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Florida Building Code, Energy Conservation, 8th Edition (2023) vs. 2021 International Energy Conservation Code Residential Stringency Analysis

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Executive Summary

This project was initiated to review residential provisions of the Florida Building Code, Energy Conservation, 8th Edition (2023) (FBC-EC) in order to make a determination if it meets or exceeds the 2021 International Energy Conservation Code (IECC).

This project's code stringency evaluation activities included:

- Reviewing residential provisions of the 2023 FBC-EC and comparing them with residential provisions of the 2021 IECC
- Listing impactful code differences by Mandatory, Prescriptive, Performance and Energy Rating Index categories and providing the anticipated stringency impact for each
- Using EnergyGauge® USA energy modeling software to compare 2023 FBC-EC and 2021 IECC Prescriptive and Performance compliance method stringencies.

The comparison of the 2023 FBC-EC to the 2023 IECC showed a range of stringency impacts, from making the Florida code more stringent to no impact to making the Florida code less stringent. A number of the changes only apply in certain cases such as if a multi-family project, or if certain efficiency credits apply to a project. Two of the more significant changes between the two codes are the increased FBC-EC maximum building air leakage ACH50 and the FBC-EC storage water heater heat trap requirement, the first making the Florida code somewhat less stringent and the second making it slightly more stringent in applicable cases. Another significant difference is one made in the FBC 2020 time frame: in Climate Zone 2 new Florida code homes complying via the Prescriptive method are not allowed to heat with electric resistance. Since electric heating is a majority of the homes in Florida, this is substantial.

Another significant change is the FBC-EC's new electric resistance heating system prohibition for complete equipment replacements in Climate Zone 2; although since it does not affect new construction and can be exempted for many small projects, this change will not show up in Prescriptive and Performance stringency comparisons in this report.

Prescriptive and Performance compliance method based simulations were performed for one and two story single-family sample houses and a multi-family unit in three Florida cities representing the two Florida Climate Zones: Miami (Climate Zone 1), Tampa (Climate Zone 2) and Jacksonville (Climate Zone 2). A number of construction type, component and equipment variables enter into an energy code comparison so actual results will depend on the details of the projects eventually built under the new code. However, evaluated as outlined in this report, the stringency of the 2023 FBC-EC was shown to somewhat exceed the stringency of the 2021 IECC.

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Introduction

This report summarizes the review and evaluation activities carried out to make a determination whether the residential provisions of the 8th Edition (2023) Florida Building Code, Energy Conservation (referred to in this report as the FBC-EC) meet or exceed those of the 2021 International Energy Conservation Code (IECC).[1]

Residential code stringency evaluation activities included:

- Reviewing residential provisions of the 2023 FBC-EC and comparing them with residential provisions of the 2021 IECC
- Listing impactful code differences by Mandatory, Prescriptive, Performance and Energy Rating Index sections and providing anticipated stringency impact for each change
- Using EnergyGauge® USA energy modeling software to compare 2021 IECC and 2023 Florida Energy Code Prescriptive and Performance compliance method stringencies.

Impactful Differences between the 2023 FBC-EC and 2021 IECC

A listing of impactful code differences between the 2023 FBC-EC and 2021 IECC is provided below, organized by General, Mandatory, Prescriptive, Performance and Energy Rating Index sections. Anticipated stringency impacts are also provided for each code difference. Many of these are qualitative and not quantitative so they are not modeled in simulation. Those that are modeled are indicated with purple text at the end saying, "This impact is modeled."

Requirements and Compliance Options

Residential Chapter 3 of both the 2023 FBC-EC and 2021 IECC stipulates several general compliance requirements. Residential Chapter 4 of both codes includes additional mandatory requirements that apply to all projects and three compliance method options:

- Sections R401 through R404, commonly referred to as "Prescriptive" option
- Section R405, the "Simulated Performance Alternative" or "Performance" option
- An "Energy Rating Index" or "ERI" approach option in Section R406.

General Requirements

There are a number of Section R303 Materials, Systems and Equipment differences between the 2023 FBC-EC and 2021 IECC. The FBC-EC adds several requirements to the IECC insulation requirements including the following.

[1] This report is an update of a 2020 FBC-EC vs. 2018 IECC stringency comparison report; as such, the same or similar discussion language is often used where the differences between these earlier code editions persist.

FBC-EC R303.1.1.1.1

The 2023 FBC-EC includes a subsection regarding insulation *R*-value that is not included in the 2021 IECC:

> **R303.1.1.1.1** *R*-values referenced in Chapter 4 of this code refer to the *R*-values of the added insulation only. The *R*-values of structural building materials such as framing members, concrete blocks or gypsum board shall not be included.
>
> Exception: R402.1.5 Total UA Alternative.

Depending on common practice, this clarification may make the 2023 FBC-EC slightly more stringent than the 2021 IECC.

FBC-EC R303.2.1 Insulation Installation

The 2023 FBC-EC includes the following section regarding insulation installation that is not included in the 2021 IECC:

> **R303.2.1 Insulation installation.** Insulation materials shall comply with the requirements of their respective ASTM standard specification and shall be installed in accordance with their respective ASTM installation practice in Table R303.2.1 in such a manner as to achieve rated R-value of insulation. Open-blown or poured loose-fill insulation shall not be used in attic roof spaces when the slope of the ceiling is more than three in twelve. When eave vents are installed, baffling of the vent openings shall be provided to deflect the incoming air above the surface of the insulation.
>
> Exception: Where metal building roof and metal building wall insulation is compressed between the roof or wall skin and the structure.

Again depending on common practice, these requirements together with the additional requirements of this section's compressed insulation, substantial contact and insulation protection subsections may make the 2023 FBC-EC slightly more stringent than the 2021 IECC.

Mandatory Requirements

Each 2021 IECC and 2023 FBC-EC compliance option includes mandatory requirements. There are a number of impactful differences between the 2021 IECC and 2023 FBC-EC mandatory requirements.

IECC R401.2.5 Additional Energy Efficiency

The 2021 IECC adds an "additional energy efficiency" section which stipulates additional efficiency requirements for all compliance options:

- For Prescriptive compliance, one of the Section R408.2 package options
- For Performance compliance, one of the Section R408.2 package options or 5% reduction in annual energy cost

- For Energy Rating Index compliance, a 5% reduction from the target Index

This IECC change decreases FBC-EC Prescriptive and Energy Rating Index stringency relative to the IECC. For Performance compliance, the 2023 FBC-EC includes an equivalent 5% stringency reduction, so now matches the 2021 IECC.

R402.2.3 Eave Baffle

The 2021 IECC makes the Eave Baffle section mandatory, adds "net free area" to the baffle opening stipulation, and adds baffle installation language to maximize space for attic insulation coverage and prevent ventilation air bypass. This change slightly decreases FBC-EC stringency relative to the IECC (depending on typical practice).

FBC-EC R402.2.4 Access Hatch Doors and Insulation Retention [IECC R402.2.4 Access Hatches and Doors and R402.2.4.1 Access Hatches and Door Insulation Installation and Retention]

IECC changes separate existing IECC prescriptive Section R402.2.4 regarding access hatches and doors between conditioned and unconditioned spaces into mandatory and Prescriptive sections, and new Section R402.2.4.1 regarding access hatch and door insulation installation and retention is now mandatory. A new IECC horizontal pull-down stair access hatch insulation level exception is added for Prescriptive compliance. The mandatory section change slightly decreases stringency of FBC-EC Performance and ERI compliance relative to the IECC, while the horizontal pull-down stair access hatch exception slightly increases stringency of FBC-EC Prescriptive compliance relative to the IECC.

FBC-EC Table R402.4.1.1 Air Barrier and Insulation Installation [IECC Air Barrier, Air Sealing and Insulation Installation]

Table R402.4.1.1 of the 2021 IECC includes a number of changes that are anticipated to slightly decreases FBC-EC stringency relative to IECC (depending on current practice):

- Adds rim joist junction air sealing requirements and insulation installation clarification
- Revises section name to clarify foundation types that are included, and revises and adds to Air Barrier Criteria and Insulation Installation Criteria to clarify foundation related requirements
- Revises and adds Air Barrier Criteria and Insulation Installation Criteria to clarify shaft and penetration related requirements
- Adds Insulation Installation Criteria to narrow cavity requirements
- Adds Air Barrier Criteria to garage separation requirements
- Revises and adds Air Barrier Criteria and Insulation Installation Criteria to clarify recessed lighting related requirements
- Adds "or other obstructions" to Plumbing and Wiring section name, adds Air Barrier Criteria and revises Insulation Installation Criteria to clarify these requirements

The 2023 FBC-EC modifies the Table R402.4.1.1 Electrical/phone box on exterior walls section name, revises Air Barrier Criteria and adds Insulation Installation Criteria to clarify these requirements. These FBC-EC changes are anticipated to slightly increases FBC-EC stringency relative to the IECC (depending on current practice).

R402.4.1.2 Testing

Section R402.4.1.2 below shows the 2023 FBC-EC building testing language changes from the 2021 IECC in strike-out and underline format:

> **R402.4.1.2 Testing.**
> The building or dwelling unit shall be tested for air leakage and verified as having an air leakage rate not exceeding seven air changes per hour in Climate Zones 1 and 2, and three air changes per hour in Climate Zones 3 through 8. ~~The maximum air leakage rate for any building or dwelling unit under any compliance path shall not exceed 5.0 air changes per hour or 0.28 cubic feet per minute (CFM) per square foot [0.0079 $m^3/(s \times m^2)$] of dwelling unit enclosure area.~~ Dwelling units with an air leakage rate less than three air changes per hour shall be provided with whole-house mechanical ventilation in accordance with Section R403.6.1 of this code and Section M1507.3 of the Florida Building Code, Residential. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380~~, ASTM E779 or ASTM E1827~~ and reported at a pressure of 0.2 inch w.g. (50 Pascals). ~~Where required by the *code official,*~~ Testing shall be conducted by either individuals as defined in Section 553.993(5) or (7), Florida Statutes or individuals licensed as set forth in Section 489.105(3)(f), (g), or (i) or an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official.* Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* ~~have been sealed~~ …

Changing the maximum leakage rate from five air changes per hour (ACH50 = 5) to seven changes per hour (ACH50 = 7) in Climate Zones 1 and 2 (all of Florida) results in the 2023 FBC-EC being somewhat less stringent than the 2021 IECC. This modification is due to 2016 Florida legislation which required the change in response to homebuilders concerns regarding tight houses without reliable mechanical ventilation systems. This impact is modeled.

The 2023 FBC-EC Section R402.4.1.2 clarification regarding when and how whole-house mechanical ventilation is to be provided should have minimal impact.

As also shown above, the 2021 IECC continues to allow the requirement for tester approval to be at the discretion of the code official. This difference may result in the 2023 FBC-EC being slightly more stringent in some cases (depending on typical practice).

The 2023 FBC-EC adds a testing requirement clarification that if an attic is both air sealed and insulated at the roof deck, interior access doors and hatches between the conditioned space volume and the attic must be opened during the test and the volume of the attic must be added to the conditioned space volume for purposes of reporting infiltration volume and calculating the air leakage of the home. Since this is a clarification, minimal impact is anticipated for applicable cases and depending on typical practice.

An additional Florida change provides an exception to the Section R402.4.1.2 testing requirement:

> EXCEPTION: Testing is not required for additions, alterations, renovations, or repairs of the building thermal envelope of existing buildings in which the new construction is less than 85 percent of the building thermal envelope.

This change should continue to help clarify testing requirements and slightly reduce the amount of testing required in the state, but little or no stringency impact is anticipated.

New 2021 IECC Section R402.4.1.2 text adds an air leakage testing exception for certain heated, attached and detached private garages. This exception may slightly increase FBC-EC stringency relative to the IECC (in applicable cases).

The 2021 IECC also adds to Section R402.4.1.2 a square footage based air leakage rate testing alternative for attached single and multifamily building dwelling units and buildings or dwelling units that are 1500 square feet or smaller. Stringency impact for this testing alternative is unknown.

FBC-EC R403.3.1 Insulation [IECC Ducts Located Outside Conditioned Space]

The 2021 IECC adds mandatory insulation requirements for ducts buried beneath a building. The 2023 FBC-EC has same requirement, but only for Prescriptive compliance. No stringency impact or decreases FBC-EC stringency slightly relative to IECC in applicable Performance and ERI cases.

FBC-EC R403.3.2 [IECC R403.3.4] Sealing

Section R403.3.2 of the 2023 FBC-EC includes the following regarding duct tester qualification:

> Duct tightness shall be verified by testing in accordance with ANSI/RESNET/ICC 380 by either individuals as defined in Section 553.993(5) or (7), *Florida Statutes*, or individuals licensed as set forth in Section 489.105(3)(f), (g), or (i), *Florida Statutes*, to be "substantially leak free" in accordance with Section R403.3.3.

These tester qualification requirements may slightly increase FBC-EC stringency compared with the IECC but difficult to assess without field data.

FBC-EC R403.3.3 [IECC R403.3.5] Duct Testing

The 2023 FBC-EC Section R403.3.3 Duct Testing section is provided below with 2023 FBC-EC changes to the 2021 IECC shown in strike-out and underline format:

> Ducts shall be pressure tested ~~in accordance with ANSI/RESNET/ICC 380 or ASTM E1554~~ to determine air leakage by one of the following methods: … [no additional section changes before exceptions]
>
> **Exceptions**:
>
> 1. A duct air leakage test shall not be required where the ducts and air handlers are located entirely within the building thermal envelope.
> 2. ~~A duct air leakage test shall not be required for ducts serving ventilation systems that are not integrated with ducts serving heating or cooling systems.~~
> 2. Duct testing is not mandatory for buildings complying by Section R405 of this code. Duct leakage testing is required for Section R405 compliance where credit is taken for leakage, and a duct air leakage Qn to the outside of less than 0.080 (where Qn = duct leakage to the outside in cfm per 100 square feet of conditioned floor area tested at 25 Pascals) is indicated in the compliance report for the *proposed design*.

FBC-EC exception 1 above has been removed from the 2021 IECC. This change decreases the FBC-EC stringency wrt IECC (in applicable cases). Struck-out Exception 2 above regarding ventilation systems is a clarification in the 2021 IECC; as such, it is not a change in code stringency. Underlined Exception 2 is an additional Florida duct testing exception that only applies to Section R405 of the code (Performance compliance), so it does not affect Prescriptive compliance stringency. Performance compliance implications are discussed in the Performance Compliance section below.

IECC R403.3.3 Ducts buried within ceiling insulation

The 2021 IECC includes a renumbered section continued from the 2018 IECC regarding supply and return air ducts that are partially or completely buried in ceiling insulation along with subsection R403.3.3.1 that stipulates an effective duct insulation *R*-value of R-25 be used for performance simulations for deeply buried ducts that meet certain placement and insulation conditions. Buried ducts language code modifications were submitted for the 2020 FBC-EC update cycle, but none were finally approved. Little or no stringency impact is anticipated from these changes.

