Listing and Technical Evaluation Report™

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Use of CSP Homes Concrete Structural Steel Insulated Interlocking Plug-N-Play Panels (C-SIP)

Trade Secret Report Holder:

CSP Homes, Inc.

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CSI Designations:

DIVISION: 03 00 00 - CONCRETE

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 42 00 - Wall Panels

Section: 07 42 13 - Metal Wall Panels

Section: 07 42 13.19 - Insulated Metal Wall Panels

Section: 07 42 13.23 - Metal Composite Material Wall Panels

Section: 07 42 43 - Composite Wall Panels

Section: 07 48 00 - Exterior Wall Assemblies

1 Innovative Product Evaluated[1]

1.1 Concrete Structural Steel Insulated Interlocking Plug-N-Play Panels (C-SIP)

2 Product Description and Materials

2.1 C-SIPs are factory-assembled, load-bearing, insulated exterior and interior wall panels composed of a patented aerated concrete-foam insulation, branded as Foam-Crete, enclosed within a 19-gauge (1 mm) steel frame (Q235 / A36 Hot Dipped Galvanized) and sheathed with high-density, $^{3}/_{8}$" thick cement fiber boards on both its internal and external faces.

2.1.1 Steel frame has a minimum yield strength, F_y, of 34 ksi (235 MPa) and a minimum ultimate tensile strength, F_u, of 53 ksi (370 MPa).

2.1.2 The steel frame has an additional internal bracing system comprised of 24-gauge, $^{19}/_{32}$" x $^{19}/_{32}$" (0.7 mm thick, 15 mm x 15 mm) square tubes. Where walls exceed 8' tall (2,440 mm), 19-gauge, 1" x 1" (1 mm thick, 25 mm x 25 mm) angle steel members are to be used to support the butt-jointed cement fiber boards on both sides of the panel.

2.1.3 Wall panels are available in nominal 4" and 6" thicknesses.

2.1.4 Each wall panel measures approximately 2' (610 mm) in width, and comes in various heights up to 16.4' (5 m).

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2.2 The innovative product evaluated in this report is shown in **Figure 1**.

Figure 1. C-SIPs Used in the CSP Insulated Interlocking Plug-N-Play Panel System

2.3 *Product Components*

2.3.1 *Steel Frame:*

2.3.1.1 Steel is specified as Q235/A36 hot-dip galvanized steel, 19-gauge (1 mm) thick.

2.3.1.2 A typical steel frame consists of: 1 female steel member, 1 male steel member, 2 arch steel members, 2 angle steel members, and 6 square tubes.

2.3.1.3 Steel member cross sections are displayed in **Figure 2** through **Figure 7**.

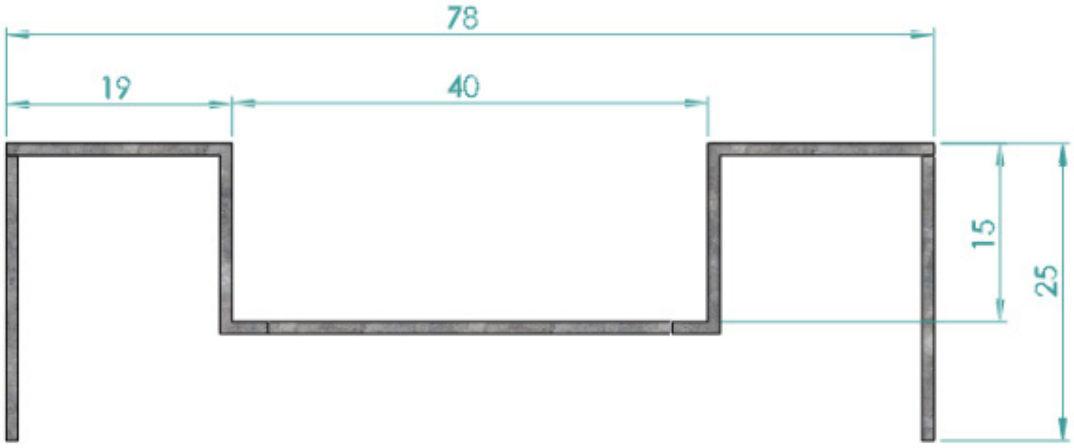

Figure 2. Female Steel Profile for 3¾" (96 mm) Thick Wall Panels

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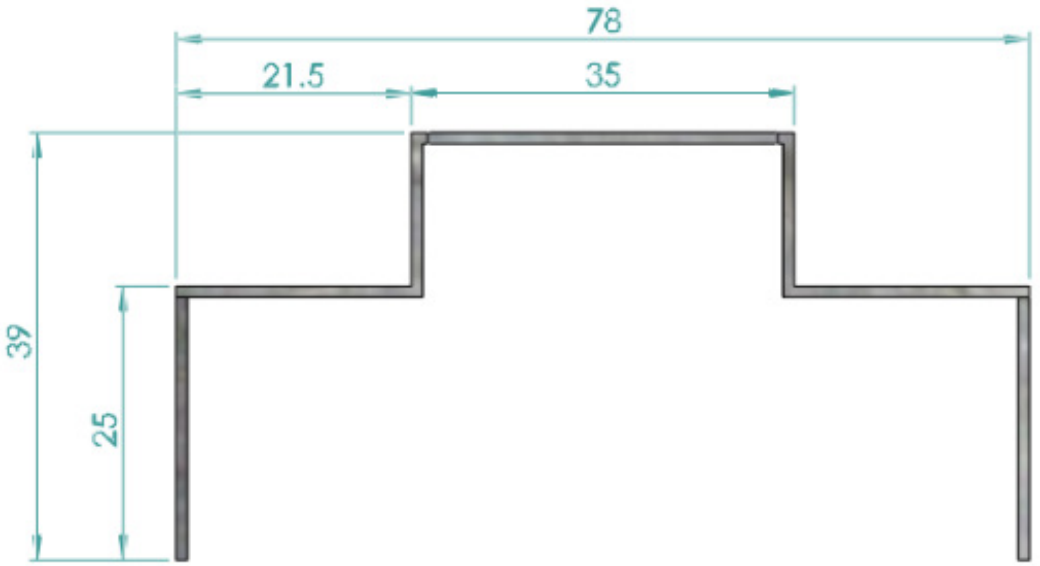

