Listing

A Duly Authenticated Report from an Approved Agency

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HWS Sheathing Panel Cold-Formed Steel

Trade Secret Report Holder:

HWS Global

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CSI Designations:

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

Section: 06 16 13 - Insulated Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 - Thermal Insulation

Section: 07 21 13 - Foam Board Insulation

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

Section: 07 26 00 - Vapor Retarders

Section: 07 27 00 - Air Barriers

Section: 07 42 43 - Composite Wall Panels

Section: 07 44 63 - Fabricated Faced Panel Assemblies

Section: 07 48 00 - Exterior Wall Assemblies

Section: 07 84 26 - Thermal Barriers for Plastics

1 Innovative Product Evaluated[1]

1.1 HWS Sheathing Panel Cold-Formed Steel (H-SPCFS)

1.1.1 This product has been evaluated and is an alternative material, design procedure, and method of construction that is equivalent to all regulations evaluated.

1.1.2 Quality control, third party inspection, and installation shall be in accordance with this duly authenticated report and the manufacturer documentation.

1.1.3 Where the building official is authorized and directed to enforce, the installation instructions shall be made available to the building official to meet the requirement that the building official shall make inspections as set forth in specific regulations.

1.1.4 Where this product or its application is not approved, the building official shall respond in writing, stating the reasons and specific regulations for which the alternative was not approved.

2 Product Description and Materials

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

Figure 1. H-SPCFS

2.2 H-SPCFS Assembly evaluated in this report is described in **Table 1**.

Table 1. Description of H-SPCFS Assemblies

Product	Component(s)	Description	Specifications
HWS-Composite Sheathing Panel (H-SPCFS)	HWS Proprietary Laminate	Proprietary Carbon Based Laminate	1/16" thick laminate with a minimum tensile strength of 12,000 psi[1]
	Foam	Proprietary Extruded Polystyrene (XPS) Foam Sheathing	Minimum properties: 1.5 pcf density, 20 psi compressive strength, F_c 50 psi tensile strength, F_t 25 psi shear strength, F_v 50 psi flexural strength, F_b 1,600 psi flexural modulus, MOE Thickness ranges from 1" to 8"
	HWS Proprietary Laminate	Proprietary Carbon Based Laminate	1/16" thick laminate with a minimum tensile strength of 12,000 psi.[1]
Cold-Formed Steel (CFS) Framing	CFS C-Channels (track) and Framing Members (Stud)	Cold-formed Steel C-channel (CFS-C) Commodity Framing Members	Minimum steel properties: 40 ksi F_y and 52 ksi F_u
Interior Sheathing (Optional)	Gypsum Wallboard (GWB)	GWB complying with ASTM C1396	Minimum 1/2" thickness

SI: 1 in = 25.4 mm
1. Per ASTM D638

2.2.1 The CFS framing is mechanically fastened and adhered to the H-SPCFS on one side of the CFS framing.

2.2.1.1 The H-SPCFS is adhered to the CFS framing with a 3/8" bead of proprietary adhesive applied onto all CFS framing members.

2.2.2 The CFS track members are wider than the CFS framing members and the H-SPCFS so that the H-SPCFS fits inside the CFS top and bottom tracks.

2.2.3 Placement of the top and bottom CFS track members can be performed in one of two ways:

2.2.3.1 The CFS track is wider than the CFS framing so the CFS framing members fit inside the top and bottom track, and the H-SPCFS is installed to the outside of all CFS framing members.

2.2.3.2 The H-SPCFS is positioned over the top of the CFS framing members and top and bottom tracks.

2.2.3.2.1 A $^{3}/_{8}$" bead of proprietary adhesive is applied onto the outside of all CFS framing members.

2.2.4 After applying the proprietary adhesive, H-SPCFS panels are attached to the CFS framing using #8 x $^{3}/_{4}$" wafer head screws, driven through the CFS C-channel flange and into the H-SPCFS Laminate at 24" on-center (o.c.) along the length of the CFS framing.

2.2.5 Lightweight GWB, $^{1}/_{2}$" thick, may or may not be attached to the CFS framing on the interior side of the assembly.

2.2.5.1 When GWB is attached to the CFS framing, it is fastened using #6 x $1^{1}/_{4}$" Type S screws spaced at 16" o.c. along an edge and 16" o.c. in the field.

