

Technical Evaluation Report™

TER 1010-01

DuPont™ Continuously Insulated Sheathing Series "Portal Frame with Hold-Down"
Evaluation (DuPont™ 12.5" CI I-Joist PFH & DuPont™ 15" CI I-Joist PFH")

DuPont™ Performance Building Solutions

Product:

**DuPont™ 12.5" CI I-Joist PFH
and DuPont™ 15" CI I-Joist PFH**

Issue Date:

October 15, 2010

Revision Date:

June 22, 2023

Subject to Renewal:

July 1, 2024



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COMPANY
INFORMATION:

ADDITIONAL
LISTEES:

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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 12 00 - Structural Panels

SECTION: 06 12 19 - Shear Wall Panels

SECTION: 06 16 00 - Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00 - Thermal Insulation

SECTION: 07 25 00 - Water-Resistive Barriers/Weather Barriers

SECTION: 07 27 00 - Air Barriers

1 Innovative Product Evaluated^{1,2}

1.1 DuPont™ 12.5" CI I-Joist PFH and DuPont™ 15" CI I-Joist PFH

2 Applicable Codes and Standards^{3,4}

2.1 Codes

2.1.1 IBC—15, 18, 21: *International Building Code®*

2.1.2 IRC—15, 18, 21: *International Residential Code®*

¹ For more information, visit drjcertification.org or call us at 608-310-6748.

² **Federal Regulation Definition.** 24 CFR 3280.2 "Listed or certified" means included in a list published by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner. **International Building Code (IBC) Definition of Listed.** Equipment, materials, products or services included in a list published by an organization acceptable to the [building official](#) and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose Listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. **IBC Definition of Labeled.** Equipment, materials or products to which has been affixed a [label](#), seal, symbol or other identifying mark of a nationally recognized testing laboratory, [approved agency](#) or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

³ This Listing is a code defined [research report](#), which is also known as a [duly authenticated report](#), provided by an [approved agency](#) (see [IBC Section 1703.1](#)) and/or an [approved source](#) (see [IBC Section 1703.4.2](#)). An approved agency is "approved" when it is ANAB accredited. DrJ Engineering, LLC (DrJ) is listed in the [ANAB directory](#). A professional engineer is "approved" as an [approved source](#) when that professional engineer is properly licensed to transact engineering commerce. Where sealed by a professional engineer, it is also a duly authenticated report certified by an [approved source](#), (i.e., [Registered Design Professional](#)). DrJ is an ANAB accredited [product certification body](#).

⁴ Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.

2.2 Standards and Referenced Documents

- 2.2.1 *ANSI/AWC SDPWS: Special Design Provisions for Wind and Seismic*
- 2.2.2 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*
- 2.2.3 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*

3 Performance Evaluation

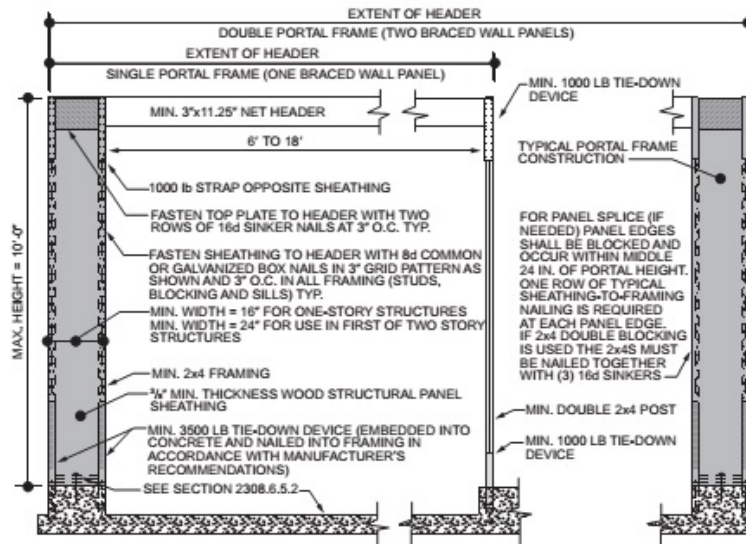
- 3.1 Tests, testing, test reports, research reports, duly authenticated reports and related engineering evaluations are defined as intellectual property and/or trade secrets and protected by Defend Trade Secrets Act 2018 (DTSA).⁵
- 3.2 Testing and/or inspections conducted for this TER were performed at an ISO/IEC 17025 accredited testing laboratory,⁶ an ISO/IEC 17020 accredited inspection body,⁷ which are internationally recognized accreditations through International Accreditation Forum (IAF), and/or a licensed Registered Design Professional (RDP).
- 3.3 Structural performance for shear wall assemblies used as lateral force resisting systems in Seismic Design Categories A through F, have been tested and evaluated in accordance with the following standards:
 - 3.3.1 ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures,
 - 3.3.2 ASTM D7989: Standard Practice for Demonstrating Equivalent In-Plane Lateral Seismic Performance to Wood-Frame Shear Walls Sheathed with Wood Structural Panels,
 - 3.3.3 ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction,
 - 3.3.4 ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings, and
 - 3.3.5 ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings.
- 3.4 Lateral force resisting systems for use in both wind and seismic applications follow the performance-based provisions of IBC Section 2306.1, IBC Section 2306.3, and/or Section 4.3 SDPWS for light-frame wood wall assemblies.

