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TRIFORCE® WOOD TRUSSES

CSI Section:

06 17 53 Shop-Fabricated Wood Trusses

1.0 RECOGNITION

The TRIFORCE® wood trusses recognized in this report, have been evaluated for structural performance the wood trusses meet the intent of the provisions of the following code editions:

- 2018, 2015 and 2012 International Building Code® (IBC)
- 2018, 2015 and 2012 International Residential Code® (IRC)
- 2017 Florida Building Code, Building (FBC) – Supplement Attached
- 2017 Florida Building Code, Residential (FBC) – Supplement attached

2.0 LIMITATIONS

Use of the wood trusses recognized in this report is subject to the following limitations:

2.1 Use of TRIFORCE® wood trusses shall comply with the provisions of the applicable codes, the manufacturer’s published installation instructions, and this report. Where conflicts occur in these provisions, the most restrictive shall govern.

2.2. Selection of the floor trusses for structural loading and its supporting structure shall be designed by an approved structural design professional. The design professional shall provide signed and sealed calculations and drawings when required by the building official for approval.

2.3 The open web trusses shall be properly braced in accordance with the installation instructions and the applicable codes.

2.4 The open web trusses shall be installed and remain in dry service conditions as defined in Section 3.1.1 of this report.

2.5 Design values found in this report do not account for concentrated loading and were determined for uniform loading only.

2.6 The trusses recognized in this report are produced by Barrette Structural Distribution, Inc in Trois-Rivieres, Quebec, Canada.

3.0 PRODUCT USE

3.1 Design: TRIFORCE® wood trusses shall be designed using Allowable Stress Design (ASD) in accordance with manufacturer’s design information and ANSI/AWC National Specification for Wood Construction (NDS). The NDS version used for design shall be applicable to the appropriate code year. Allowable design values: moment, shear, and deflection identified in Table 2 of this report shall be used for design. Applicable adjustment factors found in this section shall be used to determine adjusted allowable design values.

3.1.1 Adjustment Factors: The adjustment factors found in Section 7.3 of the NDS shall be used. Adjustment factors shall be applied to the design values for bending, shear, stiffness, shear stiffness coefficients and design reaction values as defined in Table 7.3.1 of the NDS. A load duration factor, C_D , shall be used to determine the adjusted design values as specified in Section 2.3.2 of the NDS. A wet service factor, C_M , of 1.0 shall be used to determine the adjusted design values when installed in accordance with this report and when the moisture content of lumber in service conditions is less than 16% in accordance with Section 7.1.4 of the NDS. Design values shall be adjusted by a temperature factor, C_t , when trusses are exposed to elevated temperatures above 100°F (37°C) to 150°F (65°C) as specified in Section 2.3.3 of the NDS. A beam stability factor, C_L of 1.0 shall be applied to determine the adjusted design values in accordance with Section 7.3.5 of the NDS and adhering to the installation requirements specified in this report. A repetitive member factor, C_r of 1.0 shall be applied to determine the adjusted design values in accordance with Section 7.3.6 of the NDS.

3.1.2 Loading: Determining the span for bending and stiffness of trusses shall be in accordance with Section 3.2.1 of the NDS. Design values for deflection in Table 2 of this report are based on uniform loading and deflection at mid-span and as shown in Note 4 of Table 2 of this report. The span used for shear calculations shall be the distance between face of support to face of support in accordance with Section 7.4.7 of the NDS.

3.1.3 Bearing: Bearing capacities with and without web stiffeners are based on allowable end reactions found in Table 3 of this report.

3.2 Installation: Installation of the TRIFORCE® wood trusses shall be in accordance with manufacturer’s installation guide, this evaluation report and the applicable provisions of the IBC and IRC. Trusses shall be installed in dry, covered conditions. The trusses are imprinted with the word “bottom” on the bottom flanges to assure installation is as designed. See Figure 4 for typical labeling.

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.





The manufacturer's installation instructions and this report shall be available at the jobsite during construction for use by installers and for quality assurance purposes.