2.2.6 This Listing includes properties for the following wall assembly products:

2.2.6.1 10' span, 350S200-33 – 20-gauge 3.5" studs, 24" o.c., 2" H-SPCFS, with and without $^{1}/_{2}$" GWB

2.2.6.2 10' span, 350S200-54 -16-gauge 3.5" studs, 24" o.c., 2" H-SPCFS, with and without $^{1}/_{2}$" GWB

2.2.6.3 16' span, 400S200-54 -16-gauge 4.0" studs, 24" o.c., 4" H-SPCFS, with and without $^{1}/_{2}$" GWB

2.2.6.4 8' tall shear walls, 350S200-54 -16-gauge 3.5" studs, 24" o.c., 2" H-SPCFS, with $^{1}/_{2}$" GWB

2.3 As needed, review material properties for design in **Section 6**.

2.3.1 **Section 6** provides tabulated properties to create end use application solutions, which are to be used in the design of a building structural system that provides a complete load path to meet the requirements for the transfer of loads from their point of origin through all load-resisting elements and connections to the foundation.

3 Definitions[2]

3.1 New Materials[3] 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.[4] The design strength and permissible stresses shall be established by tests[5] and/or engineering analysis.[6]

3.2 Duly authenticated reports[7] and research reports[8] are test reports and related engineering evaluations that are written by an approved agency[9] and/or an approved source.[10]

3.2.1 These reports utilize intellectual property and/or trade secrets to create public domain material properties for commercial end-use.

3.2.1.1 This report protects confidential Intellectual Property and trade secretes under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[11]

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

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional, hereinafter RDP) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[12]

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 RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[13] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[14] 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[15] 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.[16]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory. Therefore, recognition of certificates and validation statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope shall be approved.[17] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[18] and can be used in any country that is an MLA signatory found at this link: https://iaf.nu/en/recognised-abs/

3.9 Approval equity is a fundamental commercial and legal principle.[19]

4 Applicable Regulations and Standards for the Listing[20]

4.1 *Local, State, and Federal Regulations*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which include, but is not limited it, the following featured local jurisdictions: Austin, Baltimore, Broward County, Chicago, Clark County, Dade County, Dallas, Detroit, Denver, DuPage County, Fort Worth, Houston, Kansas City, King County, Knoxville, Las Vegas, Los Angeles City, Los Angeles County, Miami, Nashville, New York City, Omaha, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Jose, San Francisco, Seattle, Sioux Falls, South Holland, Texas Department of Insurance, and Wichita.

4.1.2 Approved in all state jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which include, but is not limited to, the following featured states: California, Florida, New Jersey, New York, Oregon, Texas, Washington, and Wisconsin.

4.1.3 *IBC – 18, 21, 24: International Building Code®*

4.1.4 *IRC – 18, 21, 24: International Residential Code®*

4.1.5 *IECC – 18, 21, 24: International Energy Conservation Code®*

4.1.6 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[21] and Part 3280[22] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.2 *Standards*

4.2.1 *AISI S240: North American Standard for Cold-Formed Steel Structural Framing*

4.2.2 *AISI S400: North American Standard for Seismic Design of Cold-Formed Steel Structural Systems*

4.2.3 *ASTM C297: Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions*

4.2.4 *ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*

4.2.5 *ASTM C1396: Standard Specification for Gypsum Board*

4.2.6 *ASTM C1860: Standard Test Methods for Measurement of Tensile Strength or Bond Strength of Portland Cement-Based Plaster by Direct Tension*

4.2.7 *ASTM D638: Standard Test Method for Tensile Properties of Plastics*

4.2.8 *ASTM D779: Standard Test Method for Determining the Water Vapor Resistance of Sheet Materials in Contact with Liquid Water by the Dry Indicator Method*

4.2.9 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

4.2.10 *ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials*

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

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

4.2.13 *ASTM E2556/E2556M: Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment*

4.2.14 *ASTM G154: Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials*

4.2.15 *NFPA 13: Standard for the Installation of Sprinkler Systems*

4.2.16 *NFPA 13D: Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*

4.2.17 *NFPA 13R: Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*

4.2.18 *UL 723: Test for Surface Burning Characteristics of Building Materials*

4.2.19 *UL 1715 Fire Test of Interior Finish Material*

4.3 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:

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

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

4.3.2.1 ASTM D7989 is accepted engineering practice used to establish Seismic Design Coefficients (SDC).

4.3.2.2 Tested data generated by ISO/IEC 17025 approved agencies and/or professional engineers, which use ASTM D7989 as their basis, are defined as intellectual property and/or trade secrets.