⁵ <https://www.law.cornell.edu/uscode/text/18/part-II/chapter-90>. Given our professional duty to inform, please be aware that whoever, with intent to convert a trade secret (TS), that is related to a product or service used in or intended for use in interstate or foreign commerce, to the economic benefit of anyone other than the owner thereof, and intending or knowing that the offense will, injure any owner of that trade secret, knowingly without authorization copies, duplicates, sketches, draws, photographs, downloads, uploads, alters, destroys, photocopies, replicates, transmits, delivers, sends, mails, communicates, or conveys such information; shall be fined under this title or imprisoned not more than 10 years, or both. Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of \$5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. As the National Society of Professional Engineers states, "Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve." Therefore, to protect intellectual property (IP) and TS, and to achieve compliance with public records and trade secret legislation, requires approval through the use of Listings, certified reports, technical evaluation reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

⁶ Internationally recognized accreditations are performed by members of the International Accreditation Forum (IAF). Accreditation Body and Regional Accreditation Group Members of IAF are admitted to the IAF MLA only after a stringent evaluation of their operations by a peer evaluation team, which is charged to ensure that the applicant complies fully with both international standards and IAF requirements. Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.

⁷ Ibid.

- 3.5 The “DuPont™ 12.5” CI I-Joist PFH” and “DuPont™ 15” CI I-Joist PFH” were tested and evaluated for equivalency to the following IBC requirement:
- 3.5.1 Per [IBC Section 2308.6.5.2](#), any bracing required by [Section 2308.6.5](#) [i.e., Wood structural panel sheathing with a thickness not less than 3/8 inch (9.5 mm) for 16-inch (406 mm) or 24-inch (610 mm) stud spacing in accordance with Tables 2308.6.3(2) and 2308.6.3(3).] is permitted to be replaced by the following (see Figure 1) when used adjacent to a door or window opening with a full-length header.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.448 N.

Figure 1. IBC/IRC Detail of Method PFH

- 3.6 In addition to [IBC Section 2308.6.5.2](#), the IRC defines the PFH detail in [Figure R602.10.6.2](#) as an equivalent replacement to the capacity of a 4x8 sheet of 3/8" wood structural panel (WSP) sheathing through the use of the following language:

IRC Section R602.10.6.2 Method PFH: Portal frame with hold-downs. Method PFH braced wall panels constructed in accordance with the following provisions (see Figure 1 above) are also permitted to replace each 4 feet (1219 mm) of braced wall panel as required by [Section R602.10.6](#) for use adjacent to a window or door opening with a full-length header.

- 3.7 The testing and the supporting data meets the intent of the IBC and IRC through the use of accepted engineering procedures, experience, and technical judgment, where the “DuPont™ 12.5” CI I-Joist PFH” and “DuPont™ 15” CI I-Joist PFH” assemblies have been found to be an alternative material, design, or method of construction that is at least the equivalent of that prescribed in the code in quality, strength, effectiveness, durability, and safety, and can be approved as such.^{8,9}

⁸ [IBC Section 104.11](#) (Alternative materials, design and methods of construction and equipment) and [IRC Section R104.11](#) (Alternative materials, design and methods of construction and equipment): “An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code...”

⁹ Definition of approved in [IBC Section 202](#): “Acceptable to the building official.”

- 3.8 Any building code and/or accepted engineering evaluations (i.e. research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an [ISO/IEC 17065 accredited certification body](#) and a professional engineering company operated by RDPs / [approved sources](#). DrJ is qualified¹⁰ to practice product and code compliance services within its scope of accreditation and engineering expertise, respectively.
- 3.9 Engineering evaluations are conducted with DrJ's ANAB [accredited ICS code scope](#), which are also its areas of professional engineering competence.
- 3.10 Any regulation specific issues not addressed in this section are outside the scope of this TER.

4 Product Description and Materials

- 4.1 A "DuPont™ 12.5" CI I-Joist PFH" or a "DuPont™ 15" CI I-Joist PFH" is constructed as shown in Figure 2, Figure 3, and Figure 4.

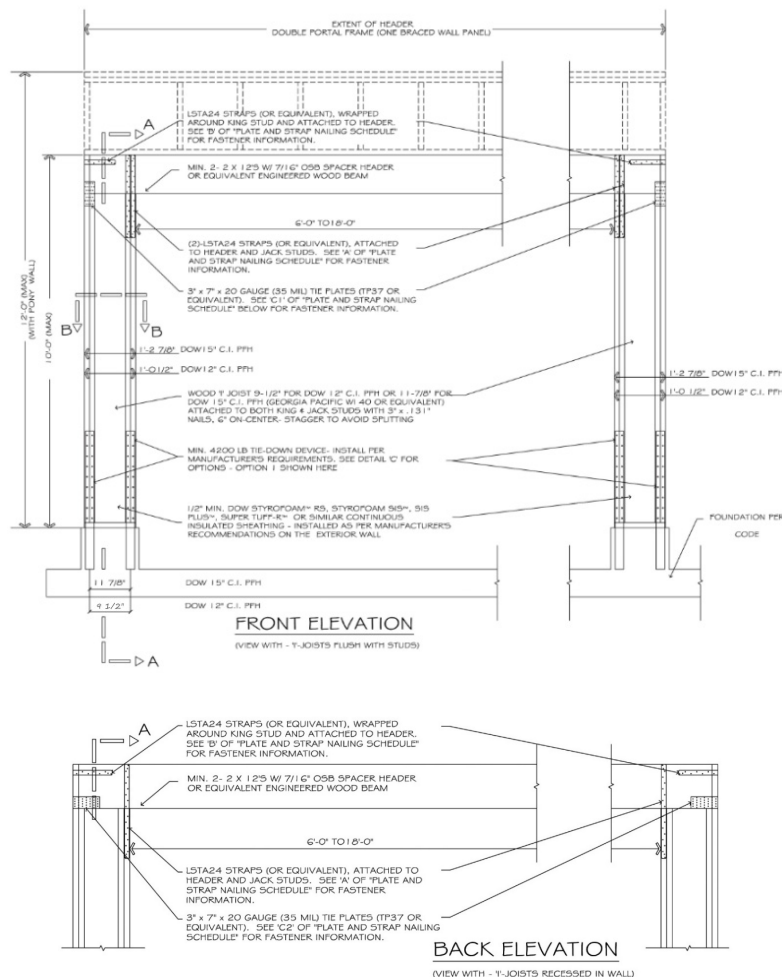


Figure 2. Construction Details of DuPont™ 12.5" CI I-Joist PFH or DuPont™ 15" CI I-Joist PFH

¹⁰ Qualification is performed by a legislatively defined [Accreditation Body](#). [ANSI National Accreditation Board \(ANAB\)](#) is the largest independent accreditation body in North America and provides services in more than 75 countries. [DrJ](#) is an ANAB accredited [product certification body](#).