FBC-EC R403.5.4 [IECC R403.5.3] Drain Water Heat Recovery Units

The 2021 IECC clarifies that the drain water heat recovery requirements in this section only apply where a drain water heat recovery unit is installed, and makes the section mandatory; the FBC-EC is not clear whether this section is mandatory or Prescriptive. This difference may slightly decrease FBC-EC stringency relative to the IECC in applicable Performance and ERI compliance cases (depending on if FBC-EC section is mandatory or not).

FBC-EC R403.5.5 Heat Traps

Section R403.5.5 of the FBC-EC requires heat traps for storage water heaters:

> **R403.5.5 Heat traps (Mandatory).** Storage water heaters not equipped with integral heat traps and having vertical pipe risers shall have heat traps installed on both the inlets and outlets. External heat traps shall consist of either a commercially available heat trap or a downward and upward bend of at least 3½ inches (89 mm) in the hot water distribution line and cold water line located as close as possible to the storage tank.

This heat trap requirement increases Florida Prescriptive, Performance and ERI compliance stringency slightly relative to the 2021 IECC in applicable cases. This impact is modeled.

FBC-EC R403.5.6 Water Heater Efficiencies

The FBC-EC includes several additional water heater subsections not included in the IECC that specify controls, shut down, and efficiency requirements. These additional requirements may slightly increase FBC-EC stringency relative to the IECC (in applicable cases).

FBC-EC R403.6.1 [IECC R403.6.2] Whole-House[Dwelling] Mechanical Ventilation System Fan Efficacy

The 2018 IECC and 2023 FBC-EC include a WHMV efficacy exception for air handlers that are integral to HVAC equipment, just requiring them to use an electronically commutated motor. The 2021 IECC removes this exception and adds air-handler integrated to the tested and listed HVAC equipment, with a minimum efficacy requirement of 1.2 cfm/watt. This difference somewhat increases FBC-EC stringency relative to the IECC (in applicable cases).

FBC-EC R403.6.2 Ventilation Air

The FBC-EC provides mechanical ventilation criteria, including maximum rates, prohibited make-up air sources, and insulation requirements. This difference may slightly increase FBC-EC stringency relative to the IECC (in applicable cases and depending on typical practice).

IECC R403.6.3 Testing

The 2021 IECC adds a section requiring testing of mechanical ventilation system flow rates, with exception for certain kitchen range hoods. This addition may improve intent, but impact on energy is unknown.

R403.7.1 Equipment sizing

Subsections under 2023 FBC-EC Section R403.7 provide additional cooling and heating system sizing requirements and exceptions that are not included in the 2021 IECC system sizing section. Depending on typical practice, it is anticipated that these additions will slightly increase the stringency of the 2023 FBC-EC relative to the 2021 IECC.

R403.10.3 Covers

The 2021 IECC requires that 75% of the heated pool and outdoor permanent spa heating energy must come from a heat pump or on-site renewable energy to exempt the pool or spa from the cover requirement. The 2021 IECC also specifies the 75% heat pump or on-site renewable heating energy must be computed over an operation season of not fewer than three calendar months. These specifications make the 2021 IECC slightly more stringent than the 2023 FBC-EC in applicable cases, which only requires 70% of the heating energy come from site-recovered energy for the exemption.

FBC-EC R403.10.4 Gas- and Oil-Fired Pool and Spa Heaters

The FBC-EC includes efficiency requirements for gas- and oil-fired pool and spa heaters. This difference may slightly increase FBC-EC stringency relative to the IECC (in applicable cases and depending on typical practice).

FBC-EC R403.10.5 Heat Pump Pool Heaters

The FBC-EC includes efficiency requirements for heat pump pool heaters. This difference may slightly increase FBC-EC stringency relative to the IECC (in applicable cases and depending on typical practice).

FBC-EC R403.13 Dehumidifiers

FBC-EC Section R403.13 provides minimum efficiency, control, insulation and condensate disposal requirements for dehumidifiers (only applicable if dehumidifiers are installed):

> **R403.13 Dehumidifiers (Mandatory).** If installed, a dehumidifier shall conform to the following requirements:
>
> 1. The minimum rated efficiency of the dehumidifier shall be greater than 1.7 liters/ kWh if the total dehumidifier capacity for the house is less than 75 pints/day and greater than 2.38 liters/kWh if the total dehumidifier capacity for the house is greater than or equal to 75 pints/day.
> 2. The dehumidifier shall be controlled by a sensor that is installed in a location where it is exposed to mixed house air.
> 3. Any dehumidifier unit located in unconditioned space that treats air from conditioned space shall be insulated to a minimum of R-2.
> 4. Condensate disposal shall be in accordance with Section M1411.3.1 of the Florida Building Code, Residential.

Additional mandatory FBC-EC subsection R403.13.1 provides configuration and insulation requirements for ducted dehumidifiers. Depending on typical practice, in applicable cases, these changes together should increase the stringency of the 2023 FBC-EC slightly relative to the 2021 IECC.

IECC R404.1.1 Exterior lighting

With several exceptions (including for detached one and two family dwellings and compliance with Section R404.1), this new 2021 IECC section requires connected exterior lighting for residential buildings to comply with commercial exterior lighting Section C405.4. This IECC change will either have no impact on stringency or will somewhat decrease the stringency of the FBC-EC relative to the IECC.

IECC R404.2 Interior lighting controls

With several exceptions, this new mandatory IECC interior lighting controls section requires either a dimmer, occupant sensor or other control for permanently installed lighting fixtures. This IECC change will somewhat decrease the stringency of the FBC-EC relative to the IECC.

IECC R408.2 Additional Efficiency Package Options

New 2021 IECC Section R408.2 provides additional efficiency package options referenced in new Section R401.2.5 (discussed above):

- R408.2.1 provides an enhanced envelope performance option
- R408.2.2 provides a more efficient HVAC equipment performance option
- R408.2.3 provides a reduced energy use in service water-heating option
- R408.2.4 provides a more efficient duct thermal distribution system option
- R408.2.5 provides an improved air sealing and efficient ventilation system option.

In conjunction with Section R401.2.5, this new IECC section decreases FBC-EC Prescriptive and Energy Rating Index stringency relative to the IECC. This impact is modeled. For Performance compliance, the 2023 FBC-EC includes a 5% stringency reduction.

Other Mandatory Changes

There are several additional Mandatory differences between the 2023 FBC-EC and the 2021 IECC which either do not directly affect stringency or the impact of which would be difficult to determine, such as the Section R402.4 FBC-EC exception that allows R-2 Occupancies and multiple attached single family dwellings to comply with commercial code air leakage requirements.

Prescriptive Compliance

Section R402 of the 2021 IECC and 2023 FBC-EC provides residential building thermal envelope requirements for prescriptive compliance centered around component efficiencies listed in Tables R402.1.2 and R402.1.3 for the IECC and Tables R402.1.2 and R402.1.4 for the FBC-EC.

General Requirements Table R301.1

The 2021 IECC adds Palm Beach as a Climate Zone 1 county to the three it previously had. The FBC-EC includes three additional south Florida counties in Climate Zone 1. This change will have some impact on Prescriptive compliance in applicable cases.

FBC-EC Table R402.1.2 [IECC-EC Table R402.1.3] Insulation [Minimum R-values] and Fenestration Requirements by Component

IECC Section R402 Table R402.1.3 "Insulation Minimum R-values and Fenestration Requirements by Component" of the 2021 IECC provides specific requirements by building component together with clarifying notes:

TABLE R402.1.3 INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b, i]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE[g]	MASS WALL *R*-VALUE[h]	FLOOR *R*-VALUE	BASEMENT[c,g] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c,g] WALL *R*-VALUE
0	NR	0.75	0.25	30	13 or 0& 10ci	3/4	13	0	0	0
1	NR	0.75	0.25	30	13 or 0& 10ci	3/4	13	0	0	0
2	0.40	0.65	0.25	49	13 or 0& 10ci	4/6	13	0	0	0
3	.30	0.55	0.25	49	20 or 13& 5ci[h] or 0& 15ci[h]	8/13	19	5ci or 13[f]	10ci, 2 ft	5ci or 13[f]
4 except Marine	.30	0.55	0.40	60	30 or 20&5ci[h] or 13& 10ci[h] or 0&20ci[h]	8/13	19	10ci or 13	10ci, 4 ft	10ci or 13
5 and Marine 4	0.30[i]	0.55	0.40	60	30 or 20&5ci[h] or 13& 10ci[h] or 0&20ci[h]	13/17	30	15ci or 19 or 13& 5ci	10ci, 4 ft	15ci or 19 or 13& 5ci
6	0.30[i]	0.55	NR	60	30 or 20&5ci[h] or 13& 10ci[h] or 0&20ci[h]	15/20	30	15ci or 19 or 13& 5ci	10ci, 4 ft	15ci or 19 or 13& 5ci
7 and 8	0.30[i]	0.55	NR	60	30 or 20&5ci[h] or 13&10ci[h] or 0&20ci[h]	19/21	38	15ci or 19 or 13& 5ci	10ci, 4 ft	15ci or 19 or 13& 5ci

For SI: 1 foot = 304.8 mm.

NR = Not Required.

ci = continuous insulation.

a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not 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: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.

c. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13&5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.

d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation *R*-value for slabs. as indicated in the table. The slab-edge insulation for heated slabs shall not be required to extend below the slab.

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. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "13&5" means R-13 cavity insulation plus R-5 continuous insulation.

h. Mass walls shall be in accordance with Section R402.2.5. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.

i. A maximum *U*-factor of 0.32 shall apply in Climate Zones 3 through 8 to vertical fenestration products installed in buildings located either:

1. Above 4,000 feet in elevation, or
2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.

While only Climate Zones 1 and 2 of this table apply to Florida, the 2023 FBC-EC also includes this entire table.

Applicable differences to this table between the IECC and FBC-EC include a new, higher IECC Climate Zone 2 ceiling *R*-value requirement of R-49 vs. R-38 for the FBC-EC. This change

decreases 2023 FBC-EC Prescriptive compliance stringency somewhat relative to the 2021 IECC in applicable cases. This impact is modeled.

Another difference for this table is the addition of note "j" to the FBC-EC version of the table:

> j. For impact rated fenestration complying with Section R301.2.1.2 of the *Florida Building Code, Residential* or Section 1609.1.2 of the *Florida Building Code, Building* the maximum *U*-factor shall be 0.65 in Climate Zone 2.

In allowing a maximum Climate Zone 2 *U*-factor of 0.65 for impact rated fenestration vs. the 2021 IECC's 0.4 value which does not differentiate for impact fenestration, the note "j" change decreases 2023 FBC-EC Prescriptive compliance stringency slightly in applicable cases relative to the 2021 IECC.

FBC-EC Table R402.1.4 [IECC Table R402.1.2] Equivalent [*Maximum Assembly] U-Factors [and Fenestration Requirements]*

Table R402.1.2 "Maximum Assembly *U*-Factors and Fenestration Requirements" of the 2021 IECC provides assembly *U*-factors for a number of components that can be used as alternatives to *R*-value requirements in Table R402.1.3:

TABLE R402.1.2 MAXIMUM ASSEMBLY *U*-FACTORS[a] AND FENESTRATION REQUIREMENTS

CLIMATE ZONE	FENESTRATION *U*-FACTOR[f]	SKYLIGHT *U*-FACTOR	GLAZED FENESTRATION SHGC[d, e]	CEILING *U*-FACTOR	WOOD FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
0	0.50	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477
1	0.50	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.25	0.026	0.084	0.165	0.064	0.360	0.477
3	0.30	0.55	0.25	0.026	0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.30	0.55	0.40	0.024	0.045	0.098	0.047	0.059	0.065
5 and Marine 4	0.30	0.55	0.40	0.024	0.045	0.082	0.033	0.050	0.055
6	0.30	0.55	NR	0.024	0.045	0.060	0.033	0.050	0.055
7 and 8	0.30	0.55	NR	0.024	0.045	0.057	0.028	0.050	0.055

For SI: 1 foot = 304.8 mm.

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. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 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. In Warm Humid locations as defined by Figure R301.1 and Table R301.1, the basement wall *U*-factor shall not exceed 0.360.

d. The SHGC column applies to all glazed fenestration.

Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.

e. There are no SHGC requirements in the Marine Zone.

f. A maximum *U*-factor of 0.32 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:

1. Above 4,000 feet in elevation above sea level, or
2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.

Only Climate Zones 1 and 2 of the table apply to Florida, but the 2023 FBC-EC again includes the entire table.

Corresponding to the 2021 IECC Table R402.1.3 stringency increase for Climate Zone 2 ceiling *R*-value, the IECC Table R402.1.2 maximum Climate Zone 2 ceiling *U*-factor has been decreased from 0.030 to 0.026 while the 2023 FBC-EC value remains at 0.030. This IECC change decreases 2023 FBC-EC Prescriptive compliance stringency somewhat relative to the 2021 IECC in applicable cases. This impact is modeled as part of UA calculation.

Otherwise only slight wording changes exist between the two codes for applicable sections of the table.

R402.2.1 Ceilings with attics

The 2021 IECC includes an allowance for ceilings with attic spaces where installing R-38 insulation over 100 percent of the ceiling or attic area requiring insulation is deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. The 2023 FBC-EC includes the same allowance, except allows R-30 insulation instead of the otherwise required R-38. These changes maintain the 2021 IECC's slight increase in stringency relative to the 2023 FBC-EC in applicable Prescriptive compliance cases.

R402.2.2 Ceilings without attics

The 2021 IECC includes an allowance for R-30 insulation for ceilings without attic spaces that do not have sufficient space for otherwise required above R-30 insulation, if the R-30 insulation extends over the top of the wall plate to the outer edge of the plate and not be compressed. The 2023 FBC-EC includes the same allowance, except does not include the requirement for the insulation to extend over the top of the wall plate to the outer edge of the plate and not be compressed. The change may make the 2021 IECC slightly more stringent than the 2023 FBC-EC in applicable Prescriptive compliance cases and depending on typical practice.

FBC-EC R402.2.9 [IECC R402.2.8] Basement Walls

The IECC unconditioned basement wall insulation exception includes more requirements than does the FBC-EC. This difference slightly decreases stringency of Prescriptive FBC-EC compliance relative to the IECC (in applicable cases).

FBC-EC R402.2.13 Sunroom Insulation [IECC R402.2.12 Sunroom and Heated Garage Insulation]

In the 2021 IECC, heated garages must now also meet this section's sunroom insulation requirements and are also eligible for the sunroom thermal isolation exceptions. This change slightly decreases FBC-EC Prescriptive stringency relative to the IECC (in applicable cases).