4.3.2.3 All professional engineering evaluations are defined as an independent design review (i.e., listings, certified reports, duly authenticated reports from approved agencies, and/or research reports, are prepared independently by approved agencies and/or approved sources, when signed and sealed by licensed professional engineer pursuant to registration law.

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

5 Listed[23]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), an approved agency (i.e., CBI and DrJ), and/or and approved source (i.e., DrJ), or other organization(s) 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 *General*

6.1.1 H-SPCFS assemblies are used in the following applications:

6.1.1.1 Walls in buildings constructed in accordance with the applicable sections in the IBC and IRC.

6.1.1.2 Structural wall panels to provide lateral load resistance (wind) for buildings.

6.1.1.3 Structural wall panels to provide resistance to transverse loads for wall assemblies.

6.1.1.4 Structural wall panels in buildings constructed in accordance with the IBC requirements for Type V construction

6.1.2 This Listing is for H-SPCFS assemblies with a 4" H-SPCFS thickness or less as defined in the tables herein and in **Section 2.2.6**.

6.1.2.1 H-SPCFS, up to 8" thick, can be used via special engineering. Please contact HWS Global to obtain an engineered design drawing for 2" or greater.

6.2 *Structural Applications*

6.2.1 Except as otherwise described in this Listing, H-SPCFS assemblies shall be installed in accordance with the applicable building codes and the provisions set forth therein for the design and installation.

6.2.2 Structural performance under lateral load conditions for wind loading for use with the IBC and IRC performance-based provisions for light-frame steel wall assemblies:

6.2.2.1 For wind design, anchor bolt spacing shall not exceed 24" o.c.

6.2.2.2 The maximum aspect ratio for full-height walls braced with H-SPCFS shall be 2:1.

6.2.2.3 Fastener type and spacing shall be per the applicable table(s) of this Listing.

6.2.2.3.1 Fasteners shall be installed with the head in contact with the face of the CFS framing members.

6.2.3 The following design values in this report are based on the Allowable Stress Design (ASD) method as permitted by the applicable IBC and IRC code sections and referenced standards listed in **Section 4**.

6.2.4 *Lateral Load Diaphragm Shear Resistance for Wall Applications:*

6.2.4.1 Walls shall be designed in accordance with AISI S240 or AISI S400 and the applicable building codes.

6.2.4.2 For wind design, the allowable unit shear capacity values for H-SPCFS assemblies are shown in **Table 2**.

Table 2. Allowable Unit Diaphragm Shear Capacity of H-SPCFS Assemblies for Wind Design[1]

Assembly Description[2]	**Allowable Unit Shear Capacity for Wind (PLF) ASD**
H-SPCFS Braced Wall Panel 8' tall, 16-Gauge, 3.5" CFS Framing with 2" H-SPCFS & 1/2" GWB	645

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

1. Tested in accordance with ASTM E2126.
2. See **Section 2.2.6** for additional details of the assembly.

6.2.5 *Transverse Load:*

6.2.5.1 Allowable stress design properties for resistance to transverse loads are shown in **Table 3**.

Table 3. Allowable Flexural Strength and Stiffness for H-SPCFS Assemblies

Assembly Description[1]	Allowable Moment (lb-ft per foot) (ASD)	EI ($lb\text{-}in^2$ per foot)
20-Gauge, 3.5" CFS framing with 2" H-SPCFS	670	21,000,000
16-Gauge, 3.5" CFS framing with 2" H-SPCFS	950	27,000,000
16-Gauge, 4" CFS framing with 4" H-SPCFS	1,085	50,000,000

SI: 1 in = 25.4 mm, 1 ft. = 0.305 m, 1 lb-ft = N-m, 1 $lb\text{-}in^2$ = $N\text{-}mm^2$
1. Panel must be continuous along its height or flexural span.
2. See **Section 2.2.6** for additional details of the assembly

6.2.5.2 Allowable positive and negative design pressure properties for resistance to transverse uniform loads are shown in **Table 4** and **Table 5**.