DOW 12.5" & 15" CI I-JOIST PFH

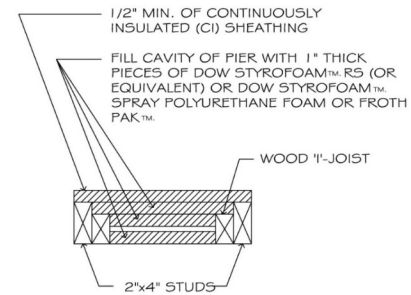
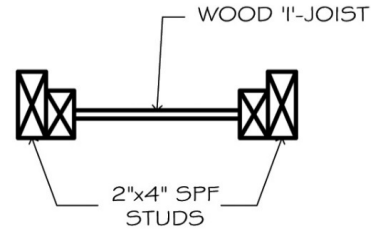
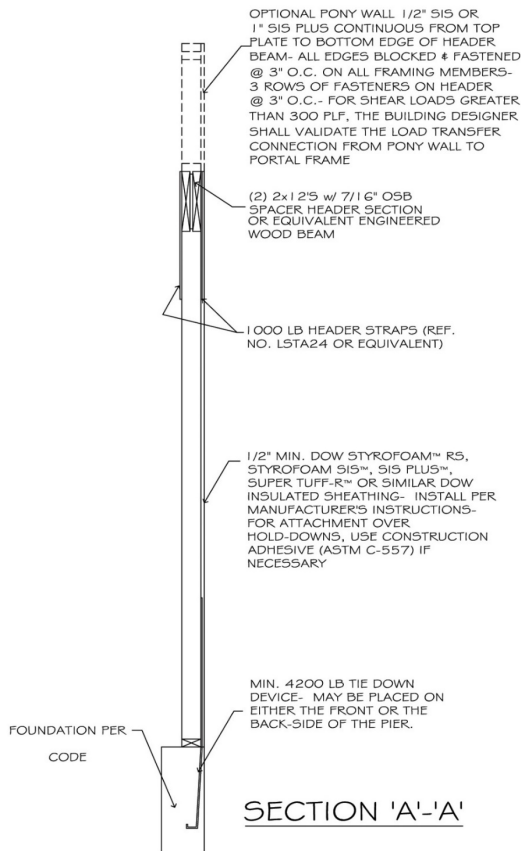


PLATE AND STRAP NAILING SCHEDULE

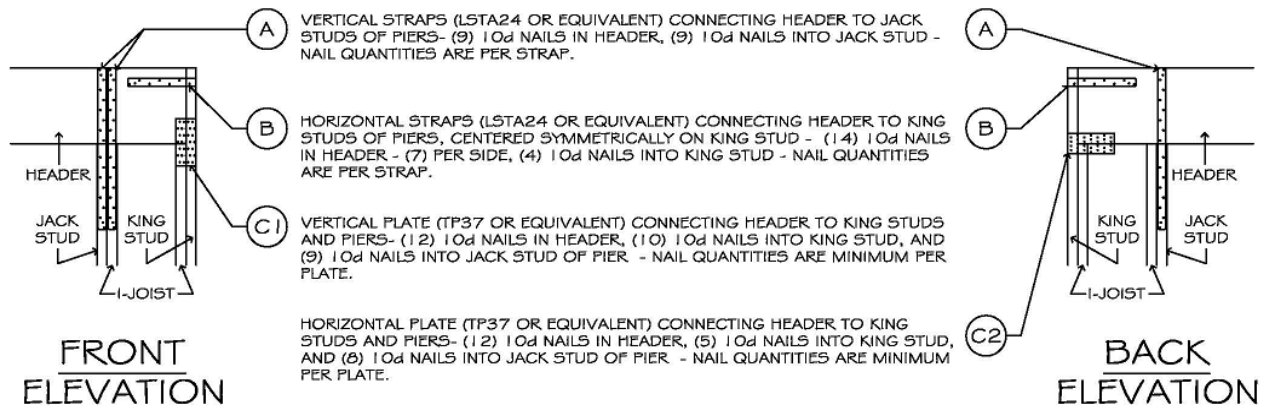
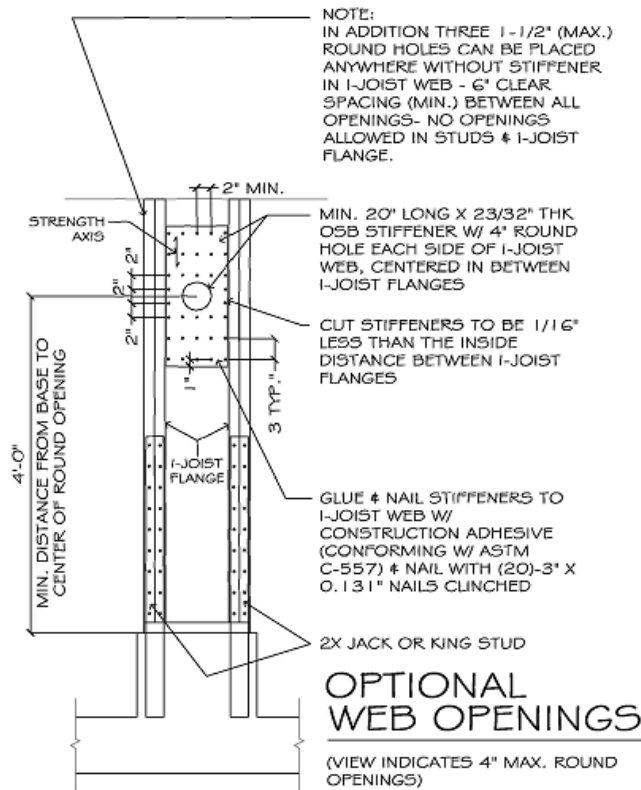
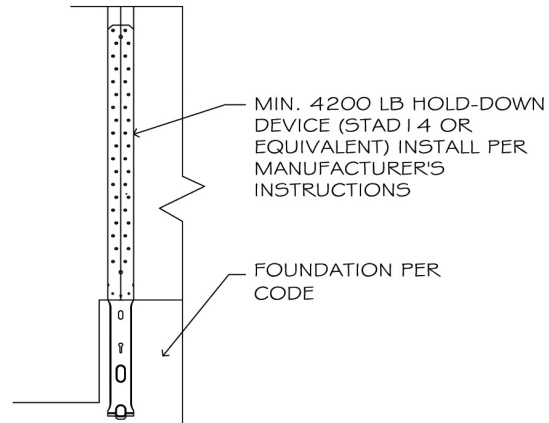
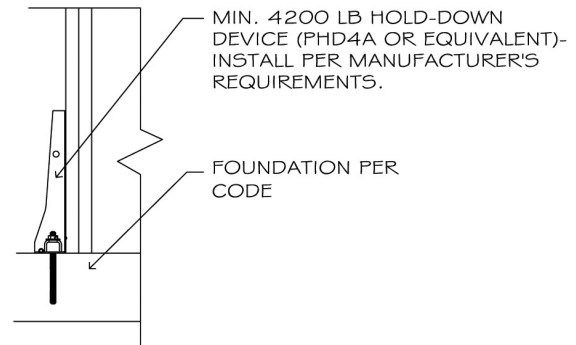