Fasteners, fastener spacing and connection of trusses to the supporting structure shall be designed in accordance with the applicable code and the NDS. A maximum specific gravity of 0.42 shall be used when determining fastener withdrawal and lateral design.

Installation of the wood trusses shall be continuously laterally supported at the compression flange throughout its length and on each end of the truss to prevent rotation. Lateral support shall be provided as noted in the manufacturer's installation instructions and the design documentation.

Full depth blocking or rim boards shall be required where vertical loads are to be directly transferred from bearing walls located above trusses.

Trusses shall be installed with a minimum bearing length of 1½ inches (38 mm) at each end. Each truss has one trimmable end in which a maximum of 24 inches (609 mm) can be removed. There shall be no cutting or notching of trusses outside of the trimmable end. Trimmable ends are to be cut in accordance with the manufacturer's installation instructions. See Figure 3 and Table 4 for mechanical clearances, dimensions, and details in the open web of trusses.

Web stiffeners shall be installed on both sides of the web at bearing points when required by Table 3 of this report. Web stiffeners shall have a minimum dimensions of 19/32-inch thick (15 mm) and 2½ inches wide (63.5 mm). A gap is to be maintained at the top of bearing. Stiffeners to be installed with 3 – 8d nails for 9.5-inch (229 mm) and 11.875-inch (301 mm) truss depths and 5 -8d nails for 14-inch (356 mm) and 16-inch (406 mm) truss depths. Nails shall be on one side only and equally spaced along the vertical length of the stiffener. Materials used for stiffeners shall meet the requirement of PS-1, PS-2 or solid sawn lumber. When PS-1 or PS-2 is used for bearing stiffener material, the face grain shall be parallel to the long axis of the stiffener. See Figure 2.

Trusses may be installed cantilevered to a maximum length of the lesser of either 24 inches (610 mm) or one-third of the adjacent continuous span. The bearing area must be completely within the trusses' OSB web section and the truss bearing area at the cantilever must have a minimum 3½ inches (89 mm) bearing length.

Bearing stiffener installation and size shall be in accordance with Figure 2 of this report.

4.0 PRODUCT DESCRIPTION

4.1 General: TRIFORCE® wood trusses are prefabricated open web floor trusses constructed of solid-sawn wood and finger-jointed Spruce-Pine-Fir (SPF) lumber. Web members are connected to flanges by adhesively bonded finger joints. See Figure 1 for general assembly.

4.1.1 Flanges: The top and bottom flanges are constructed of solid-sawn or finger-jointed Spruce-Pine-Fir (SPF) lumber having a minimum 2-inch-by-3-inch nominal dimension.

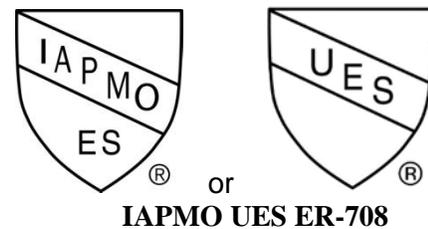
4.1.2 Web Members: The vertical and diagonal web members are constructed of minimum nominal 2-inch-by-2-inch SPF lumber.

An extension is provided on one end of the truss that may be cut, according to manufacturer's installation instructions, to adjust the length of the truss.

4.1.3 Adhesive: The adhesive used for manufacturing the trusses complies with ASTM D2559 and qualifies under the heat durability performance requirements of ASTM D7247.

5.0 IDENTIFICATION

The bottom flange of the product is imprinted with the manufacturer's name, product name, approved inspection agency, the UES Mark of Conformity and evaluation report number (ER-708). Either UES Mark of Conformity may be used as shown below:



6.0 SUBSTANTIATING DATA

6.1 Calculations and test data in accordance with ICC-ES Acceptance Criteria for Prefabricated Parallel Wood Trusses, AC 224, Approved October 2018.