Table 4. Allowable Transverse Load (psf) for H-SPCFS [2]

Product Description	Span (ft)	Maximum Allowable Load (psf)	Allowable Load at Various Deflection Limits (psf)[1]			
			L/180	L/240	L/360	L/480
4" H-SPCFS Panel (No Wood or Steel Framing)	8	24	12	10.5	8	5.5
	9	24	12	9	7	5
	10	24	11	8	5.5	4

SI: 1 in = 25.4 mm, 1 ft. = 0.305 m, 1 psf = 47.9 Pa
1. Values for pressure at various deflection limits are capped at the allowable design pressure.
2. Allowable design pressures given are maximums for the span listed. Shorter spans are permitted.

Table 5. Allowable Transverse Load (psf) for H-SPCFS Assemblies[2]

Assembly Description[3]	Span (ft)	Maximum Allowable Load (psf)	Allowable Load at Various Deflection Limits (psf)[1]			
			L/180	L/240	L/360	L/480
20-Gauge 3.5" CFS framing with 2" H-SPCFS	10	50	50	45	30	25
16-Gauge 3.5" CFS framing with 2" H-SPCFS	10	80	80	65	45	35
16-Gauge 4" CFS framing with 4" H-SPCFS	16	35	35	30	20	15

SI: 1 in = 25.4 mm, 1 ft. = 0.305 m, 1 psf = 47.9 Pa

1. Values for pressure at various deflection limits are capped at the allowable design pressure.
2. Allowable design pressures given are maximums for the span listed. Shorter spans are permitted.
3. See **Section 2.2.6** for additional details of the assembly

6.2.6 *Pull-Off Resistance of the H-SPCFS Proprietary Laminate Attached to Structural Members:*

6.2.6.1 The allowable adhesive bond strength of H-SPCFS proprietary laminate adhered to structural framing is shown in **Table 6**.

Table 6. Pull-Off Resistance of the H-SPCFS Proprietary Laminate

Connection	Allowable Pull-off Resistance of Proprietary Laminate as Attached to Structural Members (psf)
Pull-off resistance of H-SPCFS Proprietary Laminate	120

SI: 1-psf = 47.9 Pa

6.2.7 *Axial Shear Resistance of the Exterior Sheathing Attached to Structural Members at the Structural Member Interface (Gravity):*

6.2.7.1 The allowable axial shear resistance design value of the proprietary exterior sheathing connected at the structural member connection interface is shown in **Table 7**.

Table 7. Axial (Gravity) Shear Resistance of the H-SPCFS Exterior Sheathing

H-SIS-AGS Exterior Sheathing	Allowable Resistance of the Exterior Sheathing Connection to the Structural Member (Gravity) (psf)
2" H-SPCFS Exterior Sheathing to Structural Member	240

SI: 1-psf = 47.9 Pa

6.2.8 *Tensile Strength of the Internal Bond of the Proprietary Exterior Sheathing:*

6.2.8.1 The allowable H-SPCFS tensile (suction perpendicular to studs) strength of the exterior sheathing is shown in **Table 8**.

Table 8. Tensile Strength of the Internal Bond of the H-SPCFS

Component	Allowable Tensile Strength (psi)
H-SPCFS[1]	50
SI: 1 psi = 6.89 kPa 1. Tensile strength of the XPS foam portion of the panel.	

6.3 *Building Science*

6.3.1 *Thermal Resistance:*

6.3.1.1 Testing of the foam portion of the H-SPCFS was conducted in accordance with ASTM C518. Thermal resistance and nominal density are detailed in **Table 9**.

Table 9. Thermal Resistance and Density Properties of H-SPCFS

Component	R-Value at a Mean Temperature of 75° F (23.9° C)	Density of XPS Foam Sheathing (pcf)
H-SPCFS	5.0 per inch[1]	2.0
SI: 1 in = 25.4 mm, 1 pcf = 16.02 kg/m^3 1. Foam sheathing portion of the panels only.		

