



Understanding EFP Truss Design & Compliance

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Jay Jones, TPI

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A wide-angle photograph of a city skyline at sunset. The sky is a mix of orange, yellow, and deep blue with scattered clouds. In the foreground, a river flows under a multi-arched bridge. The city skyline is filled with various skyscrapers, including one with a prominent green dome and another with a tall, thin spire. The water in the river reflects the colors of the sky and the buildings. A large red shape, resembling a stylized roof or a corner, is overlaid on the top-left portion of the image.

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A wide-angle photograph of a city skyline at sunset. The sky is a mix of orange, yellow, and blue with scattered clouds. In the foreground, a river flows under a multi-arched bridge. The city skyline features various skyscrapers, including a prominent one with a green dome and another with a tall, thin spire. The water in the river reflects the colorful sky and the city lights. A large red shape, resembling a stylized roof or a banner, covers the top-left portion of the image, containing the BCMC logo and text.

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Understanding EFP Truss Design & Compliance

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Introductions



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EFP Truss

What is an EFP Truss?



Equivalent Fire Protected Truss

What it is NOT

BCMC	TRUSS	FLOOR	2nd	1st	See Reference (optional)
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This truss is a special BC&TPI EFP Truss designed in accordance with IAPMO Report No. USF-ER-008, including overdesigning wood members and metal connector plates by 8 percent, to achieve fire-endurance equivalency to unprotected 2x10 dimension lumber as permitted by IRC R302.13, Exception 4. See also the BC&TPI EFP Truss Design and Fabrication document for complete design and manufacturing requirements.

All exposed chord splice plates shall be protected with 2x4 wood scales centered over the splice plates with a length extending 3-inches beyond each end of each splice plate and fastened with a minimum of 2x4 x 3-inch nails on each side of the splice. Strongbacks shall be installed per standard industry details at 10 ft. or maximum.

If random representative sampling of trusses shows not include at least one EFP Truss per week per operational set-up location per shift when manufacturing for the week includes an EFP Truss, then an additional inspection shall be performed to include an EFP Truss.

LOADING (gpf)	SPACING	CE	DEFL.	in (in)	SPAC	LT	PLATES	GRP
TCLL 45.0	Plank Spacing 1.00	TC 0.48	VERTICAL 0.19	14	HSSC 360	MT20	20x108	20x108
TCDL 10.0	Lumber DOL 1.00	BC 0.88	VERTICAL 0.28	14	HSSC 240	MT20HS	14x108	
BCCL 9.0	Plg Strngs for YES	WB 0.28	VERTICAL 0.05	10	N/A	N/A		
BCCL 5.0	Code IRC2024TP002	Main S					Weight 55 lb	FT = 2014F, 2016E

LUMBER:
TOP CHORD 2x4 SPF No.20M
BOT CHORD 2x4 SPF No.20M
WEBS 2x4 SPF No.20M

BRACING:
TOP CHORD Structural wood sheathing directly applied or 6-0-0 oc panels, except
BOT CHORD 10-0-0 oc bracing

REACTIONS: (Rings) 18x20x5-3-8 (min. 0-1-8), 18x20x5-3-8 (min. 0-1-8)

FORCES: (Rings) - Max. Comp. Max. Ten. - All forces 250 (R) or less except where shown:
TOP CHORD 3-16-1800, 3-16-1810, 4-16-1820, 5-16-1830, 6-16-1840, 7-16-1850, 8-16-1860, 9-16-1870, 10-16-1880, 11-16-1890, 12-16-1900
BOT CHORD 17-18x1200, 18-17x1200, 19-18x1200, 20-18x1200, 21-18x1200, 22-18x1200, 23-18x1200, 24-18x1200, 25-18x1200, 26-18x1200, 27-18x1200, 28-18x1200, 29-18x1200, 30-18x1200
WEBS 2-18x1200, 3-17x1200, 4-17x1200, 5-17x1200, 6-17x1200, 7-17x1200, 8-17x1200, 9-17x1200, 10-17x1200, 11-17x1200, 12-17x1200, 13-17x1200, 14-17x1200, 15-17x1200, 16-17x1200, 17-17x1200, 18-17x1200, 19-17x1200, 20-17x1200, 21-17x1200, 22-17x1200, 23-17x1200, 24-17x1200, 25-17x1200, 26-17x1200, 27-17x1200, 28-17x1200, 29-17x1200, 30-17x1200

NOTES:
1) Unlabeled floor live loads have been considered for this design.
2) All plates are MT20 plates unless otherwise indicated.
3) All plates are 3/4" MT20 plates unless otherwise indicated.
4) Recommend 2x4 strongbacks, on edge, spaced at 10-0-0 oc and fastened to each truss with 3-10d (0.131" X 3.75" nails. Strongbacks to be attached to walls at their ends or fastened to other means.
5) CAUTION: Do not end truss backstays.
6) Detail of permanent bracing per project specific bracing requirements, designed by others, or per industry standard details.