Figure 3. Male Steel Profile for 3¾" (96 mm) Thick Wall Panels

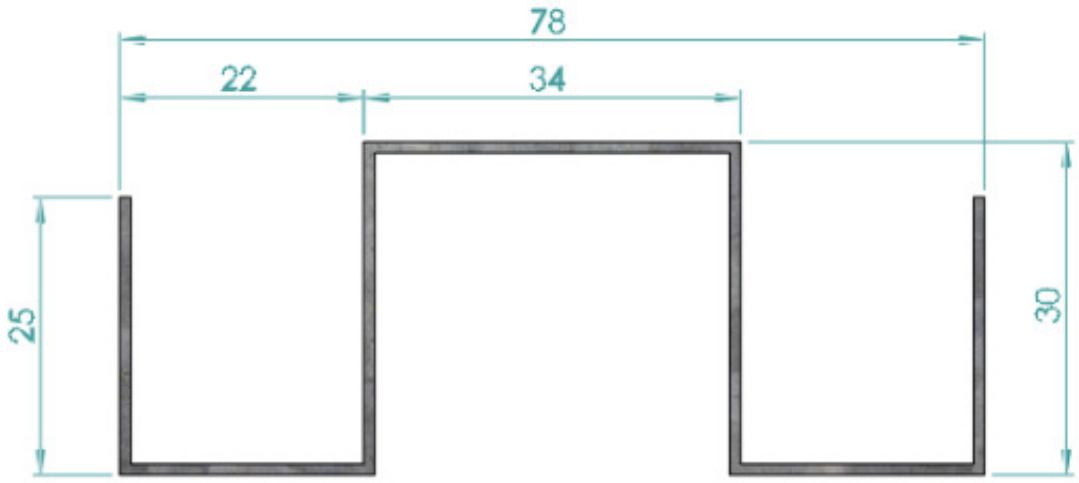

Figure 4. Arch Steel Profile for 3¾" (96 mm) Thick Wall Panels

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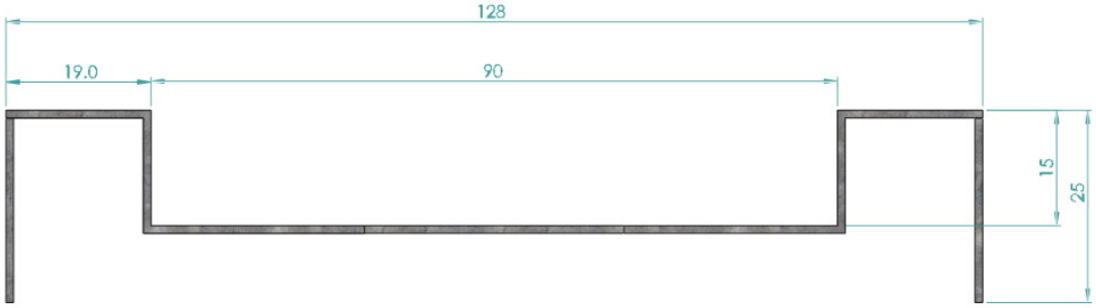

Figure 5. Female Steel Profile for 5 3/4" (146 mm) Thick Wall Panels

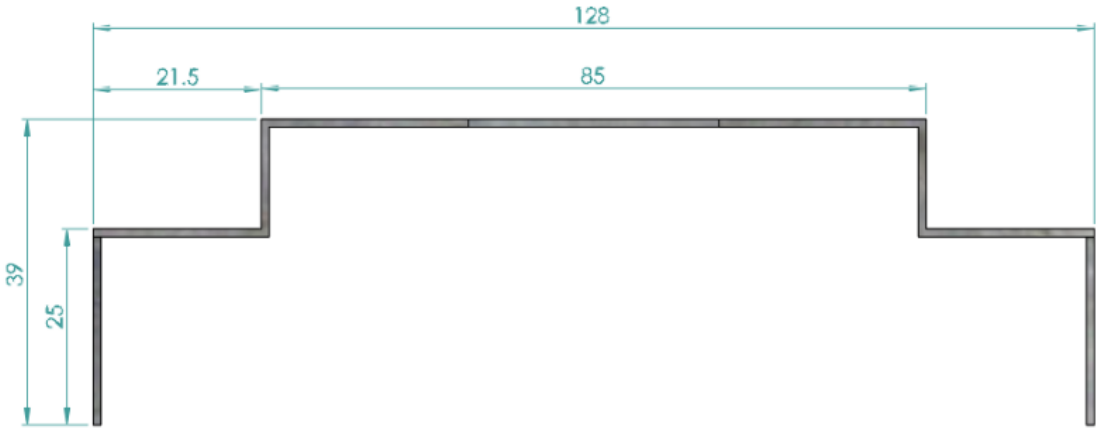

Figure 6. Male Steel Profile for 5 3/4" (146 mm) Thick Wall Panels

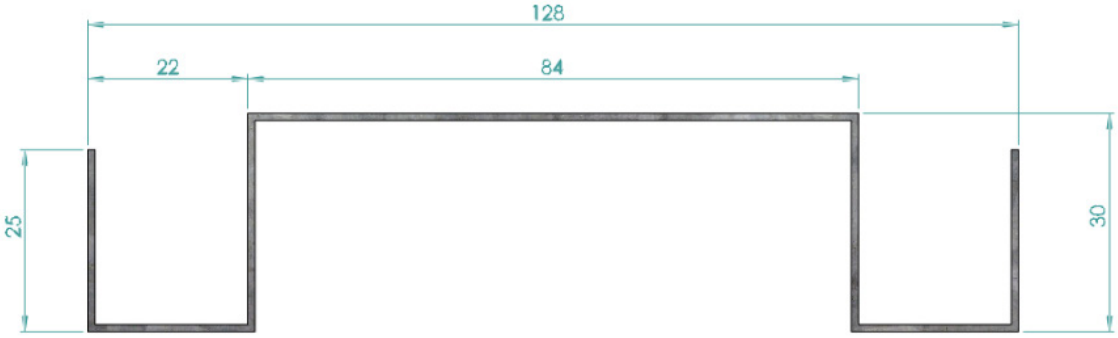

Figure 7. Arch Steel for 5 3/4" (146 mm) Thick Wall Panels

2.3.2 *Fiber Cement Board*

2.3.2.1 Nominal thickness: 3/8" (9 mm)

2.3.2.2 Boards are fastened to the steel frame with #6 x 1" (3.5 mm x 25 mm) self-tapping drywall screws, spaced approximately 24" (610 mm) o.c., along vertical panel edges and 6" (152mm) along horizontal panel edges. Fasteners are located 3/8" (9.5 mm) from the panel edges.

