Listing

A Duly Authenticated Report from an Approved Agency

Report No: 2311-04

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HWS SIS Steel Assembly with GWB

Trade Secret Report Holder:

HWS Global

Phone: 844-497-0866 Website: www.hwsglobal.com

CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 05 23.10 - Adhesives

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 SIS Steel CFS Assembly with Interior Gypsum Wallboard (H-SIS-SAG)

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 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 the building official is authorized and directed to enforce.

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**.

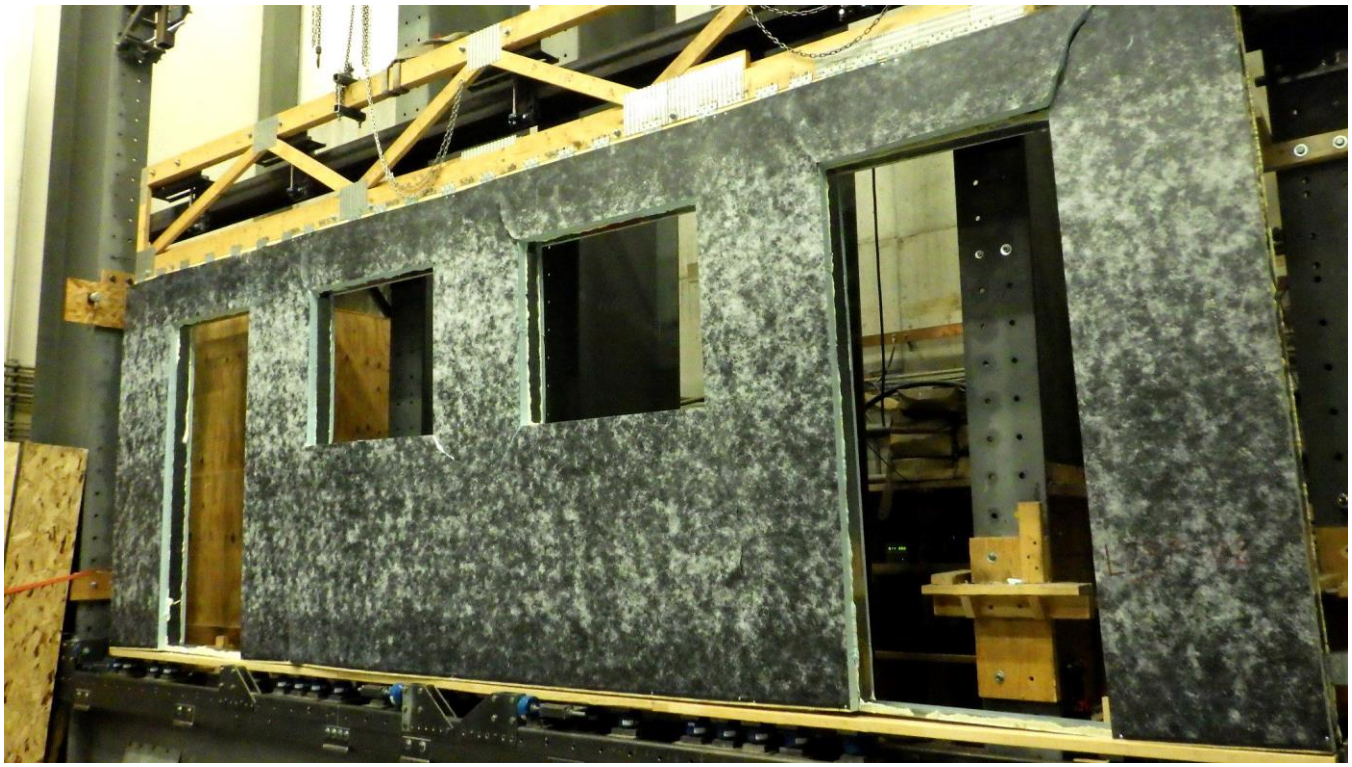


Figure 1. H-SIS-SAG Assembly with Interior GWB – Wall Application

2.2 *Assembly Overview*

2.2.1 H-SIS-SAG 2″ Exterior Sheathing Panel: $^{1}/_{8}$" H-SIS-SAG laminate adhered to a minimum 2" proprietary XPS foam sheathing with a proprietary low VOC, urethane adhesive.

2.2.2 H-SIS-SAG Interior Sheathing Panel: minimum $^{1}/_{2}$" gypsum wallboard complying with ASTM C1396.

2.3 H-SIS-SAG is described in **Table 1** and **Table 2**:

Table 1. Description of H-SIS-SAG

Product	Component(s)	Description	Specifications	Connection
H-SIS-SAG Exterior Sheathing	H-SIS-SAG Laminate	Proprietary carbon-based laminate	1/8" thick laminate with a minimum tensile[1] strength of 12,000 psi.[1]	H-SIS-SAG exterior sheathing is fastened to structural members with one #8 x 3" truss head self-drilling screw at each exterior sheathing panel corner. Additionally, proprietary polyurethane foam construction adhesive is applied along the length of all structural members to achieve full coverage of structural members after application of the H-SIS-SAG exterior sheathing per HWS assembly instructions and quality control.
	Foam	Proprietary extruded polystyrene (XPS) foam sheathing	2" thick XPS (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	
H-SIS-SAG Structural Framing Member	Cold-Formed Steel (CFS) C-Channels	Cold-formed steel C-channel (CFS-C) commodity framing members	Minimum steel properties per thickness: 18 mil- 70 ksi F_y, 33 mil- 33 ksi F_y.	Structural members are assembled using minimum #8 x 1 5/8" truss head self-drilling screws per HWS assembly instructions and quality control.
H-SIS-SAG Interior Sheathing	Gypsum Wallboard	Gypsum wallboard complying with ASTM C1396	Minimum 1/2" thickness	GWB fastened to structural members with #6 x 1 1/4" Type S screws 16' o.c. at panel edges and 16" o.c. in the field (16:16)

SI: 1 in = 25.4 mm, 1 psi = 6.895 kPa, 1 pcf = 16.02 kg/m^3

1. Per ASTM D638

Table 2. H-SIS-SAG Assembly Details

Product	Assembly Details		
	Exterior Sub-Assembly	Structural Framing Member	Interior Sheathing[1]
7" H-SIS-SAG-G	2" H-SIS-SAG Exterior Sheathing	Thickness: 18 mil Web: 3 5/8", Flange: 1 1/4" F_y: 70 ksi	1/2" GWB
9" H-SIS-SAG-1G	2" H-SIS-SAG Exterior Sheathing	Thickness: 18 mil Web: 6", Flange: 1 1/4" F_y: 70 ksi	1/2" GWB
9" H-SIS-SAG-2G	2" H-SIS-SAG Exterior Sheathing	Thickness: 33 mil Web: 6", Flange: 1 5/8" F_y: 33 ksi	1/2" GWB
11" H-SIS-SAG-G	2" H-SIS-SAG Exterior Sheathing	Thickness: 33 mil Web: 8", Flange: 1 5/8" F_y: 33 ksi	1/2" GWB
13" H-SIS-SAG-G	2" H-SIS-SAG Exterior Sheathing	Thickness: 33 mil Web: 10", Flange: 1 5/8" F_y: 33 ksi	1/2" GWB

1. Listed sheathing thicknesses are minimums. Thicker GWB sheathing is permitted.

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

2.4.1 **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

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 that are written by an approved agency[8] and/or an approved source.[9]

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).[10]

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.[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 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. 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.[16] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[17] 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.[18]

4 Applicable Regulations and Standards for the Listing[19]

4.1 *Local, State, and Federal*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which include the following featured local jurisdictions and are not limited to: 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 the following featured states and are not limited to: 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[20] and Part 3280[21] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.2 *Standards*

4.2.1 *AISI S100: North American Specification for the Design of Cold-Formed Steel Structural Members*

4.2.2 *AISI S230: Standard for Cold-Formed Steel Framing – Prescriptive Method for One- and Two-Family Dwellings*

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

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

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

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

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

4.2.8 *ASTM C1396: Standard Specification for Gypsum Board*

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

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

4.2.11 *ASTM D882: Standard Test Method for Tensile Properties of Thin Plastic Sheeting*

4.2.12 *ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics*

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

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

4.2.15 *ASTM E96: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials*

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

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

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

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

4.2.20 *NFPA 13 Standard for the Installation of Sprinkler Systems*

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

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

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

4.2.24 *UL 1715: Fire Test of Interior Finish Material*

4.2.25 *UL 2218: Impact Resistance of Prepared Roof Covering Materials.*

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

4.3.4 *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[22]

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-SIS-SAG 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 and seismic) 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 to provide resistance to axial loads for wall assemblies.

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

6.2 *Structural Applications*

6.2.1 Except as otherwise described in this Listing, H-SIS-SAG 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 and seismic loading for use with the IBC and IRC performance-based provisions for light-frame steel wall assemblies:

6.2.2.1 For wind and seismic 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-SIS-SAG 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 board.

6.3 *Prescriptive Wall Applications in accordance with AISI S230*

6.3.1 Detached one and two-family dwellings and townhouses less than or equal to three stories above grade plane, shall be permitted to be constructed in accordance with AISI S230 and subject to the limitations therein.

6.3.2 *Prescriptive Wall Bracing for H-SIS-SAG – Wind <140 mph (Exposure B) and Seismic Design Category A, B or C:*

6.3.2.1 For wind and seismic design, the required minimum length of full-height wall panels on each braced wall line shall be as shown in:

6.3.2.1.1 **Table 5** through **Table 8** for H-SIS-SAG assemblies with for wind design

6.3.2.1.2 **Table 9** through **Table 12** for H-SIS-SAG assemblies for seismic design

6.3.2.1.3 These tables shall be used in place of Table E8-1(1) through Table E8-2(2) in AISI S230.

6.3.2.2 The greater of wind or seismic bracing shall control the minimum length of bracing required.

6.3.2.2.1 The minimum length of full-height wall panels shall not be less than twenty percent (20%) of the braced wall line after all applicable adjustments.

6.3.2.2.2 Where the minimum required length of bracing exceeds the available length of braced wall panels in a braced wall line, a design shall be required.

6.3.2.2.3 Full-height braced wall panels shall have a minimum length of 4′ as measured along a braced wall line with height not exceeding 10′.

6.3.2.2.4 Segments of a braced wall line with full-height wall panels less than 4′ in length shall be permitted, but not counted towards meeting the minimum required bracing length.

6.3.2.3 *General Notes for **Table 5** through **Table 8**:*

6.3.2.3.1 Values are based on a mean roof height of 30′ and wall height in all stories of 10′. For walls 9′ or less, multiply braced wall lengths by 0.95.

6.3.2.3.2 Interpolation between braced wall line spacing is permitted.

6.3.2.3.3 For a mean roof height other than 30′ and site wind exposure other than Wind Exposure B, multiply the values in the table by the applicable adjustment factors shown in **Table 3**.

Table 3. Adjustment Factors based on Exposure and mean Roof Height

Mean Roof Height (ft)	Exposure		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
33	1.03	1.43	1.69

6.3.2.3.4 For a roof eave-to-ridge height other than 10′, multiply the values in the table by the applicable adjustment factors shown in **Table 4**.

Table 4. Adjustment Factors Based on Roof Eave-to-Ridge Height and Location

Stories Above Braced Wall Line	Roof Eave-to-Ridge Height			
	< 5 ft	10 ft	15 ft	20 ft
Roof Only	0.80	1.00	1.30	1.60
Roof Plus One Story	0.90	1.00	1.20	1.30
Roof Plus Two Stories	0.95	1.00	1.10	1.20

Table 5. Minimum Length of Full-Height Wall Segments using H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – Wind

Stories Above Braced Wall Line	Roof Pitch	Braced Wall Line Spacing (ft)	Basic Wind Speed (mph), Exposure B			
			115	120	130	<140
Roof Only	≤ 6:12	10	10	10	12	14
		20	17	19	23	26
		40	31	35	40	43
		60	43	47	54	59
	> 6:12	10	14	14	17	19
		20	24	26	29	33
		40	40	43	50	55
		60	55	59	66	73
Roof Plus One Story	≤ 6:12	10	23	26	29	33
		20	38	42	47	54
		40	61	66	73	81
		60	80	85	94	102
	> 6:12	10	24	26	29	35
		20	42	45	50	57
		40	68	71	80	87
		60	87	90	101	109
Roof Plus Two Story	≤ 6:12	10	35	38	43	49
		20	55	59	68	75
		40	83	88	97	106
		60	104	109	118	127
	> 6:12	10	35	36	42	47
		20	57	61	68	75
		40	87	92	101	109
		60	107	113	123	130
SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h						

Table 6. Minimum Length of Full-Height Wall Segments using H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – Wind

Stories Above Braced Wall Line	Roof Pitch	Braced Wall Line Spacing (ft)	Basic Wind Speed (mph), Exposure B			
			115	120	130	<140
Roof Only	≤ 6:12	10	11	11	13	15
		20	19	21	25	29
		40	34	38	44	48
		60	48	52	59	65
	> 6:12	10	15	15	19	21
		20	27	29	33	36
		40	44	48	56	61
		60	61	65	73	80
Roof Plus One Story	≤ 6:12	10	25	29	33	36
		20	42	46	52	59
		40	67	73	80	90
		60	88	94	103	113
	> 6:12	10	27	29	33	38
		20	46	50	56	63
		40	75	79	88	96
		60	96	100	111	121
Roof Plus Two Story	≤ 6:12	10	38	42	48	54
		20	61	65	75	82
		40	92	98	107	117
		60	115	121	130	140
	> 6:12	10	38	40	46	52
		20	63	67	75	82
		40	96	102	111	121
		60	119	125	136	144
SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h						

Table 7. Minimum Length of Full-Height Wall Segments using H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – Wind

Stories Above Braced Wall Line	Roof Pitch	Braced Wall Line Spacing (ft)	Basic Wind Speed (mph), Exposure B			
			115	120	130	<140
Roof Only	≤ 6:12	10	9	9	10	12
		20	15	16	19	22
		40	26	29	33	36
		60	36	39	45	50
	> 6:12	10	12	12	15	16
		20	20	22	25	28
		40	33	36	42	47
		60	47	50	55	61
Roof Plus One Story	≤ 6:12	10	19	22	25	28
		20	32	35	39	45
		40	51	55	61	68
		60	67	71	79	86
	> 6:12	10	20	22	25	29
		20	35	38	42	48
		40	57	60	67	73
		60	73	76	84	92
Roof Plus Two Story	≤ 6:12	10	29	32	36	41
		20	47	50	57	63
		40	70	74	82	89
		60	87	92	99	106
	> 6:12	10	29	31	35	39
		20	48	51	57	63
		40	73	77	84	92
		60	90	95	103	109
SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h						

Table 8. Minimum Length of Full-Height Wall Segments using H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – Wind

Stories Above Braced Wall Line	Roof Pitch	Braced Wall Line Spacing (ft)	Basic Wind Speed (mph), Exposure B			
			115	120	130	<140
Roof Only	≤ 6:12	10	9	9	11	13
		20	16	17	21	24
		40	28	32	36	40
		60	40	43	49	54
	> 6:12	10	13	13	16	17
		20	22	24	27	30
		40	36	40	46	51
		60	51	54	60	66
Roof Plus One Story	≤ 6:12	10	21	24	27	30
		20	35	38	43	49
		40	55	60	66	74
		60	73	78	85	93
	> 6:12	10	22	24	27	32
		20	38	41	46	52
		40	62	65	73	79
		60	79	82	92	100
Roof Plus Two Story	≤ 6:12	10	32	35	40	44
		20	51	54	62	68
		40	76	81	89	97
		60	95	100	108	116
	> 6:12	10	32	33	38	43
		20	52	55	62	68
		40	79	84	92	100
		60	98	103	112	119
SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h						

6.3.2.4 *General Notes for **Table 9** through **Table 12**:*

6.3.2.4.1 Bracing amounts apply to a maximum floor-to-ceiling height of 10′ on all stories, a 10-psf exterior wall dead load, a 10-psf floor dead load, a 12-psf roof/ceiling dead load, and 30-psf or less ground snow load.