LOAD CASES: Standard

IRC Requirements

R302.13 Fire protection of floors.

Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.

Exceptions:

- 1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system.*
- 2. Floor assemblies located directly over a crawl space not intended for storage or for the installation of fuel-fired or electric-powered heating appliances.*
- 3. Portions of floor assemblies shall be permitted to be unprotected where complying with the following:*
 - 3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m²) per story.*
 - 3.2. Fireblocking in accordance with Section R302.11.1 is installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.*
- 4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.*
- 5. Wood floor assemblies less than 600 square feet (55.7 m²) within detached accessory structures with no habitable space above them.*

IRC Requirements

4. *Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.*

- Minimum baseline is performance of 2x10
- Performance is below gypsum-protected assembly

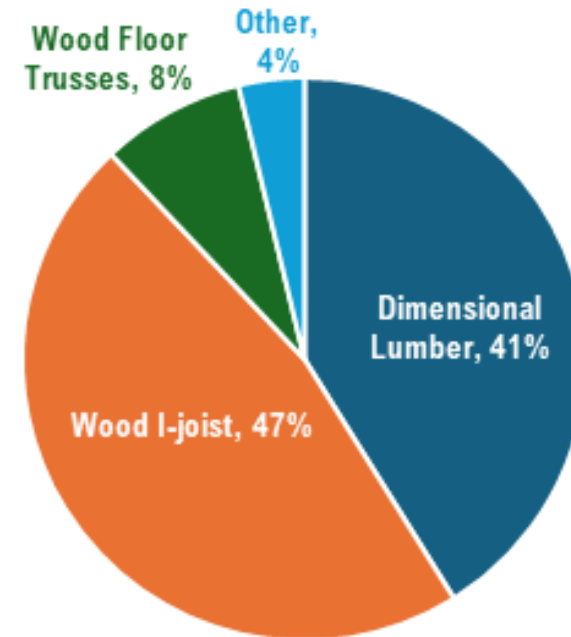


Potential Market

Houses with Basements

No Basement (Slab on Grade)	72%
Basement	17%
Crawlspace	11%

Ground Floor Structural Material

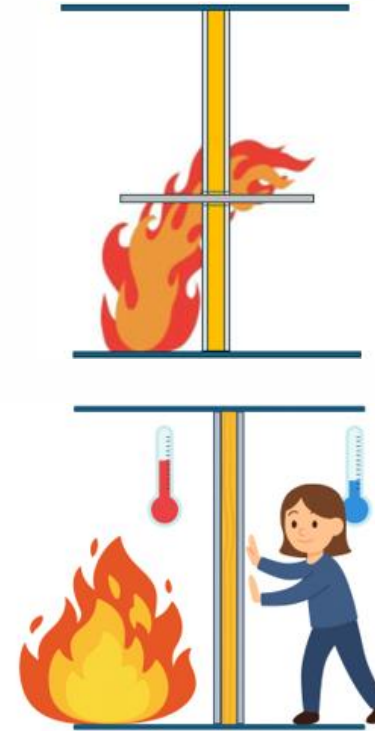


Potential Market

Market Size	
2023 Single Family Housing Starts	947,000
Percent with Basements	16.6%
2023 Houses with Basements	157,000
New Houses with Finished Basements	47,000
New Houses with Unfinished Basements	110,000

Fire Testing Objectives

- Ability to resist **passage of flames or hot gasses**
 - *No through-penetrations or flaming on the unexposed face*
- Ability to provide **thermal insulation**
 - *The temperature rise on the unexposed surface must stay below a certain level.*
- Ability to maintain **structural capacity**
 - *Must carry a specified load for a specified duration without collapse or certain level of deflection*



Performance Requirements

ASTM E119 and D8391

- Test Criteria

- Load – 50% of Design Load
- 15.5 minute duration (based on calculated 2x10)
- Deflection less than $l/40$ (3.6 inches for 12 ft span)
- Change in Rate of Deflection without reason

Not a prediction of real fire conditions. Just a comparable benchmark for code compliance.