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2.4 *Panel-to-Panel Connection*

2.4.1 A 14-gauge, $1^{3}/_{16}$" x $1^{3}/_{16}$" (2 mm thick, 30 mm x 30 mm) square tube is fitted into the groove of the top and bottom arch steel members of the panels being joined together.

2.4.2 The square tube (steel slot track) is fastened to the top and bottom arch steel members with #12 x 3" self-tapping screws spaced approximately 6" o.c. staggered front-to-back for each wall panel.

2.5 *Material Availability*

2.5.1 *Standard Product Thickness:*

2.5.1.1 $3^{3}/_{4}$" (96 mm)

2.5.1.2 $5^{3}/_{4}$" (146 mm)

2.5.2 *Standard Product Width:*

2.5.2.1 $23^{5}/_{8}$" (600 mm)

2.5.2.1.1 Width measurement applies only to the net face and excludes the tongue of the male end.

2.5.3 *Standard Product Height:*

2.5.3.1 122" (3,100 mm) to $141^{3}/_{4}$" (3,600 mm)

2.6 As needed, review material properties for design in **Section 6** and to regulatory evaluation in **Section 8**.

3 Definitions

3.1 New Materials[2] are defined as building materials, equipment, appliances, systems, or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[3] The design strengths and permissible stresses shall be established by tests[4] and/or engineering analysis.[5]

3.2 Duly Authenticated Reports[6] and Research Reports[7] are test reports and related engineering evaluations, which are written by an approved agency[8] and/or an approved source.[9]

3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).[10]

3.3 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[11]

3.5 Testing and/or inspections conducted for this Duly Authenticated Report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed Registered Design Professional (RDP).

3.5.1 The Center for Building Innovation (CBI) is ANAB[12] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[13] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[14] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept Duly Authenticated Reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[15]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.[16] Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.[17]

3.9 Approval equity is a fundamental commercial and legal principle.[18]

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4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation[19]

4.1 *Standards*

4.1.1 *ACI 318: Building Code Requirements for Structural Concrete*

4.1.2 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

4.1.3 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*

4.1.4 *ASTM E119: Standard Test Methods for Fire Tests of Building Construction and Materials*

4.1.5 *ASTM E136: Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C*

4.1.6 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

4.1.7 *ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*

4.1.8 *EN 12089:-1997: Thermal Insulating Products for Building Applications - Determination of Bending Behavior*

4.1.9 *EN 12667-2001: Thermal Performance of Building Materials and Products - Determination of Thermal Resistance by Means of Guarded Hot Plate and Heat Flow Meter Methods - Products of High and Medium Thermal Resistance*

4.1.10 *EN 13501-1: Fire Test for Building Materials*

4.1.11 *EN ISO 1182-2010: Reaction to fire tests for products — Non-combustibility test*

4.1.12 *EN ISO 1716-2010: Reaction to fire tests for products — Determination of the gross heat of combustion (calorific value)*

4.1.13 *GB/T 23451-2009: Light Weight Panels for Partition Wall Used in Buildings*

4.1.14 *ISO 140-3-1995/A1-2004: Acoustics — Measurement of sound insulation in buildings and of building elements — Part 3: Laboratory measurements of airborne sound insulation of building elements*

4.1.15 *ISO 717-1-1996/A1-2006: Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation*

4.1.16 *SANS 10177-2: Fire Testing of Materials, Components and Elements Used in Buildings Part 2: Fire Resistance Test for Building Elements*

4.2 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:

4.2.1 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

4.2.2 *ASTM D7989: Standard Practice for Demonstrating Equivalent In-Plane Lateral Seismic Performance to Wood-Frame Shear Walls Sheathed with Wood Structural Panels*

4.2.2.1 ASTM D7989 is accepted engineering practice used to establish Seismic Design Coefficients (SDCs).

4.2.2.2 Test data generated by ISO/IEC 17025 approved agencies and/or professional engineers.

4.2.2.3 All associated professional engineering evaluations that use ASTM D7989 as their basis, are defined as intellectual property and/or trade secrets and are also defined as an Independent Design Review (i.e., Listings, certified reports, Duly Authenticated Reports from approved agencies and/or research reports prepared by approved agencies and/or approved sources).

4.2.3 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*

4.2.4 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*

4.2.5 *ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*

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4.3 *Regulations*

4.3.1 *IBC – 15, 18, 21: International Building Code®*

4.3.2 *IRC – 15, 18, 21: International Residential Code®*

4.3.3 *IECC – 15, 18, 21: International Energy Conservation Code®*

4.3.4 *WUIC– 15, 18, 21: Wildland Urban Interface Code®*

4.3.5 *FBC-B – 20, 23: Florida Building Code - Building[20] (FL 44554)*

4.3.6 *FBC-R – 20, 23: Florida Building Code – Residential[20] (FL 44554)*

4.3.7 *CBC-R – 19, 22: California Building Standards Code (California Code of Regulations, Title 24)*

5 Listed[21]

5.1 Equipment, materials, products or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), approved agency (i.e., CBI and DrJ), and/or approved source (i.e., DrJ) or other organization concerned with product evaluation (i.e., DrJ) that maintains periodic inspection (i.e., CBI) 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.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 C-SIPs are used in applications as:

6.1.1 Walls in buildings constructed in accordance with the IRC and IBC

6.1.2 Structural wall panels to provide lateral load resistance (wind and seismic) for buildings

6.1.3 Structural wall panels in buildings constructed in accordance with the IBC requirements for Type I-V construction

6.1.4 Structural wall panels to provide resistance to transverse loads for wall assemblies

6.1.5 Structural wall panels to provide resistance to compression loads for wall assemblies

6.2 *Structural Applications*

6.2.1 Except as otherwise described in this report, C-SIPs shall be installed in accordance with the applicable building codes listed in **Section 4** using the provisions set forth herein for the design and installation.

6.2.2 Anchorage for in-plane shear shall be provided to transfer the induced shear force into and out of each shear wall.

6.2.2.1 For wind and seismic design, anchor bolt spacing shall not exceed 20" o.c.

6.2.3 The maximum aspect ratio for full height walls braced of 5.75" (146 mm) C-SIPs shall be 1.8:1.

6.2.4 Fastener type and spacing shall be per the applicable table of this report and **Section 9**. Fasteners shall be installed with the head in contact with the face of the board.