Figure 3. Construction Details of DuPont™ 12.5" CI I-Joist PFH or DuPont™ 15" CI I-Joist PFH

OPTION 1



OPTION 2



DETAIL 'C'

Figure 4. Construction Details of DuPont™ 12.5" CI I-Joist PFH or DuPont™ 15" CI I-Joist PFH

5 Applications

- 5.1 A “DuPont™ 12.5” CI I-Joist PFH” and “DuPont™ 15” CI I-Joist PFH” were built and tested to determine if equivalency could be achieved.
- 5.2 $\frac{3}{8}$ " Braced Wall Panel: To define braced wall panel equivalency in accordance with the [IBC Section 104.11](#) and [IRC Section R104.11](#), a 12'x30' single-story building was tested, framed and assembled precisely to the IRC prescriptive requirements. The building was constructed using the WSP (wood structural panel) braced wall panel (BWP) construction method where a BWP is defined by the IBC and IRC as follows:

IBC Section 202 Definitions. BRACED WALL PANEL. A full-height section of wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material and anchors. The panel's length meets the requirements of its particular bracing method, and contributes toward the total amount of bracing required along its braced wall line.

IRC Section R202 Definitions. BRACED WALL PANEL. A full-height section of wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material and anchors. The panel's length meets the requirements of its particular bracing method, and contributes toward the total amount of bracing required along its braced wall line in accordance with [Section R602.10.1](#).

- 5.3 A shear wall is defined by the ANSI/AWC SDPWS: Special Design Provisions for Wind and Seismic standard with commentary as follows:

AWC SDPWS Section 4.3.7 Shear Wall Systems. 4.3.7.1 Wood Structural Panel Shear Walls: Shear walls sheathed with wood structural panel sheathing shall be permitted to be used to resist seismic and wind forces. The size and spacing of fasteners at shear wall boundaries and panel edges shall be as provided in Table 4.3A. The shear wall shall be constructed as follows: 1. Panels shall not be less than 4' x 8', except at boundaries and changes in framing. All edges of all panels shall be supported by and fastened to framing members or blocking.

- 5.4 The IBC, IRC, and SDPWS all provide the ability to use a $\frac{3}{8}$ " thick WSP, which is the minimum BWP specification in the conventional light-frame construction sections of the IBC and IRC as shown in Figure 5.