SBCA/TPI Testing

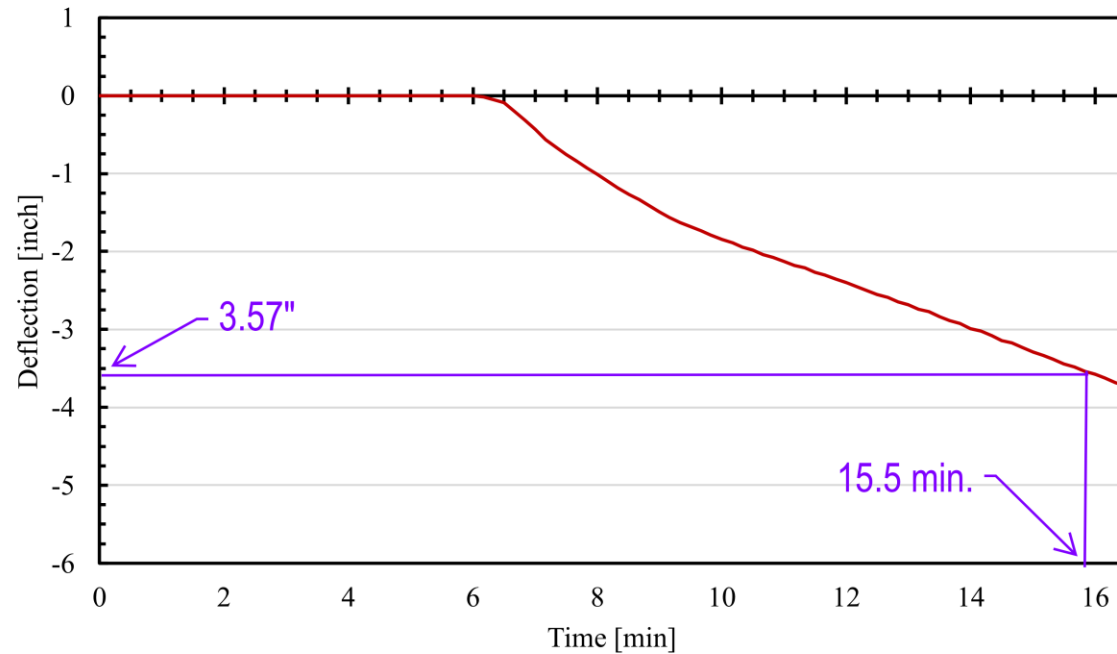


SBCA/TPI Testing

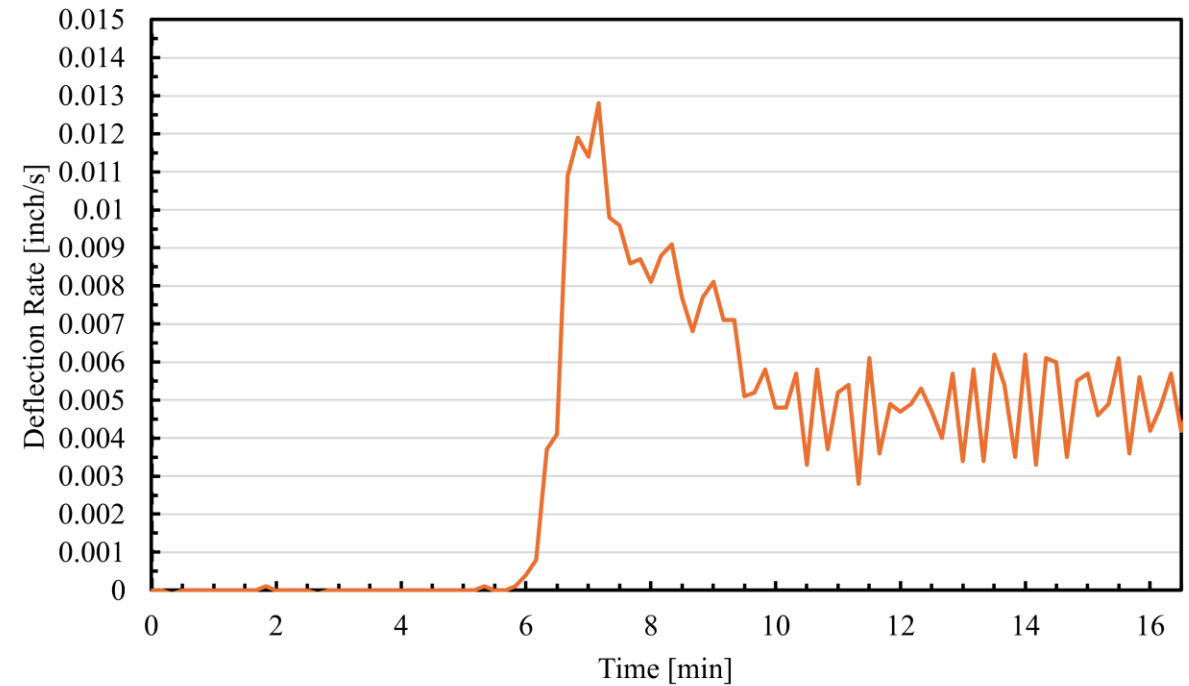
Test Results

Passed load and deflection criteria

DEFLECTION



RATE OF DEFLECTION



Development of Requirements

- Review of test performance
- Understanding why it passed
- Important characteristics
 - Plate tooth length
 - All members #2 grade or better
 - 30 inch max panels
 - Strongbacks mandatory
 - Double vertical web members
 - Sealed drawing with EFP identification
 - Quality Assurance requirements
 - ERS and Additional Requirements