6.2.5 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

6.3 *Simplified IRC Bracing Provisions*

6.3.1 5.75" (146 mm) C-SIP wall panels are permitted to be used in accordance with IRC simplified bracing method as prescribed in IRC Section R602.12 as modified by **Table 1**.

6.3.1.1 A single 5.75" (146 mm) C-SIP wall panel bracing unit is nominally 24" wide.

6.3.2 Unless stated otherwise in this report and where applicable, all provisions of the IRC simplified bracing method shall be met when using **Table 1**, which replaces IRC Table R602.12.4.

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Table 1. Minimum Number of 5.75" (146 mm) C-SIP Panels on Each Side of the Circumscribed Rectangle[1,2,3,4,5,6]

Ultimate Design Wind Speed (mph)	Story Level	Eave to Ridge Height (ft)	Minimum Number of Bracing Units Required (Long Side)[7]						Minimum Number of Bracing Units Required (Short Side)[7]					
			Length of Short Side						Length of Long Side					
			10	20	30	40	50	60	10	20	30	40	50	60
115	One Story or Top of Two or Three Story	10	1	2	3	4	5	5	1	2	3	4	5	5
	First of Two Story or Second of Three Story		2	4	5	7	8	10	2	4	5	7	8	10
	First of Three Story		3	6	8	10	12	14	3	6	8	10	12	14
	One Story or Top of Two or Three Story	15	1	3	4	5	7	7	1	3	4	5	7	7
	First of Two Story or Second of Three Story		2	5	6	8	9	12	2	5	6	8	9	12
	First of Three Story		3	7	9	11	13	15	3	7	9	11	13	15
130	One Story or Top of Two or Three Story	10	2	3	4	5	6	7	2	3	4	5	6	7
	First of Two Story or Second of Three Story		3	5	7	9	11	12	3	5	7	9	11	12
	First of Three Story		4	7	10	12	15	18	4	7	10	12	15	18
	One Story or Top of Two or Three Story	15	3	4	5	7	8	9	3	4	5	7	8	9
	First of Two Story or Second of Three Story		3	6	8	10	13	14	3	6	8	10	13	14
	First of Three Story		4	8	11	13	17	20	4	8	11	13	17	20

SI: 1 in = 25.4 mm, 1 mph = 1.61 km/h

1. This simplified bracing table is based on the provisions of IRC Section R602.12. All provisions therein shall be observed, except that this table shall replace IRC Table R602.12.4, and full-height C-SIP wall panels shall replace the prescribed wall assembly.
2. Interpolation shall not be permitted.
3. Cripple walls or wood-framed basement walls in a walk-out condition shall be designated as the first story, and the stories above shall be re-designated as the second and third stories, respectively, and shall be prohibited in a three-story structure.
4. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of ten (10) when using this table.
5. For Exposure Category C, multiply bracing units by a factor of 1.20 for a one-story building, 1.30 for a two-story building, and 1.40 for a three-story building.
6. This table is valid for wall heights up to 10' in accordance with IRC Section R602.12.
7. A bracing unit is one nominal 24" wide panel.

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6.4 *Minimum Total Length (ft) of Braced Wall Panels Required Along Each Braced Wall Line*

6.4.1 C-SIPs may be used on braced wall lines as an equivalent alternative to the IRC Method WSP and Method CS-WSP, when installed in accordance with IRC Section R602.10 and this report.

6.4.2 For wind design, required braced wall panel lengths for C-SIPs shall be as shown in **Table 2** and shall be used in conjunction with IRC Table R602.10.3(2), which provides the required adjustments.

Table 2. Minimum Total Length (ft) of Bracing Required Along Each Braced Wall Line - Wind Design[1,2,3,4,5,6]

Minimum Total Length (ft) of Braced Wall Panels Required Along Each Braced Wall Line Condition	Braced Wall Line Spacing (ft)	Minimum Total Length (ft) of Braced Wall Panels Required Along Each Braced Wall Line											
		Intermittent Sheathing						Continuous Sheathing					
		Ultimate Design Wind Speed											
		< 95 mph	≤110 mph	≤115 mph	≤120 mph	≤130 mph	<140 mph	< 95 mph	≤110 mph	≤115 mph	≤120 mph	≤130 mph	<140 mph
One Story or the Top of Two or Three Stories	10	1.4	1.9	1.9	2.4	2.4	2.8	1.4	1.4	1.9	1.9	2.4	2.4
	20	2.4	3.3	3.3	3.8	4.7	5.2	2.4	2.8	3.3	3.3	3.8	4.7
	30	3.8	4.7	5.2	5.6	6.6	7.5	3.3	4.2	4.2	4.7	5.6	6.6
	40	4.7	6.1	6.6	7.5	8.5	9.9	3.8	5.2	5.6	6.1	7.1	8.5
	50	5.6	7.5	8.5	8.9	10.3	12.2	4.7	6.6	7.1	7.5	8.9	10.3
	60	6.6	8.9	9.9	10.8	12.2	14.1	5.6	7.5	8.5	8.9	10.3	12.2
First Story of Two Stories or Second Story of Three Stories	10	2.8	3.3	3.8	4.2	4.7	5.6	2.4	2.8	3.3	3.3	4.2	4.7
	20	4.7	6.1	7.1	7.5	8.9	10.3	4.2	5.2	6.1	6.6	7.5	8.5
	30	6.6	8.9	9.9	10.8	12.7	14.6	5.6	7.5	8.5	8.9	10.8	12.2
	40	8.9	11.8	12.7	14.1	16.5	18.8	7.5	9.9	10.8	11.8	14.6	16.0
	50	10.8	14.6	15.5	16.9	20.2	23.0	9.4	12.2	13.2	14.6	16.9	19.7
	60	12.7	16.9	18.8	20.2	23.5	27.3	10.8	14.6	16.0	17.4	20.2	23.5
First Story of Three Stories	10	3.8	5.2	5.6	6.1	7.1	8.0	3.3	4.2	4.7	5.2	6.1	7.1
	20	7.1	9.4	10.3	10.8	12.7	15.0	6.1	8.0	8.5	9.4	10.8	12.7
	30	9.9	13.2	14.6	16.0	18.3	21.6	8.5	11.3	12.2	13.6	16.0	18.3
	40	12.7	17.4	18.8	20.7	24.0	27.7	10.8	14.6	16.0	17.4	20.7	23.5
	50	16.0	21.2	23.0	25.4	29.6	34.3	13.6	17.9	19.7	21.6	24.9	29.1
	60	18.8	24.9	27.3	30.1	35.3	40.4	16.0	21.6	23.5	25.4	29.6	34.3

