you meet one of umpteen exceptions. In Section C403.2 – System Design – the code says you have zones (unless you meet the exception).

Overall the intent of the proposal is editorial. Text shown for deletion is existing routing text that is no longer needed in the new organization. New text, the same, routing text for the new organization.

Some detailed explanations:
C403.1 – General. Two provisions are moved here: the requirement for commissioning and the reference to ASHRAE 183 for calculating design loads. The latter seemed more of a basis for design and not a system requirement as found in other sections.
C403.2 – System Design: This includes two key 'requirements': Former Section C403.2.4.4 Zone isolation. Reading this section it appears to be a base requirement for all buildings – you create zones. The controls sections frequently refer to zones – it seemed appropriate to put the requirement for the zones at the beginning of the Section. The other requirement is to comply with ventilation requirements of the IMC. Again it seems like a thing to put first in the design of the system
C403.3 – Efficiencies. The home for equipment sizing and the efficiency tables.
C403.4 – System controls. The placement of control requirements which are more full system in nature versus those for specific equipment such as fans or kitchen ventilation. There are 3 key provisions: Thermostatic controls, Off-hour controls, and Hydronic system controls. Specific controls are found with the specific equipment/elements in Sections C403.5 through C403.12.

C403.4.1 – Thermostatic Controls – (includes boiler setback based on outdoor temp)
C403.4.2 – Off Hour controls
C403.4.3 – Hydronic system controls
C403.4.4 – Part load controls –
C403.4.5 – Pump isolation -

Boiler turndown and the last 3 all seemed fairly unique – they didn't seem to fit in as part of the 3 key provisions – Thermostat, Off-hour or Hydronic system
C403.5 – Economizers – existing economizer sections plus Fault Detection requirement
C403.6 - VAV and multiple zone systems – This is the home of existing C403.4.4. C403.4.4 is currently labeled 'requirements for complex system'….But when you read it, it appears to only be addressing VAV systems. Some of the requirements are specific to multizone designs.
C403.7 – Ventilation and Exhaust – this is a collection of unique related to ventilation and exhaust requirements. These are distinct from the requirement to comply with ventilation of the IMC.

C403.8 – Fans and fan controls. There is fan requirements scattered throughout the chapter. The provisions placed here seem to be specific about fans (efficiencies and controls).
C403.9 – Heat rejection equipment. Heat rejection equipment is a special type of fan system which could be combined with C403.8 – but is better to stand by itself.
C403.10 – Refrigeration everything
C403.11 – Construction: Insulation of ducts, piping, construction of ducts
C403.12- weird stuff that is really outside the envelope

Table below provides the section numbers and titles of the existing chapter with the new location in the second column

EXISTING C403	**PROPOSED C403**
C403 Building Mechanical Systems	C403 Building Mechanical Systems
C403.1 General	C403.1 General
C403.2 Provisions applicable to all mechanical systems (Mandatory)	Deleted – only a routing provision
C403.2.1 Calculation of heating and cooling loads	C403.1.2
	C403.2 – System design – new routing
C403.2.2 Equipment Sizing	C403.3.1
C403.2.3 HVAC equipment performance requirements TABLES	C403.3.2
C403.2.3.1 Water-cooled centrifugal chilling packages	C403.3.2.1
C403.2.3.2 Positive displacement (air and water-cooled) chilling packages	C403.3.2.2
C403.2.4 HVAC system controls	C403.4
C403.2.4.1 Thermostatic controls	C403.4.1
C403.2.4.1.1 Heat pump supplemental heat	C403.4.1.1
C403.2.4.1.2 Deadband	C403.4.1.2
C403.2.4.1.3 Set point overlap restrictions	C403.4.1.3
C403.2.4.2 Off-hour controls	C403.4.2
C403.2.4.2.1 Thermostatic setback capabilities	C403.4.2.1
C403.2.4.2.2 Automatic setback and shutdown capabilities	C403.4.2.2
C403.2.4.2.3 Automatic start capabilities	C403.4.2.3
C403.2.4.3 Shutoff Dampers	C403.7.5
C403.2.4.4 Zone Isolation	C403.2.1
C403.2.4.5 Snow- and ice-melt system controls	C403.12.2
C403.2.4.6 Freeze protection system controls	C403.12.3
C403.2.4.7 Economizer fault detection and diagnostic (FDD)	C403.5.5
C403.2.5 Hot water boiler outdoor temperature setback control	C403.4.1.4
C403.2.6 – Ventilation	C403.2.2
	C403.7 New routing section
C403.2.6.1 Demand controlled ventilation	C403.7.1
C403.2.6.2 Enclosed parking garage ventilation controls	C403.7.2
C403.2.7 Energy recovery ventilation systems	C403.7.3
C403.2.8 Kitchen exhaust systems	C403.7.4
	C403.11 – new routing section
C403.2.9 Duct and plenum insulation and sealing	C403.11.1
C403.2.9.1 Duct construction	C403.11.2
C403.2.9.1.1 through C403.2.9.1.3	C403.11.2.1 through C403.11.2.3
C403.2.10 Piping insulation	C403.11.3
C403.2.10.1 Protection of piping insulation	C403.11.3.1
C403.2.11 Mechanical systems commissioning and completion requirements	C403.2.11
C403.2.12 Air system design and control	C403.8
	C403.8.1 – Fan – new routing section
C403.2.12.1 Allowable fan motor horsepower	C403.8.1.1
C403.2.12.2 Motor nameplate horsepower	C403.8.1.2
C403.2.12.3 Fan Efficiency	C403.8.1.3
	C403.12 – new routing section
C403.2.13 Heating outside a building	C403.12.1
C403.2.14 Refrigeration equipment performance	C403.10
C403.2.15 Walkin coolers, walkin freezers, refrigerated warehouse coolers and refrigerated	C403.10.1
C403.2.16 Walkin coolers and walkin freezers	C403.10.2
C403.2.17 Refrigerated display cases	C403.10.3
C403.3 Economizers (prescriptive)	C403.5
C403.3.1 Integrated economizer control	C403.5.1
C403.3.2 Economizer heating impact	C403.5.2

C403.3.3 Air Economizers	C403.5.3
C403.3.3.1 through C403.3.3.5	C403.5.3.1 through C403.5.3.5
C403.3.4 Water-side economizers	C403.5.4
C403.3.4.1 and C403.3.4.2	C403.5.4.1 and C403.5.4.2
C403.4 Hydronic and multi-zone HVAC systems controls and equipment (Prescriptive)	Deleted – routing section
C403.4.1 Fan control	C403.8.3
C403.4.1.1 Fan airflow control	C403.8.3.1
C403.4.1.2 Static pressure sensor location	C403.6.7
C403.4.1.3 Set points for direct digital control	C403.6.6
C403.4.2 Hydronic system controls	C403.4.3
C403.4.2.1 Three pipe system	C403.4.3.1
C403.4.2.2 Two-pipe changeover system	C403.4.3.2
C403.4.2.3 Hydronic (water loop) heat pump systems	C403.4.3.3
C403.4.2.3.1 Temperature dead band	C403.4.3.3.1
C403.4.2.3.2 Heat rejection	C403.4.3.3.2
C403.4.2.3.2.1 Climate zones 3 and 4	C403.4.3.3.2.1
C403.4.2.3.2.2 Climate zones 5 through 8	C403.4.3.3.2.2
C403.4.2.3.3 Two position valve	C403.4.3.3.3
C403.4.2.4 Part-load controls	C403.4.4
C403.4.2.5 Boiler turndown	C403.3.4
C403.4.2.6 Pump isolation	C403.4.5
C403.4.3 Heat rejection equipment	C403.9
C403.4.3.1 General	C403.9.1
C403.4.3.2 Fan speed control	C403.9.2
C403.4.3.2.1 Fan motors not less than 7.5 hp	C403.9.2.1
C403.4.3.2.2 Multiple cell heat rejection equipment	C403.9.2.2
C403.4.3.3 Limitation on centrifugal fan open-circuit cooling towers	C403.9.3
C403.4.3.4 tower flow turndown	C403.9.4
C403.4.4 Requirements for complex mechanical systems serving multiple zones	C403.6
C403.4.4.1 Single duct VAV systems	C403.6.1
C403.4.4.2 Dual duct and mixing VAV systems	C403.6.2
C403.4.4.3 Single fan dual duct and mixing VAV systems	C403.6.3
C403.4.4.4 Fractional hp fan motors	C403.8.2
C403.4.4.5 Supply air temperature reset controls	C403.6.4
C403.4.4.6 Multiple zone VAV system ventilation optimization control	C403.6.5
C403.4.5 Heat recovery for service water heating	C404.9.5
C403.4.6 Hot gas bypass limitation	C403.3.3
C403.5 Refrigeration systems	C403.10.4
C403.5.1 Condensers serving refrigeration systems	C403.10.4.1
C403.5.2 Compressor systems.	C403.10.4.2

Cost Impact: Will not increase the cost of construction
There is no intent to change any technical requirement but to reorganize Section C403 into a more user friendly format.

CE119-16 : C403-COLLINS11420

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE119-16 **AS**

Code Change No: CE122-16

Original Proposal

Section: C202, C403.2.12, C403.2.12.1, C403.2.12.2, C403.2.12.3, C403.4.1, C403.4.1.1, C403.4.1.2, C403.4.1.3, C403.4.4.4.

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

FAN SYSTEM DESIGN CONDITIONS. Operating conditions that can be expected to occur during normal system operation that result in the highest supply fan airflow rate to conditioned spaces served by the system, other than during air economizer operation.

C403.2.12 Air system design and control. Each HVAC system ~~having~~ with a ~~total~~ fan ~~system motor nameplate horsepower (hp) exceeding 5 hp (3.7 kW)~~ shall comply with the provisions of Sections C403.2.12.1 through ~~C403.2.12.3~~ C403.2.12.5.

C403.2.12.1 Allowable fan ~~motor~~ horsepower. Each HVAC system having a total fan system motor nameplate horsepower exceeding 5 hp (3.7 kW) at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) as shown in Table C403.2.12.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single-*zone* variable air volume systems shall comply with the constant volume fan power limitation.

Exceptions:

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp (0.746 kW) or less are exempt from the allowable fan horsepower requirement.

C403.2.12.2 Motor nameplate horsepower. For each fan, the fan brake horsepower shall be indicated on the construction documents and the selected motor shall be not larger than the first available motor size greater than the following:

1. For fans less than 6 bhp (4413 W), 1.5 times the fan brake horsepower.
2. For fans 6 bhp (4413 W) and larger, 1.3 times the fan brake horsepower.
3. Systems complying with Section C403.2.12.1 *fan system motor nameplate hp* (Option 1).

Exception: Fans with motor nameplate horsepower less than 1 hp are exempt from this section.

C403.2.12.3 Fan efficiency. Fans shall have a fan efficiency grade (FEG) of not less than 67 when determined in accordance with AMCA 205 by an *approved*, independent testing laboratory and labeled by the manufacturer. The total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

Exception: The following fans are not required to have a fan efficiency grade:

1. Fans of 5 hp (3.7 kW) or less as follows:
   1.1 ~~Single~~ fan~~ ~~Individual fans with a motor nameplate horsepower of 5 hp (3.7 kW) or less, unless Exception 1.2 applies.
   1.2 Multiple fans in series or parallel that have a combined motor nameplate horsepower of 5 hp (3.7 kW) or less and are operated as the functional equivalent of a single fan.
   1.3 Fans that are part of equipment covered under Section C403.2.3.
   1.4 Fans included in an equipment package certified by an *approved agency* for air or energy performance.
   1.5 Powered wall/roof ventilators.
   1.6 Fans outside the scope of AMCA 205.
   1.7 Fans that are intended to operate only during emergency conditions.

~~C403.4.4.4~~ C403.2.12.4 Fractional hp fan motors. Motors for fans that are not less than $^{1}/_{12}$ hp (0.082 kW) and less than 1 hp (0.746 kW) shall be electronically commutated motors or shall have a minimum motor efficiency of 70 percent, rated in accordance with DOE 10 CFR 431. These motors shall also have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing instead of a varying motor speed shall be permitted.

Exceptions: The following motors are not required to comply with this section:

1. Motors in the airstream within fan coils and terminal units that only provide heating to the space served.
2. Motors in space-conditioning equipment that comply with Section 403.2.3 or C403.2.12.
3. Motors that comply with Section C405.8.

~~C403.4.1~~ C403.2.12.5 Fan control. *No change to text.*

TABLE ~~C403.4.1.1~~C403.2.12.5
~~EFFECTIVE DATES~~ REQUIREMENTS FOR FAN CONTROL

COOLING SYSTEM TYPE	FAN MOTOR SIZE	MECHANICAL COOLING CAPACITY
DX cooling	Any	~~[3] 75,000 Btu/h (before 1/1/2016)~~
		≥ 65,000 Btu/h ~~(after 1/1/2016~~
Chilled water and evaporative cooling	~~[3] 5 hp~~	~~Any~~
	≥ $^{1}/_{4}$ hp	Any

For SI: 1 British thermal unit per hour = 0.2931 W; 1 hp = 0.746 kW.

C403.4.1.1 Fan airflow control. Each cooling system listed in Table C403.4.1.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements:

1. Direct expansion (DX) and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have not fewer than two stages of fan control. Low or minimum speed shall not be greater than 66 percent of full speed. At low or minimum speed, the fan system shall draw not more than 40 percent of the fan power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
2. Other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall be not greater than 50 percent of full speed. At minimum speed the fan system shall draw not more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
3. Units that include an airside economizer in accordance with Section C403.3 shall have not fewer than two speeds of fan control during economizer operation

Exceptions:

1. Modulating fan control is not required for chilled water and evaporative cooling units with fan motors of less than 1 hp (0.746 kW) where the units are not used to provide *ventilation* air and the indoor fan cycles with the load.
2. Where the volume of outdoor air required to comply with the *ventilation* requirements of the *International Mechanical Code* at low speed exceeds the air that would be delivered at the speed defined in Section C403.4.1, the minimum speed shall be selected to provide the required *ventilation air*.

C403.4.1.2 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be located such that the controller set point is not greater than 1.2 inches w.c. (299 Pa). Where this results in one or more sensors being located downstream of major duct splits, not less than one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

C403.4.1.3 Set points for direct digital control. For systems with direct digital control of individual zones reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure. In such case, the set point is reset lower until one zone damper is nearly wide open. The direct digital controls shall be capable of monitoring *zone* damper positions or shall have an alternative method of indicating the need for static pressure that is capable of all of the following:

1. Automatically detecting any *zone* that excessively drives the reset logic.
2. Generating an alarm to the system operational location.
3. Allowing an operator to readily remove one or more zones from the reset algorithm.

Reason: Section C403.2.12 was added to the IECC under proposal CE239 in the hearings for 2015 IECC.Current code language limits some fan requirements to fans with motors greater than 5 hp. This is the result of a section being relocated in 90.1-2013 where it was inappropriately subject to the limit. Addendum **ap** to ASHRAE Standard 90.1-2013 revised 90.1 so that requirements for smaller fans are as originally intended. This proposal mirrors that revision. In addition fan requirements are moved to Section C403.2.12 so all fan requirements are in one location. Table C403.4.1.1 is relocated and revised to match the original intention and to reflect the publication date of IECC 2018.

Approval of this code change proposal will ensure consistency with ASHRAE Standard 90.1-16, which will be adopted by reference as an alternative path to the 2018 IECC Commercial Provisions. This change was made via addendum **ap** to ASHRAE Standard 90.1-2013

Cost Impact: Will not increase the cost of construction
The proposal primarily deals with clarification and reorganization of the code to improve understanding and compliance. The proposal does clarify that improved fan efficiencies are required on smaller motors; however, that was the original intention of a past proposal to 90.1 that was included in prior proposal CE239. In addition, the ECM motors called for are standard construction practice where they would be applied. There is not expected to be an increase in construction cost over normal construction practice.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE122-16 **AS**

Code Change No: CE126-16

Original Proposal

Section: C403.2.16, C403.2.16.1 (New), C403.2.16.1(1) (New), C403.2.16.1(2) (New), C403.2.16.1(3) (New)

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

C403.2.16 Walk-in coolers and walk-in freezers. Site- assembled or site-constructed *walk-in coolers* and *walk-in freezers* shall comply with the following:

1. Automatic door closers shall be provided that fully close walk-in doors that have been closed to within 1 inch (25 mm) of full closure.

   Exception: Closers are not required for doors more than 45 inches (1143 mm) in width or more than 7 feet (2134 mm) in height.

2. Doorways shall be provided with strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when the doors are open.
3. Walls shall be provided with insulation having a thermal resistance of not less than R-25, ceilings shall be provided with insulation having a thermal resistance of not less than R-25 and doors of *walk-in coolers* and *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R-32.

   Exception: Insulation is not required for glazed portions of doors or at structural members associated with the walls, ceiling or door frame.

4. The floor of *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R-28.
5. Transparent reach-in doors for and windows in opaque *walk-in freezer* doors shall be provided with triple-pane glass having the interstitial spaces filled with inert gas or provided with heat-reflective treated glass.
6. Transparent reach-in doors for and windows in opaque walk-in cooler doors shall be double-pane heat-reflective treated glass having the interstitial space gas filled.
7. Evaporator fan motors that are less than 1 hp (0.746 kW) and less than 460 volts shall be electronically commutated motors or 3-phase motors.
8. Condenser fan motors that are less than 1 hp (0.746 kW) in capacity shall be of the electronically commutated or permanent split capacitor-type or shall be 3-phase motors.

   Exception: Fan motors in *walk-in coolers* and *walk-in freezers* combined in a single enclosure greater than 3,000 square feet (279 m^2) in floor area are exempt.

9. Antisweat heaters that are not provided with anti-sweat heater controls shall have a total door rail, glass and frame heater power draw not greater than 7.1 W/ft^2 (76 W/m^2) of door opening for *walk-in freezers*, and not greater than 3.0 W/ft^2 (32 W/m^2) of door opening for *walk-in coolers*.
10. Antisweat heater controls shall be capable of reducing the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

11. Light sources shall have an efficacy of not less than 40 lumens per Watt, including any ballast losses, or shall be provided with a device that automatically turns off the lights within 15 minutes of when the *walk-in cooler* or *walk-in freezer* was last occupied.

Add new text as follows:

TABLE C403.2.16.1(1)
Walk-in Cooler and Freezer Display Doors Efficiency Requirements

Class Descriptor	Class	Maximum Energy Consumption (kWh/day)[a]
Display Door, Medium Temperature	DD, M	$0.04 \times A_{dd} + 0.41$
Display Door, Low Temperature	DD, L	$0.15 \times A_{dd} + 0.29$

a. A_{dd} is the surface area of the display door.

TABLE C403.2.16.1(2)
Walk-in Cooler and Freezer Non-Display Doors Efficiency Requirements

Class Descriptor	Class	Maximum Energy Consumption (kWh/day)[a]
Passage Door, Medium Temperature	PD, M	$0.05 \times A_{nd} + 1.7$
Passage Door, Low Temperature	PD, L	$0.14 \times A_{nd} + 4.8$
Freight Door, Medium Temperature	PD, M	$0.04 \times A_{nd} + 1.9$
Freight Door, Medium Temperature	PD, L	$0.12 \times A_{nd} + 5.6$

a. A_{nd} is the surface area of the non-display door.

TABLE C403.2.16.1(3)
Walk-in Cooler and Freezer Refrigeration Systems Efficiency Requirements

Class Descriptor	Class	Minimum Annual Walk-In Energy Factor AWEF (Btu/W-h)
Dedicated Condensing, Medium Temperature, Indoor System	DC.M.I	5.61
Dedicated Condensing, Medium Temperature, Indoor System, > 9,000 Btu/h Capacity	DC.M.I, > 9,000	5.61
Dedicated Condensing, Medium Temperature, Outdoor System	DC.M.I	7.60
Dedicated Condensing, Medium Temperature, Outdoor System, > 9,000 Btu/h Capacity	DC.M.I, > 9,000	7.60

C403.2.16.1 Performance standards. Effective June 5, 2017, walk-in coolers and walk-in freezers shall meet the requirements of Tables C403.2.16.1(1), C403.2.16.1(2) and C403.2.16.1(3).

Reason: Federal efficiency standards for walk-in coolers and freezers were established as part of the Energy Independence and Security Act of 2007, and the current requirements are shown in this section. However, as part of this law, DOE was required to create performance requirements to replace all of these design specifications.

According to the US Code of Federal Regulations, the new requirements will take effect in June, 2017. Further information on the upcoming requirements can be found at the following web site: http://www.ecfr.gov/cgi-bin/text-idx?SID=23ae18c05e2e7b66dd60f8d6e49d1e62&mc=true&node=sp10.3.431.r&rgn=div6

This proposal updates the energy code with the June 2017 performance requirements.

Cost Impact: Will increase the cost of construction
It is likely that the new performance requirements will increase costs compared to the previous design requirements. However, the performance requirements may allow more technology and design flexibilty for manufacturers such that they may reduce such costs.

Report of Committee Action Hearings

Committee Action: Approved as Modified

Modify as follows:

C403.2.16.1 Performance standards. Effective ~~June 5~~ January 1, ~~2017~~ 2020, walk-in coolers and walk-in freezers shall meet the requirements of Tables C403.2.16.1(1), C403.2.16.1(2) and C403.2.16.1(3).

Committee Reason: For site-assembled walk-in coolers and freezers, it is important to have specifications in the code. The Modification corrects the effective date.

Assembly Action None

Final Action Results

CE126-16	**AM**

Code Change No: CE127-16

Original Proposal

Section: C403.2.2

Proponent: Duane Jonlin, Seattle Dept of Construction and Inspections, representing Seattle Dept of Construction and Inspections (duane.jonlin@seattle.gov)

Revise as follows:

C403.2.2 Equipment sizing. The output capacity of heating and cooling equipment shall be not greater than that of the smallest available equipment size that exceeds the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

~~**Exceptions:**~~

1. ~~Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.~~
2. ~~Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.~~

Reason: If interpreted literally, the code as currently written requires all heating and cooling equipment to be undersized. (If the equipment's capacity cannot exceed the calculated load, then in virtually every case the available equipment would be sized smaller than the calculated load.) This amendment clarifies what is common practice for most building departments.

Cost Impact: Will not increase the cost of construction
Clarification - no cost impact. This proposal clarifies the common interpretation of the intent of the section. If anything it reduces cost, by changing an impossible standard to a reasonable standard.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C403.2.2 Equipment sizing. The output capacity of heating and cooling equipment shall be not greater than that of the smallest available equipment size that exceeds the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.

Committee Reason: The proposal allows designers to select equipment that will do the job because now they can slightly oversize the equipment rather than try to match the load exactly. The Modification restores the exceptions which were not intended to be deleted by the proponent.

Assembly Action **None**

Final Action Results

CE127-16	AM

Code Change No: CE128-16

Original Proposal

Section: C403.2.16, C403.2.2, C403.2.4.1.2, C403.2.4.1.3, C403.2.4.2.1, C403.2.4.2.2, C403.2.4.2.3, C403.2.4.5, C403.2.4.7, C403.2.7, C403.2.8, C403.3.1, C403.3.3.1, C403.3.3.2, C403.3.3.3, C403.3.4.1, C403.4.1.3, C403.4.2, C403.4.2.3.1, C403.4.2.4, C403.4.2.6, C403.4.4, C403.4.4.1, C403.4.4.2, C403.4.4.5, C405.2.3.1, C405.2.4, C406.4

Proponent: Eric Makela, Cadmus Group, representing Northwest Energy Codes Group

Revise as follows:

C403.2.2 Equipment sizing. The output capacity of heating and cooling equipment shall be not greater than the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that ~~have the capability~~ are configured to sequence the operation of each unit based on load.

C403.2.4.1.2 Deadband. Where used to control both heating and cooling, zone thermostatic controls shall be ~~capable of providing~~ configured to provide a temperature range or deadband of at least 5°F (2.8°C) within which the supply of heating and cooling energy to the zone is ~~capable of being~~ shut off or reduced to a minimum.

Exceptions:

1. Thermostats requiring manual changeover between heating and cooling modes.
2. Occupancies or applications requiring precision in indoor temperature control as approved by the code official.

C403.2.4.1.3 Set point overlap restriction. Where a *zone* has a separate heating and a separate cooling thermostatic control located within the *zone*, a limit switch, mechanical stop or direct digital control system with software programming shall be ~~provided with the capability~~ configured to prevent the heating set point from exceeding the cooling set point and to maintain a deadband in accordance with Section C403.2.4.1.2.

C403.2.4.2.1 Thermostatic setback ~~capabilities~~. Thermostatic setback controls shall ~~have the capability~~ be configured to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C).

C403.2.4.2.2 Automatic setback and shutdown ~~capabilities~~. Automatic time clock or programmable controls shall be capable of starting and stopping the system for seven different daily schedules per week and retaining their programming and time setting during a loss of power for at least 10 hours. Additionally, the controls shall have a manual override that allows temporary operation of the system for up to 2 hours;

a manually operated timer ~~capable of being adjusted~~ configured to operate the system for up to 2 hours; or an occupancy sensor.

C403.2.4.2.3 Automatic start ~~capabilities~~. Automatic start controls shall be provided for each HVAC system. The controls shall be ~~capable of~~ configured to automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

C403.2.4.5 Snow- and ice-melt system controls. Snow- and ice-melting systems shall include automatic controls ~~capable of shutting~~ configured to shut off the system when the pavement temperature is above 50°F (10°C) and no precipitation is falling and an automatic or manual control that ~~will allow~~ is configured to shutoff when the outdoor temperature is above 40°F (4°C).

C403.2.4.7 Economizer fault detection and diagnostics (FDD). Air-cooled unitary direct-expansion units listed in Tables C403.2.3(1) through C403.2.3(3) and variable refrigerant flow (VRF) units that are equipped with an economizer in accordance with Section C403.3 shall include a fault detection and diagnostics (FDD) system complying with the following:

1. The following temperature sensors shall be permanently installed to monitor system operation:
   1.1. Outside air.
   1.2 Supply air.
   1.3 Return air.
2. Temperature sensors shall have an accuracy of ±2°F (1.1°C) over the range of 40°F to 80°F (4°C to 26.7°C).
3. Refrigerant pressure sensors, where used, shall have an accuracy of ±3 percent of full scale.
4. The unit controller shall ~~be capable of providing~~ configured to provide system status by indicating the following:
   4.1 Free cooling available.
   4.2 Economizer enabled.
   4.3 Compressor enabled.
   4.4 Heating enabled.
   4.5 Mixed air low limit cycle active.
   4.6 The current value of each sensor.
5. The unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans and the heating system can be independently tested and verified.
6. The unit shall be ~~capable of reporting~~ configured to report faults to a fault management application accessible by day-to-day operating or service personnel, or annunciated locally on zone thermostats.
7. The FDD system shall be ~~capable of detecting~~ configured to detect the following faults:
   7.1 Air temperature sensor failure/fault.
   7.2 Not economizing when the unit should be economizing.
   7.3 Economizing when the unit should not be economizing.
   7.4 Damper not modulating.
   7.5 Excess outdoor air.

C403.2.7 Energy recovery ventilation systems. Where the supply airflow rate of a fan system exceeds the values specified in Tables C403.2.7(1) and C403.2.7(2), the system shall include an energy recovery system. The energy recovery system shall ~~have the capability~~ be configured to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section C403.3.

> **Exception:** An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include at least one of the following features:

2.1. Variable-air-volume hood exhaust and room supply systems ~~capable of reducing~~ configured to reduce exhaust and makeup air volume to 50 percent or less of design values.

2.2. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated not warmer than 2°F (1.1°C) above room setpoint, cooled to not cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.

3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
9. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.2.7(1).
10. Systems exhausting toxic, flammable, paint or corrosive fumes or dust.
11. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

C403.2.8 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not be greater than 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space shall not exceed the greater of the following:

1. The ventilation rate required to meet the space heating or cooling load.
2. The hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

Where total kitchen hood exhaust airflow rate is greater than 5,000 cfm (2360 L/s), each hood shall be a factory-built commercial exhaust hood listed by a nationally recognized testing laboratory in compliance with UL 710. Each hood shall have a maximum exhaust rate as specified in Table C403.2.8 and shall comply with one of the following:

1. Not less than 50 percent of all replacement air shall be transfer air that would otherwise be exhausted.
2. Demand ventilation systems on not less than 75 percent of the exhaust air that are ~~capable of~~ configured to provide not less than a 50-percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.
3. Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40 percent on not less than 50 percent of the total exhaust airflow.

Where a single hood, or hood section, is installed over appliances with different duty ratings, the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

Exception: Where not less than 75 percent of all the replacement air is transfer air that would otherwise be exhausted

C403.2.16 Walk-in coolers and walk-in freezers. Site- assembled or site-constructed *walk-in coolers* and *walk-in freezers* shall comply with the following:

1. Automatic door closers shall be provided that fully close walk-in doors that have been closed to within 1 inch (25 mm) of full closure.

   Exception: Closers are not required for doors more than 45 inches (1143 mm) in width or more than 7 feet (2134 mm) in height.

2. Doorways shall be provided with strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when the doors are open.
3. Walls shall be provided with insulation having a thermal resistance of not less than R-25, ceilings shall be provided with insulation having a thermal resistance of not less than R-25 and doors of *walk-in coolers* and *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R-32.

   Exception: Insulation is not required for glazed portions of doors or at structural members associated with the walls, ceiling or door frame.

4. The floor of *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R-28.
5. Transparent reach-in doors for and windows in opaque *walk-in freezer* doors shall be provided with triple-pane glass having the interstitial spaces filled with inert gas or provided with heat-reflective treated glass.
6. Transparent reach-in doors for and windows in opaque walk-in cooler doors shall be double-pane heat-reflective treated glass having the interstitial space gas filled.
7. Evaporator fan motors that are less than 1 hp (0.746 kW) and less than 460 volts shall be electronically commutated motors or 3-phase motors.
8. Condenser fan motors that are less than 1 hp (0.746 kW) in capacity shall be of the electronically commutated or permanent split capacitor-type or shall be 3-phase motors.

   Exception: Fan motors in *walk-in coolers* and *walk-in freezers* combined in a single enclosure greater than 3,000 square feet (279 m^2) in floor area are exempt.

9. Antisweat heaters that are not provided with anti-sweat heater controls shall have a total door rail, glass and frame heater power draw not greater than 7.1 W/ft^2 (76 W/m^2) of door opening for *walk-in freezers*, and not greater than 3.0 W/ft^2 (32 W/m^2) of door opening for *walk-in coolers*.
10. Antisweat heater controls shall be ~~capable of reducing~~ configured to reduce the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.
11. Light sources shall have an efficacy of not less than 40 lumens per Watt, including any ballast losses, or shall be provided with a device that automatically turns off the lights within 15 minutes of when the *walk-in cooler* or *walk-in freezer* was last occupied.

C403.3.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be ~~capable of providing~~ configured to provide partial cooling even where additional mechanical cooling is required to provide the remainder of the cooling load. Controls shall not be capable of creating a false load in the mechanical cooling systems by limiting or disabling the economizer or any other means, such as hot gas bypass, except at the lowest stage of mechanical cooling.

Units that include an air economizer shall comply with the following:

1. Unit controls shall have the mechanical cooling capacity control interlocked with the air economizer controls such that the outdoor air damper is at the 100-percent open position when mechanical cooling is on and the outdoor air damper does not begin to close to prevent coil freezing due to minimum compressor run time until the leaving air temperature is less than 45°F (7°C).
2. Direct expansion (DX) units that control 75,000 Btu/h (22 kW) or greater of rated capacity of the capacity of the mechanical cooling directly based on occupied space temperature shall have not fewer than two stages of mechanical cooling capacity

3. Other DX units, including those that control space temperature by modulating the airflow to the space, shall be in accordance with Table C403.3.1.

C403.3.3.1 Design capacity. Air economizer systems shall be ~~capable of modulating~~ configured to modulate *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

C403.3.3.2 Control signal. Economizer controls and dampers shall be ~~capable of being sequenced~~ configured to sequence the dampers with the mechanical cooling equipment and shall not be controlled by only mixed-air temperature.

Exception: The use of mixed-air temperature limit control shall be permitted for systems controlled from space temperature (such as single-*zone* systems).

C403.3.3.3 High-limit shutoff. Air economizers shall be ~~capable of~~ configured to automatically ~~reducing~~ reduce *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table C403.3.3.3. High-limit shutoff control settings for these control types shall be those specified in Table C403.3.3.3.

C403.3.4.1 Design capacity. Water economizer systems shall be ~~capable of cooling~~ configured to cool supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of not greater than 50°F (10°C) dry bulb/45°F (7°C) wet bulb.

Exceptions:

1. Systems primarily serving computer rooms in which 100 percent of the expected system cooling load at 40°F (4°C) dry bulb/35°F (1.7°C) wet bulb is met with evaporative water economizers.
2. Systems primarily serving computer rooms with dry cooler water economizers which satisfy 100 percent of the expected system cooling load at 35°F (1.7°C) dry bulb.
3. Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F (10°C) dry bulb/45°F (7°C) wet bulb and where 100 percent of the expected system cooling load at 45°F (7°C) dry bulb/40°F (4°C) wet bulb is met with evaporative water economizers.

C403.4.1.3 Set points for direct digital control. For systems with direct digital control of individual zones reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure. In such case, the set point is reset lower until one zone damper is nearly wide open. The direct digital controls shall be capable of monitoring *zone* damper positions or shall have an alternative method of indicating the need for static pressure that is ~~capable of~~ configured to provide all of the following:

1. Automatically detecting any *zone* that excessively drives the reset logic.
2. Generating an alarm to the system operational location.
3. Allowing an operator to readily remove one or more zones from the reset algorithm.

C403.4.2 Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections C403.4.2.1 through C403.4.2.3. Hydronic heating systems comprised of multiple-packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls ~~capable of sequencing~~ configured to sequence operation of the boilers. Hydronic heating systems comprised of a single boiler and greater than 500,000 Btu/h (146.5 kW) input design capacity shall include either a multistaged or modulating burner.

C403.4.2.3.1 Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are ~~capable of providing~~configured to provide a heat pump water supply temperature dead band of not less than 20°F (11°C) between initiation of heat rejection and heat addition by the central devices.

> **Exception:** Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on realtime conditions of demand and capacity, dead bands of less than 20°F (11°C) shall be permitted.

C403.4.2.4 Part-load controls. Hydronic systems greater than or equal to 500,000 Btu/h (146.5 kW) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that ~~have the capability~~ are configured to do all of the following:

1. ~~Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using coil valve position, zone-return water temperature, building-return water temperature or outside air temperature. The temperature shall be capable of being~~ reset by not less than 25 percent of the design supply-to-return water temperature difference.
2. Automatically vary fluid flow for hydronic systems with a combined motor capacity of 10 hp (7.5 kW) or larger with three or more control valves or other devices by reducing the system design flow rate by not less than 50 percent by designed valves that modulate or step open and close, or pumps that modulate or turn on and off as a function of load.
3. Automatically vary pump flow on chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners with a combined motor capacity of 10 hp (7.5 kW) or larger by reducing pump design flow by not less than 50 percent, utilizing adjustable speed drives on pumps, or multiple-staged pumps where not less than one-half of the total pump horsepower is capable of being automatically turned off. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

   Exceptions:

   1. Supply-water temperature reset for chilled-water systems supplied by off-site district chilled water or chilled water from ice storage systems.
   2. Minimum flow rates other than 50 percent as required by the equipment manufacturer for proper operation of equipment where using flow bypass or end-of-line 3-way valves.
   3. Variable pump flow on dedicated equipment circulation pumps where configured in primary/secondary design to provide the minimum flow requirements of the equipment manufacturer for proper operation of equipment.

C403.4.2.6 Pump isolation. Chilled water plants including more than one chiller shall ~~have the capability~~ be capable of and configured to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler plants including more than one boiler shall ~~have the capability~~ be capable of and configured to reduce flow automatically through the boiler plant when a boiler is shut down.

C403.4.4 Requirements for complex mechanical systems serving multiple zones. Sections C403.4.4.1 through C403.4.6.4 shall apply to complex mechanical systems serving multiple zones. Supply air systems serving multiple zones shall be variable air volume (VAV) systems that, during periods of occupancy, are designed and ~~capable of being controlled~~ configured to reduce primary air supply to each *zone* to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each *zone*.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code.*

4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in *outdoor air* intake for the system, as *approved* by the *code official*.
5. The airflow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

   Exception: The following individual *zones* or entire air distribution systems are exempted from the requirement for VAV control:

   1. *Zones* or supply air systems where not less than 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.
   2. *Zones* where special humidity levels are required to satisfy process needs.
   3. *Zones* with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.
   4. *Zones* where the volume of air to be reheated, recooled or mixed is not greater than the volume of outside air required to provide the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
   5. *Zones* or supply air systems with thermostatic and humidistatic controls ~~capable of operating~~ configured to operate in sequence the supply of heating and cooling energy to the *zones* and which are ~~capable of preventing~~ configured to prevent reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

C403.4.4.1 Single-duct VAV systems, terminal devices. Single-duct VAV systems shall use terminal devices capable of ~~reducing~~ and configured to reduce the supply of primary supply air before reheating or recooling takes place.

C403.4.4.2 Dual-duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct shall use terminal devices that are ~~capable of reducing~~ configured to reduce the flow from one duct to a minimum before mixing of air from the other duct takes place.

C403.4.4.5 Supply-air temperature reset controls. Multiple-*zone* HVAC systems shall include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be ~~capable of resetting~~ configured to reset the supply air temperature not less than 25 percent of the difference between the design supply-air temperature and the design room air temperature.

Exceptions:

1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.
2. Seventy-five percent of the energy for reheating is from site-recovered or site-solar energy sources.
3. *Zones* with peak supply air quantities of 300 cfm (142 L/s) or less.

C405.2.3.1 Daylight-responsive control function. Where required, *daylight-responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in toplight *daylight zones* in accordance with Section C405.2.3.3 shall be controlled independently of lights in sidelight *daylight zones* in accordance with Section C405.2.3.2.
2. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel.
3. Calibration mechanisms shall be r*eadily accessible*.

4. Where located in offices, classrooms, laboratories and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to 15 percent of full light output or lower.
5. *Daylight responsive controls* shall be ~~capable of a complete~~ configured to completely shutoff of all controlled lights.
6. Lights in sidelight *daylight zones* in accordance with Section C405.2.3.2 facing different cardinal orientations [i.e., within 45 degrees (0.79 rad) of due north, east, south, west] shall be controlled independently of each other.

   Exception: Up to 150 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

C405.2.4 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device that is ~~capable of~~ configured to automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by captive key systems.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

C406.4 Enhanced digital lighting controls. Interior lighting in the building shall have the following enhanced lighting controls that shall be located, scheduled and operated in accordance with Section C405.2.2.

1. Luminaires shall be ~~capable of~~ configured for continuous dimming.
2. Luminaires shall be ~~capable of being~~ addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of not more than four luminaries shall be allowed.
3. Not more than eight luminaires shall be controlled together in a *daylight zone*.
4. Fixtures shall be controlled through a digital control system that includes the following function:
   4.1. Control reconfiguration based on digital addressability.
   4.2. Load shedding.
   4.3. Individual user control of overhead general illumination in open offices.
   4.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4 of this section.
6. Functional testing of lighting controls shall comply with Section C408.

Reason: The overall intent of this code change proposal is to increase the likelihood that energy savings intended by the energy code will be realized. Much of the savings from energy codes is dependent on the presence and functionality of building controls for HVAC and lighting systems. The word "capable" alone is not the best mandatory language for controls, as control equipment can be provided that could be said to be capable of achieving the desired result even though the required software, hardware, and programming is not present and the setpoint is not correct or the programming is not even complete. Using only the word "capable" in the code provides a potential loophole. This change generally replaces the term "capable of" with "configured to" where related to control requirements. In some instances it is appropriate to retain "capable of" and add "configured to". Requiring the equipment to be "configured" to achieve certain operation at the time of inspection provides assurance that the required operation is achievable while not mandating any specific post-occupancy operation. It should be noted that "configured to" is already used in many places in the code to achieve this objective including Sections C403.2.4.3, C403.2.4.4, C403.2.4.6, C405.2.5, C405.9.2 and C409.4.1.

Cost Impact: Will not increase the cost of construction
The proposal is completely editorial in nature and does not alter any technical standard.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE128-16	**AS**

Code Change No: CE130-16

Original Proposal

Section: C403.2.3

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

TABLE ~~C403.2.3(2)~~ C403.2.3(2) (2)
MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY ~~Before 1/1/2016~~	MINIMUM EFFICIENCY ~~As of 1/1/2016~~	TEST PROCEDURE[a]
Air cooled (cooling mode)	b	All	Split System	~~13.0 SEER[c]~~	14.0 SEER[c]	AHRI 210/240
			Single Package	~~13.0 SEER[c]~~	14.0 SEER[c]	
Through-the-wall, air cooled	≤ 30,000 Btu/h[b]	All	Split System	~~12.0 SEER~~	12.0 SEER	
			Single Package	~~12.0 SEER~~	12.0 SEER	
Single-duct high-velocity air cooled	b	All	Split System	~~11.0 SEER~~	11.0 SEER	
Air cooled (cooling mode)	≥ 65,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER 11.2 IEER~~	11.0 EER 12.0 IEER	AHRI 340/360
		All other	Split System and Single Package	~~10.8 EER 11.0 IEER~~	10.8 EER 11.8 IEER	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~10.6 EER 10.7 IEER~~	10.6 EER 11.6 IEER	
		All other	Split System and Single Package	~~10.4 EER 10.5 IEER~~	10.4 EER 11.4 IEER	
	≥ 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~9.5 EER 9.6 IEER~~	9.5 EER 10.6 IEER	
		All other	Split System and Single Package	~~9.3 EER 9.4 IEER~~	9.3 EER 9.4 IEER	
Water to Air: Water Loop (cooling mode)		All	86°F entering water	~~12.2 EER~~	12.2 EER	ISO 13256-1

	≥ 17,000 Btu/h and	All	86°F entering water	~~13.0 EER~~	13.0 EER	
	≥ 65,000 Btu/h and	All	86°F entering water	~~13.0 EER~~	13.0 EER	
Water to Air: Ground Water (cooling mode)		All	59°F entering water	~~18.0 EER~~	18.0 EER	ISO 13256-1
Brine to Air: Ground Loop (cooling mode)		All	77°F entering water	~~14.1 EER~~	14.1 EER	ISO 13256-1
Water to Water: WaterLoop (cooling mode)		All	86°F entering water	~~10.6 EER~~	10.6 EER	ISO 13256-2
Water to Water: Ground Water (cooling mode)		All	59°F entering water	~~16.3 EER~~	16.3 EER	
Brine to Water: Ground Loop (cooling mode)		All	77°F entering fluid	~~12.1 EER~~	12.1 EER	
Air cooled (heating mode)	b	—	Split System	~~7.7 HSPF[c]~~	8.2 HSPF[c]	AHRI 210/240
		—	Single Package	~~7.7 HSPF[c]~~	8.0 HSPF[c]	
Through-the-wall, (air cooled, heating mode)	≤ 30,000 Btu/h[b] (cooling capacity)	—	Split System	~~7.4 HSPF~~	7.4 HSPF	
		—	Single Package	~~7.4 HSPF~~	7.4 HSPF	
Small-duct high velocity (air cooled, heating mode)	b	—	Split System	~~6.8 HSPF~~	6.8 HSPF	
Air cooled (heating mode)	≥ 65,000 Btu/h and (cooling capacity)	—	47ºF db/43ºF wb outdoor air	~~3.3 COP~~	3.3 COP	AHRI 340/360
			17ºF db/15ºF wb outdoor air	~~2.25 COP~~	2.25 COP	
	≥ 135,000 Btu/h (cooling capacity)	—	47ºF db/43ºF wb outdoor air	~~3.2 COP~~	3.2 COP	
			17ºF db/15ºF wb outdoor air	~~2.05 COP~~	2.05 COP	
Water to Air: Water Loop (heating mode)	(cooling capacity)	—	68°F entering water	~~4.3 COP~~	4.3 COP	ISO 13256-1
Water to Air: Ground Water (heating mode)	(cooling capacity)	—	50°F entering water	~~3.7 COP~~	3.7 COP	
Brine to Air: Ground Loop (heating mode)	(cooling capacity)	—	32°F entering fluid	~~3.2 COP~~	3.2 COP	
Water to Water: Water Loop (heating mode)	(cooling capacity)	—	68°F entering water	~~3.7 COP~~	3.7 COP	ISO 13256-2
Water to Water: Ground Water (heating mode)	(cooling capacity)	—	50°F entering water	~~3.1 COP~~	3.1 COP	
Brine to Water: Ground Loop (heating mode)	(cooling capacity)	—	32°F entering fluid	~~2.5 COP~~	2.5 COP	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled ~~air conditioners~~ heat pumps less than 65,000 Btu/h are regulated by NAECA. SEER and HSPF values are those set by NAECA.

~~c. Minimum efficiency as of January 1, 2015.~~

Reason: The proposed changes updates the footnotes to Table C403.2.3(2) for heat pumps. This table shows values for heat pumps, not air conditioners. NAECA also provides the minimum HSPF requirements for single-phase heat pumps with a capacity of less than 65,000 Btu/h.

Footnote c is no longer needed, based on the values shown for equipment as of 1/1/2016.