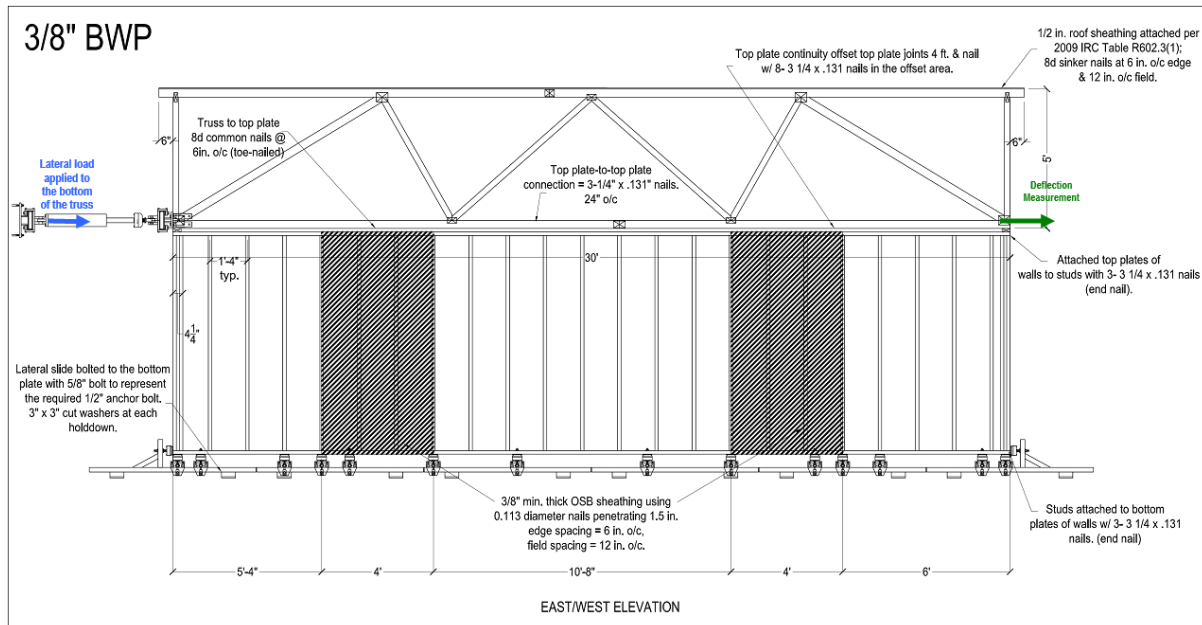


Figure 5. Test Assembly's 30' Braced Wall Line Illustrating Locations of Lateral Load Application & Deflection Measurements

-
- End of braced wall line
- End Distance 1
- Braced wall panel
- End Distance 2
- End of braced wall line
- End Distance 1
+ End Distance 2
= Maximum of 12.5'
- Extent of braced wall line
- Braced wall panel shall be permitted to be located away from the end of a braced wall line, provided the total end distance from each end to the nearest braced wall panel does not exceed 12.5'. If braced wall panel is located at the end of the braced wall line, then end distance is 0'.

5.5 IBC/IRC 16" PFH: This portal frame was constructed as shown in Figure 1 and tested in accordance with ASTM E564 testing procedures. Testing determined its lateral resistance within an identical braced wall line so that a direct performance comparison could be made with respect to the tests performed on the "DuPont™ 12.5" GI I-Joist PFH" and "DuPont™ 15" GI I-Joist PFH" assemblies.

-
- IBC/IRC 16" PFH
- 1/2 in. roof sheathing attached per 2009 IRC Table R602.3(1); 60 sinker nails at 6 in. o/c edge & 12 in. o/c field.
- Top plate to top plate connection = 3 1/4 x 131 nails 24" o/c
- Min. (2) 2"x12"s w/ 7/16" OSB spaced header
- Truss to top plate Quick Tie Metal Connector Plates (12" x 40" x 1-3/4" (3/4" construction screws per plate) (15) plates per wall section
- Top plate to header connection: 16d sinker nails in 2 rows at 3" o/c
- Top plate continuity offset top plate joints 4 ft. nail w/ 3-3 1/4 x 131 nails in the offset area.
- Attached top plates of walls to studs with 3-3 1/4 x 131 nails (end nail).
- 1,000 lb. Header-to-Jack-Strap (Install on backside of sheathing as shown in side elevation) (ref. no LSTA24) with 14-16d nails.
- Min. 4200 lb tie-down device (ref. no. STD 14 or equivalent) attached directly to studs - placed on either side of wall and secured to framing - install per manufacturer's requirements
- 3/8" min. thick OSB sheathing using 0.113 diameter nails penetrating 1.5 in. edge spacing = 3 in. o/c, field spacing = 3 in. o/c.
- Lateral slide bolted to the bottom plate with 5/8" bolt to represent the required 1/2" anchor bolt 3" x 2" cut washers at each hold-down.
- Studs attached to bottom plates of walls w/ 3-3 1/4 x 131 nails (end nail)
- Lateral slide bolted to the 4200 LB tie down device to mimic the concrete foundation attachment.
- EAST / WEST ELEVATION

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- 5.6 “DuPont™ 12.5" CI I-Joist PFH” and “DuPont™ 15" CI I-Joist PFH”: These portal frames were constructed as shown in Figure 2, Figure 3, and Figure 4 and were tested in accordance with ASTM E564 testing procedures. Testing determined their lateral resistance within an identical braced wall line so that a direct performance comparison could be made with respect to the tests performed on the $\frac{3}{8}$ " BWP and the IBC/IRC 16" PFH assemblies.
- 5.6.1 Two 30' braced wall lines were framed using standard code complying framing techniques with SPF top plate, sill plate, and stud grade lumber. The braced wall lines were then tested simultaneously.
- 5.6.2 The assembly was constructed with either 9 $\frac{1}{2}$ " Wood “I”-Joist (2 $\frac{1}{2}$ " wide and 1 $\frac{1}{2}$ " thick flange with $\frac{3}{8}$ " web¹² or equivalent) (“DuPont™ 12.5" CI I-Joist PFH”) or 11 $\frac{7}{8}$ " Wood “I”-Joist (2 $\frac{1}{2}$ " wide and 1 $\frac{1}{2}$ " thick flange with $\frac{3}{8}$ " web¹³ or equivalent) (“DuPont™ 15" CI I-Joist PFH”) fastened between SPF studs as shown in Figure 2 and Figure 8.¹⁴
- 5.6.3 Interior GWB was not applied.

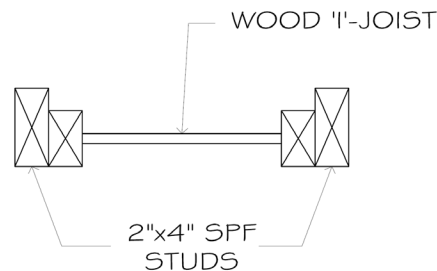


Figure 8. Cross-section View of the DuPont™ 12.5" or DuPont™ 15"

- 5.6.4 Providing for thermal insulation and the code required water-resistive barrier, $\frac{1}{2}$ " thick DuPont™ STYROFOAM™ RS was attached to the exterior of the PFH piers with staples (1" crown x $\frac{1}{4}$ " long 16 gage staples, $\frac{3}{4}$ " embedment into stud) 12" o.c. spacing at the edges and 12" o.c. spacing in the field (Figure 9).