**EVALUATION REPORT**

Originally Issued: 06/09/2026

Valid Through: 06/30/2027

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EFP MPC WOOD FLOOR TRUSS
CSI Section:
06 17 53 – Shop-Fabricated Wood Trusses

1.0 RECOGNITION

The Equivalent Fire Protected Metal Plate Connected Wood Floor Truss, herein referred to as an EFP Truss, recognized in this report, has been evaluated for fire protection of floors. In accordance with Exception 4 of 2024, 2021, 2018, and 2015 IRC Section R302.13, and 2012 IRC Section R501.3, the trusses were evaluated for equivalent fire performance to 2-inch-by-10-inch nominal dimension lumber. The fire protection properties of the EFP Truss comply with the intent of the provisions of the following code editions:

- 2024, 2021, 2018, 2015, and 2012 International Residential Code® (IRC)

2.0 LIMITATIONS

Use of an EFP Truss recognized in this report is subject to the following limitations:

2.1 The EFP Truss has only been evaluated for the fire-protection requirements noted in Section 1.0. The truss assemblies shall be limited to 92 percent of the Allowable Stress Design (ASD) design capacity for fire-protection equivalency. All other IRC requirements shall be evaluated by an approved evaluation service and subject to approval of the building official.

2.2 Selection of an EFP Truss for structural loading shall be performed by a registered design professional. The registered design professional shall prepare structural calculations and provide sealed engineered truss design drawings for each distinct EFP Truss configuration used on a project.

2.3 EFP Truss design, bracing, and truss design drawings shall comply with 2024 IRC Section R502.12 or 2021, 2018, 2015, and 2012 IRC Section R502.11, as applicable. The truss design drawings shall be submitted to the building official and approved prior to installation.

2.4 Each EFP Truss shall be manufactured in a truss manufacturing facility operating under a documented in-plant quality assurance program that meets the requirements of ANSI/TPI 1, and at a minimum, one (1) EFP Truss shall be inspected for each EFP Truss job manufactured. The in-plant quality assurance program shall be verified and monitored through ongoing third-party inspections by an approved inspection agency.

2.5 Metal Connector Plates shall be recognized as complying with ANSI/TPI 1 in an evaluation report issued by an approved and accredited certification agency.

3.0 PRODUCT USE

3.1 Design: The EFP Truss shall be designed and manufactured in accordance with ANSI/TPI 1 National Design Standard for Metal Plate Connected Wood Truss Construction (ANSI/TPI 1-2022), 2024 IRC Section R502.12 or 2021, 2018, 2015, and 2012 IRC Section R502.11, this Evaluation Report, and all additional requirements, limitations, and notes specified on the sealed engineered truss design drawings, as determined by the truss designer.

3.1.1 Fire Protection of Floors: The minimum 9/16-inch (235 mm) deep trusses at a maximum spacing of 24 inches (610 mm) demonstrate equivalent fire performance to 2-inch by 10-inch nominal dimension solid sawn lumber and are recognized for installation without the prescribed gypsum wallboard or wood structural panel membrane, as permitted in Exception 4 of 2024, 2021, 2018, and 2015 IRC Section R302.13, and 2012 IRC Section R501.3, when installed as described in this report.

3.2 Installation: Installation of the EFP Truss shall be in accordance with the sealed engineered truss design drawing, this evaluation report, and the applicable provisions of the IRC. Plate embedment gaps shall be no greater than 1/2 inch (0.8 mm) as determined by ANSI/TPI 1. Where there is a conflict between these documents, the most restrictive provisions shall govern. Strongbacks as specified in SBCA BCSI-2025 shall be installed at a maximum spacing of 10 feet (3048 mm) on center throughout the truss span. The sealed engineered EFP Truss truss design drawing, and this report shall be available at the job site during construction for use by installers and for quality assurance. Job site inspections by the building official shall be conducted in accordance with IRC Section R109.

The product described in this Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to safely and comply with the intent of the provisions of the code, as noted in this report, and for at least equivalence in that provision of the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with Section 104.2.3 of the 2024 IRC and Section 104.11 of previous editions. This document shall only be reproduced in its entirety.