Cost Impact: Will not increase the cost of construction
This proposal clarifies footnotes in a table and eliminates language that is no longer applicable. It does not change any of the requirements in the table or create any new requirements in the code.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE130-16	**AS**

Code Change No: CE131-16

Original Proposal

Section: C403.2.3

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

TABLE ~~C403.2.3(1)~~ C403.2.3(1) (1)
MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				~~Before 1/1/2016~~	~~As of 1/1/2016~~	
Air conditioners, air cooled	b	All	Split System	~~13.0 SEER~~	13.0 SEER	AHRI 210/240
			Single Package	~~13.0 SEER~~	14.0 SEER[c]	
Through-the-wall (air cooled)	≤ 30,000 Btu/h[b]	All	Split system	~~12.0 SEER~~	12.0 SEER	
			Single Package	~~12.0 SEER~~	12.0 SEER	
Small-duct high-velocity (air cooled)	b	All	Split System	~~11.0 SEER~~	11.0 SEER	
Air conditioners, air cooled	≥ 65,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~11.2 EER~~ ~~11.4 IEER~~	11.2 EER 12.8 IEER	AHRI 340/360
		All other	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	11.0 EER 12.6 IEER	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	11.0 EER 12.4 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~11.0 IEER~~	10.8 EER 12.2 IEER	
	≥ 240,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~10.0 EER~~ ~~10.1 IEER~~	10.0 EER 11.6 IEER	
		All other	Split System and Single Package	~~9.8 EER~~ ~~9.9 IEER~~	9.8 EER 11.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~9.7 EER~~ ~~9.8 IEER~~	9.7 EER 11.2 IEER	
		All other	Split System and Single Package	~~9.5 EER~~ ~~9.6 IEER~~	9.5 EER 11.0 IEER	
Air conditioners, water cooled	b	All	Split System and Single Package	~~12.1 EER~~ ~~12.3 IEER~~	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~12.1 EER~~ ~~12.3 IEER~~	12.1 EER 13.9 IEER	AHRI 340/360
		All other	Split System and	~~11.9 EER~~	11.9 EER	

			Single Package	~~12.1 IEER~~	13.7 IEER	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~12.5 EER~~ ~~12.5 IEER~~	12.5 EER 13.9 IEER	
		All other	Split System and Single Package	~~12.3 EER~~ ~~12.5 IEER~~	12.3 EER 13.7 IEER	
	≥ 240,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~12.4 EER~~ ~~12.6 IEER~~	12.4 EER 13.6 IEER	
		All other	Split System and Single Package	~~12.2 EER~~ ~~12.4 IEER~~	12.2 EER 13.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~12.2 EER~~ ~~12.4 IEER~~	12.2 EER 13.5 IEER	
		All other	Split System and Single Package	~~12.0 EER~~ ~~12.2 IEER~~	12.0 EER 13.3 IEER	
Air conditioners, evaporatively cooled	b	All	Split System and Single Package	~~12.1 EER~~ ~~12.3 IEER~~	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~12.1 EER~~ ~~12.3 IEER~~	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split System and Single Package	~~11.9 EER~~ ~~12.1 IEER~~	11.9 EER 12.1 IEER	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~12.0 EER~~ ~~12.2 IEER~~	12.0 EER 2.2 IEER	
		All other	Split System and Single Package	~~11.8 EER~~ ~~12.0 IEER~~	11.8 EER 12.0 IEER	
	≥ 240,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~11.9 EER~~ ~~12.1 IEER~~	11.9 EER 2.1 IEER	
		All other	Split System and Single Package	~~11.7 EER~~ ~~11.9 IEER~~	11.7 EER 11.9 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.7 EER~~ ~~11.9 IEER~~	11.7 EER 11.9 IEER	
		All other	Split System and Single Package	~~11.5 EER~~ ~~11.7 IEER~~	11.5 EER 11.7 IEER	
Condensing units air cooled	≥ 135,000 Btu/h			~~10.5 EER~~ ~~11.8 IEER~~	10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h			~~13.5 EER~~ ~~14.0 IEER~~	13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h			~~13.5 EER~~ ~~14.0 IEER~~	13.5 EER 14.0 IEER	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER and EER values are those set by NAECA.

~~c. Minimum efficiency as of January 1, 2015.~~

Reason: Based on the requirements shown in the table (as of 1/1/2016), and since this version of the IECC will be published in late 2016 or early 2017, Footnote c is no longer needed.

Cost Impact: Will not increase the cost of construction
This proposal updates the footnote in the table, and does not change any of the requirements in the table, nor does it add any new requirements.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE131-16	**AS**

Code Change No: CE132-16

Original Proposal

Section: C403.2.3

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

TABLE C403.2.3(3)
MINIMUM E3FFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
PTAC (cooling mode) new construction	All Capacities	95°F db outdoor air	14.0 – (0.300 × Cap/1000) EER[c]	AHRI 310/380
PTAC (cooling mode) replacements[b]	All Capacities	95°F db outdoor air	10.9 - (0.213 × Cap/1000) EER	
PTHP (cooling mode) new construction	All Capacities	95°F db outdoor air	14.0 - (0.300 × Cap/1000) EER	
PTHP (cooling mode) replacements[b]	All Capacities	95°F db outdoor air	10.8 - (0.213 × Cap/1000) EER	
PTHP (heating mode) new construction	All Capacities	—	3.2 - (0.026 × Cap/1000) COP	
PTHP (heating mode) replacements[b]	All Capacities	—	2.9 - (0.026 × Cap/1000) COP	
SPVAC (cooling mode)		95°F db/ 75°F wb outdoor air	9.0 EER	AHRI 390
	≥ 65,000 Btu/h and	95°F db/ 75°F wb outdoor air	8.9 EER	
	≥ 135,000 Btu/h and	95°F db/ 75°F wb outdoor air	8.6 EER	
SPVHP (cooling mode)		95°F db/ 75°F wb outdoor air	9.0 EER	
	≥ 65,000 Btu/h and	95°F db/ 75°F wb outdoor air	8.9 EER	
	≥ 135,000 Btu/h and	95°F db/ 75°F wb outdoor air	8.6 EER	
SPVHP (heating mode)		47°F db/ 43°F wb outdoor air	3.0 COP	AHRI 390
	≥ 65,000 Btu/h and	47°F db/ 43°F wb outdoor air	3.0 COP	
	≥ 135,000 Btu/h and	47°F db/ 75°F wb outdoor air	2.9 COP	
Room air conditioners, with louvered sides	< 6,000 Btu/h	—	~~9.7 SEER~~11.0 CEER	ANSI/ AHAM RAC-1
	≥ 6,000 Btu/h and	—	~~9.7 EER~~11.0	

			CEER	
	≥ 8,000 Btu/h and	—	~~9.8 EER~~10.9 CEER	
	≥ 14,000 Btu/h and	—	~~9.7 EER~~10.7 CEER	
	≥ 20,000 Btu/h and < 25,000 Btu/h > 25,000 Btu/h	—	~~8.5 EER~~9.4 CEER 9.0 CEER	
Room air conditioners, without louvered sides	< 6,000 Btu/h > 6,000 Btu/h and < 8,000 Btu/h	—	10.0 CEER ~~9.0 EER~~10.0 CEER	
	≥ 8,000 Btu/h and < 11,000 Btu/h > 11,000 Btu/h and < 14,000 Btu/h > 14,000 Btu/h and < 20,000 Btu/h	—	~~8.5 EER~~9.6 CEER 9.5 CEER 9.3 CEER	
	≥ 20,000 Btu/h	—	~~8.5 EER~~9.4 CEER	
Room air-conditioner heat pumps with louvered sides	< 20,000 Btu/h	—	~~9.0 EER~~9.8 CEER	
	≥ 20,000 Btu/h	—	~~8.5 EER~~9.3 CEER	
Room air-conditioner heat pumps without louvered sides	< 14,000 Btu/h	—	~~8.5 EER~~9.3 CEER	
	≥ 14,000 Btu/h	—	~~8.0 EER~~8.7 CEER	
Room air conditioner casement only	All capacities	—	~~8.7 EER~~9.5 CEER	ANSI/ AHAM RAC-1
Room air conditioner casement-slider	All capacities	—	~~9.5 EER~~10.4 CEER	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8, wb = wet bulb, db = wet bulb.
"Cap" = The rated cooling capacity of the project in Btu/h. Where the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. Where the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculations.
a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Replacement unit shall be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY: NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches (406 mm) in height and less than 42 inches (1067 mm) in width.
~~c. Before January 1, 2015 the minimum efficiency shall be 13.8 - (0.300 x Cap/1000) EER.~~

Reason: As of June 1, 2014, the federal efficiency requirements values for room air conditioners have been increased. In addition, the efficiency metric has been changed from EER (Energy Efficiency Ratio) to CEER (Combined Energy Efficiency Ratio), which is a metric that accounts for energy used in the "active" and "standby" modes of operation.

This proposal updates the table to reflect the current federal minimum efficiency standards.

Cost Impact: Will increase the cost of construction
The cost of room air conditioners that meet the most recent (2014) minimum standards is higher than the cost of room air conditioners that met the previous federal minimum standard.

The new room air conditioners are more energy efficient and will have lower operating costs than the air conditioners meeting the previous federal standard. According to a 2011 DOE analysis, the consumer median payback is between 2.1 and 10.1 years, depending on the product.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE132-16	**AS**

Code Change No: CE136-16

Original Proposal

Section: C403.2.4.1.4 (New)

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Add new text as follows:

403.2.4.1.4 Heated or cooled vestibules The heating system for heated vestibules and air curtains with integral heating shall be provided with controls configured to shut off the source of heating when the outdoor air temperature is greater than 45°F (7°C). Vestibule heating and cooling systems shall be controlled by a thermostat located in the vestibule configured to limit heating to a temperature not greater than 60°F (16°C) and cooling to a temperature not less than 85°F (29°C).

> **Exception:** Control of heating or cooling provided by site-recovered energy or transfer air that would otherwise be exhausted.

Reason: Vestibules or air curtains are required to be installed per C402.5.7 to reduce infiltration into the building. The benefit of a vestibule is negated if the vestibule is heated or cooled to the setpoint of the adjacent space. The proposed change limits heating and cooling energy use associated with vestibules. An exception for temperature limits is allowed when the vestibule is tempered with transfer air or heated with recovered energy. Transfer air tempering is beneficial because that conditioned air is destined to be exhausted anyway, and pressurizing the vestibule can reduce infiltration further.

Approval of this code change proposal will ensure consistency with ASHRAE Standard 90.1-16, which will be adopted by reference as an alternative path to the 2018 IECC Commercial Provisions. This change was made via addendum ca to to ASHRAE Standard 90.1-2010 and addendum ag to ASHRAE Standard 90.1-2013.

Cost Impact: Will increase the cost of construction
If there is a heating or cooling system serving a vestibule, it will already have a thermostat based on requirements in section C403.2.4.1. The upgrade to a thermostat with setpoint limits or a locking cover is a modest cost ($20 to $45). In a DDC system, there would be no additional cost for the outside air lockout, and in an electromechanical control system the cost for an outside air lockout thermostat is modest ($40 to $70). These modest costs will be more than offset by reduced loss of heated or cooled air. If a transfer air fan into the vestibule were selected to condition the vestibule as allowed in the exception, that cost is likely to be less than the cost of providing a separate heating or cooling system for the vestibule.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE136-16	**AS**

Code Change No: CE137-16 Part I

Original Proposal

Section: C104.1, C202, C202 (New), C303.3, C403.2.4.2, C403.2.4.7, C404.6, C404.9.1, C405.2.2.3, C405.2.3.1, C405.2.4, C408.3.1.3.

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins (dcollins@preview-group.com); Dan Buuck (dbuuck@nahb.org); Steven Orlowski (sorlowski@boma.org)

Add new definition as follows:

ACCESS (TO). That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel, or similar obstruction.

READY ACCESS (TO). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, or similar obstruction.

Revise as follows:

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his or her designated agent, and such construction or work shall remain ~~accessible and~~ exposed for inspection purposes until *approved*. It shall be the duty of the permit applicant to cause the work to remain ~~accessible and~~ exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

C303.3 Maintenance information. Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a readily ~~accessible~~ visible label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

C403.2.4.7 Economizer fault detection and diagnostics (FDD). Air-cooled unitary direct-expansion units listed in Tables C403.2.3(1) through C403.2.3(3) and variable refrigerant flow (VRF) units that are equipped with an economizer in accordance with Section C403.3 shall include a fault detection and diagnostics (FDD) system complying with the following:

1. The following temperature sensors shall be permanently installed to monitor system operation:
   1.1. Outside air.
   1.2. Supply air.
   1.3. Return air.
2. Temperature sensors shall have an accuracy of ±2°F (1.1°C) over the range of 40°F to 80°F (4°C to 26.7°C).
3. Refrigerant pressure sensors, where used, shall have an accuracy of ±3 percent of full scale.
4. The unit controller shall be capable of providing system status by indicating the following:
   4.1. Free cooling available.
   4.2. Economizer enabled.
   4.3. Compressor enabled.

4.4. Heating enabled.
4.5. Mixed air low limit cycle active.
4.6. The current value of each sensor.

5. The unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans and the heating system can be independently tested and verified.
6. The unit shall be capable of reporting faults to a fault management application ~~accessible~~ available for *access* by day-to-day operating or service personnel, or annunciated locally on zone thermostats.
7. The FDD system shall be capable of detecting the following faults:
   7.1. Air temperature sensor failure/fault.
   7.2. Not economizing when the unit should be economizing.
   7.3. Economizing when the unit should not be economizing.
   7.4. Damper not modulating.
   7.5. Excess outdoor air.

C404.6 Heated-water circulating and temperature maintenance systems. Heated-water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Controls for hot water storage shall be in accordance with Section C404.6.3. Automatic controls, temperature sensors and pumps shall be ~~accessible~~ in a location with *access*. Manual controls shall be ~~readily accessible~~ in a location with *ready access*.

C404.9.1 Heaters. The electric power to all heaters shall be controlled by ~~a readily accessible~~ an on-off switch that is an integral part of the heater, mounted on the exterior of the heater, or external to and within 3 feet (914 mm) of the heater in a location with *ready access*. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously burning ignition pilots.

C405.2.2.3 Manual controls. *Manual controls* for lights shall comply with the following:

1. Shall be readily accessible to occupants.
2. Shall be in a location with *ready access* to occupants.
3. Shall be located where the controlled lights are visible, or shall identify the area served by the lights and indicate their status.

C405.2.3.1 Daylight-responsive control function. Where required, *daylight-responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in toplight *daylight zones* in accordance with Section C405.2.3.3 shall be controlled independently of lights in sidelight *daylight zones* in accordance with Section C405.2.3.2.
2. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel.
3. Calibration mechanisms shall be~~r~~ in a location with ~~*readily accessible*~~ *ready access*.
4. Where located in offices, classrooms, laboratories and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to 15 percent of full light output or lower.
5. *Daylight responsive controls* shall be capable of a complete shutoff of all controlled lights.
6. Lights in sidelight *daylight zones* in accordance with Section C405.2.3.2 facing different cardinal orientations [i.e., within 45 degrees (0.79 rad) of due north, east, south, west] shall be controlled independently of each other.

   Exception: Up to 150 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

C405.2.4 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by captive key systems.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is ~~readily accessible~~ in a location with *ready access*.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

C408.3.1.3 Daylight responsive controls. Where daylight responsive controls are provided, the following shall be verified:

1. Control devices have been properly located, field calibrated and set for accurate setpoints and threshold light levels.
2. Daylight controlled lighting loads adjust to light level set points in response to available daylight.
3. The ~~locations of~~ calibration adjustment equipment are ~~readily accessible~~ located for *ready access* only to authorized personnel.

C403.2.4.2 Off-hour controls. Each *zone* shall be provided with thermostatic setback controls that are controlled by either an automatic time clock or programmable control system.

Exceptions:

1. *Zones* that will be operated continuously.
2. *Zones* with a full HVAC load demand not exceeding 6,800 Btu/h (2 kW) and having ~~a readily accessible~~ manual shutoff switch located with ready access.

SECTION R202 (N1101.6)
DEFINITIONS

Delete without substitution:

~~**ACCESSIBLE.** Admitting close approach as a result of not being guarded by locked doors, elevation or other effective means (see "Readily *accessible*").~~

~~**READILY ACCESSIBLE.** Capable of being reached quickly for operation, renewal or inspection without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders or access equipment (see "*Accessible*").~~

Reason: The intent of this proposal is for clarification of terminology. This proposal will clarify where the provisions are for access for repair, not accessibility for persons with disabilities.

The term 'accessible' is defined in the IBC and relates to elements and facilities that serve or have special accommodations for persons with mobility impairments. The IPC and IMC use the term "Access (to)" or "Ready Access" for access to equipment which is proposed here for the IECC.

There is a similar proposal for the IRC. A similar proposal was approved for the International Plumbing Code as part of Group A - P84-15

Cost Impact: Will not increase the cost of construction
This is a clarification of terminology that will not change any construction requirements.

Analysis: Section R104.1 does not have a corresponding section in Chapter II of the IRC.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE137-16 Part I	**AS**

Code Change No: CE138-16

Original Proposal

Section(s): C202 (New), C403.2.4.3 (New), C403.2.4.3.1 (New), C403.2.4.3.2 (New)

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Add new definition as follows:

ISOLATION DEVICES Devices that isolate HVAC zones so that they can be operated independently of one another. Isolation devices include separate systems, isolation dampers, and controls providing shutoff at terminal boxes.

NETWORKED GUEST ROOM CONTROL SYSTEM A control system, accessible from the front desk or other central location associated with a Group R-1 building, that is capable of identifying the occupancy status of each guest room according to a timed schedule, and is capable of controlling HVAC in each hotel and motel guest room separately.

Add new text as follows:

C403.2.4.3 Automatic control of HVAC systems serving guest rooms. In Group R-1 buildings containing over 50 guest rooms, each guest room shall be provided with controls complying with the provisions of Sections C403.2.4.3.1 and C403.2.4.3.2. Captive key card systems comply with these requirements.

C403.2.4.3.1 Temperature setpoint controls. Controls shall be provided on each HVAC system that are capable of and configured to automatically raise the cooling setpoint and lower the heating setpoint by not less than 4°F (2°C) from the occupant set-point within 30 minutes after the occupants have left the guest room. The controls shall also be capable of and configured to automatically raise the cooling setpoint to not lower than 80°F (27°C) and lower the heating set point to not higher than 60°F (16°C) when the guest room is unrented or has not been continuously unoccupied for over 16 hours or a networked guest room control system indicates that the guest room is unrented and the guest room is unoccupied for more than 30 minutes. A networked guest room control system that is capable of returning the thermostat set-points to default occupied set-points 60 minutes prior to the time a guest room is scheduled to be occupied is not precluded by this section. Cooling that is capable of limiting relative humidity with a setpoint not lower than 65 percent Relative Humidity during unoccupied periods is not precluded by this section.

C403.2.4.3.2 Ventilation controls. Controls shall be provided on each HVAC system that are capable of and configured to automatically turn off the ventilation and exhaust fans within 30 minutes of the occupants leaving the guest room or isolation devices shall be provided to each guest room that are capable of automatically shutting off the supply of outdoor air to and exhaust air from the guest room.

> **Exception**: Guest room ventilation systems are not precluded from having an automatic daily pre-occupancy purge cycle that provides daily outdoor air ventilation during unrented periods at the design ventilation rate for 60 minutes, or at a rate and duration equivalent to one air change.

Reason: The proposed additional criteria to the IECC provides the ability to reduce building energy use through deeper thermostat setups and setbacks and ventilation control in unrented guestrooms without affecting occupant comfort or creating a conflict with the International Mechanical Code. The technology exists from multiple manufacturers to support the implementation of these provisions. For standalone controls, guest rooms are considered unrented if they are unoccupied for longer than 16 hours. For systems connected to a networked guest room control, the control can be configured to indicate whether the room is scheduled to be occupied and thus setbacks and ventilation can be turned off earlier when the guest room is scheduled to be unoccupied and the networked control can return setpoints to their default levels 60 minutes in advance of scheduled check-in.

This proposal also requires that ventilation air to the guest room be shut off during unoccupied periods. This proposal includes an exception for a "purge cycle" that would provide ventilation air to the guest room one hour before scheduled check-in as indicated by a networked guest room control or through a timed outdoor air ventilation "purge cycle" one hour per day. The purge cycle exception allowed by this proposal allows for enhanced indoor air quality beyond the requirements of the International Mechanical Code, while still capturing the majority of the energy savings of the ventilation shut-off for the rest of the day. The controls would operate from an occupancy sensor, so that cleaning crews in unrented rooms would receive ventilation necessary during cleaning.

Cost Impact: Will increase the cost of construction
An analysis of the small hotel prototypes associated with the ASHRAE SSPC 90.1 activities indicates this change (which will be included in ASHRAE 90.1-2016 because this change was made via addendum j to ASHRAE 90.1-2013) results in savings and paybacks that meet ASHRAE SSPC 90.1 scalar thresholds for cost effectiveness for all climate zones for systems where the ventilation fan is simply switched off such as PTACs. For central ventilation and exhaust systems typically provided with fan coil units there is some additional cost for ventilation and exhaust dampers and pressure regulation devices. Even with these added costs the proposed measure meets the SSPC 90.1 cost effectiveness criteria. The situation where an energy recovery ventilation device is required was investigated, and it was also found that the measure meets the cost effective criteria even with reduced savings accounting for this measure. In the cost effectiveness analysis, added costs for a 77 room hotel or motel were estimated at $21,000 (single unit control) to $38,000 (central exhaust fan system control) with energy cost savings net of maintenance ranging from $3263 to $12,432, depending on climate zone and to average $5,887 annually across all U.S. climate zones

Report of Committee Action Hearings

Committee Action: **As Modified**

Modify as follows:

C403.2.4.3.1 Temperature setpoint controls. Controls shall be provided on each HVAC system that are capable of and configured to automatically raise the cooling setpoint and lower the heating setpoint by not less than 4°F (2°C) from the occupant set-point within 30 minutes after the occupants have left the guest room. The controls shall also be capable of and configured to automatically raise the cooling setpoint to not lower than 80°F (27°C) and lower the heating set point to not higher than 60°F (16°C) when the guest room is unrented or has not been continuously ~~unoccupied~~ occupied for over 16 hours or a networked guest room control system indicates that the guest room is unrented and the guest room is unoccupied for more than 30 minutes. A networked guest room control system that is capable of returning the thermostat set-points to default occupied set-points 60 minutes prior to the time a guest room is scheduled to be occupied is not precluded by this section. Cooling that is capable of limiting relative humidity with a setpoint not lower than 65 percent Relative Humidity during unoccupied periods is not precluded by this section.

C403.2.4.3 Automatic control of HVAC systems serving guest rooms. In Group R-1 buildings containing over 50 guest rooms, each guest room shall be provided with controls complying with the provisions of Sections C403.2.4.3.1 and C403.2.4.3.2. ~~Captive~~ Card key ~~card systems~~ controls comply with these requirements.

Committee Reason: Approval is based on the proponent's published reason statements. The Modifications revise the text to use the correct terminology and fix an error in intent.

Assembly Action: **None**

Public Comments

Public Comment 1:

Steven Ferguson, representing American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org) requests Approve as Modified by this Public Comment.

Modify as follows:

C403.2.4.3.1 Temperature setpoint controls. Controls shall be provided on each HVAC system that are capable of and configured to automatically raise the cooling setpoint and lower the heating setpoint by not less than 4°F (2°C) from the occupant set-point within 30 minutes after the occupants have left the guest room. The controls shall also be capable of and configured to automatically raise the cooling setpoint to not lower than 80°F (27°C) and lower the heating set point to not higher than 60°F (16°C) when the guest room is unrented or has ~~not~~ been continuously ~~occupied~~ unoccupied for over 16 hours or a networked guest room control system indicates that the guest room is unrented and the guest room is unoccupied for more than 30 minutes. A networked guest room control system that is capable of returning the thermostat set-points to default occupied set-points 60 minutes prior to the time a guest room is scheduled to be occupied is not precluded by this section. Cooling that is capable of limiting relative humidity with a setpoint not lower than 65 percent Relative Humidity during unoccupied periods is not precluded by this section.

Commenter's Reason: All this public comment is doing is changing has not been continuously for over 16 hours to has been continuously unoccupied for over 16 hours

This matches the original intent of the proposal. Rarely is a hotel room continuously occupied for 16 straight hours. The point is for the controls to change the set points if no one has been in the room for a long time (16 hours).

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Final Action Results

CE138-16	AMPC1

BACK

Code Change No: CE139-16

Original Proposal

Section: C403.2.4.3

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

C403.2.4.3 Shutoff dampers. Outdoor air intake and exhaust openings and stairway and shaft vents shall be provided with Class I motorized dampers. The dampers shall have an air leakage rate not greater than 4 cfm/ft^2 (20.3 L/s • m^2) of damper surface area at 1.0 inch water gauge (249 Pa) and shall be labeled by an approved agency when tested in accordance with AMCA 500D for such purpose.

Outdoor air intake and exhaust dampers shall be installed with automatic controls configured to close when the systems or spaces served are not in use or during unoccupied period warm-up and setback operation, unless the systems served require outdoor or exhaust air in accordance with the *International Mechanical Code* or the dampers are opened to provide intentional economizer cooling.

Stairway and shaft vent dampers shall be installed with automatic controls configured to open upon the activation of any fire alarm initiating device of the building's fire alarm system or the interruption of power to the damper.

Exception: Gravity (nonmotorized) dampers shall be permitted to be used <u>for exhaust and relief</u> as follows:

1. In buildings less than three stories in height above grade plane.
2. In buildings of any height located in *Climate Zones* 1, 2 or 3.
3. Where the design exhaust capacity is not greater than 300 cfm (142 L/s).

Gravity (nonmotorized) dampers shall have an air leakage rate not greater than 20 cfm/ft^2 (101.6 L/s • m^2) where not less than 24 inches (610 mm) in either dimension and 40 cfm/ft^2 (203.2 L/s • m^2) where less than 24 inches (610 mm) in either dimension. The rate of air leakage shall be determined at 1.0 inch water gauge (249 Pa) when tested in accordance with AMCA 500D for such purpose. The dampers shall be labeled by an approved agency.

Reason: This proposal restricts the exception allowing gravity dampers to exhaust and relief air streams, and consequently requires a positive shutoff damper for outside air intakes. Outside air intakes are under negative pressure when the system is operating and as a result will draw in the full outside air amount when a system operates during unoccupied periods to maintain setback heating temperatures. This additional outdoor requires additional heating and increases energy use

Cost Impact: Will increase the cost of construction
Based on an estimating, a typical 10" x 10" motorized vent damper with actuator costs around $111, installed. A gravity damper cost is expected to be around $44. The incremental cost is expected to be $67 for units affected by this code change proposal

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE139-16	AS

Code Change No: CE141-16

Original Proposal

Section: C403.2.6.1

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C403.2.6.1 Demand controlled ventilation. Demand control ventilation (DCV) shall be provided for spaces larger than 500 square feet (46.5 m^2) and with an average occupant load of 25 people or greater per 1,000 square feet (93 m^2) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) and served by systems with one or more of the following:

1. An air-side economizer.
2. Automatic modulating control of the outdoor air damper.
3. A design outdoor airflow greater than 3,000 cfm (1416 L/s).

Exception: Demand control ventilation is not required for systems and spaces as follows:

1. Systems with energy recovery complying with Section C403.2.7.
2. Multiple *zone* systems without direct digital control of individual *zones* communicating with a central control panel.
3. Systems with a design outdoor airflow less than 1,200 cfm (566 L/s).
4. Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1,200 cfm (566 L/s).
5. Ventilation provided for process loads only.

Reason: The existing text is an absolute number. If the average occupant load is 24.9 or 25.1 per 1000 square feet – then technically the section doesn't apply. It is generally being enforced that the 25 per 1000 square feet is the lowest density that triggers the requirement.

Cost Impact: Will not increase the cost of construction
The proposal is essentially editorial. The existing code's absolute figure has been treated as the lower limit in past practices. Installing the figure now may result in application in situations which should have been covered perviously, but due to absolute figure may have been ignored.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE141-16	**AS**

Code Change No: CE143-16

Original Proposal

Section: C403.2.6.3 (New)

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Add new text as follows:

C403.2.6.3 Ventilation air heating control. Units that provide ventilation air to multiple zones and operate in conjunction with zone heating and cooling systems shall not use heating or heat recovery to warm supply air to a temperature greater than 60°F (16°C) when representative building loads or outdoor air temperature indicate that the majority of zones require cooling.

Reason: Dedicated outside air systems (DOAS) use significant heating energy when controlled to provide a "neutral" supply temperature that matches the space setpoint. In fact, for humidity control DOAS air is often cooled to remove moisture then reheated to a neutral temperature. In addition, when cooling is required in the building, the neutral air does not contribute to cooling like ventilation though a single air system would. This addendum limits heating the DOAS supply air to 60°F when the majority of the building is expected to require cooling. This can be established based either on zone conditions or outside air temperature. Zones that do not require cooling can provide heating to neutral with the zone conditioning system. Zones that do require cooling will benefit from the lower outside air temperature.

Cost Impact: Will increase the cost of construction
This represents a control requirement rather than a requirement for additional equipment, so there is no anticipated cost increase and cost effectiveness analysis is not required.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE143-16	**AS**

Code Change No: CE149-16

Original Proposal

Section: C403.2.9.1, C403.2.9.1.3

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

C403.2.9.1 Duct construction. Ductwork shall be constructed and erected in accordance with the *International Mechanical Code*.

Revise as follows:

C403.2.9.1.3 High-pressure duct systems. Ducts and plenums designed to operate at static pressures equal to or greater than 3 inches water gauge (747 Pa) shall be insulated and sealed in accordance with Section C403.2.9. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual and shown to have a rate of air leakage (CL) less than or equal to 4.0 as determined in accordance with Equation 4-8.

$CL = F/P^{0.65}$ **(Equation 4-8)**

where:

F	=	The measured leakage rate in cfm per 100 square feet of duct surface.
P	=	The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections comply with the requirements of this section.

Reason: Section C403.2.9.1 has a gap with respect to whether a duct system with the exact static pressure of 3 inches of w.g. is a medium or high pressure duct. Traditional practice is to consider 3 inches w.g. or greater treats these within the high pressure category. This is a 'gap' that has been in the code since 2009. The fix should be considered editorial.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
No cost impact is expected as the change is primarily editorial clarification as to the appropriate category of regulation that applies to ducts with exactly 3 inches w.g. pressure.
a requirement for additional equipment, so there is no anticipated cost increase and cost effectiveness analysis is not required.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE149-16	AS

BACK

CE149-16

~~**C403.2.9.1 Duct construction.** Ductwork shall be constructed and erected in accordance with the *International Mechanical Code*.~~

~~**C403.2.9.1.3 High-pressure duct systems.** Ducts and plenums designed to operate at static pressures~~
~~greater than 3 inches water gauge (747 Pa) shall be insulated and sealed in accordance with Section~~
~~C403.2.8. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA *HVAC*~~

~~*Air Duct Leakage Test Manual* and shown to have a rate of air leakage (CL) less than or equal to 4.0 as determined in accordance with Equation 4-8.~~

~~*CL* = *F*/*P*0.65 **(Equation 4-8)**~~

~~where:~~

~~*F* = The measured leakage rate in cfm per 100~~
~~square feet of duct surface.~~

~~*P* = The static pressure of the test.~~

~~Documentation shall be furnished by the designer demonstrating that representative sections totaling at~~
~~least 25 percent of the duct area have been tested and that all tested sections comply with the requirements of this section.~~

Code Change No: CE150-16

Original Proposal

Section: C403.2.12.1

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.12.1 (2)
FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT

DEVICE	ADJUSTMENT
Credits	
~~Fully ducted return and/or exhaust air systems~~ <u>Return air or exhaust systems required by code or accreditation standards to be fully ducted, or systems required to maintain air pressure differentials between adjacent rooms</u>	0.5 inch w.c. (2.15 in w.c. for laboratory and vivarium systems)
Return and/or exhaust airflow control devices	0.5 inch w.c.
Exhaust filters, scrubbers or other exhaust treatment	The pressure drop of device calculated at fan system design condition
Particulate filtration credit: MERV 9 thru 12	0.5 inch w.c.
Particulate filtration credit: MERV 13 thru 15	0.9 inch. w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure drop calculated at 2x clean filter pressure drop at fan system design condition.
Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition.
Biosafety cabinet	Pressure drop of device at fan system design condition.
Energy recovery device, other than coil runaround loop	~~(2.2 × energy recovery effectiveness) – 0.5 inch w.c. for each airstream.~~ <u>For each airstream (2.2 * Energy Recovery Effectiveness – 0.5 in)</u>
Coil runaround loop	0.6 inch w.c. for each airstream.
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design conditions.
Sound attenuation section (fans serving spaces with design background noise goals below NC35)	0.15 inch w.c.
Exhaust system serving fume hoods	0.35 inch w.c.
Laboratory and vivarium exhaust systems in high-rise buildings	0.25 inch w.c./100 feet of vertical duct exceeding 75 feet.
Deductions	
Systems without central cooling device	- 0.6 in. w.c.
Systems without central heating device	- 0.3 in. w.c.
Systems with central electric resistance heat	- 0.2 in. w.c.

For SI: 1 inch w.c. = 249 Pa, 1 inch = 25.4 mm.
w.c. = water column, NC = Noise criterion.

Reason: This proposal makes changes to be consistent with addenda G and Q to 90.1-2013.

The wording in the 2015 IECC regarding the fan power pressure drop limitation adjustment can be interpreted in two ways. This change is intended to clarify which equation is the one that that was originally used in the economic analysis performed in the development of ASHRAE 90.1 upon which this provision in the IECC is based. This change was made via addendum g to ASHRAE Standard 90.1-13.There is no cost impact of this proposal as it's a clarification of the equation.

The proposed change related to addendum q limits the systems that can take advantage of the fan power pressure allowance for fully ducted return and/or exhaust air systems. For example, a rooftop unit with a ducted return in a small commercial office building or with a concentric diffuser currently qualifies for the fully ducted fan power credit, but would not if this proposed change is approved. The change recognizes that common practice is to use a plenum return with lower pressure drop than a fully ducted return system. Where there is an accreditation or pressure maintenance need to use ducted returns the credit is allowed. Where a designer wishes to use a ducted return in other situations, it can be accommodated by increasing fan efficiency or improving ductwork design.

Cost Impact: Will not increase the cost of construction
Generally, a plenum return is a lower cost construction option and is typically used in most building design. Where a ducted return is required for accreditation or pressure maintenance, there is no change in requirements. In the case where a designer elects to use a higher cost ducted return outside the excepted conditions, that choice of a higher cost system does incur additional costs for larger ductwork or a higher efficiency fan; however, selection of that higher cost path (ducted return vs. a plenum return) is the option of the designer and not a requirement of the energy code. Based on this, no added cost is estimated for this proposal.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE150-16	**AS**

Code Change No: CE151-16

Original Proposal

Section: C403.2.3

Proponent: Frank Morrison, representing Baltimore Aircoil Company (fmorrison@baltimoreaircoil.com); Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

ABLE C403.2.3 (8)
MINIMUM EFFICIENCY REQUIREMENTS: HEAT REJECTION EQUIPMENT

EQUIPMENT TYPE[a]	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION[i]	PERFORMANCE REQUIRED[b, c, d, g, h]	TEST PROCEDURE[e, f]
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 40.2 gpm/hp	CTI ATC-105 and CTI STD-201 <u>RS</u>
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201 <u>RS</u>
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 14.0 gpm/hp	CTI ATC-105S and CTI STD-201 <u>RS</u>
Centrifugal fan closed- circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201 <u>RS</u>
Propeller or axial fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 110,000 Btu/h·hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 157,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 135,000 Btu/h·hp	CTI ATC-106
Air-cooled condensers	All	125°F Condensing Temperature 190°F Entering Gas Temperature 15°F subcooling 95°F entering db	≥ 176,000 Btu/h·hp	AHRI 460

For SI: °C = [(°F)-32]/1.8, L/s · kW = (gpm/hp)/(11.83), COP = (Btu/h · hp)/(2550.7),
db = dry bulb temperature, °F, wb = wet bulb temperature, °F.

a. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of wet and dry heat exchange sections.

b. For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the fan nameplate-rated motor power.

c. For purposes of this table, closed-circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the sum of the fan nameplate-rated motor power and the spray pump

nameplate-rated motor power.
d. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate-rated motor power.
e. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. The certification requirements do not apply to field-erected cooling towers.
f. Where a certification program exists for a covered product and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program; or, where a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report.
g. Cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project-specific accessories and/or options included in the capacity of the cooling tower
h. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power
i. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A shall meet the minimum efficiency requirements listed in this table with R-507A as the test fluid.

Reference standards type: This is an update to reference standard(s) already in the ICC Code Books
Add new standard(s) as follows:

Cooling Technology Institute (CTI)
2611 FM 1960 West, Suite A-101, Houston, TX 77068-3730; P.O. Box 73383, Houston, TX 77273-3383

Referenced Standards:

CTI STD-201 RS (15)	Performance Rating of Evaporative Heat Rejection Equipment
CTI STD-201 OM (15)	Operations Manual for Thermal Performance Certification of Evaporative Heat Rejection Equipment

Reason: Reference to CTI Standard 201 in Table C403.2.3 (8), Minimum Efficiency Requirements: Heat Rejection Equipment, has been updated. The standard has been divided into Standard 201 RS and Standard 201 OM. Standard 201 RS sets forth a program whereby the Cooling Tower Institute will certify that all models of a line of evaporative heat rejection equipment offered for sale by a specific manufacturer will perform thermally in accordance with the manufacturer's published ratings. Standard 201 OM is a manual to guide program participants in complying with the provisions of the latest edition of Standard 201 RS. Taken together, STD-201 RS (15) and STD-201 OM (15) are functionally equivalent to the original STD-201.

For the purpose of this table, STD-201 RS and either CTI ATC-105 (Acceptance Test Code for open circuit cooling towers) or CTI ATC-105S (Acceptance Test Code for closed circuit cooling towers) are the proper reference standards for rating and testing this equipment. References to the appropriate test codes (ATC-105 and ATC-105S) remain unchanged. The Section on References should also be updated to reflect this change to STD-201. STD-201 OM, the Operating Manual for the CTI Thermal Certification Program, can also be added to the Informative Reference Section if applicable.

Finally, note that all referenced CTI Standards included in the IECC have been developed using the consensus procedure outlined in the CTI Operating Procedure 304 (copy attached).

Cost Impact: Will not increase the cost of construction
This change will not increase the cost of construction; change updates table to the most recent CTI Standard for Performance Rating.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The standards are enforceable and produced by a consensus process.

Assembly Action **None**

Final Action Results

CE151-16	**AS**

Code Change No: CE152-16

Original Proposal

Section: C403.2.3

Proponent: Frank Morrison (fmorrison@baltimoreaircoil.com); Steven Ferguson, representing American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.3 (8)
MINIMUM EFFICIENCY REQUIREMENTS: HEAT REJECTION EQUIPMENT

EQUIPMENT TYPE[a]	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION[i]	PERFORMANCE REQUIRED[b, c, d, g, h]	TEST PROCEDURE[e, f]
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 40.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ ~~14.0~~<u>15.4</u> gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal fan closed- circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201
Propeller or axial fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 110,000 Btu/h·hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 157,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 135,000 Btu/h·hp	CTI ATC-106
Air-cooled condensers	All	125°F Condensing Temperature 190°F Entering Gas Temperature 15°F subcooling 95°F entering db	≥ 176,000 Btu/h·hp	AHRI 460

For SI: °C = [(°F)-32]/1.8, L/s · kW = (gpm/hp)/(11.83), COP = (Btu/h · hp)/(2550.7),

db = dry bulb temperature, °F, wb = wet bulb temperature, °F.

a. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of wet and dry heat exchange sections.

b. For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the fan nameplate-rated motor power.
c. For purposes of this table, closed-circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the sum of the fan nameplate-rated motor power and the spray pump nameplate-rated motor power.
d. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate-rated motor power.
e. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. The certification requirements do not apply to field-erected cooling towers.
f. Where a certification program exists for a covered product and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program; or, where a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report.
g. Cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project-specific accessories and/or options included in the capacity of the cooling tower
h. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power
i. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A shall meet the minimum efficiency requirements listed in this table with R-507A as the test fluid.

Reason: Evaporatively cooled heat rejection devices are a key part of the most efficient cooling systems on the market. An increase in the minimum efficiency of closed circuit axial fan cooling towers from the current 14.0 gpm/HP to 15.4 gpm/HP (at the rated condition of 102°F entering water temperature, 90°F leaving water temperature, and 75°F entering wet bulb temperature), a 10% increase, is proposed to further increase the overall system efficiency, taking advantage of technological advances by the Industry. Such an increase will remove lower efficiency models from the market without unnecessarily causing market shifts due to first cost pressures in the absence of a limitation on the use of lower efficiency systems in the Code.

Note that this is a consensus based proposal supported by the ASHRAE TC 8.6 Working Group on Codes and Standards. ASHRAE Technical Committee 8.6 is concerned with open circuit cooling towers, closed circuit cooling towers, evaporative condensers, spray ponds, and other types of contact type liquid to air exchangers as well as the optimal use of these devices in various cooling systems in Commercial, Industrial, Refrigeration, Process, and Power applications, including the associated water treatment requirements.

Cost Impact: Will not increase the cost of construction
The impact of having to select more energy efficient models will have a negligible effect on the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

TABLE C403.2.3 (8)
MINIMUM EFFICIENCY REQUIREMENTS: HEAT REJECTION EQUIPMENT

EQUIPMENT TYPE[a]	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION[i]	PERFORMANCE REQUIRED[b, c, d, g, h]	TEST PROCEDURE[e, f]
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 40.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ ~~15.4~~ 16.1 gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal fan closed- circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201
Propeller or axial fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 110,000 Btu/h·hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 157,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 135,000 Btu/h·hp	CTI ATC-106
Air-cooled condensers	All	125°F Condensing Temperature 190°F Entering Gas Temperature 15°F subcooling 95°F entering db	≥ 176,000 Btu/h·hp	AHRI 460

For SI: °C = [(°F)-32]/1.8, L/s · kW = (gpm/hp)/(11.83), COP = (Btu/h · hp)/(2550.7),

db = dry bulb temperature, °F, wb = wet bulb temperature, °F.

a. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of wet and dry heat exchange sections.

b. For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the fan nameplate-rated motor power.

c. For purposes of this table, closed-circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the sum of the fan nameplate-rated motor power and the spray pump nameplate-rated motor power.

d. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate-rated motor power.

e. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. The certification requirements do not apply to field-erected cooling towers.

f. Where a certification program exists for a covered product and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program; or, where a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report.

g. Cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project-specific accessories and/or options included in the capacity of the cooling tower

h. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power

i. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A shall meet the minimum efficiency requirements listed in this table with R-507A as the test fluid.

Committee Reason: Approval is based on the proponent's published reason statements. The Modification updates the table to match the ASHRAE table.

Assembly Action **None**

Final Action Results

CE152-16	**AM**

Code Change No: CE153-16

Original Proposal

Section: C403.2.3

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

TABLE ~~C403.2.3(4)~~ C403.2.3(4)
WARM-AIR FURNACES AND COMBINATION WARM-AIR FURNACES/AIR-CONDITIONING UNITS, WARM-AIR DUCT FURNACES AND UNIT HEATERS, MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[d, e]	TEST PROCEDURE[a]
Warm-air furnaces, gas fired	< 225,000 Btu/h	—	~~78%~~80% AFUE or 80% E_t[c]	DOE 10 CFR Part 430 or ANSI Z21.47
	≥ 225,000 Btu/h	Maximum capacity[c]	80% E_t[f]	ANSI Z21.47
Warm-air furnaces, oil fired	< 225,000 Btu/h	—	~~78%~~83% AFUE or 80% E_t[c]	DOE 10 CFR Part 430 or UL 727
	≥ 225,000 Btu/h	Maximum capacity[b]	81% E_t[g]	UL 727
Warm-air duct furnaces, gas fired	All capacities	Maximum capacity[b]	80% E_c	ANSI Z83.8
Warm-air unit heaters, gas fired	All capacities	Maximum capacity[b]	80% E_c	ANSI Z83.8
Warm-air unit heaters, oil fired	All capacities	Maximum capacity[b]	80% E_c	UL 731

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Minimum and maximum ratings as provided for and allowed by the unit's controls.

c. Combination units not covered by the National Appliance Energy Conservation Act of 1987 (NAECA) (3-phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]) shall comply with either rating.

d. E_t = Thermal efficiency. See test procedure for detailed discussion.

e. E_c = Combustion efficiency (100% less flue losses). See test procedure for detailed discussion.

f. E_c = Combustion efficiency. Units shall also include an IID, have jackets not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

g. E_t = Thermal efficiency. Units shall also include an IID, have jacket losses not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

Reason: New (and increased) federal minimum efficiency standards went into effect for residential oil-fired warm-air furnaces in May, 2013. New and increased federal minimum efficiency standards for residential gas-fired warm-air furnaces went into effect in November, 2015.

This proposal updates the table to reflect the new minimum federal standards.

More information about the new federal standards can be found at the following DOE web site: https://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/72

The AFUE of residential furnaces shall not be less than the following starting on the compliance date shown in the table:

Table 2. Energy Conservation Standards for Non-Weatherized Furnaces and Weatherized Gas and Oil-Fired Furnaces

Furnace Product Class	AFUE[1] (percent)	Compliance Date
(A) Non-weatherized gas furnaces (not including mobile home furnaces)	80	November 19, 2015
(B) Mobile Home gas furnaces	80	November 19, 2015
(C) Non-weatherized oil-fired furnaces (not including mobile home furnaces)	83	May 1, 2013

Cost Impact: Will increase the cost of construction
The furnaces that meet the new federal standards have a higher initial cost than the furnaces that met the previous standards. However, the furnaces that meet the new standards will have a lower operating cost.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE153-16	**AS**

CE153-16

TABLE C403.2.3(4)
WARM AIR FURNACES AND COMBINATION WARM AIR FURNACES/AIR-CONDITIONING UNITS,
WARM AIR DUCT FURNACES AND UNIT HEATERS
Minimum Efficiency Requirements

Equipment Type	Size Category	Subcategory or Rating Condition	Minimum Efficiency[d,e]	Test Procedure[a]
Warm Air Furnace, Gas-Fired Non-weatherized	<225,000 Btu/h	---	80 ~~78~~% AFUE or 80% E_t[c]	DOE 10 CFR, Part 430 or Section 2.39, Thermal Efficiency of ANSI Z 21.47
Weatherized gas furnace			81% AFUE	
	≥225,000 Btu/h	Maximum Capacity[c]	80% E_c[f]	Section 2.39, Thermal Efficiency of ANSI Z21.47
Warm Air Furnace, Oil-Fired Non-weatherized	<225,000 Btu/h	---	83 ~~78~~% AFUE or 80% E_t[c]	DOE 10 CFR, Part 430 or Section 42, Combustion, of UL 727
Weatherized oil-fired furnace			78% AFUE	
	≥225,000 Btu/h	Maximum Capacity[b]	81% E_t[g]	Section 42, Combustion, of UL 727
Warm Air Duct Furnaces, Gas-Fired	All Capacities	Maximum Capacity[b]	80% E_c	Section 2.10, Efficiency of ANSI Z83.8
Warm Air Unit Heaters, Gas-Fired	All Capacities	Maximum Capacity[b]	80% E_c	Section 2.10, Efficiency of ANSI Z83.8
Warm Air Unit Heaters, Oil-Fired	All Capacities	Maximum Capacity[b]	80% E_c	Section 40, Combustion, of UL 731
Mobile home furnace, gas-fired	<225,000 Btu/h	---	80 % AFUE	DOE 10 CFR, Part 430
Mobile home furnace, oil-fired	<225,000 Btu/h	---	75 % AFUE	DOE 10 CFR, Part 430

For SI: 1 British thermal unit per hour = 0.2931 W.
[a] Chapter 6, Referenced ~~s~~Standards contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
[b] Minimum and maximum ratings as provided for and allowed by the unit's controls.
[c] Combination units not covered by NAECA (3 phase power or cooling capacity greater than or equal to 65,000 Btu/h) may comply with either rating.