SI: 1 in. = 25.4 mm, 1 mph = 1.61 km/h

1. Linear interpolation is permitted.
2. C-SIP walls assemblies shall be constructed as described in **Section 2** and the manufacturer installation instructions.
3. Demonstrates equivalency to IRC Table R602.10.3(1). All adjustment factors from IRC Table R602.10.3(2) shall be applied.
4. Wind speeds are V_{ult} in accordance with ASCE 7-22. Convert to equivalent V_{asd} wind speed per IBC Section 1609.3.1.
5. Bracing lengths based on assemblies fastened at the top and bottom with fasteners 6" o.c.
6. This table is valid for wall heights up to 10'. For walls up to 12' in height, multiply the listed bracing lengths by the ratio of the actual wall height divided by 10'.

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6.5 *Required Bracing Lengths for C-SIP (Method WSP and CS-WSP) – Seismic*

6.5.1 For seismic design, required braced wall panel lengths for C-SIPs shall be as shown in **Table 3**, and shall be used in conjunction with IRC Table R602.10.3(4), which provides the required adjustments.

Table 3. Required Bracing Lengths for C-SIPs (Method WSP and CS-WSP) – Seismic[1,2,3,4,5]

Condition	Braced Wall Line Spacing (ft)	Minimum Total Length (ft) of Braced Wall Panels Required Along Each Braced Wall Line							
		Intermittent Sheathing				Continuous Sheathing			
		Seismic Design Category (SDC)							
		C	D_0	D_1	D_2	C	D_0	D_1	D_2
One Story or the Top of Two or Three Stories	10	1.6	1.7	1.9	2.3	1.3	1.6	1.6	2.0
	20	3.0	3.4	3.8	4.7	2.5	2.9	3.2	4.0
	30	4.5	5.1	5.6	7.1	3.9	4.3	4.8	6.0
	40	6.0	6.8	7.5	9.4	5.1	5.8	6.4	8.0
	50	7.5	8.4	9.4	11.7	6.4	7.2	8.0	10.0
First Story of Two Stories or Second Story of Three Stories	10	2.8	3.5	4.2	5.2	2.4	3.0	3.5	4.4
	20	5.6	7.1	8.4	10.3	4.8	6.0	7.2	8.9
	30	8.4	10.6	12.7	15.5	7.2	9.0	10.8	13.2
	40	11.3	14.1	16.9	20.7	9.6	12.0	14.4	17.6
	50	14.1	17.7	21.1	25.9	12.0	15.1	17.9	22.0
First Story of Three Stories	10	4.2	5.0	5.6	NP	3.5	4.2	4.8	NP
	20	8.4	9.9	11.3	NP	7.2	8.4	9.6	NP
	30	12.7	14.8	16.9	NP	10.8	12.6	14.4	NP
	40	16.9	19.7	22.6	NP	14.4	16.8	19.2	NP
	50	21.1	24.7	28.2	NP	17.9	20.9	24.0	NP

SI: 1 in. = 25.4 mm, 1 mph = 1.61 km/h

1. C-SIP walls assemblies shall be constructed as described in **Section 2** and the manufacturer installation instructions.
2. Demonstrates equivalency to IRC Table R602.10.3(3). All applicable adjustment factors from IRC Table R602.10.3(4) shall be applied.
3. Tabulated bracing lengths are based on the following:
   a. Soil Class D
   b. Wall height = 10'
   c. 10 psf floor dead load
   d. 15 psf roof/ceiling dead load
   e. Braced wall line spacing ≤ 25'
4. Linear interpolation is permitted.
5. Bracing lengths are the results of comparative equivalency testing and analysis using both tested and published design values as points of comparison. DrJ relies upon the design values published in the codes and standards listed in **Section 4** that are adopted into law and that the manufacturer of those products stand behind. DrJ performs all equivalency analysis based on legally defined design values, the responsibility for which is the manufacturer of those products or the members of the associations that publish those design values.

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6.6 *C-SIP Equivalency Factor to IRC Wall Bracing Provisions*

6.6.1 **Table 4** provides an equivalency factor that can be used to adjust the IRC bracing tables for use with the C-SIPs.

6.6.2 Multiply the bracing lengths derived from IRC Table R602.10.3(1) and IRC Table R602.10.3(3), including all applicable adjustments found in IRC Table R602.10.3(2) and IRC Table R602.10.3(4), respectively.

6.6.3 All other IRC prescriptive bracing minimums, spacing requirements, and rules must still be met.

Table 4. C-SIP Equivalency Factor to IRC Wall Bracing Provisions[1,2]

Bearing Wall System	Maximum Aspect Ratio	Fastener Spacing		Wind Minimum SPF Structural Member Equivalency Factors to IRC WSP or CS-WSP
		Panel to Steel Slot Track	Steel Slot Track to Foundation	
5 3/4" (146 mm) C-SIP Wall Assembly	1.8:1	6" o.c.	20" o.c.	0.96

SI: 1 in = 25.4 mm

1. Based on equivalency testing for use with the IRC.
2. C-SIPs tested equivalency factors allow the user to determine the length of bracing required, by multiplying the factor by the length of bracing shown in the WSP or CS WSP columns in IRC Table R602.10.3(1) and IRC Table R602.10.3(3), as modified by all applicable factors in IRC Table R602.10.3(2) and IRC Table R602.10.3(4), respectively.

6.7 *Transverse Load Resistance*

6.7.1 The maximum allowable transverse load resistance capacities for various deflection limits and product thicknesses are shown in **Table 5.**

Table 5. Allowable Transverse Load (psf) at Various Deflection Limits for C-SIP Structural Members[1]

Bearing Wall System	Maximum Allowable Wind Pressure (psf)	Maximum Wind Pressure at Various Deflection Limits (psf)			
		L/180	L/240	L/360	L/480
3 3/4" (96 mm) C-SIP	40	40	40	25	20
5 3/4" (146 mm) C-SIP	85	85	85	70	55

SI: 1 in = 25.4 mm, 1 psf = 0.048 kPa

1. Limited to wall height of 10'. For wall taller than 10' an engineered design per **Table 10** is required.

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6.8 *Basic Wind Speed (mph) for C-SIP Used in Exterior Sheathed Assemblies*

6.8.1 The maximum basic wind speed for C-SIPs for various deflection limits used in wall applications are shown in **Table 6**.