6.3.2 *Moisture Vapor Permeance:*

6.3.2.1 Water vapor permeability of H-SPCFS components and two layup configuration of H-SPCFS are shown in **Table 10**.

Table 10. Vapor Permeance for H-SPCFS Configurations[1]

Product Description	Water Vapor Permeance (perm)	Classification
H-SPCFS Laminate	5.80	Class III
XPS Foam Core	1.50	Class III
H-SPCFS Configuration: Laminate/XPS	1.19	Class III
H-SPCFS Configuration: Laminate/XPS/Laminate	1.00	Class II
1. Tested in accordance with ASTM E96 Method A.		

6.3.3 *Water-Resistive Barrier (WRB):*

6.3.3.1 The water-resistive barrier properties of the H-SPCFS is shown in **Table 11**.

Table 11. Water-Resistive Performance of the H-SPCFS

Product Description	Standard	Test Result
Minimum 6" H-SPCFS	ASTM E2556- Type II (60 Minute)	Pass

6.4 *Fire Performance*

6.4.1 *Surface Burning Characteristics:*

6.4.1.1 The flame spread and smoke developed index performance of the exterior sheathing component of the H-SPCFS is shown in **Table 12**.

Table 12. Flame Spread and Smoke Developed Index[1]

Product Description	Flame Spread	Smoke Developed Index	Classification
H-SPCFS Proprietary Laminate	≤ 25	≤ 450	Class A
XPS Foam Sheathing	≤ 25	≤ 450	Class A
1. Laminate and XPS tested in accordance with ASTM E84/ UL723			

6.4.2 *Thermal Barrier:*

6.4.2.1 H-SPCFS up to 8" thick may be used without a prescriptive thermal barrier, pursuant to the tested performance found in **Table 13,** when sprinklers are installed, according to the requirements of the following sprinkler standards:

6.4.2.1.1 NFPA 13 Standard for the Installation of Sprinkler Systems

6.4.2.1.2 NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes

6.4.2.1.3 NFPA 13R Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies

6.4.2.2 Testing of H-SPCFS generated the UL 1715 test results found in **Table 13**.

6.4.2.2.1 UL 1715 is one of three tests permitted by building codes to show that fire performance is sufficient for use without a prescriptive thermal barrier. These tests are NFPA 286, UL 1715, and FM 4880.

6.4.2.2.2 Use without a prescriptive thermal barrier requires installation of an NFPA 13, 13D, or 13R sprinkler system with a minimum flow rate of 13 gallons per minute.

Table 13. UL 1715 Tested Performance of H-SPCFS for Use as Interior Wall and Ceiling Finish Materials without a Thermal Barrier

Product	Maximum Thickness (in.)	Spread of Flames to Ceiling	Spread of Flames to Outer Extremity of H-SPCFS Sheathing	Passes Requirements of UL 1715
H-SPCFS	8	No	No	Yes
SI: 1 in = 25.4 mm				

6.5 *Impact Resistance (Hail)*

6.5.1 The H-SPCFS Sheathing Laminate used as the exterior face of the H-SPCFS Exterior Sheathing was tested in accordance with UL 2218 to evaluate resistance to damage from hail.

6.5.2 The results of this testing are shown in **Table 14**.

Table 14. Impact Resistance of H-SPCFS Sheathing and Laminate

Component	Minimum Component Thickness (in.)	Fastening Method to Structural Framing	Test Classification	Assessment
H-SPCFS Sheathing Laminate	1/16	12:12	4	PASS
H-SPCFS Sheathing Laminate	1/16	12:12 and Proprietary Polyurethane Foam Construction Adhesive	4	PASS
2" H-SPCFS Sheathing	Laminate: 1/16 Foam: 2	12:12	4	PASS
SI: 1 in = 25.4 mm				

6.6 *Fastener Attachments to Steel Framing through H-SPCFS Sheathing to Support Cladding Weight*

6.6.1 Fasteners are required to attach cladding through the H-SPCFS Exterior Sheathing to the wall framing to carry the cladding weight.

6.6.1.1 See **Table 15** and **Table 16** for allowable cladding attachments with various fastener types for light frame cold-formed steel construction.

6.6.2 The fasteners attaching the cladding through the H-SPCFS Sheathing to the wall framing shall have a minimum size and maximum spacing as shown in **Table 15** and **Table 16**.