[d] E_t = Thermal efficiency. See test procedure for detailed discussion
[e] E_c= Combustion efficiency (100% less flue losses). See test procedure for detailed discussion.
[f] E_c = Combustion efficiency. Units must also include an IID, have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.
[g] E_t = Thermal efficiency. Units must also include an IID, have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

BACK

Code Change No: CE154-16

Original Proposal

Section: C403.2.3

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

TABLE ~~C403.2.3(5)~~ C403.2.3(5)
MINIMUM EFFICIENCY REQUIREMENTS: GAS- AND OIL-FIRED BOILERS

EQUIPMENT TYPE[a]	SUBCATEGORY OR RATING CONDITION	SIZE CATEGORY (INPUT)	MINIMUM EFFICIENCY[d, e]	TEST PROCEDURE
Boilers, hot water	Gas-fired	< 300,000 Btu/h[f,g]	~~80%~~ 82% AFUE	10 CFR Part 430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	80% E_t	10 CFR Part 431
		> 2,500,000 Btu/h[a]	82% E_c	
	Oil-fired[c]	< 300,000 Btu/h[g]	~~80%~~ 84% AFUE	10 CFR Part 430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	82% E_t	10 CFR Part 431
		> 2,500,000 Btu/h[a]	84% E_c	
Boilers, steam	Gas-fired	< 300,000 Btu/h[f]	~~75%~~ 80% AFUE	10 CFR Part 430
	Gas-fired- all, except natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	79% E_t	10 CFR Part 431
		> 2,500,000 Btu/h[a]	79% E_t	
	Gas-fired-natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	77% E_t	
		> 2,500,000 Btu/h[a]	77% E_t	
	Oil-fired[c]	< 300,000 Btu/h	~~80%~~ 82% AFUE	10 CFR Part 430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	81% E_t	10 CFR Part 431
		> 2,500,000 Btu/h[a]	81% E_t	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. These requirements apply to boilers with rated input of 8,000,000 Btu/h or less that are not packaged boilers and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers.

b. Maximum capacity – minimum and maximum ratings as provided for and allowed by the unit's controls.

c. Includes oil-fired (residual).

d. E_c = Combustion efficiency (100 percent less flue losses).

e. E_t = Thermal efficiency. See referenced standard for detailed information.

f. Boilers shall not be equipped with a constant burning ignition pilot.

g. A boiler not equipped with a tankless domestic water heating coil shall be equipped with an automatic means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.

Reason: As a result of the Energy Independence and Security Act of 2007, updated standards for residential boilers were implemented for products that were manufactured (or imported) as of September 1, 2012. In addition to the increased AFUE requirements, other design and control requirements were added to the federal standard. These other requirements are reflected in new footnotes f and g.

This proposal ensures that the table reflects the current minimum federal standards and design requirements for residential products that may be used in commercial buildings.

Cost Impact: Will increase the cost of construction
The boilers that meet the most recent federal efficiency standards and design requirements will have higher initial costs than the boilers that met the previous federal standards. However, they will have lower annual energy costs than the products meeting the previous standards.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE154-16 **AS**

Code Change No: CE155-16

Original Proposal

Section: C403.2.7

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

TABLE ~~C403.2.7(1)~~ C403.2.7(1)
ENERGY RECOVERY REQUIREMENT (Ventilation systems operating less than 8,000 hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥10% and	≥ 20% and	≥ 30% and	≥ 40% and 50%	≥ 50% and 60%	≥ 60% and 70%	≥ 70% and 80%	≥ 80%
	DESIGN SUPPLY FAN AIRFLOW RATE (cfm)							
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	NR	NR	NR	NR
1B, 2B, 5C	NR	NR	NR	NR	≥ 26,000	≥ 12,000	≥ 5,000	≥ 4,000
6B	≥ 28,000	≥ 26,5000	≥ 11,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,500	≥ 1,500
1A, 2A, 3A, 4A, 5A, 6A	≥ 26,000	≥ 16,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,000	≥ 1,000	> 120
7, 8	≥ 4,500	≥ 4,000	≥ 2,500	≥ 1,000	> 140	> 120	> 100	> 80

For SI: 1 cfm = 0.4719 L/s.
NR = Not Required.

TABLE ~~C403.2.7(2)~~ C403.2.7(2)
ENERGY RECOVERY REQUIREMENT (Ventilation systems operating not less than 8,000 hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥ 10% and	≥ 20% and	≥ 30% and	≥ 40% and	≥ 50% and	≥ 60% and	≥ 70% and	≥ 80%
	Design Supply Fan Airflow Rate (cfm)							
3C	NR	NR	NR	NR	NR	NR	NR	NR
1B, 2B, 3B, 4C, 5C	NR	≥ 19,500	≥ 9,000	≥ 5,000	≥ 4,000	≥ 3,000	≥ 1,500	~~>~~≥ 120
1A, 2A, 3A, 4B, 5B	≥ 2,500	≥ 2,000	≥ 1,000	≥ 500	~~>~~≥ 140	~~>~~≥ 120	~~>~~≥ 100	~~>~~≥ 80
4A, 5A, 6A, 6B, 7, 8	~~>~~≥ 200	~~>~~≥ 130	~~>~~≥ 100	~~>~~≥ 80	~~>~~≥ 70	~~>~~≥ 60	~~>~~≥ 50	~~>~~≥40

For SI: 1 cfm = 0.4719 L/s.
NR = Not required

Reason: This addendum increases the minimum ERV requirements from zero to a reasonable minimum size for smaller units. There are small HVAC units (for example, PTACS in apartment buildings) where energy recovery is currently required with very small amounts of supply air. With this addendum, the supply air requirements at various outside air fractions are reduced so at least 40 cfm of outside air is available for recovery for continuous ventilation systems in the coldest climate zones. This airflow limit matches the smallest typical ERV unit available and ventilation requirements for residential units larger than 500 square feet, representing about two-thirds of the multi-family units (https://www.census.gov/construction/chars/mfu.html). There continues to be a requirement for most dwelling units to have energy recovery in the colder climates. In warmer climates, a larger unit is used as

Cost Impact: Will not increase the cost of construction
There is no increased cost, as the need for heat recovery on smaller units is eliminated.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE155-16	**AS**

Code Change No: CE156-16

Original Proposal

Section: C403.3, C403.3.3, C403.3.4

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C403.3 Economizers (Prescriptive). ~~Each cooling system~~ Economizers shall ~~include either an air or water economizer complying~~ comply with Sections C403.3.1 through C403.3.4

Exceptions: ~~Economizers are not required for the systems listed below.~~

1. In cooling systems for buildings located in Climate Zones 1A and 1B.
2. In climate zones other than 1A and 1B, where individual fan cooling units have a capacity of less than 54,000 Btu/h (15.8 kW) and meet one of the following~~:~~
   - 2.1. Have direct expansion cooling coils.
   - 2.2. The total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum specified in Table C403.3(1).

   The total supply capacity of all fan-cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan-cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.

3. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7°C) dew-point temperature to satisfy process needs.
4. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3(1).
5. Systems expected to operate less than 20 hours per week.
6. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
7. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3(2).
8. Chilled-water cooling systems that are passive (without a fan) or use induction where the total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum specified in Table C403.3(1).
9. Systems that include a heat recovery system in accordance with Section C403.4.5.
10. <u>An air or water economizer shall be provided for the following cooling systems.</u>
    - <u>10.1. Chilled water systems with a total cooling capacity, less cooling capacity provided with air economizers, as specified in Table C403.3(1).</u>
    - <u>10.2. Individual fan systems with cooling capacity greater than or equal to 54,000 Btu/h in buildings having other than a Group R occupancy, .</u>

      <u>The total supply capacity of all fan-cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.</u>

    - 10.3. <u>Individual fan systems with cooling capacity greater than or equal to 270,000</u>

Btu/h in buildings having a Group R occupancy,

The total supply capacity of all fan cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 1,500,000 Btu/h (440 kW), whichever is greater.

Exceptions: Economizers are not required for the following systems.

1. Individual fan systems not served by chilled water for buildings located in *Climate Zones* 1A and 1B.
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35ºF (1.7ºC) dew-point temperature to satisfy process needs.
3. Systems expected to operate less than 20 hours per week.
4. Systems serving supermarket areas with open refrigerated casework.
5. Where the cooling efficiency is greater than or equal to the efficiency requirements in Table C403.3(2).
6. Systems that include a heat recovery system in accordance with Section C403.4.5.

C403.3.3 Air economizers. ~~Air~~ Where economizers are required by Section C403.3, air economizers shall comply with Sections C403.3.3.1 through C403.3.3.5.

C403.3.4 Water-side economizers. Where economizers are required by Section C403.3, water-side economizers shall comply with Sections C403.3.4.1 and C403.3.4.2.

Reason: The proposal corrects gaps and conflicts in the economizer provisions which resulted from the confluence of changes approved for the 2015 edition. It attempts to move away from a provision that is dominated by a list of 9 exceptions.
Finally it clarifies that the use of the term 'residential' in the existing exception 4 to be consistent with other provisions of the code such as the building envelope tables which uses the term Group R.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The intent is editorial correction to existing provisions and changes approved in the 2015 code. The proponent believes there is no impact on the cost of construction. The one potential on impact of cost would depend on local interpretation of the overlap between Exceptions 1 and 2 to Section C403.3 where both Climate Zones 1A and 1B are exempt and Table C403.3(1) where only Climate zone 1A is exempt.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements. This states where economizers are required instead of where they are not required.

Assembly Action **None**

Final Action Results

CE156-16 **AS**

CE156-16

C403.3 Economizers (Prescriptive). Each cooling system shall include either an air or water economizer complying with Sections C403.3.1 through C403.3.4.

> **Exceptions:** Economizers are not required for the systems listed below.
>
> 7. The required air or water economizer may be eliminated if the minimum code required cooling efficiency of the HVAC unit rated with an IPLV, IEER or SEER is increased by at least 17 percent. If the HVAC unit is only rated with a full-load metric like EER cooling, then it must be increased by at least 17percent.

Table C403.3(2) Equipment Efficiency Performance Exception for Economizers. Reserved.

Code Change No: CE157-16 Part I

Original Proposal

Section: C101.4.1, C101.5, C202, C202 (New), C403.3, C406.7, C407.5.1, C407.5.2.3

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins (dcollins@preview-group.com); Dan Buuck (dbuuck@nahb.org); Steven Orlowski (sorlowski@boma.org)

Revise as follows:

C101.4.1 Mixed ~~occupancy~~ Residential and Commercial buildings. Where a building includes both r*esidential* building and *commercial* building ~~occupancies,~~ portions, each ~~occupancy~~ portion shall be separately considered and meet the applicable provisions of IECC—Commercial Provisions or IECC—Residential Provisions.

C101.5 Compliance. *Residential buildings* shall meet the provisions of IECC—Residential Provisions. *Commercial buildings* shall meet the provisions of IECC—Commercial Provisions.

STOREFRONT. A ~~nonresidential~~ system of doors and windows mulled as a composite fenestration structure that has been designed to resist heavy use. *Storefront* systems include, but are not limited to, exterior fenestration systems that span from the floor level or above to the ceiling of the same story on commercial buildings, with or without mulled windows and doors.

Add new definition as follows:

GROUP R Buildings or portions of buildings that contain any of the following occupancies as established in the International Building Code:

1. Group R-1.
2. Group R-2 where located more than three stories in height above grade plane.
3. Group R-4 where located more than three stories in height above grade plane.

Revise as follows:

C403.3 Economizers (Prescriptive). Each cooling system shall include either an air or water economizer complying with Sections C403.3.1 through C403.3.4

Exceptions: Economizers are not required for the systems listed below.

1. In cooling systems for buildings located in Climate Zones 1A and 1B.
2. In climate zones other than 1A and 1B, where individual fan cooling units have a capacity of less than 54,000 Btu/h (15.8 kW) and meet one of the following:
   2.1. Have direct expansion cooling coils.
   2.2. The total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum specified in Table C403.3(1). The total supply capacity of all fan-cooling units not provided with economizers shall not exceed 20 percent of the total

supply capacity of all fan-cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.

3. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7°C) dew-point temperature to satisfy process needs.
4. Systems that serve ~~residential~~ Group R occupancy spaces where the system capacity is less than five times the requirement listed in Table C403.3(1).
5. Systems expected to operate less than 20 hours per week.
6. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
7. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3(2).
8. Chilled-water cooling systems that are passive (without a fan) or use induction where the total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum specified in Table C403.3(1).
9. Systems that include a heat recovery system in accordance with Section C403.4.5.

C406.7 Reduced energy use in service water heating. Buildings shall be of the following types to use this compliance method:

1. Group R-1: Boarding houses, hotels or motels.
2. Group I-2: Hospitals, psychiatric hospitals and nursing homes.
3. Group A-2: Restaurants and banquet halls or buildings containing food preparation areas.
4. Group F: Laundries.
5. Group R-2~~: Buildings with residential occupancies~~.
6. Group A-3: Health clubs and spas.
7. Buildings showing a service hot water load of 10 percent or more of total building energy loads, as shown with an energy analysis as described in Section C407.

TABLE C407.5.1 (2)
HVAC SYSTEMS MAP

CONDENSER COOLING SOURCE[a]	HEATING SYSTEM CLASSIFICATION[b]	STANDARD REFERENCE DESIGN HVC SYSTEM TYPE[c]		
		Single-zone Residential System	Single-zone Nonresidential System	All Other
Water/ground	Electric resistance	System 5	System 5	System 1
	Heat pump	System 6	System 6	System 6
	Fossil fuel	System 7	System 7	System 2
Air/none	Electric resistance	System 8	System 9	System 3
	Heat pump	System 8	System 9	System 3
	Fossil fuel	System 10	System 11	System 4

a. Select "water/ground" where the proposed design system condenser is water or evaporatively cooled; select "air/none" where the condenser is air cooled. Closed-circuit dry coolers shall be considered air cooled. Systems utilizing district cooling shall be treated as if the condenser water type were "water." Where no mechanical cooling is specified or the mechanical cooling system in the proposed design does not require heat rejection, the system shall be treated as if the condenser water type were "Air." For proposed designs with ground-source or groundwater-source heat pumps, the standard reference design HVAC system shall be water-source heat pump (System 6).

b. Select the path that corresponds to the proposed design heat source: electric resistance, heat pump (including air source and water source), or fuel fired. Systems utilizing district heating (steam or hot water) and systems with no heating capability shall be treated as if the heating system type were "fossil fuel." For systems with mixed fuel heating sources, the system or systems that use the secondary heating source type (the one with the smallest total installed output capacity for the spaces served by the system) shall be modeled identically in the standard reference design and the primary heating source type shall be used to determine *standard* reference design HVAC system type.

c. Select the standard reference design HVAC system category: The system under "single-zone residential system" shall be selected where the HVAC system in the proposed design is a single-zone system and serves a ~~residential space~~ Group R occupancy. The system under "single-zone nonresidential system" shall be selected where the HVAC system in the proposed design is a single-zone system and serves other than ~~residential spaces~~ Group R occupancies. The system under "all other" shall be selected for all other cases.

C407.5.2.3 ~~Multifamily residential~~ Group R-2 occupancy buildings. ~~Residential~~ Group R-2 occupancy spaces shall be modeled using one thermal block per space except that those facing the same orientations are permitted to be combined into one thermal block. Corner units and units with roof or floor loads shall only be combined with units sharing these features.

Reason: The code is split in Commercial and Residential halves. The definitions of commercial buildings and residential buildings rely on the occupancy categories found in the IBC. While used in the Commercial provisions the terms 'Group R' and 'residential' are not defined. Group R occupancies can occur in a building defined as a Commercial Building. Non-residential occupancies can not, by definition, occur in a Residential Building. People with an IBC background – when using the IECC-C and encountering the word 'residential' are likely to consider one of the Group R occupancies. People with an ASHRAE background, on the other hand, will also include such things as nursing home rooms and hospital patient rooms as 'residential'. The result is inconsistent application.

This proposal would end the issue by defining 'Group R' as those having one of the IBC Group R occupancies that can occur in a Commercial building and then it either removes or replaces the word 'residential' in various provisions. Group R is already used in various places in the code, most notably the building envelope (insulation) assembly tables.

Specific amendments:

1. The definitions of entrance door and storefront (a type of door) both have the word 'nonresidential' removed. The truth is these types of doors are often found on Group R buildings such as hotels and larger apartment buildings. Removal of the term 'non-residential' will not change how the fenestration industry considers these doors.
2. Section C101.4.1 and R101.4.1 are both now titled Mixed occupancy - but the discussion is not about mixed occupancy as someone used to the IBC would consider a mixed occupancy, but is addressing when a building might meet the definitions of Residential Building and Commercial Building. This controls which half of the code is used - not provisions within each half of the code.
3. Section C406.7: The text is removed because it is redundant. Group R-2 buildings are residential occupancy buildings.
4. C407.5.2.3 In this case the term Multifamily residential building appeared to be applying to Group R-2 apartments and not other types of residential occupancy. If the committee believes this applies to hotels, motels and Group R-4 care facilities - then the term Group R should be used instead of Group R-2.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The intent of the proposal is editorial in nature. To the extent that people had previously interpreted 'residential' to apply to hospital patient room and nursing home sleeping units, there may be some increase in cost for envelope insulation or HVAC systems.

Analysis: This proposal does not impact Chapter 11 of the IRC.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE157-16 Part I **AS**

CE157-16 Part I

C101.4.1 Mixed occupancy. Where a building includes both residential and commercial occupancies, each occupancy shall be separately considered and meet the applicable provisions of Florida Building Code, Energy Conservation—Commercial Provisions or Florida Building Code, Energy Conservation—Residential Provisions.

STOREFRONT. A nonresidential system of doors and windows mulled as a composite fenestration structure that has been designed to resist heavy use. Storefront systems include, but are not limited to, exterior fenestration systems that span from the floor level or above to the ceiling of the same story on commercial buildings.

Code Change No: CE157-16 Part II

Original Proposal

Section: R101.4.1, R101.5

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins (dcollins@preview-group.com); Dan Buuck (dbuuck@nahb.org); Steven Orlowski (sorlowski@boma.org)

Revise as follows:

R101.4.1 Mixed ~~occupancy~~ Residential and Commercial buildings. Where a building includes both *residential* building and *commercial* building ~~occupancies~~ portions, each ~~occupancy~~ portion shall be separately considered and meet the applicable provisions of the IECC—Commercial Provisions or IECC—Residential Provisions.

R101.5 Compliance. *Residential buildings* shall meet the provisions of IECC—Residential Provisions. *Commercial buildings* shall meet the provisions of IECC—Commercial Provisions.

Reason: The code is split in Commercial and Residential halves. The definitions of commercial buildings and residential buildings rely on the occupancy categories found in the IBC. While used in the Commercial provisions the terms 'Group R' and 'residential' are not defined. Group R occupancies can occur in a building defined as a Commercial Building. Non-residential occupancies can not, by definition, occur in a Residential Building. People with an IBC background – when using the IECC-C and encountering the word 'residential' are likely to consider one of the Group R occupancies. People with an ASHRAE background, on the other hand, will also include such things as nursing home rooms and hospital patient rooms as 'residential'. The result is inconsistent application.

This proposal would end the issue by defining 'Group R' as those having one of the IBC Group R occupancies that can occur in a Commercial building and then it either removes or replaces the word 'residential' in various provisions. Group R is already used in various places in the code, most notably the building envelope (insulation) assembly tables.

Specific amendments:

1. The definitions of entrance door and storefront (a type of door) both have the word 'nonresidential' removed. The truth is these types of doors are often found on Group R buildings such as hotels and larger apartment buildings. Removal of the term 'non-residential' will not change how the fenestration industry considers these doors.
2. Section C101.4.1 and R101.4.1 are both now titled Mixed occupancy - but the discussion is not about mixed occupancy as someone used to the IBC would consider a mixed occupancy, but is addressing when a building might meet the definitions of Residential Building and Commercial Building. This controls which half of the code is used - not provisions within each half of the code.
3. Section C406.7: The text is removed because it is redundant. Group R-2 buildings are residential occupancy buildings.
4. C407.5.2.3 In this case the term Multifamily residential building appeared to be applying to Group R-2 apartments and not other types of residential occupancy. If the committee believes this applies to hotels, motels and Group R-4 care facilities - then the term Group R should be used instead of Group R-2.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The intent of the proposal is editorial in nature. To the extent that people had previously interpreted 'residential' to apply to hospital patient room and nursing home sleeping units, there may be some increase in cost for envelope insulation or HVAC systems.

Analysis: This proposal does not impact Chapter 11 of the IRC.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This clarity is needed for portions of buildings that are different types (residential versus commercial).

Assembly Action **None**

Final Action Results

CE157-16 Part II	**AS**

Code Change No: CE158-16

Original Proposal

Section: C403.3

Proponent: Kent Browning, KWR Engineering Services LLC, representing KWR Engineering Services LLC (kwr-services@engineer.com)

Revise as follows:

TABLE 403.3(2)
EQUIPMENT EFFICIENCY PERFORMANCE EXCEPTION FOR ECONOMIZERS

CLIMATE ZONES	COOLING EQUIPMENT PERFORMANCE IMPROVEMENT (EER OR IPLV)
2A, 2B	10% efficiency improvement
3A, 3B	15% efficiency improvement
4A, 4B	20% efficiency improvement

Reason: This change proposal is to allow the prescriptive economizer to be replaced by more efficient cooling equipment in moist climates (climate zone suffix A) just as they are currently allowed in dry climates (climate zone suffix B). Table C403.3(2) is revised to add the moist climate zones to the existing dry climate zones.

Currently, the IECC allows a required economizer to be replaced with more efficient cooling equipment, but only in dry climate zones (suffix B). Generally, there are more available hours for economical economizer operation in dry climates (suffix B) than there are in moist climate zones (suffix A). For example, the TMY3 (Typical Meteorological Year 1991-2005) data shows that Austin, TX (climate zone 2A) has 2030 hours at 50F > Tdb > 65F when the dew point is less than 55F. Phoenix AZ (climate zone 2B) has 2165 hours at those conditions. Dallas Tx (climate zone 3A) has 1432 hours while Midland TX (climate zone 3B) has 1796 hours at those conditions. The locations and set points can be argued but the trend is consistent - Dry climate zones are better suited to the economizer function. Unfortunately, the IECC currently only allows the economizer to be replaced with more efficient equipment where the economizer is most useful (in dry climates). It would be more energy efficient to allow the economizer to be replaced by more efficient equipment in moist climate zones where the economizer is less useful.

Additionally, in moist climates many service technicians will disable the economizer as the first step of troubleshooting. Once disabled, the economizers are rarely re-enabled. The result is many economizers do not function after the first service call. Conversely, higher efficiency equipment will always reduce energy consumption, even after servicing. It would save more energy to allow the economizer to be replaced by more energy efficient equipment.

The fault detection and monitoring of the economizer function required in paragraph C403.2.4.7 are a step in the right direction. However, those steps don't help when the same technician that disabled the economizer is the person who monitors the signals.

Bibliography: Typical Meteorological Year 1991-2005 can be found at - http://rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/by_state_and_city.html

Cost Impact: Will not increase the cost of construction
Allowing the option of more energy efficient cooling equipment instead of an economizer does not increase the cost because the designer / builder / owner has the option of using either alternative. The decision can be made to use the cheaper option - economizer or higher efficiency equipment.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements. The proposal adds flexibility.

Assembly Action **None**

Final Action Results

CE158-16 **AS**

BACK

CE158-16

Table C403.3(2) Equipment Efficiency Performance Exception for Economizers.
Reserved.

Code Change No: CE160-16

Original Proposal

Section: C403.4.2.3.2, C403.4.2.3.2.1, C403.4.2.3.2.2

Proponent: Frank Morrison (fmorrison@baltimoreaircoil.com); Steven Ferguson, representing American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

C403.4.2.3.2 Heat rejection. ~~Heat rejection equipment shall comply with Sections C403.4.2.3.2.1 and C403.4.2.3.2.2.~~

The following shall apply to hydronic water loop heat pump systems in Climate Zones 3 through 8:

1. Where a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass the flow of water around the closed-circuit cooling tower, except for any flow necessary for freeze protection, or low leakage positive closure dampers shall be provided.
2. Where an open-circuit cooling tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the open-circuit cooling tower.
3. Where an open-circuit cooling tower is used in conjunctionwith a separate heat exchanger to isolate the open-cirucit cooling tower from the heat pump loop, heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

Delete without substitution:

~~**C403.4.2.3.2.1 Climate zones 3 and 4.** For *Climate Zones* 3 and 4:~~

1. ~~Where a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.~~
2. ~~Where an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.~~
3. ~~Where an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.~~

~~**C403.4.2.3.2.2 Climate zones 5 through 8.** For *Climate Zones* 5 through 8, where an open- or closed-circuit cooling tower is used, a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.~~

Reason: Heat rejection for a hydronic heat pump loop can be provided by a closed circuit cooling tower, an open circuit cooling tower / heat exchanger combination, or an open circuit cooling tower. This change is justified as the heat rejection requirements for hydronic heat pump systems for all three heat rejection types should apply equally to climate zones 3 through 8, rather than separate requirements for Climate Zones 3 and 4 and Climate Zones 5 through 8. This is because the requirements for all of these climate zones are similar, with the intent to minimize heat loss when the loop is in heating mode in colder weather.

The additional heat exchanger currently called for in C403.4.3.3.2.2 for climate zones 5 through 8 is unnecessary for reducing heat loss for systems utilizing any of the three options for heat rejection mentioned above. This requirement adds substantial, unnecessary cost to such systems, especially the case where a closed circuit cooling tower is utilized (a closed circuit tower combines the functions of a heat exchanger and cooling tower in one compact unit). For the case where an open tower is used without an isolation heat exchanger, there is a requirement for a bypass around the tower to prevent unnecessary heat loss in the proposed text.

Besides correcting the discrepancy in this section, this new language makes the IECC language consistent with ASHRAE/IES 90.1-2010 while at the same time simplifying the code language. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with Standard 90.1, this issue must be addressed. Note that the requirements for hydronic heat pump heat loss have been in Standard 90.1 for many years and this change will bring the requirements in line with Standard 90.1.

Cost Impact: Will not increase the cost of construction
The code change proposal will not increase the cost of construction. In the case of a closed circuit cooling tower used in a water source heat pump loop, this code change will actually reduce the cost of construction for these systems in Climate Zones 5 though 8 by not requiring an unnecessary isolation heat exchanger. Note that a closed circuit cooling tower combines a heat exchanger and tower in one compact device. Heat loss is minimized by the use of positive closure dampers or by bypassing the flow around the closed circuit cooling tower in climate zones 3 through 8.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE160-16	**AS**

Code Change No: CE162-16

Original Proposal

Section: C403.4.2.4, C403.4.2.4 (New)

Proponent: Jeremiah Williams (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.4.2.4 Part-load controls. Hydronic systems greater than or equal to 500,000 Btu/h (146.5 kW) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that ~~have the capability~~ are configured to do all of the following:

1. Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using coil valve position, zone-return water temperature, building-return water temperature or outside air temperature. The temperature shall be capable of being reset by not less than 25 percent of the design supply-to-return water temperature difference.
2. Automatically vary fluid flow for hydronic systems with a combined pump motor capacity of ~~10~~ 2 hp (~~7.5~~1.5 kW) or larger with three or more control valves or other devices by reducing the system design flow rate by not less than 50 percent or as required by ~~designed~~the equipment manufacturer for proper operation of equipment by valves that modulate or step open and close, or pumps that modulate or turn on and off as a function of load.
3. ~~Automatically vary pump flow on chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners with a combined motor capacity of 10 hp (7.5 kW) or larger by reducing pump design flow by not less than 50 percent, utilizing adjustable speed drives on pumps, or multiple-staged pumps where not less than one-half of the total pump horsepower is capable of being automatically turned off. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.~~

   ~~**Exceptions:**~~

   1. ~~Supply-water temperature reset for chilled-water systems supplied by off-site district chilled water or chilled water from ice storage systems.~~
   2. ~~Minimum flow rates other than 50 percent as required by the equipment manufacturer for proper operation of equipment where using flow bypass or end-of-line 3-way valves.~~
   3. ~~Variable pump flow on dedicated equipment circulation pumps where configured in primary/secondary design to provide the minimum flow requirements of the equipment manufacturer for proper operation of equipment.~~

3. Automatically vary pump flow on heating-water systems, chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners as follows:
   3.1. Where pumps operate continuously or operate based on a time schedule, pumps with nominal output motor power of 2 hp or more shall have a variable speed drive.
   3.2 Where pumps have automatic direct digital control configured to operate pumps only when zone heating or cooling is required, a variable speed drive shall be provided for pumps with motors having the same or greater nominal output power indicated in Table C403.4.2.4 based on the climate zone and system served.
4. Where a variable speed drive is required by item 3 of this Section, pump motor power input shall be not more than 30 percent of design wattage at 50 percent of the design water flow. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

Exceptions:

1. Supply-water temperature reset is not required for chilled-water systems supplied by off-site district chilled water or chilled water from ice storage systems.
2. Variable pump flow is not required on dedicated coil circulation pumps where needed for freeze protection.
3. Variable pump flow is not required on dedicated equipment circulation pumps where configured in primary/secondary design to provide the minimum flow requirements of the equipment manufacturer for proper operation of equipment.
4. Variable speed drives are not required on heating water pumps where more than 50% of annual heat is generated by an electric boiler.

Add new text as follows:

TABLE C403.4.2.4
VARIABLE SPEED DRIVE (VSD) REQUIREMENTS FOR DEMAND-CONTROLLED PUMPS

CHILLED WATER AND HEAT REJECTION LOOP PUMPS IN THESE CLIMATE ZONES	HEATING WATER PUMPS IN THESE CLIMATE ZONES	VSD REQUIRED FOR MOTORS WITH RATED OUTPUT OF AT LEAST
0a, 0b, 1a, 1b, 2b		≥2 HP
2a, 3b		≥3 HP
3a, 3c, 4a, 4b	7, 8	≥5 HP
4c, 5a, 5b, 5c, 6a, 6b	3c, 5a, 5c, 6a, 6b	≥7.5 HP
	4a, 4c, 5b	≥10 HP
7, 8	4b	≥15 HP
	2a, 2b, 3a, 3b	≥25 HP
	1b	≥100 HP
	0a, 0b, 1a	≥200 HP

[Note (not new code language): Climate Zones 0a and 0b to be included in table above only if another proposal introducing these new very hot climate zones is approved.]

Reason: This proposal reduces the threshold where variable flow and variable speed drives (VSD) are required for pumping systems. The pump threshold is reduced from 10 to 2 hp for continuous operation and time schedule controlled pumps. Pumps that have operation controlled by direct digital control based on zone demand result in a varied threshold based on climate zone. Requirements for heating pump VSDs are added.

Variable flow systems use less pumping energy than constant flow systems. Variable pumping systems also produce larger system temperature differences that can enhance chiller efficiency and condensing boiler efficiency (although these effects are not included in the savings calculations). Variable flow systems can reduce flow either by throttling flow and then having the pump "ride the pump curve" to reduce flow and energy at higher pressure or by using a VSD. Using a variable speed drive provides similar flow control at a lower energy cost, as pressure differential is reduced.

In addition to threshold adjustments, the proposal:

- Restates the minimum flow exception as a condition requirement, removing the exception with the result of the same code requirement.
- An exception for pump flow controls on coils requiring freeze protection is added.
- Adds the words "is not required" to exceptions 1 and 3 to clarify the scope of the exception.

The first and third exceptions had the words "is not required" added to them, Exception 2 was deleted after having the intent added to the provisions above, then a new exception for freeze protection was added as exception 2 and exception 4 is new]

Energy Savings: Operation of variable flow systems is less expensive than constant flow systems and variable speed drives increase the savings compared to throttling control. An analysis of energy impact shows that annual savings from expanding the use of motor speed control in the proposal ranges from $1,303 to $401 for 10 to 3 horsepower heating pumps and from $1821 to $386 for 10 to 2 horsepower cooling pumps in typical HVAC systems. Savings for larger pumps are proportional. More details are found in the cost-effectiveness analysis referenced in the cost impact section.

The U.S. Department of Energy (DOE) develops its proposals through a public process to ensure transparency, objectivity and consistency in DOE-proposed code changes. Energy savings and cost impacts are assessed based on established methods and reported for each proposal, as applicable. More information on the process utilized to develop the DOE proposals for the 2018 IECC can be found at: https://www.energycodes.gov/development/2018IECC.

Bibliography:

1. Hart, R., and Liu, B. (2015). *Methodology for Evaluating Cost-effectiveness of Commercial Energy Code Changes*. Pacific Northwest National Laboratories for U.S. Department of Energy; Energy Efficiency & Renewable Energy. PNNL-23923 Rev1. https://www.energycodes.gov/development/commercial/methodology.
2. Wang, W. and R. Hart. December 2015. "Cost-effectiveness Analysis of Pump VSD." https://www.energycodes.gov/development/2018IECC.

Cost Impact: Will increase the cost of construction

The cost of variable frequency drives continues to drop. Incremental cost for VSD and associated controls ranges from $5,101 to $3,920 for 10 to 2 horsepower pumps. Costs for larger pumps are proportional. There is no cost for reducing the threshold where variable flow systems are required, as 2-way valves that vary flow are less costly than 3-way valves used in a constant flow system.

Cost-effectiveness: PNNL performed a cost-effectiveness analysis using the established DOE methodology.[1] Results of the cost-effectiveness analysis showed that at the requirement thresholds proposed, the savings-to-investment ratio (SIR) was greater than 1.2 in typical heating and cooling HVAC systems. A proposal is cost-effective when the SIR is greater than or equal to 1.0, indicating that the present value of savings is equal to or greater than the incremental cost. The complete cost-effectiveness analysis is available at: https://www.energycodes.gov/development/2018IECC.[2]

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C403.4.2.4 Part-load controls. Hydronic systems greater than or equal to ~~500,000~~ <u>300,000</u> Btu/h (146.5 kW) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that are configured to do all of the following:

1. Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using coil valve position, zone-return water temperature, building-return water temperature or outside air temperature. The temperature shall be capable of being reset by not less than 25 percent of the design supply-to-return water temperature difference.
2. Automatically vary fluid flow for hydronic systems with a combined pump motor capacity of 2 hp (1.5 kW) or larger with three or more control valves or other devices by reducing the system design flow rate by not less than 50 percent or ~~as required~~ <u>the maximum reduction allowed</u> by the equipment manufacturer for proper operation of equipment by valves that modulate or step open and close, or pumps that modulate or turn on and off as a function of load.
3. Automatically vary pump flow on heating-water systems, chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners as follows:
   3.1. Where pumps operate continuously or operate based on a time schedule, pumps with nominal output motor power of 2 hp or more shall have a variable speed drive.
   3.2. Where pumps have automatic direct digital control configured to operate pumps only when zone heating or cooling is required, a variable speed drive shall be provided for pumps with motors having the same or greater nominal output power indicated in Table C403.4.2.4 based on the climate zone and system served.
4. Where a variable speed drive is required by item 3 of this Section, pump motor power input shall be not more than 30 percent of design wattage at 50 percent of the design water flow. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

Exceptions:

1. Supply-water temperature reset is not required for chilled-water systems supplied by off-site district chilled water or chilled water from ice storage systems.
2. Variable pump flow is not required on dedicated coil circulation pumps where needed for freeze protection.
2. Variable pump flow is not required on dedicated equipment circulation pumps where configured in primary/secondary design to provide the minimum flow requirements of the equipment manufacturer for proper operation of equipment.
3. Variable speed drives are not required on heating water pumps where more than 50% of annual heat is generated by an electric boiler.

Committee Reason: Approval is based on the first sentence of the proponent's published reason statement. The proposed text is finely tuned to the climate zones.

Assembly Action **None**

Final Action Results

CE162-16	AM

Code Change No: CE163-16

Original Proposal

Section: C403.4.2.6

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C403.4.2.6 Pump isolation. Chilled water plants including more than one chiller shall have the capability to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler ~~plants~~ systems including more than one boiler shall have the capability to reduce flow automatically through the boiler ~~plant~~ system when a boiler is shut down.

Reason: There are many provisions throughout Section C403 which address boilers and boiler controls. The SEHPCAC initially considered whether to consolidate the boiler provisions, but opted instead to propose reorganization of all of C403 found in a different proposal. The provisions addressing boilers are updated nearly every edition. In the 2015 code requirements for boiler turndown were added to Section C403.4.2.5 to apply to boiler systems. Boiler system is a defined term added to the code in 2015. The term 'boiler plant' used in section C403.4.2.6 is not defined. In the context it appears to mean an interconnected system of boilers. Boiler plant is not defined in the IMC or IFGC. Boiler plant is also not defined in ASHRAE 90.1. To reduce confusion of application the proposal replaces boiler plant with boiler system.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The change is editorial in nature in that it modernizes text to a currently defined term. There is no technical change to the code requirements.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE163-16	**AS**

Code Change No: CE165-16

Original Proposal

Section: C403.4.3, C403.4.3.1, C403.4.3.2, C403.4.3.2.1, C403.4.3.2.2

Proponent: Frank Morrison (fmorrison@baltimoreaircoil.com); Steven Ferguson, representing American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

C403.4.3 Heat rejection equipment. ~~Each fan powered by a motor of 7.5 hp (5.6 kW) or larger~~ Heat rejection equipment including air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers and evaporative condensers shall ~~have~~ comply with this section.

Exception: Heat rejection devices where energy usage is included in the ~~capability to operate that fan at two-thirds of full speed or less,~~ equipment efficiency ratings listed in Tables C403.2.3(6) and ~~shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device~~C403.2.3(7).

Exception: ~~Factory-installed heat rejection devices within HVAC equipment tested and rated in accordance with Tables C403.2.3(6) and C403.2.3(7).~~

C403.4.3.1 ~~General~~ Fan speed control. ~~Heat~~ Each fan system powered by an individual motor or array of motors with a connected power, including the motor service factor, totaling 5 hp (3.7 kW) or more shall have controls and devices configured to automatically modulate the fan speed to control the leaving fluid temperature or condensing temperature and pressure of the heat rejection ~~equipment such as air-cooled condensers, dry coolers, open-circuit~~ device. Fan motor power input shall be not more than 30% of design wattage at 50% of the design airflow.

Exceptions:

1. Fans serving multiple refrigerant or fluid cooling ~~towers, closed-circuit cooling towers and evaporative~~ circuits.
2. Condenser fans serving flooded condensers ~~used for comfort cooling applications shall comply with this section~~.

~~**Exception:** Heat rejection devices where energy usage is included in the equipment efficiency ratings listed in Tables C403.2.3(6) and C403.2.3(7).~~

C403.4.3.2 ~~Fan speed control~~ Multiple-cell heat rejection equipment. Multiple-cell heat rejection equipment with variable speed fan drives shall be controlled to operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components and so that all fans operate at the same fan speed required for the instantaneous cooling duty, as opposed to staged on and off operation. The minimum fan speed shall be ~~controlled as provided~~ the minimum allowable speed of the fan drive system in ~~Sections C403.4.3.2.1 and C403.4.3.2.2~~ accordance with the manufacturer's recommendations.

Delete without substitution:

~~**C403.4.3.2.1 Fan motors not less than 7.5 hp.** Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have~~

~~controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.~~

~~**Exception:** The following fan motors over 7.5 hp (5.6 kW) are exempt:~~

1. ~~Condenser fans serving multiple refrigerant circuits.~~
2. ~~Condenser fans serving flooded condensers.~~
3. ~~Installations located in *Climate Zones* 1 and 2.~~

~~**C403.4.3.2.2 Multiple-cell heat rejection equipment.** Multiple-cell heat rejection equipment with variable speed fan drives shall be controlled in both of the following manners:~~

1. ~~To operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components.~~
2. ~~So all fans can operate at the same fan speed required for the instantaneous cooling duty, as opposed to staged (on/off) operation.~~

~~Minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations.~~

Reason: This proposal reduces the threshold where variable speed drives (VSD) are required for heat rejection fan systems. The fan threshold is reduced from 7.5 to 5 hp. It also revises the exceptions for variable frequency drives on tower fans and clarifies that the hp threshold applies to arrays of fans. Variable flow systems use less fan energy than constant flow systems.

For tower fans, the exception for climate zones 1 & 2 is eliminated. These exceptions were originally developed when VSD costs were high. Due to the control complexities associated with evaporative condensers, closed circuit cooling towers, dry coolers, etc. that have multiple refrigerant or fluid cooling circuits with common fans serving different systems and flooded condensers, the first two exceptions are continued, especially as these represent a small portion of the market and operators can still use variable speed technology if the particular system can accommodate such technology.

Additionally, motors on heat rejection equipment often are supplied with service factors in order to allow for startup and operation in all climates with no motor overload. To be sure to capture the energy savings per the intent of the Code, the maximum motor horsepower (kW) based on the service factor (motor nameplate horsepower [or kW] times the service factor) would be used to establish compliance with this requirement. For example, a heat rejection device with four parallel operating motors, each labeled at 1.0 HP with a service factor of 1.5, would be capable of operating at 6.0 HP (1.5 SF times 1.0 HP). Under the current requirement, the heat rejection device would not call for variable speed control. However, when including the service factor, the device would now require variable speed control.

Energy Savings: Operation of variable flow systems is less expensive than constant flow systems and variable speed drives increase the savings compared to throttling control. An analysis of the energy impact shows that savings from expanding the use of motor speed control on heat rejection equipment in the proposal is $407 for 7.5 horsepower fans in typical HVAC systems. More details are found in the cost-effectiveness analysis referenced in the cost impact section.

Cost Impact: Will increase the cost of construction
PNNL performed a cost-effectiveness analysis using DOE's methodology. The cost of variable frequency drives continues to drop. Incremental cost for VSD and associated controls is $3,670 for fans powered by 5.0 horsepower motors. Energy savings for the 5.0 horsepower motor with VSD is $407 per year for a simple payback of 9.02 years. The Savings to Investment Ratio (SIR) is 1.4 in typical HVAC&R systems indicating that the present value of the savings is greater than the incremental cost. The complete cost-effectiveness analysis is attached with this proposal.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the first paragraph of the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE165-16	**AS**

Code Change No: CE166-16

Original Proposal

Section: C403.4.4, C403.4.4 (New)

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Add new text as follows:

C403.4.4 Requirements for complex mechanical systems serving multiple zones Sections C403.4.4.1 through C403.4.7 shall apply to mechanical systems.

Revise as follows:

~~C403.4.4~~ C403.4.4.1 ~~Requirements for complex mechanical systems serving multiple zones~~Zone controls. ~~Sections C403.4.4.1 through C403.4.6.4 shall apply to complex mechanical systems serving multiple zones.~~

Supply air systems serving multiple zones shall be variable air volume (VAV) systems that~~, during periods of occupancy, are designed and~~ have zone controls capable of ~~being controlled~~ and configured to reduce ~~primary~~ the volume of air ~~supply to~~ that is reheated, resolved, or mixed in each *zone* to one of the following ~~before reheating, recooling~~:

1. Twenty percent of the *zone* design peak supply for systems with DDC and 30 percent for other systems.
2. Systems with DDC where items 2.1 through 2.3 apply.
   - 2.1. The airflow rate in dead band between heating and cooling does not exceed 20 percent of the *zone* design peak supply rate or higher allowed rates under items 3, 4, or 5 of this section.
   - 2.2. The first stage of heating modulates the zone supply air temperature setpoint up to a maximum setpoint while the airflow is maintained at the dead band flow rate.
   - 2.3 The second stage of heating modulates the airflow rate from the dead band flow rate up to the heating maximum flow rate that is less than 50 percent of the zone design peak supply rate.
3. The outdoor airflow rate required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code.*
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat and recool energy losses through a reduction in *outdoor air* intake for the system, as *approved* by the *code official*.
5. The airflow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

   Exception: The following individual *zones* or ~~mixing takes place~~ entire air distribution systems are exempted from the requirement for VAV control:

6. *Zones* or supply air systems where not less than 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered energy source including condenser heat or from a site-solar energy source.

7. Systems that prevent reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

~~1. Thirty percent of the maximum supply air to each *zone*.~~
~~2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.~~
~~3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.~~
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in ~~*outdoor air* intake for the system, as *approved* by the *code official*.~~
~~5. The airflow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.~~

~~**Exception:** The following individual *zones* or entire air distribution systems are exempted from the requirement for VAV control:~~

~~1. *Zones* or supply air systems where not less than 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.~~
~~2. *Zones* where special humidity levels are required to satisfy process needs.~~
~~3. *Zones* with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.~~
~~4. *Zones* where the volume of air to be reheated, recooled or mixed is not greater than the volume of outside air required to provide the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.~~
~~5. *Zones* or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the *zones* and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.~~

Reason: *The proposed change reflects advances in control strategies for VAV zone control. The dual maximum method with recommended control sequence results in better control of supply air temperature and an improvement in ventilation effectiveness, possibly resulting in less minimum ventilation air being required in a multiple-zone system.*

This is consistent with changes made to 90.1 in addenda s and ck.

Cost Impact: Will not increase the cost of construction
The sequences listed in the exception are readily available as standard practice and do not add any costs to construction.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C403.4.4 Requirements for ~~complex~~ mechanical systems serving multiple zones Sections C403.4.4.1 through C403.4.7 shall apply to mechanical systems serving multiple zones.