6.3.2.4.2 Interpolation between braced wall line spacing is permitted.

6.3.2.4.3 Values may be multiplied by an adjustment factor of 0.7 where a hold-down anchor with an ASD capacity of 4,300 lbs is provided at each end of a braced wall line.

6.3.2.4.4 A single hold-down anchor is permitted to restrain two perpendicular braced wall lines at building corners provided the corner be fastened together to transfer the overturning force.

Table 9. Minimum Length of Full-Height Wall Segments using H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – Seismic SDC C

Stories Above Braced Wall Line	Braced Wall Line Spacing (ft)	Minimum Percentage of Full-Height Panels (%)	
		Seismic Design Category C	Seismic Design Category C with Maximum Ground Snow Load, 70-psf
Roof & Ceiling Only	10	9	14
	20	16	23
	40	26	38
	60	35	52
One Story, Roof & Ceiling	10	24	28
	20	36	42
	40	55	68
	60	73	87
Two Stories, Roof & Ceiling	10	40	43
	20	55	62
	40	83	92
	60	106	116
SI: 1 ft = 0.305 m, 1 psf = 0.048 kPa			

Table 10. Minimum Length of Full-Height Wall Segments using H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – Seismic SDC C

Stories Above Braced Wall Line	Braced Wall Line Spacing (ft)	Minimum Percentage of Full-Height Panels (%)	
		Seismic Design Category C	Seismic Design Category C with Maximum Ground Snow Load, 70-psf
Roof & Ceiling Only	10	10	15
	20	17	25
	40	29	42
	60	38	57
One Story, Roof & Ceiling	10	27	31
	20	40	46
	40	61	75
	60	80	96
Two Stories, Roof & Ceiling	10	44	48
	20	61	69
	40	92	102
	60	117	128
SI: 1 ft = 0.305 m, 1 psf = 0.048 kPa			

Table 11. Minimum Length of Full-Height Wall Segments using H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – Seismic SDC C

Stories Above Braced Wall Line	Braced Wall Line Spacing (ft)	Minimum Percentage of Full-Height Panels (%)	
		Seismic Design Category C	Seismic Design Category C with Maximum Ground Snow Load, 70-psf
Roof & Ceiling Only	10	7	12
	20	13	19
	40	22	32
	60	29	44
One Story, Roof & Ceiling	10	20	23
	20	31	35
	40	47	57
	60	61	73
Two Stories, Roof & Ceiling	10	33	36
	20	47	52
	40	70	77
	60	89	98
SI: 1 ft = 0.305 m, 1 psf = 0.048 kPa			

Table 12. Minimum Length of Full-Height Wall Segments using H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – Seismic SDC C

Stories Above Braced Wall Line	Braced Wall Line Spacing (ft)	Minimum Percentage of Full-Height Panels (%)	
		Seismic Design Category C	Seismic Design Category C with Maximum Ground Snow Load, 70-psf
Roof & Ceiling Only	10	8	13
	20	14	21
	40	24	35
	60	32	47
One Story, Roof & Ceiling	10	22	25
	20	33	38
	40	51	62
	60	66	79
Two Stories, Roof & Ceiling	10	36	40
	20	51	57
	40	76	84
	60	97	106
SI: 1 ft = 0.305 m, 1 psf = 0.048 kPa			

6.3.3 *Prescriptive Wall Bracing with H-SIS-SAG – High Wind Areas:*

6.3.3.1 For wind design in high wind areas, the required minimum length of full-height wall panels on building sidewall and building end-wall shall be as shown in:

6.3.3.1.1 **Table 13** through **Table 16** for H-SIS-SAG assembled with 18 mil CFS members.

6.3.3.1.2 **Table 17** through **Table 20** for H-SIS-SAG assembled with 33 mil CFS structural members.

6.3.3.1.3 These tables shall be used in place of Table E13-3 and Table E13-4 in AISI S230.

6.3.3.1.4 Values are based on 8′ wall heights.

6.3.3.1.4.1 For 9′ wall heights, the tabulated values shall be multiplied by 1.13.

6.3.3.1.4.2 For 10′ wall heights, the tabulated values shall be multiplied by 1.25.

6.3.3.1.5 For mean roof heights of 15′ or less, the tabulated values are permitted to be multiplied by 0.80.

Table 13. Minimum Length of Full-Height Wall Segments on Building Sidewall using H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – Wind

Wind Category		**Wind Speed (mph)**				
Exposure B		**160**	**170**	**180**	**-**	
Exposure C		**140**	**150**	**160**	**170**	**180**
Braced Wall Supporting	**End-Wall Length, W (ft)**	**Minimum Length of Full-Height Wall Panels on Building Sidewall, L (ft)**				
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	12	11	11	11	11	11
	16	11	11	11	11	14
	20	11	11	14	16	16
	24	11	14	16	18	20
	28	14	16	18	20	23
	32	14	18	20	23	27
	36	16	20	23	27	27
	40	18	23	25	29	32
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	20	18	23	25	29	32
	24	23	27	32	34	38
	28	25	32	36	38	45
	32	29	34	41	45	52
	36	34	38	45	52	59
	40	36	43	52	56	65
Two Floors and Roof/Ceiling (Lower Story of a Three-Story Building)	20	27	34	38	43	50
	24	34	38	45	52	59
	28	38	45	54	61	70
	32	45	52	59	70	77
	36	50	59	68	79	88
	40	54	65	74	86	97
SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h						

Table 14. Minimum Length of Full-Height Wall Segments on Building End-Wall using H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – Wind

Wind Category		Wind Speed (mph)				
Exposure B		160	170	180	-	
Exposure C		140	150	160	170	180
Braced Wall Supporting	Sidewall Length, W (ft)	Minimum Length of Full-Height Sheathing on Building End-Wall, L (ft)				
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	12	11	11	11	11	11
	16	11	11	11	11	11
	20	11	11	11	14	16
	24	11	11	14	16	18
	28	11	14	16	18	20
	32	14	16	18	20	25
	36	14	18	20	23	27
	40	16	20	23	27	27
	50	20	25	27	32	36
	60	25	29	34	36	43
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	20	20	25	29	34	36
	24	25	29	34	36	43
	28	29	34	41	43	50
	32	32	38	45	50	59
	36	36	43	52	56	65
	40	41	47	56	63	70
	50	50	61	68	79	92
	60	61	72	83	95	108
Two Floors and Roof/Ceiling (Lower Story of a Three-Story Building)	20	34	41	47	52	59
	24	41	47	56	63	70
	28	47	56	63	72	81
	32	54	63	72	81	95
	36	61	72	81	92	106
	40	68	79	90	104	117
	50	83	99	115	131	149
	60	99	119	137	155	176

SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h

Table 15. Minimum Length of Full-Height Wall Segments on Building Sidewall using H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – Wind

Wind Category		Wind Speed (mph)				
Exposure B		160	170	180	-	
Exposure C		140	150	160	170	180
Braced Wall Supporting	End-Wall Length, W (ft)	Minimum Length of Full-Height Wall Panels on Building Sidewall, L (ft)				
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	12	12	12	12	12	12
	16	12	12	12	12	15
	20	12	12	15	17	17
	24	12	15	17	20	22
	28	15	17	20	22	25
	32	15	20	22	25	30
	36	17	22	25	30	30
	40	20	25	27	32	35
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	20	20	25	27	32	35
	24	25	30	35	37	42
	28	27	35	40	42	50
	32	32	37	45	50	57
	36	37	42	50	57	65
	40	40	47	57	62	72
Two Floors and Roof/Ceiling (Lower Story of a Three-Story Building)	20	30	37	42	47	55
	24	37	42	50	57	65
	28	42	50	60	67	77
	32	50	57	65	77	85
	36	55	65	75	87	97
	40	60	72	82	95	107
SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h						

Table 16. Minimum Length of Full-Height Wall Segments on Building End-Wall using H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – Wind

Wind Category		Wind Speed (mph)				
Exposure B		160	170	180	-	
Exposure C		140	150	160	170	180
Braced Wall Supporting	Sidewall Length, W (ft)	Minimum Length of Full-Height Sheathing on Building End-Wall, L (ft)				
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	12	12	12	12	12	12
	16	12	12	12	12	12
	20	12	12	12	15	17
	24	12	12	15	17	20
	28	12	15	17	20	22
	32	15	17	20	22	27
	36	15	20	22	25	30
	40	17	22	25	30	30
	50	22	27	30	35	40
	60	27	32	37	40	47
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	20	22	27	32	37	40
	24	27	32	37	40	47
	28	32	37	45	47	55
	32	35	42	50	55	65
	36	40	47	57	62	72
	40	45	52	62	70	77
	50	55	67	75	87	102
	60	67	80	92	105	119
Two Floors and Roof/Ceiling (Lower Story of a Three-Story Building)	20	37	45	52	57	65
	24	45	52	62	70	77
	28	52	62	70	80	90
	32	60	70	80	90	105
	36	67	80	90	102	117
	40	75	87	100	115	129
	50	92	110	127	144	164
	60	110	132	152	172	194

SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h

Table 17. Minimum Length of Full-Height Wall Segments on Building Sidewall using H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – Wind

Wind Category		Wind Speed (mph)				
Exposure B		160	170	180	-	
Exposure C		140	150	160	170	180
Braced Wall Supporting	End-Wall Length, W (ft)	Minimum Length of Full-Height Wall Panels on Building Sidewall, L (ft)				
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	12	9	9	9	9	9
	16	9	9	9	9	11
	20	9	9	11	13	13
	24	9	11	13	15	17
	28	11	13	15	17	19
	32	11	15	17	19	23
	36	13	17	19	23	23
	40	15	19	21	25	26
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	20	15	19	21	25	26
	24	19	23	26	28	32
	28	21	26	30	32	38
	32	25	28	34	38	44
	36	28	32	38	44	49
	40	30	36	44	47	55
Two Floors and Roof/Ceiling (Lower Story of a Three-Story Building)	20	23	28	32	36	42
	24	28	32	38	44	49
	28	32	38	45	51	59
	32	38	44	49	59	64
	36	42	49	57	66	74
	40	45	55	62	72	81
SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h						

Table 18. Minimum Length of Full-Height Wall Segments on Building End-Wall using H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – Wind

Wind Category		Wind Speed (mph)				
Exposure B		160	170	180	-	
Exposure C		140	150	160	170	180
Braced Wall Supporting	Sidewall Length, W (ft)	Minimum Length of Full-Height Wall Panels on Building End-Wall, L (ft)				
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	12	9	9	9	9	9
	16	9	9	9	9	9
	20	9	9	9	11	13
	24	9	9	11	13	15
	28	9	11	13	15	17
	32	11	13	15	17	21
	36	11	15	17	19	23
	40	13	17	19	23	23
	50	17	21	23	26	30
	60	21	25	28	30	36
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	20	17	21	25	28	30
	24	21	25	28	30	36
	28	25	28	34	36	42
	32	26	32	38	42	49
	36	30	36	44	47	55
	40	34	40	47	53	59
	50	42	51	57	66	78
	60	51	61	70	79	91
Two Floors and Roof/Ceiling (Lower Story of a Three-Story Building)	20	28	34	40	44	49
	24	34	40	47	53	59
	28	40	47	53	61	68
	32	45	53	61	68	79
	36	51	61	68	78	89
	40	57	66	76	87	98
	50	70	83	96	110	125
	60	83	100	115	131	148

SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h

Table 19. Minimum Length of Full-Height Wall Segments on Building Sidewall using H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – Wind

Wind Category		Wind Speed (mph)				
Exposure B		160	170	180	-	
Exposure C		140	150	160	170	180
Braced Wall Supporting	End-Wall Length, W (ft)	Minimum Length of Full-Height Wall Panels on Building Sidewall, L (ft)				
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	12	10	10	10	10	10
	16	10	10	10	10	12
	20	10	10	12	14	14
	24	10	12	14	16	19
	28	12	14	16	19	21
	32	12	16	19	21	25
	36	14	19	21	25	25
	40	16	21	23	27	29
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	20	16	21	23	27	29
	24	21	25	29	31	35
	28	23	29	33	35	41
	32	27	31	37	41	47
	36	31	35	41	47	53
	40	33	39	47	51	60
Two Floors and Roof/Ceiling (Lower Story of a Three-Story Building)	20	25	31	35	39	45
	24	31	35	41	47	53
	28	35	41	49	56	64
	32	41	47	53	64	70
	36	45	53	62	72	80
	40	49	60	68	78	88
SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h						

Table 20. Minimum Length of Full-Height Wall Segments on Building End-Wall using H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – Wind

Wind Category		Wind Speed (mph)				
Exposure B		160	170	180	-	
Exposure C		140	150	160	170	180
Braced Wall Supporting	Sidewall Length, W (ft)	Minimum Length of Full-Height Wall Panels on Building End-Wall, L (ft)				
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	12	10	10	10	10	10
	16	10	10	10	10	10
	20	10	10	10	12	14
	24	10	10	12	14	16
	28	10	12	14	16	19
	32	12	14	16	19	23
	36	12	16	19	21	25
	40	14	19	21	25	25
	50	19	23	25	29	33
	60	23	27	31	33	39
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	20	19	23	27	31	33
	24	23	27	31	33	39
	28	27	31	37	39	45
	32	29	35	41	45	53
	36	33	39	47	51	60
	40	37	43	51	58	64
	50	45	56	62	72	84
	60	56	66	76	86	99
Two Floors and Roof/Ceiling (Lower Story of a Three-Story Building)	20	31	37	43	47	53
	24	37	43	51	58	64
	28	43	51	58	66	74
	32	49	58	66	74	86
	36	56	66	74	84	97
	40	62	72	82	95	107
	50	76	90	105	119	136
	60	90	109	125	142	160

SI: 1 ft = 0.305 m, 1 mph = 1.61 km/h

6.3.4 *Prescriptive Wall Bracing for H-SIS-SAG – High Seismic Areas:*

6.3.4.1 For seismic design in high seismic areas, the required length for H-SIS-SAG braced wall panels shall be determined from:

6.3.4.1.1 **Table 22** through **Table 27** for H-SIS-SAG assembled with 18 mil CFS members.