6.6.3 All H-SPCFS edges shall be supported by framing or blocking.

6.6.4 For attaching to cold-form steel studs, fasteners with design properties equal or greater than the following shall be permitted:

6.6.4.1 #8 screw: 0.164" shank diameter, 0.313" head diameter

6.6.4.2 #10 screw: 0.190" shank diameter, 0.363" head diameter

6.6.5 Minimum fastener penetration into stud is steel thickness plus three threads plus the tip.

6.6.6 The specified cladding weight shall include all supported materials.

6.6.7 Steel framing shall have a minimum yield strength, F_y, of 33 ksi.

6.6.8 Screws shall comply with ASTM C1513 and the requirements in AISI S240.

6.6.9 Cladding material shall be separately checked for fastener head pull-through.

6.6.10 Wood furring, as specified in **Table 16**, is permitted to be any softwood species having a specific gravity of, at least, 0.42. Steel furring and steel studs shall have a minimum yield strength, F_y, of 33 ksi.

6.6.10.1 Furring shall be spaced not more than 24" o.c. When installed vertically, furring shall be located over the steel-framing members and attached with the permitted fasteners. When furring is installed horizontally, the 12" furring spacing shall be achieved by use of two fasteners into the framing members at 24" o.c.

Table 15. Permitted Fastening for Direct Attachment of Cladding Materials Through the H-SPCFS Exterior Sheathing into the Steel Framing[1,2,3,4,5]

Cladding Fastener Through 2" H-SPCFS Sheathing Into:	Cladding Fastener Type and Min. Size[2]	Cladding Fastener Vertical spacing (in.)	Permitted Fastener Applications									
			16" o.c. Framing					24" o.c. Framing				
			Cladding weight (psf)					Cladding Weight (psf)				
			3	11	15	18	25	3	11	15	18	25
Minimum 33 mil CFS Framing Members	#8 screw	6	OK	OK	OK	OK	-	OK	OK	-	-	-
		8	OK	OK	OK	-	-	OK	-	-	-	-
		12	OK	-	-	-	-	OK	-	-	-	-
	#10 screw	6	OK	OK	OK	OK	-	OK	OK	OK	-	-
		8	OK	OK	OK	OK	-	OK	OK	-	-	-
		12	OK	OK	-	-	-	OK	-	-	-	-
SI: 1 in = 25.4 mm, 1-psf = 0.0479 kN/m^2												

Table 16. Permitted Fastening for Furring Attachment Through the H-SPCFS Exterior Sheathing into the Steel Framing

Furring Material	Furring Fastener through 2" H-SPCFS Into:	Furring Fastener Type and Min. Size	Furring Fastener Vertical spacing (in.)	Permitted Fastener Applications									
				16" o.c. Furring					24" o.c. Furring				
				Cladding weight (psf)					Cladding Weight (psf)				
				3	11	15	18	25	3	11	15	18	25
Minimum 33 mil CFS Furring or Minimum 1x Wood Furring	33 mil Steel Framing	#8 screw	12	OK	-	-	-	-	OK	-	-	-	-
			16	OK	-	-	-	-	OK	-	-	-	-
			24	OK	-	-	-	-	OK	-	-	-	-
		#10 screw	12	OK	OK	-	-	-	OK	-	-	-	-
			16	OK	-	-	-	-	OK	-	-	-	-
			24	OK	-	-	-	-	OK	-	-	-	-
SI: 1 in = 25.4 mm, 1-psf = 0.0479 kN/m^2													

6.7 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[24]

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.[25]

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.[26]

8 Installation

8.1 *Installation Procedure to Produce a Complete H-SPCFS Component*

8.1.1 The HWS Global internal quality control, installation manual, installation quality control, and third-party quality assurance oversight is currently being performed on a project by project basis.

8.1.2 HWS Global shall provide DrJ the project's quality control, installation manual, installation quality control, and third-party quality assurance oversight for each construction application.

8.1.3 *Exterior Sheathing:*

8.1.3.1 XPS foam plastic insulation factory adhered to a proprietary laminate on both sides. The panel is attached to CFS structural members a maximum of 24" o.c.

8.1.3.1.1 Sheathing joints shall be butted at framing members and all panel edges shall be blocked.

8.1.3.2 *Fastening:*

8.1.3.2.1 A $^{3}/_{8}$" bead of proprietary construction adhesive is applied along the length of each CFS structural member. The H-SPCFS is adhered to each structural member post-adhesive application.