R402.3.5 Sunroom Fenestration [IECC Sunroom and Heated Garage Fenestration]

In the 2021 IECC, heated garages must now also meet this section's sunroom fenestration requirements and are also eligible for the sunroom thermal isolation exceptions. This change slightly decreases FBC-EC Prescriptive stringency relative to the IECC (in applicable cases).

IECC R403.3.2 Ducts located in conditioned space

The 2021 IECC includes a section that specifies four separate conditions under which ducts are considered as being inside conditioned space:

1. Duct systems that are "located completely within the continuous air barrier and within the building thermal envelope"
2. Buried ducts that meet specified air handler location (within the continuous air barrier and building thermal envelope), duct leakage, and ceiling insulation R-value requirements
3. Ductwork in floor cavities located over unconditioned space if air barrier, insulation installation, and cavity insulation R-value requirements are met
4. Ductwork located within exterior walls if air barrier and cavity insulation R-value and requirements are met.

Regarding the first condition, ducts that are completely within the continuous air barrier and building thermal envelope may still be in an unconditioned space such as a sealed attic. Duct work in sealed attics typically experiences summer afternoon temperatures about 5°F higher than conditioned space temperatures,[2] so the specified condition is not equivalent to being inside conditioned space. The second, third, and fourth conditions are also not always tested to be equivalent to being inside conditioned space. So this section slightly increases Prescriptive FBC-EC stringency relative to the IECC (in applicable cases).

IECC R403.3.3 Ducts Buried Within Ceiling Insulation

This IECC section provides Prescriptive requirements for ducts buried within ceiling insulation. Little or no stringency impact is anticipated (in applicable cases).

FBC-EC R403.3.4 [IECC R403.3.6] Duct Leakage

The 2021 IECC adds Prescriptive compliance total duct leakage limit of 8 cfm/100 sq. ft. for cases in which all ducts and air handlers are located entirely within the building thermal envelope. This change somewhat decreases FBC-EC Prescriptive stringency compliance relative to the IECC (in applicable cases).

FBC-EC R403.3.6 Air Handling units

The 2023 FBC-EC includes Section R403.3.6 which prohibits the installation of air handlers in attics for prescriptive compliance:

[2] Parker, D., J. Sonne, and J. Sherwin. 2002. Comparative Evaluation of the Impact of Roofing Systems on Residential Cooling Energy Demand in Florida. Proceedings of ACEEE 2002 Summer Study, American Council for an Energy Efficient Economy, Washington, DC; https://www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-1220-00.pdf

> **R403.3.6 Air-handling units.** Air handling units shall not be installed in the attic when a home is brought into code compliance by Section R402. …

There are a number of new homes, particularly in South Florida, where installing air handlers in the attic is common. While the number of air handlers that would have been installed in attics in Florida without this code section cannot be known, this section makes 2023 FBC-EC Prescriptive compliance more stringent than 2021 IECC Prescriptive compliance. This impact is modeled.

FBC-EC R403.7.2. Electric space heating

The 2023 FBC-EC prohibits electric resistance space heating from being the primary heating system used in Climate Zone 2 for Prescriptive compliance. This change makes the FBC-EC more stringent than the IECC in applicable Prescriptive cases. This impact is modeled.

IECC R404.3 Exterior Lighting Controls

A new Prescriptive IECC section requires specified automatic shut off controls where total permanent installed exterior lighting power is greater than 30 watts. This addition somewhat decreases FBC-EC Prescriptive stringency relative to the IECC (in applicable cases).

Performance Compliance

Section R405 of the 2021 IECC and 2023 FBC-EC provides a Simulated Performance Alternative, or "Performance" compliance option that compares heating, cooling and water heating energy costs (IECC) or annual loads (FBC-EC) for a proposed project building with those of a reference building of the same size. The 2023 FBC-EC includes a number of Performance compliance differences from the 2021 IECC.

Traded-off Differences

The 2023 FBC-EC and 2021 IECC include a number of Performance requirements that can be traded-off, thus not having an impact on overall stringency. For example, per Section R405.2, the 2021 IECC requires 2009 IECC envelope efficiency minimums which stipulate a minimum ceiling R-value of R-30 for Climate Zones 1 and 2, while per Section R405.2.1, the 2023 FBC-EC allows R-19 ceiling insulation, and that space permitting. While the IECC ceiling R-value minimum is more stringent than that of the FBC-EC, if R-19 ceiling insulation is stipulated for a FBC-EC project, the lower insulation level must be made up elsewhere to allow the project to pass, maintaining stringency.

FBC-EC Table R402.1.4 [IECC Table R402.1.2] Equivalent [Maximum Assembly] U-Factors [and Fenestration Requirements]

The maximum 2021 IECC Table R402.1.2 ceiling *U*-factor in Climate Zones 2 and 3 is reduced from 0.030 to 0.026. Since this change increases stringency of the IECC standard reference design, it decreases FBC-EC Climate Zone 2 Performance stringency relative to the IECC. This impact is modeled.

FBC-EC R405.2.2 Building air leakage testing

The 2023 FBC-EC includes Section R405.2.2 which clarifies Performance compliance building air leakage rate limits:

> **R405.2.2 Building air leakage testing.** Building or dwelling air leakage testing shall be in accordance with Sections R402.4 through R402.4.1.2. If an air leakage rate below seven air changes per hour at a pressure of 0.2 inch w.g. (50 Pascals) is specified for the *proposed design*, testing shall verify the air leakage rate does not exceed the air leakage rate of the *proposed design* instead of seven air changes per hour.

Based on anecdotal evidence of typical practice and enforcement, this difference should slightly increase the stringency of the 2023 FBC-EC compared with the 2021 IECC.

FBC-EC R405.2.3 Duct air leakage testing

The 2023 FBC-EC includes Section R405.2.3 which clarifies when Performance compliance duct air leakage testing is required, and in cases where testing is required, that the maximum leakage rate allowed is the leakage value entered for the *proposed design*:

> **R405.2.3 Duct air leakage testing.** In cases where duct air leakage lower than the default Qn to outside of 0.080 (where Qn = duct leakage to the outside in cfm per 100 square feet of conditioned floor area tested at 25 Pascals) is specified for the *proposed design*, testing in accordance with Section R403.3.2 shall verify a duct air leakage rate not exceeding the leakage rate of the *proposed design*. Otherwise, in accordance with Section R403.3.3, duct testing is not mandatory for buildings complying by Section R405.

Based on anecdotal evidence of typical practice and enforcement, this difference should slightly increase the stringency of the FBC-EC compared with the IECC for those cases where FBC-EC ducts are tested.

FBC-EC R403.3.3 Duct Testing

An FBC-EC exception clarifies that Performance compliance duct air leakage testing is only required when credit is taken for leakage below default level. Being similar to the Section R405.2.3 clarification directly above, this clarification should also likely slightly increase the stringency of FBC-EC compliance compared with IECC (in applicable cases).

FBC-EC R403.3.3 Duct Testing

As shown above in the Mandatory Requirements section of this report, an exception included in Section R403.3.3 of the FBC-EC allows compliance via the Performance method without duct leakage testing, regardless of whether the ducts are in conditioned space or not. While this exception allows leakier ducts for Florida Performance compliance, since there is a non-tested

"default leakage penalty" built into the calculation and again the Performance compliance method maintains a set overall efficiency requirement, it does not make the 2023 FBC-EC less stringent than the 2021 IECC.

FBC-EC R405.3 [IECC R405.2] Performance-based Compliance

While still maintaining its annual energy cost based compliance methodology, Section R405.2 Performance-based compliance of the 2021 IECC was significantly revised from the 2018 version into separate sections that stipulate mandatory requirements, building thermal envelope efficiency minimums, and maximum annual energy cost. The FBC-EC on the other hand continues to use a loads based compliance methodology and in the 2023 edition increases compliance stringency by 5 percent. The 2021 IECC performance compliance stringency allows envelope or equipment efficiencies or a 5% reduction stipulated in Section R401.2.5. As noted above:

> The 2021 IECC adds an "additional energy efficiency" section which stipulates additional efficiency requirements for all compliance options:
>
> - For Prescriptive compliance, one of the Section R408.2 package options
> - For Performance compliance, one of the Section R408.2 package options or 5% reduction in annual energy cost
> - For Energy Rating Index compliance, a 5% reduction from the target Index.

While there are clear compliance calculation differences between the two codes, with the exception of the new IECC building thermal envelope backstop, these differences already existed between the 2018 IECC and 2020 FBC-EC, with the two codes historically still providing similar stringencies. This impact is modeled.

IECC R405.2 Performance-Based Compliance

Via a Table R405.2 reference to Section R403.3.5, 2021 IECC Performance compliance requires total leakage duct testing (but does not stipulate a maximum Performance compliance duct leakage) while the FBC-EC does not require duct testing for Performance projects for default level duct leakage. This difference may slightly decrease the stringency of FBC-EC Performance compliance compared with the IECC.

FBC-EC Table R405.5.2(1) [IECC Table R405.4.2(1)] Specifications for the Standard Reference and Proposed Designs

Both the 2023 FBC-EC and 2021 IECC provide Performance compliance Standard Reference and Proposed Design specifications in Table R405.5.2(1) [IECC Table R405.4.2(1)]. Differences in these specifications between the two codes are discussed individually below.

FBC-EC Table R405.5.2(1) [IECC Table R405.4.2(1)] Air Exchange Rate

The 2023 FBC-EC changes the Standard Reference Design air leakage rate to ACH50 = 7 from ACH50 = 5 in the 2021 IECC. Differences starting from the 2021 IECC are shown in strike-out and underline format:

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	~~The~~ Air leakage rate of 7.00 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8 at a pressure of 0.2 inch w.g. (50 Pa). ~~shall be~~ ~~*Climate Zones* 0 through 2: 5 air changes per hour.~~ ~~*Climate Zones* 3 through 8: 3 air changes per hour.~~ The mechanical ventilation rate shall be in addition to the air leakage rate and ~~shall be~~ the same as in the proposed design, but not ~~greater~~ than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: *CFA* = conditioned floor area, ~~ft²~~. N_{br} = number of bedrooms~~.~~ ~~The mechanical ventilation system type shall be the same as in the proposed design.~~ Energy recovery shall not be assumed for mechanical ventilation.	The measured air exchange rate[a]. The mechanical ventilation rate[b] shall be in addition to the air leakage rate and shall be as proposed.

The reference air leakage rate difference increases the Florida Reference cooling and heating loads, so decreases the stringency of the 2023 FBC-EC relative to the 2021 IECC. This impact is modeled.

FBC-EC Table R405.5.2(1) Dehumidification Systems and Dehumidistat

The 2023 FBC-EC includes Standard Reference Design and Proposed Design Dehumidification Systems and Dehumidistat specifications (related to mandatory Section R403.13 discussed above). The 2021 IECC adds dehumidification system and dehumidistat specifications in a new Table R405.4.2(1) Dehumidistat section, but only for when a mechanical ventilation system with latent heat recovery is specified. Differences starting from the 2021 IECC are shown in strike-out and underline format:

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Dehumidification Systems	None, except where dehumidification equipment is specified by the proposed design, in which case: Fuel Type: electric Capacity: sufficient to maintain humidity at setpoint all hours Efficiency: 1.7 liters/kWh if proposed house total capacity is less than 75 pints/ day; 2.38 liters/kWh if proposed house total capacity is greater than or equal to 75 pints per day Location: in conditioned space Dehumidifier Ducts: None Dehumidifier Duct Location: N/A Dehumidifier Duct *R*-Value: N/A Dehumidifier Duct Surface Area: N/A	As proposed As proposed Sufficient to maintain humidity at setpoint all hours As proposed As proposed As proposed As proposed As proposed As proposed
Dehumidistat	~~Where a mechanical ventilation system with latent heat recovery is not specified in the proposed design:~~ ~~None~~ ~~Where the proposed design utilizes a mechanical ventilation system with latent heat recovery:~~ ~~Dehumidistat type: manual, setpoint = 60% relative humidity.~~ ~~Dehumidifier: whole-dwelling with integrated energy factor = 1.77 liters/kWh.~~ None, except where dehumidification equipment is specified by the proposed	Same as standard reference design

	design, in which case: Setpoint turn on = 60% relative humidity Setpoint turn off = 55% relative humidity	

Depending on typical practice, these changes should increase the stringency of 2023 FBC-EC Performance compliance slightly relative to the 2021 IECC in applicable cases.

Table R405.5.2(1) [IECC Table R405.4.2(1)] Equipment Efficiency Differences

Consistent with its previous edition, Table R405.4.2(1) of the 2021 IECC stipulates that the Standard Reference Design's space heating system, cooling system and service water heating efficiencies be the same as the efficiencies of the Proposed Design. The 2023 FBC-EC, also consistent with the previous edition of this code, instead stipulates Standard Reference Design heating, cooling and water heating efficiencies to be "in accordance with prevailing Federal minimum standards." This difference in effect means that while both the IECC and FBC-EC Performance compliance methods allow a number of component efficiency "trade-offs," the IECC does not include equipment efficiency trade-off options except as noted above to meet the requirements of section R401.2.5 while the FBC-EC does include equipment efficiency trade-offs. Since however both codes' Performance compliance methods again maintain a set overall efficiency requirement, this difference will not make 2023 FBC-EC Performance compliance less stringent than the 2021 IECC.

FBC-EC Table R405.5.2(1) [IECC Table R405.4.2(1)] Service Water Heating

The 2023 FBC-EC specifies the service water heating Standard Reference Design and Proposed Design use and energy consumption to be determined according to ANSI/RESNET/ICC Standard 301. The 2021 IECC added an adjustment for hot water distribution system compactness to its Proposed Design specifications. Differences starting from the 2021 IECC are shown in strike-out and underline format:

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Service water heating[d, e, f, g]	Fuel type: As proposed~~.~~ Use (gal/day): determined in accordance with ANSI/RESNET/ICC 301~~, in units of gal/day = 2.5.5 + (8.5 x Nbr)~~. ~~where:~~ ~~Nbr = number of bedrooms.~~	Fuel type: As proposed Use~~, in units of~~ gal/day = determined in accordance with ANSI/ RESNET/ICC 301 ~~2.5.5 + (8.5 x Nbr) x (1 – HWDS)~~ ~~where:~~

	Efficiency: in accordance with prevailing federal minimum standards Energy consumption: determined in accordance with ANSI/RESNET/ICC 301	~~*Nbr* = number of bedrooms.~~ ~~HWDS = factor for the compactness of the hot water distribution system.~~

Compactness ratio[i] factor		HWDS
1 story	2 or more stories	
> 60%	> 30%	0
~~> 30% to < 60%~~	~~> 15% to < 30%~~	~~0.05~~
> 15% to ≤ 30%	> 7.5% to ≤ 15%	0.10
< 15%	< 7.5%	0.15

Efficiency: as proposed

Energy consumption: determined in accordance with ANSI/RESNET/ICC 301

The stringency impact of the FBC-EC's ANSI/RESNET/ICC Standard 301 service water heating specifications will be minimal for a base code storage type system, and will vary for other system types and measures (e.g. tankless systems, heat pumps, systems with recirculation, and systems with pipe insulation and reduced pipe length). Detailed impacts are discussed in the Florida Building Commission funded research report *Improved Hot Water Code Calculation.*[3] Since the FBC-EC's calculations also already adjust for reduced pipe length, the impact of the 2021 IECC's hot water distribution system compactness adjustment should be minimal. Generally the Florida calculation hot water calculation shows less water heating energy than the equation used in the IECC. However, the quantity of hot water applies to both the reference and proposed design. The difference between FBC-EC and IECC hot water gallons may sometimes affect a house's overall compliance because it is the sum of heating, cooling, and water heating energy use that is compared between the proposed and reference home. For our simulations we maintained the IECC calculation of gallons for both.