6.3.4.1.2 **Table 28** through **Table 33** for H-SIS-SAG assembled with 33 mil CFS members.

6.3.4.2 The diaphragm span is the dimension of the diaphragm perpendicular to the walls under consideration.

6.3.4.3 These tables shall be used in place of Table E12-1 through Table E12-15 in AISI S230 for Type I shear walls.

6.3.4.4 Minimum total length of braced wall panels shall be the tabulated percentage value found in the Tables multiplied by the braced wall line length.

6.3.4.5 Linear interpolation is permitted.

6.3.4.6 The required length of braced wall panels shall be increased by the length adjustment factors shown in **Table 21** where the dead weight of the roof/ceiling assembly is greater than 15-psf and meets the criteria for heavyweight roof/ceiling assembly.

6.3.4.6.1 A roof/ceiling dead load of 12-psf maximum total load is considered lightweight roof assembly.

6.3.4.6.2 A roof/ceiling dead load of 15-psf maximum total load is considered normal-weight roof assembly.

6.3.4.6.3 A roof/ceiling dead load of 25-psf maximum total load is considered heavyweight roof assembly.

6.3.4.7 The required length of braced wall panels is permitted to be adjusted by the length adjustment factors in **Table 21** where the average weight of the roof/ceiling assembly meets the criteria for a lightweight roof/ceiling, or the exterior walls meet the criteria for lightweight exterior walls.

6.3.4.7.1 A wall dead load of 7-psf maximum total load is considered lightweight roof assembly.

6.3.4.7.2 A wall dead load of 14-psf maximum total load is considered heavyweight roof assembly.

6.3.4.8 Linear interpolation is permitted for roof/ceiling dead unit weights between 15-psf and 25-psf.

Table 21. Braced Wall Full-Height Wall Panel Length Adjustment Factors for Roof and Exterior Wall System Weights

Story Location	Light-weight Roof/Ceiling Assembly	Light-weight Exterior Walls	Buildings Having both Light-Weight Walls and Roofs	Light-weight Exterior Walls and Heavy Roof/Ceiling Assembly	Heavy-weight Roof/Ceiling Assembly
Roof/Ceiling Only (One-Story Building or Top Story of a Two-Story or Three-Story Building)	0.91	0.90	0.78	1.25	1.35
One Floor and Roof/Ceiling (Lower Story of a Two-Story Building or Middle Story of a Three-Story Building)	0.95	0.86	0.78	1.10	1.25

Table 22. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	17	19	24	29	35	42
	0.50	17	21	26	31	36	42
	0.75	19	23	28	33	38	43
	1.00	21	24	29	33	40	43
	1.25	-	24	31	35	42	45
	1.50	-	-	31	36	43	47
	1.75	-	-	33	38	43	49
	2.00	-	-	33	40	43	50
	2.25	-	-	-	42	45	52
	2.50	-	-	-	43	47	52
	2.75	-	-	-	43	49	54
	3.00	-	-	-	-	50	55
	3.25	-	-	-	-	52	55
	3.50	-	-	-	-	-	57
	3.75	-	-	-	-	-	59
	4.00	-	-	-	-	-	61
Bottom of Two-Story Building	0.25	24	26	33	42	49	55
	0.50	26	29	36	43	52	57
	0.75	28	33	40	45	52	61
	1.00	31	35	42	49	55	62
	1.25	-	36	43	52	59	64
	1.50	-	-	47	54	61	68
	1.75	-	-	49	55	62	71
	2.00	-	-	52	59	66	71
	2.25	-	-	-	62	68	75
	2.50	-	-	-	62	71	78
	2.75	-	-	-	66	73	81
	3.00	-	-	-	-	75	81
	3.25	-	-	-	-	78	85
	3.50	-	-	-	-	-	88
	3.75	-	-	-	-	-	90
	4.00	-	-	-	-	-	92

Table 22. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	19	23	28	35	42	47
	0.50	21	24	29	36	43	49
	0.75	23	24	33	38	43	50
	1.00	24	26	33	40	45	52
	1.25	-	29	35	42	47	52
	1.50	-	-	36	43	49	54
	1.75	-	-	38	43	50	55
	2.00	-	-	40	45	52	57
	2.25	-	-	-	47	52	59
	2.50	-	-	-	49	54	61
	2.75	-	-	-	50	55	62
	3.00	-	-	-	-	57	62
	3.25	-	-	-	-	59	64
	3.50	-	-	-	-	-	66
	3.75	-	-	-	-	-	68
	4.00	-	-	-	-	-	69
Middle of Three-Story Building	0.25	29	33	43	52	61	69
	0.50	33	36	45	54	62	71
	0.75	35	40	49	57	66	75
	1.00	38	43	52	61	69	78
	1.25	-	47	55	64	73	81
	1.50	-	-	59	68	76	85
	1.75	-	-	62	71	80	88
	2.00	-	-	64	73	81	90
	2.25	-	-	-	76	85	94
	2.50	-	-	-	80	88	97
	2.75	-	-	-	81	90	101
	3.00	-	-	-	-	94	102
	3.25	-	-	-	-	97	106
	3.50	-	-	-	-	-	109
	3.75	-	-	-	-	-	113
	4.00	-	-	-	-	-	116

Table 22. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	35	40	50	61	71	81
	0.50	40	43	54	64	75	85
	0.75	43	49	59	69	80	90
	1.00	47	52	62	73	81	92
	1.25	-	57	66	76	87	97
	1.50	-	-	71	81	90	101
	1.75	-	-	75	85	95	106
	2.00	-	-	80	90	101	109
	2.25	-	-	-	94	104	114
	2.50	-	-	-	99	109	120
	2.75	-	-	-	102	111	121
	3.00	-	-	-	-	116	127
	3.25	-	-	-	-	120	130
	3.50	-	-	-	-	-	135
	3.75	-	-	-	-	-	139
	4.00	-	-	-	-	-	144

SI: 1 ft = 0.305 m

Table 23. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	21	24	31	36	43	50
	0.50	23	26	33	38	45	52
	0.75	24	28	33	42	47	52
	1.00	26	29	35	43	49	55
	1.25	-	31	36	43	50	57
	1.50	-	-	40	45	52	59
	1.75	-	-	42	47	52	61
	2.00	-	-	43	49	55	62
	2.25	-	-	-	50	57	62
	2.50	-	-	-	52	59	64
	2.75	-	-	-	54	61	66
	3.00	-	-	-	-	62	69
	3.25	-	-	-	-	62	71
	3.50	-	-	-	-	-	71
	3.75	-	-	-	-	-	73
	4.00	-	-	-	-	-	75
Bottom of Two-Story Building	0.25	29	33	43	52	61	69
	0.50	33	36	45	54	62	71
	0.75	35	40	49	57	66	75
	1.00	38	43	52	61	69	78
	1.25	-	45	54	62	71	81
	1.50	-	-	57	66	75	83
	1.75	-	-	61	69	78	87
	2.00	-	-	64	71	81	90
	2.25	-	-	-	76	83	92
	2.50	-	-	-	80	88	97
	2.75	-	-	-	81	90	101
	3.00	-	-	-	-	94	102
	3.25	-	-	-	-	97	106
	3.50	-	-	-	-	-	109
	3.75	-	-	-	-	-	111
	4.00	-	-	-	-	-	114

Table 23. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	24	28	35	43	50	57
	0.50	26	29	36	43	52	61
	0.75	28	33	40	47	54	62
	1.00	29	33	42	49	55	62
	1.25	-	35	43	50	57	64
	1.50	-	-	45	52	61	68
	1.75	-	-	47	54	62	69
	2.00	-	-	49	55	62	71
	2.25	-	-	-	57	66	73
	2.50	-	-	-	61	68	75
	2.75	-	-	-	62	69	76
	3.00	-	-	-	-	71	78
	3.25	-	-	-	-	73	81
	3.50	-	-	-	-	-	81
	3.75	-	-	-	-	-	83
	4.00	-	-	-	-	-	87
Middle of Three-Story Building	0.25	36	43	52	62	75	85
	0.50	42	45	57	68	78	90
	0.75	43	50	61	71	81	94
	1.00	49	52	64	75	87	97
	1.25	-	57	69	80	90	101
	1.50	-	-	71	83	94	104
	1.75	-	-	76	87	99	109
	2.00	-	-	80	90	101	113
	2.25	-	-	-	94	106	116
	2.50	-	-	-	99	109	120
	2.75	-	-	-	102	113	125
	3.00	-	-	-	-	118	128
	3.25	-	-	-	-	120	132
	3.50	-	-	-	-	-	135
	3.75	-	-	-	-	-	139
	4.00	-	-	-	-	-	144

Table 23. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	43	50	62	75	87	101
	0.50	49	54	68	80	92	104
	0.75	52	61	71	85	97	109
	1.00	59	64	78	90	102	116
	1.25	-	71	81	95	107	120
	1.50	-	-	88	101	113	127
	1.75	-	-	92	106	120	130
	2.00	-	-	99	111	123	137
	2.25	-	-	-	116	128	140
	2.50	-	-	-	121	133	147
	2.75	-	-	-	127	139	151
	3.00	-	-	-	-	144	158
	3.25	-	-	-	-	149	161
	3.50	-	-	-	-	-	166
	3.75	-	-	-	-	-	172
	4.00	-	-	-	-	-	177

SI: 1 ft = 0.305 m

Table 24. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	33	36	47	55	66	75
	0.50	33	40	49	59	68	78
	0.75	36	42	52	62	71	81
	1.00	40	43	54	62	73	81
	1.25	-	47	55	66	76	85
	1.50	-	-	59	69	78	88
	1.75	-	-	62	71	81	90
	2.00	-	-	62	73	83	92
	2.25	-	-	-	76	85	95
	2.50	-	-	-	78	88	99
	2.75	-	-	-	81	90	101
	3.00	-	-	-	-	92	102
	3.25	-	-	-	-	95	106
	3.50	-	-	-	-	-	107
	3.75	-	-	-	-	-	109
	4.00	-	-	-	-	-	113
Bottom of Two-Story Building	0.25	43	50	62	76	90	102
	0.50	49	55	69	81	94	107
	0.75	52	61	73	87	101	113
	1.00	57	64	78	90	104	118
	1.25	-	69	81	95	109	121
	1.50	-	-	87	101	113	127
	1.75	-	-	90	104	118	130
	2.00	-	-	97	109	121	135
	2.25	-	-	-	114	128	139
	2.50	-	-	-	120	132	146
	2.75	-	-	-	123	137	149
	3.00	-	-	-	-	139	154
	3.25	-	-	-	-	146	159
	3.50	-	-	-	-	-	163
	3.75	-	-	-	-	-	166
	4.00	-	-	-	-	-	173

Table 24. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	36	43	52	64	75	87
	0.50	40	45	55	68	78	90
	0.75	43	49	59	71	81	92
	1.00	45	50	62	73	83	95
	1.25	-	52	64	76	87	99
	1.50	-	-	68	80	90	101
	1.75	-	-	71	81	92	104
	2.00	-	-	73	85	95	107
	2.25	-	-	-	87	99	92
	2.50	-	-	-	90	101	113
	2.75	-	-	-	92	104	116
	3.00	-	-	-	-	107	120
	3.25	-	-	-	-	109	120
	3.50	-	-	-	-	-	123
	3.75	-	-	-	-	-	127
	4.00	-	-	-	-	-	128
Middle of Three-Story Building	0.25	54	62	80	95	113	128
	0.50	61	69	85	101	120	135
	0.75	66	75	90	107	123	140
	1.00	71	81	97	113	128	147
	1.25	-	87	102	120	135	153
	1.50	-	-	109	125	140	158
	1.75	-	-	114	130	147	163
	2.00	-	-	120	137	153	168
	2.25	-	-	-	142	158	175
	2.50	-	-	-	147	165	180
	2.75	-	-	-	154	170	185
	3.00	-	-	-	-	177	192
	3.25	-	-	-	-	182	198
	3.50	-	-	-	-	-	205
	3.75	-	-	-	-	-	210
	4.00	-	-	-	-	-	215

Table 24. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 16" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	64	75	94	111	130	149
	0.50	71	81	101	120	139	158
	0.75	81	90	109	128	147	166
	1.00	88	99	116	135	154	173
	1.25	-	106	125	144	163	182
	1.50	-	-	132	151	170	189
	1.75	-	-	139	158	177	196
	2.00	-	-	147	166	185	205
	2.25	-	-	-	175	194	213
	2.50	-	-	-	182	201	220
	2.75	-	-	-	191	210	229
	3.00	-	-	-	-	217	236
	3.25	-	-	-	-	224	243
	3.50	-	-	-	-	-	253
	3.75	-	-	-	-	-	260
	4.00	-	-	-	-	-	267