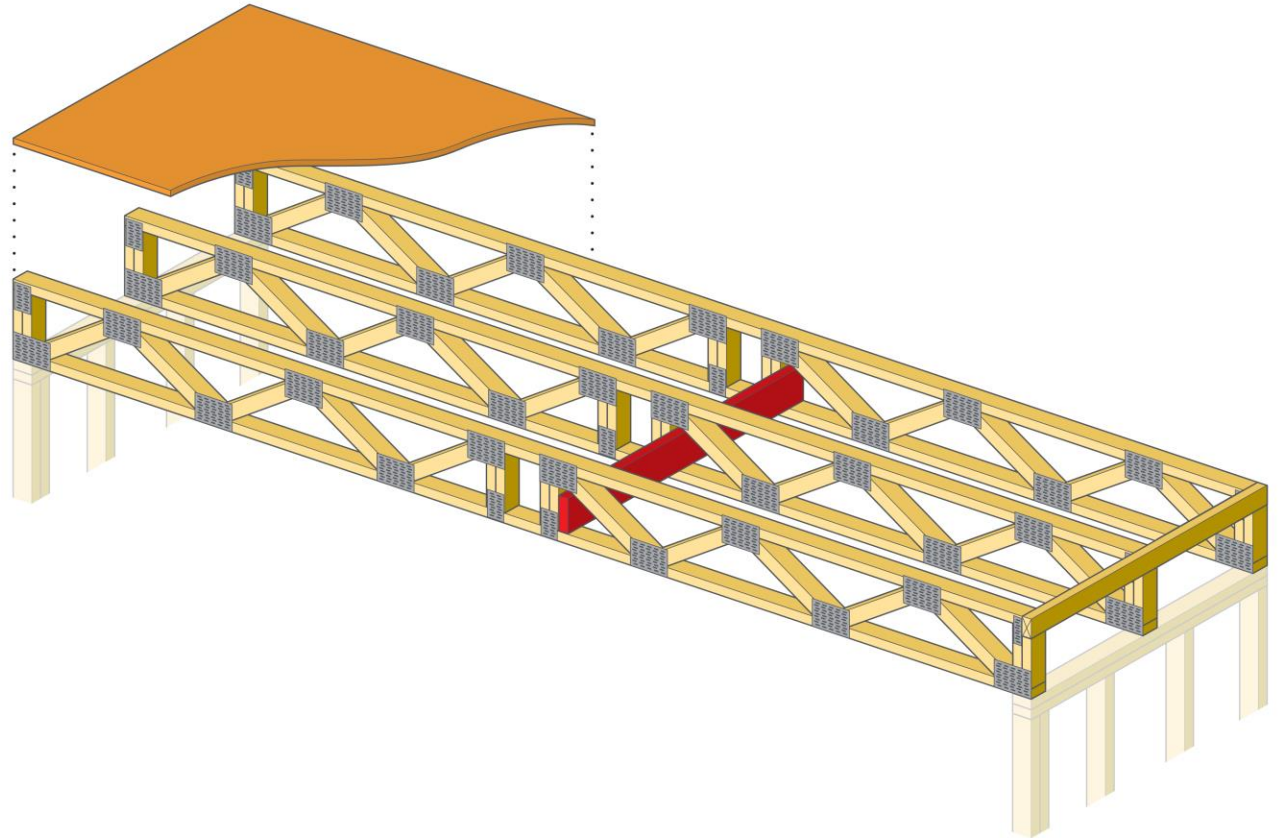
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Design Requirements

- Increase Total Design Load 8%
 - Increase added to the live load
 - 45/10/5 loading for a 40/10/5 rated truss
- Connector Plates
 - 3x3 Minimum
 - 20 gauge with 0.375" tooth
- Fabrication Tolerance
 - 20 percent
 - $C_q = 0.80$
- Lumber
 - Minimum 2x4, #2
- Spacing
 - 24" oc or less



Truss Design Drawings

- Must be signed by a Registered Design Professional
- Each EFP Truss shall be uniquely identified by a truss design drawing
- Include note:

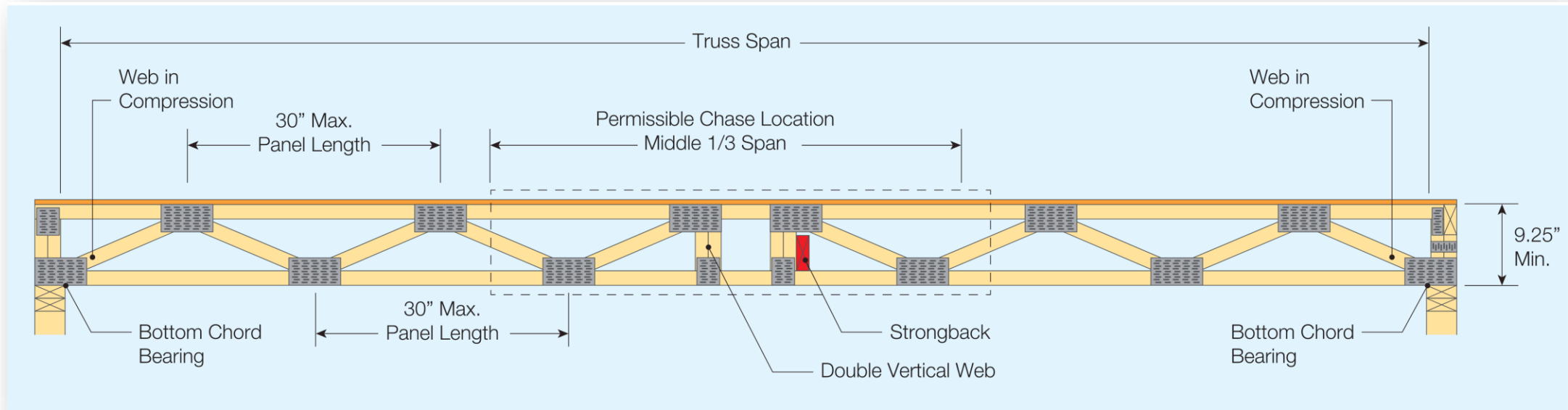
This truss is a special SBCA/TPI EFP Truss designed in accordance with IAPMO Report No. UES ER-999, including overdesigning wood members and metal connector plates by 8 percent, to achieve fire-endurance equivalency to unprotected 2×10 dimension lumber as permitted by IRC R302.13, Exception 4. See also the SBCA/TPI EFP Truss Design and Fabrication document for complete design and manufacturing requirements.