¹² Georgia Pacific WI 40 or equivalent

¹³ Ibid.

¹⁴ King stud and jack stud attachment per Figure 2. If nailing from the 2"x4" king or jack stud side into the “I”-Joist, nails shall be staggered to prevent splitting of the “I”-Joist flange. If nailing from the “I”-Joist side through the flange into the 2"x4" king and jack studs, nails may be placed along the same side of “I”-Joist flange-web joint.

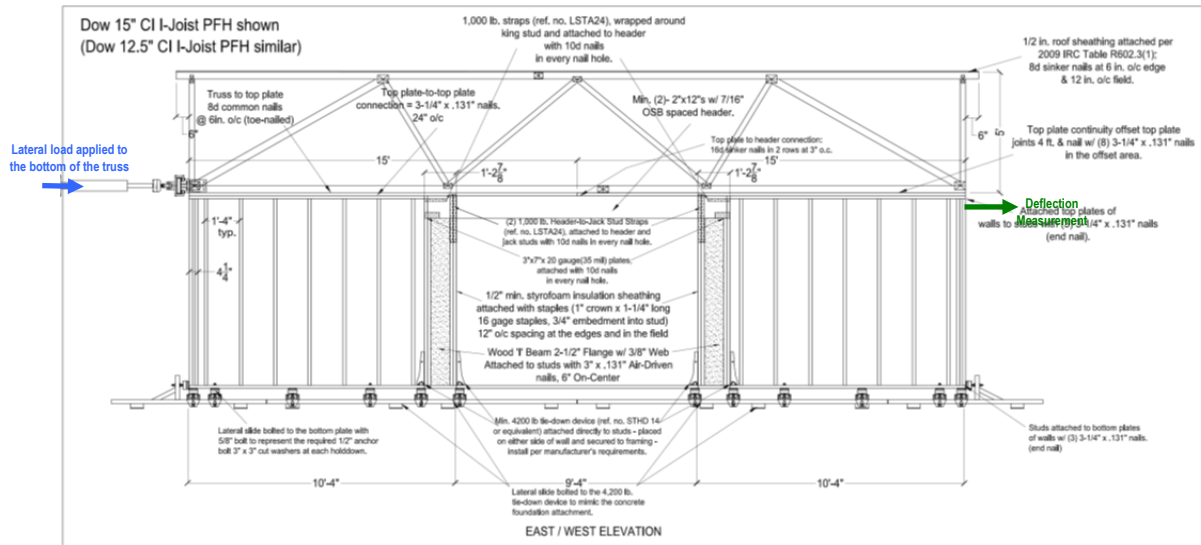


Figure 9. Test Assembly's 30' Braced Wall Line Illustrating Locations of Lateral Load Application & Deflection Measurements

- 5.7 The test data provides confirmation that the performance of the “DuPont™ 12.5” CI I-Joist PFH” and the “DuPont™ 15” CI I-Joist PFH” provide comparable equivalence to the $\frac{3}{8}$ ” BWP and the IBC/IRC 16” PFH.
- 5.8 Based on the test results using the equivalency principle as defined in [IBC Section 104.11](#) and [IRC Section R104.11](#), the “DuPont™ 12.5” CI I-Joist PFH” and “DuPont™ 15” CI I-Joist PFH” are assigned the recommended design values for designs controlled by wind or gravity loading conditions as provided in Table 1.

Table 1. Recommended Allowable Wind Design Values for DuPont™ 12.5” CI I-Joist PFH & DuPont™ 15” CI I-Joist PFH

Test Name	Maximum Wall Height ¹ (ft)	ASD Allowable Design Value per Pier ² (lb)
IBC/IRC 16” PFH (16” Wide Pier)	8	1,047
	10	785
DuPont™ 12.5” CI I-Joist PFH (12½” Wide Pier)	8	949
	10	712
DuPont™ 15” CI I-Joist PFH (14⅞” Wide Pier)	8	1,145
	10	858

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

1. Interpolation between wall heights permitted.

2. In APA Technical Topics Form No. TT-100, the 10' high portals have 77-78% of the 8' high portal capacity. Since testing provides conservative equivalency to the APA TT-100 test data, 10' high wall design values are provided that use a 75% factor to reduce the 8' high wall design values generated by test data.

- 5.9 The design values for the “DuPont™ 12.5” CI I-Joist PFH” and “DuPont™ 15” CI I-Joist PFH” assemblies are based on testing and the evaluation of the test data compared to the IBC/IRC 16” PFH test data. The evaluation considered the following two design conditions found in the IBC/IRC, and the ASD Allowable Design Value per Pier listed in Table 1, is based on the lower of these two limits:
- 5.9.1 The allowable seismic design story drift for typical residential and conventional light-frame construction as found in ASCE 7.¹⁵
- 5.9.2 The tested capacity divided by a factor of safety.
- 5.10 As detailed in Figure 2, the maximum allowable compressive strength due to gravity of the “DuPont™ 12.5” CI I-Joist PFH” or the “DuPont™ 15” CI I-Joist PFH” is 7,162 lbs. per pier. Additional compressive capacity may be engineered into each pier. Structurally attaching full height framing members within the pier cavity is one possible engineered option.
- 5.11 The test results provide assurance that both the “DuPont™ 12.5” CI I-Joist PFH” or the “DuPont™ 15” CI I-Joist PFH” provide equivalent shear resistance and comparable stiffness performance to code compliant benchmarks (the 3/8” BWP and the IBC/IRC 16” PFH).
- 5.11.1 At this time, the testing performed on the “DuPont™ 12.5” CI I-Joist PFH” or the “DuPont™ 15” CI I-Joist PFH” limits its use to replacing any bracing required by the IBC Section 2308.6 and IRC Section R602.10.6 in Seismic Design Categories A, B, and detached dwellings in Category C.
- 5.12 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

6 Installation

- 6.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this TER and the applicable building code.
- 6.2 In the event of a conflict between the manufacturer installation instructions and this TER, the more restrictive shall govern.
- 6.3 *Installation Procedure*
- 6.3.1 The “DuPont™ 12.5” CI I-Joist PFH” and “DuPont™ 15” CI I-Joist PFH” shall be constructed as shown in Figure 2, Figure 3, and Figure 4.