SI: 1 ft = 0.305 m

Table 25. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	19	21	27	33	38	46
	0.50	19	23	29	34	40	46
	0.75	21	25	31	36	42	48
	1.00	23	27	33	36	44	48
	1.25	-	27	34	38	46	50
	1.50	-	-	34	40	48	52
	1.75	-	-	36	42	48	54
	2.00	-	-	36	44	48	56
	2.25	-	-	-	46	50	57
	2.50	-	-	-	48	52	57
	2.75	-	-	-	48	54	59
	3.00	-	-	-	-	56	61
	3.25	-	-	-	-	57	61
	3.50	-	-	-	-	-	63
	3.75	-	-	-	-	-	65
	4.00	-	-	-	-	-	67
Bottom of Two-Story Building	0.25	27	29	36	46	54	61
	0.50	29	33	40	48	57	63
	0.75	31	36	44	50	57	67
	1.00	34	38	46	54	61	69
	1.25	-	40	48	57	65	71
	1.50	-	-	52	59	67	75
	1.75	-	-	54	61	69	79
	2.00	-	-	57	65	73	79
	2.25	-	-	-	69	75	82
	2.50	-	-	-	69	79	86
	2.75	-	-	-	73	80	90
	3.00	-	-	-	-	82	90
	3.25	-	-	-	-	86	94
	3.50	-	-	-	-	-	98
	3.75	-	-	-	-	-	100
	4.00	-	-	-	-	-	102

Table 25. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	21	25	31	38	46	52
	0.50	23	27	33	40	48	54
	0.75	25	27	36	42	48	56
	1.00	27	29	36	44	50	57
	1.25	-	33	38	46	52	57
	1.50	-	-	40	48	54	59
	1.75	-	-	42	48	56	61
	2.00	-	-	44	50	57	63
	2.25	-	-	-	52	57	65
	2.50	-	-	-	54	59	67
	2.75	-	-	-	56	61	69
	3.00	-	-	-	-	63	69
	3.25	-	-	-	-	65	71
	3.50	-	-	-	-	-	73
	3.75	-	-	-	-	-	75
	4.00	-	-	-	-	-	77
Middle of Three-Story Building	0.25	33	36	48	57	67	77
	0.50	36	40	50	59	69	79
	0.75	38	44	54	63	73	82
	1.00	42	48	57	67	77	86
	1.25	-	52	61	71	80	90
	1.50	-	-	65	75	84	94
	1.75	-	-	69	79	88	98
	2.00	-	-	71	80	90	100
	2.25	-	-	-	84	94	103
	2.50	-	-	-	88	98	107
	2.75	-	-	-	90	100	111
	3.00	-	-	-	-	103	113
	3.25	-	-	-	-	107	117
	3.50	-	-	-	-	-	121
	3.75	-	-	-	-	-	125
	4.00	-	-	-	-	-	128

Table 25. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	38	44	56	67	79	90
	0.50	44	48	59	71	82	94
	0.75	48	54	65	77	88	100
	1.00	52	57	69	80	90	102
	1.25	-	63	73	84	96	107
	1.50	-	-	79	90	100	111
	1.75	-	-	83	94	105	117
	2.00	-	-	88	100	111	121
	2.25	-	-	-	103	115	126
	2.50	-	-	-	109	121	132
	2.75	-	-	-	113	123	134
	3.00	-	-	-	-	128	140
	3.25	-	-	-	-	132	144
	3.50	-	-	-	-	-	149
	3.75	-	-	-	-	-	153
	4.00	-	-	-	-	-	159

SI: 1 ft = 0.305 m

Table 26. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	23	27	34	40	48	56
	0.50	25	29	36	42	50	57
	0.75	27	31	36	46	52	57
	1.00	29	33	38	48	54	61
	1.25	-	34	40	48	56	63
	1.50	-	-	44	50	57	65
	1.75	-	-	46	52	57	67
	2.00	-	-	48	54	61	69
	2.25	-	-	-	56	63	69
	2.50	-	-	-	57	65	71
	2.75	-	-	-	59	67	73
	3.00	-	-	-	-	69	77
	3.25	-	-	-	-	69	79
	3.50	-	-	-	-	-	79
	3.75	-	-	-	-	-	80
	4.00	-	-	-	-	-	82
Bottom of Two-Story Building	0.25	33	36	48	57	67	77
	0.50	36	40	50	59	69	79
	0.75	38	44	54	63	73	82
	1.00	42	48	57	67	77	86
	1.25	-	50	59	69	79	90
	1.50	-	-	63	73	82	92
	1.75	-	-	67	77	86	96
	2.00	-	-	71	79	90	100
	2.25	-	-	-	84	92	102
	2.50	-	-	-	88	98	107
	2.75	-	-	-	90	100	111
	3.00	-	-	-	-	103	113
	3.25	-	-	-	-	107	117
	3.50	-	-	-	-	-	121
	3.75	-	-	-	-	-	123
	4.00	-	-	-	-	-	126

Table 26. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	27	31	38	48	56	63
	0.50	29	33	40	48	57	67
	0.75	31	36	44	52	59	69
	1.00	33	36	46	54	61	69
	1.25	-	38	48	56	63	71
	1.50	-	-	50	57	67	75
	1.75	-	-	52	59	69	77
	2.00	-	-	54	61	69	79
	2.25	-	-	-	63	73	80
	2.50	-	-	-	67	75	82
	2.75	-	-	-	69	77	84
	3.00	-	-	-	-	79	86
	3.25	-	-	-	-	80	90
	3.50	-	-	-	-	-	90
	3.75	-	-	-	-	-	92
	4.00	-	-	-	-	-	96
Middle of Three-Story Building	0.25	40	48	57	69	82	94
	0.50	46	50	63	75	86	100
	0.75	48	56	67	79	90	103
	1.00	54	57	71	83	96	107
	1.25	-	63	77	88	100	111
	1.50	-	-	79	92	103	115
	1.75	-	-	84	96	109	121
	2.00	-	-	88	100	111	125
	2.25	-	-	-	103	117	128
	2.50	-	-	-	109	121	132
	2.75	-	-	-	113	125	138
	3.00	-	-	-	-	130	142
	3.25	-	-	-	-	132	146
	3.50	-	-	-	-	-	149
	3.75	-	-	-	-	-	153
	4.00	-	-	-	-	-	159

Table 26. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	48	56	69	82	96	111
	0.50	54	59	75	88	102	115
	0.75	57	67	79	94	107	121
	1.00	65	71	86	100	113	128
	1.25	-	79	90	105	119	132
	1.50	-	-	98	111	125	140
	1.75	-	-	102	117	132	144
	2.00	-	-	109	123	136	151
	2.25	-	-	-	128	142	155
	2.50	-	-	-	134	148	163
	2.75	-	-	-	140	153	167
	3.00	-	-	-	-	159	174
	3.25	-	-	-	-	165	178
	3.50	-	-	-	-	-	184
	3.75	-	-	-	-	-	190
	4.00	-	-	-	-	-	195

SI: 1 ft = 0.305 m

Table 27. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	36	40	52	61	73	82
	0.50	36	44	54	65	75	86
	0.75	40	46	57	69	79	90
	1.00	44	48	59	69	80	90
	1.25	-	52	61	73	84	94
	1.50	-	-	65	77	86	98
	1.75	-	-	69	79	90	100
	2.00	-	-	69	80	92	102
	2.25	-	-	-	84	94	105
	2.50	-	-	-	86	98	109
	2.75	-	-	-	90	100	111
	3.00	-	-	-	-	102	113
	3.25	-	-	-	-	105	117
	3.50	-	-	-	-	-	119
	3.75	-	-	-	-	-	121
	4.00	-	-	-	-	-	125
Bottom of Two-Story Building	0.25	48	56	69	84	100	113
	0.50	54	61	77	90	103	119
	0.75	57	67	80	96	111	125
	1.00	63	71	86	100	115	130
	1.25	-	77	90	105	121	134
	1.50	-	-	96	111	125	140
	1.75	-	-	100	115	130	144
	2.00	-	-	107	121	134	149
	2.25	-	-	-	126	142	153
	2.50	-	-	-	132	146	161
	2.75	-	-	-	136	151	165
	3.00	-	-	-	-	153	171
	3.25	-	-	-	-	161	175
	3.50	-	-	-	-	-	180
	3.75	-	-	-	-	-	184
	4.00	-	-	-	-	-	192

Table 27. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	40	48	57	71	82	96
	0.50	44	50	61	75	86	100
	0.75	48	54	65	79	90	102
	1.00	50	56	69	80	92	105
	1.25	-	57	71	84	96	109
	1.50	-	-	75	88	100	111
	1.75	-	-	79	90	102	115
	2.00	-	-	80	94	105	119
	2.25	-	-	-	96	109	102
	2.50	-	-	-	100	111	125
	2.75	-	-	-	102	115	128
	3.00	-	-	-	-	119	132
	3.25	-	-	-	-	121	132
	3.50	-	-	-	-	-	136
	3.75	-	-	-	-	-	140
	4.00	-	-	-	-	-	142
Middle of Three-Story Building	0.25	59	69	88	105	125	142
	0.50	67	77	94	111	132	149
	0.75	73	82	100	119	136	155
	1.00	79	90	107	125	142	163
	1.25	-	96	113	132	149	169
	1.50	-	-	121	138	155	174
	1.75	-	-	126	144	163	180
	2.00	-	-	132	151	169	186
	2.25	-	-	-	157	174	193
	2.50	-	-	-	163	182	199
	2.75	-	-	-	171	188	205
	3.00	-	-	-	-	195	213
	3.25	-	-	-	-	201	218
	3.50	-	-	-	-	-	226
	3.75	-	-	-	-	-	232
	4.00	-	-	-	-	-	238

Table 27. Percent Full-Height Sidewall Panels H-SIS-SAG with 18 mil CFS Members Spaced 24" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	71	82	103	123	144	165
	0.50	79	90	111	132	153	174
	0.75	90	100	121	142	163	184
	1.00	98	109	128	149	171	192
	1.25	-	117	138	159	180	201
	1.50	-	-	146	167	188	209
	1.75	-	-	153	174	195	216
	2.00	-	-	163	184	205	226
	2.25	-	-	-	193	215	236
	2.50	-	-	-	201	222	243
	2.75	-	-	-	211	232	253
	3.00	-	-	-	-	239	261
	3.25	-	-	-	-	247	268
	3.50	-	-	-	-	-	280
	3.75	-	-	-	-	-	287
	4.00	-	-	-	-	-	295

SI: 1 ft = 0.305 m

Table 28. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	15	16	20	25	29	35
	0.50	15	17	22	26	31	35
	0.75	16	19	23	28	32	36
	1.00	17	20	25	28	33	36
	1.25	-	20	26	29	35	38
	1.50	-	-	26	31	36	39
	1.75	-	-	28	32	36	41
	2.00	-	-	28	33	36	42
	2.25	-	-	-	35	38	44
	2.50	-	-	-	36	39	44
	2.75	-	-	-	36	41	45
	3.00	-	-	-	-	42	47
	3.25	-	-	-	-	44	47
	3.50	-	-	-	-	-	48
	3.75	-	-	-	-	-	50
	4.00	-	-	-	-	-	51
Bottom of Two-Story Building	0.25	20	22	28	35	41	47
	0.50	22	25	31	36	44	48
	0.75	23	28	33	38	44	51
	1.00	26	29	35	41	47	52
	1.25	-	31	36	44	50	54
	1.50	-	-	39	45	51	57
	1.75	-	-	41	47	52	60
	2.00	-	-	44	50	55	60
	2.25	-	-	-	52	57	63
	2.50	-	-	-	52	60	66
	2.75	-	-	-	55	61	68
	3.00	-	-	-	-	63	68
	3.25	-	-	-	-	66	71
	3.50	-	-	-	-	-	74
	3.75	-	-	-	-	-	76
	4.00	-	-	-	-	-	77

Table 28. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	16	19	23	29	35	39
	0.50	17	20	25	31	36	41
	0.75	19	20	28	32	36	42
	1.00	20	22	28	33	38	44
	1.25	-	25	29	35	39	44
	1.50	-	-	31	36	41	45
	1.75	-	-	32	36	42	47
	2.00	-	-	33	38	44	48
	2.25	-	-	-	39	44	50
	2.50	-	-	-	41	45	51
	2.75	-	-	-	42	47	52
	3.00	-	-	-	-	48	52
	3.25	-	-	-	-	50	54
	3.50	-	-	-	-	-	55
	3.75	-	-	-	-	-	57
	4.00	-	-	-	-	-	58
Middle of Three-Story Building	0.25	25	28	36	44	51	58
	0.50	28	31	38	45	52	60
	0.75	29	33	41	48	55	63
	1.00	32	36	44	51	58	66
	1.25	-	39	47	54	61	68
	1.50	-	-	50	57	64	71
	1.75	-	-	52	60	67	74
	2.00	-	-	54	61	68	76
	2.25	-	-	-	64	71	79
	2.50	-	-	-	67	74	82
	2.75	-	-	-	68	76	84
	3.00	-	-	-	-	79	86
	3.25	-	-	-	-	82	89
	3.50	-	-	-	-	-	92
	3.75	-	-	-	-	-	95
	4.00	-	-	-	-	-	98

Table 28. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	29	33	42	51	60	68
	0.50	33	36	45	54	63	71
	0.75	36	41	50	58	67	76
	1.00	39	44	52	61	68	77
	1.25	-	48	55	64	73	82
	1.50	-	-	60	68	76	84
	1.75	-	-	63	71	80	89
	2.00	-	-	67	76	84	92
	2.25	-	-	-	79	87	96
	2.50	-	-	-	83	92	100
	2.75	-	-	-	86	93	102
	3.00	-	-	-	-	98	106
	3.25	-	-	-	-	100	109
	3.50	-	-	-	-	-	114
	3.75	-	-	-	-	-	116
	4.00	-	-	-	-	-	121