Table 6. Maximum Transverse Basic Wind Speed (V_{ult}) for C-SIP for Various Deflection Limits Used in Wall Applications[1,2,3]

Bearing Wall System	Maximum Wind Speed (mph)	Maximum Wind Speed at Various Deflection Limits (mph)			
		L/180	L/240	L/360	L/480
96 mm C-SIP	165	165	160	135	120
146 mm C-SIP	200	200	200	200	200

SI: 1 in = 25.4 mm, 1 mph = 1.61 km/h

1. Design wind load capacity shall be in accordance with ASCE 7-22 as specified in IBC Section 1609.1.1.
2. Allowable wind speeds are based on the following:
   a. A building height of 30-feet, GC_p= -1.4 for Zone 5 and an Effective Wind Area of 10 ft², Topographic Factor: K_{zt}=1.0, Ground Elevation Factor: K_e=1.0, Internal Pressure Coefficient, GC_{pi}=+/-0.18 for an enclosed building, K_d = 0.85 for *"Component and Cladding"*, Exposure B.
3. IBC Section 1609.3.1: $V_{asd} = V_{ult}\sqrt{0.6}$.
4. Limited to wall height of 10'. For wall taller than 10' an engineered design per **Table 10** is required.

6.9 *Seismic Resistance*

6.9.1 C-SIP shear walls that require seismic design in accordance with IBC Section 1613 shall use the seismic allowable unit shear capacities set forth in **Table 7**.

6.9.1.1 The response modification coefficient, R; system overstrength factor, Ω_0, and deflection amplification factor, C_d, indicated in **Table 7**, shall be used to determine the base shear, element design forces, and design story drift in accordance with ASCE 7 Chapter 12 and Section 14.5.

Table 7. Allowable Seismic Unit Shear Capacity & Seismic Design Coefficients for 146 mm C-SIP Panels[1]

Seismic Force-Resisting System [6,7]	Seismic Allowable Unit Shear Capacity (plf)	Apparent Shear Stiffness, G_a (kips/in)	Response Modification Factor, R[2]	System Overstrength Factor, Ω_0[3]	Deflection Amplification Coefficient, C_d[4]	Structural System Limitations and Building Height Limit [5] (ft)				
						SDC[8]				
						B	C	D	E	F
146 mm C-SIP	245	5.5	6.5	3	4	NL	NL	65	65	65

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m, 1 kips/in = 175 N/mm

1. All seismic design parameters follow the equivalency as defined in **Section 8** of this report.
2. Response modification coefficient, R, for use throughout ASCE 7. Note: R reduces forces to a strength level, not an allowable stress level.
3. The tabulated value of the overstrength factor, Ω_0, is permitted to be reduced by subtracting one-half (0.5) for structures with flexible diaphragms.
4. Deflection amplification factor, C_d, for use with ASCE 7 Sections 12.8.6, 12.8.7, and 12.9.1.2.
5. NL = Not Limited. Heights are measured from the base of the structure as defined in ASCE 7 Section 11.2.
6. C-SIP must be installed properly in accordance with the manufacturer installation instructions for seismic applications.
7. C-SIP may be installed on either the interior or exterior side of the wall.
8. SDC = Seismic Design Category

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6.10 *Axial Capacity*

6.10.1 C-SIP walls were evaluated for axial performance (uplift and gravity load) in accordance with ASTM E72.

6.10.1.1 Maximum allowable uplift capacities are provided in **Table 8**.

Table 8. Allowable Axial Capacities for C-SIP Panels[1,2,3]

Bearing Wall System	Maximum Allowable Uplift Capacity (plf)	Maximum Allowable Compressive Load (plf)
90 mm C-SIP	-	4,850
96 mm C-SIP	420	5,000
146 mm C-SIP	420	8,000

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. C-SIP walls assemblies shall be constructed as described in **Section 2** and the manufacturer installation instructions.
2. Maximum fastener spacing along the steel slot tracks shall be 6" o.c.
3. Applicable up to wall height of $11^{3}/_{4}$'.

6.11 *C-SIP Hanging Force*

6.11.1 90 mm C-SIP was evaluated for resistance to a hanging force in accordance with GB/T 23451.

6.11.1.1 Maximum allowable hanging force is provided in **Table 9**.

Table 9. Allowable Axial Capacities for C-SIP Panels

Bearing Wall System	Maximum Allowable Load (lb)	Maximum Allowable Bending Moment [1] (lb-in)
90 mm C-SIP	75	285

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 lb-in = 113 N-mm

1. Based on a lever arm of $3^{15}/_{16}$".

6.12 *C-SIP Design Properties*

6.12.1 Whenever a building design involving C-SIP is outside of the prescriptive conditions, which are the tabulated resistance properties found in **Table 1** through **Table 8**, a professional engineer shall use **Table 10** for calculations, where required by statute in the jurisdiction where the building is located.

Table 10. Allowable Design Properties[1]

Product	F_b (psi)	F_t (psi)	F_c (psi)	EI (lb-in^2)	MOE (psi)	Nominal I_{xx} (in^4)	Nominal S_x (in^3)
90 mm C-SIP	190	-	115	-	-	44.5	25.1
96 mm C-SIP	275	10	110	21,900,000	1,590,000	54.0	28.6
146 mm C-SIP	255	10	115	64,900,000	1,340,000	189.9	66.1

1. Allowable design properties based on a 12" wide section.

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6.13 *Fire Performance*

6.13.1 *Fire Resistance Rating:*

6.13.1.1 C-SIP was evaluated to determine its fire resistance rating in accordance with ASTM E119.

6.13.1.1.1 C-SIP achieved a 1-hour fire rating when used for non-loadbearing applications.

6.13.1.1.1.1 Product did not collapse at the 60-minute mark

6.13.1.1.1.2 No cracks, holes, or openings were developed through which flames or gases could pass.

6.13.1.1.1.3 The temperature of the unexposed side did not exceed 220 °C and/or 140 °C above the initial temperature.

6.13.2 *Reaction to Fire:*

6.13.2.1 C-SIP was evaluated for fire performance in accordance with ASTM E136.

6.13.2.1.1 C-SIP is considered non-combustible when evaluated accordance ASTM E136.

6.13.2.1.2 When tested in accordance with ASTM E84, C-SIP will obtain a Class A rating.

6.13.2.2 C-SIP was evaluated for fire performance in accordance with EN 13501-1 and received a fire classification of A1.