[3] https://publications.energyresearch.ucf.edu/wp-content/uploads/2018/06/FSEC-CR-2066-17.pdf

FBC-EC Table R405.5.2(1) [IECC Table R405.4.2(1)] Thermal Distribution Systems

Differences between the 2023 FBC-EC and 2021 IECC thermal distribution systems Standard Reference Design and Proposed Design specifications are shown below (differences starting from the 2021 IECC are shown in strike-out and underline format):

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	Duct insulation: R-6 in accordance with Section R403.3.1. A thermal Ddistribution system efficiency: (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies for all systems other than tested duct systems. Duct location: same as proposed design entirely within the building thermal envelope. **Exception:** For nonducted heating and cooling systems that do not have a fan, the standard reference design thermal distribution system efficiency (DSE) shall be 1. For tested duct systems, the leakage rate shall be 4 cfm (113.3 L/min) per 100 ft^2 (9.29 m2) of *conditioned floor area* at a pressure of differential of 0.1 inch w.g. (25 Pa). Air handler location: entirely within the building thermal envelope	Duct insulation: As proposed. Thermal distribution system efficiency shall be Aas tested in accordance with ANSI/RESNET/ICC 380 or, if where not tested, shall be modeled as a Qn to outside of 0.080 for ducted systems. Hydronic and ductless systems shall be as specified in Table R405.5.2(2) if not tested. Duct location: Aas proposed As proposed

The Standard Reference Design duct insulation level difference results in the 2021 IECC being slightly more stringent for most projects with attic ducts. The Reference distribution system efficiency (DSE) for projects with non-tested duct systems is 0.88 in both codes, so since the

majority of Florida projects comply with non-tested ducts, there is no DSE stringency difference between the two codes in most cases. The FBC-EC Proposed Design Qn to outside requirement should match the 0.88 DSE typically but allows for credit/reduction for heat loss and gain based on duct location and attic configuration and also allows for consistent results between planned projects and fully tested projects. Field testers know the target they are trying to hit. The FBC-EC stipulation that the reference design duct location to be entirely within the building thermal envelope somewhat increases stringency of FBC-EC relative to the IECC in most Performance compliance cases.

FBC-EC Table R405.5.2(1) [IECC Table R405.4.2(1)] Footnote "a"

Consistent with Section R402.4.1.2 and as discussed above in the Mandatory Requirements section, Table R405.5.2(1) footnote "a" in the 2021 IECC continues to allow the requirement for approved building air leakage testers to be at the discretion of the code official. This difference may result in 2023 FBC-EC Performance compliance being slightly more stringent in some cases, depending on typical practice.

FBC-EC Table R405.5.2(1) [IECC Table R405.4.2(1)] Footnote "e"

The 2023 FBC-EC Table R405.5.2(1) footnote "e" adds a clarification for how projects without proposed heating systems should be handled (clarification text added in the 2023 FBC-EC is underlined):

> e. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design and this heating system shall be an electric heat pump if the proposed design has an electric water heater.

Since this clarification applies to both the Standard Reference Design and Proposed Design equally, stringency impacts, if any, will be relatively minor.

FBC-EC Table R405.5.2(1) [IECC Table R405.4.2(1)] Footnote "h" [Regarding Multi-family Projects]

The 2023 FBC-EC increases the Standard Reference Design's multi-family fenestration area adjustment backstop value in footnote "h" from 0.56 in the 2021 IECC to 0.80. In applicable multi-family cases, this backstop increase in turn increases the FBC-EC Reference Design's fenestration area, decreasing the stringency of 2023 FBC-EC Performance compliance relative to the 2021 IECC. This impact is modeled.

FBC-EC R405.5.3 Calculation requirements for glazing

The 2023 FBC-EC includes Section R405.5.3 which provides additional Performance compliance window and door calculation clarifications, including window area measurement requirements, a window area exception for additions, overhang measurement details, and specifications for how doors with glazing are to be handled. Each subsection is discussed below. A parallel to

FBC-EC Section R405.5.3 is not included in the 2021 IECC except as detailed below. IECC Section R402.5 also addresses maximum fenestration SHGC.

FBC-EC R405.5.3.1 Glass Areas

The 2023 FBC-EC includes Section R405.5.3.1 regarding glass area:

> **R405.5.3.1 Glass areas.** All glazing areas of a residence, including windows, sliding glass doors, glass in doors, skylights, etc. shall include the manufacturer's frame area in the total window area. Window measurements shall be as specified on the plans and specifications for the residence.
>
> > **Exception:** When a window in existing exterior walls is enclosed by an addition, an amount equal to the area of this window may be subtracted from the glazing area for the addition for that overhang and orientation.

Depending on typical practice, the stipulation to include the manufacturer's frame area in the total window area may increase the stringency of the 2023 FBC-EC slightly relative to the 2021 IECC. In the case of applicable additions, the exception included with this subsection will slightly decrease the stringency of FBC-EC Performance compliance relative to the IECC.

FBC-EC R405.5.3.2 Overhangs

The 2023 FBC-EC includes Section R405.5.3.2 regarding window overhangs:

> **R405.5.3.2 Overhangs.** Overhang effect is measured by Overhang Separation, which is the vertical measure of the distance from the top of a window to the bottom of the overhang. The overhang for adjustable exterior shading devices shall be determined at its most extended position. Nonpermanent shading devices such as canvas awnings shall not be considered overhangs. Permanently attached wood and metal awnings may be considered overhangs.

Depending on typical practice, the overhang stipulations included in this subsection may increase the stringency of 2023 FBC-EC Performance compliance slightly relative to the 2021 IECC.

FBC-EC R405.5.3.3 Doors with glazing

One potentially impactful glazing related difference between the 2023 FBC-EC and 2021 IECC stems from a difference in how the two codes address doors with glazing. In Chapter 2 the IECC defines an opaque door as "a door that is not less than 50 percent opaque in surface area" while Section R405.5.3.3 of the FBC-EC on the other hand states:

> **R405.5.3.3 Doors with glazing.** For doors that are opaque or where the glass is less than one-third of the area of the door, the total door area shall be included in the door calculation. For unlabeled sliding glass doors or when glass areas in doors are greater than or equal to one-third of the area of the door, the glazing portion shall be included in the glazing calculation and the opaque portion of the door shall

be included in the door calculation. When glass areas in doors are greater than or equal to one-third of the area of the door, the door shall be included in the glazing calculation as a total fenestration using the tested U-factor and solar heat gain coefficient.

These differences between the FBC-EC and IECC may result in homes with French doors (which are often around 50% opaque and 50% transparent) to be treated differently for Performance compliance by the two codes, in some cases resulting in the 2021 IECC being somewhat less stringent than the 2023 FBC-EC.

FBC-EC R405.5.3.4 Maximum Fenestration SHGC

The 2023 FBC-EC includes Section R405.5.3.4 regarding maximum fenestration SHGC and overhang depth:

> **R405.5.3.4 Maximum fenestration SHGC.** The Proposed Design must have either an area-weighted average maximum fenestration SHGC of 0.50 or a window area-weighted average overhang depth of 4.0 feet or greater (all conditioned space windows must be included in the calculation). The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Section R402.1.4 or R405 shall be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 in Climate Zones 1 through 3 shall be 0.50.

Section R402.5 of the 2021 IECC includes a Climate Zones 0 through 3 area-weighted average maximum fenestration SHGC of 0.40 (reduced from 0.50 in the 2018 IECC) for Performance compliance, with new exception for storm shelters. Per above, the 2023 FBC-EC allows an area-weighted average maximum SHGC of 0.50 and adds the four foot overhang depth alternative to the SHGC requirement. Due to efficiency trade-off allowances (both codes allowing envelope trade-offs), both the maximum SHGC difference between the codes and FBC-EC overhang exception should not affect Performance compliance results.

FBC-EC R405.6.3.1 Water Heating Efficiency Adjustment Factors

The 2023 FBC-EC includes updated Section R405.6.3.1 regarding efficiency adjustments for instantaneous water heaters (2023 update underlined):

> **R405.6.3.1 Water Heating efficiency adjustment factors.** The Energy Factor (EF) of an instantaneous water heater (those with capacity of two gallons (7.57 L) or less) in the Proposed home shall be reduced to 92% of the value in the manufacturer's documentation or AHRI *Directory of Certified Product Performance*. The Uniform Energy Factor (UEF) of an instantaneous water heater in the proposed home shall be reduced to 94 percent of the value in the manufacturer's documentation or AHRI *Directory of Certified Product Performance*.

In applicable instantaneous water heater cases, these adjustments will increase the stringency of 2023 FBC-EC Performance compliance somewhat relative to the 2021 IECC.

FBC-EC R405.7 Performance Compliance Credit Option Criteria

Section R405.7 of the 2023 FBC-EC includes criteria for six Performance compliance credit options: attic radiant barriers and interior radiation control coatings, cool roofs, cross ventilation, whole house fans, ceiling fans and heat recovery units.[4] IECC Performance compliance also allows most of these credits, but does not include the compliance criteria stipulated for them in the FBC-EC. So depending on typical practice, these criteria may slightly increase the stringency of 2023 FBC-EC Performance compliance compared to the 2021 IECC.

FBC-EC R405.7.1 Installation Criteria for Homes Claiming the Radiant Barrier Option

A 2023 FBC-EC change increases the operative surface emissivity limit for sheet radiant barriers from 0.06 to 0.10. The change may slightly decrease Performance stringency of the FBC-EC relative to the IECC (in applicable cases).

Energy Rating Index Compliance

Section R406 of the 2021 IECC and 2023 FBC-EC provides an Energy Rating Index or "ERI" compliance alternative that adds appliances and lighting to the heating, cooling and water heating loads included in Performance (R405) compliance calculations.

The 2023 FBC-EC has a number of ERI compliance differences from the 2021 IECC, with changes between the 2018 and 2021 IECC making a section by section comparison difficult.

Section R406.2 of the 2023 FBC-EC in part specifies mandatory requirements for ERI projects as being "Sections R401 through R404 labeled as "mandatory" and Section R403.5.3 of the 2015 International Energy Conservation Code." The 2021 IECC provides its mandatory ERI requirements in Table R406.2. While many of the requirements are in common, the IECC specifies a number that are not in the FBC-EC. These include sections regarding eave baffles, insulation retention, interior lighting controls, and higher R-values for ducts outside of the thermal envelope. On the other hand, FBC-EC ERI compliance requires rater verification and air leakage testing to be performed by specified testers, while the IECC leaves qualifications up to the code official.

[4] This section of the 2023 FBC-EC also provides criteria for unvented attics, but the 2021 International Residential Code includes similar criteria which would apply to 2021 IECC compliance.

Both the 2021 IECC and 2023 FBC-EC base their ERI thermal envelope efficiency requirements on whether on-site renewable power is included or not. For projects where on-site renewable power is not included for compliance, the IECC moved from a 2009 IECC Table 402.1.1 or 402.1.3 envelope efficiency requirement in the 2018 IECC to a total UA based envelope efficiency requirement for 2021. For projects where on-site renewable power is included for compliance, the 2021 IECC requires Table R402.1.2 or R402.1.4 envelope efficiency requirements from the 2018 IECC (vs. from the 2015 versions of these tables for the 2018 IECC). The 2023 FBC-EC on the other hand still continues to require 2009 IECC versions of these tables as the ERI envelope efficiency requirement if on-site renewables are not utilized for compliance, and 2015 IECC versions of the tables if on-site renewables are utilized for compliance.

FBC-EC R406.3 [IECC R406.4] Energy Rating Index

Energy Rating Index section differences between the 2023 FBC-EC and 2021 IECC are as shown here (changes from the 2021 IECC are shown in strike-out and underline format):

> **R406.3 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 annual total normalized modified loads of the *rated design* relative to the annual total loads of the *ERI reference design*. The ERI shall consider all energy used in the *residential building*. ~~determined in accordance with RESNET/ICC 301 except for buildings covered by the *International Residential Code*, the ERI Reference Design Ventilation rate shall be in accordance with Equation 4-2.~~
>
> ~~Ventilation rate, CFM = (0.01 × total square foot area of house) + [7.5 × (number of bedrooms + 1)] (Equation 4-2)~~
>
> Energy used to recharge or refuel a vehicle for on-road (and off-site) ~~used for~~ transportation purposes ~~on roads that are not on the building site~~ shall not be included in the *ERI reference design* or the *rated design*. ~~For compliance purposes, any reduction in energy use of the rated design associated with on-site renewable energy shall not exceed 5 percent of the total energy use.~~

The FBC-EC differences eliminate the Equation 4-2 exception which has been interpreted differently by various building scientists. It is difficult to assess the stringency impact of the difference between these versions.

Maximum Energy Rating Index

The 2023 FBC-EC and 2021 IECC now both specify the 2019 version of ANSI/RESNET/ICC 301 for ERI calculations. The two codes however have different maximum Energy Rating Index values for Florida, with the IECC now requiring an Index of no greater than 52 in both Florida climate

zones (reduced from 57 in the 2018 IECC) and the FBC-EC continuing to require an Index of no greater than 58. The 2021 IECC also has an ERI compliance stringency increase stipulated in new Section R401.2.5 which requires that the Index be at least 5 percent less than the specified targets. So FBC-EC ERI compliance is now decidedly less stringent.

Other ERI Differences

There are several additional ERI section differences between the 2023 FBC-EC and 2021 IECC regarding software tool capabilities and approval, but the effects of these differences on stringency would be difficult to estimate without long-term field data. As touched on above, the 2023 FBC-EC also requires that verification of ERI compliance be completed "in accordance with Florida Statutes 553.990 (Building Energy Efficiency Rating System)" which includes verifier qualification requirements. These qualification requirements may result in greater Florida ERI accuracy consistency, but it would again be difficult to estimate impact on stringency without long-term field data.

Other Relevant Code Changes

Three additional differences between the 2023 Florida codes and 2021 International codes that are not included in Chapter 4 of the FBC-EC but still affect code stringency are noted below.