SI: 1 ft = 0.305 m

Table 29. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	17	20	26	31	36	42
	0.50	19	22	28	32	38	44
	0.75	20	23	28	35	39	44
	1.00	22	25	29	36	41	47
	1.25	-	26	31	36	42	48
	1.50	-	-	33	38	44	50
	1.75	-	-	35	39	44	51
	2.00	-	-	36	41	47	52
	2.25	-	-	-	42	48	52
	2.50	-	-	-	44	50	54
	2.75	-	-	-	45	51	55
	3.00	-	-	-	-	52	58
	3.25	-	-	-	-	52	60
	3.50	-	-	-	-	-	60
	3.75	-	-	-	-	-	61
	4.00	-	-	-	-	-	63
Bottom of Two-Story Building	0.25	25	28	36	44	51	58
	0.50	28	31	38	45	52	60
	0.75	29	33	41	48	55	63
	1.00	32	36	44	51	58	66
	1.25	-	38	45	52	60	68
	1.50	-	-	48	55	63	70
	1.75	-	-	51	58	66	73
	2.00	-	-	54	60	68	76
	2.25	-	-	-	64	70	77
	2.50	-	-	-	67	74	82
	2.75	-	-	-	68	76	84
	3.00	-	-	-	-	79	86
	3.25	-	-	-	-	82	89
	3.50	-	-	-	-	-	92
	3.75	-	-	-	-	-	93
	4.00	-	-	-	-	-	96

Table 29. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	20	23	29	36	42	48
	0.50	22	25	31	36	44	51
	0.75	23	28	33	39	45	52
	1.00	25	28	35	41	47	52
	1.25	-	29	36	42	48	54
	1.50	-	-	38	44	51	57
	1.75	-	-	39	45	52	58
	2.00	-	-	41	47	52	60
	2.25	-	-	-	48	55	61
	2.50	-	-	-	51	57	63
	2.75	-	-	-	52	58	64
	3.00	-	-	-	-	60	66
	3.25	-	-	-	-	61	68
	3.50	-	-	-	-	-	68
	3.75	-	-	-	-	-	70
	4.00	-	-	-	-	-	73
Middle of Three-Story Building	0.25	31	36	44	52	63	71
	0.50	35	38	48	57	66	76
	0.75	36	42	51	60	68	79
	1.00	41	44	54	63	73	82
	1.25	-	48	58	67	76	84
	1.50	-	-	60	70	79	87
	1.75	-	-	64	73	83	92
	2.00	-	-	67	76	84	95
	2.25	-	-	-	79	89	98
	2.50	-	-	-	83	92	100
	2.75	-	-	-	86	95	105
	3.00	-	-	-	-	99	108
	3.25	-	-	-	-	100	111
	3.50	-	-	-	-	-	114
	3.75	-	-	-	-	-	116
	4.00	-	-	-	-	-	121

Table 29. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	36	42	52	63	73	84
	0.50	41	45	57	67	77	87
	0.75	44	51	60	71	82	92
	1.00	50	54	66	76	86	98
	1.25	-	60	68	80	90	100
	1.50	-	-	74	84	95	106
	1.75	-	-	77	89	100	109
	2.00	-	-	83	93	103	115
	2.25	-	-	-	98	108	118
	2.50	-	-	-	102	112	124
	2.75	-	-	-	106	116	127
	3.00	-	-	-	-	121	132
	3.25	-	-	-	-	125	135
	3.50	-	-	-	-	-	140
	3.75	-	-	-	-	-	144
	4.00	-	-	-	-	-	149

SI: 1 ft = 0.305 m

Table 30. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	28	31	39	47	55	63
	0.50	28	33	41	50	57	66
	0.75	31	35	44	52	60	68
	1.00	33	36	45	52	61	68
	1.25	-	39	47	55	64	71
	1.50	-	-	50	58	66	74
	1.75	-	-	52	60	68	76
	2.00	-	-	52	61	70	77
	2.25	-	-	-	64	71	80
	2.50	-	-	-	66	74	83
	2.75	-	-	-	68	76	84
	3.00	-	-	-	-	77	86
	3.25	-	-	-	-	80	89
	3.50	-	-	-	-	-	90
	3.75	-	-	-	-	-	92
	4.00	-	-	-	-	-	95
Bottom of Two-Story Building	0.25	36	42	52	64	76	86
	0.50	41	47	58	68	79	90
	0.75	44	51	61	73	84	95
	1.00	48	54	66	76	87	99
	1.25	-	58	68	80	92	102
	1.50	-	-	73	84	95	106
	1.75	-	-	76	87	99	109
	2.00	-	-	82	92	102	114
	2.25	-	-	-	96	108	116
	2.50	-	-	-	100	111	122
	2.75	-	-	-	103	115	125
	3.00	-	-	-	-	116	130
	3.25	-	-	-	-	122	133
	3.50	-	-	-	-	-	137
	3.75	-	-	-	-	-	140
	4.00	-	-	-	-	-	146

Table 30. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	31	36	44	54	63	73
	0.50	33	38	47	57	66	76
	0.75	36	41	50	60	68	77
	1.00	38	42	52	61	70	80
	1.25	-	44	54	64	73	83
	1.50	-	-	57	67	76	84
	1.75	-	-	60	68	77	87
	2.00	-	-	61	71	80	90
	2.25	-	-	-	73	83	77
	2.50	-	-	-	76	84	95
	2.75	-	-	-	77	87	98
	3.00	-	-	-	-	90	100
	3.25	-	-	-	-	92	100
	3.50	-	-	-	-	-	103
	3.75	-	-	-	-	-	106
	4.00	-	-	-	-	-	108
Middle of Three-Story Building	0.25	45	52	67	80	95	108
	0.50	51	58	71	84	100	114
	0.75	55	63	76	90	103	118
	1.00	60	68	82	95	108	124
	1.25	-	73	86	100	114	128
	1.50	-	-	92	105	118	132
	1.75	-	-	96	109	124	137
	2.00	-	-	100	115	128	141
	2.25	-	-	-	119	132	147
	2.50	-	-	-	124	138	151
	2.75	-	-	-	130	143	156
	3.00	-	-	-	-	149	162
	3.25	-	-	-	-	153	166
	3.50	-	-	-	-	-	172
	3.75	-	-	-	-	-	176
	4.00	-	-	-	-	-	181

Table 30. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 16" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	54	63	79	93	109	125
	0.50	60	68	84	100	116	132
	0.75	68	76	92	108	124	140
	1.00	74	83	98	114	130	146
	1.25	-	89	105	121	137	153
	1.50	-	-	111	127	143	159
	1.75	-	-	116	132	149	165
	2.00	-	-	124	140	156	172
	2.25	-	-	-	147	163	179
	2.50	-	-	-	153	169	185
	2.75	-	-	-	160	176	192
	3.00	-	-	-	-	182	198
	3.25	-	-	-	-	188	204
	3.50	-	-	-	-	-	213
	3.75	-	-	-	-	-	218
	4.00	-	-	-	-	-	224

SI: 1 ft = 0.305 m

Table 31. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	16	17	22	27	32	38
	0.50	16	19	24	28	33	38
	0.75	17	21	25	30	35	40
	1.00	19	22	27	30	36	40
	1.25	-	22	28	32	38	41
	1.50	-	-	28	33	40	43
	1.75	-	-	30	35	40	44
	2.00	-	-	30	36	40	46
	2.25	-	-	-	38	41	47
	2.50	-	-	-	40	43	47
	2.75	-	-	-	40	44	49
	3.00	-	-	-	-	46	51
	3.25	-	-	-	-	47	51
	3.50	-	-	-	-	-	52
	3.75	-	-	-	-	-	54
	4.00	-	-	-	-	-	55
Bottom of Two-Story Building	0.25	22	24	30	38	44	51
	0.50	24	27	33	40	47	52
	0.75	25	30	36	41	47	55
	1.00	28	32	38	44	51	57
	1.25	-	33	40	47	54	59
	1.50	-	-	43	49	55	62
	1.75	-	-	44	51	57	65
	2.00	-	-	47	54	60	65
	2.25	-	-	-	57	62	68
	2.50	-	-	-	57	65	71
	2.75	-	-	-	60	66	74
	3.00	-	-	-	-	68	74
	3.25	-	-	-	-	71	78
	3.50	-	-	-	-	-	81
	3.75	-	-	-	-	-	82
	4.00	-	-	-	-	-	84

Table 31. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	17	21	25	32	38	43
	0.50	19	22	27	33	40	44
	0.75	21	22	30	35	40	46
	1.00	22	24	30	36	41	47
	1.25	-	27	32	38	43	47
	1.50	-	-	33	40	44	49
	1.75	-	-	35	40	46	51
	2.00	-	-	36	41	47	52
	2.25	-	-	-	43	47	54
	2.50	-	-	-	44	49	55
	2.75	-	-	-	46	51	57
	3.00	-	-	-	-	52	57
	3.25	-	-	-	-	54	59
	3.50	-	-	-	-	-	60
	3.75	-	-	-	-	-	62
	4.00	-	-	-	-	-	63
Middle of Three-Story Building	0.25	27	30	40	47	55	63
	0.50	30	33	41	49	57	65
	0.75	32	36	44	52	60	68
	1.00	35	40	47	55	63	71
	1.25	-	43	51	59	66	74
	1.50	-	-	54	62	70	78
	1.75	-	-	57	65	73	81
	2.00	-	-	59	66	74	82
	2.25	-	-	-	70	78	85
	2.50	-	-	-	73	81	89
	2.75	-	-	-	74	82	92
	3.00	-	-	-	-	85	93
	3.25	-	-	-	-	89	97
	3.50	-	-	-	-	-	100
	3.75	-	-	-	-	-	103
	4.00	-	-	-	-	-	106

Table 31. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_0

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	32	36	46	55	65	74
	0.50	36	40	49	59	68	78
	0.75	40	44	54	63	73	82
	1.00	43	47	57	66	74	84
	1.25	-	52	60	70	79	89
	1.50	-	-	65	74	82	92
	1.75	-	-	69	78	87	97
	2.00	-	-	73	82	92	100
	2.25	-	-	-	85	95	104
	2.50	-	-	-	90	100	109
	2.75	-	-	-	93	101	111
	3.00	-	-	-	-	106	116
	3.25	-	-	-	-	109	119
	3.50	-	-	-	-	-	123
	3.75	-	-	-	-	-	127
	4.00	-	-	-	-	-	131

SI: 1 ft = 0.305 m

Table 32. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	19	22	28	33	40	46
	0.50	21	24	30	35	41	47
	0.75	22	25	30	38	43	47
	1.00	24	27	32	40	44	51
	1.25	-	28	33	40	46	52
	1.50	-	-	36	41	47	54
	1.75	-	-	38	43	47	55
	2.00	-	-	40	44	51	57
	2.25	-	-	-	46	52	57
	2.50	-	-	-	47	54	59
	2.75	-	-	-	49	55	60
	3.00	-	-	-	-	57	63
	3.25	-	-	-	-	57	65
	3.50	-	-	-	-	-	65
	3.75	-	-	-	-	-	66
	4.00	-	-	-	-	-	68
Bottom of Two-Story Building	0.25	27	30	40	47	55	63
	0.50	30	33	41	49	57	65
	0.75	32	36	44	52	60	68
	1.00	35	40	47	55	63	71
	1.25	-	41	49	57	65	74
	1.50	-	-	52	60	68	76
	1.75	-	-	55	63	71	79
	2.00	-	-	59	65	74	82
	2.25	-	-	-	70	76	84
	2.50	-	-	-	73	81	89
	2.75	-	-	-	74	82	92
	3.00	-	-	-	-	85	93
	3.25	-	-	-	-	89	97
	3.50	-	-	-	-	-	100
	3.75	-	-	-	-	-	101
	4.00	-	-	-	-	-	104

Table 32. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	22	25	32	40	46	52
	0.50	24	27	33	40	47	55
	0.75	25	30	36	43	49	57
	1.00	27	30	38	44	51	57
	1.25	-	32	40	46	52	59
	1.50	-	-	41	47	55	62
	1.75	-	-	43	49	57	63
	2.00	-	-	44	51	57	65
	2.25	-	-	-	52	60	66
	2.50	-	-	-	55	62	68
	2.75	-	-	-	57	63	70
	3.00	-	-	-	-	65	71
	3.25	-	-	-	-	66	74
	3.50	-	-	-	-	-	74
	3.75	-	-	-	-	-	76
	4.00	-	-	-	-	-	79
Middle of Three-Story Building	0.25	33	40	47	57	68	78
	0.50	38	41	52	62	71	82
	0.75	40	46	55	65	74	85
	1.00	44	47	59	69	79	89
	1.25	-	52	63	73	82	92
	1.50	-	-	65	76	85	95
	1.75	-	-	70	79	90	100
	2.00	-	-	73	82	92	103
	2.25	-	-	-	85	97	106
	2.50	-	-	-	90	100	109
	2.75	-	-	-	93	103	114
	3.00	-	-	-	-	108	117
	3.25	-	-	-	-	109	120
	3.50	-	-	-	-	-	123
	3.75	-	-	-	-	-	127
	4.00	-	-	-	-	-	131

Table 32. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_1

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	40	46	57	68	79	92
	0.50	44	49	62	73	84	95
	0.75	47	55	65	78	89	100
	1.00	54	59	71	82	93	106
	1.25	-	65	74	87	98	109
	1.50	-	-	81	92	103	116
	1.75	-	-	84	97	109	119
	2.00	-	-	90	101	112	125
	2.25	-	-	-	106	117	128
	2.50	-	-	-	111	122	135
	2.75	-	-	-	116	127	138
	3.00	-	-	-	-	131	144
	3.25	-	-	-	-	136	147
	3.50	-	-	-	-	-	152
	3.75	-	-	-	-	-	157
	4.00	-	-	-	-	-	161