All exposed chord splice plates shall be protected with 2x4 wood scabs centered over the splice plates with a length extending 3-inches beyond each end of each splice plate and fastened with a minimum of (2) 0.120 x 3-inch nails on each side of the splice. Strongbacks shall be installed per standard industry details at 10 ft. oc maximum.

If random representative sampling of trusses as part of the manufacturer's quality program does not include at least one EFP Truss per week per operational set-up location per shift when manufacturing for the week includes an EFP Truss, then an additional inspection shall be performed to include an EFP Truss.

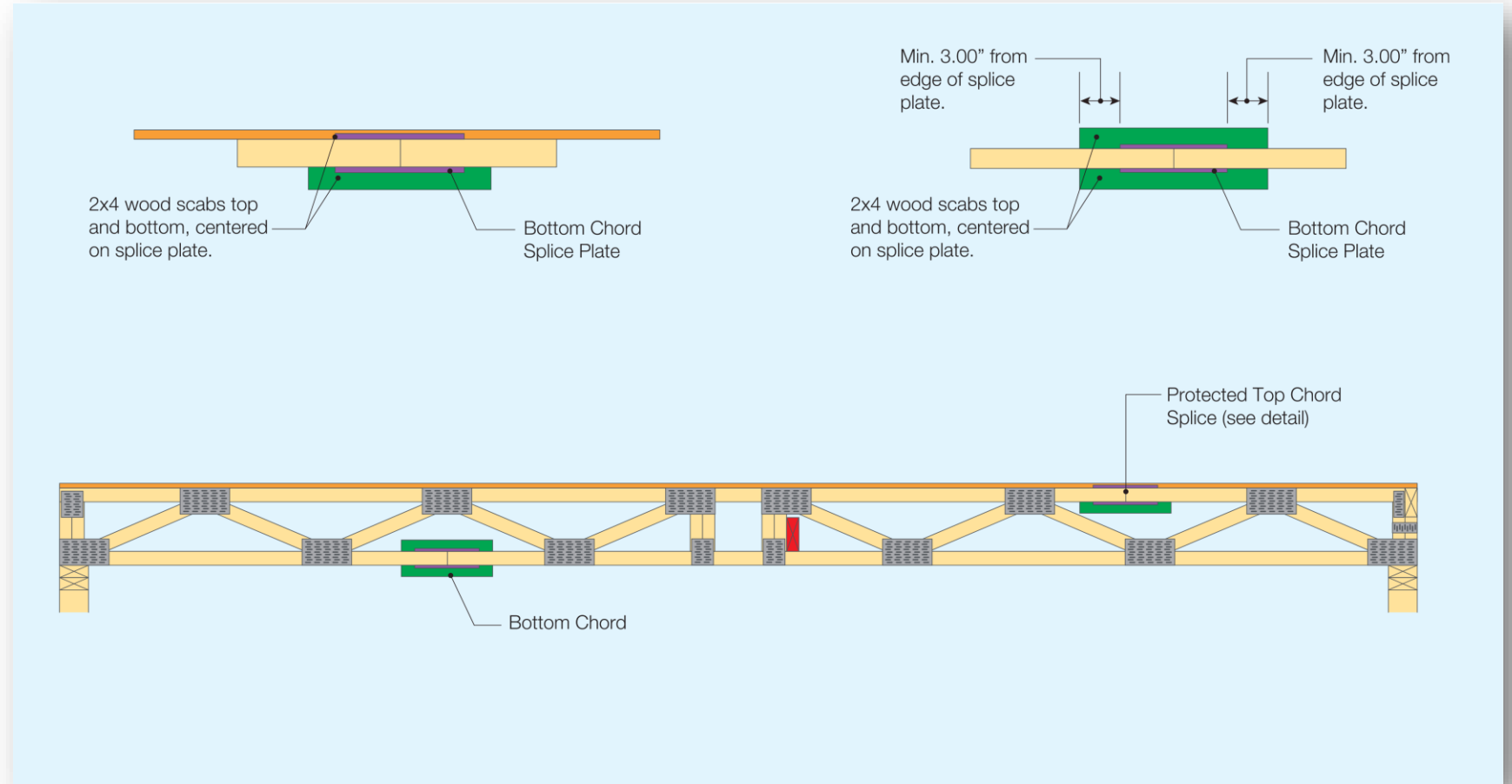
Configuration Requirements

- Warren style with 30-inch maximum panel lengths
- First web member in compression
- Bottom chord bearing only
- Minimum depth = 9.25 inches
- Chase in the middle 1/3
- Double vertical webs at 10 ft oc maximum
- 2x6 strongbacks required