C403.4.4.1 Zone controls. Supply air systems serving multiple zones shall be variable air volume (VAV) systems that have zone controls capable of, and configured to, reduce the volume of air that is reheated, ~~resolved~~ recooled or mixed in each zone to one of the following: (remainder unchanged)

Committee Reason: Approval was based on the proponent's published reason statements. The Modifications correct a typing error and make the section title match the code text.

Assembly Action **None**

Final Action Results

CE166-16 **AM**

BACK

Code Change No: CE167-16

Original Proposal

Section: C403.4.3, C403.4.3.1, C403.4.3.2, C403.4.3.2.1, C403.4.3.2.2

Proponent: Frank Morrison (fmorrison@baltimoreaircoil.com); Steven Ferguson, representing American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

C403.4.4.6 Multiple-zone VAV system ventilation optimization control. Multiple-zone VAV systems with direct digital control of individual zone boxes reporting to a central control panel shall have automatic controls configured to reduce outdoor air intake flow below design rates in response to changes in system *ventilation* efficiency (*Ev*) as defined by the International Mechanical Code.

Exceptions:

1. VAV systems with zonal transfer fans that recirculate air from other zones without directly mixing it with outdoor air, dual-duct dual-fan VAV systems, and VAV systems with fan-powered terminal units.
~~2. Systems having exhaust air energy recovery complying with Section C403.2.7.~~
2. Systems where total design exhaust airflow is more than 70 percent of total design outdoor air intake flow requirements.

Reason: Previously, Ventilation optimization was generally excepted wherever ERV was installed, as the savings for optimization overlap with the savings for ERV. The change proposed here removes the exception to the VAV system ventilation optimization when ERV is installed. Additional analysis of the interaction between ventilation optimization and exhaust recoveryventilation (ERV) has determined that in all climates, having VAV system ventilation optimization in addition to ERV is cost effective.

Approval of this code change proposal will ensure consistency with ASHRAE Standard 90.1-16, which will be adopted by reference as an alternative path to the 2018 IECC Commercial Provisions. This change was made via addendum j to ASHRAE Standard 90.1-13.

Cost Impact: Will increase the cost of construction
Ventilation optimization is required only where an appropriate DDC system is already included in the building design. ERV is not required by this change, so the added cost is only to program the ventilation optimization into the DDC system. This is a standard protocol already required by code elsewhere, so the basic standard DDC programming is readily available and custom programming should not be required. The additional setup cost for four systems in a building with a total of 22 zones is estimated at $3,000. Additional analysis of the savings interaction between ventilation optimization and exhaust recovery ventilation (ERV) has determined that in all climates, having VAV system ventilation optimization in addition to ERV is cost effective. The annual savings for the prototype 22 zone office building was found to range from $406 to $7,039, depending on climate zone and to average $2,624 annually across all U.S. climate zones.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE167-16	**AS**

Code Change No: CE168-16

Original Proposal

Section: C403.4.4.7 (New)

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Add new text as follows:

C403.4.4.7 Parallel-flow fan-powered VAV air terminal control. Parallel-flow fan-powered VAV air terminals shall have automatic controls configured to:

1. Turn off the terminal fan except when space heating is required or where required for ventilation.
2. Turn on the terminal fan as the first stage of heating before the heating coil is activated
3. During heating for warmup or setback temperature control, either:
   3.1. Operate the terminal fan and heating coil without primary air.
   3.2. Reverse the terminal damper logic and provide heating from the central air handler by primary air.

Reason: This proposal addresses control of fans in fan powered parallel VAV boxes. The fan is only required during heating; however, these fans may be programmed to run continuously during occupied hours. The addendum also requires the fan operation to be used as the first stage of heating and allows fan operation in response to DCV ventilation requests. Use of primary air for setback and warmup heating during unoccupied hours is not allowed unless the terminal logic is reversed and primary air provides central heating rather than cooling

Cost Impact: Will not increase the cost of construction
This represents a setup of controls and does not require new equipment, so there is no anticipated cost increase and cost effectiveness analysis is not required.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE168-16	**AS**

Code Change No: CE171-16

Original Proposal

Section(s): C404.2

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

TABLE C404.2
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED[a, b]	TEST PROCEDURE
Water heaters, electric	≤ 12 kW[d]	Tabletop, > 20 gallons and < 120 gallons	0.93 - 0.00132V, EF	DOE 10 CFR Part 430
		Resistance > 20 gallons and < 55 gallons	~~0.97 - 0.00 132V~~ 0.960 - 0.0003V, EF	
		Grid-enabled > 20 gallons and < 120 gallons	1.06 - 0.00168V, EF	
	> 12 kW	Resistance	(0.3 + 27/V_m), %/h	ANSI Z21.10.3
	≤ 24 amps and ≤ 250 volts	Heat pump > 55 gallons and <120 gallons	~~0.93 - 0.00 132V~~ 2.057 - 0.00113V, EF	DOE 10 CFR Part 430
Storage water heaters, gas	≤ 75,000 Btu/h	> 20 gallons and < 55 gallons	~~0.62 - 0.00 19V~~ 0.675 - 0.0015V, EF	DOE 10 CFR Part 430
		> 55 gallons and < 100 gallons	~~0.62 - 0.00 19V~~ 0.8012 - 0.00078V, EF	
	> 75,000 Btu/h and ≤ 155,000 Btu/h		80% E_t (Q/800 + 110 V)SL, Btu/h	ANSI Z21.10.3
	> 155,000 Btu/h		80% E_t (Q/800 + 110 V)SL, Btu/h	
Instantaneous water heaters, gas	> 50,000 Btu/h and c	≥ 4,000 (Btu/h)/gal and	~~0.62~~ 0.82 - 0.0019V, EF	DOE 10 CFR Part 430
	≥ 200,000 Btu/h	≥ 4,000 Btu/h/gal and	80% E_t	ANSI Z21.10.3
	≥ 200,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t (Q/800 + 110 V)SL, Btu/h	
Storage water heaters, oil	≤ 105,000 Btu/h	≥ 20 gal and < 50 gallons	~~0.59~~ 0.68 - 0.0019V, EF	DOE 10 CFR Part 430
	≥ 105,000 Btu/h		80% E_t (Q/800 + 110 V)SL, Btu/h	ANSI Z21.10.3
Instantaneous	≤ 210,000 Btu/h	≥ 4,000 Btu/h/gal and	0.59 - 0.0019V, EF	DOE 10 CFR

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED[a, b]	TEST PROCEDURE
water heaters, oil				Part 430
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and	80% E_t	ANSI Z21.10.3
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	78% E_t (Q/800 + 110 V)SL, Btu/h	
Hot water supply boilers, gas and oil	≥ 300,000 Btu/h and	≥ 4,000 Btu/h/gal and	80% E_t	ANSI Z21.10.3
Hot water supply boilers, gas	≥ 300,000 Btu/h and	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t (Q/800 + 110 V)SL, Btu/h	
Hot water supply boilers, oil	> 300,000 Btu/h and	> 4,000 Btu/h/gal and > 10 gal	78% E_t (Q/800 + 110 V)SL, Btu/h	
Pool heaters, gas and oil	All	—	82% E_t	ASHRAE 146
Heat pump pool heaters	All	—	4.0 COP	AHRI 1160
Unfired storage tanks	All	—	Minimum insulation requirement R-12.5 (h · ft^2 · °F)/Btu	(none)

For SI: °C = [(°F) - 32]/1.8, 1 British thermal unit per hour = 0.2931 W, 1 gallon = 3.785 L, 1 British thermal unit per hour per gallon = 0.078 W/L.

a. Energy factor (EF) and thermal efficiency (Et) are minimum requirements. In the EF equation, V is the rated volume in gallons.

b. Standby loss (SL) is the maximum Btu/h based on a nominal 70°F temperature difference between stored water and ambient requirements. In the SL equation, Q is the nameplate input rate in Btu/h. In the equations for electric water heaters, V is the rated volume in gallons and Vm is the measured volume in gallons. In the SL equation for oil and gas water heaters and boilers, V is the rated volume in gallons.

c. Instantaneous water heaters with input rates below 200,000 Btu/h shall comply with these requirements where the water heater is designed to heat water to temperatures 180°F or higher.

d. Electric water heaters with an input rating of 12 kW (40,950 Btu/hr) or less that are designed to heat water to temperatures of 180°F or greater shall comply with the requirements for electric water heaters that have an input rating greater than 12 kW (40,950 Btu/h).

Reason: New federal standards for residential type water heaters went into effect as of April 16, 2015. This proposal updates the values and equations in the table to reflect the new federal minimum standards for these products.
More information about these standards can be found at the following web site:
https://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/27

Cost Impact: Will increase the cost of construction
The new federal standard significantly increased the initial cost of residential water heaters, especially for large storage water heaters with a rated volume above 55 gallons.

Report of Committee Action Hearings

Committee Action: **As Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action: **None**

Public Comments

Public Comment 1:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify as follows:

TABLE C404.2
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED[a, b]	TEST PROCEDURE
Water heaters, electric	≤ 12 kW[d]	Tabletop[e], > 20 gallons and < 120 gallons	0.93 - 0.00132V, EF	DOE 10 CFR Part 430
		Resistance > 20 gallons and < 55 gallons	0.960 - 0.0003V, EF	
		Grid-enabled[f] > 75 ~~20~~ gallons and < 120 gallons	1.061 - 0.00168V, EF	
	> 12 kW	Resistance	(0.3 + 27/V_m), %/h	ANSI Z21.10.3
	≤ 24 amps and ≤ 250 volts	Heat pump > 55 gallons and < 120 gallons	2.057 - 0.00113V, EF	DOE 10 CFR Part 430
Storage water heaters, gas	≤ 75,000 Btu/h	> 20 gallons and < 55 gallons	0.675 - 0.0015V, EF	DOE 10 CFR Part 430
		> 55 gallons and < 100 gallons	0.8012 - 0.00078V, EF	
	> 75,000 Btu/h and ≤ 155,000 Btu/h		80% E_t (Q/800 + 110 V)SL, Btu/h	ANSI Z21.10.3
	> 155,000 Btu/h		80% E_t (Q/800 + 110 V)SL, Btu/h	
Instantaneous water heaters, gas	> 50,000 Btu/h and c	≥ 4,000 (Btu/h)/gal and	0.82 - 0.0019V, EF	DOE 10 CFR Part 430
	≥ 200,000 Btu/h	≥ 4,000 Btu/h/gal and	80% E_t	ANSI Z21.10.3
	≥ 200,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t (Q/800 + 110 V)SL, Btu/h	
Storage water heaters, oil	≤ 105,000 Btu/h	≥ 20 gal and < 50 gallons	0.68 - 0.0019V, EF	DOE 10 CFR Part 430
	≥ 105,000 Btu/h		80% E_t (Q/800 + 110 V)SL, Btu/h	ANSI Z21.10.3
Instantaneous water heaters, oil	≤ 210,000 Btu/h	≥ 4,000 Btu/h/gal and	0.59 - 0.0019V, EF	DOE 10 CFR Part 430
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and	80% E_t	ANSI Z21.10.3
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	78% E_t (Q/800 + 110 V)SL, Btu/h	
Hot water supply boilers, gas and oil	≥ 300,000 Btu/h and	≥ 4,000 Btu/h/gal and	80% E_t	ANSI Z21.10.3
Hot water supply boilers, gas	≥ 300,000 Btu/h and	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t (Q/800 + 110 V)SL, Btu/h	
Hot water supply boilers,	> 300,000 Btu/h and	> 4,000 Btu/h/gal and > 10 gal	78% E_t (Q/800 + 110 V)SL, Btu/h	

oil				
Pool heaters, gas and oil	All	—	82% E_t	ASHRAE 146
Heat pump pool heaters	All	—	4.0 COP	AHRI 1160
Unfired storage tanks	All	—	Minimum insulation requirement R-12.5 (h · ft^2 · °F)/Btu	(none)

For SI: °C = [(°F) - 32]/1.8, 1 British thermal unit per hour = 0.2931 W, 1 gallon = 3.785 L, 1 British thermal unit per hour per gallon = 0.078 W/L.

a. Energy factor (EF) and thermal efficiency (Et) are minimum requirements. In the EF equation, V is the rated volume in gallons.

b. Standby loss (SL) is the maximum Btu/h based on a nominal 70°F temperature difference between stored water and ambient requirements. In the SL equation, Q is the nameplate input rate in Btu/h. In the equations for electric water heaters, V is the rated volume in gallons and Vm is the measured volume in gallons. In the SL equation for oil and gas water heaters and boilers, V is the rated volume in gallons.

c. Instantaneous water heaters with input rates below 200,000 Btu/h shall comply with these requirements where the water heater is designed to heat water to temperatures 180°F or higher.

d. Electric water heaters with an input rating of 12 kW (40,950 Btu/hr) or less that are designed to heat water to temperatures of 180°F or greater shall comply with the requirements for electric water heaters that have an input rating greater than 12 kW (40,950 Btu/h).

e. A tabletop water heater is a water heater that is enclosed in a rectangular cabinet with a flat top surface not more than 3 feet (0.91 m) in height.

f. A grid-enabled water heater is an electric resistance water heater that meets all of the following:
(1) Has a rated storage tank volume of more than 75 gallons.
(2) Is manufactured on or after April 16, 2015.
(3) Is equipped at the point of manufacture with an activation lock.
(4) Bears a permanent label applied by the manufacturer that complies with all of the following:
(4.1) Is made of material not adversely affected by water.
(4.2) Is attached by means of non-water-soluble adhesive.
(4.3) Advises purchasers and end-users of the intended and appropriate use of the product with the following notice printed in 16.5 point Arial Narrow Bold font: "IMPORTANT INFORMATION: This water heater is intended only for use as part of an electric thermal storage or demand response program. It will not provide adequate hot water unless enrolled in such a program and activated by your utility company or another program operator. Confirm the availability of a program in your local area before purchasing or installing this product."

Commenter's Reason: The proposed modifications make table corrections and add explanatory footnotes for certain types of water heaters.

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Final Action Results

CE171-16 **AMPC1**

Code Change No: CE172-16

Original Proposal

Section: C404.2.1

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

C404.2.1 High input-rated service water-heating systems. Gas-fired water-heating equipment installed in new buildings shall be in compliance with this section. Where a singular piece of water-heating equipment serves the entire building and the input rating of the equipment is 1,000,000 Btu/h (293 kW) or greater, such equipment shall have a thermal efficiency, E_t, of not less than 90 percent. Where multiple pieces of water-heating equipment serve the building and the combined input rating of the water-heating equipment is 1,000,000 Btu/h (293 kW) or greater, the combined input-capacity-weighted-average thermal efficiency, E_t, shall be not less than 90 percent.

Exceptions:

1. Where <u>not less than</u> 25 percent of the annual *service water-heating* requirement is provided by ~~site-solar~~ <u>*on-site renewable energy*</u> or site-recovered energy, the minimum thermal efficiency requirements of this section shall not apply.
2. The input rating of water heaters installed in individual dwelling units shall not be required to be included in the total input rating of *service water-heating* equipment for a building.
3. The input rating of water heaters with an input rating of not greater than 100,000 Btu/h (29.3 kW) shall not be required to be included in the total input rating of *service water-heating* equipment for a building.

Reason: This proposal adds clarifications and updates to Exception 1 in Section C404.2.1.
It clarifies that systems that provide <u>at least</u> 25% will qualify for the exception, not systems only providing 25%.
It also updates the exception to allow all types of renewable energy systems to comply, not just certain technologies. This update allows multiple technologies to be considered and/or used for this exception.

Cost Impact: Will not increase the cost of construction
This proposal clarifies and updates provisions in this exception, but it does not change the requirement. It also allows the use of alternate renewable technologies, or multiple renewable technologies, and may lower the cost of this exception.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE172-16	**AS**

Code Change No: CE173-16

Original Proposal

Section: C404.3

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C404.3 Heat traps~~.~~ for hot water storage tanks ~~Water-heating equipment not supplied~~ ~~Storage tank-type water heaters and hot water storage tanks that have vertical water pipes connecting to the inlet and outlet of the tank shall be provided~~ with integral heat traps at those inlets and ~~serving noncirculating systems~~ outlets or shall ~~be provided with~~ have pipe configured heat traps ~~on~~ in the ~~supply~~ piping connected to those inlets and ~~discharge piping~~ outlets. Tank inlets and outlets associated with ~~the equipment~~ solar water heating system circulation loops shall not be required to have heat traps.

Reason: The existing text is confusing as to the intent of the provision and how to design a complying installations.
This section has its origin in ASHRAE 90.1 but the IECC doesn't exactly say what 90.1 intended. Here's what is in ASHRAE 90.1-2007

> **7.4.6 Heat traps.** Vertical pipe risers serving storage water heaters and storage tanks not having integral heat traps and serving a nonrecirculating system shall have heat traps on both the inlet and outlet piping as close as practical to the storage tank. A heat trap is a means to counteract the natural convection of heated water in a vertical pipe run. The means is either a device specifically designed for the purpose or an arrangement of tubing that forms a loop of 360 degrees or piping that from the point of connection to the water heater (inlet or outlet) includes a length of piping directed downward before connection to the vertical supply water or hot-water distribution system, as applicable.

Although this language has a fair amount of commentary text (which cannot be placed in ICC code text), it does explain better about what the IECC Section C404.3 is supposed to be conveying.
The IECC Commentary has a few figures (that are attributed to DOE) to explain what is intended.
The final sentence is added to clarify application to solar water heating systems.
This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The intent is editorial. The existing text is unclear and the revision is intended to provide better, more enforceable provisions without changing the technical requirement.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This clarifies the code intent. Storage tank-type water heater is stated to define the application of the text.

Assembly Action **None**

Final Action Results

CE173-16	**AS**

Code Change No: CE174-16 Part I

Original Proposal

Section: C202, C404.7

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

C404.7 Demand recirculation controls. ~~A~~ Demand recirculation water ~~distribution system having one or more recirculation pumps that pump water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe shall be a *demand recirculation water system*. Pumps~~ systems shall have controls that comply with both of the following:

1. The ~~control~~ controls shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The ~~control~~ controls shall limit the temperature of the water entering the cold-water piping to not greater than 104°F (40°C).

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system ~~where~~ having one or more recirculation pumps ~~prime~~ that pump water from a heated-water supply pipe back to the ~~service hot water piping with heated water upon demand for hot water~~ heated-water source through a code-water supply pipe.

Reason: The proposal suggests three actions:

1. It removes language from C404.7, R403.5.2 and N1103.5.2 which is definitional in nature and creates a definition of Demand Recirculation Water System in Sections C202, R202 and N1101.6.
2. It changes the requirement from the pump having to have controls to the system having to have the controls. If one reads the second control requirement – it would seem this is a system requirement – not a requirement that applies to the pumps in the system.
3. Item 2 currently limits the water temperature of water entering the cold water piping to 'exactly' 104 degrees. We believe the intent is for that limit to be a maximum temperature.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal is editorial in nature. It will have no impact on the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE174-16 Part I	**AS**

Code Change No: CE174-16 Part II

Original Proposal

Section: R403.5.2 (IRC N1103.5.2)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

R403.5.2 (N1103.5.2) Demand recirculation water systems. ~~A~~ Demand recirculation water ~~distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system*.~~ ~~Pumps~~ systems shall have controls that comply with both of the following:

1. The ~~control~~ controls shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The ~~control~~ controls shall limit the temperature of the water entering the cold water piping to ~~104~~not greater than104ºF (40ºC).

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system ~~where pump(s) prime~~ having one or more recirculation pumps that pump water from a heated-water supply pipe back to the ~~service hot water piping with heated water upon demand for hot water~~ heated-water source through a cold-water supply pipe.

Reason: The proposal suggests three actions:

1. It removes language from C404.7, R403.5.2 and N1103.5.2 which is definitional in nature and creates a definition of Demand Recirculation Water System in Sections C202, R202 and N1101.6.
2. It changes the requirement from the pump having to have controls to the system having to have the controls. If one reads the second control requirement – it would seem this is a system requirement – not a requirement that applies to the pumps in the system.
3. Item 2 currently limits the water temperature of water entering the cold water piping to 'exactly' 104 degrees. We believe the intent is for that limit to be a maximum temperature.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal is editorial in nature. It will have no impact on the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The proposal changes the code language to be more technically correct. Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE174-16 Part II	**AS**

Code Change No: CE176-16 Part II

Original Proposal

Section: C404.9.3

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

R403.10.3 (N1103.10.3) Covers. Outdoor heated pools and outdoor permanent spas shall be provided with a vapor-retardant cover or other *approved* vapor-retardant means.

> **Exception:** Where more than 70 percent of the energy for heating, computed over an operation season, is from ~~site-recovered energy, such as from~~ a heat pump or a solar energy source, covers or other vapor-retardant means shall not be required.

Reason: The original intent of this exception was that when an air-source swimming pool heat pump was installed on a pool or spa, it would not require a vapor retardant cover. Because an air-source swimming pool heat pump transfers heat from the air to the pool, it is a more energy efficient way to heat a pool over other types of heaters. The language included the term "site recovered energy" without the knowledge that this term is defined in ASHRAE 90.1 and as defined would not include air-source swimming pool heat pumps. If this exception were to be interpreted to require a heat pump that uses site-recovered energy, as defined in ASHRAE 90.1, then one would find that such a product does not exist in the swimming pool industry.

Therefore, this proposal eliminates that terminology to clarify that the intent here is if a pool or permanent spa utilizes a heat pump or solar energy source for more than 70% of the energy used in heating the pool or permanent spa, than one is exempt from the vapor retardant cover requirement. This change also ensures consistency with the change made to the 2018 International Swimming Pool & Spa Code (proposal SP 7) in the Group A hearings and is also what is being proposed for the corresponding commercial section of the IECC (See Part I of this proposal number)..

Cost Impact: Will not increase the cost of construction
This is only a clarification of the original intent of this section. This change does not require additional materials or labor for construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Changing the language allows for more sources of energy to be available so that covers don't have to be used.

Assembly Action **None**

Final Action Results

CE176-16 Part II	**AS**

Code Change No: CE177-16 Part I

Original Proposal

Section: C404.9.3

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

C404.9.3 Covers. Outdoor heated pools and outdoor permanent spas shall be provided with a vapor-retardant cover or other approved vapor-retardant means.

> **Exception:** Where more than ~~70~~75 percent of the energy for heating, computed over an operating season of at least 3 calendar months, is from site-recovered energy such as from a heat pump or ~~solar~~ on-site renewable energy ~~source~~ system, covers or other vapor-retardant means shall not be required.

Reason: This proposal makes the following changes:

Revise the exception from 70% to 75%. This revision is based on information provided by the US Department of Energy, which can be found at the following web sites:

http://energy.gov/energysaver/swimming-pool-covers
http://energy.gov/energysaver/heat-pump-swimming-pool-heaters (see Table 1. Costs by Location of Heating Outdoor Pools with a Heat Pump)
http://energy.gov/energysaver/gas-swimming-pool-heaters (see Table 2. Costs of Outdoor Pool Gas Heating by Location)

Based on the tables shown, for many cities and pool water temperatures, the energy savings from using covers is on the order of 75-90%. By increasing the requirement to 75%, the exception will help to create more of an energy savings balance between not using the cover and on-site energy systems.

Add in parameters for "operating season". As shown on the DOE web site, the estimated operating season can be anywhere from 3 months to 12 months, depending on the location of the pool. Adding in the words "of at least 3 months" ensures that the on-site systems can provide the required amount of energy while the pool is being operated.

Allow the use of other on-site renewable energy systems. The phrase "such as" provides examples of site-recovered energy systems. By using the term "*on-site renewable energy*", which is a defined term in Section C202, it provides more technical options that can qualify. Since this is a list, the new language provides more information and clarification.

Cost Impact: Will increase the cost of construction
For this exception, since the requirement has been increased from 70% to 75%, the estimated increase in cost for this option would be approximately 7 percent.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE177-16 Part I	**AS**

BACK

CE177-16 Part I

C404.9.3 Covers. Outdoor heated swimming pools and outdoor permanent spas shall be equipped ~~provided~~ with a vapor-retardant cover on or at the water surface or a liquid cover or other means proven to reduce heat loss. ~~or other approved vapor-retardant means~~.

Exception: no change.

Code Change No: CE177-16 Part II

Original Proposal

Section: R403.10.3 (IRC N1103.10.3)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

R403.10.3 (N1103.10.3) Covers. Outdoor heated pools and outdoor permanent spas shall be provided with a vapor-retardant cover or other *approved* vapor-retardant means.

> **Exception:** Where more than ~~70~~75 percent of the energy for heating, computed over an operation season of at least 3 calendar months, is from site-recovered energy, such as from a heat pump or ~~solar energy source~~ *on-site renewable energy* system, covers or other vapor-retardant means shall not be required.

Reason: This proposal makes the following changes:

Revise the exception from 70% to 75%. This revision is based on information provided by the US Department of Energy, which can be found at the following web sites:

http://energy.gov/energysaver/swimming-pool-covers
http://energy.gov/energysaver/heat-pump-swimming-pool-heaters (see Table 1. Costs by Location of Heating Outdoor Pools with a Heat Pump)
http://energy.gov/energysaver/gas-swimming-pool-heaters (see Table 2. Costs of Outdoor Pool Gas Heating by Location)

Based on the tables shown, for many cities and pool water temperatures, the energy savings from using covers is on the order of 75-90%. By increasing the requirement to 75%, the exception will help to create more of an energy savings balance between not using the cover and on-site energy systems.

Add in parameters for "operating season". As shown on the DOE web site, the estimated operating season can be anywhere from 3 months to 12 months, depending on the location of the pool. Adding in the words "of at least 3 months" ensures that the on-site systems can provide the required amount of energy while the pool is being operated.

Allow the use of other on-site renewable energy systems. The phrase "such as" provides examples of site-recovered energy systems. By using the term "*on-site renewable energy*", which is a defined term in Section C202, it provides more technical options that can qualify. Since this is a list, the new language provides more information and clarification.

Cost Impact: Will increase the cost of construction
For this exception, since the requirement has been increased from 70% to 75%, the estimated increase in cost for this option would be approximately 7 percent.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the published reason statement.

Assembly Action **None**

Final Action Results

CE177-16 Part II **AS**

Code Change No: CE179-16

Original Proposal

Section: C405.1, C405.2.2, C405.2.3, C405.2.4, C405.4.1

Proponent: Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the maximum lighting power for interior and exterior applications and electrical energy consumption.

> **Exception:** ~~Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5, provided that they comply with Section R404.1.~~ *Dwelling units* within multi-family buildings shall comply with Section R404.1. All other *dwelling units* shall comply with either Section R404.1, or with Sections C405.2.4 and C405.4. *Sleeping units* shall comply with Section C405.2.4, and with either Section R404.1 or C405.4. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.2.15 or C403.2.16.

Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.2.15 or C403.2.16.

C405.2.2 Time-switch controls. Each area of the building that is not provided with *occupant sensor controls* complying with Section C405.2.1.1 shall be provided with *time switch controls* complying with C405.2.2.1.

> **Exception:** Where a *manual control* provides light reduction in accordance with Section C405.2.2.2, automatic controls shall not be required for the following:
>
> ~~1. *Sleeping units.*~~
> 1. Spaces where patient care is directly provided.
> 2. Spaces where an automatic shutoff would endanger occupant safety or security.
> 3. Lighting intended for continuous operation.
> 4. Shop and laboratory classrooms.

C405.2.3 Daylight-responsive controls. *Daylight-responsive controls* complying with Section C405.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with Section C405.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.4.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with Section C405.2.3.3.

   Exceptions: Daylight responsive controls are not required for the following:

   1. Spaces in health care facilities where patient care is directly provided.
   ~~2. Dwelling units and sleeping units.~~

2. Lighting that is required to have specific application control in accordance with Section C405.2.4.
3. Sidelight daylight zones on the first floor above grade in Group A-2 and Group M occupancies.

C405.2.4 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites *Sleeping units* shall have a master control device that is capable of automatically switching off all permanently installed luminaires and switched receptacles within 20 minutes after all occupants ~~leave~~ have left the ~~room~~unit.

   ~~Exception~~ Exceptions:

   1. Lighting and switched receptacles controlled by captive key systems.
   2. Spaces where patient care is directly provided.

4. Permanently installed luminaires within *dwelling units* shall be provided with controls complying with either Section C405.2.2.2 or C405.2.1.1.
5. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is readily accessible.
6. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
7. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

C405.4.1 Total connected interior lighting power. The total connected interior lighting power shall be determined in accordance with Equation 4-9.

$TCLP = [SL + LV + LTPB + \text{Other}]$ **(Equation 4-9)**

where:

TCLP =	Total connected lighting power (watts).
SL =	Labeled wattage of luminaires for screw-in lamps.
LV =	Wattage of the transformer supplying low-voltage lighting.
LTPB =	Wattage of line-voltage lighting tracks and plugin busways as the specified wattage of the luminaires, but at least 30 W/lin. ft. (100 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current-limiting devices on the system.
Other =	The wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   ~~1.2. Lighting in sleeping units, provided that the lighting complies with Section R404.1.~~

1.2. Emergency lighting automatically off during normal building operation.
1.3. Lighting in spaces specifically designed for use by occupants with special lighting needs, including those with visual impairment and other medical and age-related issues.
1.4. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
1.5. Casino gaming areas.
1.6. Mirror lighting in dressing rooms.

2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
   2.1. Task lighting for medical and dental purposes.
   2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture-mounted supplemental task lighting that is controlled by automatic shutoff.
15. Exit signs.

Reason: There is probably no part of the 2015 IECC lighting requirements that is more confusing than the treatment of sleeping unit and dwelling unit lighting.

In the 2015 IECC, sleeping units have the option of either complying with the lighting power density requirements in Tables C405.4.2(1) and C405.4.2(2) or complying with Section R404.1. Sleeping units must always comply with the controls requirements in the code, so that they must be provided with occupant sensors in all spaces 300 sf or less, and light reduction controls in all other spaces. Please keep in mind that hospital patient rooms are considered sleeping units. The proposed re-write in C405.2.4 eliminates the requirement for automatic controls in hospital patient rooms, and also allows captive key systems to be used in other types of sleeping units in lieu of occupant sensors.

Dwelling units also have the choice of either complying with the lighting power density requirements in Tables C405.4.2(1) and C405.4.2(2) or complying with Section R404.1. However, dwelling units which choose to comply with the lighting power density requirements in the code are also required to have automatic shutoff in every room, using either occupant sensors or time-switch controls. One important effect of this proposal would be to replace the controls requirements for dwelling units following the "lighting power density" compliance path with a requirement that all lights within the units either be connected to "light reduction controls" complying with C405.2.2.2 or occupancy sensors complying with C405.2.1.1. Please keep in mind that this is a reduction in stringency compared to the current code, which requires automatic shutoff in all spaces.

An important clarification is also provided for dwelling units in multifamily buildings. There is no category for individual apartment "living" units in multifamily buildings in Table C405.4.2(2), and the lighting within apartment "living" units was not included in the PNNL models when the "multifamily" category was derived in Table C405.4.2(1). Therefore, dwelling units should always be excluded from lighting power density calculations in multifamily buildings, and R404.1 should be followed instead. Very few people understand this, and it is almost impossible to decipher by reading the code.

Finally, the structure of the code is quite confusing in how it deals with sleeping units and dwelling units, with numerous exceptions and qualifications hidden in different locations. These requirements do not appear to conflict with each other, but you could spend a great deal of time with the code book before you uncovered them all. Rather than sending users of the code through the entirety of C405.2, and including exceptions in every section for dwelling and sleeping units, it makes more sense to provide an overview of these requirements in one location, by providing guidance in C405.1.

Cost Impact: Will not increase the cost of construction
By eliminating some controls requirements in sleeping and dwelling units the overall cost of construction would be reduced.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE179-16	**AS**

Code Change No: CE180-16

Original Proposal

Section: C405.1

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the maximum lighting power for interior and exterior applications and electrical energy consumption.

> **Exception:** Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5, provided that they comply with Section R404.1.

Walk-~~in~~ Lighting installed in walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with the lighting requirements of Section C403.2.15 or C403.2.16.

Reason: This proposal clarifies the language in Section C405.1 that pertains to the lighting that is installed in walk-in coolers, freezers, and other refrigeration equipment. The vast majority of requirements shown in Sections C403.2.15 and C403.2.16 are not related to lighting efficiency or controls.

It should be noted that as the federal law for this equipment changes from design specifications to overall energy performance specifications, this language will not be necessary in future versions of the IECC.

Cost Impact: Will not increase the cost of construction
This is a clarification of the language and does not change or add any requirements to the code.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE180-16	**AS**

Code Change No: CE182-16

Original Proposal

Section: C405.2, C405.2.4

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C405.2 Lighting controls (Mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1~~, C405.2.2, C405.2.3, C405.2.4 and~~ through C405.2.5.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted.
2. Interior exit stairways, interior exit ramps and exit passageways.
3. Emergency egress lighting that is normally off.

C405.2.4 Specific application controls. Specific application controls shall be provided for the following:

~~1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.~~
~~2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.~~
1. The following lighting shall be controlled by an occupant sensor complying with Section C405.2.1.1 or a time-switch control complying with Section C405.2.2.1. In addition, a manual control shall be provided to control such lighting separately from the general lighting in the space:
   1.1. Display and accent.
   1.2. Lighting in display cases
   1.3. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting.
   1.4. Lighting equipment that is for sale or demonstration in lighting education.
2. Hotel and motel sleeping units and guest suites shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by captive key systems.

~~3. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is readily accessible.~~
3. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a ~~dedicated~~ time switch control complying with Section C405.2.2.1 that is independent of the controls for other lighting within the room or space.
~~4. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.~~

Reason: This proposal is an editorial simplification of this list of requirements. It also clarifies, in item 1, that the automatic controls requirements in Sections C405.2.1 and C405.2.2 are also applicable to lighting in items 1.1 through 1.4. Some users of the code have understood lighting in items 1.1 through 1.4 to be exempt from the requirements of C405.2.1 and C405.2.2, but a careful reading of the code shows that this is not the case and that these lights must also be connected to occupant sensor or time switch controls, in addition to having separate manual control.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal is editorial and should have no impact on the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE182-16 **AS**

Code Change No: CE183-16

Original Proposal

Section: C202 (New), C405.2

Proponent: Eric Makela, Cadmus Group, representing Northwest Energy Codes Group

Add new text as follows:

LUMINAIRE LIGHT LEVEL CONTROLS. A lighting system consisting of one or more luminaires with embedded lighting control logic, occupancy and ambient light sensors, wireless networking capabilities, and local override switching capability, where required.

Revise as follows:

C405.2 Lighting controls (Mandatory). Lighting systems shall be provided with controls ~~as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4~~ that comply with one of the following:

1. Lighting controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4, and C405.2.5.
2. Luminaire light level controls (LLLC) and lighting controls as specified in Sections C405.2.4, and C405.2.5. The LLLC luminaire shall be independently capable of:
   1. Monitoring occupant activity to brighten or dim its lighting when occupied or unoccupied respectively.
   2. Monitoring ambient light, both electric light and ~~C405.2.5~~daylight, and brighten or dim artificial light to maintain desired light level
   3. Configuration and re-configuration of performance parameters including; bright and dim set-points, time-outs, dimming fade rates, sensor sensitivity adjustments, and wireless zoning configurations, for each control strategy.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted.
2. Interior exit stairways, interior exit ramps and exit passageways.
3. Emergency egress lighting that is normally off.

Reason: The purpose of this code change proposal is to acknowledge lighting control technology that meets the intent of the provisions of the IECC if the control requirements have specific capabilities. Luminaire level lighting control (LLLC) refers to a controls solution where each luminaire in a space has independence from every other and can therefore maximize incremental control within very small areas. For example, a LLLC luminaire serves 80-120 square feet (sf) of open office space versus the standard approach of 'zoned' lighting controls with luminaires grouped to serve much larger interior areas. Each LLLC is not only 'wirelessly addressable', it can locally process information from integrated sensors to implement lighting control logic as well as can be programmed, overseen and modified through a computer user interface. An LLLC system will meet the intent of the lighting control requirements as specified in Section C405.2.1, C405.2.2, C405.2.3. The minimum LLLC capabilities that will meet the IECC lighting control requirements include:

1. Single or multi-type sensors (occupancy and photocell)
2. Embedded luminaire control processor
3. Continuous dimming ballast/drivers
4. Wireless networking radio.

LLLC Benefits include:

• Granularity allowing control at the smallest increment
• System persistence via independent nodes

• Flexibility to modify luminaire output: Limitless grouping, zone control with pre-set auto- response. Tuning the light level (and resulting energy use) to match occupant needs at each fixture. Adjusting to new employee/user/older occupant with individualized adjustment. In response to space reuse (all or part). For temporary demand responsiveness
• Standardization

The LLLC technology, as specified in this proposal, will save approximately 50% over the current lighting control requirements in open office areas. Plan review verification time will be less than that for plan review for compliance with the current lighting control requirements. Plan reviewers only need to determine of the LLLC is specified for all of the lights in the building instead of reviewing lighting control specifications for each space. Building inspection can spot check to verify that the technology is installed verses looking at each room.

Cost Impact: Will not increase the cost of construction
None. The LLLC is listed as an option in meeting the lighting control requirements and is not a required lighting control system.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

LUMINAIRE LEVEL LIGHTING ~~LEVEL~~ CONTROLS. A lighting system consisting of one or more luminaires with embedded lighting control logic, occupancy and ambient light sensors, wireless networking capabilities, and local override switching capability, where required.

C405.2 Lighting controls (Mandatory). Lighting systems shall be provided with controls that comply with one of the following:

1. Lighting controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4, and C405.2.5.
2. Luminaire level lighting ~~level~~ controls (LLLC) and lighting controls as specified in Sections C405.2.1, C405.2.4, and C405.2.5. The LLLC luminaire shall be independently capable of:
   1. Monitoring occupant activity to brighten or dim its lighting when occupied or unoccupied respectively.
   2. Monitoring ambient light (both electric light and daylight) and brighten or dim artificial light to maintain desired light level.
   3. Configuration and re-configuration of performance parameters including; bright and dim set-points, time-outs, dimming fade rates, sensor sensitivity adjustments, and wireless zoning configurations, for each control strategy.

   Exceptions: Lighting controls are not required for the following:

   1. Areas designated as security or emergency areas that are required to be continuously lighted.
   2. Interior exit stairways, interior exit ramps and exit passageways.
   3. Emergency egress lighting that is normally off.

Committee Reason: When the code official encounters this technology, and the technology is being implemented, the code needs to provide coverage, guidance and parameters for such technology. This is a type of system, not a specific product. The functions are described in the proposed text, so a product standard is not necessary. This will encourage adoption of less expensive and more reliable technology to save energy. The Modification to the terminology/definition matches the text with the acronym found in the reason statement. An additional Modification picks up the section for occupancy sensor controls to prevent rollback of requirements and to retain options.

Assembly Action **None**

Final Action Results

CE183-16	AM

Code Change No: CE184-16

Original Proposal

Section: C405.2.1

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.2.1 Occupant sensor controls. Occupant sensor controls shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. ~~Lounges~~ Lounge/breakrooms.
5. ~~Employee lunch and break rooms.~~
6. ~~Private offices.~~
7. Enclosed offices.
8. Restrooms.
9. Storage rooms.
10. ~~Janitorial closets.~~
11. Locker rooms.
12. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.
13. ~~Warehouses~~ Warehouse storage areas.

Reason: This proposal revises this section for clarity, and for consistency with other parts of the code, with no change in stringency.

1. Conforms the space types names in this list with the space type names in the Lighting Power Allowance Table C405.5.2(2).
2. "Janitorial closets" are not a space type listed in Table C405.5.2(2) but any room referred to as a "closet" should be assumed to be less than 300 square feet, and hence would already be required to have occupant sensor controls and does not need to be listed separately.

Cost Impact: Will not increase the cost of construction
The proposal is a clarification of the intent of the current code requirements.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE184-16	AS

Code Change No: CE185-16

Original Proposal

Section: C405.2.1, C405.2.1.1, C405.2.1.3 (New)

Proponent: Jeremiah Williams (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.2.1 Occupant sensor controls. Occupant sensor controls shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. Lounges.
5. Employee lunch and break rooms.
6. Private offices.
7. <u>Open plan office areas.</u>
8. Restrooms.
9. Storage rooms.
10. Janitorial closets.
11. Locker rooms.
12. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.
13. Warehouses.

C405.2.1.1 Occupant sensor control function. Occupant sensor controls in spaces other than warehouses<u> and open plan office areas, as</u> specified in Section C405.2.1 shall comply with the following:

1. Automatically turn off lights within 30 minutes of all occupants leaving the space.
2. Be manual on or controlled to automatically turn the lighting on to not more than 50 percent power.

   Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants.

3. Shall incorporate a *manual control* to allow occupants to turn lights off.

Add new text as follows:

<u>**C405.2.1.3 Occupant sensor control function in open plan office areas.** Occupant sensor controls in open plan office spaces less than 250 square feet (23 m^2) in area shall comply with Section C405.2.1.1. Occupant sensor controls in all other open plan office spaces shall comply with all of the following:</u>

1. <u>The controls shall be configured so that general lighting can be controlled separately in control zones with floor areas not greater than 600 square feet (55 m^2) within the open plan office space.</u>
2. <u>The controls shall automatically turn off general lighting in all control zones within 20 minutes after all occupants have left the open plan office space.</u>

3. The controls shall be configured so that general lighting power in each control zone is reduced by not less than 80 percent of the full zone general lighting power in a reasonably uniform illumination pattern within 20 minutes of all occupants leaving that control zone. Control functions that switch control zone lights completely off when the zone is vacant meet this requirement.
4. The controls shall be configured such that any *daylight responsive control* will activate open plan office space general lighting or control zone general lighting only when occupancy for the same area is detected.

Reason: This proposal adds occupant sensor control to open plan office areas. These areas were not previously included in occupant sensor control requirements because there were not readily available controls to switch off small groups of work stations while maintaining a minimum background illumination in the overall area. Multiple manufacturers now have those controls available, so they can be included in code requirements. There are significant savings, especially during after-hours use and custodial service, as lighting only the workstation areas in actual use rather than the entire open office space saves significant energy. The control function for these areas is written so it can be accomplished either with dimming or switching systems and "manual on" is intentionally excluded from this control function, because that is not easily workable in an open office plan area with multiple occupants. The provision does not apply to areas smaller than 250 square feet, as the control function in Section C405.2.1.1 is more appropriate for smaller areas with multiple workstations. For open office areas between 250 and 600 square feet, the control function in either Sections C405.2.1.1 or C405.2.1.3 can be applied, as the control function of C405.2.1.1 meets the requirements of C405.2.1.3, as switching lights off is "no more than 20%."

Energy Savings: An analysis of energy impact shows that net savings from the expanding occupancy sensors to open office areas as proposed is about $34 annually per 400 square feet of floor area in offices in Climate Zone 8. A 400 square foot example is selected as an area that would cover 4 typical workstations and is within the 250 to 600 square foot range of the requirement. Other climate zones will have greater total savings, as there will be less increase in heating resulting from the lower internal loads. More details are found in the cost-effectiveness analysis referenced in the cost impact section.

The U.S. Department of Energy (DOE) develops its proposals through a public process to ensure transparency, objectivity and consistency in DOE-proposed code changes. Energy savings and cost impacts are assessed based on established methods and reported for each proposal, as applicable. More information on the process utilized to develop the DOE proposals for the 2018 IECC can be found at: https://www.energycodes.gov/development/2018IECC.

Bibliography:

Hart, R., and Liu, B. (2015). Methodology for Evaluating Cost-effectiveness of Commercial Energy Code Changes. Pacific Northwest National Laboratories for U.S. Department of Energy; Energy Efficiency & Renewable Energy. PNNL-23923 Rev1. https://www.energycodes.gov/development/commercial/methodology.

Hart, R. and R. Athalye. September 2015. "Cost-effectiveness Analysis of Expanding use of Occupancy Sensors." https://www.energycodes.gov/development/2018IECC.

Cost Impact: Will increase the cost of construction

The cost for additional lighting controls in open office areas is expected to be about $250 per 400 square foot workstation area for simple controls, or $0.95 per square foot for advanced wireless control systems; however, there are significant savings associated with these applications.

Cost-effectiveness: PNNL performed a cost-effectiveness analysis using the established DOE methodology.[1] Results of the cost-effectiveness analysis showed that the average savings-to-investment ratio (SIR) is 2.2 to 1.4 in typical offices, depending on the sophistication of the system installed. A proposal is cost-effective when the SIR is greater than 1.0, indicating that the present value of savings is greater than the incremental cost. The complete cost-effectiveness analysis is available at: https://www.energycodes.gov/development/2018IECC.[2]

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C405.2.1.3 Occupant sensor control function in open plan office areas. Occupant sensor controls in open plan office spaces less than ~~250~~ 300 square feet (~~23~~ 28 m^2) in area shall comply with Section C405.2.1.1. Occupant sensor controls in all other open plan office spaces shall comply with all of the following:

1. The controls shall be configured so that general lighting can be controlled separately in control zones with floor areas not greater than 600 square feet (55 m^2) within the open plan office space.
2. The controls shall automatically turn off general lighting in all control zones within 20 minutes after all occupants have left the open plan office space.
3. The controls shall be configured so that general lighting power in each control zone is reduced by not less than 80 percent of the full zone general lighting power in a reasonably uniform illumination pattern within 20 minutes of all occupants leaving that control zone. Control functions that switch control zone lights completely off when the zone is vacant meet this requirement.

4. The controls shall be configured such that any *daylight responsive control* will activate open plan office space general lighting or control zone general lighting only when occupancy for the same area is detected.

Committee Reason: Approval is based upon the proponent's published reason statement. The modification coordinates the threshold with other thresholds in the code.

Assembly Action **None**

Final Action Results

CE185-16	**AM**

Code Change No: CE186-16

Original Proposal

Section: C405.2.1, C405.2.1.1, C405.2.1.2

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

C405.2.1 Occupant sensor controls. Occupant sensor controls shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. Lounges.
5. Employee lunch and break rooms.
6. Private offices.
7. Restrooms.
8. Storage rooms.
9. Janitorial closets.
10. Locker rooms.
11. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.
12. Warehouses.

Revise as follows:

C405.2.1.1 Occupant sensor control function. Occupant sensor controls in ~~spaces~~ warehouses shall comply with Section C405.2.1.2. Occupant sensor controls for other ~~than warehouses~~ spaces specified in Section C405.2.1 shall comply with the following:

1. ~~Automatically~~ They shall automatically turn off lights within 30 minutes of all occupants leaving the space.
2. ~~Be~~ They shall be manual on or controlled to automatically turn the lighting on to not more than 50 percent power.

   Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants.

3. ~~Shall~~ They shall incorporate a *manual control* to allow occupants to turn lights off.

C405.2.1.2 Occupant sensor control function in warehouses. In warehouses, the lighting in aisleways and open areas shall be controlled with occupant sensors that automatically reduce lighting power by not less than 50 percent when the areas are unoccupied. The occupant sensors shall control lighting in each aisleway independently and shall not control lighting beyond the aisleway being controlled by the sensor.

Reason: Section C405.2.1 tells the code user which spaces must be provided with occupant sensor controls. Section C405.2.1.2 tells the user how the occupant sensor controls must operate in warehouses. Section C405.2.1.1 tells the user how the occupant sensor controls must operate in all the other uses on the C405.2.1 list. The text of C405.2.1.1 is slightly confusing. It doesn't clearly say that the section applies to all of the spaces listed in C405.2.1 **EXCEPT** warehouses. The proposed change solves the issue by providing two sentences with distinct direction for the code user. In case the cdpACCESS system doesn't show the 2 sections not being amended, we have shown all of them for context of the change.

C405.2.1 Occupant sensor controls. Occupant sensor controls shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. Lounges.
5. Employee lunch and break rooms.
6. Private offices.
7. Restrooms.
8. Storage rooms.
9. Janitorial closets.
10. Locker rooms.
11. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.
12. Warehouses.

C405.2.1.1 Occupant sensor control function. Occupant sensor controls in spaces other than warehouses specified in Section C405.2.1 shall comply with the following:

1. Automatically turn off lights within 30 minutes of all occupants leaving the space.
2. Be manual on or controlled to automatically turn the lighting on to not more than 50 percent power.

   Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants.

3. Shall incorporate a *manual control* to allow occupants to turn lights off.

C405.2.1.2 Occupant sensor control function in warehouses. In warehouses, the lighting in aisleways and open areas shall be controlled with occupant sensors that automatically reduce lighting power by not less than 50 percent when the areas are unoccupied. The occupant sensors shall control lighting in each aisleway independently and shall not control lighting beyond the aisleway being controlled by the sensor.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
This is editorial clarification and should have no impact on construction cost.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE186-16	**AS**

Code Change No: CE187-16

Original Proposal

Section: C405.2.1.1

Proponent: Jeremiah Williams (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.2.1.1 Occupant sensor control function. Occupant sensor controls in spaces other than warehouses specified in Section C405.2.1 shall comply with the following:

1. Automatically turn off lights within ~~30~~ 20 minutes of all occupants leaving the space.
2. Be manual on or controlled to automatically turn the lighting on to not more than 50 percent power.

   Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants.

3. Shall incorporate a *manual control* to allow occupants to turn lights off.

Reason: Reducing the shutoff time for occupancy sensors will result in lights turning off sooner after occupants leave a room and increase savings. There has been enough experience with occupancy sensor selection and placement in the design community so that acceptable performance can be achieved with a 20 minute maximum timeout setting.

Energy Savings: A field study of the energy impact of occupancy sensor settings[1] shows a significant difference in savings for 20 minute vs. 5 minute shutoff settings. The range is 6% to 13% difference, depending on space type. It is expected that about half that difference in savings would result from a 30 to 20 minute setting change, or about 5% of total baseline lighting energy use. For a typical installation in Climate Zone 8, where the heating penalty for lighting savings is greatest, the shift in time-off setting from 30 to 20 minutes can result in annual increased savings of around $15 to $20 per thousand square feet of occupancy sensor controlled area.

The U.S. Department of Energy (DOE) develops its proposals through a public process to ensure transparency, objectivity and consistency in DOE-proposed code changes. Energy savings and cost impacts are assessed based on established methods and reported for each proposal, as applicable. More information on the process utilized to develop the DOE proposals for the 2018 IECC can be found at: https://www.energycodes.gov/development/2018IECC.

Bibliography:

1. Lighting Controls Council. "Demand Reduction and Energy Savings Using Occupancy Sensors." National Electric Manufacturers Association (NEMA), April 2006. https://www.nema.org/Policy/Energy/Efficiency/Documents/demandreduction.pdf.

Cost Impact: Will not increase the cost of construction
There is no added cost, as this simply requires changing a simple setting on the occupancy sensor during installation.
Cost-effectiveness: This change is cost-effective in that it provides significant savings with no anticipated cost increase.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the first paragraph of the proponent's published reason statements. This proposal will increase energy savings.

Assembly Action **None**

Final Action Results

CE187-16	**AS**

Code Change No: CE188-16

Original Proposal

Section: C405.2.2, C405.2.2.1

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C405.2.2 Time-switch controls. Each area of the building that is not provided with *occupant sensor controls* complying with Section C405.2.1.1 shall be provided with *time switch controls* complying with C405.2.2.1.

> **Exception:** Where a *manual control* provides light reduction in accordance with Section C405.2.2.2, ~~automatic controls~~ *time-switch controls* shall not be required for the following:
>
> 1. *Sleeping units*.
> 2. Spaces where patient care is directly provided.
> 3. Spaces where an automatic shutoff would endanger occupant safety or security.
> 4. Lighting intended for continuous operation.
> 5. Shop and laboratory classrooms.

C405.2.2.1 Time-switch control function. Each space provided with *time-switch controls* shall also be provided with a *manual control* for light reduction in accordance with Section C405.2.2.2. Time-switch *controls* shall include an override switching device that complies with the following:

1. Have a minimum 7-day clock.
2. Be capable of being set for seven different day types per week.
3. Incorporate an automatic holiday "shutoff" feature, which turns off all controlled lighting loads for at least 24 hours and then resumes normally scheduled operations.
4. Have program backup capabilities, which prevent the loss of program and time settings for at least 10 hours, if power is interrupted.
5. Include an override switch that complies with the following:
   - 5.1. The override switch shall be a manual control.
   - 5.2. The override switch, when initiated, shall permit the controlled lighting to remain on for not more than 2 hours.
   - 5.3. Any individual override switch shall control the lighting for an area not larger than 5,000 square feet (465 m^2).

   Exceptions:

   1. Within malls, arcades, auditoriums, single-tenant retail spaces, industrial facilities and arenas:
      - 1.1. The time limit shall be permitted to be greater than 2 hours, provided that the override switch is a captive key device.
      - 1.2. The area controlled by the override switch is permitted to be greater than 5,000 square feet (465 m^2), but shall not be greater than 20,000 square feet (1860 m^2).
      - 1.3. Where provided with *manual control*, the following areas are not required to have light reduction control:

1.3.1 Spaces that have only one luminaire with a rated power of less than 100 watts.
1.3.2. Spaces that use less than 0.6 watts per square foot (6.5 W/m^2).
~~1.3.3. Corridors, equipment rooms, public lobbies, electrical or mechanical rooms.~~
<u>1.3.3. Corridors, lobbies, electrical rooms and mechanical rooms.</u>

Reason: The proposal is editorial in nature.

In Section C405.2.2.2 the use of the term "automatic control" is confusing, as occupant sensor controls, time switch controls, and daylight responsive controls are all "automatic" by definition, and this exception is clearly intended to apply to time switch controls only.

The list of space types in the exception to C405.2.2.1 is modified to match the space types listed in Table C405.2.2(2). It is important that we use the same terminology to describe space types throughout the lighting section.

Cost Impact: Will not increase the cost of construction
The proposal clarifies code requirements only. No new requirements are added, and no existing requirements are eliminated.

Analysis: Please note that the format of Section C405.2.2.1 is not correctly reflective of current IECC. Please consult page C72 of the 2015 IECC to see the proper numbering and indentation for this Section.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE188-16	**AS**

Code Change No: CE190-16

Original Proposal

Section: C202 (New), C405.2.2.1, C405.2.4

Proponent: Hope Medina, Cherry Hills Village, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Add new definition as follows:

CAPTIVE KEY OVERRIDE A lighting control that will not release the key that activates the override when the lighting is on.

Revise as follows:

C405.2.2.1 Time-switch control function. Each space provided with *time-switch controls* shall also be provided with a *manual control* for light reduction in accordance with Section C405.2.2.2. Time-switch *controls* shall include an override switching device that complies with the following:

1. Have a minimum 7-day clock.
2. Be capable of being set for seven different day types per week.
3. Incorporate an automatic holiday "shutoff" feature, which turns off all controlled lighting loads for at least 24 hours and then resumes normally scheduled operations.
4. Have program backup capabilities, which prevent the loss of program and time settings for at least 10 hours, if power is interrupted.
5. Include an override switch that complies with the following:
   - 5.1. The override switch shall be a manual control.
   - 5.2. The override switch, when initiated, shall permit the controlled lighting to remain on for not more than 2 hours.
   - 5.3. Any individual override switch shall control the lighting for an area not larger than 5,000 square feet (465 m^2).

Exceptions:

1. Within malls, arcades, auditoriums, single-tenant retail spaces, industrial facilities and arenas:
   - 1.1. The time limit shall be permitted to be greater than 2 hours, provided that the ~~override~~ switch is a captive key device.
   - 1.2. The area controlled by the override switch ~~is permitted to~~ shall not be ~~greater than~~ limited to 5,000 square feet (465 m2)~~, but shall not be greater~~ provided that such area is less than 20,000 square feet (1860 m^2).
   - 1.3. Where provided with *manual control*, the following areas are not required to have light reduction control:
     - 1.3.1. Spaces that have only one luminaire with a rated power of less than 100 watts.
     - 1.3.2. Spaces that use less than 0.6 watts per square foot (6.5 W/m^2).
     - 1.3.3. Corridors, equipment rooms, public lobbies, electrical or mechanical rooms.

C405.2.4 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by captive key <u>override</u> systems.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

Reason: Currently there is no definition in the code for a captive key device, and when researching the definition it brings up a device for fire services. We corrected the verbiage to reference the correct device for what is being required in these sections of the IECC. The definition added is the definition used with California's Title 24. This is a definition that is currently being used and recognized, so it makes sense to use something that is already recognizable and usable.
Our Theme: A Code for the End User
Is the code section completely understandable to the end user?
Is the code section or requirement easy to find?
Is the code requirement even doable in the real world?
Will the code requirement really save energy or only on paper?

Cost Impact: Will not increase the cost of construction
This is using the correct terminology, so it will not increase cost.

Analysis: Please note that the format of Section C405.2.2.1 is not correctly reflective of current IECC. Please consult page C72 of the 2015 IECC to see the proper numbering and indentation for this Section.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C405.2.4 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by ~~captive~~ <u>card</u> key ~~override systems~~ <u>controls</u>.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

Committee Reason: Approval was based on the proponent's published reason statements. The Modification clarifies the terminology.

Assembly Action **None**

Final Action Results

CE190-16	**AM**

Code Change No: CE191-16

Original Proposal

Section: C405.2.2.3

Proponent: Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

~~C405.2.2.3~~C405.2.5 Manual controls. Where required by this code, ~~*Manual*~~ *manual controls* for lights shall comply with the following:

1. ~~Shall~~ They shall be readily accessible to occupants.
2. ~~Shall~~ They shall be located where the controlled lights are visible, or shall identify the area served by the lights and indicate their status.

Reason: Sections C405.2.1 and C405.2.2 both require manual controls, and yet this section is currently located within C405.2.2. In order for the provisions to be clearly applicable to C405.2.1 it is proposed that this be re-numbered C405.2.5.

It is common for people to install "above code" lighting controls, for example a manual override switch which is provided for convenience, not to meet a code requirement. When this is done, the code should not be telling people where their "above code" control device must be located.

Cost Impact: Will not increase the cost of construction
No additional requirements are being added to the code.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE191-16	**AS**

Code Change No: CE192-16

Original Proposal

Section: C405.2.3, C405.4

Proponent: Jeremiah Williams (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.2.3 Daylight-responsive controls. *Daylight-responsive controls* complying with Section C405.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with Section C405.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.4.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with Section C405.2.3.3.

Exceptions: *Daylight responsive controls* are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.4.
4. Sidelight ~~daylight zones~~ *daylight zones* on the first floor above grade in Group A-2 and Group M occupancies.
5. Buildings where the total connected lighting power calculated under Section C405.4.1 is not greater than the adjusted interior lighting power allowance (*LPAadj*) calculated in accordance with Equation 4-9:

$$LPAadj = [LPAnorm \cdot (1.0 - 0.4 \cdot UDZFA / TBFA)] \qquad \textbf{(Equation 4-9)}$$

where:

LPAadj = Adjusted building interior Lighting Power Allowance in Watts
LPAnorm = Normal building Lighting Power Allowance in Watts calculated in accordance with Section C405.4.2 and reduced in accordance with Section C406.3 where option 2 is used to comply with the requirements of Section C406.
UDZFA = Uncontrolled *daylight zone* floor area is the sum of all sidelight and toplight *daylight zones,* calculated in accordance with Sections C405.2.3.2 and C405.2.3.3, that do not have *daylight responsive controls.*
TBFA = Total building floor area is the sum of all floor areas included in the Lighting Power Allowance calculation in Section C405.4.2.

C405.4 Interior lighting power requirements (Prescriptive). A building complies with this section where its total connected lighting power calculated under Section C405.4.1 is not greater than the interior lighting power allowance calculated under Section C405.4.2.

Reason: The IECC currently requires daylight responsive controls in daylight areas except in specific spaces where such controls are not practical or would compromise the use of the space. This proposal allows the option for lighting power density (LPD) to be reduced by 40% in daylight areas in exchange for an exception to daylight responsive controls in daylit areas. That 40% reduction is proportional to daylight areas and can be made in any area of the building to meet the average reduced interior lighting power allowance. In a number of cases, faced with the cost of daylighting controls and the challenges associated with commissioning them, lighting designers have found it more cost-effective to use more efficient lamps and luminaires. This allows a reduction in LPD with no reduction in illumination levels in the affected spaces. However, the daylight-responsive control requirements do not currently allow this tradeoff, as daylight-responsive controls are mandatory. This proposal is **not** a mandate that the LPD be reduced and such controls not be installed – it is only an option should the lighting designer choose to apply it.

The proposal is not intended to allow the LPD reduction exception when daylight controls are used to allow the 40% window-to-wall ratio, as that requirement directly references section C405.2.3.1 without referring to section C405.2.3 where the exception will be added.

In addition to the option for LPD reduction, the word "allowance" was added to section C405.4 as a point of clarification, as the reference is to the lighting power allowance, not the lighting power.

Energy Savings: This change is expected to have slight savings or be savings neutral, but result in more efficient base lighting systems that do not require correct control operation to provide savings. While there is not expected to be a theoretical savings for this tradeoff, two causes may contribute a marginal savings:

- Realization rates (actual delivered savings) for base lighting power density changes are generally expected to be higher for fixed efficiency items like lighting fixture efficacy when compared with savings that rely on controls.
- The proposed exception requires a higher reduction (40% instead of 28.9%) than a theoretical analysis shows is needed, although this may be partially offset by the actual average LPDs in new buildings being below the allowed LPD.

PNNL analyzed the impact of both LPD reductions and daylighting for the small office prototype. The simulation results were reviewed for climate zone 4A which has a typical daylighting impact. It was found that the energy cost savings from 100% daylight responsive building controls could be matched with a 28.9% reduction in LPD for both a furnace and air conditioner systems and an air-source heat pump system. These values were rounded up to 40% to establish a tradeoff value of LPD reduction to daylight area controlled. The increase in savings tradeoff is included for four reasons:

To account for the fact that many new buildings have a lower actual LPD than the allowance.

The fact that the LPD reduction can be spread over the non-daylight areas, making it highly achievable.

If daylight responsive controls were eligible for a performance tradeoff in Section 407, that path requires energy use to be 85% of the standard reference design building.

There is interest in encouraging the continued implementation of daylight controls to improve field implementation and acceptance, so the tradeoff should require using the highest efficiency lighting for LPD reduction.

The U.S. Department of Energy (DOE) develops its proposals through a public process to ensure transparency, objectivity and consistency in DOE-proposed code changes. Energy savings and cost impacts are assessed based on established methods and reported for each proposal, as applicable. More information on the process utilized to develop the DOE proposals for the 2018 IECC can be found at: https://www.energycodes.gov/development/2018IECC.

Bibliography:
Richman, E., S. Loper, J. Zhang and R. Hart. December 2015. "Cost-effectiveness Analysis of Reducing Interior Lighting Allowances." https://www.energycodes.gov/development/2018IECC.

Cost Impact: Will not increase the cost of construction

The LPD reduction option as an alternative to daylight responsive controls is an option that can be exercised at the discretion of the designer, so there is no change in actual code requirements. Should the option be taken, the higher efficiency lighting necessary to achieve the reduced LPD is expected to be less expensive than the cost of daylighting controls. A similar analysis was made for LPD reduction where it was found that LED lighting is a cost-effective way to reduce LPDs. That analysis can be reviewed in the documentation for proposal C-8 at: https://www.energycodes.gov/development/2018IECC.[1]

Cost-effectiveness: This change is cost-effective in that it either provides some savings or neutral energy impact, combined with an increase in savings reliability, at no anticipated cost increase. In addition, there is no change in requirements, as this code change proposal simply provides an optional alternative to daylight responsive controls.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C405.2.3 Daylight-responsive controls. *Daylight-responsive controls* complying with Section C405.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with Section C405.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.4.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with Section C405.2.3.3.

Exception: *Daylight responsive controls* are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.4.
4. Sidelight *daylight zones* on the first floor above grade in Group A-2 and Group M occupancies.
5. ~~Buildings~~ New buildings where the total connected lighting power calculated under Section C405.4.1 is not greater than the adjusted interior lighting power allowance (*LPAadj*) calculated in accordance with Equation 4-9:

   $$LPAadj = [LPAnorm \cdot (1.0 - 0.4 \cdot UDZFA / TBFA)] \qquad \textbf{(Equation 4-9)}$$

   where:

   LPAadj = Adjusted building interior Lighting Power Allowance in Watts
   LPAnorm = Normal building Lighting Power Allowance in Watts calculated in accordance with Section C405.4.2 and reduced in accordance with Section C406.3 where option 2 is used to comply with the requirements of Section C406.
   UDZFA = Uncontrolled *daylight zone* floor area is the sum of all sidelight and toplight *daylight zones,* calculated in accordance with Sections C405.2.3.2 and C405.2.3.3, that do not have *daylight responsive controls*.
   TBFA = Total building floor area is the sum of all floor areas included in the Lighting Power Allowance calculation in Section C405.4.2.

Committee Reason: Faced with the cost of day-lighting controls and the challenges associated with commissioning them, lighting designers have found it more cost-effective to use more efficient lamps and luminaries. This proposal adds a design option. The modification is made because the text should apply only to new buildings.

Assembly Action None

Final Action Results

CE192-16	**AM**

Code Change No: CE193-16

Original Proposal

Section: C405.2.3.2, C405.2.3.3

Proponent: Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C405.2.3.2 Sidelight daylight zone. The sidelight *daylight zone* is the floor area adjacent to vertical *fenestration* which complies with all of the following:

1. Where the fenestration is located in a wall, the daylight zone shall extend laterally to the nearest full-height wall, or up to 1.0 times the height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest full-height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure C405.2.3.2(1).
2. Where the *fenestration* is located in a rooftop monitor, the *daylight zone* shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the *fenestration*, whichever is less, and longitudinally from the edge of the *fenestration* to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the *fenestration*, whichever is less, as indicated in Figures C405.2.3.2(2) and C405.2.3.2(3).
3. The area of the *fenestration* is not less than 24 square feet (2.23 m^2).
4. The distance from the *fenestration* to any building or geological formation which would block access to daylight is greater than the height from the bottom of the *fenestration* to the top of the building or geologic formation.
5. ~~Where located in existing buildings, the~~ The *visible transmittance* of the *fenestration* is not less than 0.20.

C405.2.3.3 Toplight daylight zone. The toplight daylight zone is the floor area underneath a roof fenestration assembly which complies with all of the following:

1. The daylight zone shall extend laterally and longitudinally beyond the edge of the roof *fenestration* assembly to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.7 times the ceiling height, whichever is less, as indicated in Figure C405.2.3.3.
2. No building or geological formation blocks direct sunlight from hitting the roof *fenestration* assembly at the peak solar angle on the summer solstice.
3. ~~Where located in existing buildings, the~~ The product of the visible *transmittance* of the roof *fenestration* assembly and the area of the rough opening of the roof *fenestration* assembly divided by the area of the *daylight zone* is not less than 0.008.

Reason: The term *fenestration* includes opaque doors in walls, and opaque rooftop access hatches. As currently written, the code would establish a *daylight zone* adjacent to these elements when they are installed in new buildings. By deleting the phrase "where located in existing buildings" we resolve this problem, so that only fenestration elements that admit daylight would be considered to establish a *daylight zone*.

Cost Impact: Will not increase the cost of construction
By reducing the scope of daylight responsive controls requirements this proposal would reduce the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE193-16	**AS**

Code Change No: CE195-16

Original Proposal

Section: C405.2.4

Proponent: Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C405.2.4 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have ~~a master~~ control ~~device~~ devices or systems that ~~is capable of~~ automatically ~~switching~~ switch off all permanently installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by a captive key ~~systems~~ override switch.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

Reason: Editorial.

The existing language is permissive, i.e. "capable" rather than "shall". Also, there is no need to require a "master" device when the goal of switching off lights in unoccupied guest suites can be achieved by stand-alone occupant sensors in each room which are not networked together.

The word "permanently" is added to modify "installed luminaires". Hotel and motel guest rooms are unlike many other types of spaces in that they are often lighted primarily with plug-in luminaires.

Finally, the term "captive key system" is proposed to be replaced with "captive key override switch". First, in practice this is usually a device, not a system. Second, a quick review of manufacturer literature shows that these devices are usually referred to as either a "card key switch" or a "key card switch". Third, CA Title 24 uses the term "captive-key override".

Cost Impact: Will not increase the cost of construction
The proposal is mainly editorial, but by eliminating the "master" control and "system" phrases it is possible that some users will be able to install less expensive devices rather than more complicated networked systems, which would decrease the cost of construction without reducing the efficiency.

Report of Committee Action Hearings

Committee Action: Approved as Modified

Modify as follows:

C405.2.4 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have control devices or systems that automatically switch off all permanently installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by ~~a captive~~ card key ~~override switch~~ controls.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

Committee Reason: Approval was based on the proponent's published reason statements. The Modification is for consistency with other committee action to do the same.

Assembly Action: None

Final Action Results

CE195-16	**AM**

Code Change No: CE196-16

Original Proposal

Section(s): C405.2.5, C405.2.5.1 (New), C405.2.5.2 (New), C405.2.5.3 (New), C405.2.5.4 (New)

Proponent: Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C405.2.5 Exterior lighting controls. Exterior lighting systems shall be provided with controls that comply with Sections C405.2.5.1 through C405.2.5.4.

Exceptions:

1. Lighting for ~~exterior applications other than emergency lighting that is intended to be automatically off during building operation, lighting specifically~~ covered vehicle entrances and exits from buildings and parking structures where required ~~to meet health and life safety requirements or decorative~~ for eye adaptation.
2. Decorative gas lighting systems ~~shall:~~
3. Lighting controlled from within dwelling units.

~~1. Be provided with a control that automatically turns off the lighting as a function of available daylight.~~
~~2. Where lighting the building façade or landscape, the lighting shall have controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.~~
~~3. Where not covered in Item 2, the lighting shall have controls configured to automatically reduce the connected lighting power by not less than 30 percent from not later than midnight to 6 a.m., from one hour after business closing to one hour before business opening or during any period when activity has not been detected for a time of longer than 15 minutes.~~

~~All time switches shall be able to retain programming and the time setting during loss of power for a period of at least 10 hours.~~

Exception~~:~~ ~~Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security or eye adaptation.~~

Add new text as follows:

C405.2.5.1 Daylight shutoff. Lights shall be automatically turned off when daylight is present and satifies the lighting needs.

C405.2.5.2 Decorative lighting shutoff. Building facade and landscape lighting shall automatically shut off from not later than one hour after business closing to not earlier than one hour before business opening, or longer.

C405.2.5.3 Lighting setback. Lighting that is not controlled in accordance with Section C405.2.5.2 shall be controlled so that the total wattage of such lighting is automatically reduced by not less than 30 percent by selectively switching off or dimming luminaires at one of the following times:

1. From not later than midnight to not earlier than 6 a.m.
2. From not later than one hour after business closing to not earlier than one hour before business opening.
3. During any time where activity has not been detected for 15 minutes or more.

C405.2.5.4 Exterior time-switch control function. Time-switch controls for exterior lighting shall comply with the following:

1. They shall have a clock that is not less than 7 day.
2. They shall be capable of being set for seven different day types per week.
3. They shall incorporate an automatic holiday setback feature.
4. They shall have program backup capabilities that prevent the loss of program and time settings for not less than 10 hours, if power is interrupted.

Reason: Section C405.2.5 was added to the 2015 IECC, and the language does not conform to ICC code writing standards. First, two of the exceptions in the first paragraph, which are not explicitly identified as such, are redundant and unnecessary. "Emergency lighting that is intended to be automatically off during building operation" is already exempted in C405.2 (exception 3). And "Lighting specifically required to meet health and life safety requirements" is also exempted in C405.2 (exception 1). Second, the overall structure of this section is unlike anything else in the code book.

This proposal addresses both of these issues. It also tightens the standards for timeswitch systems. When exterior lighting operations are based on business operating hours, it makes sense that a more robust time switch system is required, which has a seven day operating schedule and holiday setback. The language in C405.2.5.4 is copied directly from C405.2.2.1 so that the same time switch system could be used to control both interior and exterior lights.

The proposal also adds one new exception, for "lighting controlled from within dwelling units". This occurs quite frequently on private roof terraces on high-rise residential buildings. People tend to take responsibility for shutting off the lighting that is connected to their own electrical meter, and it is not reasonable to require that a digital astronomic timeclock be required to control the light on your private terrace.

Cost Impact: Will not increase the cost of construction
Many people interpret the current provisions of the code to require that exterior lighting be dimmable by at least 30%. While technologically achievable, the additional wiring and controls are expensive, and in many instances the 30% reduction can be achieved by switching off lights which are not critical to safety and security. The existing code language is not clear on this point. On the other hand, by placing more stringent requirements on timeswitch systems for exterior lighting this proposal may require a more expensive control system to be used on some projects. But in reality, the big break point in time switch system pricing is from a mechanical device to a digital device, and the requirements in the 2015 IECC will already require you to use the more expensive digital device in almost all instances.

Putting these two considerations together it appears that there will be a net reduction in construction costs, though this will vary from project to project.

Report of Committee Action Hearings

Committee Action: **As Modified**

Modify as follows:

C405.2.5.2 Decorative lighting shutoff. Building facade and landscape lighting shall automatically shut off from not later than one hour after business closing to not earlier than one hour before business opening, ~~or longer~~.

Committee Reason: Approval was based on the proponent's published reason statements. The modification eliminates unnecessary text.

Assembly Action: **None**

Public Comments

Public Comment 2:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Further modify as follows:

C405.2.5 Exterior lighting controls. Exterior lighting systems shall be provided with controls that comply with Sections C405.2.5.1 through C405.2.5.4. Decorative lighting systems shall comply with Sections C405.2.5.1, C405.2.5.2, and C405.2.5.4.

Exceptions:

1. Lighting for covered vehicle entrances and exits from buildings and parking structures where required for eye adaptation.
2. ~~Decorative gas lighting systems.~~
3. Lighting controlled from within dwelling units.

Commenter's Reason: Gas lighting systems use anywhere from 12 to 73 times more energy than electric lighting systems. Decorative gas lighting systems produce even less light than non-decorative gas lighting systems. In the current code, they are required to be controlled. Exempting them from any controls will increase energy usage for no reason (by allowing them to operate for 24 hours per day, 365 days per year).

Also, based on the committee's approval of CE213, these systems will have electronic controls that will allow for the lights to be turned on and off along with other exterior lights.

This proposal ensures that all decorative lighting systems, whether gas or electric, are controlled to save energy when their light is not needed.

Commenter's Reason: The proposed modifications make table corrections and add explanatory footnotes for certain types of water heaters.

.

Final Action Results

CE196-16	**AMPC2**

Code Change No: CE198-16

Original Proposal

Section: C405.3

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Delete without substitution:

~~**C405.3 Exit signs (Mandatory).** Internally illuminated exit signs shall not be more than 5 watts per side.~~

Reason: This requirement is already mandated by U.S. Federal regulation and is commonly complied with. It is no longer needed in this code.

Exit signs manufactured and distributed in commerce since January 1, 2006 are required by U.S. Federal regulations to consume no more than 5 watts per side.
See: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/59

Cost Impact: Will not increase the cost of construction
Exit signs that meet the deleted requirement are already the type of exit signs that are commonly installed, and are required by Federal regulations. Deleting this requirement from this code will have no impact on the cost of exit signs that must be installed.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE198-16	**AS**

BACK

Code Change No: CE201-16

Original Proposal

Section: C405.4, C405.4.1, C405.4.2, C406.1, C406.3

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C405.4 Interior lighting power requirements (Prescriptive). A building complies with this section where its total connected interior lighting power calculated under Section C405.4.1 is not greater than the interior lighting power allowance calculated under Section C405.4.2.
C405.4.1 Total connected interior lighting power. The total connected interior lighting power shall be determined in accordance with Equation 4-9.

TCLP = [*SL* + *LV* + *LTPB* + Other] **(Equation 4-9)**

where:

TCLP	=	Total connected lighting power (watts).
SL	=	Labeled wattage of luminaires for screw-in lamps.
LV	=	Wattage of the transformer supplying low-voltage lighting.
LTPB	=	Wattage of line-voltage lighting tracks and plugin busways as the specified wattage of the luminaires, but at least 30 W/lin. ft. (100 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current-limiting devices on the system.
Other	=	The wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. Lighting in sleeping units, provided that the lighting complies with Section R404.1.
   1.3. Emergency lighting automatically off during normal building operation.
   1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs, including those with visual impairment and other medical and age-related issues.
   1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
   1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
   2.1. Task lighting for medical and dental purposes.
   2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and installed by the manufacturer.

6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture-mounted supplemental task lighting that is controlled by automatic shutoff.
15. Exit signs.

C405.4.2 Interior lighting power allowance. *No change to text.*

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power ~~density system~~ in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.

~~C406.3 Reduced lighting power density~~. The total connected interior lighting power ~~(watts) of the building~~ calculated in accordance with Section C405.4.1 shall be ~~determined by using~~ less than 90 percent of the ~~lighting power values specified in Table C405.4.2(1) times the floor area for the building types, or by using 90 percent of the interior~~ total lighting power allowance calculated ~~by the Space-by-Space Method~~ in accordance with Section C405.4.2.

Reason: The proposal seeks to improve the language in C405 and C406 regarding lighting power budget. The intent is editorial - providing consistent terms throughout the section.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal is editorial and presents no technical change. There should be no impact on the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE201-16 **AS**

Code Change No: CE202-16

Original Proposal

Section: C202, C405.4.1

Proponent: Jack Bailey, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Delete without substitution:

~~**LOW-VOLTAGE LIGHTING.** Lighting equipment powered through a transformer such as a cable conductor, a rail conductor and track lighting.~~

Revise as follows:

C405.4.1 Total connected interior lighting power. The total connected interior lighting power shall be determined in accordance with Equation 4-9.

TCLP = [~~*SL*~~*LVL* ~~+ *LV* + *LTPB*~~ **+ BLL + LED + TRK** + Other] **(Equation 4-9)**

where:

TCLP	=	Total connected lighting power (watts).
~~*SL*~~	=	~~Labeled wattage of luminaires for screw-in lamps.~~
~~*LV*~~ *LVL*	=	~~Wattage~~ For luminaires with lamps connected directly to building power, such as line voltage lamps , the rated wattage of the ~~transformer supplying low-voltage lighting~~ lamp.
BLL	=	For luminaires incorporating a ballast or transformer, the rated input wattage of the ballast or transformer when operating that lamp.
LED	=	For light emitting diode luminaires with either integral or remote drivers, the rated wattage of the luminaire.
~~*LTPB*~~ *TRK*	=	~~Wattage~~ For lighting track, cable conductor, rail conductor, and plug-in busway systems that allow the addition and relocation of ~~line-voltage lighting tracks and plugin busways as~~ luminaires without rewiring, the wattage shall be one of the following: 1. The specified wattage of the luminaires, but ~~at least~~ not less than 30 W/lin. ft. (100 W/lin m)~~, or the~~. 2. The wattage limit of the ~~system's circuit breaker, or~~ permanent current-limiting devices protecting the system. 3. The wattage limit of ~~other permanent current-limiting devices on~~ the transformer supplying the system.
Other	=	The wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. Lighting in sleeping units, provided that the lighting complies with Section R404.1.

1.3. Emergency lighting automatically off during normal building operation.
1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs, including those with visual impairment and other medical and age-related issues.
1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
1.6. Casino gaming areas.
1.7. Mirror lighting in dressing rooms.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
2.1. Task lighting for medical and dental purposes.
2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture-mounted supplemental task lighting that is controlled by automatic shutoff.
15. Exit signs.

Reason: Equation 4-9 was added in the 2015 IECC. While this was a worthwhile addition to the code, when it was added it re-used language from previous versions of the code which have not kept pace with technological developments in the lighting industry. This outdated language creates several problems:

First, "screw base lamps" are not synonymous with incandescent lamps. Incandescent lamps are available in over a dozen different base types, of which only three or four could be described as "screw base". At the same time, many metal halide and high pressure sodium lamps, which operate from ballasts, also have screw bases. This proposal eliminates the term "screw base lamps" and refers instead to "lamps connected directly to building power".

Second, it is not clear what voltages are considered to be "low". When this definition was first added to the code, if was probably assumed to refer to 12V and 24V applications, but UL Class 2 would allow up to 60 volts DC (and LED luminaires with remote drivers in this voltage range are becoming much more common). Furthermore, this code tells us that a "low voltage transformer" has an input voltage of less than 600 volts. So presumably a 277V circuit would be considered "low voltage" to a power engineer, and lights that operates at 277V would also be considered "low voltage". This proposal eliminates the term entirely. The code really doesn't care about voltage - it should only be concerned with wattage. The term "low voltage lighting" was previously used in three different locations within the code, but the other two locations were eliminated in the 2015 version, so this is the only remaining reference in the commercial section of the code.

Third, there is no reference in the code to lighting emitting diode (LED) technology. LED luminaires have neither lamps nor ballasts. This proposal would simply require that the watts going into LED luminaires be counted.

And finally, the introduction of microprocessors into ballasts has resulted in a dramatic reduction in ballast SKU's, as ballasts can now sense what lamp is connected to them and adjust their output accordingly. This proposal requires that the wattage consumed by the ballast when operating the actual installed lamp is all that matters.

Overall this proposal will modernize terminology in the code to much more closely match lighting terminology which is currently in use.

Cost Impact: Will not increase the cost of construction
The intent of this proposal is to clarify the language to result in a more consistent interpretation of the code. However, there may be a minor cost savings. When specifying a luminaire utilizing screw-base lamps in a commercial building, it has become common to require that a "wattage reduction label" be provided on the fixture. This label states that the maximum lamp wattage that can be installed is limited to some smaller amount - typically 12W or 15W per socket - based on the LED retrofit lamp that is actually going to be used in the fixture, rather than the 60W - 150W that the incandescent socket is rated for. This has no impact on the lamps that are used (no commercial building owner will accept incandescent lamps anymore - they all want LED), but it does add a minor fee of typically $5-$15 per fixture for the label. The updated language above would end this practice, and result in some minor savings on the re-labelling fee.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE202-16	**AS**

Code Change No: CE203-16

Original Proposal

Section: C405.4.1

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C405.4.1 Total connected interior lighting power. The total connected interior lighting power shall be determined in accordance with Equation 4-9.

TCLP = [*SL* + *LV* + *LTPB* + Other] **(Equation 4-9)**

where:

TCLP	=	Total connected lighting power (watts).
SL	=	Labeled wattage of luminaires for screw-in lamps.
LV	=	Wattage of the transformer supplying low-voltage lighting.
LTPB	=	Wattage of line-voltage lighting tracks and plugin busways as the specified wattage of the luminaires, but at least 30 W/lin. ft. (100 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current-limiting devices on the system.
Other	=	The wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

~~**Exceptions 1.**~~ The connected power associated with the following lighting equipment and applications is not included in calculating total connected lighting power.

~~1.1~~ 1. Television broadcast lighting for playing areas in sports arenas. Professional sports arena playing field lighting.
~~1.2~~ 2. Lighting in sleeping units, provided the lighting complies with Section R404.1.
~~1.3~~. 3. Emergency lighting automatically off during normal business hours.
~~1.4~~. 4. Lighting in spaces specifically designed for use by occupants with special lighting needs, including those with visual impairment and other medical and age-related issues.
~~1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.~~
~~1.6~~. 5. Casino gaming areas.
~~1.7~~. 6. Mirror lighting in dressing rooms.
~~2. Lighting equipment used for the following shall be exempt provided that it is in addition to general~~

~~lighting and is controlled by an independent control device.~~

~~2.1.~~ 7. Task lighting for medical and dental purposes that is in addition to general lighting and controlled by an independent control device.

~~2.2.~~ 8. Display lighting for exhibits in galleries, museums and monuments that is in addition to general lighting and controlled by an independent control device.

~~3.~~ 9. Lighting for theatrical purposes, including performance, state, film production and video production.

~~4.~~ 10. Lighting for photographic processes.

~~5~~11. Lighting integral to equipment or instrumentation and installed by the manufacturer.

~~6.~~ 12. Task lighting for plant growth or maintenance.

~~7,~~13. Advertising signage or directional signage.

~~8.~~ 14. ~~In restaurant buildings and areas~~, Lighting for food warming ~~or integral to food preparation equipment~~

~~9.~~15. Lighting equipment that is for sale.

~~10.~~ 16. Lighting demonstration equipment in lighting education facilities.

~~11.~~ 17. Lighting approved because of safety ~~or emergency~~ considerations, ~~inclusive of exit lights~~.

~~12. Lighting integral to both open and glass enclosed refrigerator and freezer cases.~~

~~13.~~ 18. Lighting in retail display windows, provided the display area is enclosed by ceiling height partitions.

~~14.~~19. Furniture-mounted supplemental task lighting that is controlled by automatic shutoff.

~~15.~~ 20. Exit signs.

Reason: This is mostly an editorial reorganization that organizes all exceptions into one list. Unfortunately that seems to have resulted in an excessive amout of underline and strikethrough, but only four revisions are also proposed:

1. Television broadcast lighting for playing areas in sports arenas. ~~Professional sports arena playing field lighting.~~
   Lighting requirements for high definition television are identical for professional and amateur sports arenas and there should be no distinction made based on the professional or amateur status of the athletes. The exception is limited to "television broadcast lighting" because ample lighting wattage is already available for functional lighting for the players (see Table C405.4.2(2) where 3.68 w/sf is allowed). This change also makes the IECC consistent with the exemption in ASHRAE 90.1.

~~1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.~~
   This seems to be in conflict with C501.6.

~~8. In restaurant buildings and areas,~~ Lighting for food warming ~~or integral to food preparation equipment~~.
   See exception ~~5.~~11. for lighting that is integral to equipment.
   Food warming lights should be exempt regardless of whether they are used in a restaurant or in some other type of food preparation and sales area (e.g. a high school cafeteria).

11. Lighting *approved* because of safety ~~or emergency~~ considerations~~, inclusive of exit lights~~.
   See exception ~~1.3.~~3. for emergency lighting exception.
   See exception ~~15.~~20. for exit sign exception.

~~12 Lighting integral to both open and glass enclosed refrigerator and freezer cases.~~

See exception 5. for lighting that is integral to equipment.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
This is really an editorial modernizing and simplifying of this list of exceptions. The only change that might be construed as substantive changing is the playing field lighting which is simultaneously broadened (i.e. it is no longer limited to professional sports venues) and narrowed (it is limited to broadcast lighting only).

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C405.4.1 Total connected interior lighting power. The total connected interior lighting power shall be determined in accordance with Equation 4-9.

TCLP = [*SL* + *LV* + *LTPB* + Other] **(Equation 4-9)**

where:

TCLP	=	Total connected lighting power (watts).
SL	=	Labeled wattage of luminaires for screw-in lamps.
LV	=	Wattage of the transformer supplying low-voltage lighting.
LTPB	=	Wattage of line-voltage lighting tracks and plugin busways as the specified wattage of the luminaires, but at least 30 W/lin. ft. (100 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current-limiting devices on the system.
Other	=	The wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

The connected power associated with the following lighting equipment and applications shall not be included in calculating the total connected lighting power.

1. Television broadcast lighting for playing areas in sports arenas. ~~Professional sports arena playing field lighting~~.
2. Lighting in sleeping units, provided that the lighting complies with Section R404.1.
3. Emergency lighting that is automatically off during normal building operation.
4. Lighting in spaces specifically designed for use by occupants with special lighting needs, including those with visual impairment and other medical and age-related issues.
5. Casino gaming areas.
6. Mirror lighting in dressing rooms.
7. Task lighting for medical and dental purposes that is in addition to general lighting and controlled by an independent control device.
8. Display lighting for exhibits in galleries, museums and monuments that is in addition to general lighting and controlled by an independent control device.
9. Lighting for theatrical purposes, including performance, stage, film production and video production.
10. Lighting for photographic processes.
11. Lighting integral to equipment or instrumentation and installed by the manufacturer.
12. Task lighting for plant growth or maintenance.
13. Advertising signage or directional signage.
14. Lighting for food warming.
15. Lighting equipment that is for sale.
16. Lighting demonstration equipment in lighting education facilities.
17. Lighting *approved* because of safety considerations.
18. Lighting in retail display windows, provided that the display area is enclosed by ceiling-height partitions.
19. Furniture-mounted supplemental task lighting that is controlled by automatic shutoff.
20. Exit signs.

Committee Reason: Approval was based on the proponent's published reason statement. The Modification is corrects an error in the submitted proposal to make the text consistent with what is expressed in the reason statement.

Assembly Action **None**

Final Action Results

CE203-16	**AM**

Code Change No: CE204-16

Original Proposal

Section: C405.4.1

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.4.1 Total connected interior lighting power. The total connected interior lighting power shall be determined in accordance with Equation 4-9.

TCLP = [*SL* + *LV* + *LTPB* + Other] **(Equation 4-9)**

where:

TCLP	=	Total connected lighting power (watts).
SL	=	Labeled wattage of luminaires for screw-in lamps.
LV	=	Wattage of the transformer supplying low-voltage lighting.
LTPB	=	Wattage of line-voltage lighting tracks and plugin busways as the specified wattage of the luminaires, but at least ~~30~~ 8 W/lin. ft. (~~100~~ 25 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current-limiting devices on the system.
Other	=	The wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. Lighting in sleeping units, provided that the lighting complies with Section R404.1.
   1.3. Emergency lighting automatically off during normal building operation.
   1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs, including those with visual impairment and other medical and age-related issues.
   1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
   1.6. Casino gaming areas.
   1.7. Mirror lighting in dressing rooms.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
   2.1. Task lighting for medical and dental purposes.
   2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and installed by the manufacturer.
6. Task lighting for plant growth or maintenance.

7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture-mounted supplemental task lighting that is controlled by automatic shutoff.
15. Exit signs.

Reason: The code requires that at least 30 W/ft be accounted to track lighting because track lighting does not have a fixed power consumption. The power consumption of track can change if fixtures are added or deleted. The 30 watts/ft assumes the use of incandescent track fixtures, for example one 90W incandescent halogen PAR38 fixture every three feet. But if you have a design that uses long lengths of track with few fixtures, you are required to account for much more power than you are actually using, which can very quickly eat up your power allowance. The code allows you to count the wattage of the current limiting device, instead of 30 watts/ft. But this then requires the installation of special current limiters, which is additional hassle, complexity, and cost. These current limiters have no practical purpose. They prevent someone from theoretically loading up the track with many high-wattage halogen fixtures, but realistically this isn't going to happen. So these current limiters just sit there doing nothing.
The world is rapidly shifting from halogen to LED for track lighting fixtures. LED track fixtures are already the default for new installations in the US. By the time IECC-2018 goes into effect it is very unlikely that anyone will be installing halogen track fixtures. LED track fixtures are approximately four times more efficacious than halogen (LED PAR about 80 lumens/watt, Halogen PAR about 20 lumens/watt), using about 25% of the energy of a halogen fixture with equivalent output. Therefore, this proposal reduces the required minimum power allocation for track to 8 watts/ft (25% of 30 watts). This will mean that it will be much less likely that useless current limiters will need to be specified and installed.

Cost Impact: Will not increase the cost of construction
Overall this proposal will reduce the cost of construction because useless current limiters will no longer need to be installed to comply with the code.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE204-16 **AS**

Code Change No: CE205-16

Original Proposal

Section: C405.4.2

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

TABLE C405.4.2 (1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD

BUILDING AREA TYPE	LPD (w/ft^2)
Automotive facility	0.80
Convention center	1.01
Courthouse	1.01
Dining: bar lounge/leisure	1.01
Dining: cafeteria/fast food	0.9
Dining: family	0.95
Dormitory [(a,b)]	0.57
Exercise center	0.84
Fire station [(a)]	0.67
Gymnasium	0.94
Health care clinic	0.90
Hospital [(a)]	1.05
Hotel/Motel [(a,b)]	0.87
Library	1.19
Manufacturing facility	1.17
Motion picture theater	0.76
Multifamily [(c)]	0.51
Museum	1.02
Office	0.82
Parking garage	0.21
Penitentiary	0.81
Performing arts theater	1.39
Police station	0.87
Post office	0.87
Religious building	1.0
Retail	1.26
School/university	0.87
Sports arena	0.91
Town hall	0.89
Transportation	0.70
Warehouse	0.66

BUILDING AREA TYPE	LPD (w/ft^2)
Workshop	1.19

a. *Where sleeping units* are excluded from lighting power calculations by application of R404.1, neither the area of the *sleeping units* nor the wattage of lighting in the *sleeping units* is counted.

b. Where *dwelling units* are excluded from lighting power calculations by application of R404.1, neither the area of the *dwelling units* nor the wattage of lighting in the *dwelling units* is counted.

c. *Dwelling units* are excluded. Neither the area of the *dwelling units* nor the wattage of lighting in the *dwelling units* is counted.