SI: 1 ft = 0.305 m

Table 33. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of One or Two-Story Building	0.25	30	33	43	51	60	68
	0.50	30	36	44	54	62	71
	0.75	33	38	47	57	65	74
	1.00	36	40	49	57	66	74
	1.25	-	43	51	60	70	78
	1.50	-	-	54	63	71	81
	1.75	-	-	57	65	74	82
	2.00	-	-	57	66	76	84
	2.25	-	-	-	70	78	87
	2.50	-	-	-	71	81	90
	2.75	-	-	-	74	82	92
	3.00	-	-	-	-	84	93
	3.25	-	-	-	-	87	97
	3.50	-	-	-	-	-	98
	3.75	-	-	-	-	-	100
	4.00	-	-	-	-	-	103
Bottom of Two-Story Building	0.25	40	46	57	70	82	93
	0.50	44	51	63	74	85	98
	0.75	47	55	66	79	92	103
	1.00	52	59	71	82	95	108
	1.25	-	63	74	87	100	111
	1.50	-	-	79	92	103	116
	1.75	-	-	82	95	108	119
	2.00	-	-	89	100	111	123
	2.25	-	-	-	104	117	127
	2.50	-	-	-	109	120	133
	2.75	-	-	-	112	125	136
	3.00	-	-	-	-	127	141
	3.25	-	-	-	-	133	145
	3.50	-	-	-	-	-	149
	3.75	-	-	-	-	-	152
	4.00	-	-	-	-	-	158

Table 33. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Top of Three-Story Building	0.25	33	40	47	59	68	79
	0.50	36	41	51	62	71	82
	0.75	40	44	54	65	74	84
	1.00	41	46	57	66	76	87
	1.25	-	47	59	70	79	90
	1.50	-	-	62	73	82	92
	1.75	-	-	65	74	84	95
	2.00	-	-	66	78	87	98
	2.25	-	-	-	79	90	84
	2.50	-	-	-	82	92	103
	2.75	-	-	-	84	95	106
	3.00	-	-	-	-	98	109
	3.25	-	-	-	-	100	109
	3.50	-	-	-	-	-	112
	3.75	-	-	-	-	-	116
	4.00	-	-	-	-	-	117
Middle of Three-Story Building	0.25	49	57	73	87	103	117
	0.50	55	63	78	92	109	123
	0.75	60	68	82	98	112	128
	1.00	65	74	89	103	117	135
	1.25	-	79	93	109	123	139
	1.50	-	-	100	114	128	144
	1.75	-	-	104	119	135	149
	2.00	-	-	109	125	139	154
	2.25	-	-	-	130	144	160
	2.50	-	-	-	135	150	165
	2.75	-	-	-	141	155	169
	3.00	-	-	-	-	161	176
	3.25	-	-	-	-	166	180
	3.50	-	-	-	-	-	187
	3.75	-	-	-	-	-	191
	4.00	-	-	-	-	-	196

Table 33. Percent Full-Height Sidewall Panels H-SIS-SAG with 33 mil CFS Members Spaced 24" o.c. – SDC D_2

Story Location	Aspect Ratio	Diaphragm Span (ft)					
		15	20	30	40	50	60
Bottom of Three-Story Building	0.25	59	68	85	101	119	136
	0.50	65	74	92	109	127	144
	0.75	74	82	100	117	135	152
	1.00	81	90	106	123	141	158
	1.25	-	97	114	131	149	166
	1.50	-	-	120	138	155	173
	1.75	-	-	127	144	161	179
	2.00	-	-	135	152	169	187
	2.25	-	-	-	160	177	195
	2.50	-	-	-	166	184	201
	2.75	-	-	-	174	191	209
	3.00	-	-	-	-	198	215
	3.25	-	-	-	-	204	222
	3.50	-	-	-	-	-	231
	3.75	-	-	-	-	-	237
	4.00	-	-	-	-	-	244

SI: 1 ft = 0.305 m

6.3.5 *H-SIS-SAG Equivalency Factors to AISI S230 Wall Bracing Provisions for High Wind and Seismic:*

6.3.5.1 **Table 34** provides equivalency factors that were used to adjust the AISI S230 wall bracing tables for use with H-SIS-SAG wall assemblies. Simply multiply the bracing lengths derived from the Table E12-1 through Table E12-15 and Table E13-3 through Table E13-4 in AISI S230 by the factors shown in **Table 34** to obtain the required bracing lengths for H-SIS-SAG wall assemblies.

6.3.5.2 All other prescriptive bracing minimums, spacing requirements and provisions in AISI S230 must still be met.

Table 34. H-SIS-SAG Equivalency Factor to AISI S230 Wall Bracing Provisions[2]

Assembly	Minimum H-SIS-SAG Exterior Sheathing Thickness	Exterior Sheathing Fastening Schedule[1]	Structural Framing Member Thickness (mil)	Structural Framing Member Spacing (in)	Minimum Structural Framing Member Dimensions (in)	Minimum Interior Sheathing Type	Interior GWB Fastening Schedule[1]	Equivalency Factor for Wind/Seismic and High Seismic Areas	Equivalency Factor for High Wind Conditions
#1	2"	#8 x 3" Truss Head Self-Drilling Screw, One Screw per Corner	18	16	Web: 3 5/8 Flange: 1 1/4	1/2" GWB	#6 x 1 1/4" Type S Screw 16:16	1.73	2.25
#2	2"	#8 x 3" Truss Head Self-Drilling Screw, One Screw per Corner	18	24	Web: 3 5/8 Flange: 1 1/4	1/2" GWB	#6 x 1 1/4" Type S Screw 16:16	1.92	2.49
#3	2"	#8 x 3" Truss Head Self-Drilling Screw, One Screw per Corner	33	16	Web: 3 5/8 Flange: 1 5/8	1/2" GWB	#6 x 1 1/4" Type S Screw 16:16	1.46	1.89
#4	2"	#8 x 3" Truss Head Self-Drilling Screw, One Screw per Corner	33	24	Web: 3 5/8 Flange: 1 5/8	1/2" GWB	#6 x 1 1/4" Type S Screw 16:16	1.58	2.06

SI: 1 in = 25.4 mm, 1 mil = 0.0254 mm, 1 plf = 0.0146 kN/m

1. All sheathing panel to stud interfaces are additionally adhered with proprietary polyurethane foam construction adhesive. Continuous along all framing members.
2. Applies to wall assemblies where the structural framing members are a minimum of 3 5/8" thick.

6.4 *Structural Applications*

6.4.1 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.**

6.4.2 *Lateral Load Diaphragm Shear Resistance for Wall, Floor and Roof Applications:*

6.4.2.1 Walls shall be designed in accordance with AISI S230, AISI S240, AISI S400, and the applicable building codes.

6.4.2.2 For wind design, the allowable unit shear capacity values for H-SIS-SAG assemblies are shown in **Table 35**.

6.4.2.2.1 All sheathing panel-to-stud interfaces are additionally adhered with proprietary polyurethane foam construction adhesive. Continuous along all framing members.

6.4.2.2.2 Applies to wall assemblies where the structural framing members are a minimum of 3 5/8" thick.

Table 35. Allowable (ASD) Unit Diaphragm Shear Capacity of H-SIS-SAG Assemblies for Wind Design[2]

Assembly	Minimum H-SIS-SAG Exterior Sheathing Thickness	Exterior Sheathing Fastening Schedule[1]	Structural Framing Member Thickness (mil)	Structural Framing Member spacing (in)	Minimum Structural Framing Member Dimensions (in)	Minimum Interior Sheathing Type	Interior GWB Fastening Schedule[1]	Allowable Unit Shear Capacity (plf)
#1	2"	#8 x 3" Truss Head Self-Drilling Screw, One Screw per Corner	18	16	Web: 3 5/8 Flange: 1 1/4	1/2" GWB	#6 x 1 1/4" Type S Screw 16:16	210
#2	2"	#8 x 3" Truss Head Self-Drilling Screw, One Screw per Corner	18	24	Web: 3 5/8 Flange: 1 1/4	1/2" GWB	#6 x 1 1/4" Type S Screw 16:16	190
#3	2"	#8 x 3" Truss Head Self-Drilling Screw, One Screw per Corner	33	16	Web: 3 5/8 Flange: 1 5/8	1/2" GWB	#6 x 1 1/4" Type S Screw 16:16	250
#4	2"	#8 x 3" Truss Head Self-Drilling Screw, One Screw per Corner	33	24	Web: 3 5/8 Flange: 1 5/8	1/2" GWB	#6 x 1 1/4" Type S Screw 16:16	230
SI: 1 in = 25.4 mm, 1 mil = 0.0254 mm, 1 plf = 0.0146 kN/m								

6.4.2.3 **Table 36** of this Listing provides Seismic Design Coefficients (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).

6.4.2.3.1 The basis for equivalency testing is outlined in ASCE 7 Section 12.2.1.1:

> **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_o; and deflection amplification factor, C_d.

Table 36. Allowable Unit Diaphragm Shear Capacity of H-SIS-SAG Assemblies for Seismic Design[1,2,3]

Assembly Depth or Thickness	Maximum Structural Member Spacing (in)	Seismic Allowable Unit Shear Capacity (plf)	Apparent Shear Stiffness, G_a (kips/in)	Response Modification Factor, R	System Over-strength Factor, Ω_0	Deflection Amplification Coefficient, C_d	Structural System Limitations and Building Height Limit (ft)				
							Seismic Design Category				
							B	C	D	E	F
7" or larger H-SIS-SAG [3]	16 o.c.	210	5.3	2.0	2.5	2.0	NL	NL	35	NP	NP
	24 o.c.	190	5.3	2.0	2.5	2.0	NL	NL	35	NP	NP

SI: 1 in = 25.4 mm, 1 ft = 0.3048 m, 1 plf = 0.0146 kN/m, 1 kip/in = 175.1 N/mm

1. NL= Not limited, NP = Not Permitted
2. Where higher capacities are needed for structural member spacing less than 16" on center, an engineered design may be used.
3. Assemblies comprised of the following components: H-SIS-SAG 2" Exterior Sheathing, 1/2" GWB Interior Sheathing, and minimum 3 5/8" x 1 1/4", 18 mil structural framing members. Larger components are permitted with no increase in capacities.

6.4.3 *Perforated Shear Walls:*

6.4.3.1 H-SIS-SAG is permitted to be designed in accordance with the methodology found in AISI S400 Section E1.3.1.2 in the commentary with the following exceptions:

6.4.3.1.1 C_a from AISI S400, Table E1.3.1.2-1 shall be replaced by the equation presented below:

$$C_a = \frac{r}{(1.1 - 0.1 \times r)} \times \frac{L_{tot}}{\sum L_i} \times 0.6$$

$$r = \frac{1}{1 + \frac{A_o}{h \Sigma L_i}}$$

where,

C_a = shear resistance adjustment factor

r = sheathing area ratio

L_{tot} = total length of the perforated shear wall (including the lengths of perforated shear wall segments, and the lengths of segments containing openings), [ft]

A_o = total area of openings, [ft^2]

h = height of wall, [ft]

ΣL_i = sum of the length of full-height sections, [ft]

6.4.3.1.2 The following example shows how to calculate the capacity of a perforated H-SIS-SAG shear wall using the equation in **Section 6.4.3.1.1**.

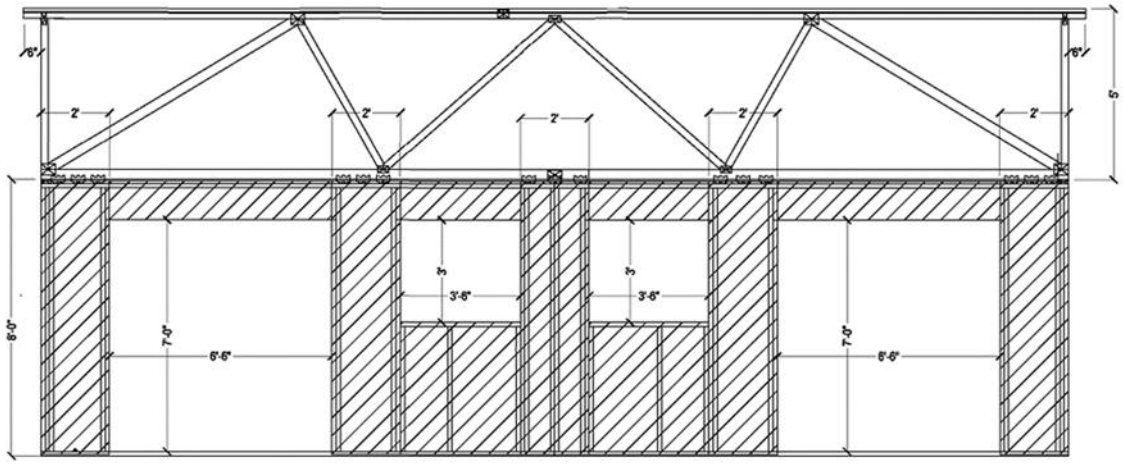


Figure 2. Example of a Perforated Shear Wall

Calculation Steps:

1. The total length of the perforated shear wall (including the lengths of perforated shear wall segments, and the lengths of segments containing openings), L_{tot}, is 30'.
2. The height of the perforated shear wall, h, is 8'.
3. The sum of the perforated shear wall segment lengths (full-height sheathing), ΣL_i, is 10'.
4. The total area of the openings, A_o, is:
   - 4.1. Two (2) 7' x 6' 6" openings – 45.5 sq. ft. x 2 = 91 sq. ft.
   - 4.2. Two (2) 3' x 3' 6" openings – 10.5 sq. ft. x 2 = 21 sq. ft.
   - 4.3. Total opening area is: 91 + 21 = 112 sq. ft.
5. The sheathing area ratio, r, is:

$$r = \frac{1}{1 + \frac{A_o}{h\Sigma L_i}} = \frac{1}{1 + \frac{112}{8 * 10}} = 0.417$$

6. The shear capacity adjustment factor, C_a, is:

$$C_a = \frac{r}{1.1 - 0.1 \times r} \times \frac{L_{tot}}{\Sigma L_i} \times 0.6 = \frac{0.417}{1.1 - 0.1 \times 0.417} \times \frac{30}{10} \times 0.6 = 0.71$$

7. From **Table 35**, Assembly #1, the nominal shear strength per unit length (allowable unit shear capacity), v_n, is 210 plf.
8. In accordance with AISI S400 E1.3.1.2, the nominal (allowable) shear capacity of this perforated shear wall, V_n, is:

$$V_n = v_n * \Sigma L_i * C_a = 210\, plf * 10\, ft. * 0.71 = 1{,}491\, lbs.$$

6.4.4 *Transverse Load Resistance:*

6.4.4.1 The maximum allowable transverse load resistance capacities at various deflection limits and structural member spacing are shown in:

6.4.4.1.1 **Table 37** and **Table 38** for H-SIS-SAG assembled with 18 mil CFS members spaced at 16" o.c. and 24″ o.c.