7 Substantiating Data

- 7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
- 7.1.1 Lateral resistance testing in accordance with ASTM E564
- 7.2 A Portal Frame with Hold Downs for Wall Bracing or Engineered Applications, APA Technical Topics, Form No. TT-100; APA – The Engineered Wood Association; Tacoma, WA.
- 7.3 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies (i.e., ANAB accredited agencies), approved sources (i.e., RDPs), and/or professional engineering regulations. Accuracy of external test data and resulting analysis is relied upon.

¹⁵ Although the ASCE 7 criterion is specifically for seismic design and does not apply to wind design, it does provide a reasonable deformation point of reference. The ASD allowable unit shear capacity is determined per SDPWS Section 4.3.3. SDPWS also references the allowable story drift limits according to ASCE 7 Section 12.12.1 and Table 12.12-1

- 7.4 Where pertinent, testing and/or engineering analysis is based upon provisions that have been codified into law through state or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ's engineering practice may use a code-adopted provision as the control sample. A control sample versus a test sample establishes a product as being equivalent to the code-adopted provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.
- 7.5 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, Listings, certified reports, duly authenticated reports from approved agencies, and research reports prepared by approved agencies and/or approved sources provided by the suppliers of products, materials, designs, assemblies and/or methods of construction. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this TER, may be dependent upon published design properties by others.
- 7.6 Testing and engineering analysis: The strength, rigidity and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.¹⁶
- 7.7 Where additional condition of use and/or code compliance information is required, please search for one of DuPont™ 12.5" CI I-Joist PFH and DuPont™ 15" CI I-Joist PFH on the DrJ Certification website.

8 Findings

- 8.1 As delineated in Section 3, DuPont™ 12.5" CI I-Joist PFH and DuPont™ 15" CI I-Joist PFH have performance characteristics that were tested and/or meet pertinent standards and is suitable for use pursuant to its specified purpose.
- 8.2 The testing and engineering analysis performed provides the basis for the use of either the "DuPont™ 12.5" CI I-Joist PFH" or the DuPont™ 15" CI I-Joist PFH" as an equivalent alternative to and replacement for a 4' WSP located within a braced wall line in accordance with the IBC Section 2308.6.5 and the IRC Section R602.10.6.2.
- 8.3 The testing and engineering analysis performed provides the basis for the use of either the "DuPont™ 12.5" CI I-Joist PFH" or the "DuPont™ 15" CI I-Joist PFH" as a substitution for a IBC/IRC 16" PFH as defined in IBC Section 2308.6.5.2 and IRC Section R602.10.6.2, and have the relative performance as defined in Table 1.
- 8.4 Unless exempt by state statute, when the DuPont™ 12.5" CI I-Joist PFH and DuPont™ 15" CI I-Joist PFH is to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by a registered design professional (RDP).
- 8.5 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from DuPont™ Performance Building Solutions.
- 8.6 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10)¹⁷ are similar) in pertinent part states:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.

¹⁶ See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

¹⁷ 2018 IFC Section 104.9

- 8.7 **Approved:**¹⁸ Building codes require that the building official shall accept duly authenticated reports¹⁹ or research reports²⁰ from approved agencies and/or approved sources (i.e., licensed RDP) with respect to the quality and manner of use of new products, materials, designs, services, assemblies, or methods of construction.
- 8.7.1 Acceptability of an approved agency, by a building official, is performed by verifying that the agency is accredited by a recognized accreditation body of the International Accreditation Forum (IAF).
- 8.7.2 Acceptability of a licensed RDP, by a building official, is performed by verifying that the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.
- 8.7.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved, as denial without written reason deprives a protected right to free and fair competition in the marketplace.
- 8.8 DrJ is an engineering company, employs RDPs and is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.
- 8.9 Through ANAB accreditation and the IAF Multilateral Agreements, this TER can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – “*certified once, accepted everywhere.*” IAF specifically says, “*Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.*”²¹

9 Conditions of Use

- 9.1 Material properties shall not fall outside the boundaries defined in Section 3.
- 9.2 As defined in Section 3, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.
- 9.3 The “DuPont™ 12.5” CI I-Joist PFH” and the “DuPont™ 15” CI I-Joist PFH” Designs are limited to use in buildings constructed in accordance with the IBC and IRC where wind loading controls the design or where constructed in accordance with the IRC for Seismic Design Categories A, B and detached dwellings in C.
- 9.4 The “DuPont™ 12.5” CI I-Joist PFH” and the “DuPont™ 15” CI I-Joist PFH” Designs are also permitted in buildings constructed in accordance with the Conventional Light frame provisions of the IBC Section 2308.
- 9.5 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
- 9.5.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice, and, when prepared by an approved source, shall be approved when requirements of adopted legislation are met.
- 9.5.2 This TER and the installation instructions shall be submitted at the time of permit application.
- 9.5.3 These products have an internal quality control program and a third-party quality assurance program.
- 9.5.4 At a minimum, these products shall be installed per Section 6 of this TER.
- 9.5.5 The review of this TER, by the AHJ, shall be in compliance with IBC Section 104 and IBC Section 105.4.