8.1.3.2.1.1 Adhesive manufacturer instructions shall be followed.

8.1.3.2.2 The exterior sheathing is fastened to CFS structural members with #8 x $^{3}/_{4}$" wafer head self-drilling screws.

8.1.3.2.2.1 Screws are driven through the flanges of the CFS structural members and into the interior side of the H-SPCFS at 24" o.c. along the length of the CFS framing.

8.1.4 *Structural Member:*

8.1.4.1 CFS structural members are listed in **Section 2.2.6** of this report, and shall have the minimum specified properties stated in **Table 1**.

8.1.4.2 *Fastening:*

8.1.4.2.1 A #10 x $^{3}/_{4}$" flat pan head, self-drilling screw shall be installed at each CFS stud and CFS track interface.

8.1.5 *Cavity Insulation:*

8.1.5.1 When desired, any type of cavity insulation may be used.

8.1.5.2 Fastening is per cavity insulation manufacturer instructions.

8.1.6 *Interior Sheathing:*

8.1.6.1 A minimum $^1/_2$" GWB is attached to the interior side of the wall assembly to the CFS members.

8.1.6.2 All GWB panel edges shall be blocked.

8.1.6.3 *Fastening:*

8.1.6.3.1 The GWB is fastened with #6 x $1^1/_4$″ Type S screws at 16″ o.c. spacing around the perimeter and 16″ o.c. in the field. Adhesive can also be applied but is not a requirement.

8.2 *Field Installation of Completed H-SPCFS Component*

8.2.1 The HWS internal quality control, installation manual, installation quality control, and third-party quality assurance oversight is currently being performed on a project by project basis.

8.2.2 HWS shall provide DrJ the project's quality control, installation manual, installation quality control, and third-party quality assurance oversight for each construction application.

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

8.4 In the event of a conflict between the manufacturer installation instructions and this report, contact the manufacturer for counsel on the proper installation method.

9 Substantiating Data

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

9.1.1 Cyclic wall testing in accordance with ASTM E2126

9.1.2 Transverse load testing in accordance with ASTM E330

9.1.3 Pull-off resistance testing in accordance with ASTM C1860

9.1.4 Internal bond strength testing of XPS foam in accordance with ASTM C297

9.1.5 Axial shear resistance of foam in accordance with ASTM E72

9.1.6 Thermal resistance testing in accordance with ASTM C518

9.1.7 Vapor permeance testing in accordance with ASTM E96

9.1.8 Water resistance testing in accordance with ASTM E2556

9.1.9 Surface burning characteristics testing in accordance with ASTM E84/UL 723

9.1.10 Impact resistance testing in accordance with UL 2218 (Hail)

9.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or an RDP. Accuracy of external test data and resulting analysis is relied upon.

9.3 Where applicable, 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.

9.4 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.

9.5 *Testing and Engineering Analysis*

9.5.1 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.[27]

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

10 Findings

10.1 As outlined in **Section 6**, H-SPCFS has performance characteristics that were tested and/or meet applicable regulations. In addition, they are suitable for use pursuant to its specified purpose.

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

10.2.1 Resistance to lateral loads for assemblies used as lateral force resisting systems for wind pressures on building surfaces as described in **Table 2**.

10.2.2 Resistance to transverse loads due to wind and gravity pressures on building surfaces as described in **Table 3**, **Table 4**, and **Table 5**.

10.2.3 Pull-off resistance (i.e., resistance to negative wind loads) in accordance **Table 6**.

10.2.4 Foam shear in accordance with **Table 7**.

10.2.5 Tensile strength for wind suction applied directly to the H-SPCFS as described in **Table 8**.

10.2.6 Thermal resistance as described in **Table 9**.

10.2.7 Use as a Class II or Class III Vapor Retarder as described in **Table 10**.

10.2.8 Use as a Water-Resistive Barrier as described in **Table 11**.

10.2.9 Use as a Class A interior finish material as described in **Table 12**.

10.2.10 Use as an interior finish material, up to 8" thick, without the use of a thermal barrier in accordance with UL1715, A NFPA 13, NFPA 13R, or NFPA 13D as described in **Table 13**. A sprinkler system must be installed.