Florida Residential Code Section M1602.3 Balanced Return Air

The 2023 Florida Building Code, Residential volume (FRC) includes a thermal distribution system return air provision that is not included in the 2021 International Residential Code (IRC) that directly affects house air pressures and infiltration, and in turn energy use:

> **M1602.3 Balanced Return Air.** Restricted return air occurs in buildings when returns are located in central zones and closed interior doors impede air flow to the return grill or when ceiling spaces are used as return plenums and fire walls restrict air movement from one portion of the return plenum to another. Provisions shall be made in both residential and commercial buildings to avoid unbalanced air flows and pressure differentials caused by restricted return air. Pressure differentials across closed doors where returns are centrally located shall be limited to 0.01 inch WC (2.5 Pa) or less. Pressure differentials across fire walls in ceiling space plenums shall be limited to 0.01 inch WC (2.5 Pa) by providing air duct pathways or air transfer pathways from the high pressure zone to the low zone.
>
> **Exceptions:**
>
> 1. Transfer ducts may achieve this by increasing the return transfer 1½ times the cross sectional area (square inches) of the supply duct entering the room or space it is serving and the door having at least an unrestricted 1 inch undercut to achieve proper return air balance.

2. Transfer grilles shall use 50 square inches (of grille area) to 100 cfm (of supply air) for sizing through-the-wall transfer grilles and using an unrestricted 1 inch undercutting of doors to achieve proper return air balance.

3. Habitable rooms only shall be required to meet these requirements for proper balanced return air excluding bathrooms, closets, storage rooms and laundry rooms, except that all supply air into the master suite shall be included.

Research in 70 central Florida homes before this provision was added to the Florida Residential Code (Cummings and Withers 2006) found the average infiltration rate increased from 0.46 air changes per hour (ach) when the air hander was operating and all interior doors were open to 0.60 ach when all interior doors were closed. By reducing room pressures with respect to the outdoors and unconditioned spaces, this return air provision reduces infiltration, resulting in a lower overall infiltration rate and energy savings. However, since the infiltration increase measured in the research above was for all interior doors closed and, based on homeowner reports from the same study interior doors are estimated to all be closed only 11% of the time on average, the stringency increase is somewhat limited.

Florida Residential Code Section R303.4 Mechanical Ventilation

The 2023 Florida Building Code, Residential volume (FRC) includes a whole-house mechanical ventilation requirement "trigger" of < 3 ACH50. Since the 2021 IECC has a maximum allowed ACH50 of 5 and requires mechanical ventilation for all dwelling units complying with the IECC, there is a 2 ACH50 mechanical ventilation requirement difference between the two codes. While the average new home ACH50 in Florida is over 5 (Withers et al. 2012), there is significant spread in the ACH50 values (Vieira et al. 2016), so this ventilation trigger difference will mean a number of homes that would have been required to have mechanical ventilation under the 2021 IRC will not be required to have it under the 2023 FRC. As a result, some Florida energy use reduction should be realized.

Code Software Approval

Section R101.5.1 of the 2023 FBC-EC requires that software used for Florida compliance be approved by the Florida Building Commission while the 2021 IECC allows code official approval of software. While the Florida approval requirements may result in greater code compliance consistency, it is difficult to estimate impact on stringency without long-term field data.

Code Differences Summary

Table 1 of the Appendix provides a summary of the impactful differences between the 2023 FBC-EC and 2021 IECC, together with the anticipated impact of each on code stringency.

Prescriptive and Performance Compliance Simulations

EnergyGauge USA energy modeling software, which is currently used for 2021 IECC and 2023 FBC-EC compliance calculations, was used to compare the Prescriptive and Performance compliance method stringencies of the 2021 IECC and 2023 FBC-EC.

Prescriptive Compliance Simulations

The Prescriptive compliance comparison included three all-electric dwelling units: a 2,000 sq. ft. single story, single-family house, a 2,400 sq. ft. two story, single-family house, and a 1,200 sq. ft. multi-family unit with either 2021 IECC or 2023 FBC-EC Prescriptive code minimum component and equipment efficiencies, modeled in three Florida cities: Miami, Tampa and Jacksonville. Miami represents IECC Climate Zone 1 and Tampa and Jacksonville are both in Climate Zone 2. House characteristics are shown in Table 2.

Multi-family residential construction in Florida commonly includes two-story and three-story buildings. As a result, while duct location for typical single-family homes in the state is roughly estimated to be 80% in the attic and 20% in conditioned space (further discussed below), a higher percentage of multi-family units will have ducts in conditioned space verses ducts in the attic. So for multi-family units in this study, energy use results were weighted 40% ducts in the vented attic and 60% ducts in conditioned space via simulating top floor units with ceilings adjacent to attic space and attic supply and return ducts (40% weighting) and "embedded" first floor units with a neighbor unit above (60% weighting).

Table 1. Prescriptive Comparison House Characteristics.

	Climate Zone 1		**Climate Zone 2**	
Component	**2021 IECC**	**2023 FBC-EC**	**2021 IECC**	**2023 FBC-EC**
Conditioned floor area (ft^2) (one story / two story / multi)	2,000 / 2,400 / 1,200	2,000 / 2,400 / 1,200	2,000 / 2,400 / 1,200	2,000 / 2,400 / 1,200
Foundation type*	SOG	SOG	SOG	SOG
Floor perimeter *R*-value	0	0	0	0
Wall type	Wood Frame	Wood Frame	Wood Frame	Wood Frame
Wall insul. *R*-value	13	13	13	13
Wall solar absorptance	0.75	0.75	0.75	0.75
Common wall area (multi-family only)	720	720	720	720
Window area (ft^2) (one story / two story / multi)	300 / 360 / 120	300 / 360 / 120	300 / 360 / 120	300 / 360 / 120
Window *U*-factor (one story / two story / multi)	**0.488 / 0.469 / 0.5 ****	**0.5**	**0.397 / 0.372 / 0.4 ****	**0.4**
Window SHGC	**0.237****	**0.25**	**0.237****	**0.25**
Roofing material	Comp. Shingles	Comp. Shingles	Comp. Shingles	Comp. Shingles

Roof solar absorptance	0.92	0.92	0.92	0.92
Attic ventilation	Vented 1/300	Vented 1/300	Vented 1/300	Vented 1/300
Ceiling insul. *R*-value	30	30	**49**	**38**
Envelope ACH50 (air chng/hr @ 50pa)	**5**	**7**	**5**	**7**
Equipment and Effic. Cooling / Heating for "Better Equipment Installation"	SEER2 14.3 / HSPF2 7.5	SEER2 14.3 / HSPF2 7.5	SEER2 14.3 / HSPF2 7.5	SEER2 14.3 / HSPF2 7.5
Equipment and Effic. Cooling / Heating for "Code Minimal Equipment Installation"	SEER2 14.3 / Elec. Strip Heat	SEER2 14.3 / Elec. Strip Heat	**SEER2 14.3 / Elec. Strip Heat**	**SEER2 14.3 / HSPF2 7.5**
AHU location (one story / two story / multi) for "Better Equipment Installation"	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space
AHU location (one story / two story / multi) for "Code Minimal Equipment Installation"	**Attic / Attic / Cond. Space**	**Garage / Garage / Cond. Space**	**Attic / Garage / Cond. Space**	**Garage / Garage / Cond. Space**
Duct insul. *R*-value	8 / 8 / 6 or 8***	8 / 8 / 6 or 8***	8 / 8 / 6 or 8***	8 / 8 / 6 or 8***
Duct location (one story / two story / multi)	Attic / Attic / Cond. Space or Attic***	Attic / Attic / Cond. Space or Attic***	Attic / Attic / Cond. Space or Attic***	Attic / Attic / Cond. Space or Attic***
Duct leakage	Qn_{out}= 0.04	Qn_{out}= 0.04	Qn_{out}= 0.04	Qn_{out}= 0.04
Heating / Cooling set points (°F)	72 / 75	72 / 75	72 / 75	72 / 75
# of bedrooms (one story / two story / multi)	3 / 4 / 2	3 / 4 / 2	3 / 4 / 2	3 / 4 / 2
Water heater size (gallons)	50 / 50 / 40	50 / 50 / 40	50 / 50 /40	50 / 50 / 40
Water heater UEF (electric)	0.93	0.93	0.93	0.93
Water heater location (one story / two story / multi)	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space
Water heater pipe insulation *R*-value	3	3	3	3
Water heater heat trap	**No**	**Yes**	**No**	**Yes**

Bold font indicates difference between IECC and FBC-EC.

* Multi-family top floor units have floors above conditioned neighbor units.

** IECC window *U*-factor and SHGC adjustments to meet 2021 IECC additional efficiency package requirement via Section R408.2.1 Enhanced envelope performance option. First floor multi-family IECC units meet the 2021 IECC's Section R408.2.4 more efficient duct system additional efficiency option requirements, so no window *U*-factor or SHGC adjustments are made for these units.

*** R-8 duct insulation and attic located supply and return ducts used for FBC-EC and IECC multi-family top floor units.

All houses were modeled with wood frame walls. Since the 2021 IECC and 2023 FBC-EC both use the same wall reference *U*-factors, there should be no appreciable differences in results for mass walls.

Two sets of simulations were run to reflect some of what occurs and not overly penalize some of the key deficiencies of the IECC equipment choices relative to the FBC-EC. "Better Equipment Installation" is for simulations where all simulated homes had heat pumps, and air handlers in garage (except for multi-family which had air handlers in conditioned space). "Code Minimal Equipment Installation" had heat pumps for Climate Zone 2 for FBC-EC where there is a prohibition on electric resistance heat, while electric resistance heat was used for IECC Climate Zone 2 simulations. "Code Minimal Equipment Installation" runs had electric resistance heat in Climate Zone 1 for prescriptive compliance for both FBC-EC and IECC. The "Code Minimal Equipment Installation" runs also had air handler located in the attic for all IECC Climate Zone 1 single and two story house runs and IECC Climate Zone 2 single story house runs. Air handlers in attics are not allowed in FBC-EC Prescriptive compliance, but are a common installation location in South Florida where homes typically comply by the Performance method.

After each Prescriptive minimum house was entered in EnergyGauge USA, an annual simulation was run to estimate cooling, heating and water heating energy use. Tables 2 and 3 show the simulation results for the 2,000 sq. ft. one story single-family house in each of the three modeled cities. Tables 4 and 5 show the results for the 2,400 sq. ft. two story single-family house, and Tables 6 and 7 show the results for the 1,200 sq. ft. multi-family unit. Positive differences between the FBC-EC and IECC energy use values mean that the Prescriptive 2023 FBC-EC is less stringent than the Prescriptive 2021 IECC while negative differences mean the FBC-EC is more stringent than the IECC.

Table 2. "Better Equipment Installation" One Story House Prescriptive Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	FEC	99	5462	2150	7711
	IECC	87	5235	2177	7499
	Diff.	12	227	-27	212
Tampa	FEC	516	4212	2380	7108
	IECC	443	3955	2410	6808
	Diff.	73	257	-30	300
Jacksonville	FEC	1444	2886	2621	6951
	IECC	1279	2683	2653	6615
	Diff.	165	203	-32	336

Table 3. "Code Minimal Equipment Installation" One Story House Prescriptive Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	FEC	361	5462	2150	7973
	IECC	320	5292	2177	7789
	Diff.	41	170	-27	184
Tampa	FEC	516	4212	2380	7108
	IECC	1218	4027	2410	7655
	Diff.	-702	185	-30	-547
Jacksonville	FEC	1444	2886	2621	6951
	IECC	3322	2742	2653	8717
	Diff.	-1878	144	-32	-1766

Table 4. "Better Equipment Installation" Two Story House Prescriptive Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	FEC	126	6373	2489	8988
	IECC	106	6003	2517	8626
	Diff.	20	370	-28	362
Tampa	FEC	713	4848	2756	8317
	IECC	612	4566	2786	7964
	Diff.	101	282	-30	353
Jacksonville	FEC	2068	3304	3036	8408
	IECC	1851	3106	3068	8025
	Diff	217	198	-32	383

Table 5. "Code Minimal Equipment Installation" Two Story House Prescriptive Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	FEC	468	6372	2489	9329
	IECC	388	6077	2517	8982
	Diff.	80	295	-28	347
Tampa	FEC	713	4848	2756	8317
	IECC	1742	4566	2786	9094
	Diff.	-1029	282	-30	-777
Jacksonville	FEC	2068	3304	3036	8408
	IECC	5034	3106	3068	11208
	Diff	-2966	198	-32	-2800

Table 6. "Better Equipment Installation" Multi-family Prescriptive Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	Wgtd. FBC-EC	28	2585	1819	4432
	Wgtd. IECC	24	2496	1848	4368
	Diff.	4	89	-29	64
Tampa	Wgtd. FBC-EC	146	2029	2003	4178
	Wgtd. IECC	116	1956	2033	4104
	Diff.	31	73	-30	74
Jacksonville	Wgtd. FBC-EC	375	1510	2198	4082
	Wgtd. IECC	302	1453	2227	3982
	Diff	73	57	-29	101

Table 7. "Code Minimal Equipment Installation" Multi-family Prescriptive Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	Wgtd. FBC-EC	98	2585	1819	4502
	Wgtd. IECC	80	2496	1848	4424
	Diff.	18	89	-29	78
Tampa	Wgtd. FBC-EC	146	2029	2003	4178
	Wgtd. IECC	255	1956	2033	4243
	Diff.	-108	73	-30	-65
Jacksonville	Wgtd. FBC-EC	375	1510	2198	4082
	Wgtd. IECC	629	1453	2227	4309
	Diff	-254	57	-29	-226

The tables show that when all projects are run with heat pumps ("Better Equipment Installation" runs), the 2023 Prescriptive FBC-EC is consistently somewhat less efficient than the Prescriptive 2021 IECC in all three cases-- for one story, two story, and multi-family sample houses in all three cities. When the FBC-EC Prescriptive electric resistance space heating prohibition for Climate Zone 2 and air handler location rules are reflected in these simulations however ("Code Minimal Equipment Installation" runs), the FBC-EC is somewhat more efficient than the IECC in Tampa and considerably more efficient in Jacksonville, and on an average basis for the three locations. This serves as an example of how including equipment efficiency stipulations in codes as is done in the FBC-EC can help improve overall building efficiency.

Performance Compliance Simulations

Similar to the Prescriptive compliance simulations, the Performance compliance comparison simulations used three all electric dwelling units: a 2,000 sq. ft. single story, single-family house, a 2,400 sq. ft. two story, single-family house, and a 1,200 sq. ft. multi-family unit modeled in three Florida cities: Miami, Tampa and Jacksonville. Miami again represents IECC Climate Zone 1 and Tampa and Jacksonville are both in Climate Zone 2. These houses vary from the ones used for the Prescriptive compliance comparison in that instead of using Prescriptive minimum component and equipment efficiencies, they use "reference" component and equipment efficiencies (further discussed below). House characteristics are shown in Table 8.