6.4.4.1.2 **Table 39** and **Table 40** for H-SIS-SAG assembled with 33 mil CFS structural members spaced at 16" o.c. and 24″ o.c.

6.4.4.2 A CFS member is required at each interior or exterior sheathing panel edge.

Table 37. Allowable Transverse Load (psf) at Various Deflection Limits for H-SIS-SAG Assemblies with 18 mil CFS Members Spaced 16″ o.c.[1]

Assembly Depth or Thickness	Span (ft)	Maximum Allowable Load (psf)	Allowable Load at Various Deflection Limits (psf)				
			L/120	L/180	L/240	L/360	L/480
7" H-SIS-SAG	6	145	145	145	130	90	65
	8	80	80	75	55	35	30
	9	65	65	50	40	25	20
	10	50	50	40	30	20	15
	11	45	45	30	20	15	10
	12	35	35	20	15	10	10
9" H-SIS-SAG	6	195	195	195	195	175	130
	8	110	110	110	110	75	55
	9	85	85	85	80	50	40
	10	70	70	70	55	40	30
	11	60	60	55	45	30	20
	12	50	50	45	35	20	15

SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1-psf = 47.9 Pa

1. To install the H-SIS-SAG assembly, for any specific application, it is required to implement all of **Section 8**.

Table 38. Allowable Transverse Load (psf) at Various Deflection Limits for H-SIS-SAG Assemblies with 18 mil CFS Members Spaced 24″ o.c.[1]

Assembly Depth or Thickness	Span (ft)	Maximum Allowable Load (psf)	Allowable Load at Various Deflection Limits (psf)				
			L/120	L/180	L/240	L/360	L/480
7" H-SIS-SAG	6	110	110	110	100	65	50
	8	60	60	55	40	30	20
	9	50	50	40	30	20	15
	10	40	40	30	20	15	10
	11	30	30	20	15	10	10
	12	25	25	15	10	10	5
9" H-SIS-SAG	6	195	195	195	195	135	105
	8	110	110	110	85	60	45
	9	85	85	80	60	40	30
	10	70	70	60	45	30	20
	11	60	60	45	35	20	15
	12	50	50	35	25	15	15

SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1-psf = 47.9 Pa

1. To install the H-SIS-SAG assembly, for any specific application, it is required to implement all of **Section 8**.

Table 39. Allowable Transverse Load (psf) at Various Deflection Limits for H-SIS-SAG Assemblies with 33 mil CFS Structural Members Spaced 16″ o.c.[1]

Assembly Depth or Thickness	Span (ft)	Maximum Allowable Load (psf)	Allowable Load at Various Deflection Limits (psf)				
			L/120	L/180	L/240	L/360	L/480
7" H-SIS-SAG	6	185	185	185	185	150	115
	8	105	105	105	95	65	50
	9	80	80	80	70	45	35
	10	65	65	65	50	35	25
	11	55	55	50	35	25	20
	12	45	45	40	30	20	15
9" H-SIS-SAG	6	300	300	300	300	300	300
	8	170	170	170	170	170	130
	9	130	130	130	130	120	90
	10	105	105	105	105	85	65
	11	90	90	90	90	65	50
	12	75	75	75	75	50	40
11" H-SIS-SAG	6	345	345	345	345	345	345
	8	195	195	195	195	195	195
	9	155	155	155	155	155	155
	10	125	125	125	125	125	115
	11	105	105	105	105	105	90
	12	85	85	85	85	85	70
13" H-SIS-SAG	6	415	415	415	415	415	415
	8	235	235	235	235	235	235
	9	185	185	185	185	185	185
	10	150	150	150	150	150	150
	11	125	125	125	125	125	125
	12	105	105	105	105	105	105

SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1-psf = 47.9 Pa

1. To install the H-SIS-SAG assembly, for any specific application, it is required to implement all of **Section 8**.

Table 40. Allowable Transverse Load (psf) at Various Deflection Limits for H-SIS-SAG Assemblies with 33 mil CFS Structural Members Spaced 24″ o.c.[1]

Assembly Depth or Thickness	Span (ft)	Maximum Allowable Load (psf)	Allowable Load at Various Deflection Limits (psf)				
			L/120	L/180	L/240	L/360	L/480
7" H-SIS-SAG	6	125	125	125	125	100	75
	8	70	70	70	65	45	30
	9	55	55	55	45	30	25
	10	45	45	45	35	20	15
	11	35	35	35	25	15	10
	12	30	30	25	20	15	10
9" H-SIS-SAG	6	200	200	200	200	200	200
	8	110	110	110	110	110	85
	9	90	90	90	90	80	60
	10	70	70	70	70	60	45
	11	60	60	60	60	45	35
	12	50	50	50	50	35	25
11" H-SIS-SAG	6	230	230	230	230	230	230
	8	130	130	130	130	130	130
	9	105	105	105	105	105	105
	10	85	85	85	85	85	80
	11	70	70	70	70	70	60
	12	60	60	60	60	60	45
13" H-SIS-SAG	6	280	280	280	280	280	280
	8	155	155	155	155	155	155
	9	125	125	125	125	125	125
	10	100	100	100	100	100	100
	11	85	85	85	85	85	85
	12	70	70	70	70	70	70

SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1-psf = 47.9 Pa

1. To install the H-SIS-SAG assembly, for any specific application, it is required to implement all of **Section 8**.

6.4.5 *Basic Wind Speed (mph) for H-SIS-SAG Used in Exterior Sheathed Assemblies:*

6.4.5.1 The maximum basic wind speed for H-SIS-SAG assemblies at various deflection limits used in wall applications are shown in:

6.4.5.1.1 **Table 41** and **Table 42** for H-SIS-SAG assembled with 18 mil CFS members spaced at 16" o.c. and 24″ o.c.

6.4.5.1.2 **Table 43** and **Table 44** for H-SIS-SAG assembled with 33 mil CFS members spaced at 16" o.c. and 24″ o.c.

6.4.5.1.3 Tabulated wind speeds are V_{ult} per ASCE 7-22.

6.4.5.1.4 Allowable wind speeds are based on the following: Components and Cladding wind loads, Zone 5, Mean roof height 30', Exposure B, 10 sq. ft. effective wind area. See the applicable building code for any adjustment needed for specific building location and configuration.

Table 41. Maximum Basic Wind Speed (mph) for H-SIS-SAG Assemblies with 18 mil CFS Members Spaced 16" o.c. [1,2]

Assembly Depth or Thickness	Span (ft)	Max. Structural Member Spacing (in)	Basic Wind Speed, V_{ult} (mph)	Basic Wind Speed, V_{ult}, at Various Deflection Limits (mph)				
				L/120	L/180	L/240	L/360	L/480
7" H-SIS-SAG	6	16 o.c.	200	200	200	200	200	200
	8		200	200	200	195	155	145
	9		200	200	185	165	130	120
	10		185	185	165	145	120	100
	11		175	175	145	120	100	85
	12		155	155	120	100	85	85
9" H-SIS-SAG	6	16 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	195
	9		200	200	200	200	185	165
	10		200	200	200	195	165	145
	11		200	200	195	175	145	120
	12		185	185	175	155	120	100
SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1 mph = 1.61 km/h								

Table 42. Maximum Basic Wind Speed (mph) for H-SIS-SAG Assemblies with 18 mil CFS Members Spaced 24" o.c [1,2]

Assembly Depth or Thickness	Span (ft)	Max. Structural Member Spacing (in)	Basic Wind Speed, V_{ult} (mph)	Basic Wind Speed, V_{ult}, at Various Deflection Limits (mph)				
				L/120	L/180	L/240	L/360	L/480
7" H-SIS-SAG	6	24 o.c.	200	200	200	200	200	185
	8		200	200	195	165	145	120
	9		185	185	165	145	120	100
	10		165	165	145	120	100	85
	11		145	145	120	100	85	85
	12		130	130	100	85	85	60
9" H-SIS-SAG	6	24 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	175
	9		200	200	200	200	165	145
	10		200	200	200	175	145	120
	11		200	200	175	155	120	100
	12		185	185	155	130	100	100
SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1 mph = 1.61 km/h								

Table 43. Maximum Basic Wind Speed (mph) for H-SIS-SAG Assemblies with 33 mil CFS Structural Members Spaced 16" o.c. [1,2]

Assembly Depth or Thickness	Span (ft)	Max. Structural Member Spacing (in)	Basic Wind Speed, V_{ult} (mph)	Basic Wind Speed, V_{ult}, at Various Deflection Limits (mph)				
				L/120	L/180	L/240	L/360	L/480
7" H-SIS-SAG	6	16 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	185
	9		200	200	200	200	175	155
	10		200	200	200	185	155	130
	11		195	195	185	155	130	120
	12		175	175	165	145	120	100
9" H-SIS-SAG	6	16 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	200
	9		200	200	200	200	200	200
	10		200	200	200	200	200	200
	11		200	200	200	200	200	185
	12		200	200	200	200	185	165
11" H-SIS-SAG	6	16 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	200
	9		200	200	200	200	200	200
	10		200	200	200	200	200	200
	11		200	200	200	200	200	200
	12		200	200	200	200	200	200
13" H-SIS-SAG	6	16 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	200
	9		200	200	200	200	200	200
	10		200	200	200	200	200	200
	11		200	200	200	200	200	200
	12		200	200	200	200	200	200

SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1 mph = 1.61 km/h

Table 44. Maximum Basic Wind Speed (mph) for H-SIS-SAG Assemblies with 33 mil CFS Structural Members Spaced 24" o.c.[1,2]

Assembly Depth or Thickness	Span (ft)	Max. Structural Member Spacing (in)	Basic Wind Speed, V_{ult} (mph)	Basic Wind Speed, V_{ult}, at Various Deflection Limits (mph)				
				L/120	L/180	L/240	L/360	L/480
7" H-SIS-SAG	6	24 o.c.	200	200	200	200	200	200
	8		200	200	200	200	175	145
	9		195	195	195	175	145	130
	10		175	175	175	155	120	100
	11		155	155	155	130	100	85
	12		145	145	130	120	100	85
9" H-SIS-SAG	6	24 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	200
	9		200	200	200	200	200	200
	10		200	200	200	200	200	175
	11		200	200	200	200	175	155
	12		185	185	185	185	155	130
11" H-SIS-SAG	6	24 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	200
	9		200	200	200	200	200	200
	10		200	200	200	200	200	200
	11		200	200	200	200	200	200
	12		200	200	200	200	200	175
13" H-SIS-SAG	6	24 o.c.	200	200	200	200	200	200
	8		200	200	200	200	200	200
	9		200	200	200	200	200	200
	10		200	200	200	200	200	200
	11		200	200	200	200	200	200
	12		200	200	200	200	200	200

SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1 mph = 1.61 km/h

6.4.6 *Axial Load Resistance:*

6.4.6.1 Structural performance for axial compression resistance is provided in **Table 45** for assembled with 18 mil CFS members, and **Table 46** for H-SIS-SAG assembled with 33 mil CFS structural members.

Table 45. Allowable (ASD) Gravity Loads for H-SIS-SAG with 18 mil CFS Structural Members

Assembly Depth or Thickness	Maximum Structural Member Spacing (in)	Allowable Compression Resistance (plf)						
		Nominal Wall Heights (ft)						
		8	9	10	11	12	13	14
7" H-SIS-SAG	16 o.c.	1,000	930	855	775	700	630	575
9" H-SIS-SAG		1,100	1,065	1,030	995	950	910	865
7" H-SIS-SAG	24 o.c.	750	695	640	580	525	475	430
9" H-SIS-SAG		825	800	775	745	715	680	650
SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1 plf = 0.0146 kN/m								

Table 46. Allowable (ASD) Gravity Loads for H-SIS-SAG with 33 mil CFS Structural Members

Assembly Depth or Thickness	Maximum Structural Member Spacing (in)	Allowable Compression Resistance (plf)						
		Nominal Wall Heights (ft)						
		8	9	10	11	12	13	14
7" H-SIS-SAG	16 o.c.	2,445	2,360	2,265	2,170	2,065	1,955	1,850
9" H-SIS-SAG		2,365	2,330	2,295	2,255	2,215	2,170	2,120
11" H-SIS-SAG		2,320	2,300	2,280	2,255	2,230	2,200	2,175
13" H-SIS-SAG		2,300	2,290	2,275	2,260	2,240	2,225	2,205
7" H-SIS-SAG	24 o.c.	1,835	1,770	1,700	1,625	1,550	1,465	1,385
9" H-SIS-SAG		1,770	1,750	1,720	1,690	1,660	1,625	1,590
11" H-SIS-SAG		1,740	1,725	1,710	1,690	1,670	1,650	1,630
13" H-SIS-SAG		1,725	1,715	1,705	1,695	1,680	1,665	1,650
SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 ft. = 0.3048 m, 1 plf = 0.0146 kN/m								

6.4.6.2 Structural performance under axial uplift load conditions is provided in **Table 47**.

Table 47. Allowable (ASD) Uplift Loads for H-SIS-SAG [1]

HWS Steel SIS Assembly	Minimum Structural Member Thickness (mil)	Maximum Structural Member Spacing (in)	Allowable Uplift Resistance (plf)
Minimum 7" H-SIS-SAG	18	16 o.c.	660
		24 o.c.	375
	33	16 o.c.	800
		24 o.c.	410
SI: 1 mil = 0.254 mm, 1 in = 25.4 mm, 1 plf = 0.0146 kN/m 1. Where higher capacities are needed for structural member spacing less than 16" on center, an engineered design may be used. 2. 18 mil CFS structural member shall have a minimum specified yield strength of 70 ksi, 3. 33 mil CFS structural member shall have a minimum specified yield strength of 33 ksi.			

6.4.7 *Pull-Off Resistance of the H-SIS-SAG Proprietary Laminate Attached to Structural Members:*

6.4.7.1 The allowable adhesive bond strength of H-SIS-SAG proprietary laminate adhered to structural framing is shown in **Table 48**.