10.2.11 Impact resistance as described in **Table 14**.

10.2.12 Cladding attachment through 2" H-SPCFS Sheathing as described in **Table 15** and **Table 16**.

10.3 Unless exempt by state statute, when H-SPCFS 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.

10.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from HWS Global.

10.5 IBC Section 104.2.3[28] (IRC Section R104.2.2[29] and IFC Section 104.2.3[30] are similar) in pertinent part state:

> **104.2.3 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, provided that any such alternative is not specifically prohibited by this code and has been approved.

10.6 **Approved:**[31] Building regulations require that the building official shall accept duly authenticated reports.[32]

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

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

10.6.3 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.

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

10.8 Through the IAF Multilateral Arrangement (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.[33]

11 Conditions of Use

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

11.2 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.

11.3 As listed herein, H-SPCFS shall not be used:

11.3.1 As a nail base for claddings, trim, windows, and doors

11.3.2 To resist horizontal loads from concrete and masonry walls

11.4 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:

11.4.1 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.

11.4.2 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.7.2, IBC Section 110.4, IBC Section 1703, IRC Section R104.7.2, and IRC Section R109.2.

11.4.2.1 The HWS internal quality control, installation manual, installation quality control, and third-party quality assurance oversight is currently being performed on a project by project basis.

11.4.2.2 HWS shall provide DrJ the project's quality control, installation manual, installation quality control, and third-party quality assurance oversight for each construction application.

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

11.4.4 This innovative product has an internal quality control program and a third-party quality assurance program.

11.4.5 At a minimum, this innovative product shall be installed per **Section 8**.

11.4.6 The review of this report by the AHJ shall comply with IBC Section 104.2.3.2 and IBC Section 105.3.1.

11.4.7 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.

11.5 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *"the building official shall make, or cause to be made, the necessary tests and investigations; or 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 104.2.3"*, all of IBC Section 104, and IBC Section 105.3.

11.6 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).

11.7 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.

12 Identification

12.1 HWS Sheathing Panel Cold-Formed Steel (H-SPCFS), as 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.

12.2 Additional technical information can be found at www.hwsglobal.com

13 Review Schedule

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

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

Notes

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

2 Capitalized terms and responsibilities are defined pursuant to the applicable building code, applicable reference standards, the latest edition of TPI 1, the NDS, AISI S202, US professional engineering law, Canadian building code, Canada professional engineering law, Qualtim External Appendix A: Definitions/Commentary, Qualtim External Appendix B: Project/Deliverables, Qualtim External Appendix C: Intellectual Property and Trade Secrets, definitions created within Design Drawings and/or definitions within Reference Sheets. Beyond this, terms not defined shall have ordinarily accepted meanings as the context implies. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

3 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1702

4 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/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3

5 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.2:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests

6 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/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.1:~:text=Conformance%20to%20Standards-,The%20design%20strengths%20and%20permissible%20stresses,-of%20any%20structural

7 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20make%2C%20or%20cause%20to%20be%20made%2C%20the%20necessary%20tests%20and%20investigations%3B%20or%20the%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%20104.2.3.

8 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4.2

9 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_agency

10 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_source

11 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.

12 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/

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

14 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.1:~:text=directed%20to%20enforce%20the%20provisions%20of%20this%20code

15 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3 AND https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#105.3.1

16 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

17 https://iaf.nu/en/about-iaf-mla/#:~:text=Once%20an%20accreditation%20body%20is%20a%20signatory%20of%20the%20IAF%20MLA%2C%20it%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

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

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

20 Unless otherwise noted, the links referenced herein use un-amended versions of the 2024 International Code Council (ICC) 2024 International Code Council (ICC) model codes as foundation references. Mississippi versions of the IBC 2024 and the IRC 2024 are un-amended. This material, product, design, service and/or method of construction also complies with the 2000-2012 versions of the referenced codes and the standards referenced therein. As pertinent to this technical and code compliance evaluation, CBI and/or DrJ staff have reviewed any state or local regulatory amendments to assure this report is in compliance.

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

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

23 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#listed AND https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#labeled

24 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4

25 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

26 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

27 See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

28 2021 IBC Section 104.11

29 2021 IRC Section R104.11

[30] 2018: https://up.codes/viewer/wyoming/ifc-2018/chapter/1/scope-and-administration#104.9 AND 2021: https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11

[31] 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 (https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[32] https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

[33] Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.