Table 8. Performance Comparison House Characteristics.

Component	Climate Zone 1		Climate Zone 2	
	2021 IECC	**2023 FBC-EC**	**2021 IECC**	**2023 FBC-EC**
Conditioned floor area (ft^2) (one story / two story / multi)	2,000 / 2,400 / 1,200	2,000 / 2,400 / 1,200	2,000 / 2,400 / 1,200	2,000 / 2,400 / 1,200
Foundation type	SOG	SOG	SOG	SOG
Floor perimeter *R*-value	0	0	0	0
Wall type	Wood Frame	Wood Frame	Wood Frame	Wood Frame
Wall *U*-factor	0.084	0.084	0.084	0.084
Wall solar absorptance	0.75	0.75	0.75	0.75
Window area (ft^2) (one story / two story / multi)	**300 / 360 / 67***	**300 / 360 / 96***	**300 / 360 / 67***	**300 / 360 / 96***
Window *U*-factor	**0.442 / 0.441 / 0.433 or 0.401****	**0.5**	**0.3504 / 0.348 / 0.341 or 0.317****	**0.4**
Window SHGC	**0.237****	**0.25**	**0.237****	**0.25**
Roofing material	Comp. Shingles	Comp. Shingles	Comp. Shingles	Comp. Shingles
Roof solar absorptance	0.75	0.75	0.75	0.75
Attic ventilation	Vented 1/300	Vented 1/300	Vented 1/300	Vented 1/300
Ceiling *U*-factor	0.035	0.035	**0.026**	**0.030**
Envelope ACH50 (air chng/hr @ 50pa)	**5**	**7*****	**5**	**7*****
HP SEER2 / HSPF2	14.3 / 7.5	14.3 / 7.5	14.3 / 7.5	14.3 / 7.5
AHU location	**Garage if tested / Cond. if not tested and for multi-family**	**Conditioned space**	**Garage if tested / Cond. if not tested and for multi-family**	**Conditioned space**
Duct insul. *R*-value (supply / return)	**6 or 8 / 6 or 8†**	**6 / 6**	**6 or 8 / 6 or 8†**	**6 / 6**
Duct location	**Attic if tested / Cond. if not tested**	**Conditioned space**	**Attic if tested / Cond. if not tested**	**Conditioned space**
Duct leakage	**Qn_{out}= 0.04 / DSE = 0.88†**	**Variable Qn_{out}*****	**Qn_{out}= 0.04 / DSE = 0.88†**	**Variable Qn_{out}*****
Heating / Cooling set points (°F)	72 / 75	72 / 75	72 / 75	72 / 75
# of bedrooms (one story / two story / multi)	3 / 4 / 2	3 / 4 / 2	3 / 4 / 2	3 / 4 / 2
Water heater size (gallons) (one story / two story / multi)	50 / 50 / 40	50 / 50 / 40	50 / 50 / 40	50 / 50 / 40
Water heater UEF (Electric)	0.93	0.93	0.93	0.93
Water heater location (one story / two story / multi)	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space	Garage / Garage / Cond. Space

Water heater heat trap	**No**	**Yes**	**No**	**Yes**

Bold font indicates difference between IECC and FBC-EC.

* Multi-family window areas vary due to differences in reference fenestration area calculations between the FBC-EC and IECC for dwelling units with common (neighbor) walls.

** IECC window *U*-factor and SHGC adjustments made to meet 2021 IECC additional efficiency package requirement via Section R408.2.1 Enhanced envelope performance option. Multifamily IECC *U*-factors shown for both 1st floor units and top floor units.

*** The FBC-EC reference duct leakage is specified as being 0.88 DSE, but was modified to a Qn_{out} leakage and reduced as needed as the main means of meeting the 2023 FBC-EC's 5% Performance stringency increase. Similarly, the FBC-EC reference ACH50 is specified as being 7.0, but was reduced for multi-family runs as needed to help meet the 5% stringency increase. See Table 9 for details.

ǂ As further discussed below, since the IECC stipulates both untested and tested duct reference options, two simulations were run for each IECC reference house. One IECC house had non-tested R-6 ducts in conditioned space with a distribution system efficiency (DSE) of 0.88, and the other had R-8 ducts in unconditioned space and leakage of Qn_{out} = 0.04.

All houses were again modeled with wood frame walls. Since the 2021 IECC and 2023 FBC-EC both use the same wall reference *U*-factors, there should be no appreciable differences in results for mass walls. As described in Table 1, there are some cases not included in the simulations where other energy use differences might occur such as houses with skylights.

After each house was entered in EnergyGauge USA, annual simulations were run to estimate cooling, heating and water heating energy use for the standard reference 2021 IECC house and standard reference 2023 FBC-EC house. The standard reference house is a house that has the same conditioned floor, wall and ceiling areas as a proposed project house, but with other characteristics such as window area and efficiency levels stipulated by the code's rule set[5]. Since the total annual energy costs (IECC) or annual loads (FBC-EC) of a reference house represent the minimum Performance code level, using the reference house for these simulations provides a comparison of each code's minimum Performance compliance efficiency.

The 2021 IECC includes reference options for both tested and untested duct systems, so IECC simulations were run for each of these cases. IECC reference duct location is stipulated as being as the proposed design. Since the IECC allows tested ducts in unconditioned space, tested duct systems were modeled in an unconditioned, vented attic with air handlers in the garage (except air handlers were modeled in conditioned space for multi-family). Per IECC requirements for untested duct systems, untested ducts were modeled with the ducts and air handler in conditioned space. Since most duct systems in single-family Florida residences are

[5] See Section R405 and Table R405.4.2(1) of the 2021 IECC and Table R405.5.2(1) of the 2023 FBC-EC for more information on reference houses.

installed in unconditioned attics[6], energy use results were weighted 80% for tested ducts in the attic and 20% for untested ducts in conditioned space for the one and two story houses.

As noted in the Table 8 footnotes, the FBC-EC reference duct leakage is specified as being 0.88 DSE, but was modified to a Qnout leakage and adjusted as needed as the main means of meeting the 2023 FBC-EC's 5% Performance stringency increase. In most multi-family cases, ACH50 entries were reduced from the reference ACH50 of 7.0 for the same purpose. Actual Qnout and ACH50 values used for the Performance FBC-EC modeling runs are shown in Table 9.

Table 9. Duct Leakage Qnout and ACH50 Values used for Performance FBC-EC Modeling.

	Single Story		Two Story		Multi-family 1st Floor		Multi-family Top Floor	
	Duct Leak. Qnout	ACH50	Duct Leak. Qnout	ACH50	Duct Leak. Qnout	ACH50	Duct Leak. Qnout	ACH50
Miami	0.033	7.0	0.036	7.0	0.033	5.0	0.030	7.0
Tampa	0.030	7.0	0.031	7.0	0.035	4.0	0.031	6.0
Jacksonville	0.041	7.0	0.041	7.0	0.038	4.0	0.033	6.0

As discussed earlier, multi-family residential construction in Florida commonly includes two story and three story buildings. As a result, a higher percentage of multi-family units will have ducts in conditioned space verses ducts in the attic, so for multi-family units in this study, energy use results were weighted 40% tested ducts in the attic and 60% untested ducts in conditioned space. Multi-family weighting was accomplished by simulating both a first floor "embedded" unit with neighbor unit above and a top floor unit with vented attic.

Table 10 shows the estimated space heating, cooling, water heating, and total energy use, and energy use differences for the 2,000 sq. ft. one story single-family house in each of the three modeled cities. Table 11 shows the same results for the 2,400 sq. ft. two story single-family house, and Table 12 shows the results for the 1,200 sq. ft. multi-family unit. Positive differences between the Florida Code (FBC-EC) and weighted IECC energy use values again mean that the FBC-EC is less stringent than the IECC while negative differences mean the FBC-EC is more stringent than the IECC.

[6] A 2013 code compliance form analysis report by the University of Florida (Nash 2013) found sampled 2010 - 2012 homes to have less than 15% of supply ducts in conditioned space; around 30% of return ducts were found to be in conditioned space for the same three years. A 2012 FSEC code compliance study (Withers et al. 2012) found 96.8% of sampled new Florida homes to have supply ducts in the attic.

Table 10. One Story House Performance Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	FBC-EC	108	4706	2150	6964
	Wgtd. IECC	109	4986	2178	7272
	Diff.	-1	-280	-28	-308
Tampa	FBC-EC	500	3551	2380	6431
	Wgtd. IECC	502	3802	2410	6714
	Diff.	-2	-251	-30	-283
Jacksonville	FBC-EC	1358	2511	2621	6490
	Wgtd. IECC	1390	2615	2654	6659
	Diff.	-32	-104	-33	-169

Table 11. Two Story House Performance Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	FBC-EC	164	5816	2489	8469
	Wgtd. IECC	163	6058	2517	8738
	Diff.	1	-242	-28	-269
Tampa	FBC-EC	680	4548	2757	7985
	Wgtd. IECC	674	4839	2786	8299
	Diff.	6	-291	-29	-314
Jacksonville	FBC-EC	1693	3345	3036	8074
	Wgtd. IECC	1705	3480	3069	8254
	Diff.	-12	-135	-33	-180

Table 12. Multi-family Performance Comparison Annual Energy Use Estimates.

City		Heating (kWh/yr)	Cooling (kWh/yr)	Wtr Htg (kWh/yr)	Total (kWh/yr)
Miami	Wgtd. FBC-EC	32	2239	1819	4091
	Wgtd. IECC	18	2282	1848	4148
	Diff.	14	-43	-29	-58
Tampa	Wgtd. FBC-EC	132	1742	2003	3878
	Wgtd. IECC	128	1810	2033	3971
	Diff.	4	-68	-30	-93
Jacksonville	Wgtd. FBC-EC	340	1309	2198	3847
	Wgtd. IECC	346	1348	2227	3921
	Diff.	-6	-39	-29	-74

The Performance compliance tables include a range of results but combining all three use categories shows 2023 FBC-EC compliance to have somewhat less energy use than 2021 IECC compliance for all three building types modeled. The FBC-EC also has slightly less energy use than the IECC for water heating for all three buildings in all three cities because of the FBC-EC heat trap provision. When one and two story single-family and multi-family results are combined[7], the 2023 FBC-EC results show somewhat less overall Performance energy use than the 2021 IECC.

Discussion

A review of the various differences between the 2023 FBC-EC and 2021 IECC discussed above shows a range of stringency impacts, from making the Florida code more stringent to no impact to making the Florida code less stringent, but as analyzed overall, the Florida code is somewhat more stringent. Significant new factors that bring about these results include:

- Applying the FBC-EC's Prescriptive electric resistance space heating prohibition for Climate Zone 2 and air handler location rules (the "Code Minimal Equipment Installation" Prescriptive modeling results)

[7] Single-family one story and two story and multi-family results were equally weighted, roughly reflecting current construction housing permits in Florida of single family being twice as numerous as multi-family permits; this is supported by NAHB reported Census building permit data for the state: https://www.nahb.org/News-and-Economics/Housing-Economics/State-and-Local-Data/Building-Permits-by-State-and-Metro-Area

- Window *U*-factor and SHGC adjustments were used to meet the 2021 IECC's additional efficiency package requirement via the Section R408.2.1 Enhanced envelope performance option, which did not save as much energy in the modeling runs as meeting the 2023 FBC-EC's 0.95 e-Ratio requirement as modeled.

Additional existing differences that affect the results include the FBC-EC's increased maximum building air leakage ACH50 and storage water heater heat trap requirement, the first making the Florida code somewhat less stringent and the second making it slightly more stringent.

A number of the differences between the two codes only apply in certain cases such as if a multi-family project, or if certain efficiency credits apply to a project.

Prescriptive compliance results show that when all projects are run with heat pumps, the 2023 Prescriptive FBC-EC is consistently somewhat less efficient than the Prescriptive 2021 IECC for all three cases modeled. When the FBC-EC Prescriptive electric resistance space heating prohibition for Climate Zone 2 is reflected in these simulations however, the FBC-EC is somewhat more efficient than the IECC in Tampa and considerably more efficient in Jacksonville, and on an average basis for the three locations. As also noted above, this serves as an example of how including equipment efficiency stipulations in codes as is done in the FBC-EC can help improve overall building efficiency.

The Performance compliance tables show a range of results, but combined for all three building types simulated in all three Florida cities, the 2023 FBC-EC results show somewhat less overall Performance energy use than the 2021 IECC.

Based on their code related work, the authors anticipate that over 90% of new Florida residential construction complies via the Performance method. For example, code forms from all 31 new homes evaluated for a 2012 Florida code compliance study (Withers et al. 2012) were Performance based. A total of 27 additional code forms acquired for a 2018 Florida air leakage testing study were also all Performance compliance (Sonne 2018—12 of the 27 acquired forms were specifically noted in the study report). Considering that 2023 FBC-EC Performance compliance is somewhat more stringent than it was in the 2020 version, it is possible that Florida will see some compliance move from Performance to Prescriptive and/or Energy Rating Index compliance.

Table 13 shows the point of equal stringency calculation results for the 2023 FBC-EC vs. 2021 IECC modeling analysis. The Prescriptive use difference is an equally weighted average of the modeling runs that did and did not reflect the FBC-EC Prescriptive electric resistance space heating prohibition for Climate Zone 2 and air handler location rules. Since both the

Prescriptive average difference and Performance average difference are negative, meaning the FBC-EC is more stringent in both cases, there is no weighting of performance vs. prescriptive that results in the IECC being more stringent than the FBC-EC.

Table 13. Point of Equal Stringency Calculations.

2023 FBC-EC vs. 2021 IECC Point of Equal Stringency Calculations for one and two story single family and multi-family units combined	
Prescriptive FBC-EC vs. IECC Average Difference (kWh/yr) =	**-188**
Performance FBC-EC vs. IECC Average Difference (kWh/yr) =	**-194**
Stringency Difference between FBC-EC and IECC by Performance Weighting (kWh/yr):*	
- 40% Performance weighting	**-191**
- 50% Performance weighting	**-191**
- 60% Performance weighting	**-192**
- 70% Performance Weighting	**-192**
- 80% Performance Weighting	**-193**
- 90% Performance Weighting	**-194**

* Positive values mean IECC is more stringent; negative values mean FBC-EC is more stringent.

Conclusions

As catalogued above, a number of construction type, component and equipment variables enter into an energy code comparison so actual results will depend on the details of the projects eventually built under the new code. However, evaluated as outlined in this report, the 2023 FBC-EC was shown to somewhat exceed the stringency of the 2021 IECC on an overall basis.

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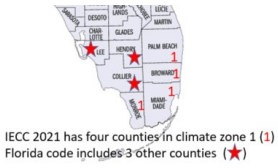
Appendix

Table 1. 2023 FBC-EC vs. 2021 IECC Impactful Differences Listing and Stringency Impacts.