Configuration Requirements

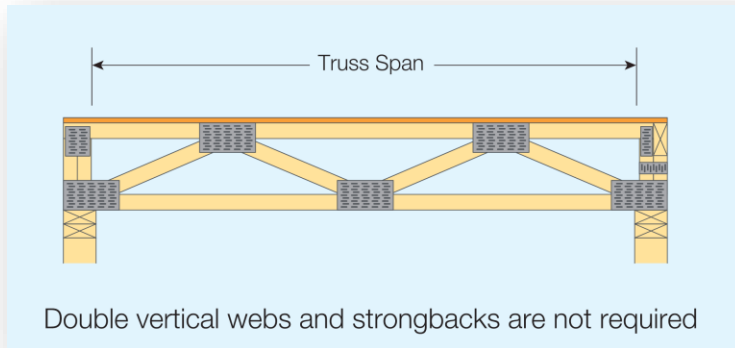
Chord Splices



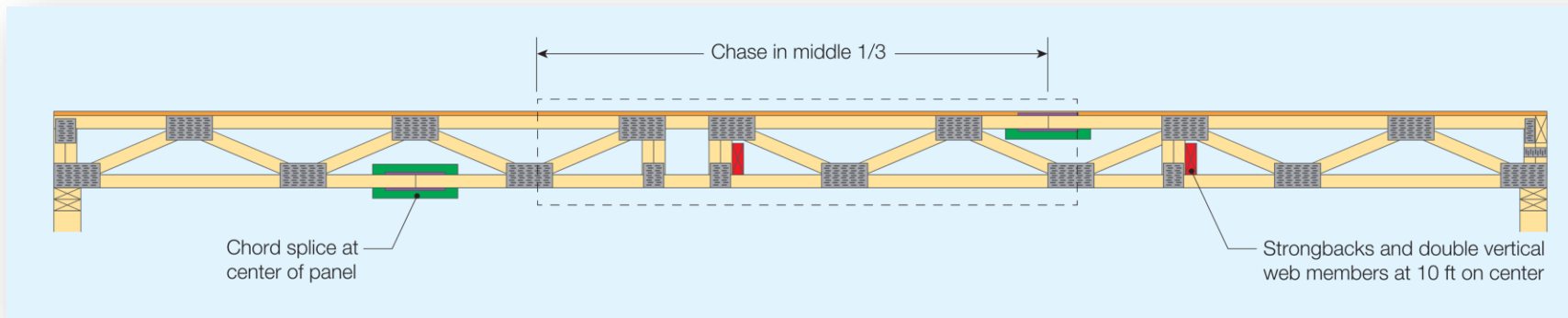
Configuration Requirements

Example Layouts

- **Truss span less than 10 feet**

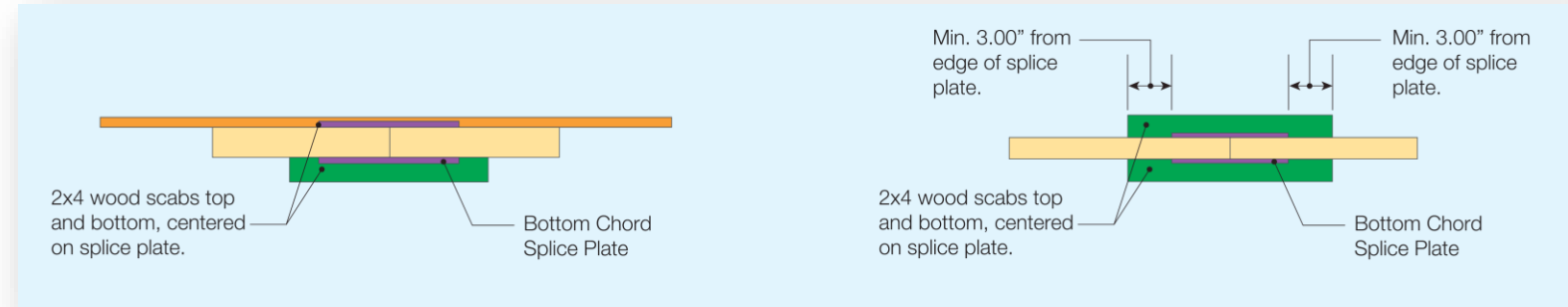


- **Longer truss spans**



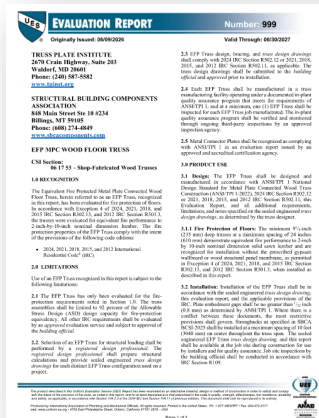
Fabrication Requirements

- **Chord splice**



- **Labeling**

- Each EFP Truss shall be identified with a marking, or affixed label or tag that coordinates the truss with the truss' unique truss design drawing and identifies the truss as an EFP Truss.