6.2 Engineering analysis.

6.3 Manufacturer's quality documentation, descriptive literature and installation instructions.



7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on TRIFORCE[®] wood trusses to assess their conformance to the codes shown in Section 1.0 of this report and documents the product’s certification. The wood trusses are produced at locations noted in Section 2.6 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

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For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org

TABLE 1- TRIFORCE[®] PREFABRICATED OPEN WEB JOISTS¹

Series	Joist Depth (inches)	Flange Material Grade ¹	Flange Dimensions (depth x width) (inches)	Diagonal Web Material ¹	Diagonal Web Dimensions (depth x width) (inches)	Trimnable End Web Material
OJ-314	9 ½ - 16	G14	1.5 x 2.5	G14	1.5 x 1.5	3/8 OSB
OJ-315	9 ½ - 16	G15-1.5E	1.5 x 2.5	G14	1.5 x 1.5	3/8 OSB
OJ-318	9 ½ - 16	G18-1.8E	1.5 x 2.5	G14	1.5 x 1.5	3/8 OSB
OJ-320	9 ½ - 16	G20-2.0E	1.5 x 2.5	G14	1.5 x 1.5	3/8 OSB
OJ-414	9 ½ - 16	G14	1.5 x 3.5	G14	1.5 x 1.5	3/8 OSB
OJ-415	9 ½ - 16	G15-1.5E	1.5 x 3.5	G14	1.5 x 1.5	3/8 OSB
OJ-418	9 ½ - 16	G18-1.8E	1.5 x 3.5	G14	1.5 x 1.5	3/8 OSB
OJ-420	9 ½ - 16	G20-2.0E	1.5 x 3.5	G14	1.5 x 1.5	3/8 OSB

For SI: 1 inch = 25.4 mm.

¹ Grades referenced are proprietary and meet the criteria maintained in the quality manual.



TABLE 2- TRIFORCE® REFERENCE ALLOWABLE STRESS DESIGN PROPERTIES^{1,2,3}

Series	Joist Depth (inches)	Flange Width (inches)	Ma (lbs-ft)	Va (lbs)	EI (x10 ⁶ lb-in ²)	K (x 10 ⁶ lbs)	Joist Weight (plf)
OJ-314	9.5	2.5	2344	945	170	2.7	2.70
	11.875	2.5	3035	1100	285	3.7	2.80
	14	2.5	3635	1240	413	4.6	2.85
	16	2.5	4131	1373	554	5.5	2.95
OJ-315	9.5	2.5	2836	945	182	2.7	2.70
	11.875	2.5	3672	1100	305	3.7	2.80
	14	2.5	4420	1240	442	4.6	2.85
	16	2.5	5124	1373	594	5.5	2.95
OJ-318	9.5	2.5	3607	945	219	2.7	2.73
	11.875	2.5	4670	1100	366	3.7	2.83
	14	2.5	5621	1240	530	4.6	2.88
	16	2.5	6516	1373	712	5.5	2.98
OJ-320	9.5	2.5	3738	945	243	2.7	2.73
	11.875	2.5	4840	1100	407	3.7	2.83
	14	2.5	5826	1240	589	4.6	2.88
	16	2.5	6753	1373	791	5.5	2.98
OJ-414	9.5	3.5	3339	945	238	3.3	3.23
	11.875	3.5	4324	1100	398	4.6	3.33
	14	3.5	5178	1240	577	5.7	3.43
	16	3.5	5884	1373	776	6.8	3.53
OJ-415	9.5	3.5	4041	945	255	3.3	3.25
	11.875	3.5	5231	1100	427	4.6	3.35
	14	3.5	6296	1240	618	5.7	3.45
	16	3.5	7298	1373	831	6.8	3.55
OJ-418	9.5	3.5	5138	945	306	3.3	3.25
	11.875	3.5	6652	1100	512	4.6	3.35
	14	3.5	8007	1240	742	5.7	3.45
	16	3.5	9282	1373	997	6.8	3.55
OJ-420	9.5	3.5	5325	945	340	3.3	3.25
	11.875	3.5	6894	1100	569	4.6	3.35
	14	3.5	8298	1240	824	5.7	3.45
	16	3.5	9620	1373	1108	6.8	3.55

For SI: 1 inch = 25.4 mm.