TABLE C405.4.2 (2)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

COMMON SPACE TYPES[a]	LPD (watts/sq.ft)
Atrium	
Less than 40 feet in height	0.03 per foot in total height
Greater than 40 feet in height	0.40 + 0.02 per foot in total height
Audience seating area	
In an auditorium	0.63
In a convention center	0.82
In a gymnasium	0.65
In a motion picture theater	1.14
In a penitentiary	0.28
In a performing arts theater	2.43
In a religious building	1.53
In a sports arena	0.43
Otherwise	0.43
Banking activity area	1.01
Breakroom (See Lounge/Breakroom)	
Classroom/lecture hall/training room	
In a penitentiary	1.34
Otherwise	1.24
Conference/meeting/multipurpose room	1.23
Copy/print room	0.72
Corridor	
In a facility for the visually impaired (and not used primarily by the staff)[b]	0.92
In a hospital	0.79
In a manufacturing facility	0.41
Otherwise	0.66
Courtroom	1.72
Computer room	1.71
Dining area	
In a penitentiary	0.96
In a facility for the visually impaired (and not used primarily by the staff)[b]	1.9
In bar/lounge or leisure dining	1.07
In cafeteria or fast food dining	0.65
In family dining	0.89
Otherwise	0.65
Electrical/mechanical room	0.95
Emergency vehicle garage	0.56

COMMON SPACE TYPES[a]	LPD (watts/sq.ft)
Food preparation area	1.21
Guest room [(c,d)]	0.47
Laboratory	
In or as a classroom	1.43
Otherwise	1.81
Laundry/washing area	0.6
Loading dock, interior	0.47
Lobby	
In a facility for the visually impaired (and not used primarily by the staff)[b]	1.8
For an elevator	0.64
In a hotel	1.06
In a motion picture theater	0.59
In a performing arts theater	2.0
Otherwise	0.9
Locker room	0.75
Lounge/breakroom	
In a healthcare facility	0.92
Otherwise	0.73
Office	
Enclosed	1.11
Open plan	0.98
Parking area, interior	0.19
Pharmacy area	1.68
Restroom	
In a facility for the visually impaired (and not used primarily by the staff[b]	1.21
Otherwise	0.98
Sales area	1.59
Seating area, general	0.54
Stairway (See space containing stairway)	
Stairwell	0.69
Storage room	0.63
Vehicular maintenance area	0.67
Workshop	1.59
BUILDING TYPE SPECIFIC SPACE TYPES[a]	**LPD (watts/sq.ft)**
Facility for the visually impaired[b]	
In a chapel (and not used primarily by the staff)	2.21
In a recreation room (and not used primarily by the staff)	2.41
Automotive (See Vehicular Maintenance Area above)	
Convention Center—exhibit space	1.45
Dormitory—living quarters [(c,d)]	0.38
Fire Station—sleeping quarters [(c)]	0.22
Gymnasium/fitness center	
In an exercise area	0.72
In a playing area	1.2

BUILDING TYPE SPECIFIC SPACE TYPES[a]	LPD (watts/sq.ft)
healthcare facility	
In an exam/treatment room	1.66
In an imaging room	1.51
In a medical supply room	0.74
In a nursery	0.88
In a nurse's station	0.71
In an operating room	2.48
In a patient room [(c)]	0.62
In a physical therapy room	0.91
In a recovery room	1.15
Library	
In a reading area	1.06
In the stacks	1.71
Manufacturing facility	
In a detailed manufacturing area	1.29
In an equipment room	0.74
In an extra high bay area (greater than 50′ floor-to-ceiling height)	1.05
In a high bay area (25-50′ floor-to-ceiling height)	1.23
In a low bay area (less than 25'' floor-to- ceiling height)	1.19
Museum	
In a general exhibition area	1.05
In a restoration room	1.02
Performing arts theater—dressing room	0.61
Post Office—Sorting Area	0.94
Religious buildings	
In a fellowship hall	0.64
In a worship/pulpit/choir area	1.53
Retail facilities	
In a dressing/fitting room	0.71
In a mall concourse	1.1
Sports arena—playing area	
For a Class I facility	3.68
For a Class II facility	2.4
For a Class III facility	1.8
For a Class IV facility	1.2
Transportation facility	
In a baggage/carousel area	0.53
In an airport concourse	0.36
At a terminal ticket counter	0.8
Warehouse—storage area	
For medium to bulky, palletized items	0.58
For smaller, hand-carried items	0.95

a. In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply

b. A 'Facility for the Visually Impaired' is a facility that is licensed or will be licensed by local or state authorities for senior long-term care, adult daycare, senior support or people with special visual needs.

c. Where sleeping units are excluded from lighting power calculations by application of R404.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.
d. Where *dwelling units* are excluded from lighting power calculations by application of R404.1, neither the area of the *dwelling units* nor the wattage of lighting in the *dwelling units* is counted.

Reason: The treatment of dwelling and sleeping units is one of the most commonly misunderstood parts of C405.
To begin with, users have the option of either including dwelling and sleeping unit lighting within their lighting power calculations, or following the "high efficacy lighting" compliance path in R404.1. This choice is not clearly spelled out, as these options are incorporated in very different parts of the code, and a casual user could easily miss them.

Another problem is that many users of the code believe that they are supposed to include the area of sleeping and dwelling units when determining their lighting power allowance for the building, but that they should exclude the wattage of lighting in those units when calculating their connected lighting power. This creates a huge loophole, and is not the intent of the code, although it is also not clearly prohibited anywhere.

The last problem is that dwelling units are always excluded from the scope of Standard 90.1, and when PNNL derives the LPD values for 90.1 they do not include the lighting within dwelling units in building types which have dwelling units. This is not such a big problem for hotels, motels, and dormitories, but it is a significant issue for multifamily buildings, where 90% or more of the floor area may be located within dwelling units.

This proposal would add clarifying footnotes to the LPD Tables to result in a more consistent use and application of the code.

Cost Impact: Will not increase the cost of construction
This proposal is a clarification which does not add any new requirements to the code or delete any existing requirements.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE205-16	**AS**

Code Change No: CE206-16

Original Proposal

Section: C405.4.2

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

TABLE C405.4.2 (1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD

BUILDING AREA TYPE	LPD (w/ft^2)
Automotive facility	~~0.80~~ 0.71
Convention center	~~1.01~~ 0.76
Courthouse	~~1.01~~ 0.90
Dining: bar lounge/leisure	~~1.01~~ 0.90
Dining: cafeteria/fast food	~~0.9~~ 0.79
Dining: family	~~0.95~~ 0.78
Dormitory	~~0.57~~ 0.61
Exercise center	~~0.84~~ 0.65
Fire station	~~0.67~~ 0.53
Gymnasium	~~0.94~~ 0.68
Health care clinic	~~0.90~~ 0.82
Hospital	1.05
Hotel/Motel	~~0.87~~ 0.75
Library	~~1.19~~ 0.78
Manufacturing facility	~~1.17~~ 0.90
Motion picture theater	~~0.76~~ 0.83
Multifamily	~~0.51~~ 0.68
Museum	~~1.02~~ 1.06
Office	~~0.82~~ 0.79
Parking garage	~~0.21~~ 0.15
Penitentiary	~~0.81~~ 0.75
Performing arts theater	~~1.39~~ 1.18
Police station	~~0.87~~ 0.80
Post office	~~0.87~~ 0.67
Religious building	~~1.0~~ 0.94
Retail	~~1.26~~ 1.06
School/university	~~0.87~~ 0.81
Sports arena	~~0.91~~ 0.87

Town hall	~~0.89~~ 0.80
Transportation	~~0.70~~ 0.61
Warehouse	~~0.66~~ 0.48
Workshop	~~1.19~~ 0.90

TABLE C405.4.2 (2)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

COMMON SPACE TYPES[a]	LPD (watts/sq.ft)
Atrium	
Less than 40 feet in height	0.03 per foot in total height
Greater than 40 feet in height	0.40 + 0.02 per foot in total height
Audience seating area	
In an auditorium	0.63
In a convention center	0.82
In a gymnasium	0.65
In a motion picture theater	1.14
In a penitentiary	0.28
In a performing arts theater	~~2.43~~ 2.03
In a religious building	1.53
In a sports arena	0.43
Otherwise	0.43
Banking activity area	~~1.01~~ 0.86
Breakroom (See Lounge/Breakroom)	
Classroom/lecture hall/training room	
In a penitentiary	1.34
Otherwise	~~1.24~~ 0.96
Conference/meeting/multipurpose room	~~1.23~~ 1.07
Copy/print room	~~0.72~~ 0.56
Corridor	
In a facility for the visually impaired (and not used primarily by the staff)[b]	0.92
In a hospital	~~0.79~~ 0.92
In a manufacturing facility	~~0.41~~ 0.29
Otherwise	0.66
Courtroom	~~1.72~~ 1.39
Computer room	~~1.71~~ 1.33
Dining area	
In a penitentiary	0.96
In a facility for the visually impaired (and not used primarily by the staff)[b]	~~1.9~~ 2.00
In bar/lounge or leisure dining	~~1.07~~ 0.93
In cafeteria or fast food dining	~~0.65~~ 0.63
In family dining	~~0.89~~ 0.71
Otherwise	~~0.65~~ 0.63
Electrical/mechanical room	~~0.95~~ 0.43

Emergency vehicle garage	~~0.56~~ 0.41
Food preparation area	~~1.21~~ 1.06
Guest room	~~0.47~~0.77
Laboratory	
In or as a classroom	~~1.43~~1.20
Otherwise	~~1.81~~1.45
Laundry/washing area	~~0.6~~0.43
Loading dock, interior	~~0.47~~0.58
Lobby	
In a facility for the visually impaired (and not used primarily by the staff)[b]	~~1.8~~2.03
For an elevator	~~0.64~~0.68
In a hotel	1.06
In a motion picture theater	~~0.59~~0.45
In a performing arts theater	~~2.0~~1.70
Otherwise	~~0.9~~1.0
Locker room	~~0.75~~0.48
Lounge/breakroom	
In a healthcare facility	~~0.92~~0.78
Otherwise	~~0.73~~0.62
Office	
Enclosed	~~1.11~~0.93
Open plan	~~0.98~~0.81
Parking area, interior	~~0.19~~0.14
Pharmacy area	~~1.68~~1.34
Restroom	
In a facility for the visually impaired (and not used primarily by the staff[b]	~~1.21~~0.96
Otherwise	~~0.98~~0.85
Sales area	~~1.59~~1.22
Seating area, general	~~0.54~~0.42
Stairway (See space containing stairway)	
Stairwell	~~0.69~~0.58
Storage room	~~0.63~~0.46
Vehicular maintenance area	~~0.67~~0.56
Workshop	~~1.59~~1.14
BUILDING TYPE SPECIFIC SPACE TYPES[a]	**LPD (watts/sq.ft)**
Facility for the visually impaired[b]	
In a chapel (and not used primarily by the staff)	~~2.21~~1.06
In a recreation room (and not used primarily by the staff)	~~2.41~~1.80
Automotive (See Vehicular Maintenance Area above)	
Convention Center—exhibit space	~~1.45~~0.88
Dormitory—living quarters	~~0.38~~0.54
Fire Station—sleeping quarters	~~0.22~~0.20
Gymnasium/fitness center	
In an exercise area	~~0.72~~0.50
In a playing area	~~1.2~~0.82

BUILDING TYPE SPECIFIC SPACE TYPES[a]	LPD (watts/sq.ft)
healthcare facility	
In an exam/treatment room	~~1.66~~ 1.68
In an imaging room	~~1.51~~1.06
In a medical supply room	~~0.74~~ 0.54
In a nursery	~~0.88~~ 1.00
In a nurse's station	~~0.71~~ 0.81
In an operating room	~~2.48~~ 2.17
In a patient room	0.62
In a physical therapy room	~~0.91~~ 0.84
In a recovery room	~~1.15~~ 1.03
Library	
In a reading area	~~1.06~~ 0.82
In the stacks	~~1.71~~ 1.20
Manufacturing facility	
In a detailed manufacturing area	~~1.29~~ 0.93
In an equipment room	~~0.74~~ 0.65
In an extra high bay area (greater than 50′ floor-to-ceiling height)	1.05
In a high bay area (25-50′ floor-to-ceiling height)	~~1.23~~ 0.75
In a low bay area (less than 25" floor-to- ceiling height)	~~1.19~~ 0.96
Museum	
In a general exhibition area	1.05
In a restoration room	~~1.02~~ 0.85
Performing arts theater—dressing room	~~0.61~~ 0.36
Post Office—Sorting Area	~~0.94~~ 0.68
Religious buildings	
In a fellowship hall	~~0.64~~ 0.55
In a worship/pulpit/choir area	1.53
Retail facilities	
In a dressing/fitting room	~~0.71~~ 0.50
In a mall concourse	~~1.1~~ 0.90
Sports arena—playing area	
For a Class I facility	~~3.68~~ 2.47
For a Class II facility	~~2.4~~ 1.96
For a Class III facility	~~1.8~~ 1.70
For a Class IV facility	~~1.2~~ 1.13
Transportation facility	

In a baggage/carousel area	~~0.53~~ 0.45
In an airport concourse	~~0.36~~ 0.31
At a terminal ticket counter	~~0.8~~ 0.62
Warehouse—storage area	
For medium to bulky, palletized items	~~0.58~~ 0.35
For smaller, hand-carried items	~~0.95~~ 0.69

a. In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply
b. A 'Facility for the Visually Impaired' is a facility that is licensed or will be licensed by local or state authorities for senior long-term care, adult daycare, senior support or people with special visual needs.

Reason: This proposal revises the Lighting Power Density (LPD) allowances to be appropriate for currently available lighting technology. The values in this proposal are identical to those in Addendum ch to ASHRAE/IES Standard 90.1 after the second public review draft. These values were developed by PNNL/DOE and approved by the ASHRAE/IES 90.1 Lighting Subcommittee for inclusion in Standard 90.1 - 2016 and are derived from the PNN/DOE lighting models that have been used for the development of the LPDs in previous versions of Standard 90.1. LED technology was used in the models for the first time and this is the main reason for the significant reduction in the allowances.

The IALD has supported, and continues to support, the PNNL/DOE LPD modeling process as the best available method for developing appropriate lighting power allowances for energy codes. We participated in the development of these new values through our representation on the 90.1 lighting subcommittee and through the ANSI/ASHRAE/IES public review commenting process. We believe that these values will reduce the energy use of our buildings while still allowing high-quality interior lighting to be provided.

Cost Impact: Will increase the cost of construction
Currently, LED fixtures cost more than fluorescent fixtures. So as of today, this proposal would increase the cost of construction because it will require the use of more LED fixtures. But the effect on cost of construction when IECC-2018 goes into effect will be much less because we expect the cost of LED fixtures to continue to decline. Even though the initial cost of construction may be higher, the use of LED fixtures will be cost effective due to the lower energy use and reduced maintenance costs of LEDs. This is already the case today according to DOE analysis. It will only improve as LED costs come down.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE206-16 **AS**

Code Change No: CE207-16

Original Proposal

Section: C405.4.2

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

TABLE C405.4.2 (2)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

BUILDING TYPE SPECIFIC SPACE TYPES[a]	LPD (watts/sq.ft)
healthcare facility	
In an exam/treatment room	1.66
In an imaging room	1.51
In a medical supply room	0.74
In a nursery	0.88
In a nurse's station	0.71
In an operating room	2.48
In a patient room	0.62
In a physical therapy room	0.91
In a recovery room	1.15
Library	
In a reading area	1.06
In the stacks	1.71
Manufacturing facility	
In a detailed manufacturing area	1.29
In an equipment room	0.74
In an extra high bay area (greater than 50′ floor-to-ceiling height)	1.05
In a high bay area (25-50′ floor-to-ceiling height)	1.23
In a low bay area (less than 25" floor-to- ceiling height)	1.19
Museum	
In a general exhibition area	1.05
In a restoration room	1.02
Performing arts theater—dressing room	0.61
Post Office—Sorting Area	0.94
Religious buildings	
In a fellowship hall	0.64
In a worship/pulpit/choir area	1.53
Retail facilities	
In a dressing/fitting room	0.71
In a mall concourse	1.1
Sports arena—playing area	

For a Class I facility [(c)]	3.68
For a Class II facility [(d)]	2.4
For a Class III facility [(e)]	1.8
For a Class IV facility [(f)]	1.2
Transportation facility	
In a baggage/carousel area	0.53
In an airport concourse	0.36
At a terminal ticket counter	0.8
Warehouse—storage area	
For medium to bulky, palletized items	0.58
For smaller, hand-carried items	0.95

a. In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply

b. A 'Facility for the Visually Impaired' is a facility that is licensed or will be licensed by local or state authorities for senior long-term care, adult daycare, senior support or people with special visual needs.

c. Class I facilities consist of Professional facilities; and Semi-professional, Collegiate, or Club facilities with seating for 5,000 or more spectators.

d. Class II facilities consist of Collegiate and Semi-professional facilities with seating for fewer than 5,000 spectators; Club facilities with seating for between 2,000 and 5,000 spectators; and Amateur League and High School facilities with seating for more than 2,000 spectators.

e. Class III facilities consist of Club, Amateur League, and High School facilities with seating for 2,000 or fewer spectators.

f. Class IV facilities consist of Elementary School and Recreational facilities, and Amateur League and High School facilities without provision for spectators.

Reason: The Classes of Facility for Sports Arena playing area Lighting Power Allowances are not defined in this code and need to be defined. Otherwise, users of this code and code officials have no idea what they mean. These space types in the interior lighting power allowance LPD table come from ASHRAE/IES Standard 90.1. Class of facility is not defined in Standard 90.1 either, but is known to come from the Illuminating Engineering Society (IES) *Recommended Practice for Sports and Recreational Area Lighting*, IES RP-6-15. The definitions used in the proposed footnotes to the table are derived from IES RP-6-15.

Cost Impact: Will not increase the cost of construction
The proposal is a clarification of the intent of the current code requirements.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the first sentence of the proponent's published reason statement.

Assembly Action **None**

Final Action Results

CE207-16 **AS**

Code Change No: CE209-16

Original Proposal

Section(s): C405.4.2.2.1

Proponent: Jeremiah Williams (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.4.2.2.1 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:

1. For lighting equipment to be installed in sales areas specifically to highlight merchandise, the additional lighting power shall be determined in accordance with Equation 4-10.

~~Additional interior lighting power allowance = 500 watts + (Retail Area 1 • 0.6 W/ft 2) + (Retail Area 2 • 0.6 W/ft 2) + (Retail Area 3 • 1.4 W/ft 2) + (Retail Area 4• 2.5 W/ft 2)~~ ~~**(Equation 4-10)**~~

<u>Additional interior lighting power allowance = 300 W + (*Retail Area 1* • 0.36 W/ft 2) + (*Retail Area 2* • 0.36 W/ft 2) + (*Retail Area 3* • 0.84 W/ft 2) + (*Retail Area 4* • 1.87 W/ft 2)</u>
<u>For SI units:</u>

<u>Additional interior lighting power allowance = 300 W + (*Retail Area 1* • 3.87 W/m2) + (*Retail Area 2* • 3.87 W/m2) + (*Retail Area 3* • 9.04 W/m2) + (*Retail Area 4* • 20.1 W/m2)</u>

<u>**(Equation 4-10)**</u>

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where:

Retail Area 1	=	The floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	=	The floor area used for the sale of vehicles, sporting goods and small electronics.
Retail Area 3	=	The floor area used for the sale of furniture, clothing, cosmetics and artwork.
Retail Area 4	=	The floor area used for the sale of jewelry, crystal and china.

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the code official.

2. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall be not more than 1.0 ~~w~~W/ft^2 ~~(~~ (10.7 ~~w~~W/m^2) of such spaces.

Reason: The code allows additional lighting wattage for display lighting in retail areas to acknowledge the need for bright merchandise lighting. This proposal reduces that allowance based on providing equivalent lighting levels with newer light emitting diode (LED) lamp technology. A large portion of retail display lighting that is eligible for the additional allowances typically uses Halogen MR-16 lamps. The LED market has been working steadily to enter this area. In 2012, there were many effective products but they were not robust enough to replace the higher wattage (50W) MR-16 products. As of 2014 and beyond, this has changed. There are now many products covering the spread of the capabilities of the 20W to 50W Halogen MR-16s. LED offerings are effective direct replacements for retail display Halogen. Information from recent reports[1] shows that LED could provide similar light at approximately 30% of the existing Halogen wattage or a 70% reduction. A more conservative approach is taken in this proposal, with a 50% reduction in the general display allowance and a 25% reduction in retail area 4.

This proposal does not include any changes to the decorative lighting allowance in item 2, although the lower case w/ft^2 have been changed to upper case W/ft^2.

Energy Savings: While there is a high variation in how different retail establishments apply display lighting, an analysis of the DOE strip mall prototype[2] for the impact of the proposed savings shows annual energy cost savings of 2.7% per year or around $850 for a 22,500 square foot establishment. This electric cost savings is in addition to the lamp replacement cost savings from using longer life LEDs.

The U.S. Department of Energy (DOE) develops its proposals through a public process to ensure transparency, objectivity and consistency in DOE-proposed code changes. Energy savings and cost impacts are assessed based on established methods and reported for each proposal, as applicable. More information on the process utilized to develop the DOE proposals for the 2018 IECC can be found at: https://www.energycodes.gov/development/2018IECC.

Bibliography:

1. http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/snapshot2014_mr16.pdf & http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/caliper_22_summary.pdf.
2. The DOE prototypes represent typical U.S. building stock and the building energy use is simulated in EnergyPlus. See more information about the prototypes at: https://www.energycodes.gov/commercial-prototype-building-models.

Cost Impact: Will increase the cost of construction

The LED fixtures for use in display light fixtures provide more lighting output at a lower energy use. LEDs have a higher cost per lamp, but their expected life is longer, so their overall cost is lower. A survey of typical lamps in the 200 to 800 lumen output range is shown in the following table, based on a review of online lamp prices from a national maintenance product supplier.

MR-16 lamp	Lumen Output	Cost per lamp	Life, hours MTTF*	Lamp cost, $/3000 hours	$/500 lumens /3000 hours	$/500 lumens /3000 hours Limited to 5 year use
Halogen	200	$3.33	3,000	$3.33	$8.33	$8.33
Halogen	400	$3.08	1,971	$4.69	$5.86	$5.86
Halogen	500	$15.31	3,000	$15.31	$15.31	$15.31
Halogen	790	$6.47	3,000	$6.47	$4.09	$4.09
Average Halogen		**$7.05**		**$7.45**	**$8.40**	**$8.40**
LED	450	$16.25	25,000	$1.95	$2.17	$3.61
LED	370	$37.00	25,000	$4.44	$6.00	$10.00
LED	650	$35.00	30,000	$3.50	$2.69	$5.38
Average LED		**$23.82**		**$3.30**	**$3.62**	**$6.33**
Ratio of LED to Halogen lamp cost				44%	43%	75%

*MTTF is mean time to failure, a statistically calculated lamp life.

LED prices are expected to continue to decrease, and will be lower by the time this code is adopted. Lamp costs are normalized to 500 lumens of output and 3000 hours of operation a year or about 10 hours per day for 6 days a week. The last column in the table is the lamp cost per 500 lumens per 3000 hours, but limits the LEDs to 5 years of use at 3000 hours per year. In both the full life and conservative 5-year case, the average lamp cost for LEDs is less once lamp life is considered. The costs shown do not include additional lamp replacement labor savings or any reduction in electrical distribution costs due to lower wattage lamps. From several points of view, the use of LED fixtures for display lighting represents a reduction in life cycle lamp costs to building owners.

Cost-effectiveness: This change is cost-effective in that it provides significant savings with no anticipated life-cycle cost increase.

Report of Committee Action Hearings

Committee Action: **As Submitted**

Committee Reason: Approval was based on the proponent's published reason statement. ASHRAE 90.1 and the IECC do not need to match exactly, as they are optional paths.

Assembly Action: **None**

Public Comments

Public Comment 1:

Steven Ferguson, representing American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org) requests Approve as Modified by this Public Comment.

Modify as follows:

C405.4.2.2.1 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:

1. For lighting equipment to be installed in sales areas specifically to highlight merchandise, the additional lighting power shall be determined in accordance with Equation 4-10.
   Additional interior lighting power allowance = ~~300~~ 1000 W + (*Retail Area 1* • ~~0.36~~ 0.45 W/ft^2) + (*Retail Area 2* • ~~0.36~~ 0.45 W/ft^2) + (*Retail Area 3* ~~• 0.84~~ 1.05 W/ft^2) + (*Retail Area 4* • 1.87 W/ft^2)
   For SI units:
   Additional interior lighting power allowance = ~~300~~ 1000 W + (*Retail Area 1* • ~~**3.87**~~ 4.8 W/m^2) + (*Retail Area 2* • 4.84 W/m^2) + (*Retail Area 3* • 11 W/m^2) + (*Retail Area* ~~*2*~~ *4* • ~~3.87~~ 20 W/m^2) ~~+ (Retail Area 3 • 9.04 W/m2) + (Retail Area 4 • 20.1 W/m2)~~

   (Equation 4-10)

   where:

Retail Area 1 =	The floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2 =	The floor area used for the sale of vehicles, sporting goods and small electronics.
Retail Area 3 =	The floor area used for the sale of furniture, clothing, cosmetics and artwork.
Retail Area 4 =	The floor area used for the sale of jewelry, crystal and china.

   Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the code official.

2. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall be not more than 1.0 W/ft^2 (10.7 W/m^2) of such spaces.

Commenter's Reason: ASHRAE 90.1 had not developed revised values in time to submit a proposal. The 90.1 Lighting sub-committee had the advantage of seeing the DOE proposal, initial public comments and other research before developing an addendum to 90.1. Based on our evaluation of proposals to the committee and the light sources, 90.1 developed revised values in January of 2016. We recommend adopting the values recently developed by 90.1 for the following reasons:

- The base allowance should be restored to 1000 watts. A large retail facility, like a department store or big box store may not need this allowance, but a small stand-alone store often will not have sufficient display lighting allowance based on their small footprint (sq. ft.). The allowance is intended as a cushion for the small retailer.
- Public commenters uniformly stated that a reduction of 25-30% would be acceptable. The DOE proposal is 40% for three of the retail categories.
- Retail display lighting models at ASHRAE had been based on halogen and ceramic metal halide. Per the public comments, and DOE response, it was the intent to provide sufficient allowance for the continued limited use of non-LED sources.
- Most importantly, halogen and ceramic metal halide are 90-100 CRI sources. The retail display allowances should be sufficient to allow the use of 90+ CRI LED sources. These sources are currently 25% less efficient than 80CRI LED sources. In order to allow quality lighting design and encourage adoption of good LED sources, these modifications are being proposed

Final Action Results

CE209-16	**AMPC1**

Code Change No: CE210-16

Original Proposal

Section: C405.4.2.2.1

Proponent: Jeremiah Williams (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.4.2.2.1 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:

1. For lighting equipment to be installed in sales areas specifically to highlight merchandise, the additional lighting power shall be determined in accordance with Equation 4-10.

Additional interior lighting power allowance = 500 watts + (Retail Area 1~~ • 0.6 W/ft 2) + (Retail Area 2 • 0.6 W/ft 2) + (Retail Area 3 • 1.4 W/ft 2) + (Retail Area 4• 2.5 W/ft 2)~~	**(Equation 4-10~~)~~**
<ins>Additional interior lighting power allowance = 500 watts + (Retail Area 1 • 0.6 W/ft 2) + (Retail Area 2 • 0.6 W/ft 2) + (Retail Area 3 • 1.4 W/ft 2) + (Retail Area 4 • 2.5 W/ft 2)</ins>	
<ins>(Equation 4-10)</ins>	

where:

Retail Area 1	=	The floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	=	The floor area used for the sale of vehicles, sporting goods and small electronics.
Retail Area 3	=	The floor area used for the sale of furniture, clothing, cosmetics and artwork.
Retail Area 4	=	The floor area used for the sale of jewelry, crystal and china.

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the code official.

2. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional

lighting power shall be not more than ~~1.0 w~~0.9 W/ft^2 ~~(10.7 w~~ (9.7 W/m2) in lobbies or museum exhibition areas and not more than 0.75 W/ft2 (8.1 W/m^2) ~~of such~~ in other spaces.

Reason: The code allows additional lighting wattage for decorative lighting to acknowledge the need for highlighting art or architectural features. This proposal reduces that allowance based on providing equivalent or brighter lighting levels with newer light emitting diode (LED) lamp technology. A large portion of decorative lighting that is eligible for the additional allowances is typically Halogen MR-16 product. The LED market has been working steadily to enter this area. In 2012, there were many effective products but they were not robust enough to replace the higher wattage (50W) MR-16 products. As of 2014 and beyond, this has changed. There are now many products covering the spread of the capabilities of the 20W to 50W Halogen MR-16s. LED offerings are effective direct replacements for Halogen used to spotlight art or architectural features. Information from recent reports[1] shows that LED could provide similar light at approximately 30% of the existing Halogen wattage or a 70% reduction. A more conservative approach is taken in this proposal, to allow for use of fluorescent wall washers and other luminaires with a 25% reduction in the general decorative allowance and a 10% reduction in spaces with a high need for decorative lighting: lobbies and museum exhibition spaces.

Energy Savings: While there is a high variation in how different buildings apply decorative lighting, a reduction in the maximum allowed decorative lighting allowance will result in potential energy savings. This electric cost savings is in addition to the lamp replacement cost savings from using longer life LEDs.

The U.S. Department of Energy (DOE) develops its proposals through a public process to ensure transparency, objectivity and consistency in DOE-proposed code changes. Energy savings and cost impacts are assessed based on established methods and reported for each proposal, as applicable. More information on the process utilized to develop the DOE proposals for the 2018 IECC can be found at: https://www.energycodes.gov/development/2018IECC.

Bibliography:
http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/snapshot2014_mr16.pdf
& http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/caliper_22_summary.pdf

Cost Impact: Will increase the cost of construction

The LED fixtures for use in many decorative light fixtures provide more lighting output at a lower energy use. LEDs have a higher cost per lamp, but their expected life is longer, so their overall cost is lower. A survey of typical lamps in the 200 to 800 lumen output range is shown in the following table, based on a review of online lamp prices from a national maintenance product supplier.

MR-16 lamp	Lumen Output	Cost per lamp	Life, hours MTTF*	Lamp cost, $/3000 hours	$/500 lumens /3000 hours	$/500 lumens /3000 hours Limited to 5 year use
Halogen	200	$3.33	3,000	$3.33	$8.33	$8.33
Halogen	400	$3.08	1,971	$4.69	$5.86	$5.86
Halogen	500	$15.31	3,000	$15.31	$15.31	$15.31
Halogen	790	$6.47	3,000	$6.47	$4.09	$4.09
Average Halogen		**$7.05**		**$7.45**	**$8.40**	**$8.40**
LED	450	$16.25	25,000	$1.95	$2.17	$3.61
LED	370	$37.00	25,000	$4.44	$6.00	$10.00
LED	650	$35.00	30,000	$3.50	$2.69	$5.38
Average LED		**$23.82**		**$3.30**	**$3.62**	**$6.33**
Ratio of LED to Halogen lamp cost				44%	43%	75%

*MTTF is mean time to failure, a statistically calculated lamp life.

LED prices are expected to continue to decrease, and will be lower by the time this code is adopted. Lamp costs are normalized to 500 lumens of output and 3000 hours of operation a year or about 10 hours per day for 6 days a week. The last column in the table is the lamp cost per 500 lumens per 3000 hours, but limits the LEDs to 5 years of use at 3000 hours per year. In both the full life and conservative 5-year case, the average lamp cost for LEDs is less once lamp life is considered. The costs shown do not include additional lamp replacement labor savings or any reduction in electrical distribution costs due to lower wattage lamps. From several points of view, the use of LED fixtures for decorative lighting represents a reduction in life cycle lamp costs to building owners.

Cost-effectiveness: This change is cost-effective in that it provides savings with no anticipated life-cycle cost increase.

Report of Committee Action Hearings

Committee Action: Approved as Modified

Modify as follows:

C405.4.2.2.1 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:

1. For lighting equipment to be installed in sales areas specifically to highlight merchandise, the additional lighting power shall be determined in accordance with Equation 4-10.

Additional interior lighting power allowance = 500 watts + (Retail Area 1 • 0.6 W/ft ^{2}) + (Retail Area 2 • 0.6 W/ft ^{2}) + (Retail Area 3 • 1.4 W/ft ^{2}) + (Retail Area 4 • 2.5 W/ft ^{2})

(Equation 4-10)

where:

Retail Area 1	=	The floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	=	The floor area used for the sale of vehicles, sporting goods and small electronics.
Retail Area 3	=	The floor area used for the sale of furniture, clothing, cosmetics and artwork.
Retail Area 4	=	The floor area used for the sale of jewelry, crystal and china.

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the code official.

2. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall be not more than 0.9 W/ft^2 (9.7 W/m^2) in lobbies ~~or museum exhibition areas~~ and not more than 0.75 W/ft^2 (8.1 W/m^2) in other spaces.

Committee Reason: Approval was based on the proponent's published reason statements. The Modification eliminates words that were a moot point because those areas are already exempted elsewhere in the code.

Assembly Action None

Final Action Results

CE210-16	**AM**

Code Change No: CE211-16

Original Proposal

Section: C405.5, C405.5.1, C405.5.2 (New), C405.5.2(3) (New), C405.5.2.1 (New)

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C405.5 Exterior lighting power requirements (Mandatory). ~~Where the power for~~ A building complies with this section where its total connected exterior lighting power calculated under Section C405.5.1 is ~~supplied through~~ not greater than the ~~energy service to the building, all~~ exterior lighting ~~shall comply with~~ power allowance calculated under Section ~~C405.5.1~~C405.5.2.

Exception~~:~~ ~~Where *approved* because of historical, safety, signage or emergency considerations.~~

~~C405.5.1~~ ~~Exterior~~ Total connected building lighting power. The total exterior connected lighting power ~~allowance for~~ shall be the total maximum rated wattage of all ~~exterior building applications~~ lighting that is ~~the sum of~~ powered through the ~~base site allowance plus the individual allowances for areas that are~~ energy service to ~~be illuminated and are permitted in Table C405.5.1(2) for the applicable lighting zone. Trade-offs are allowed only among exterior lighting applications listed in Table C405.5.1(2), in the Tradable Surfaces section. The lighting zone for~~ the building ~~exterior is determined from Table C405.5.1(1) unless otherwise specified by the local jurisdiction~~.

Exception: Lighting used for the following ~~exterior~~ applications ~~is exempt where equipped with a control device independent of the control of the nonexempt lighting:~~ shall not be included.

1. Lighting approved because of safety considerations.
2. Emergency lighting automatically off during normal business operation.
3. Exit signs.
4. Specialized signal, directional and marker lighting associated with transportation.
5. Advertising signage or directional signage.
6. Integral to equipment or instrumentation and is installed by its manufacturer.
7. Theatrical purposes, including performance, stage, film production and video production.
8. Athletic playing areas.
9. Temporary lighting.
10. Industrial production, material handling, transportation sites and associated storage areas.
11. Theme elements in theme/amusement parks.
12. ~~Used to highlight features of public monuments and registered historic landmark structures or buildings.~~
12. Used to highlight features of public monuments.

Add new text as follows:

C405.5.2 Exterior lighting power allowance The total exterior lighting power allowance is the sum of the base site allowance plus the individual allowances for areas that are to be illuminated by lighting that is powered through the energy service to the building. Lighting power allowances are as specified in Table C405.5.2(2). The lighting zone for the building exterior is determined in accordance with Table C405.5.2(1) unless otherwise specified by the authority having jurisdiction.

TABLE ~~C405.5.1 (2)~~ C405.5.2(2)
~~INDIVIDUAL~~ LIGHTING POWER ALOWANCES FOR BUILDING EXTERIORS

		LIGHTING ZONES			
		Zone 1	Zone 2	Zone 3	Zone 4
~~Base Site Allowance (Base allowance is usable in tradable or nontradable surfaces.)~~	Base site Allowance	500 W	600 W	750 W	1300 W
~~Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas are tradable.)~~	**Uncovered Parking Areas**				
	Parking areas and drives	0.04 W/ft^2	0.06 W/ft^2	0.10 W/ft^2	0.13 W/ft^2
	Building Grounds				
	Walkways less than 10 feet wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
	Walkways 10 feet wide or greater, plaza areas special feature areas	0.14 W/ft^2	0.14 W/ft^2	0.16 W/ft^2	0.2 W/ft^2
	Stairways	0.75 W/ft^2	1.0 W/ft^2	1.0 W/ft^2	1.0 W/ft^2
	Pedestrian tunnels	0.15 W/ft^2	0.15 W/ft^2	0.2 W/ft^2	0.3 W/ft^2
	Building Entrances and Exits				
	Main entries	20 W/linear foot of door width	20 W/linear foot of door width	30 W/linear foot of door width	30 W/linear foot of door width
	Other doors	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width
	Entry canopies	0.25 W/ft^2	0.25 W/ft^2	0.4 W/ft^2	0.4 W/ft^2
	Sales Canopies				
	Free-standing and attached	0.6 W/ft^2	0.6 W/ft^2	0.8 W/ft^2	1.0 W/ft^2
	Outdoor Sales				
	Open areas (including vehicle sales lots)	0.25 W/ft^2	0.25 W/ft^2	0.5 W/ft^2	0.7 W/ft^2
	Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	10 W/linear foot	10 W/linear foot	30 W/linear foot
~~Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.~~)	~~Building facades~~	~~No allowance~~	~~0.075 W/ft2 of gross above-grade wall area~~	~~0.113 W/ft^2 of gross above-grade wall area~~	~~0.15 W/ft^2 of gross above-grade wall area~~
	~~Automated teller machines (ATM) and~~	~~270 W per location plus~~	~~270 W per location plus~~	~~270 W per location plus~~	~~270 W per location plus~~

	~~night depositories~~	~~90 W per additional ATM per location~~	~~90 W per additional ATM per location~~	~~90 W per additional ATM per location~~	~~90 W per additional ATM per location~~
	~~Entrances and gatehouse inspection stations at guarded facilities~~	~~0.75 W/ft^2 of covered and uncovered area~~	~~0.75 W/ft^2 of covered and uncovered area~~	~~0.75 W/ft^2 of covered and uncovered area~~	~~0.75 W/ft^2 of covered and uncovered area~~
	~~Loading areas for law enforcement, fire, ambulance and other emergency service vehicles~~	~~0.5 W/ft^2 of covered and uncovered area~~	~~0.5 W/ft^2 of covered and uncovered area~~	~~0.5 W/ft^2 of covered and uncovered area~~	~~0.5 W/ft^2 of covered and uncovered area~~
	~~Drive-up windows/doors~~	~~400 W per drive-through~~	~~400 W per drive-through~~	~~400 W per drive-through~~	~~400 W per drive-through~~
	~~Parking near 24-hour retail entrances~~	~~800 W per main entry~~	~~800 W per main entry~~	~~800 W per main entry~~	~~800 W per main entry~~

For SI: 1 foot = 304.8 mm, 1 watt per square foot = 0.0929 W/~~0.0929~~ m^2 .
W = watts.

TABLE C405.5.2(3)

	LIGHTING ZONES			
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**
Building facades	No allowance	0.075 W/ft^2 of gross above-grade wall area	0.113 W/ft^2 of gross above-grade wall area	0.15 W/ft^2 of gross above-grade wall area
Automated teller machines (ATM) and night depositories	270 W per location plus 90 W per additional ATM per location			
Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft^2 of covered and uncovered area.			
Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft^2 of covered and uncovered area			
Drive-up windows and doors	400 W per drive through			
Parking near 24-hour retail entrances.	800 W per main entry			

C405.5.2.1 Additional exterior lighting power. Any increase in the exterior lighting power allowance is limited to the specific lighting applications indicated in Table C405.5.2(3). The additional power shall be used only for the luminaires that are serving these applications and shall not be used for any other purpose.

Reason: This proposal is intended as an editorial re-write to make the exterior lighting power section read like the interior lighting power section. This would be of great benefit to the code in the long run. Some specific notes about the changes:

The code does not currently state that the connected exterior lighting power must be less than or equal to the exterior lighting power allowance. This seems like a significant omission. The language above, and the proposed restructuring of this section, is meant to replicate the interior lighting power requirements in C405.4 as closely as possible. This has obvious advantages in education, application of the code, and enforcement.

Regarding the existing exception in Section C405.5: First, all exceptions should be listed under C405.5.1. Second, all "historical" exceptions should be eliminated from the body of the code, as these are addressed in Section C501.6. Third, signage is already exempt (see C405.5.1 exceptions 1 and 2). The "safety and emergency" exemptions are added to the list in Section C405.5.1.

It is not clear why the interior lighting power section uses the concept of "additional power allowances" whereas the exterior lighting power section uses the concept of "tradable and nontradable allowances". It is much cleared to users if both sections approach this in the same way and with the same terminology.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The intent of the proposal is editorial. While a substantial modernization of the text, there is no intent at substantive change.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE211-16	**AS**

Code Change No: CE212-16

Original Proposal

Section: C405.5.1

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.1 Exterior building lighting power. The total exterior lighting power allowance for all exterior building applications is the sum of the base site allowance plus the individual allowances for areas that are to be illuminated and are permitted in Table C405.5.1(2) for the applicable lighting zone. Trade-offs are allowed only among exterior lighting applications listed in Table C405.5.1(2), in the Tradable Surfaces section. The lighting zone for the building exterior is determined from Table C405.5.1(1) unless otherwise specified by the local jurisdiction.

Exception: Lighting used for the following exterior applications is exempt where equipped with a control device independent of the control of the nonexempt lighting:

1. Specialized signal, directional and marker lighting associated with transportation.
2. Advertising signage or directional signage.
3. Integral to equipment or instrumentation and is installed by its manufacturer.
4. Theatrical purposes, including performance, stage, film production and video production.
5. Athletic playing areas.
6. Temporary lighting.
7. Industrial production, material handling, transportation sites and associated storage areas.
8. Theme elements in theme/amusement parks.

~~9. Used to highlight features of public monuments and registered historic landmark structures or buildings.~~

9. Used to highlight features of art, public monuments, and the National flag.
10. Lighting for water features and swimming pools.
11. Lighting that is controlled from within dwelling units, where the lighting complies with Section R404.1.

Reason: This proposal adds some minor types of lighting to be exempted from the exterior lighting power limits.

1. The exemption for art would make the IECC 2018 consistent with ANSI/ASHRAE/IES Standard 90.1 - 2016.
2. The exemptions for swimming pools and water features should be have been added to previous versions of this code. They were added in the 2010 version of ASHRAE/IES Standard 90.1.
3. All "historical" exceptions should be eliminated from the body of the code, as these are addressed in Section C501.6.
4. Federal law stipulates many aspects of flag etiquette. The section of law dealing with American Flag etiquette is generally referred to as the Flag Code. The flag code stipulates that the flag should be lighted at all times, either by sunlight or by an appropriate light source. However, there is no allowance in TABLE C405.5.2(2) for flag lighting, so a project which consisted of (a) erecting a flag pole, and (b) lighting it, would be in trouble.

Cost Impact: Will not increase the cost of construction
This proposal exempts some additional types of lighting from the exterior lighting power requirements of this code.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE212-16	**AS**

Code Change No: CE213-16

Original Proposal

Section: C405.5.2 (New)

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Add new text as follows:

C405.5.2 Lighting equipment (Mandatory) Gas-fired lighting appliances shall not be equipped with continuously burning pilot ignition systems.

Reason: This provision will make the lighting section of commercial code consistent with the lighting section of the residential code section R404.1.1. It will also be consistent with other provisions of the code, such as Section C404.9.1 for commercial pool heaters ("Gas-fired heaters shall not be equipped with continuously burning pilot lights"), Table 403.2.3(4) for warm air furnaces, footnotes f and g, ("Units shall also include an IID" - IID is an intermittent ignition device), federal energy efficiency requirements for residential gas ovens, federal energy efficiency requirements for residential gas hot water boilers, and federal efficiency requirements for residential gas steam boilers.

The energy usage of gas lighting with continuously burning pilot lights is very significant. A gas light using 2,500 Btu/hour will give off about the same amount of light as a 60-Watt (205 Btu) incandescent light bulb (about 800-850 lumens). In other words, a gas light will use over 12 times more energy than an incandescent light bulb. When compared to a 10-Watt LED light bulb, the gas light uses over 72 times more energy.

With a continuously burning pilot light, the 2,500 Btu/hour gas light will use 21.9 Million Btu's (or about 215 therms or 215 ccf) of gas per year. In other words, one light will use more than a typical residential gas water heater.

Many manufacturers produce gas lamps that do not have continuously burning pilot lights, as shown below: http://www.gaslights.com/electronicignitionlightstorches.aspx, https://www.vulcanlighting.com/catalog/, http://americangaslamp.com/product-support/lamp-installation/, http://www.flambeauxlighting.com/faqs.aspx

The savings will be significant. Usage will be reduced by at least 50%, and for a 2,500 Btu/hour gas lamp, that translate to a savings of 109.5 Million Btu's per year (or about 107.5 therms per year). At a commercial rate of $0.90 per therm, the savings are $96.75 per year. This will mean that the simple payback will be less than 1-2 years.