6.13.2.2.1 C-SIP is considered non-combustible when evaluated in accordance with EN ISO 1182.

6.13.2.2.2 C-SIP has been evaluated in accordance with EN ISO 1716 and has a gross heat of combustion (PCS) ≤ 2.0 MJ/kg

6.13.3 *Exterior Wildfire Exposure:*

6.13.3.1 Use of C-SIP within a Wildland-Urban Interface (WUI) Fire Area shall comply with the following provisions:

6.13.3.1.1 CBC Chapter 7A (specifically CBC Section 707A for exterior wall applications)

6.13.3.1.2 CRC Section R337 (specifically CRC R337.7 for exterior wall applications)

6.13.3.1.3 California Referenced Standards Code, Chapter 12-7A

6.13.3.2 C-SIP, being non-combustible and achieving a 1-hour fire-resistance rating, may be used in the following applications:

6.13.3.2.1 Ignition-resistant materials as specified in CBC Section 704A.2 and CRC Section R337.4.2.

6.13.3.2.2 Exterior wall coverings as specified in CBC Section 707A.3 and CRC Section R337.7.3.

6.13.3.2.3 Exterior wall assemblies as specified CBC Section 707A.4 and CRC Section R337.7.4, item 5.

6.14 *Thermal Resistance*

6.14.1 C-SIP has been evalauated to determine its thermal resistance in accordance with EN 12667

Table 11. Thermal Resistance Properties

Product	R-Value(h·ft²·°F/Btu)	RSI (m²·K/W)
90 mm C-SIP	3.58	0.63
96 mm C-SIP	5.26	0.93
146 mm C-SIP	8.00	1.41
SI: 1 in = 25.4 mm, 1 (h·ft²·°F)/Btu = 0.1761 (m²·K)/W		

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6.15 *Durability*

6.15.1 *Freeze-Thaw Resistance:*

6.15.1.1 C-SIP has been evaluated to determine its resistance to freeze-thaw cycles in accordance with GB/T 23451.

6.15.1.1.1 90 mm C-SIP met the requirements specified in GB/T 23451 where no visible cracks appeared on the surface of the specimens.

6.15.2 *Impact Reistance:*

6.15.2.1 C-SIP has been evalauated to determine its impact resistance in accordance with GB/T 23451.

6.15.2.1.1 90 mm C-SIP met the requirements specified in GB/T 23451 where no visible cracks appeared on the surface of the specimens.

6.16 *Sound Insulation Properties*

6.16.1 C-SIP has been evalauated to determine its sound insulation properties in accordance with ISO 140-3:1995+A1:2004 and the weighted Sound Reduction Index was determined in accordance with ISO 717-1:1996+A1:2006.

6.16.1.1 90 mm C-SIP achieved a weighted Sound Reduction Index, R_w (C; C_{tr}) of 37 (0;-2) dB.

6.16.1.1.1 C: calculated with weighted pink noise

6.16.1.1.2 C_{tr}: caluclated with weighted urban traffic noise

6.17 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.

7 Certified Performance[22]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[23]

7.2 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.[24]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 C-SIP complies with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Structural performance under lateral load conditions for wind and seismic loading for use with the IBC performance-based provisions of IBC Section 2211.1.1 for light-frame steel wall assemblies.

8.1.1.1 **Table 7** provides SDC that conform to the requirements in ASCE 7 Section 12.2.1 and Table 12.2-1 for design of wall assemblies in buildings that require seismic design in accordance with ASCE 7 (i.e., all seismic design categories).

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8.1.1.2 The basis for equivalency testing is outlined in Section 12.2.1 of ASCE 7:

> **12.2.1.1 Alternative Structural Systems.** Use of seismic force-resisting systems not contained in Table 12.2-1 shall be permitted contingent on submittal to and approval by the Authority Having Jurisdiction and independent structural design review of an accompanying set of design criteria and substantiating analytical and test data. The design criteria shall specify any limitations on system use, including Seismic Design Category and height; required procedures for designing the system's components and connections; required detailing; and the values of the response modification coefficient, R; overstrength factor, Ω_0, and deflection amplification factor, C_d.

8.1.1.3 The basis of the seismic evaluation performed as part of this report is based on ASTM D7989 and testing per ASTM E2126 to establish SDCs that conform to the requirements of ASCE 7 Section 12.2.1.1.

8.1.2 Resistance to transverse loads for wall assemblies used in light-frame wood and steel construction in accordance with IBC Section 1609.1.1 and IRC Section R301.2.1.

8.1.3 Resistance to gravity loads for wall assemblies used in light-frame steel construction in accordance with IBC Section 1604 and IRC Section R301.1.

8.2 Any building code, regulation, 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 RDP/approved sources. DrJ is qualified[25] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.

8.3 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.

8.4 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report and the applicable building code.

9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.

9.3 *Installation Procedure*

9.3.1 Wall sections shall be connected in accordance with **Section 2** of this report and the manufacturer installation instructions.

9.3.2 Wall sections arrive pre-assembled. Panel-to-panel connections and panel-to-top and bottom rail members are completed onsite.

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10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

10.1.1 Transverse wind load resistance in accordance with ASTM E330

10.1.2 Lateral load resistance in accordance with ASTM E2126

10.1.3 Compression and tension load resistance in accordance with ASTM E72

10.1.4 Non-combustibility test in accordance with EN ISO 1182

10.1.5 Determination of gross heat of combustion in accordance with EN ISO 1716

10.1.6 Fire-resistance testing in accordance with SANS 10177-2

10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or RDPshttps://www.drjcertification.org/2021/ibc/chapter-2/registered-design-professional. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where pertinent, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

10.4 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, or Duly Authenticated Reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this Duly Authenticated Report, may be dependent upon published design properties by others.

10.5 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.[26]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for C-SIP on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, C-SIP have performance characteristics that were tested and/or meet applicable regulations and is suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, C-SIP shall be approved for the following applications:

11.2.1 Use in wall constructions in accordance with code requirements this report.

11.3 Unless exempt by state statute, when C-SIP 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 an RDP.

11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from CSP Homes, Inc.