¹ Design properties in this table are reference design values as defined in the NDS for nominal duration load.

² Values in this table shall be adjusted in accordance with Section 3.1.1 of this report and the NDS.

³ Moment capacity shall not be increased by a repetitive adjustment factor as described in Section 3.1.1 of this report.

⁴ Deflection (maximum) from uniform loads at mid-span is calculated based on the following formula:

$$Deflection (\Delta_{max}) = \frac{5wL^4}{384EI} + \frac{wL^2}{K}, \text{ Where } L = \text{span length, } w = \text{uniform load, } EI = \text{bending stiffness, } K = \text{shear deflection factor.}$$

TABLE 3- TRIFORCE® ALLOWABLE BEARING REACTIONS^{1,2,3,4}

Series	Depth (inches)	2X3 Post Ends (lbs)		OSB End (lbs)		
		1 1/2"	3 1/2"	1 1/2"	1 1/2" with web Stiffeners	3 1/2"
OJ-300	9 1/2	1514	1830	1030	1341	1349
	11 7/8	1581	1951	1047	1595 ⁵	1349
	14	1595 ⁵	2059	1063	1595 ⁵	1349
	16	1595 ⁵	2160	1078	1595 ⁵	1349
OJ-400	9 1/2	1514	1830	1030	1341	1349
	11 7/8	1581	1951	1047	1622	1349
	14	1640	2059	1063	1872	1349
	16	1690	2160	1078	2104	1349

For SI: 1 inch = 25.4 mm.

¹ Design values in this table are maximum bearing values. Values may be increased by applicable adjustment factors defined in Section 3.1.1 of this report unless performance is controlled by bearing stress limited by flange perpendicular to grain (See Note 5)

² A minimum bearing length of 1 1/2 inch shall be required for end bearing areas as defined in Section 3.3 of this report. Linear interpolation between bearing lengths is permitted.

³ Design values in this table are not affected by trimmable ends of trusses when removed per the manufacturer's installation instructions and this report.

⁴ Web stiffeners must be installed in accordance with Section 3.3 of this report.

⁵ Bearing reaction is limited by flange perpendicular to grain bearing stress. Values shall not be increased by any adjustment factors in Section 3.1.1 of this report.

TABLE 4- TRIFORCE® MECHANICAL CLEARANCES^{1,2}

Series	Depth (inches)	Round D (inches)	Rectangle W X L (inches)	Square W X L (inches)
OJ-300 and OJ-400	9 1/2	5	3 x 9, 4 x 6	4 1/2 x 4 1/2
	11 7/8	7 1/4	3 x 13	5 3/4 x 5 3/4
	14	8 1/2	3 x 14, 6 x 8	6 1/2 x 6 1/2
	16	9 1/2	3 x 15	7 1/2 x 7 1/2

¹ Maximum dimensions do not account for any loading applied by mechanical equipment

² No cutting or notching of truss chords. See Figure 3.