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
CHAPTER 1 SCOPE AND ADMINISTRATION			
Scope and Admin	R101.5.1	FBC-EC compliance calculation software approval requirement	May increase consistency but difficult to assess stringency without field data
CHAPTER 3 GENERAL REQUIREMENTS			
Climate Zones  IECC 2021 has four counties in climate zone 1 (1) Florida code includes 3 other counties (★)	Table R301.1	2021 IECC adds Palm Beach as Climate Zone 1 county; FBC-EC includes three additional south Florida counties in Climate Zone 1	Some impact on Prescriptive and Performance compliance (in applicable cases)
CHAPTER 4 RESIDENTIAL ENERGY EFFICIENCY			
Addresses all compliance options	IECC R401.2.5	2021 IECC adds "additional energy efficiency" section which stipulates additional efficiency requirements for all compliance options: - For Prescriptive compliance, one of the Section R408.2 package options - For Performance compliance, one of the Section R408.2 package options or 5% reduction in annual energy cost - For Energy Rating Index compliance, a 5% reduction from the target Index	Decreases FBC-EC Prescriptive and Energy Rating Index stringency wrt IECC; for Performance compliance, the 2023 FBC-EC includes a 5% stringency reduction
Mandatory	R402.2.3	2021 IECC makes section mandatory, adds "net free area" to the baffle opening stipulation, and adds baffle installation language to maximize space for attic	Slightly decreases FBC-EC stringency wrt IECC (depending on typical practice)

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		insulation coverage and prevent ventilation air bypass	
Mandatory	FBC-EC R402.2.4 IECC R402.2.4 and R402.2.4.1	Separates existing IECC prescriptive Section R402.2.4 into mandatory and Prescriptive sections-- new Section R402.2.4.1 regarding access hatch and door insulation installation and retention is now mandatory; a new IECC horizontal pull-down stair access hatch insulation level exception is added for Prescriptive compliance	Mandatory section change slightly decreases stringency of FBC-EC Performance and ERI compliance wrt IECC; horizontal pull-down stair access hatch exception slightly increases stringency of FBC-EC Prescriptive compliance wrt IECC
Mandatory	R402.4	FBC-EC exception allows R-2 and multiple attached single-family dwellings to comply with commercial code air leakage requirements	Difficult to assess without field data
Mandatory	Table R402.4.1.1	2021 IECC adds rim joist junction air sealing requirements and insulation installation clarification	Slightly decreases stringency of FBC-EC compliance wrt IECC (depending on current practice)
Mandatory	Table R402.4.1.1	2021 IECC revises section name to clarify foundation types that are included, and revises and adds to Air Barrier Criteria and Insulation Installation Criteria to clarify foundation related requirements	Slightly decreases FBC-EC stringency wrt IECC (depending on current practice)
Mandatory	Table R402.4.1.1	2021 IECC revises and adds Air Barrier Criteria and Insulation Installation Criteria to clarify shaft and penetration related requirements	Slightly decreases FBC-EC stringency wrt IECC (depending on current practice)
Mandatory	Table R402.4.1.1	2021 IECC adds Insulation Installation Criteria to narrow cavity requirements	Slightly decreases FBC-EC stringency wrt IECC (depending on current practice)

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
Mandatory	Table R402.4.1.1	2021 IECC adds Air Barrier Criteria to garage separation requirements	Slightly decreases FBC-EC stringency wrt IECC (depending on current practice)
Mandatory	Table R402.4.1.1	2021 IECC revises and adds Air Barrier Criteria and Insulation Installation Criteria to clarify recessed lighting related requirements	Slightly decreases FBC-EC stringency wrt IECC (depending on current practice)
Mandatory	Table R402.4.1.1	2021 IECC adds “or other obstructions” to Plumbing and Wiring section name, adds Air Barrier Criteria and revises Insulation Installation Criteria to clarify these requirements	Slightly decreases FBC-EC stringency wrt IECC (depending on current practice)
Mandatory	Table R402.4.1.1	2023 FBC-EC modifies the Electrical/phone box on exterior walls section name, revises Air Barrier Criteria and adds Insulation Installation Criteria to clarify these requirements	Slightly increases FBC-EC stringency wrt IECC (depending on current practice)
Mandatory	R402.4.1.2	FBC-EC building air leakage tester approval requirement	Possibly increases stringency of FBC-EC compliance wrt IECC
Mandatory	R402.4.1.2	2021 IECC adds air leakage testing exception for certain heated, attached and detached private garages	May slightly increase FBC-EC stringency wrt IECC (in applicable cases)
Mandatory	R402.4.1.2	IECC adds square footage based air leakage rate testing alternative for attached single and multifamily building dwelling units and buildings or dwelling units that are 1500 square feet or smaller	Unknown
Mandatory	R402.4.1.2	IECC clarifies mechanical ventilation requirements	Unknown
Mandatory	R402.4.1.2	IECC sets maximum building air leakage rate in all Climate	Decreases stringency of FBC-EC wrt IECC

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		Zones to 5 ACH50 vs. 7 in FBC-EC; also adds decimal place to ACH50 values (“5” to “5.0”) to clarify intent	
Mandatory	R402.4.1.2	2023 FBC-EC adds clarification that whole-house mechanical ventilation is required for dwelling units with air leakage rates less than 3 ACH50, in accordance with provided code sections	Since this is a clarification, minimal impact is anticipated for applicable cases and depending on typical practice
Mandatory	R402.4.1.2	2023 FBC-EC adds testing requirement clarification that if an attic is both air sealed and insulated at the roof deck, interior access doors and hatches between the conditioned space volume and the attic must be opened during the test and the volume of the attic must be added to the conditioned space volume for purposes of reporting infiltration volume and calculating the air leakage of the home	Since this is a clarification, minimal impact is anticipated for applicable cases and depending on typical practice.
Mandatory	R402.4.1.2	FBC-EC includes exception that testing is not required for additions, alterations, renovations or repairs of the building thermal envelope of existing buildings in which the new construction is less than 85 percent of the building thermal envelope	May slightly decrease FBC-EC stringency wrt IECC (in applicable cases)
Mandatory in FBC-EC; prescriptive in IECC	R402.4.2	IECC removed UL 907 listing and labeling requirement for the doors of masonry fireplaces	May slightly increase stringency of FBC-EC wrt IECC (in applicable cases)
Mandatory	R403.3.1	IECC changes section from Prescriptive to Mandatory and	Slightly decreases FBC-EC Prescriptive stringency

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		changes duct location criteria from “attic” to “outside conditioned space”, so 3+ inch diameter ducts outside of conditioned space must be insulated to R-8 for all compliance options, vs. FBC-EC which only requires R-8, 3+ inch ducts for Prescriptive compliance and if located in the attic	wrt IECC in some cases (homes with ducts in crawlspaces or other non-attic unconditioned space)
Mandatory	R403.3.1	IECC adds mandatory insulation requirements for ducts buried beneath a building; 2023 FBC-EC has same requirement, but only for Prescriptive compliance	None or decreases FBC-EC stringency slightly wrt IECC in applicable Performance and ERI cases
Mandatory	FBC-EC R403.3.2 IECC R403.3.4	FBC-EC duct tightness tester approval requirement	May slightly increase FBC-EC stringency wrt IECC but difficult to assess without field data
Mandatory	FBC-EC R403.3.3 IECC R403.3.5	FBC-EC includes a duct testing requirement exception for Performance compliance with default leakage ducts	Slight decrease FBC-EC stringency wrt IECC for Performance method.
Mandatory	FBC-EC R403.3.3 IECC R403.3.5	IECC removes exception that had exempted projects with ducts and air handlers located entirely within the building thermal envelope from the duct testing requirement	Decreases FBC-EC stringency wrt IECC (in applicable cases)
Mandatory	FBC-EC R403.3.3 IECC R403.3.5	IECC duct testing exception text reads: “A duct air-leakage test shall not be required for ducts serving ventilation systems that are not integrated with ducts serving heating or cooling systems.”	FBC-EC does not state it, but may interpret it the same

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
Mandatory	FBC-EC R403.5.4 IECC R403.5.3	IECC clarifies that the drain water heat recovery requirements in this section only apply where a drain water heat recovery unit is installed, and makes the section mandatory; FBC-EC is not clear whether this section is mandatory or Prescriptive	May slightly decrease FBC-EC stringency wrt IECC in applicable Performance and ERI compliance cases (depending on if FBC-EC section is mandatory or not)
Mandatory	FBC-EC R403.5.5	FBC-EC includes heat trap requirement for storage water heaters	Slightly increases FBC-EC stringency wrt IECC (in applicable cases)
Mandatory	FBC-EC R403.5.6	FBC-EC includes several water heater subsections not included in the IECC that specify controls, shut down, and efficiency requirements	May slightly increase FBC-EC stringency wrt IECC (in applicable cases)
Mandatory	FBC-EC R403.6.1 IECC R403.6.2	2018 IECC and 2023 FBC-EC include WHMV efficacy exception for air handlers that are integral to HVAC equipment, just requiring them to use an electronically commutated motor; 2021 IECC removes this exception and in Table R403.6.2 adds new requirement that air-handler integrated to tested and listed HVAC equipment have a minimum efficacy of 1.2 cfm/watt	Somewhat increases FBC-EC stringency wrt IECC (in applicable cases)
Mandatory	FBC-EC R403.6.2	FBC-EC provides mechanical ventilation criteria, including maximum rates, prohibited make-up air sources, and insulation requirements	May slightly increase FBC-EC stringency wrt IECC (in applicable cases and depending on typical practice)
Mandatory	IECC R403.6.3	New IECC section requiring testing of mechanical ventilation system flow rates,	May improve intent; impact on energy unknown

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		with exception for certain kitchen range hoods	
Mandatory	R403.7	Additional FBC-EC heating and cooling equipment sizing requirements	Slightly increases FBC-EC stringency wrt IECC (depending on typical practice)
Mandatory	R403.10.3	Increased percentage of pool and spa heating from heat pump or on-site renewables for IECC cover exemption	Slightly decreases FBC-EC stringency wrt IECC (in applicable cases)
Mandatory	FBC-EC R403.10.4	FBC-EC includes efficiency requirements for gas- and oil-fired pool and spa heaters	May slightly increase FBC-EC stringency wrt IECC (in applicable cases and depending on typical practice)
Mandatory	FBC-EC R403.10.5	FBC-EC includes efficiency requirements for heat pump pool heaters	May slightly increase FBC-EC stringency wrt IECC (in applicable cases and depending on typical practice)
Mandatory	FBC-EC R403.13	FBC-EC includes requirements for dehumidifiers	Slightly increases FBC-EC stringency wrt IECC (in applicable cases)
Mandatory	FBC-EC R403.13.1	FBC-EC includes requirements for ducted dehumidifiers	Slightly increases FBC-EC stringency wrt IECC (in applicable cases)
Mandatory	IECC R404.1.1	With several exceptions (including for detached one and two family dwellings and compliance with Section R404.1), this new IECC section requires connected exterior lighting for residential buildings to comply with commercial exterior lighting Section C405.4	None or somewhat decreases FBC-EC stringency wrt IECC
Mandatory	IECC R404.2	With several exceptions, new mandatory IECC interior lighting controls section requires either a dimmer, occupant sensor or other	Somewhat decreases FBC-EC stringency wrt IECC

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		control for permanently installed lighting fixtures	
Prescriptive	FBC-EC Table R402.1.4 IECC Table R402.1.2	IECC decreases the maximum ceiling *U*-factor in Climate Zones 2 and 3 from 0.030 to 0.026	Decreases FBC-EC Climate Zone 2 Prescriptive stringency wrt IECC
Prescriptive	FBC-EC Table R402.1.2 IECC Table R402.1.3	IECC increases the minimum ceiling *R*-value in Climate Zones 2 and 3 from R-38 to R-49	Decreases FBC-EC Climate Zone 2 Prescriptive stringency wrt IECC
Prescriptive	FBC-EC R402.1.2 IECC Table R402.1.3	FBC-EC Table R402.1.2 maximum *U*-factor increase for impact rated fenestration in Climate Zone 2	Decreases FBC-EC Climate Zone 2 Prescriptive stringency wrt IECC (in applicable cases)
Prescriptive	R402.2.1	Both the IECC and FBC-EC include an allowance for reduced insulation for ceilings with attics where the full height of uncompressed insulation extends over the wall top plate at the eaves; the FBC-EC starts from a lower insulation requirement than the IECC though, and in turn also allows a lower allowance R-value	Maintains FBC-EC's slight decrease in stringency wrt to the IECC in applicable Prescriptive compliance cases
Prescriptive	R402.2.2	The IECC includes an allowance for R-30 insulation for ceilings without attic spaces that also do not have sufficient space for otherwise required above R-30 insulation, if the R-30 insulation extends over the top of the wall plate to the outer edge of the plate and is not compressed; the FBC-EC includes the same allowance,	May slightly reduce the stringency of the FBC-EC wrt the IECC in applicable Prescriptive cases and depending on typical practice

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		except does not include the requirement for the insulation to extend over the top of the wall plate to the outer edge of the plate and not be compressed	
Prescriptive	R402.2.4	IECC provides insulation level exceptions for horizontal pull-down stair type access hatches	Slightly increases stringency of FBC-EC compliance wrt IECC (in applicable cases)
Prescriptive	FBC-EC R402.2.9 IECC R402.2.8	IECC unconditioned basement wall insulation exception includes more requirements than the FBC-EC	Slightly decreases stringency of FBC-EC compliance wrt IECC (in applicable cases)
Prescriptive	FBC-EC R402.2.13 IECC R402.2.12	In IECC, heated garages must now also meet this section's sunroom insulation requirements and are also eligible for sunroom thermal isolation exceptions	Slightly decreases FBC-EC stringency wrt IECC (in applicable cases)
Prescriptive	R402.3.5	In IECC, heated garages must now also meet this section's sunroom fenestration requirements and are also eligible for sunroom thermal isolation exception	Slightly decreases FBC-EC stringency wrt IECC (in applicable cases)
Prescriptive	IECC R403.3.2	2021 IECC clarifies existing IECC option that allows ductwork to be considered as being inside conditioned space, and adds two new options-- for ductwork in floor cavities and within exterior walls	Slightly increases FBC-EC stringency wrt IECC in some cases
Prescriptive	IECC R403.3.3	IECC Prescriptive stipulations for ducts buried within ceiling insulation	Little or no stringency impact anticipated (in applicable cases)
Prescriptive	FBC-EC R403.3.4	IECC adds Prescriptive compliance total duct leakage limit of 8 cfm/100 sq. ft. for cases in which all ducts and air	Somewhat decreases FBC-EC stringency compliance wrt IECC (in applicable cases)