- **Jobsite Package**

- IAPMO Report
- Truss design drawings

EFP TRUSS

EQUIVALENT FIRE PROTECTION TRUSS

Scan for
installation
and inspection
guidance.

Escanear para
obtener
información
adicional.

Bottom chord gypsum layer not required.

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Quality Requirements

- In-plant Quality program meeting requirements of ANSI/TPI 1.
- Third party inspections by an approved inspection agency.
- Metal connector plates shall be recognized as complying with ANSI/TPI 1 in an evaluation report.
- Minimum (1) EFP Truss included in the random sampling when EFP Trusses are being manufactured.
- No plate gaps greater than 1/32". No toothholding reductions allowed.



Marketing Sheet



TRUSS PLATE INSTITUTE

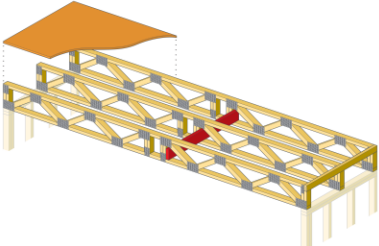


Structural Building
Components Association

EFP Truss

Equivalent Fire Performance Truss: A Tested Alternative

The International Residential Code (IRC) mandates fire protection measures for the underside of floor framing members. This is commonly provided by ½-inch gypsum board, 5/8-inch wood structural panel, or other approved material. The code section includes an exception for approved floor assemblies demonstrating equivalent fire performance.



SBCA and TPI have jointly developed and tested a new floor truss, the EFP (Equivalent Fire Performance) Truss, as an approved floor assembly that provides all the benefits of floor trusses without the need to install a layer of gypsum to the underside of the bottom chord as permitted by IRC R302.13, Exception 4. This solution also eliminates the need for drilling and cutting openings as associated with traditional 2x10 dimensional lumber.



IAPMO Uniform Evaluation Services has evaluated the EFP Truss testing for compliance and issued Uniform Evaluation Service report No. 999. This report, along with the SBCA EFP Truss Design and Fabrication Guidance document, provides requirements for the design, fabrication, and installation of the EFP Truss. These documents can be accessed through the QR Code below.



EFP TRUSS
EQUIVALENT FIRE PERFORMANCE TRUSS

Scan for installation and inspection guidance.

Register your truss to obtain information and/or report.

Bottom chord gypsum layer not required.

SBCA TRUSS TAG

EFP Truss Tags Available from SBCA

SBCA offers EFP Truss Tags designed to help manufacturers clearly identify each EFP Truss and coordinate it with its unique truss design drawing. Visit www.pubs.sbcacomponents.com to learn more and purchase tags.

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EFP Truss Design and Fabrication



TRUSS PLATE INSTITUTE

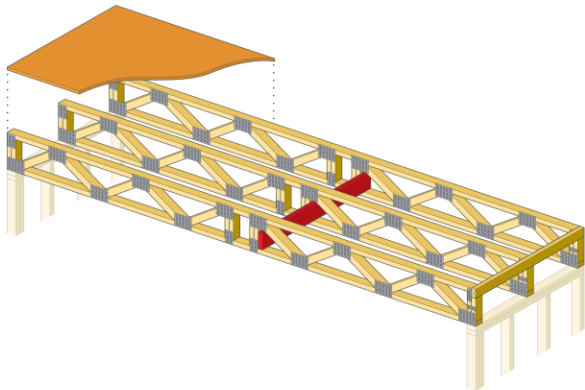


Structural Building
Components Association

EFP Truss

The EFP (Equivalent Fire Performance) Truss is a new truss design developed and tested jointly by SBCA and TPI. It has been tested per ASTM D8391 to demonstrate fire-endurance equivalency to unprotected 2X10 dimension lumber as permitted by IRC R302.13, Exception 4.3.

The EFP Truss possesses unique design, configuration, fabrication and quality requirements which enable it to perform as required. These required characteristics are provided in this document.



EFP Truss – Truss Design and Fabrication

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Current Activities

Future Documents

- Installation and Inspection

Dedicated Webpage

- Literature
- Evaluation Report
- QR Code on truss tag



Education

- On-line education module

Advocacy

- NAHB
- AWC
- Fire association

Q&A

Education Session
Evaluation

SCAN HERE





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