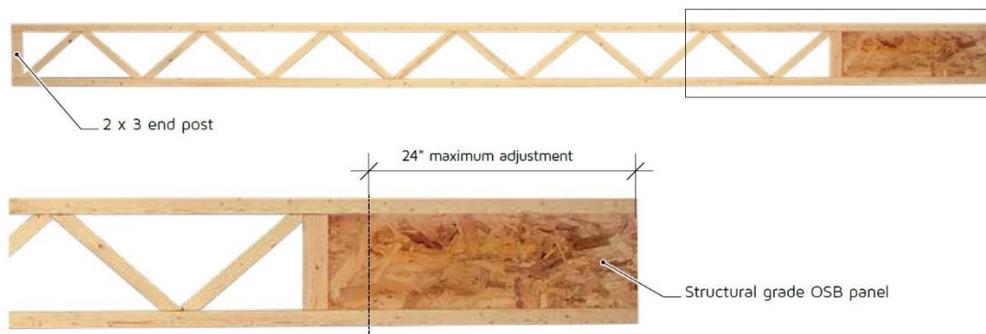


Figure 1 - General Truss Assembly

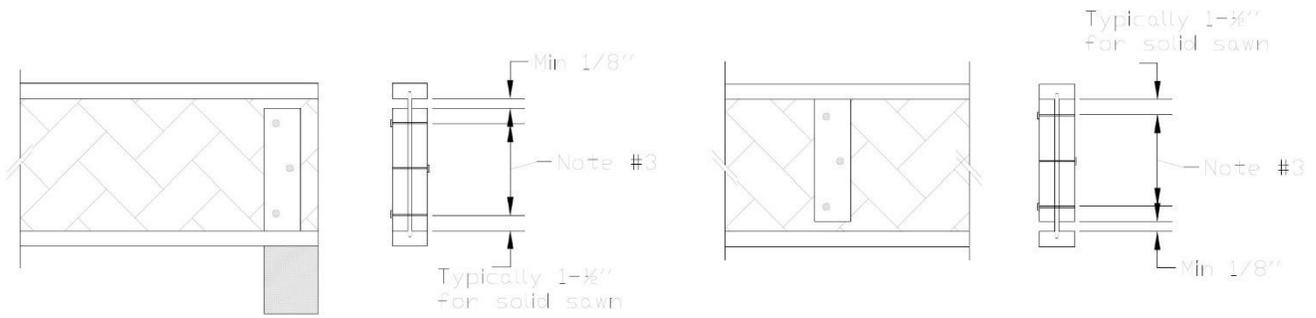


Figure 2 - Web Stiffener Assembly

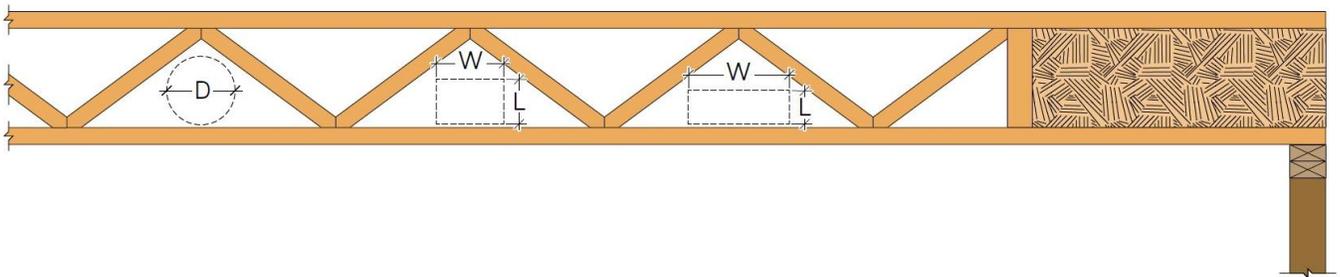


Figure 3- Mechanical Clearances



Figure 4 - Typical Label



FLORIDA SUPPLEMENT

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1.0 RECOGNITION

TRIFORCE® wood trusses evaluated in IAPMO UES ER-708 is a satisfactory alternative to the following codes and regulations:

- 2017 Florida Building Code, Building (FBC, Building)
- 2017 Florida Building Code, Residential (FBC, Residential)

2.0 LIMITATIONS

Use of TRIFORCE® wood trusses described in this report supplement is subject to the following limitations:

2.1 Use of TRIFORCE® wood trusses shall comply with the provisions of the applicable codes, the manufacturer's published installation instructions, and this report. Where conflicts occur in these provisions, the most restrictive shall govern.

2.2 Evaluation to the high-velocity hurricane zone provisions in Chapter 23 of the FBC is outside the scope of this report.

2.3 For products falling under Florida Rule 61G20-3.008, it has been verified that the report holder's quality assurance program is audited by a quality assurance entity, approved by the Florida Building Commission, to provide oversight and determine that the products are being manufactured as described in this evaluation report to establish continual product performance.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org