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
	IECC R403.3.6	handlers are located entirely within the building thermal envelope	
Prescriptive	FBC-EC R403.3.6	Air handlers not allowed in attics for FBC-EC Prescriptive compliance	Somewhat increases FBC-EC stringency compliance wrt IECC (in applicable cases)
Prescriptive	FBC-EC R403.7.2	FBC-EC prohibits electric resistance from being primary heating used in Climate Zone 2 for Prescriptive compliance	Increases FBC-EC stringency compliance wrt IECC (in applicable cases)
Prescriptive	IECC R404.3	New Prescriptive IECC section requires specified automatic shut off controls where total permanent installed exterior lighting power is greater than 30 watts	Somewhat decreases FBC-EC stringency wrt IECC (in applicable cases)
Performance	FBC-EC Table R402.1.4 IECC Table R402.1.2	Maximum IECC ceiling *U*-factor in Climate Zones 2 and 3 is reduced from 0.030 to 0.026	Decreases FBC-EC stringency wrt IECC (increases stringency of IECC std. reference design)
Performance	IECC R402.5	Maximum IECC area-weighted average fenestration SHGC permitted for Performance compliance in Climate Zones 0 through 3 reduced from 0.50 to 0.40	No impact because of FBC-EC trade-offs
Performance	IECC R402.5	IECC adds fenestration *U*-factor and SHGC exception for storm shelters in compliance with ICC 500	No impact because of trade-offs
Performance	IECC R405.2	Per Table R405.2 reference, 2021 IECC Performance compliance requires total leakage duct testing (but does not stipulate a maximum Performance compliance duct leakage)	May slightly decrease stringency of FBC-EC compliance compared with IECC

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
Performance	IECC R405.2	IECC requires Performance compliance project envelope efficiency to meet or exceed residential 2009 IECC Table 402.1.1 or Table 402.1.3	No impact because of FBC-EC trade-offs
Performance	FBC-EC R405.2.1	FBC-EC requires space permitting Performance compliance minimum ceiling insulation level of R-19	No impact because of FBC-EC trade-offs
Performance	FBC-EC R405.2.2	FBC-EC subsection clarifies that Performance building air leakage testing must verify the leakage rate used for the proposed design	Likely slightly increases stringency of FBC-EC compliance compared with IECC (in applicable cases)
Performance	FBC-EC R405.2.3	FBC-EC subsection clarifies when Performance compliance duct air leakage testing is required and that testing must verify the leakage rate used for the proposed design	Likely slightly increases stringency of FBC-EC compliance compared with IECC (in applicable cases)
Performance	FBC-EC R403.3.3	FBC-EC exception clarifies when Performance compliance duct air leakage testing is required	Being similar to the item directly above, likely also slightly increases stringency of FBC-EC compliance compared with IECC (in applicable cases)
Performance	FBC-EC R403.3.3	FBC-EC exception allows compliance via the Performance method without duct leakage testing, regardless of whether the ducts are in conditioned space or not	The direction of stringency impact is unknown
Performance	FBC-EC R405.3 IECC R405.2	Performance-based compliance calculation methodology	See Simulations section of final report
Performance	FBC-EC R405.3	2023 FBC-EC increases stringency of performance compliance method by 5%	Increases FBC-EC stringency to now match one of the 2021 IECC

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
			additional efficiency requirements
Performance	FBC-EC R405.5 IECC R405.4	For R-2 and R-4 residences and townhouses, the limit for the FBC-EC's common wall area dependent "F" term used in the equation to determine standard referenced design fenestration area varies from the limit in the IECC	Somewhat decreases stringency of FBC-EC compliance wrt IECC (in applicable cases)
Performance	FBC-EC R405.5 IECC R405.4	FBC-EC Table R405.5.2(1) has a standard reference design air exchange rate of ACH50 = 7 vs. IECC's rate of ACH50 = 5	Decreases FBC-EC stringency wrt IECC
Performance	FBC-EC R405.5 IECC R405.4	2021 IECC clarifies that the standard reference design's air exchange rate mechanical ventilation system type is the same as in the proposed design	None or slightly changed stringency for Performance projects
Performance	FBC-EC R405.5 IECC R405.4	As a clarification, 2021 IECC adds "system type" to definition of mechanical ventilation sections' minimum fan efficacy term used to calculate standard reference design annual vent fan energy use	No stringency impacts likely
Performance	FBC-EC R405.5 IECC R405.4	IECC specifies the same proposed and standard reference design heating and cooling equipment efficiencies while the 2023 FBC-EC specifies federal minimum standards applicable January 2023 for its standard reference design	FBC-EC allows equipment efficiency trade-offs while IECC does not
Performance	FBC-EC R405.5 IECC R405.4	FBC-EC specifies service water heating standard reference and proposed design use and energy consumption according to ANSI/RESNET/ICC Standard	Minimal impact for use of Std. 301 for base code storage type system; will vary for other system types and measures; also

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		301, while IECC specifies same proposed and standard reference design water heating efficiency	FBC-EC allows water heating equipment efficiency trade-offs while IECC does not
Performance	FBC-EC R405.5 IECC R405.4	2021 IECC Table R405.4.2(1) stipulates the standard reference design duct insulation be R-8 for ducts ≥ three inches in diameter and outside of conditioned space (per Section R403.3.1), while the FBC-EC stipulates R-6 standard reference design ducts	Somewhat decreases stringency of FBC-EC wrt IECC in most Performance compliance cases
Performance	FBC-EC R405.5 IECC R405.4	2021 IECC Table R405.4.2(1) stipulates the standard reference design duct location be the same as the proposed design, while the FBC-EC stipulates the reference design duct location to be entirely within the building thermal envelope	Somewhat increases stringency of FBC-EC wrt IECC in most Performance compliance cases
Performance	FBC-EC R405.5 IECC R405.4	FBC-EC includes Dehumidification Systems section in Table R405.5.2(1) while the IECC only includes dehumidifiers if a mechanical ventilation system with latent heat recovery is utilized (see next item below); other differences include the FBC-EC having two dehumidifier reference efficiencies depending on total capacity, and separate proposed design specifications while the IECC uses standard reference design specifications for the proposed design	None or slightly changed stringency (for applicable projects)

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
Performance	FBC-EC R405.5 IECC R405.4	2021 IECC adds dehumidistat and dehumidifier standard reference and proposed design specifications for proposed designs with mechanical ventilation systems with latent heat recovery; FBC-EC already includes dehumidistat specifications with same reference setpoint turn on (differences include IECC section being specifically for mechanical ventilation systems, and FBC-EC has two dehumidifier reference efficiencies depending on total capacity vs. one reference efficiency in the IECC)	None or slightly changed stringency (for applicable projects)
Performance	FBC-EC R405.5 IECC R405.4	IECC Table R405.4.2(1) footnote “a” continues to allow the building air leakage testing requirement to be at the discretion of the code official	May slightly increase stringency of FBC-EC wrt IECC in some cases
Performance	FBC-EC R405.5 IECC R405.4	FBC-EC Table R405.5.2(1) footnote “e” adds clarification of type of heating system to be used for projects without proposed heating systems	Little or no stringency difference
Performance	FBC-EC R405.5.3.1	FBC-EC requires glazing areas to include manufacturer’s frame area	May slightly increase stringency of FBC-EC wrt IECC (depending on typical practice)
Performance	FBC-EC R405.5.3.1	FBC-EC allows area of an existing window enclosed by addition to be subtracted from addition’s glazing area for same overhang and orientation	Slightly decreases stringency of FBC-EC wrt IECC (in applicable cases)
Performance	FBC-EC R405.5.3.2	FBC-EC includes Performance compliance window overhang specifications	May slightly increase stringency of FBC-EC wrt

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
			IECC (depending on typical practice)
Performance	FBC-EC R405.5.3.3	FBC-EC stipulates how glass area in doors is to be calculated	Slightly increases stringency of FBC-EC wrt IECC (in applicable cases and depending on typical practice)
Performance	FBC-EC R405.5.3.4	FBC-EC includes maximum fenestration SHGC overhang depth alternative	Little or no impact (in applicable cases)
Performance	FBC-EC R405.6.3.1	FBC-EC includes proposed home EF and UEF adjustment factors for instantaneous water heaters	Somewhat increases stringency of FBC-EC wrt IECC (in applicable cases)
Performance	FBC-EC R405.7	FBC-EC Performance compliance installation criteria for radiant barrier, cool roof, cross ventilation, whole house fan, ceiling fan, heat recovery unit, and heat pump water heater credit options	Slightly increases stringency of FBC-EC wrt IECC (in applicable cases and depending on typical practice)
Performance	FBC-EC R405.7.1	Increases operative surface emissivity limit for sheet radiant barriers from 0.06 to 0.10	May slightly decrease stringency of FBC-EC wrt IECC (in applicable cases)
Energy Rating Index	R406.2	FBC-EC continues to include 2015 IECC Section R403.5.3 hot water pipe insulation requirements for ERI compliance, while the 2021 IECC no longer includes this requirement for ERI compliance	No impact because of trade-offs
Energy Rating Index	IECC Table R406.2	2021 IECC Table R406.2 includes a requirement that duct insulation be R-8 for ducts ≥ three inches in diameter and outside of conditioned space (per reference to Section R403.3.1), while the FBC-EC stipulates a minimum duct	No impact because of trade-offs

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		insulation of R-6 for ducts not inside the building thermal envelope (unless site-wrapped)	
Energy Rating Index	FBC-EC R406.3 IECC R406.4	Energy Rating Index details including standard reference design ventilation rate differences	Difficult to assess
Energy Rating Index	IECC R406.3.1	New 2021 IECC subsection replaces building thermal envelope requirements for cases in which on-site renewables are not included with a total building thermal envelope UA requirement; intended to increase thermal "backstop" flexibility	No impact because of trade-offs
Energy Rating Index	IECC R406.3.2 and R406.4	New 2021 IECC subsection increases stringency of building thermal envelope requirements for cases in which on-site renewables are included, specifying those in 2018 IECC (instead of those in 2015 IECC), and in Section R406.4, limits the reduction in energy use of the rated design from on-site renewables to 5 percent of the total energy use	No impact because of trade-offs
Energy Rating Index	FBC-EC R406.4 IECC R406.5	Maximum Energy Rating Index in FBC-EC is 58 vs. 52 in IECC for the two Florida Climate Zones	Decreases stringency of FBC-EC wrt IECC
Energy Rating Index	FBC-EC R406.4 IECC R406.5	Added 2021 IECC language specifies that both the proposed design and confirmed built dwelling unit be shown to meet ERI requirements	None or somewhat decreases stringency of FBC-EC wrt IECC depending on typical practice
Energy Rating Index	FBC-EC R406.5 IECC R406.6	FBC-EC requires that verification be completed by an approved third party in accordance with Florida statute	None or slightly increases stringency of FBC-EC depending on typical practice

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		based Building Energy Efficiency Rating System while IECC only requires verification by an approved third party or authority having jurisdiction	
Energy Rating Index	FBC-EC R406.6.2 IECC R406.7.2	2021 IECC stipulates that compliance documentation be created and submitted for both the proposed design and confirmed built dwelling unit, and moves expanded required information to proposed and confirmed subsections	None or somewhat decreases stringency of FBC-EC wrt IECC depending on typical practice
Energy Rating Index	IECC R406.7.3	New IECC section requires that where onsite renewable energy is included in the calculation of an ERI, the code official must be provided with either 1) substantiation that the associated RECs are owned by, or retired on behalf of, the homeowner, or 2) a contract that conveys the RECs associated with the onsite renewable energy to the homeowner, or conveys an equivalent quantity of RECs associated with other renewable energy to the homeowner	Slight reduction in overall community energy use for applicable IECC ERI projects as these RECs won't be used for offsetting others
Additional Efficiency Package Options	IECC R408.2	New IECC section provides additional efficiency package options referenced in new Section R401.2.5 (discussed above): - R408.2.1 provides an enhanced envelope performance option - R408.2.2 provides a more efficient HVAC equipment performance option	In conjunction with Section R401.2.5, decreases FBC-EC Prescriptive and Energy Rating Index stringency wrt IECC; for Performance compliance, the 2023 FBC-EC includes a 5% stringency reduction

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
		- R408.2.3 provides a reduced energy use in service water-heating option - Section R408.2.4 provides a more efficient duct thermal distribution system option - Section R408.2.5 provides an improved air sealing and efficient ventilation system option	
CHAPTER 5 EXISTING BUILDINGS			
General	FBC-EC R501.7.2	New FBC-EC subsection prohibits electric resistance from being the primary space heating system type used for complete central equipment replacements in Climate Zone 2	Increases FBC-EC stringency wrt IECC (in applicable equipment replacement cases); see December 2023 DBPR bulletin regarding application of this section
Additions	FBC-EC R502.1.1.1 IECC R502.3.1	Renumbered IECC section exempts new envelope assemblies that are part of an addition from the requirements of Section R402.4.1.2 (air leakage testing)	None or minor impact in applicable cases
Additions	FBC-EC R502.1.1.2 IECC R502.3.2	Renumbered IECC Prescriptive compliance section now states "HVAC ducts newly installed as part of an addition…" must comply with Section R403 instead of stating "New heating, cooling and duct systems that are part of the addition…" must comply with Section R403; the 2023 FBC-EC only requires compliance with R403.1, R403.2, R403.3, R403.5 and R403.6, but still applies the requirement to "New heating, cooling and duct systems"	May slightly decrease or increase FBC-EC stringency wrt IECC

Provision Type	Code Section	Difference Summary	Anticipated Effect on FBC-EC Stringency wrt IECC
Additions	FBC-EC R502.1.1.2 IECC R502.3.2	IECC Prescriptive existing system duct testing exception for additions formerly limited to ducts extending less than 40 linear feet in unconditioned spaces; now does not include a duct length limit (while FBC-EC still includes the 40 foot limit)	Slightly increases FBC-EC stringency wrt IECC (in applicable cases)
Alterations	FBC-EC and IECC R503.1.2	Renumbered IECC Prescriptive compliance section now states "HVAC ducts newly installed as part of an alteration…" must comply with Section R403 instead of "New heating, cooling and duct systems that are part of the alteration…" must comply with Section R403; the 2023 FBC-EC only requires compliance with R403.1, R403.2, R403.3, R403.5 and R403.6, but still applies the requirement to "New heating, cooling and duct systems"	May slightly decrease or increase FBC-EC stringency wrt IECC
Alterations	FBC-EC and IECC R503.1.2	IECC Prescriptive existing system duct testing exception for alterations formerly limited to ducts extending less than 40 linear feet in unconditioned spaces; now does not include a duct length limit (while FBC-EC still includes the 40 foot limit)	Slightly increases FBC-EC stringency wrt IECC (in applicable cases)
FBC-EC APPENDIX RC CALCULATION OF END USE ENERGY LOADS			
Calculation of end use energy loads for code compliance determination	FBC-EC Table RC-1(1)	2023 FBC-EC updates Performance compliance end use load calculation coefficients 'a' and 'b' that apply to Florida heating and cooling equipment	Slightly increases FBC-EC Performance stringency wrt IECC