Cost Impact: Will increase the cost of construction
The cost to install a gas light without continuously burning pilot lights is slightly higher (approximately $50-100), depending on the installation and wiring needs.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE213-16	**AS**

Code Change No: CE215-16

Original Proposal

Section: C405.5.1

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

TABLE C405.5.1 (2)
INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

		LIGHTING ZONES			
		Zone 1	**Zone 2**	**Zone 3**	**Zone 4**
Base Site Allowance (Base allowance is usable in tradable or nontradable surfaces.)		~~500~~ 350 W	~~600~~ 400 W	~~750~~ 500 W	~~1300~~ 900 W
Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas are tradable.)	**Uncovered Parking Areas**				
	Parking areas and drives	~~0.04~~ 0.03 W/ft^2	~~0.06~~ 0.04 W/ft^2	~~0.10~~0.06 W/ft^2	~~0.13~~ 0.08 W/ft^2
	Building Grounds				
	Walkways and Ramps less than 10 feet wide	~~0.7~~ 0.5 W/linear foot	~~0.7~~ 0.5 W/linear foot	~~0.8~~ 0.6 W/linear foot	~~1.0~~ 0.7 W/linear foot
	Walkways and Ramps 10 feet wide or greater, plaza areas, special feature areas	~~0.14~~ 0.10 W/ft^2	~~0.14~~ 0.10 W/ft^2	~~0.16~~ 0.11 W/ft^2	~~0.2~~ 0.14 W/ft^2
	Dining Areas	0.65 W/ft^2	0.65 W/ft^2	0.75 W/ft^2	0.95 W/ft^2
	Stairways	~~0.75~~ 0.6 W/ft^2	~~1.0~~ 0.7 W/ft^2	~~1.0~~ 0.7 W/ft^2	~~1.0~~ 0.7 W/ft^2
	Pedestrian tunnels	~~0.15~~ 0.12 W/ft^2	~~0.15~~ 0.12 W/ft^2	~~0.2~~ 0.14 W/ft^2	~~0.3~~ 0.21 W/ft^2
	Landscaping	0.03 W/ft^2	0.04 W/ft^2	0.04 W/ft^2	0.04 W/ft^2
	Building Entrances and Exits				

	Pedestrian and vehicular entrances and exits ~~Main entries~~	~~20~~ 14 W/linear foot of opening ~~door width~~	~~20~~ 14 W/linear foot of opening ~~door width~~	~~30~~ 21 W/linear foot of opening ~~door width~~	~~30~~ 21 W/linear foot of opening ~~door width~~
	~~Other doors~~	~~20 W/linear foot of door width~~	~~20 W/linear foot of door width~~	~~20 W/linear foot of door width~~	~~20 W/linear foot of door width~~
	Entry canopies	~~0.25~~ 0.2 W/ft^2	0.25 W/ft^2	0.4 W/ft^2	0.4 W/ft^2
	Loading docks	0.35 W/ft^2	0.35 W/ft^2	0.35 W/ft^2	0.35 W/ft^2
	Sales Canopies				
	Free-standing and attached	~~0.6~~ 0.4 W/ft^2	~~0.6~~ 0.4 W/ft^2	~~0.8~~ 0.6 W/ft^2	~~1.0~~ 0.7 W/ft^2
	Outdoor Sales				
	Open areas (including vehicle sales lots)	~~0.25~~ 0.2 W/ft^2	~~0.25~~ 0.2 W/ft^2	~~0.5~~ 0.35 W/ft^2	~~0.7~~ 0.5 W/ft^2
	Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	~~10~~ 7 W/linear foot	~~10~~ 7 W/linear foot	~~30~~ 21 W/linear foot
Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following	Building facades	No allowance	0.075 W/ft2 of gross above-grade wall area	0.113 W/ft^2 of gross above-grade wall area	0.15 W/ft^2 of gross above-grade wall area
	Automated teller machines (ATM) and night depositories	~~270~~ 135 W per location plus ~~90~~ 45 W per additional ATM per location	~~270~~ 135 W per location plus ~~90~~ 45 W per additional ATM per location	~~270~~ 135 W per location plus ~~90~~ 45 W per additional ATM per location	~~270~~ 135 W per location plus ~~90~~ 45 W per additional ATM per location
	Uncovered entrances and gatehouse inspection stations at guarded facilities	~~0.75~~ 0.5 W/ft^2 of covered and uncovered area	~~0.75~~ 0.5 W/ft^2 of covered and uncovered area	~~0.75~~ 0.5 W/ft^2 of covered and uncovered area	~~0.75~~ 0.5 W/ft^2 of covered and uncovered area
	Uncovered loading areas for law enforcement, fire, ambulance and other emergency service	~~0.5~~ 0.35 W/ft^2 ~~of covered and uncovered area~~	~~0.5~~ 0.35 W/ft^2 ~~of covered and uncovered area~~	~~0.5~~ 0.35 W/ft^2 ~~ofcovered and uncovered area~~	~~0.5~~ 0.35 W/ft^2 ~~ofcovered and uncovered area~~

allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)	vehicles				
	Drive-up windows/doors	~~400~~ 200 W per drive-through	~~400~~ 200 W per drive-through	~~400~~ 200 W per drive-through	~~400~~ 200 W per drive-through
	Parking near 24-hour retail entrances	~~800~~ 400 W per main entry	~~800~~ 400 W per main entry	~~800~~ 400 W per main entry	~~800~~ 400 W per main entry

For SI: 1 foot = 304.8 mm, 1 watt per square foot = W/0.0929 m^2.
W = watts.

Reason: This proposal revises the Lighting Power Density (LPD) allowances to be appropriate for currently available lighting technology. The values in this proposal are from those in Addendum cg to ASHRAE/IES Standard 90.1. These values were developed by PNNL/DOE and approved by the ASHRAE/IES 90.1 Lighting Subcommittee for inclusion in Standard 90.1 - 2016 and are derived from the PNN/DOE lighting models that have been used for the development of the LPDs in previous versions of Standard 90.1. LED technology was used in the models for the first time and this is the main reason for the significant reduction in the allowances.

The IALD has supported, and continues to support, the PNNL/DOE LPD modeling process as the best available method for developing appropriate lighting power allowances for energy codes. We participated in the development of these new values through our representation on the 90.1 lighting subcommittee and through the ANSI/ASHRAE/IES public review commenting process. We believe that these values will reduce the energy use of our buildings while still allowing high-quality exterior lighting to be provided.

Cost Impact: Will not increase the cost of construction
These reduced power allowances will likely require the use of LED fixtures, which in some cases are more expensive than HID fixtures. But LED fixtures are already the type of fixture commonly installed for exterior lighting. So the code would not require the purchase of more expensive fixtures than are already being used.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE215-16 **AS**

Code Change No: CE220-16

Original Proposal

Section: C405.7

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C405.7 Electrical transformers (Mandatory). ~~Electric~~ Low-voltage dry-type distribution electric transformers shall meet the minimum efficiency requirements of Table C405.7 as tested and rated in accordance with the test procedure listed in DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the transformer manufacturer.

Exceptions: The following transformers are exempt:

1. Transformers that meet the *Energy Policy Act of 2005* exclusions based on the DOE 10 CFR 431 definition of special purpose applications.
2. Transformers that meet the *Energy Policy Act of 2005* exclusions that are not to be used in general purpose applications based on information provided in DOE 10 CFR 431.
3. Transformers that meet the *Energy Policy Act of 2005* exclusions with multiple voltage taps where the highest tap is at least 20 percent more than the lowest tap.
4. Drive transformers.
5. Rectifier transformers.
6. Auto-transformers.
7. Uninterruptible power system transformers.
8. Impendance transformers.
9. Regulating transformers.
10. Sealed and nonventilating transformers.
11. Machine tool transformers.
12. Welding transformers.
13. Grounding transformers.
14. Testing transformers.

TABLE C405.7
MINIMUM NOMINAL EFFICIENCY LEVELS FOR 10 CFR 431 LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS

SINGLE-PHASE TRANSFORMERS		THREE-PHASE TRANSFORMERS	
kVA[a]	Efficiency (%)[b]	kVA[a]	Efficiency (%)[b]
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6

333	98.9	500	98.7
		750	98.8
		1000	98.9

a. kiloVolt-Amp rating.
b. Nominal efficiencies shall be established in accordance with the DOE 10 CFR 431 test procedure for low-voltage dry-type transformers.

Reason: This proposal is a simple editorial connection between Section C405.7 and Table C405.7. The transformers regulated by the section are only those listed in the table. The table is titled Low-voltage dry-type distribution transformers. The section's text implies coverage of all electric transformers. They should be consistent.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The change is editorial and changes no technical provisions.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE220-16 **AS**

Code Change No: CE221-16

Original Proposal

Section: C405.7

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org); Steven Rosenstock (srosenstock@eei.org)

Revise as follows:

TABLE C405.7
MINIMUM NOMINAL EFFICIENCY LEVELS FOR 10 CFR 431 LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS

SINGLE-PHASE TRANSFORMERS		THREE-PHASE TRANSFORMERS	
kVA[a]	Efficiency (%)[b]	kVA[a]	Efficiency (%)[b]
15	97.70	15	~~97.0~~ 97.89
25	98.00	30	~~97.5~~ 98.23
37.5	98.20	45	~~97.7~~ 98.40
50	98.30	75	~~98.0~~ 98.60
75	98.50	112.5	~~98.2~~ 98.74
100	98.60	150	~~98.3~~ 98.83
167	98.70	225	~~98.5~~ 98.94
250	98.80	300	~~98.6~~ 99.02
333	98.90	500	~~98.7~~ 99.14
		750	~~98.8~~ 99.23
		1000	~~98.9~~ 99.28

a. kiloVolt-Amp rating.
b. Nominal efficiencies shall be established in accordance with the DOE 10 CFR 431 test procedure for low-voltage dry-type transformers.

Reason: New US federal energy efficiency standards go into effect for low voltage dry-type transformers go into effect on January 1, 2016. This proposal updates the minimum efficiency values required for newly purchased low-voltage dry-type transformers, and ensures that the 2018 IECC is updated with the latest information.

Cost Impact: Will not increase the cost of construction
As these values represent the baseline minimum requirements for all new transformers, this proposal will not increase costs for new transformers that have to meet the required increase in energy efficiency.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE221-16	AS

Code Change No: CE223-16

Original Proposal

Section: C202 (New), C405.8

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org); Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Delete without substitution:

~~**GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE II).** A motor incorporating the design elements of a general purpose electric motor (Subtype I) that is configured as one of the following:~~

1. ~~A U-frame motor.~~
2. ~~A Design C motor.~~
3. ~~A close-coupled pump motor.~~
4. ~~A footless motor.~~
5. ~~A vertical, solid-shaft, normal-thrust motor (as tested in a horizontal configuration).~~
6. ~~An 8-pole motor (900 rpm).~~
7. ~~A polyphase motor with voltage of not more than 600 volts (other than 230 or 460 volts).~~

~~**GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE I).** A motor that is designed in standard ratings with either of the following:~~

1. ~~Standard operating characteristics and standard mechanical construction for use under usual service conditions, such as those specified in NEMA MG1, paragraph 14.02, "Usual Service Conditions," and without restriction to a particular application or type of application.~~
2. ~~Standard operating characteristics or standard mechanical construction for use under unusual service conditions, such as those specified in NEMA MG1, paragraph 14.03, "Unusual Service Conditions," or for a particular type of application, and that can be used in most general purpose applications.~~

~~General purpose electric motors (Subtype I) are constructed in NEMA T-frame sizes or IEC metric equivalent, starting at 143T.~~

Add new definition as follows:

<u>**IEC DESIGN H MOTOR** An electric motor that meets all of the following:</u>

1. <u>It is an induction motor designed for use with three-phase power.</u>
2.
3. <u>It contains a cage rotor.</u>
4. <u>It is capable of direct-on-line starting.</u>
5. <u>It has 4, 6, or 8 poles.</u>
6. <u>It is rated from 0.4 kW to 1600 kW at a frequency of 60 Hz.</u>

<u>**IEC DESIGN N MOTOR** An electric motor that meets all of the following:</u>

1. <u>It is an induction motor designed for use with three-phase power.</u>
2. <u>It contains a cage rotor.</u>
3. <u>It is capable of direct-on-line starting.</u>

4. It has 2, 4, 6, or 8 poles.
5. It is rated from 0.4 kW to 1600 kW at a frequency of 60 Hz.

NEMA DESIGN A MOTOR A squirrel-cage motor that meets all of the following:

2. It is designed to withstand full-voltage starting and developing locked-rotor torque as shown in paragraph 12.38.1 of NEMA MG 1.
3. It has pull-up torque not less than the values shown in paragraph 12.40.1 of NEMA MG 1.
4. It has breakdown torque not less than the values shown in paragraph 12.39.1 of NEMA MG 1.
5. It has a locked-rotor current higher than the values shown in paragraph 12.355.1 of NEMA MG 1 for 60 hertz and paragraph 12.35.2 of NEMA MG 1 for 50 hertz.
6. It has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

NEMA DESIGN B MOTOR A squirrel-cage motor that meets all of the following:

1. It is designed to withstand full-voltage starting.
2. It develops locked-rotor, breakdown, and pull-up torques adequate for general application as specified in Sections 12.38, 12.39 and 12.40 of NEMA MG1.
3. It draws locked-rotor current not to exceed the values shown in Section 12.35.1 for 60 hertz and Section 12.35.2 for 50 hertz of NEMA MG1.
4. It has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

NEMA DESIGN C MOTOR A squirrel-cage motor that meets all of the following:

2. It is Designed to withstand full-voltage starting and developing locked-rotor torque for high-torque applications up to the values shown in paragraph 12.38.2 of NEMA MG1 (incorporated by reference, see §431.15).
3. It has pull-up torque not less than the values shown in paragraph 12.40.2 of NEMA MG1.
4. It has breakdown torque not less than the values shown in paragraph 12.39.2 of NEMA MG1.
5. It has a locked-rotor current not to exceed the values shown in paragraph 12.35.1 of NEMA MG1 for 60 hertz and paragraph 12.35.2 for 50 hertz.
6. It has a slip at rated load of less than 5 percent.

Revise as follows:

C405.8 Electrical motors (Mandatory). Electric motors shall meet the minimum efficiency requirements of Tables C405.8(1) through C405.8(4) when tested and rated in accordance with the DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the motor manufacturer.

Exceptions: The standards in this section shall not apply to the following exempt electric motors:

1. Air-over electric motors
2. Component sets of an electric motor
3. Liquid-cooled electric motors
4. Submersible electric motors
5. Inverter-only electric motors

TABLE C405.8 (1)
MINIMUM NOMINAL FULL-LOAD EFFICIENCY FOR ~~60 HZ~~ NEMA DESIGN A, NEMA ~~GENERAL PURPOSE~~ DESIGN B, AND IEC DESIGN N MOTORS (EXCLUDING FIRE PUMP ELECTRIC MOTORS ~~(SUBTYPE I)~~ ~~RATED 600 VOLTS OR LESS (Random Wound)~~ AT 60 HZ[aa,b]

~~MOTOR HORSEPOWER~~	~~NUMBER OF POLES~~	~~OPEN DRIP-PROOF MOTORS~~			~~TOTALLY ENCLOSED FAN-COOLED MOTORS~~		
		~~2~~	~~4~~	~~6~~	~~2~~	~~4~~	~~6~~
	~~Synchronous Speed (RPM)~~	~~3600~~	~~1800~~	~~1200~~	~~3600~~	~~1800~~	~~1200~~
~~1~~	-	~~77.0~~	~~85.5~~	~~82.5~~	~~77.0~~	~~85.5~~	~~82.5~~
~~1.5~~	-	~~84.0~~	~~86.5~~	~~86.5~~	~~84.0~~	~~86.5~~	~~87.5~~
~~2~~	-	~~85.5~~	~~86.5~~	~~87.5~~	~~85.5~~	~~86.5~~	~~88.5~~
~~3~~	-	~~85.5~~	~~89.5~~	~~88.5~~	~~86.5~~	~~89.5~~	~~89.5~~
~~5~~	-	~~86.5~~	~~89.5~~	~~89.5~~	~~88.5~~	~~89.5~~	~~89.5~~
~~7.5~~	-	~~88.5~~	~~91.0~~	~~90.2~~	~~89.5~~	~~91.7~~	~~91.0~~
~~10~~	-	~~89.5~~	~~91.7~~	~~91.7~~	~~90.2~~	~~91.7~~	~~91.0~~
~~15~~	-	~~90.2~~	~~93.0~~	~~91.7~~	~~91.0~~	~~92.4~~	~~91.7~~
~~20~~	-	~~91.0~~	~~93.0~~	~~92.4~~	~~91.0~~	~~93.0~~	~~91.7~~
~~25~~	-	~~91.7~~	~~93.6~~	~~93.0~~	~~91.7~~	~~93.6~~	~~93.0~~
~~30~~	-	~~91.7~~	~~94.1~~	~~93.6~~	~~91.7~~	~~93.6~~	~~93.0~~
~~40~~	-	~~92.4~~	~~94.1~~	~~94.1~~	~~92.4~~	~~94.1~~	~~94.1~~
~~50~~	-	~~93.0~~	~~94.5~~	~~94.1~~	~~93.0~~	~~94.5~~	~~94.1~~
~~60~~	-	~~93.6~~	~~95.0~~	~~94.5~~	~~93.6~~	~~95.0~~	~~94.5~~
~~75~~	-	~~93.6~~	~~95.0~~	~~94.5~~	~~93.6~~	~~95.4~~	~~94.5~~
~~100~~	-	~~93.6~~	~~95.4~~	~~95.0~~	~~94.1~~	~~95.4~~	~~95.0~~
~~125~~	-	~~94.1~~	~~95.4~~	~~95.0~~	~~95.0~~	~~95.4~~	~~95.0~~
~~150~~	-	~~94.1~~	~~95.8~~	~~95.4~~	~~95.0~~	~~95.8~~	~~95.8~~
~~200~~	-	~~95.0~~	~~95.8~~	~~95.4~~	~~95.4~~	~~96.2~~	~~95.8~~
~~250~~	-	~~95.0~~	~~95.8~~	~~95.4~~	~~95.8~~	~~96.2~~	~~95.8~~
~~300~~	-	~~95.4~~	~~95.8~~	~~95.4~~	~~95.8~~	~~96.2~~	~~95.8~~
~~350~~	-	~~95.4~~	~~95.8~~	~~95.4~~	~~95.8~~	~~96.2~~	~~95.8~~
~~400~~	-	~~95.8~~	~~95.8~~	~~95.8~~	~~95.8~~	~~96.2~~	~~95.8~~
~~450~~	-	~~95.8~~	~~96.2~~	~~96.2~~	~~95.8~~	~~96.2~~	~~95.8~~
~~500~~	-	~~95.8~~	~~96.2~~	~~96.2~~	~~95.8~~	~~96.2~~	~~95.8~~

Motor horsepower (standard kilowatt equivalent)	Nominal full-load efficiency (%) as of June 1, 2016							
	2 Pole		4 Pole		6 Pole		8 Pole	
	Enclosed	Open	Enclosed	Open	Enclosed	Open	Enclosed	Open
1 (0.75)	77.0	77.0	85.5	85.5	82.5	82.5	75.5	75.5
1.5 (1.1)	84.0	84.0	86.5	86.5	87.5	86.5	78.5	77.0
2 (1.5)	85.5	85.5	86.5	86.5	88.5	87.5	84.0	86.5
3 (2.2)	86.5	85.5	89.5	89.5	89.5	88.5	85.5	87.5
5 (3.7)	88.5	86.5	89.5	89.5	89.5	89.5	86.5	88.5
7.5 (5.5)	89.5	88.5	91.7	91.0	91.0	90.2	86.5	89.5
10 (7.5)	90.2	89.5	91.7	91.7	91.0	91.7	89.5	90.2
15 (11)	91.0	90.2	92.4	93.0	91.7	91.7	89.5	90.2

Motor horsepower (standard kilowatt equivalent)	Nominal full-load efficiency (%) as of June 1, 2016							
	2 Pole		4 Pole		6 Pole		8 Pole	
	Enclosed	Open	Enclosed	Open	Enclosed	Open	Enclosed	Open
20 (15)	91.0	91.0	93.0	93.0	91.7	92.4	90.2	91.0
25 (18.5)	91.7	91.7	93.6	93.6	93.0	93.0	90.2	91.0
30 (22)	91.7	91.7	93.6	94.1	93.0	93.6	91.7	91.7
40 (30)	92.4	92.4	94.1	94.1	94.1	94.1	91.7	91.7
50 (37)	93.0	93.0	94.5	94.5	94.1	94.1	92.4	92.4
60 (45)	93.6	93.6	95.0	95.0	94.5	94.5	92.4	93.0
75 (55)	93.6	93.6	95.4	95.0	94.5	94.5	93.6	94.1
100 (75)	94.1	93.6	95.4	95.4	95.0	95.0	93.6	94.1
125 (90)	95.0	94.1	95.4	95.4	95.0	95.0	94.1	94.1
150 (110)	95.0	94.1	95.8	95.8	95.8	95.4	94.1	94.1
200 (150)	95.4	95.0	96.2	95.8	95.8	95.4	94.5	94.1
250 (186)	95.8	95.0	96.2	95.8	95.8	95.8	95.0	95.0
300 (224)	95.8	95.4	96.2	95.8	95.8	95.8		
350 (261)	95.8	95.4	96.2	95.8	95.8	95.8		
400 (298)	95.8	95.8	96.2	95.8				
450 (336)	95.8	96.2	96.2	96.2				
500 (373)	95.8	96.2	96.2	96.2				

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.
b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:

(1) A horsepower at or above the midpoint between the two consecutive horsepowers shall be rounded up to the higher of the two horsepowers.
(2) A horsepower below the midpoint between the two consecutive horsepowers shall be rounded down to the lower of the two horsepowers.
(3) A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula 1 kilowatt = (1/0.746) horsepower. The conversion should be calculated to three significant decimal places, and the resulting horsepower shall be rounded in accordance with paragraph (1) or (2), whichever applies.

TABLE C405.8 (2)
MINIMUM NOMINAL FULL-LOAD EFFICIENCY ~~OF GENERAL PURPOSE ELECTRIC~~ FOR NEMA DESIGN C AND IEC DESIGN H MOTORS ~~(SUBTYPE II) AND ALL DESIGN B MOTORS GREATER THAN 200 HORSEPOWER~~ AT 60 HZ[~~a~~a,b]

~~MOTOR HORSEPOWER~~	~~NUMBER OF POLES~~	~~OPEN DRIP-PROOF MOTORS~~				~~TOTALLY ENCLOSED FAN-COOLED MOTORS~~			
		~~2~~	~~4~~	~~6~~	~~8~~	~~2~~	~~4~~	~~6~~	~~8~~
	~~Synchronous Speed (RPM)~~	~~3600~~	~~1800~~	~~1200~~	~~900~~	~~3600~~	~~1800~~	~~1200~~	~~900~~
~~1~~	-	~~NR~~	~~82.5~~	~~80.0~~	~~74.0~~	~~75.5~~	~~82.5~~	~~80.0~~	~~74.0~~
~~1.5~~	-	~~82.5~~	~~84.0~~	~~84.0~~	~~75.5~~	~~82.5~~	~~84.0~~	~~85.5~~	~~77.0~~
~~2~~	-	~~84.0~~	~~84.0~~	~~85.5~~	~~85.5~~	~~84.0~~	~~84.0~~	~~86.5~~	~~82.5~~
~~3~~	-	~~84.0~~	~~86.5~~	~~86.5~~	~~86.5~~	~~85.5~~	~~87.5~~	~~87.5~~	~~84.0~~
~~5~~	-	~~85.5~~	~~87.5~~	~~87.5~~	~~87.5~~	~~87.5~~	~~87.5~~	~~87.5~~	~~84.0~~
~~7.5~~	-	~~87.5~~	~~88.5~~	~~88.5~~	~~88.5~~	~~88.5~~	~~89.5~~	~~89.5~~	~~85.5~~
~~10~~	-	~~88.5~~	~~89.5~~	~~90.2~~	~~89.5~~	~~89.5~~	~~89.5~~	~~89.5~~	~~88.5~~
~~15~~	-	~~89.5~~	~~91.0~~	~~90.2~~	~~89.5~~	~~90.2~~	~~91.0~~	~~90.2~~	~~88.5~~
~~20~~	-	~~90.2~~	~~91.0~~	~~91.0~~	~~90.2~~	~~90.2~~	~~91.0~~	~~90.2~~	~~89.5~~

~~MOTOR HORSEPOWER~~	~~NUMBER OF POLES~~	~~OPEN DRIP-PROOF MOTORS~~				~~TOTALLY ENCLOSED FAN-COOLED MOTORS~~			
		~~2~~	~~4~~	~~6~~	~~8~~	~~2~~	~~4~~	~~6~~	~~8~~
	~~Synchronous Speed (RPM)~~	~~3600~~	~~1800~~	~~1200~~	~~900~~	~~3600~~	~~1800~~	~~1200~~	~~900~~
~~25~~	-	~~91.0~~	~~91.7~~	~~91.7~~	~~90.2~~	~~91.0~~	~~92.4~~	~~91.7~~	~~89.5~~
~~30~~	-	~~91.0~~	~~92.4~~	~~92.4~~	~~91.0~~	~~91.0~~	~~92.4~~	~~91.7~~	~~91.0~~
~~40~~	-	~~91.7~~	~~93.0~~	~~93.0~~	~~91.0~~	~~91.7~~	~~93.0~~	~~93.0~~	~~91.0~~
~~50~~	-	~~92.4~~	~~93.0~~	~~93.0~~	~~91.7~~	~~92.4~~	~~93.0~~	~~93.0~~	~~91.7~~
~~60~~	-	~~93.0~~	~~93.6~~	~~93.6~~	~~92.4~~	~~93.0~~	~~93.6~~	~~93.6~~	~~91.7~~
~~75~~	-	~~93.0~~	~~94.1~~	~~93.6~~	~~93.6~~	~~93.0~~	~~94.1~~	~~93.6~~	~~93.0~~
~~100~~	-	~~93.0~~	~~94.1~~	~~94.1~~	~~93.6~~	~~93.6~~	~~94.5~~	~~94.1~~	~~93.0~~
~~125~~	-	~~93.6~~	~~94.5~~	~~94.1~~	~~93.6~~	~~94.5~~	~~94.5~~	~~94.1~~	~~93.6~~
~~150~~	-	~~93.6~~	~~95.0~~	~~94.5~~	~~93.6~~	~~94.5~~	~~95.0~~	~~95.0~~	~~93.6~~
~~200~~	-	~~94.5~~	~~95.0~~	~~94.5~~	~~93.6~~	~~95.0~~	~~95.0~~	~~95.0~~	~~94.1~~
~~250~~	-	~~94.5~~	~~95.4~~	~~95.4~~	~~94.5~~	~~95.4~~	~~95.0~~	~~95.0~~	~~94.5~~
~~300~~	-	~~95.0~~	~~95.4~~	~~95.4~~	~~NR~~	~~95.4~~	~~95.4~~	~~95.0~~	~~NR~~
~~350~~	-	~~95.0~~	~~95.4~~	~~95.4~~	~~NR~~	~~95.4~~	~~95.4~~	~~95.0~~	~~NR~~
~~400~~	-	~~95.4~~	~~95.4~~	~~NR~~	~~NR~~	~~95.4~~	~~95.4~~	~~NR~~	~~NR~~
~~450~~	-	~~95.8~~	~~95.8~~	~~NR~~	~~NR~~	~~95.4~~	~~95.4~~	~~NR~~	~~NR~~
~~500~~	-	~~95.8~~	~~95.8~~	~~NR~~	~~NR~~	~~95.4~~	~~95.8~~	~~NR~~	~~NR~~

Motor horsepower (standard kilowatt equivalent)	**Nominal full-load efficiency (%) as of June 1, 2016**					
	4 Pole		**6 Pole**		**8 Pole**	
	Enclosed	**Open**	**Enclosed**	**Open**	**Enclosed**	**Open**
1 (0.75)	85.5	85.5	82.5	82.5	75.5	75.5
1.5 (1.1)	86.5	86.5	87.5	86.5	78.5	77.0
2 (1.5)	86.5	86.5	88.5	87.5	84.0	86.5
3 (2.2)	89.5	89.5	89.5	88.5	85.5	87.5
5 (3.7)	89.5	89.5	89.5	89.5	86.5	88.5
7.5 (5.5)	91.7	91.0	91.0	90.2	86.5	89.5
10 (7.5)	91.7	91.7	91.0	91.7	89.5	90.2
15 (11)	92.4	93.0	91.7	91.7	89.5	90.2
20 (15)	93.0	93.0	91.7	92.4	90.2	91.0
25 (18.5)	93.6	93.6	93.0	93.0	90.2	91.0
30 (22)	93.6	94.1	93.0	93.6	91.7	91.7
40 (30)	94.1	94.1	94.1	94.1	91.7	91.7
50 (37)	94.5	94.5	94.1	94.1	92.4	92.4
60 (45)	95.0	95.0	94.5	94.5	92.4	93.0
75 (55)	95.4	95.0	94.5	94.5	93.6	94.1
100 (75)	95.4	95.4	95.0	95.0	93.6	94.1
125 (90)	95.4	95.4	95.0	95.0	94.1	94.1
150 (110)	95.8	95.8	95.8	95.4	94.1	94.1
200 (150)	96.2	95.8	95.8	95.4	94.5	94.1

NR = No requirement.

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:
   (1) A horsepower at or above the midpoint between the two consecutive horsepowers shall be rounded up to the higher of the two horsepowers.
   (2) A horsepower below the midpoint between the two consecutive horsepowers shall be rounded down to the lower of the two horsepowers.
   (3) A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula 1 kilowatt = (1/0.746) horsepower. The conversion should be calculated to three significant decimal places, and the resulting horsepower shall be rounded in accordance with paragraph (1) or (2), whichever applies.

Reason: New federal energy efficiency standards for electric motors will go into effect on June 1, 2016. The new final rule was published in the *Federal Register* on May 29, 2014.

This proposal updates two motor efficiency tables to be consistent with the new federal standards. The scope of the federal standards has expanded, requiring an update to the table titles (and definitions) as well. In addition, new footnotes are added to be consistent with federal regulations. The new footnotes provide requirements for motors with horsepower (or kW) ratings that are in between the values shown in the table (e.g., a 6.0 horsepower motor will be required to have the same efficiency as a 5.0 horsepower motor).

Bibliography: *Federal Register*, "Energy Conservation Program: Energy Conservation Standards for Commercial and Industrial Electric Motors", May 29, 2014, pages 30934-31014

Cost Impact: Will increase the cost of construction
The new standards for motors will increase the cost of motors, but will save energy costs compared to the previous federal standards. DOE estimated median payback periods on the order of 2.9 to 4.5 years, depending on the motor installed.

Analysis: A review of the standard(s) proposed for inclusion in the code, IEC 60034, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2015.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE223-16 **AS**

Code Change No: CE224-16

Original Proposal

Section(s): C405.9.2

Proponent: Duane Jonlin, Seattle Dept of Construction and Inspections (duane.jonlin@seattle.gov)

Revise as follows:

C405.9.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.

> <u>**Exception:** A power factor controller that reduces operating voltage in response to light loading conditions is an alternative to the reduced speed function.</u>

Reason: The requirement for escalators to reduce their speed when unoccupied is most effective for installations that experience intermittent bursts of activity followed by longer periods of inactivity, such as at rail stations and performance venues. Escalators that experience more frequent light loading during the course of the day, such as office buildings or shopping malls, can benefit more from a "power factor controller," that maintains a consistent speed but requires less energy while lightly loaded. A power factor controller is generally less expensive than speed reduction capability, and this proposal allows a choice between the two technologies.

Cost Impact: Will not increase the cost of construction
Will in some cases decrease the cost of construction, as this exception permits an alternative that is generally less expensive.

Report of Committee Action Hearings

Committee Action: **As Submitted**

Committee Reason: Approval was based on the proponent's published reason statement.

Assembly Action: **None**

Public Comments

Public Comment 1:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify as follows:

C405.9.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.

> **Exception:** A ~~power factor controller~~ <u>variable voltage drive system</u> that reduces operating voltage in response to light loading conditions is an alternative to the reduced speed function.

Commenter's Reason: Power factor control technologies only affect the power factor of the energy consuming systems. They do not affect the voltage of the motors.

Variable voltage drives do change the voltage. As described in the report published by the Airport Cooperative Research Program in 2014, ACRP Report 117, sponsored by the Federal Aviation Administration, entitled *Airport Escalators and*

Moving Walkways—Cost-Savings and Energy Reduction Technologies, "A variable voltage drive (VVD) increases and decreases the voltage delivered to the motor, directly affecting the energy consumption of the motor."

Bibliography: *Airport Escalators and Moving Walkways—Cost-Savings and Energy Reduction Technologies,* ACRP Report 117, Transportation Research Board / National Academy of Sciences, 2014, Chapter 3 (report pages 6-22), http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_117.pdf

Final Action Results

CE224-16	**AMPC1**

Code Change No: CE226-16

Original Proposal

Section: C202 (New), C405.10 (New)

Proponent: Steven Ferguson, representing American Society of Heating, Refrigerating and Air-Conditioning Engineers (sferguson@ashrae.org)

Add new definition as follows:

VOLTAGE DROP. A decrease in voltage caused by losses in the wiring systems that connect the power source to the load.

Add new text as follows:

C405.10 Voltage drop in feeders and branch circuits. The total voltage drop across the combination of feeders and branch circuits shall not exceed 5 percent.

Reason: A limitation on the amount of allowed voltage drop will reduce the energy consumption of buildings and is currently in ASHRAE Standard 90.1-2016 due to addendum c to Standard 90.1-2013. When conductors are not sized to limit voltage drop, they will use additional energy in conductor resistance losses. This proposal will make the IECC consistent with 90.1-2016, which will be adopted by reference in the IECC and consistent with recommendations in the NEC.

While footnotes to tables in the NEC suggests that conductor sizing be adjusted to limit voltage, these footnotes are not requirements, so providing a 5% limit to voltage drop in the energy code will have impact on those who do not follow the NEC table footnote suggestions.

Cost Impact: Will increase the cost of construction
While this proposed requirement has a theoretical impact on building cost, it is followed in most cases as standard practice; consequently there is not expected to be an overall cost increase.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE226-16	**AS**

CE226-16

C405.6.3 Voltage drop.

~~**C405.6.3.1 Feeders and customer owned service conductors**. Feeder and customer owned service conductors shall be sized for a maximum voltage drop of 2 percent at design load.~~

~~**C405.6.3.2 Branch Circuits.** Branch circuit conductors shall be sized for a maximum voltage drop of 3 percent at design load.~~

The conductors for feeders and branch circuits combined shall be sized for a maximum of 5% voltage drop total.

Code Change No: CE230-16

Original Proposal

Section: C406, C406.1, C406.8 (New), C406.9 (New)

Proponent: Eric Makela, Cadmus Group, representing Northwest Energy Codes Group

Revise as follows:

SECTION C406
~~ADDITIONAL~~ EFFICIENCY ~~PACKAGE OPTIONS~~ PACKAGES

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Increased lamp efficacy in dwelling units in accordance with Section C406.10.

Add new text as follows:

C406.8 Enhanced envelope performance. The total UA of the building thermal envelope as designed shall be not less than 15 percent below the total UA of the building thermal envelope in accordance with Section C402.1.5.

C406.9 Reduced air infiltration. Air infiltration shall be verified by whole building pressurization testing conducted in accordance with ASTM E779 or ASTM E1827 by an independent third party. The measured air leakage rate of the building envelope shall not exceed 0.25 cfm/ft^2 (2.0 L/s•m^2) under a pressure differential of 0.3 in. water (75 Pa), with the calculated surface area being the sum of the above and below grade building envelope. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.

> **Exception.** For buildings having over 250,000 square feet (25,000 m^2) of conditioned floor area, air leakage testing need not be conducted on the whole building where testing is conducted on representative above- grade sections of the building. Tested areas shall total not less than 25 percent of the conditioned floor area and shall be tested in accordance with this section.

C406.10 Increased lamp efficiency in dwelling unit. To use the compliance method of Section C406.10.1, buildings shall be of the following types:

1. Group R-1: Boarding houses, hotels and motels.
2. Group R-2: Buildings with residential occupancies.

C406.10.1 Lamp fraction. Ninety-five percent of the lamps in permanently installed lighting fixtures in dwelling units shall be lamps with a minimum efficacy of:

1. 90 lumens per watt for lamps over 40 watts;
2. 60 lumens per watt for lamps over 15 watts to 40 watts;
3. 45 lumens per watt for lamps over 5 watts to 15 watts; and
4. 30 lumens per watt for lamps 5 watts and less.

Reason: The options packages have been published in both the 2012 IECC and the 2015 IECC. As energy savings in codes increase, and strategies to achieve them become more varied, many state codes and model codes use the "menu" approach to get an additional increment of savings. By providing options, each project can best assess what is the best strategy for its building to achieve this increment of savings. Between the 2012 IECC and the 2015 IECC, the number of options was increased from three to six. The number of options in this proposal is further increased to nine, providing an even greater number of options and increased flexibility for each project. Each option package was designed to provide approximately 3 % savings based on the loads regulated by the energy code, but actual savings will vary by building type, building size, climate, and other factors.

This proposal strikes the word "additional" and "option" from the title of the to avoid confusion. Code users have viewed Section C406 as an option verses as a requirement so clarifying the title will lead to increased understanding of this section of the code. This proposal adds three additional packages building off of code requirements included in the commercial provisions of the energy code.

Enhanced Envelope Performance.
To meet this option the code user would increase the efficiencies of the building envelope. Options might include using high performance glazing, increased roof/ceiling insulation or increased wall insulation, or a combination of increased envelope efficiencies to demonstrate that the building envelope is 15% more efficient than minimum code requirements. Increasing the efficiency of the building envelope will reduce the overall load on the building and can result in a smaller heating and cooling system for the building reducing the overall first cost.

Reduced Air Infiltration.
This option allows the code user to demonstrate that the building is tighter than the maximum air leakage rate of 0.4 cfm/sf. Reducing the infiltration rate on the building will result in an overall reduced heating and cooling load and increased occupant comfort.

Increased lamp efficacy in dwelling units.
Dwelling units are currently required to install high efficacy lighting in 75% of the connected fixtures. Compact fluorescents or LED lighting is typically used to meet this requirement. This option would require that an additional 15% of the fixtures include high efficacy lighting.

Cost Impact: Will not increase the cost of construction
None. This proposal may reduce the first cost in meeting the Additional Efficiency Package Options for certain occupancy types.

Report of Committee Action Hearings

Committee Action: Approved as Modified

Modify as follows:

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Increased lamp efficacy in dwelling units in accordance with Section C406.10~~.~~

~~**C406.10 Increased lamp efficiency in dwelling unit**.To use the compliance method of Section C406.10.1, buildings shall be of the following types:~~

~~1. Group R-1: Boarding houses, hotels and motels.~~
~~2. Group R-2: Buildings with residential occupancies.~~

~~**C406.10.1 Lamp fraction.** Ninety-five percent of the lamps in permanently installed lighting fixtures in dwelling units shall be lamps with a minimum efficacy of:~~

1. ~~90 lumens per watt for lamps over 40 watts;~~
2. ~~60 lumens per watt for lamps over 15 watts to 40 watts;~~
3. ~~45 lumens per watt for lamps over 5 watts to 15 watts; and~~
4. ~~30 lumens per watt for lamps 5 watts and less.~~

Committee Reason: This proposal encourages energy efficiency improvements through options and flexibility. The code should give credit for thermal envelope improvements. The Modification deletes a counter-intuitive provision and is consistent with the action taken by the IECC Residential committee to raise the requirement to 90% high efficacy lamps in dwellings.

Assembly Action **None**

Final Action Results

CE230-16	**AM**

Code Change No: CE235-16

Original Proposal

Section: C406.1.1

Proponent: jim edelson (jim@newbuildings.org)

Revise as follows:

C406.1.1 Tenant spaces. Tenant spaces shall comply with Section C406.2, C406.3, C406.4, C406.6 or C406.7. Alternatively, tenant spaces shall comply with Section C406.5 where the entire building is in compliance.

> **Exception**: Previously occupied tenant spaces that comply with this code in accordance with Section C501.

Reason: This proposal clarifies that built-out tenant spaces that are or were occupied, and undergoing an alteration using the existing building provisions, do not need to comply with one or more of the packages in Section C406.

Cost Impact: Will not increase the cost of construction
This proposal is a clarification that narrows the scope of the provision.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements

Assembly Action **None**

Final Action Results

CE235-16	**AS**

Code Change No: CE242-16

Original Proposal

Section: C406.5

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C406.5 On-site renewable energy. ~~Total~~ The total minimum ratings of on-site renewable energy systems shall ~~comply with~~ be one of the following:

1. ~~Provide not~~ Not less than 1.71 Btu/h per square foot (5.4 W/m^2) or 0.50 watts per square foot (5.4 W/m^2) of conditioned floor area.
2. ~~Provide not~~ Not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4.

Reason: The original intent of this provision is to provide a minimum for both types of renewable energy equipment. The Text in 2012 IECC had used the wrong unit of measurement and that was compounded by an incorrect metric equivalence. As an editorial correction the text was removed leaving only the 0.50 watts per square foot. The proposal restores appropriate units . 1.71 Btu/h per square foot was substituted for 1.75 as being the correct conversion of 5.4/W/m^2).

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal is editorial. It provides equivalent threshold for equipment rated either in Bth/h or Watts.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This provides a threshold for regulating other types of on-site energy besides electrical.

Assembly Action **None**

Final Action Results

CE242-16	**AS**

Code Change No: CE246-16

Original Proposal

Section: 406.7.1

Proponent: Charles Foster, representing self (cfoster20187@yahoo.com)

Revise as follows:

C406.7.1 Load fraction. The building service water-heating system shall have one or more of the following that are sized to provide not less than 60 percent of the building's annual hot water requirements, or sized to provide 100 percent of the building's annual hot water requirements if the building shall otherwise comply with Section C403.4.5.

1. Waste heat recovery from service hot water, heat- recovery chillers, building equipment, or process equipment~~, or a combined heat and power system~~.
2. ~~Solar~~ *On site renewable energy* water-heating systems.

Reason: This proposal does three things:

1. it clarifies that the minimum percentage requirements are related to a building's annual hot water requirements and not simply to first hour rating,
2. it removes combined heat and power system from the list of technologies that can be used to satisfy this sections requirements, and
3. it expands the qualifying renewable energy technology from only solar energy to any on site renewable energy.

Building's annual hot water requirements
It is this proponent's belief that adding the words "of the building's annual" before "hot water requirements" simply clarifies the original intent of the proposal when it was approved. Without this clarification, the requirement might be interpreted to mean meeting only the service hot water system's first hour rating.

Remove combined heat and power system
CHP can be an efficient method of providing space heating and service hot water in certain applications, but it cannot be assumed that it is an efficient method of providing such services in ALL applications. If, for instance, an owner has invested in a building's envelope (insuation, windows, air barrier, etc) and, as a result of that investment, the buidling's HVAC load is relatively small compared to other buildings of its same size and use, then installing a CHP system to meet 60% of the building's annual hot water requirements cannot be assumed to save any energy over other means of providing said hot water. If CHP is to be included it should have an additional performance metric that establishes a minimum annual space heating / cooling load requirement. Until such time as that performance metric is debated, CHP should be removed from the list of qualifying technologies.

Expanding the list of qualifying renewable energy technologies
This change would simply expand the opportunity for builders to use on site renewable energy technologies like wind and/or biomass in addition to solar energy.

Cost Impact: Will not increase the cost of construction
With respect adding the words "of the building's annual" before "hot water requirements," this change simply clarifies the original intent of the proposal when it was approved and would not impose any additional costs.

With respect to removing CHP as a qualifying technology, such a change would not add any new requirements to the code. To the contrary, it would remove an expensive option that cannot be presumed without further information to be cost effective.
With respect to expanding the solar option to include other technologies, such a change would provide builders with more choices. More choices rather than less is preferred as it puts competitive pressure on the technology providers to keep prices reasonable.

Analysis: An errata was corrected in this section; the reference to Section C403.4.7 was changed to C403.4.5.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE246-16	**AS**

Code Change No: CE248-16 Part I

Original Proposal

Section: C407.1

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

C407.1 Scope. This section establishes criteria for compliance using total building performance. The following systems and loads shall be included in determining the total building performance: heating systems, cooling systems, service water heating, fan systems, lighting power, receptacle loads and process loads.

> **Exception:** Energy used to recharge or refuel vehicles that are used for on-road and off-site transportation purposes.

Reason: More commercial buildings are offering amenities for alternatively fueled vehicles. Items such as refueling stations and charging stations are offered to employees, customers, and visitors to provide more options to owners of vehicles that are more energy efficient and provide environmental benefits. The energy for these vehicles will most likely be delivered through a building energy meter. Even though the energy is not being used by the building, or being used by building equipment, or being used by building occupants, it may be considered to be a "process load" under the current scope.

For smaller buildings with several refueling or recharging stations, the amount of energy provided for off-site transportation purposes could be a significant portion of the overall energy use if it is counted as a "process" load.

This proposal provides an exception for this energy used to recharge or refuel a vehicle that is used for on-road (and off-site) transportation purposes. This exception is limited to vehicles that are only used for off-site purposes that are obtaining their energy through the building energy infrastructure. Please note that vehicles that are used on or at the building site for process or other purposes (e.g., forklifts, campus delivery vehicles, lawn service equipment, etc.) are to be accounted for like other "receptacle" or "process" loads in the total building performance approach.

Cost Impact: Will not increase the cost of construction
This does not change the requirements for total building performance, but clarifies what is to be excluded from scope of this section. Therefore, it will not increase the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies that vehicle charging energy is not included in the building performance energy calculations.

Assembly Action **None**

Final Action Results

CE248-16 Part I	**AS**

Code Change No: CE248-16 Part II

Original Proposal

Section: R406.3 (N1106.3)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

R406.3 (N1106.3) Energy Rating Index. The Energy Rating Index (ERI) shall be a numerical integer value that is based on a linear scale constructed such that the *ERI reference design* has an Index value of 100 and a *residential building* that uses no net purchased energy has an Index value of 0. Each integer value on the scale shall represent a 1-percent change in the total energy use of the rated design relative to the total energy use of the *ERI reference design*. The ERI shall consider all energy used in the *residential building*. Energy used to recharge or refuel a vehicle for on-road (and off-site) transportation purposes shall not be included in the *ERI reference design* or the *rated design*.

Reason: More commercial buildings are offering amenities for alternatively fueled vehicles. Items such as refueling stations and charging stations are offered to employees, customers, and visitors to provide more options to owners of vehicles that are more energy efficient and provide environmental benefits. The energy for these vehicles will most likely be delivered through a building energy meter. Even though the energy is not being used by the building, or being used by building equipment, or being used by building occupants, it may be considered to be a "process load" under the current scope.

For smaller buildings with several refueling or recharging stations, the amount of energy provided for off-site transportation purposes could be a significant portion of the overall energy use if it is counted as a "process" load.

This proposal provides an exception for this energy used to recharge or refuel a vehicle that is used for on-road (and off-site) transportation purposes. This exception is limited to vehicles that are only used for off-site purposes that are obtaining their energy through the building energy infrastructure. Please note that vehicles that are used on or at the building site for process or other purposes (e.g., forklifts, campus delivery vehicles, lawn service equipment, etc.) are to be accounted for like other "receptacle" or "process" loads in the total building performance approach.