11.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[27] 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.

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11.6 **Approved**:[28] Building regulations require that the building official shall accept Duly Authenticated Reports.[29]

11.6.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce.

11.6.3 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. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Agreements (MLA), this Duly Authenticated Report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 Duly Authenticated Reports are equivalent.[30]

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.

12.2 As defined in **Section 6**, 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.

12.3 When used in WUI zones, exterior wall assemblies shall extend from the top of the foundation to the roof and terminate at 2" nominal solid wood blocking between rafters at all roof overhangs as specified in CBC Section 707A.3.1 and CRC Section R337.7.3.1.

12.3.1 In the case of enclosed eaves, exterior wall assemblies shall terminate at the enclosure.

12.4 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:

12.4.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

12.4.2 This report and the installation instructions shall be submitted at the time of permit application.

12.4.3 This innovative product have an internal quality control program and a third-party quality assurance program.

12.4.4 At a minimum, this innovative product shall be installed per **Section 9**.

12.4.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.

12.4.6 This innovative product 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.

12.4.7 The application of this innovative product in the context of this report is 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.

12.5 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, "*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11*," all of IBC Section 104, and IBC Section 105.4.

12.6 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.7 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

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13 Identification

13.1 The innovative product listed in **Section 1.1** is identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.

13.2 Additional technical information can be found at www.csp.homes.

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

15.1 is included in this report 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. This report states either that the material, product, or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.

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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

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 this innovative product 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 2016 (DTSA),[31] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years[32] and/or a $5,000,000 fine or 3 times the value of[33] the Intellectual Property (IP) and Trade Secrets (TS).

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 materials[34] that are not specifically provided for in any regulation, 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.[35]

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 have 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.[36]

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1.3 **Approved**[37] **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 that 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.[38] The Superintendent of Building Approved Testing Agency Roster 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 DrJ 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.[39]

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 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed[40] 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 agreement[41] (i.e., ANAB, International Accreditation Forum [IAF], etc.).

1.6 **Approved by Florida**: Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation by:

1.6.1 A certification mark or listing of an approved certification agency,

1.6.2 A test report from an approved testing laboratory,

1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or

1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.

1.6.5 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:

1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,

1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,

1.6.5.3 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,

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1.6.5.4 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, or

1.6.5.5 A statewide product approval issued by the Florida Building Commission.

1.6.6 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 the 2018 Building Code of New Jersey in IBC Section 1707.1 General,[42] 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)*".[43] Furthermore N.J.A.C 5:23-3.7 states: "*Municipal approvals of alternative materials, equipment, or methods of construction*."

1.8.1 **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.

1.8.1.1 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 the above.

1.8.1.2 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 the above.

1.8.2 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 the previous paragraph, given that the listed entities are no longer in existence and/or do not provide "*reports of engineering findings*."

1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards**: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[44] and Part 3280,[45] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:

1.9.1 "*All construction methods shall be in conformance with accepted engineering practices*."

1.9.2 "*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*."

1.9.3 "*The design stresses of all materials shall conform to accepted engineering practice*."

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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.[46]

1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept Duly Authenticated Reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.[47]

1.10.2.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.

1.10.2.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[48]

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.[49]

1.11 **Approval by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:

1.11.1 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.

1.11.2 **Approved**: The purpose of the 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, designs, services, and/or methods of construction.

1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.[50]

1.11.4 Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.[51]

1.12 Approval equity is a fundamental commercial and legal principle.[52]

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Issue Date: November 20, 2023November 20, 2023
Subject to Renewal: October 1, 2025

FBC Supplement to Report Number 2302-01

REPORT HOLDER: CSP Homes, Inc.

1 Evaluation Subject

1.1 Concrete Structural Steel Insulated Interlocking Plug-N-Play Panels (C-SIP)

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Report Supplement is to show C-SIP, recognized in Report Number 2302-01, have also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

2.2 *Applicable Code Editions*

2.2.1 FBC-B—20, 23: Florida Building Code – Building (FL 44554)

2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL 44554)*

3 Conclusions

3.1 C-SIP, described in Report Number 2302-01, complies with the FBC-B and FBC-R and is subject to the conditions of use described in this supplement.

3.2 Where there are variations between the IBC and IRC and the FBC-B and FBC-R applicable to this report, they are listed here:

3.2.1 FBC-B Section 104.4 and Section 110.4 are reserved.

3.2.2 FBC-R Section, Section R109, Section R602.10 and Section R602.12.4 are reserved.

3.2.3 FBC-B Section 1609.1.1 replaces IBC Section 1609.1.1.

3.2.4 FBC-B Section 1609.3.1 replaces IBC Section 1609.3.1.

3.2.5 FBC-R Section R301.1 replaces IRC Section R301.1.

3.2.6 FBC-R Section R301.2.1 replaces IRC Section R301.2.1.

4 Conditions of Use

4.1 C-SIP, described in Report Number 2302-01, must comply with all of the following conditions:

4.1.1 All applicable sections in Report Number 2302-01.

4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.

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Notes

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

2 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702

3 Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11

4 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as

5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice

6 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies

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

8 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency

9 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source

10 https://www.law.cornell.edu/uscode/text/18/1832 (b) 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. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

11 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

12 https://www.cbitest.com/accreditation/

13 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104:~:text=to%20enforce%20the%20provisions%20of%20this%20code

14 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1:~:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore

15 https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11

16 https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

17 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

18 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

19 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.

20 All references to the FBC-B and FBC-R are the same as the 2021 IBC and 2021 IRC unless otherwise noted in the Florida Supplement.

21 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed AND https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled

22 https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4

23 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

24 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

25 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.

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

27 2018 IFC Section 104.9

28 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.

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

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30 Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.
31 http://www.drjengineering.org/AppendixC AND https://www.drjcertification.org/cornell-2016-protection-trade-secrets
32 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years
33 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided
34 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2
35 IBC 2021, Section 1706.1 Conformance to Standards
36 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General
37 See Section 11 for the distilled building code definition of **Approved**
38 Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES
39 https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1
40 New York City, The Rules of the City of New York, § 101-07 Approved Agencies
41 New York City, The Rules of the City of New York, § 101-07 Approved Agencies
42 https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1
43 https://www.nj.gov/dca/divisions/codes/codreg/ucc.html
44 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14
45 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280
46 IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.
47 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.
48 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/
49 IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.
50 https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope
51 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.
52 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

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