¹⁸ Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

¹⁹ <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>

²⁰ <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>

²¹ <https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise>

- 9.5.6 These products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4 and IRC Section R109.2.
- 9.5.7 The application of these products in the context of this TER are dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2 and any other regulatory requirements that may apply.
- 9.6 The approval of this TER by the AHJ shall comply with IBC Section 1707.1, where legislation states in pertinent part, “*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11”*, all of IBC Section 104, and IBC Section 105.4.
- 9.7 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).
- 9.8 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner’s authorized agent.

10 Identification

- 10.1 The products listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at dupont.com/building.

11 Review Schedule

- 11.1 This TER is subject to periodic review and revision. For the most recent version, visit drjcertification.org.
- 11.2 For information on the status of this TER, contact [DrJ Certification](#).

12 Approved for Use Pursuant to US and International Legislation Defined in Appendix A

- 12.1 DuPont™ 12.5" CI I-Joist PFH and DuPont™ 15" CI I-Joist PFH are included in this TER published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services, and whose TER Listing states either that the material, product, or service meets identified standards or has been tested and found suitable for a specified purpose. This TER meets the legislative intent and definition of being acceptable to the AHJ.

Appendix A

1 Legislation that Authorizes AHJ Approval

- 1.1 **Fair Competition:** State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:
 - 1.1.1 Advance Innovation,
 - 1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and
 - 1.1.3 Benefit consumers through lower prices, better quality, and greater choice.
- 1.2 **Adopted Legislation:** The following local, state, and federal regulations affirmatively authorize DuPont™ 12.5" CI I-Joist PFH and DuPont™ 15" CI I-Joist PFH to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:
 - 1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies and/or methods of construction. The goal is to “protect economic freedom and opportunity by promoting free and fair competition in the marketplace.”
 - 1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation, and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.
 - 1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2018 (DTSA).
 - 1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.
 - 1.2.4 For new materials²² that are not specifically provided for in any building code, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.
 - 1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.²³
 - 1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence, provided in writing, that specific legislation has been violated by an individual registered PE.
 - 1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.²⁴

²² <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2>

²³ IBC 2021, Section 1706.1 Conformance to Standards

²⁴ IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

- 1.3 **Approved²⁵ by Los Angeles:** The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards, which apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.²⁶ The Superintendent of Building roster of approved testing agencies is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a CBI Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.²⁷
- 1.4 **Approved by Chicago:** The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).
- 1.5 **Approved by New York City:** The NYC Building Code 2022 (NYCBC) states in pertinent part that an approved agency shall be deemed²⁸ an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement²⁹ (i.e., ANAB, International Accreditation Forum (IAF), etc.).

²⁵ See Section 8 for the distilled building code definition of Approved

²⁶ Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

²⁷ <https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1>

²⁸ New York City, The Rules of the City of New York, § 101-07 Approved Agencies

²⁹ New York City, The Rules of the City of New York, § 101-07 Approved Agencies

- 1.6 **Approved by Florida:** Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation, by 1) A certification mark or listing of an approved certification agency, 2) A test report from an approved testing laboratory, 3) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity; 4) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a professional engineer or architect, licensed in Florida. For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods; 1) A certification mark, listing, or label from a commission-approved certification agency indicating that the product complies with the code; 2) A test report from a commission-approved testing laboratory indicating that the product tested complies with the code; 3) A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code; 4) A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code; 5) A statewide product approval issued by the Florida Building Commission. The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).
- 1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA]):** A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation 553.842 and 553.8425.
- 1.8 **Approved by New Jersey:** Pursuant to Building Code 2018 of New Jersey in IBC Section 1707.1 General,³⁰ it states: "In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)".³¹ Furthermore N.J.A.C 5:23-3.7 states: Municipal approvals of alternative materials, equipment, or methods of construction. **(a) Approvals:** Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations. 1. A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. 2. Reports of engineering findings issued by nationally recognized evaluation service programs, such as, but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. The New Jersey Department of Community Affairs has confirmed that technical evaluation reports, from any accredited entity listed by ANAB, meets the requirements of item 2 given that the listed entities are no longer in existence and/or do not provide "reports of engineering findings".

³⁰ https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

³¹ <https://www.nj.gov/dca/divisions/codes/codereg/ucc.html>

- 1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards:** Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14³² and Part 3280,³³ the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform with the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow: 1) "All construction methods shall be in conformance with accepted engineering practices"; 2) "The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur."; and 3) "The design stresses of all materials shall conform to accepted engineering practice."
- 1.10 **Approval by US, Local, and State Jurisdictions in General:** In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:
- 1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.³⁴
 - 1.10.2 For innovative alternative products, materials, designs, services and/or methods of construction, in the absence of approved rules or other approved standards...the building official shall accept duly authenticated reports (i.e., listing and/or research report) from approved agencies with respect to the quality and manner of use of new materials or assemblies.³⁵ A building official approved agency is deemed to be approved via certification from an accreditation body that is listed by the International Accreditation Forum³⁶ or equivalent.
 - 1.10.3 The design strengths and permissible stresses of any structural material...shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.³⁷ An approved source is defined as a PE subject to professional engineering laws, where a research and/or a technical evaluation report certified by a PE, shall be approved.
- 1.11 **Approval by International Jurisdictions:** The USMCA and GATT agreements provide for approval of innovative materials, products, designs, services, assemblies and/or methods of construction through the Technical Barriers to Trade agreements and the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA), where these agreements:
- 1.11.1 Permit participation of conformity assessment bodies located in the territories of other Members (defined as GATT Countries) under conditions no less favourable than those accorded to bodies located within their territory or the territory of any other country,
 - 1.11.2 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.
 - 1.11.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.

³² <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14>

³³ <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280>

³⁴ IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.

³⁵ IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.

³⁶ Please see the ANAB directory for building official approved agencies.

³⁷ IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.



- 1.11.4 **Approved:** The purpose of the IAF MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA, and subsequently acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction. Accreditations granted by IAF MLA signatories are recognised worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to businesses and consumers.