Cost Impact: Will not increase the cost of construction
This does not change the requirements for total building performance, but clarifies what is to be excluded from scope of this section. Therefore, it will not increase the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: It is appropriate to not include the energy used to recharge these types of vehicles from the energy calculations. There are already incentives for fuel efficient/electric vehicles. We don't know how much those vehicles will be used so we can't depend on that use to lower the cost of the power to the building.

Assembly Action **None**

Final Action Results

CE248-16 Part II **AS**

Code Change No: CE250-16

Original Proposal

Section: C407.3

Proponent: David Collins, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

C407.3 Performance-based compliance. Compliance based on total building performance requires that a proposed building (*proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use pricing in energy cost calculations. ~~Nondepletable energy collected off site shall be treated and priced the same as purchased energy.~~ Energy from ~~nondepletable~~on-site renewable energy sources~~ collected on site~~ shall be omitted from the annual energy cost of the *proposed design.* The amount of renewable energy purchased from off-site sources shall be the same in the *standard reference design* and the *proposed design*.

> **Exception:** Jurisdictions that require site energy (1 kWh = 3413 Btu) rather than energy cost as the metric of comparison.

Reason: The proposal replaces 'non-depletable energy' with the defined term 'on-site renewable' which is the defined term. Further the fourth sentence is replaced by the final sentence. It more clearly states the intent of how purchased renewable energy needs to be treated in the factoring of energy costs for performance-based compliance.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2015, the SEHPCAC has held three two- or three-day open meetings and 25 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction
The proposal is editorial and makes no technical changes.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE250-16	**AS**

BACK

CE250-16

C407.3 Performance-based compliance. Compliance based on total building performance requires that a proposed building (*proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices used in the total building performance compliance calculation shall be those contained in software approved by the Florida Building Commission. ~~taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.~~ Nondepletable energy collected off site shall be treated and priced the same as purchased energy. Energy from nondepletable energy sources collected on site shall be omitted from the annual energy cost of the *proposed design.*

Code Change No: CE251-16

Original Proposal

Section: C407.3, C407.4.2

Proponent: Anthony Floyd, Energy Code Specialist, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov); jim edelson (jim@newbuildings.org)

Revise as follows:

C407.3 Performance-based compliance. Compliance based on total building performance requires that a proposed building (*proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use pricing in energy cost calculations. ~~Nondepletable energy collected off site shall be treated and priced the same as purchased energy. Energy from nondepletable energy sources collected on site shall be omitted from the annual~~ The reduction in energy cost of the *proposed design*~~.~~ associated with *on-site renewable energy* shall be not more than 10% of the total energy cost. The amount of renewable energy purchased from off-site sources shall be the same in the *standard reference design* and the *proposed design*.

> **Exception:** Jurisdictions that require site energy (1 kWh = 3413 Btu) rather than energy cost as the metric of comparison.

C407.4.2 Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *standard reference design*.
2. Thermal zoning diagrams consisting of floor plans showing the thermal zoning scheme for *standard reference design* and *proposed design*.
3. Input and output reports from the energy analysis simulation program containing the complete input and output files, as applicable. The output file shall include energy use totals and energy use by energy source and end-use served, total hours that space conditioning loads are not met and any errors or warning messages generated by the simulation tool as applicable.
4. An explanation of any error or warning messages appearing in the simulation tool output.
5. A certification signed by the builder providing the building component characteristics of the *proposed design* as given in Table C407.5.1(1).
6. Documentation of the reduction in energy use associated with on-site renewable energy.

Reason: The intent of the IECC (C101.3) is to regulate the design and construction of buildings for use and conservation of energy over the life of each building. The priority of the IECC is energy efficiency. Renewable energy is complimentary, not a substutute for energy efficiency. The 2011 PNNL report on "Integrating Renewable Energy into Building Codes" agrees that energy efficiency should be given priority over renewable energy in energy efficiency codes. For the purposes of code complaince, the maximum 10% renewable energy energy cost reduction ensures that buildings will meet improved energy performance associated with the thermal envelope, mechanical system, service water heating and/or lighting based on the performance-based compliance path. The maximum 10% renewable energy cost reduction does not preclude a building design from incorporating more renewable energy. It just limits how much energy efficiency can be "traded-off" when determining code compliance under the performance-based path. The 10% limit is twice that permitted in ASHRAE 90.1-2013 and therefore is more permissive in this regard.

Adding the renewable energy documentation requirement to C407.4.2 will document energy cost reductions associated with on-site renewable energy, and is also a requirement in ASHRAE 90.1-2013.

The referenced PNNL report on Integrating Renewable Energy into Building Codes is posted at http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20442.pdf

Cost Impact: Will not increase the cost of construction
The relative cost of on-site renewable energy systems to the cost of meeting the requirements of the IECC is rapidly evolving. Certainly in the preponderance of cases, the IECC requirements are less expensive, but there may be circumstances where the cost of on-site renewable systems does not exceed the cost of meeting IECC requirements. In either case, this code proposal would neither require the installation of a renewable energy system nor limit the size of an installed renewable energy system.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify as follows:

C407.3 Performance-based compliance. Compliance based on total building performance requires that a proposed building (*proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use pricing in energy cost calculations. The reduction in energy cost of the *proposed design* associated with *on-site renewable energy* shall be not more than ~~10~~ 5% of the total energy cost. The amount of renewable energy purchased from off-site sources shall be the same in the *standard reference design* and the *proposed design*.

Exception: Jurisdictions that require site energy (1 kWh = 3413 Btu) rather than energy cost as the metric of comparison.

Committee Reason: This closes a loophole that would allow building envelope performance to be be traded away for PV renewable energy. Energy production should not be substituted for energy conservation measures. The Modification will align this text with the other path in C406 for renewables. 5% is still a sizable solar array, so this will not affect the solar industry.

Assembly Action **None**

Final Action Results

CE251-16	**AM**

CE251-16

C407.3 Performance-based compliance. Compliance based on total building performance requires that a proposed building (*proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices used in the total building performance compliance calculation shall be those contained in software approved by the Florida Building Commission. ~~taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.~~ Nondepletable energy collected off site shall be treated and priced the same as purchased energy. Energy from nondepletable energy sources collected on site shall be omitted from the annual energy cost of the *proposed design.*

C407.4.2 Additional documentation. The *code official* shall be permitted to require the following documents:

~~1. Documentation of the building component characteristics of the *standard reference design;*~~

1~~2~~. Thermal zoning diagrams consisting of floor plans showing the thermal zoning scheme for *standard reference design* and *proposed design;*

2~~3~~. Input and output report(s) from the energy analysis simulation program containing the complete input and output files, as applicable. The output file shall include energy use totals and energy use by energy source and end-use served, total hours that space conditioning loads are not met and any errors or warning messages generated by the simulation tool as applicable;

3~~4~~. An explanation of any error or warning messages appearing in the simulation tool output; and

4~~5~~. A certification signed by the builder providing the building component characteristics of the *proposed design* as given in Table C407.5.1(1).

Code Change No: CE256-16

Original Proposal

Section: C407.5.1

Proponent: Amanda Hickman, InterCode Incorporated, representing Air Movement Control Association International (amanda@intercodeinc.com)

Revise as follows:

TABLE ~~C407.5.1 (1)~~ C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Space use classification	Same as proposed	The space use classification shall be chosen in accordance with Table C405.5.2 for all areas of the building covered by this permit. Where the space use classification for a building is not known, the building shall be categorized as an office building.
Roofs	Type: Insulation entirely above deck	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table C402.1.4	As proposed
	Solar absorptance: 0.75	As proposed
	Emittance: 0.90	As proposed
Walls, above-grade	Type: Mass wall where proposed wall is mass; otherwise steel-framed wall	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table C402.1.4	As proposed
	Solar absorptance: 0.75	As proposed
	Emittance: 0.90	As proposed
Walls, below-grade	Type: Mass wall	As proposed
	Gross area: same as proposed	As proposed
	U-Factor: as specified in Table C402.1.4 with insulation layer on interior side of walls	As proposed
Floors, above-grade	Type: joist/framed floor	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table C402.1.4	As proposed
Floors, slab-on-grade	Type: Unheated	As proposed
	F-factor: as specified in Table C402.1.4	As proposed
Opaque doors	Type: Swinging	As proposed
	Area: Same as proposed	As proposed
	U-factor: as specified in Table C402.1.4	As proposed
Vertical fenestration other than opaque doors	Area	As proposed
	1.The proposed glazing area; where the proposed glazing area is less than 40 percent of above-	

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
	grade wall area.	
	2.40 percent of above-grade wall area; where the proposed glazing area is 40 percent or more of the above-grade wall area.	
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used	As proposed
	External shading and PF: None	As proposed
Skylights	Area	As proposed
	1.The proposed skylight area; where the proposed skylight area is less than 3 percent of gross area of roof assembly.	
	2.3 percent of gross area of roof assembly; where the proposed skylight area is 3 percent or more of gross area of roof assembly	
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
Lighting, interior	The interior lighting power shall be determined in accordance with Section C405.4.2. Where the occupancy of the building is not known, the lighting power density shall be 1.0 Watt per square foot (10.7 W/m^2) based on the categorization of buildings with unknown space classification as offices.	As proposed
Lighting, exterior	The lighting power shall be determined in accordance with Table C405.5.2(2). Areas and dimensions of tradable and nontradable surfaces shall be the same as proposed.	As proposed
Internal gains	Same as proposed	Receptacle, motor and process loads shall be modeled and estimated based on the space use classification. All end-use load components within and associated with the building shall be modeled to include, but not be limited to, the following: exhaust fans, parking garage ventilation fans, exterior building lighting, swimming pool heaters and pumps, elevators, escalators, refrigeration equipment and cooking equipment.
Schedules	Same as proposed <u>Exception: Thermostat settings and schedules for HVAC systems that utilize radiant heating, radiant cooling, and elevated air speed, provided that equivalent levels of occupant thermal comfort are demonstrated by means of equal Standard Effective Temperature as calculated in Normative Appendix B of Standard 55.</u>	Operating schedules shall include hourly profiles for daily operation and shall account for variations between weekdays, weekends, holidays and any seasonal operation. Schedules shall model the time-dependent variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads. The schedules shall be typical of the proposed building type as determined by the

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
		designer and approved by the jurisdiction.
Mechanical ventilation	Same as proposed	As proposed, in accordance with Section C403.2.6.
Heating systems	Fuel type: same as proposed design	As proposed
	Equipment type[a] : as specified in Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: as specified in Tables C403.2.3(4) and C403.2.3(5)	As proposed
	Capacity[b] : sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet heating load hours and no larger heating capacity safety factors are provided than in the proposed design.	As proposed
Cooling systems	Fuel type: same as proposed design	As proposed
	Equipment type[c] : as specified in Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: as specified in Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3)	As proposed
	Capacity[b] : sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet cooling load hours and no larger cooling capacity safety factors are provided than in the proposed design.	As proposed
	Economizer[d] : same as proposed, in accordance with Section C403.3.	As proposed
Service water heating[e]	Fuel type: same as proposed	As proposed
	Efficiency: as specified in Table C404.2	For Group R, as proposed multiplied by SWHF. For other than Group R, as proposed multiplied by efficiency as provided by the manufacturer of the DWHR unit.
	Capacity: same as proposed	As proposed
	Where no service water hot water system exists or is specified in the proposed design, no service hot water heating shall be modeled.	

SWHF = Service water heat recovery factor, DWHR = Drain water heat recovery.

a. Where no heating system exists or has been specified, the heating system shall be modeled as fossil fuel. The system characteristics shall be identical in both the standard reference design and proposed design.

b. The ratio between the capacities used in the annual simulations and the capacities determined by sizing runs shall be the same for both the standard reference design and proposed design.

c. Where no cooling system exists or no cooling system has been specified, the cooling system shall be modeled as an air-cooled single-zone system, one unit per thermal zone. The system characteristics shall be identical in both the standard reference design and proposed design.

d. If an economizer is required in accordance with Table C403.3 and where no economizer exists or is specified in the proposed design, then a supply-air economizer shall be provided in the standard reference design in accordance with Section C403.3.

e. The SWHF shall be applied as follows:

1. Where potable water from the DWHR unit supplies not less than one shower and not greater than two showers, of which the drain water from the same showers flows through the DWHR unit then SWHF = [1 – (DWHR unit efficiency · 0.36)].
2. Where potable water from the DWHR unit supplies not less than three showers and not greater than four showers, of which the drain water from the same showers flows through the DWHR unit then SWHF = [1 – (DWHR unit efficiency · 0.33)].
3. Where potable water from the DWHR unit supplies not less than five showers and not greater than six showers, of which the drain water from the same showers flows through the DWHR unit, then SWHF = [1 – (DWHR unit efficiency · 0.26)].
4. Where Items 1 through 3 are not met, SWHF = 1.0.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:

ASHRAE 55-13 Thermal Environmental Conditions for Human Occupancy

Reason: This code change proposal provides direction regarding setpoint and schedules requirements for modeling systems that provide occupant thermal comfort via means other than directly controlling the air dry-bulb and wet-bulb temperature (i.e., radiant cooling/heating, elevated air speed, etc.

NOTE TO ICC STAFF: ASHRAE standard 55-2013 has already been submitted with ASHRAE's proposal that deals with the same subject matter as this proposal.

Cost Impact: Will not increase the cost of construction
There is no increase in the cost of construction since this code change proposal only adds an exception...

Analysis: A review of the standard(s) proposed for inclusion in the code, ASHRAE 55, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2015.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE256-16 **AS**

CE256-16

TABLE C407.5.1(1)—continued
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

Heating System	Fuel type: same as proposed design Equipment type[a]: from Tables C407.5.1(2) and C407.5.1(3) Efficiency: from Tables C403.2.3(4), and C403.2.3(5) Capacity[b]: sized proportionally to the capacities in the proposed design based on sizing runs~~, and shall be established such that no smaller number of unmet heating load hours and no larger heating capacity safety factors are provided than in the proposed design.~~	As proposed As proposed As proposed
Cooling System	Fuel type: same as proposed design Equipment type[c]: from Tables C407.5.1(2) and C407.5.1(3) Efficiency: from Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3) Capacity[b]: sized proportionally to the capacities in the proposed design based on sizing runs~~, and shall be established such that no smaller number of unmet heating load hours and no larger cooling capacity safety factors are provided than in the proposed design.~~	As proposed As proposed As proposed

Revise Table C407.5.1(1) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS as follows:

BUILDING COMPONENT CHARACTERISTICS	**STANDARD REFERENCE DESIGN**	**PROPOSED DESIGN**
Vertical fenestration other than opaque doors	Area 1. The proposed ~~glazing~~ <u>vertical fenestration</u> area; where the proposed ~~glazing~~ <u>vertical fenestration</u> area is less than 40 percent of the above-grade wall area. 2. 40 percent of above-grade wall area; where the proposed ~~glazing~~ <u>vertical fenestration</u> area is 40 percent or more of the	As proposed

	above grade wall area.	
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	External shading and PF: None	As proposed
Skylights	Area: 1. The proposed skylight area; where the proposed skylight area is less than that permitted by Section C402.1 ~~3 percent of gross area of roof assembly.~~ 2. The area permitted by Section C402.1 ~~3 percent of gross roof assembly,~~ where the proposed skylight area exceeds that permitted by Section C402.1. ~~is 3 percent or more of gross area of the roof assembly~~	As proposed
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed

Code Change No: CE259-16 Part I

Original Proposal

Section: C407.5.1

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Julie Ruth, representing American Architectural Manufacturers Association (julruth@aol.com)

Revise as follows:

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Space use classification	Same as proposed	The space use classification shall be chosen in accordance with Table C405.5.2 for all areas of the building covered by this permit. Where the space use classification for a building is not known, the building shall be categorized as an office building.
Roofs	Type: Insulation entirely above deck	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table C402.1.4	As proposed
	Solar absorptance: 0.75	As proposed
	Emittance: 0.90	As proposed
Walls, above-grade	Type: Mass wall where proposed wall is mass; otherwise steel-framed wall	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table C402.1.4	As proposed
	Solar absorptance: 0.75	As proposed
	Emittance: 0.90	As proposed
Walls, below-grade	Type: Mass wall	As proposed
	Gross area: same as proposed	As proposed
	U-Factor: as specified in Table C402.1.4 with insulation layer on interior side of walls	As proposed
Floors, above-grade	Type: joist/framed floor	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table C402.1.4	As proposed
Floors, slab-on-grade	Type: Unheated	As proposed
	F-factor: as specified in Table C402.1.4	As proposed
Opaque doors	Type: Swinging	As proposed
	Area: Same as proposed	As proposed
	U-factor: as specified in Table C402.1.4	As proposed
Vertical fenestration other than opaque	Area	As proposed
	1.The proposed ~~glazing~~ <u>vertical fenestration</u> area;	

doors	where the proposed ~~glazing~~ vertical fenestration area is less than 40 percent of above-grade wall area.	
	2.40 percent of above-grade wall area; where the proposed ~~glazing~~ vertical fenestration area is 40 percent or more of the above-grade wall area.	
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used	As proposed
	External shading and PF: None	As proposed
Skylights	Area	As proposed
	1.The proposed skylight area; where the proposed skylight area is less than that permitted by Section C402.1 ~~3 percent of gross area of roof assembly~~.	
	2. The area permitted by Section C402.1 ~~3 percent of gross area of roof assembly~~; where the proposed skylight area exceeds that permitted by Section C402.1 ~~is 3 percent or more of gross area of roof assembly~~	
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
Lighting, interior	The interior lighting power shall be determined in accordance with Section C405.4.2. Where the occupancy of the building is not known, the lighting power density shall be 1.0 Watt per square foot (10.7 W/m^2) based on the categorization of buildings with unknown space classification as offices.	As proposed
Lighting, exterior	The lighting power shall be determined in accordance with Table C405.5.2(2). Areas and dimensions of tradable and nontradable surfaces shall be the same as proposed.	As proposed

SWHF = Service water heat recovery factor, DWHR = Drain water heat recovery.

a. Where no heating system exists or has been specified, the heating system shall be modeled as fossil fuel. The system characteristics shall be identical in both the standard reference design and proposed design.

b. The ratio between the capacities used in the annual simulations and the capacities determined by sizing runs shall be the same for both the standard reference design and proposed design.

c. Where no cooling system exists or no cooling system has been specified, the cooling system shall be modeled as an air-cooled single-zone system, one unit per thermal zone. The system characteristics shall be identical in both the standard reference design and proposed design.

d. If an economizer is required in accordance with Table C403.3 and where no economizer exists or is specified in the proposed design, then a supply-air economizer shall be provided in the standard reference design in accordance with Section C403.3.

e. The SWHF shall be applied as follows:

1. Where potable water from the DWHR unit supplies not less than one shower and not greater than two showers, of which the drain water from the same showers flows through the DWHR unit then SWHF = [1 – (DWHR unit efficiency · 0.36)].
2. Where potable water from the DWHR unit supplies not less than three showers and not greater than four showers, of which the drain water from the same showers flows through the DWHR unit then SWHF = [1 – (DWHR unit efficiency · 0.33)].
3. Where potable water from the DWHR unit supplies not less than five showers and not greater than six showers, of which the drain water from the same showers flows through the DWHR unit, then SWHF = [1 – (DWHR unit efficiency · 0.26)].
4. Where Items 1 through 3 are not met, SWHF = 1.0.

Reason: Part I corrects an inconsistency in the treatment of skylights vs. vertical fenestration in the commercial provisions of the IECC. In the commercial prescriptive provisions two different sets of area limits are given for both vertical fenestration and skylights, based upon whether automatic lighting controls are also used. These two sets of area limits are reflected in the criteria for performance design for vertical fenestration, but not for skylights. Part I of this proposal corrects this inconsistency.
Part I also replaces reference to "glazing" with "vertical fenestration", where appropriate.

Cost Impact: Will not increase the cost of construction
The changes are editorial to add clarity and understanding to the definition. No new requirements are added and thus, costs are not impacted.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE259-16 Part I	**AS**

CE259-16 Part I

TABLE C407.5.1(1)—continued
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

Heating System	Fuel type: same as proposed design Equipment type[a]: from Tables C407.5.1(2) and C407.5.1(3) Efficiency: from Tables C403.2.3(4), and C403.2.3(5) Capacity[b]: sized proportionally to the capacities in the proposed design based on sizing runs~~, and shall be established such that no smaller number of unmet heating load hours and no larger heating capacity safety factors are provided than in the proposed design.~~	As proposed As proposed As proposed
Cooling System	Fuel type: same as proposed design Equipment type[c]: from Tables C407.5.1(2) and C407.5.1(3) Efficiency: from Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3) Capacity[b]: sized proportionally to the capacities in the proposed design based on sizing runs~~, and shall be established such that no smaller number of unmet heating load hours and no larger cooling capacity safety factors are provided than in the proposed design.~~	As proposed As proposed As proposed

Revise Table C407.5.1(1) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS as follows:

BUILDING COMPONENT CHARACTERISTICS	**STANDARD REFERENCE DESIGN**	**PROPOSED DESIGN**
Vertical fenestration other than opaque doors	Area 1. The proposed ~~glazing~~ <u>vertical fenestration</u> area; where the proposed ~~glazing~~ <u>vertical fenestration</u> area is less than 40 percent of the above-grade wall area. 2. 40 percent of above-grade wall area; where the proposed ~~glazing~~ <u>vertical fenestration</u> area is 40 percent or more of the	As proposed

	above grade wall area.	
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	External shading and PF: None	As proposed
Skylights	Area: 1. The proposed skylight area; where the proposed skylight area is less than that permitted by Section C402.1 ~~3 percent of gross area of roof assembly.~~ 2. The area permitted by Section C402.1 ~~3 percent of gross roof assembly,~~ where the proposed skylight area exceeds that permitted by Section C402.1. ~~is 3 percent or more of gross area of the roof assembly~~	As proposed
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed

Code Change No: CE260-16

Original Proposal

Section: C408.1

Proponent: Hope Medina, representing self (hmedina@coloradocode.net)

Revise as follows:

C408.1 General. This section covers the commissioning of the building mechanical systems in Section C403, service water heating systems in Section C404, and electrical power and lighting systems in Section C405.

Reason: Added reference to Service Water Heating Systems and associated section for clarification. Section C404 is listed as mandatory, but was not listed in Section C408.1 that list the sections covered for commissiong of certain building systems. This clarifies that Service water heating systems is part of the already mandatory systems required to be commissioned.

Cost Impact: Will not increase the cost of construction
This is a clarification

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval is based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE260-16	**AS**

Code Change No: CE265-16

Original Proposal

Section: C408.2.4, C408.2.4.1 (New)

Proponent: Hope Medina, representing self (hmedina@coloradocode.net)

Revise as follows:

C408.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner or owner's authorized agent. The report shall be organized with mechanical and service hot water findings in separate sections to allow independent review. The report shall be identified as "Preliminary Commissioning Report," shall include the completed Commissioning Compliance Checklist Table C408.2.4.1 and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

Add new text as follows:

TABLE C408.2.4.1
COMMISSIONING COMPLIANCE CHECKLIST

Project Information	**Project Name:**
	Project Address:
	Commissioning Authority:
Commissioning Plan (Section C408.2.1)	**Commissioning Plan was used during construction and includes all items required by Section C408.2.1**
Commissioning Plan was used during construction and includes all items required by Section C408.2.1	

Commissioning Plan was used during construction and includes all items required by Section C408.2.1
Systems Adjusting and Balancing has been completed.
Systems Adjusting and Balancing has been completed.
HVAC Equipment Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on:
HVAC Equipment Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on:

HVAC Controls Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on : ____________________
HVAC Controls Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on : ____________________
Economizers Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on: ________________
Economizers Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on: ________________
Lighting Controls Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on: ________________
Lighting Controls Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on: ________________
Service Water Heating System Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on: ________________
Service Water Heating System Functional Testing has been executed. If applicable, deferred and/or follow-up testing is scheduled to be provided on: ________________
Manual, record documents and training have been completed or scheduled
Manual, record documents and training have been completed or scheduled
Preliminary Commissioning Report submitted to owner and includes all items required by Section C408.2.4
Preliminary Commissioning Report submitted to owner and includes all items required by Section C408.2.4
I hereby certify that the commissioning provider has provided me with evidence of mechanical, service water heating and lighting systems commissioning in accordance with the 2018 IECC. **Signature of Building Owner or Owner's Representative Date**
I hereby certify that the commissioning provider has provided me with evidence of mechanical, service water heating and lighting systems commissioning in accordance with the 2018 IECC. **Signature of Building Owner or Owner's Representative Date**

Reason: The addition of a Commissioning Compliance Checklist will streamline the final inspection submission process as it relates to building system commissioning execution. It will also streamline the submission process to the code officials for final inspections.

Cost Impact: Will not increase the cost of construction
This will not effect the cost of design nor will is increase the cost of construction. It is a checklist provided for everyone involved to verify that all requirements have been completed. It is similar to the air barrier and insulation checklist found in the Residential Energy code. This is a tool to aid those involved with the process to verify for final inspection.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: It is helpful to code officials to have all of the critical items in a convenient list. Such a list will encourage uniformity in code enforcement.

Assembly Action **None**

Final Action Results

CE265-16	**AS**

BACK

CE265-16

C408.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the licensed design professional, electrical engineer, mechanical engineer or approved agency and provided to the building owner or owner's authorized agent. The report shall be organized with mechanical and service hot water findings in separate sections to allow independent review. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

Code Change No: CE266-16

Original Proposal

Section: C408.2.4

Proponent: Hope Medina, representing self (hmedina@coloradocode.net)

Revise as follows:

C408.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner or owner's authorized agent. The report shall be organized with mechanical and service hot water findings in separate sections to allow independent review. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.
4. <u>Results of functional performance tests.</u>
5. <u>Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance.</u>

Reason: Testing results and testing procedures are required for the final commissioning report. These documents are also readily available when drafting the preliminary report. Not including this documentation in the preliminary commissioning report limits the transfer of valuable information in a timely manor.

Testing results are valuable in understanding what the commissioning provider did, how they did it, and under what conditions the testing was executed. This can be especially helpful for contractors and building owners troubleshooting poor system operation.

Cost Impact: Will not increase the cost of construction
Testing procedures will not increase the cost of design or construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE266-16	**AS**

CE266-16

C408.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the licensed design professional, electrical engineer, mechanical engineer or approved agency and provided to the building owner or owner's authorized agent. The report shall be organized with mechanical and service hot water findings in separate sections to allow independent review. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

Code Change No: CE268-16

Original Proposal

Section: C103.6 (New), C103.6.1 (New), C103.6.3 (New), C103.6.4 (New), C408.2.5.1, C408.2.5.2, C408.2.5.3, C408.2.5.4

Proponent: Eric Makela, Cadmus Group, representing Northwest Energy Codes Group

Add new text as follows:

C103.6 Building documentation and closeout submittal requirements The *construction documents* shall specify that the *documents* described in this section be provided to the *building* owner or owner's authorized agent within 90 days of the date of receipt of the *certificate of occupancy*.

C103.6.1 Record documents. Construction documents shall be updated to convey a record of the completed work. Such updates shall include mechanical, electrical and control drawings that indicate all changes to size, type and locations of components, equipment and assemblies.

C103.6.3 Compliance documentation. All energy code compliance documentation and supporting calculations shall be delivered in one document to the building owner as part of the project record documents, manuals, or as a standalone document. This document shall include the specific energy code year utilized for compliance determination for each system, documentation demonstrating compliance with Section C303.1.3 for each fenestration product installed and the interior lighting power compliance path, building area or space-by-space, used to calculate the lighting power allowance.
For projects complying with Item 2 of Section C401.2, the documentation shall include:

1. The envelope insulation compliance path,
2. All compliance calculations including those required by Sections C402.1.5, C403.2.12.1, C405.4, and C405.5.

For projects complying with Section C407 the documentation shall include all documentation required by Sections C407.4.1 and C407.4.2.

C103.6.4 Systems operation control. Training shall be provided to those responsible for maintaining and operating equipment included in the manuals required by Section C103.6.2.
The training shall include:

1. Review of manuals and permanent certificate.
2. Hands-on demonstration of all normal maintenance procedures, normal operating modes, and all emergency shutdown and start-up procedures.
3. Training completion report.

Delete without substitution:

~~**C408.2.5.1 Drawings.** Construction documents shall include the location and performance data on each piece of equipment.~~

Revise as follows:

~~C408.2.5.3~~ C408.2.5.1 System balancing report. *No change to text.*

~~C408.2.5.4~~ C408.2.5.2 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner or owner's authorized agent. The report shall be organized with mechanical system and service hot water system findings in separate sections to allow independent review. The report shall include the following:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

   Exception: Deferred tests that cannot be performed at the time of report preparation due to climatic conditions.

Delete without substitution:

~~**C408.2.5.2 Manuals.** An operating and maintenance manual shall be provided and include all of the following:~~

1. ~~Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.~~
2. ~~Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.~~
3. ~~Name and address of at least one service agency.~~
4. ~~HVAC and service hot water controls system maintenance and calibration information, including wiring diagrams, schematics and control sequence descriptions. Desired or field-determined set points shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.~~
5. ~~Submittal data indicating all selected options for each piece of lighting equipment and lighting controls.~~
6. ~~Operation and maintenance manuals for each piece of lighting equipment. Required routine maintenance actions, cleaning and recommended relamping shall be clearly identified.~~
7. ~~A schedule for inspecting and recalibrating all lighting controls.~~
8. ~~A narrative of how each system is intended to operate, including recommended set points.~~

Reason: This code change proposal moves the requirements from the commissioning requirements to the overall documentation requirements to ensure that the building owner receives all of the documentation related to energy code compliance and the operation and maintenance (O&M) manuals for the HVAC and lighting system within 90 days after the certificate of occupancy. Similar requirements are already included in the Section C408 Commissioning but it only applies to projects with over 480,000 Btu/hr cooling capacity and 600,000 heating capacity, leaving out small commercial buildings less than approximately 15,000 sf. It is important for the building owners to be provided with the O&M manuals for the smaller buildings to ensure that the systems can be maintained and operated to maintain their efficiencies. Note that this provision was a requirement for all system types prior to the development of the 2012 IECC when it was put into the commissioning section.

It is also important for the building owner to be provided with accurate drawings and energy code documentation for future changes to the building. Demonstrating compliance for future additions and alterations to the energy using features of the building is made difficult without knowing how the existing building was made to comply with the IECC, in addition to other codes, for the building envelope, mechanical and lighting systems.

The code change proposal also specifies the type of documentation that should be submitted to demonstrate documentation with the energy code. This will ensure that the plan review and inspection staff have the necessary documentation to determine compliance with the energy code.

Cost Impact: Will not increase the cost of construction
None. The documentation is already required for buildings that are commissioned. This expands the requirements to all buildings.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE268-16	**AS**

Code Change No: CE274-16 Part I

Original Proposal

Section: C501.4

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Hope Medina, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Revise as follows:

C501.4 Compliance. *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in <u>this code and in</u> the *International Building Code*, <u>*International Existing Building Code,*</u> *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code*, *International Property Maintenance Code*, *International Private Sewage Disposal Code* and NFPA 70.

Reason: It doesn't make sense for alterations, repairs, additions, change of occupancies, and relocated buildings to not need to comply with the IECC and the Existing Building Code. Especially since this section deals with existing buildings in one form or the other. We feel this was just an oversight in the creation of the new Chapter, and would like to correct the over sight.
Our Theme: A Code for the End User

Is the code section completely understandable to the end user?
Is the code section or requirement easy to find?
Is the code requirement even doable in the real world?
Will the code requirement really save energy or only on paper?

Cost Impact: Will not increase the cost of construction
These were missing codes to the list,

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE274-16 Part I	**AS**

Code Change No: CE274-16 Part II

Original Proposal

Section: R501.4 (IRC N1107.4)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC-COMMERCIAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Hope Medina, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Revise as follows:

R501.4 (N1107.4) Compliance. *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in this code and the *International Residential Code*, *International Building Code*, *International Existing Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code*, *International Property Maintenance Code*, *International Private Sewage Disposal Code* and NFPA 70.

Reason: It doesn't make sense for alterations, repairs, additions, change of occupancies, and relocated buildings to not need to comply with the IECC and the Existing Building Code. Especially since this section deals with existing buildings in one form or the other. We feel this was just an oversight in the creation of the new Chapter, and would like to correct the over sight.
Our Theme: A Code for the End User

Is the code section completely understandable to the end user?
Is the code section or requirement easy to find?
Is the code requirement even doable in the real world?
Will the code requirement really save energy or only on paper?

Cost Impact: Will not increase the cost of construction
These were missing codes to the list,

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This proposal properly coordinates the codes.

Assembly Action **None**

Final Action Results

CE274-16 Part II	**AS**

Code Change No: CE276-16

Original Proposal

Section: C502.1, C503.1

Proponent: David Collins, The Preview Group, Inc., representing Sustainability Energy and High Per (dcollins@preview-group.com)

Revise as follows:

C502.1 General. *Additions* to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. *Additions* shall not create an unsafe or hazardous condition or overload existing building systems. An *addition* shall be deemed to comply with this code if the *addition* alone complies or if the existing building and *addition* comply with this code as a single building. *Additions* shall comply with ~~Section~~ Sections C402, C403, C404, C405 and C502.2.

Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

C503.1 General. *Alterations* to any building or structure shall comply with the requirements of Section C503 and the code for new construction. *Alterations* shall be such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the *alteration*. *Alterations* to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. *Alterations* shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

Exception: The following *alterations* need not comply with the requirements for new construction, provided the energy use of the building is not increased:

1. Storm windows installed over existing *fenestration*.
2. Surface-applied window film installed on existing single-pane *fenestration* assemblies reducing solar heat gain, provided the code does not require the glazing or *fenestration* to be replaced.
3. Existing ceiling, wall or floor cavities exposed during construction, provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. *Roof recover*.
6. *Air barriers* shall not be required for *roof recover* and roof replacement where the *alterations* or renovations to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.
7. *Alterations* that replace less than 50 percent of the luminaires in a space, provided that such *alterations* do not increase the installed interior lighting power.

Reason: Section 502.1 - The code was modified to require application of C405.2 without requiring the application of Sections C402, C403, C404 and C405. For an addition, the expected performance is to meet the requirements of the IECC, this change puts back the requirements that were left out of the code change.

Section 503.1 - There is no direction in the IECC for what specific provisions of the IECC are to be applied to an existing building. Section 503.1 references the requirements for applying the provisions for new construction, but never directs that this section also addresses when things are not required to be applied to the existing building undergoing an alteration.

Cost Impact: Will not increase the cost of construction
This change simply clarifies how this code is intended to be applied to existing buildings. Greater clarification of when the code does and does not apply will most likely lower the cost of construction because planning and design can predictably provide direction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE276-16 **AS**

Code Change No: CE279-16

Original Proposal

Section: C503.1

Proponent: Eric Makela, Cadmus Group, representing Northwest Energy Codes Group

Revise as follows:

C503.1 General. *Alterations* to any building or structure shall comply with the requirements of the code for new construction. *Alterations* shall be such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the *alteration*. *Alterations* to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. *Alterations* shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

Exception: The following *alterations* need not comply with the requirements for new construction, provided the energy use of the building is not increased:

1. Storm windows installed over existing *fenestration*.
2. Surface-applied window film installed on existing single-pane *fenestration* assemblies reducing solar heat gain, provided the code does not require the glazing or *fenestration* to be replaced.
3. Existing ceiling, wall or floor cavities exposed during construction, provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. *Roof recover*.
6. *Air barriers* shall not be required for *roof recover* and roof replacement where the *alterations* or renovations to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.
7. ~~*Alterations* that replace less than 50 percent of the luminaires in a space, provided that such *alterations* do not increase the installed interior lighting power.~~

Reason: The Northwest Energy Codes Group, New Buildings Institute and the ICC SEHPCAC, submitted code change proposals that created the new Chapter 5 for Existing Buildings. Section C503. When the approved proposals were correlated with the existing language by ICC staff, ICC staff did not strike exception 7 of C503 as was intended by the authors - and as was made clear in testimony at the Final Action Hearings in Atlantic City, New Jersey. The exception 7 artifact now in the 2015 IECC clearly conflicts with the language in GEW-4 that is now found at C503.6 of the 2015 IECC. This proposed amendment will resolve that conflict.

Cost Impact: Will not increase the cost of construction
This proposal is an editorial correction based on an action that occurred during the development of the 2015 IECC. The change to this portion of the code was not caught by staff during the publication of the 2015. There is no additional cost over the 2015 IECC.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE279-16	AS

Code Change No: CE285-16

Original Proposal

Section: C503.2, C505.1

Proponent: Duane Jonlin, Seattle Dept of Construction and Inspections (duane.jonlin@seattle.gov)

Revise as follows:

C503.2 Change in space conditioning. Any nonconditioned or low-energy space that is altered to become conditioned space shall be required to be brought into full compliance with this code.

<u>**Exceptions:**</u>

1. <u>Where the component performance alternative in Section C402.1.5 is used to comply with this section, the proposed UA shall be not greater than 110 percent of the target UA.</u>
2. <u>Where the total building performance option in Section C407 is used to comply with this section, the annual energy cost of the proposed design shall be not greater 110 percent of the annual energy cost otherwise permitted by Section C407.3.</u>

C505.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.4.2(1) or C405.4.2(2) to another use in Table C405.4.2(1) or C405.4.2(2), the installed lighting wattage shall comply with Section C405.4.

<u>**Exceptions:**</u>

1. <u>Where the component performance alternative in Section C402.1.5 is used to comply with this section, the proposed UA shall be not greater than 110 percent of the target UA.</u>
2. <u>Where the total building performance option in Section C407 is used to comply with this section, the annual energy cost of the proposed design shall be not greater than 110 percent of the annual energy cost otherwise permitted by Section C407.3.</u>

Reason: Where existing buildings undergo a change in space conditioning or change in occupancy or use, the current code requires "full compliance with this code." Such a stringent requirement is overly burdensome and in many cases unachievable, particularly for the building envelope. Details such as slab edges, basement wall insulation, entry doors and the like can be difficult or impossible to bring up to current code without completely rebuilding the facades.

This proposal allows a limited amount of "wiggle room" for buildings undergoing a change in space conditioning or change in use, where they use either the component performance tradeoff method in Section C402.1.5 or the total building performance method in Section C407.

Cost Impact: Will not increase the cost of construction
This will decrease the cost of construction. Bringing any existing building into full compliance with every aspect of the current energy code would be expensive and impractical. This proposal provides a slightly less-stringent option, allowing more design flexibility, and will thus be less expensive.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE285-16	AS

Code Change No: CE286-16

Original Proposal

Section: C503.3, C503.3.2, C503.3.3, C505.1

Proponent: Thomas Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee and Aluminum Extruders Council (culp@birchpointconsulting.com)

Revise as follows:

C503.3 Building envelope. New building envelope assemblies that are part of the *alteration* shall comply with Sections C402.1 through C402.5.

> **Exception.** Where the existing building exceeds the *fenestration area* limitations of Section C402.4.1 prior to *alteration*, the building is exempt from Section C402.4.1 provided that there is not an increase in *fenestration area.*

C503.3.2 Vertical fenestration. The addition of *vertical fenestration* that results in a total building *fenestration* area less than or equal to that specified in Section C402.4.1 shall comply with Section ~~C402.4~~ C402.4.3 or C407. The addition of *vertical fenestration* that results in a total building *fenestration* area greater than Section C402.4.1 shall comply with Section C402.4.1.1 for the space adjacent to the new fenestration only. *Alterations* that result in a total building ~~vertical glass~~ *vertical fenestration* area exceeding that specified in Section C402.4.1.1 shall comply with Section C407. Provided that the *vertical fenestration* area is not changed, using the same vertical fenestration area in the *standard reference design as the building prior to alteration shall be an alternative to using the vertical fenestration area specified in Table C407.5.1 (1).*

C503.3.3 Skylight area. The addition of *skylight* area that results in a total building *skylight* area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.4. The addition of *skylight* area that results in a total building skylight area greater than Section C402.4.1 shall comply with Section C402.4.1.2 for the space adjacent to the new skylights. *Alterations* that result in a total building skylight area exceeding that specified in Section C402.4.1.2 shall comply with Section C407. Provided that the *skylight* area is not changed, using the same skylight area in the *standard reference design* as the building prior to *alteration shall be an alternative to using the skylight area specified in Table C407.5.1 (1).*

C505.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.4.2(1) or C405.4.2(2) to another use in Table C405.4.2(1) or C405.4.2(2), the installed lighting wattage shall comply with Section C405.4. Where the space undergoing a change in occupancy or use is in a building with *a fenestration* area that exceeds the limitations of Section C402.4.1, the space is exempt from Section C402.4.1 provided that there is not an increase in fenestration area.

Reason: Last cycle, the provisions related to additions, alterations, and repairs were significantly clarified. However, the language regarding alterations needs further correction. The current language works well for deep retrofits where multiple components of the space are being modified (e.g. windows, walls, lighting, HVAC). However, as currently written, it would actually discourage building owners from making improvements in individual parts of certain existing buildings. For example, in an existing office building that may have 50% window area (greater than the prescriptive window area limit), the last sentence of Section C503.3.2 would not allow someone to simply replace the existing fenestration with more efficient windows to bring them up to code, unless they also did something else in the building to show overall compliance in the performance path. Likewise, this also hinders improvements in opaque areas, such as redoing a roof or adding cavity insulation, in buildings that already have greater than 40% window area – the current language of C503.3 and C503.3.2 would not allow someone to simply bring that roof or wall insulation up to code without doing something else in the building too via the performance path to show equivalence in a hypothetical building with a different baseline window area. While deep retrofits are certainly the most effective, many building owners do not have access to the required capital, and they could very well stop or delay making any improvements at all. Discouraging partial retrofits or even simple window replacement was surely not the intent. Therefore, this change clarifies that when a retrofit is done with no change in fenestration area, the true improvement is assessed on its own by comparing the building with its same window area.

In Section C503.3.2, it is also clarified that fenestration added in buildings under the fenestration area limits shall comply with C402.4.3, not all of C402.4 which includes other unrelated requirements like minimum skylight area. The proposal also adds the option to use the performance path even for buildings under 40% window area, which can be especially useful in deep retrofits.

Finally, a related change is included in Section 505 regarding spaces undergoing change of occupancy. The current language could imply that the building is out of compliance and would require something cost prohibitive such as removing windows and reconstructing walls for a simple change of occupancy.

Cost Impact: Will not increase the cost of construction
This proposal will decrease the cost of construction, and encourage more cost effective partial improvements of existing buildings that are not undergoing deep retrofits.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based on the proponent's published reason statements.

Assembly Action **None**

Final Action Results

CE286-16	**AS**

Code Change No: CE294-16

Original Proposal

Section: Appendix X (New)

Proponent: Joseph Cain, SunEdison, representing Solar Energy Industries Association (SEIA) (joecainpe@aol.com)

Add new text as follows:

APPENDIX (X)
SOLAR READY ZONE - COMMERCIAL

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION XA101
SCOPE

XA101.1 General. These provisions shall be applicable for new construction where solar ready provisions are required.

Add new definition as follows:

SECTION XA102
GENERAL DEFINITIONS

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.

Add new text as follows:

SECTION XA103
SOLAR READY ZONE

XA103.1 General. A solar ready zone shall be located on the roof of buildings that are five stories or less in height above grade plane, and are oriented between 110 degrees and 270 degrees of true north or have low-slope roofs. Solar ready zones shall comply with Sections XA103.2 through XA103.8.

Exceptions:

1. A building with a permanently installed on-site renewable energy system.
2. A building with a solar ready zone that is shaded for more than 70 percent of daylight hours annually.
3. A building where the licensed design professional certifies that the incident solar radiation available to the building is not suitable for a solar ready zone
4. A building where the licensed design professional certifies that the solar zone area required by Section XA103.3 cannot be met because of extensive rooftop equipment, skylights, vegetative roof areas or other obstructions.

XA103.2 Construction document requirements for solar ready zone. Construction documents shall indicate the *solar ready zone.*

XA103.3 Solar ready zone area. The total *solar ready zone* area shall be not less than 40% of the roof area calculated as the horizontally projected gross roof area less the area covered by skylights, occupied roof decks, vegetative roof areas and mandatory access or set back areas as required by the *International Fire Code*. The *solar ready zone* shall be a single area or smaller separated sub-zone areas. Each sub-zone shall be not less than 5 feet in width in the narrowest dimension.

XA103.4 Obstructions. *Solar ready zones* shall be free from obstructions, including pipes, vents, ducts, HVAC equipment, skylights, and roof mounted equipment.

XA103.5 Roof loads and documentation. A collateral dead load of not less than 5 pounds per square foot (5 psf) shall be included in the gravity and lateral design calculations for the solar ready zone. The structural design loads for roof dead load and roof live load shall be indicated on the construction documents.

XA103.6 Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or piping from the *solar ready zone* to the electrical service panel or service hot water system.

XA103.7 Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled "For Future Solar Electric". The reserved space shall be positioned at the end of the panel that is opposite from the panel supply conductor connection.

XA103.8 Construction documentation certificate. A permanent certificate, indicating the *solar ready zone* and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

Reason: This proposal adds a new non-mandatory Appendix to the IECC – Commercial Code.

Many building departments have been mandated by local regulations to accelerate permits and inspections for solar installations. Having important information and documentation available to the building department, solar contractor and building owner will assist in supporting the accelerated working environment many municipalities have mandated. It also provides uniform guidance for those jurisdictions where solar ready ordinances are under consideration.

This proposal is intended to identify the areas of a commercial building roof, called the solar ready zone, for potential future installation of renewable energy systems. This proposal requires documenting necessary solar ready zone information on the plans, some of which may already be required in permit construction requirements. This proposal also requires the builder to post specific information about the building for use by the building owners(s).

The proposed language follows similar language from the 2015 IRC Appendix U. This proposal does not require the installation of conduit, pre wiring, or pre-plumbing. It does not require any specific physical orientation of the commercial building. It does not require the redesign of plans.

Cost Impact: Will increase the cost of construction
The cost impact of this proposal is minimal, with increased cost due to the design professional's determination of the suitability of a solar ready zone on the building. The requirement for 5 psf collateral dead load in the solar ready zone could require a modest increase in strength of some bending members and some lateral design elements, resulting in some proportionately small incremental cost.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides guidance for those who want solar-ready guidance.

Assembly Action **None**

Final Action Results

CE294-16	**AS**