Table 48. Pull-Off Resistance of the H-SIS-SAG Proprietary Laminate

Connection	Allowable Pull-off Resistance of Proprietary Laminate as Attached to Structural Members (psf)
Pull-off resistance of H-SIS-SAG Proprietary Laminate	120
SI: 1-psf = 47.9 Pa	

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

6.4.8.1 The allowable axial shear resistance design value of the proprietary exterior sheathing connected at the structural member connection interface is shown in **Table 49**.

Table 49. Axial (Gravity) Shear Resistance of the H-SIS-SAG Exterior Sheathing

H-SIS-AGS Exterior Sheathing	Allowable Resistance of the Exterior Sheathing Connection to the Structural Member (Gravity) (psf)
H-SIS-SAG Exterior Sheathing to Structural Member	240
SI: 1-psf = 47.9 Pa	

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

6.4.9.1 The allowable H-SIS-SAG tensile (suction perpendicular to studs) strength of the exterior sheathing is shown in **Table 50**.

Table 50. Tensile Strength of the Internal Bond of the H-SIS-SAG Exterior Sheathing

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

6.5 *Building Science*

6.5.1 *Thermal Resistance:*

6.5.1.1 Testing of the foam portion of the H-SIS-SAG Sheathing was conducted in accordance with ASTM C518. Thermal resistance and nominal density are listed in **Table 51**.

Table 51. Thermal Resistance and Density Properties of H-SIS-SAG Sheathing

Component	R-Value at a Mean Temperature of 75°F (23.9°C)	Density of XPS Foam Sheathing (pcf)
H-SIS-SAG Sheathing	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.		

6.5.2 *Moisture Vapor Permeance:*

6.5.2.1 The moisture vapor permeance of H-SIS-SAG exterior sheathing components is shown in **Table 52**.

Table 52. Moisture Vapor Permeance of H-SIS-SAG Exterior Sheathing Components[1]

Component	Vapor Permeance
2" H-SIS-SAG Exterior Sheathing	0.66 perm
1" H-SIS-SAG Exterior Sheathing	1.33 perm
1. Tested in accordance with ASTM E96.	

6.5.3 *Water-Resistive Barrier:*

6.5.3.1 The water-resistive barrier properties of the exterior sheathing component of the H-SIS-SAG is shown in **Table 53**.

Table 53. Water-Resistive Barrier Performance of the Exterior Sheathing Component of the H-SIS-SAG

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

6.6 *Fire Performance*

6.6.1 *Surface Burning Characteristics:*

6.6.1.1 The flame spread and smoke developed index performance of the exterior sheathing component of the H-SIS-SAG is shown in **Table 54**.

Table 54. Surface Burning Characteristics of the H-SIS-SAG Exterior Sheathing Component

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

6.6.2 *Thermal Barrier:*

6.6.2.1 H-SIS-SAG Sheathing up to 8" thick may be used without a prescriptive thermal barrier, pursuant to the tested performance found in **Table 55**, when sprinklers are installed according to the requirements of the following sprinkler standards:

6.6.2.1.1 NFPA 13 Standard for the Installation of Sprinkler Systems

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

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

6.6.2.2 Testing of H-SIS-SAG Sheathing generated the UL 1715 test results found in **Table 55**.

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

6.6.2.2.2 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 55. UL 1715 Tested Performance of H-SIS-SAG for Use as Interior Wall and Ceiling Finish Materials without a Thermal Barrier

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

6.7 *Impact Resistance (Hail)*

6.7.1 The H-SIS-SAG proprietary laminate used as the exterior face of the H-SIS-SAG exterior sheathing was tested in accordance with UL 2218 to evaluate resistance to damage from hail.

6.7.2 The results of this testing are shown in **Table 56**.

Table 56. Impact Resistance of H-SIS-SAG Sheathing and Laminate

Component	Minimum Component Thickness (in.)	Fastening Method to Structural Framing	Test Classification	Test Result
H-SIS-SAG Proprietary Laminate	1/16	12:12	4	PASS
H-SIS-SAG Proprietary Laminate	1/16	12:12 and proprietary polyurethane foam construction adhesive	4	PASS
2" H-SIS-SAG Exterior Sheathing	Proprietary laminate: 1/16 Foam: 2	12:12	4	PASS
SI: 1 in = 25.4 mm				

6.8 *Fastening for Cladding Materials*

6.8.1 Fasteners are required to attach cladding through the H-SIS-SAG Exterior Sheathing to the wall framing to carry the cladding weight.

6.8.1.1 See **Table 57** and **Table 58** for allowable cladding attachments with various fastener types for light-frame cold-formed steel construction.

6.8.2 The fasteners attaching the cladding through the H-SIS-SAG Sheathing to the wall framing shall have a minimum size and maximum spacing as shown in **Table 57** and **Table 58**.

6.8.3 All H-SIS-SAG Exterior Sheathing panel edges shall be supported by framing or blocking.

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

6.8.4.1 #8 screw: 0.164" shank diameter, 0.313" head diameter.

6.8.4.2 #10 screw: 0.190" shank diameter, 0.363" head diameter.

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

6.8.6 The specified cladding weight shall include all supported materials.

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

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

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

6.8.10 Wood furring as specified in **Table 58** is permitted to be any softwood species having an SG of at least 0.42. Steel furring and steel studs shall have a minimum yield strength F_y of 33 ksi.

6.8.10.1 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 57. Permitted Fastening for Direct Attachment of Cladding Materials Through the H-SIS-SAG Exterior Sheathing into the Steel Framing

Cladding Fastener Through 2" H-SIS-SAG Sheathing Into:	Cladding Fastener Type and Min. Size	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
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 58. Permitted Fastening for Furring Attachment Through the H-SIS-SAG Exterior Sheathing into the Steel Framing

Furring Material	Furring Fastener through 2" H-SIS-SAG Sheathing 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[1]	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													

6.9 *H-SIS-SAG Design Properties*

6.9.1 Where the design is outside of prescriptive conditions that are contained in the tabulated resistance properties found in **Table 35** through **Table 50** and the design requires a shorter span, longer span, multiple spans, a cantilever, a concentrated load, multiple load, etc., an engineered design is permitted.

6.9.2 The engineered design drawing development process follows:

6.9.2.1 To properly size H-SIS-SAG assemblies, beams, or columns, treat the H-SIS-SAG assemblies as 12″ wide members for structural resistance design purposes.

6.9.2.2 The allowable stress design values for H-SIS-SAG are defined in **Table 59** through **Table 62**.

6.9.2.3 Composite design properties to design a 12″ x X″ deep structural member. All composite assembly sections shall include a structural member at each end of the assembly section. Additional structural members may be added where additional framing is necessary. For instance, framing of windows, doors, other openings, etc. to transfer the loads.

6.9.2.4 To properly size innovative product assemblies and/or beams/columns, treat the H-SIS-SAG member as a 12x__ structural member as found in these Tables.

6.9.2.5 Analyze the resistance needed using standard engineering resistance equations per the member properties defined in in these Tables.

6.9.2.6 To install the sized member as the required assembly for any specific floor, wall, or roof application, it is required to implement all of **Sections 6.9** through **Section 6.10**.

Table 59. Design Properties for H-SIS-SAG assemblies constructed with 18 mil CFS Members 16" o.c. For Use in Standard Engineering Structural Resistance Equations (per linear foot)

Assembly	F_b (psi)	F_t (psi)	F_v (psi)	F_c (psi)	$F_{c\perp}$ (psi)	Bearing Capacity (lb)	EI (lb-in^2)	MOE (psi)	I (in^4)	S (in^3)
7" H-SIS-SAG	105	8	20	39	17	3,075	12,800,000	56,000	230	75
9" H-SIS-SAG	75	8	20	38	17	4,050	25,600,000	42,000	614	145
SI: 1 in = 25.4 mm, 1 psi = 0.00689 MPa										

Table 60. Design Properties for H-SIS-SAG assemblies Constructed with 18 mil CFS Members 24" o.c. For Use in Standard Engineering Structural Resistance Equations (per linear foot)

Assembly	F_b (psi)	F_t (psi)	F_v (psi)	F_c (psi)	$F_{c\perp}$ (psi)	Bearing Capacity (lb)	EI (lb-in^2)	MOE (psi)	I (in^4)	S (in^3)
7" H-SIS-SAG	80	8	18	29	11	2,300	9,600,000	42,000	230	75
9" H-SIS-SAG	55	8	18	28	11	3,025	20,000,000	33,000	614	145
SI: 1 in = 25.4 mm, 1 psi = 0.00689 MPa										

Table 61. Design Properties for H-SIS-SAG assemblies constructed with 33 mil CFS Structural Members 16" o.c. For Use in Standard Engineering Structural Resistance Equations (per linear foot)

Product	F_b (psi)	F_t (psi)	F_v (psi)	F_c (psi)	$F_{c\perp}$ (psi)	Bearing Capacity (lb)	EI (lb-in^2)	MOE (psi)	I (in^4)	S (in^3)
7" H-SIS-SAG	135	8	18	47	17	3,700	22,200,000	97,000	230	75
9" H-SIS-SAG	110	8	18	42	17	4,575	58,800,000	96,000	614	145
11" H-SIS-SAG	85	8	18	40	17	5,300	105,700,000	91,000	1,158	221
13" H-SIS-SAG	70	8	18	40	17	6,175	169,900,000	94,000	1,953	313
SI: 1 in = 25.4 mm, 1 psi = 0.00689 MPa										

Table 62. Design Properties for H-SIS-SAG assemblies constructed with 33 mil CFS Structural Members 24" o.c. For Use in Standard Engineering Structural Resistance Equations (per linear foot)

Product	F_b (psi)	F_t (psi)	F_v (psi)	F_c (psi)	$F_{c\perp}$ (psi)	Bearing Capacity (lb)	EI (lb-in^2)	MOE (psi)	I (in^4)	S (in^3)
7" H-SIS-SAG	100	8	18	35	11	2,775	16,600,000	72,000	230	75
9" H-SIS-SAG	85	8	18	32	11	3,425	44,100,000	72,000	614	145
11" H-SIS-SAG	65	8	18	30	11	3,975	79,300,000	69,000	1,158	221
13" H-SIS-SAG	55	8	18	30	11	4,625	127,400,000	65,000	1,953	313
1. SI: 1 in = 25.4 mm, 1 psi = 0.00689 MPa										

6.9.3 Analyze the resistance needed, using standard engineering structural resistance equations per the allowable stress design properties, for each 12" wide by member depth and the following:

6.9.3.1 Create an engineered design drawing for the application, which includes but is not limited to; span, depth, applied loads, support conditions, anchorage, reaction limits, component connections, deflection limits, moisture conditions, serviceability conditions, durability conditions, end connection details, boundary condition application details, width of the H-SIS-SAG assembly to resist applied loads, and so forth.

6.9.3.2 Each H-SIS-SAG engineered design and associated engineered design drawing shall for the specific application, provide detailing sufficient to create details that comply with all of **Section 6.9** through **Section 6.10**.

6.9.3.3 Each H-SIS-SAG structural member (i.e., wall member) design is defined as engineered design pursuant to the building code and professional engineering law, which requires the design to be performed by a Registered Design Professional where all loading and boundary conditions are defined by the Registered Design Professional in Responsible Charge.

6.9.4 For assistance with H-SIS-SAG specialty engineered designs, please contact HWS Global.

6.10 The final application of H-SIS-SAG shall conform to the following requirements:

6.10.1 A minimum 18 mil, 3 5/8″ web width, and 1 1/4″ legs with a yield strength of 70 ksi CFS member is required to be applied at a maximum of 24″ o.c. unless otherwise defined herein.

6.10.2 Proprietary polyurethane foam construction adhesive is applied to each CFS member along the length of structural members and top/bottom plates to achieve full coverage of CFS members after application of the H-SIS-SAG Sheathing Panels.

6.10.2.1 The foam sheathing is adhered to CFS members post adhesive application.

6.10.2.2 All structural assembly edges and ends require the exterior sheathing to be glued and attached to a CFS member.

6.10.2.3 All unsupported H-SIS-SAG Sheathing Panel edges or ends must be supported by a CFS member.

6.10.3 All connections shall be designed separately to transfer load from H-SIS-SAG to other structural members to the foundation.

6.10.3.1 Refer to the manufacturer details and installation instructions.

6.10.4 *Design for Compression Loads:*

6.10.4.1 The maximum allowable compression load for H-SIS-SAG is specified in **Table 45** and **Table 46** where H-SIS-SAG assemblies utilizing minimum 18 mil and 33 mil CFS structural framing members as wall studs and plates.

6.10.4.2 The allowable axial compression for H-SIS-SAG assemblies can be calculated using the provisions shown in Sections E2 and I4 of AISI S100-16(2020).

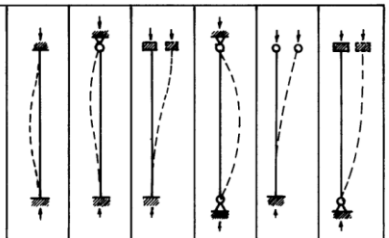
6.10.4.3 For the H-SIS-SAG panel elastic buckling strength, the values in **Table 59** through **Table 62** can be used to determine the elastic critical buckling design load, $(P_{cr})_e$ (plf). Compute $(P_{cr})_e$ using the formula in **Equation 1**.

Equation 1. Allowable Elastic Critical Buckling Design Load along H-SIS-SAG panel (plf)

$$(P_{cr})_e = \frac{\pi^2 EI}{1.8(KL)^2}$$

Where: EI = Bending stiffness for H-SIS-SAG panel (lb-in^2)

K= Effective length factor

Buckling modes						
Theoretical K_e value	0.5	0.7	1.0	1.0	2.0	2.0
Recommended design K_e when ideal conditions approximated	0.65	0.80	1.2	1.0	2.10	2.4
End condition code	Rotation fixed, translation fixed Rotation free, translation fixed Rotation fixed, translation free Rotation free, translation free					

L = Unbraced length (in) (e.g. panel height for out of plane load

6.10.5 *Design for Bending:*

6.10.5.1 The maximum bending moment and shear forces shall not exceed the reference design values for the H-SIS-SAG specified in **Table 59** through **Table 62** through per section F2 in AISI S100-16(2020).

6.10.6 *Design for Combined Bending and Axial Compression Loads:*

6.10.6.1 Members subjected to a combination of bending about a single axis of symmetry and axial compression shall be proportioned in accordance with **Equation 2**.

Equation 2. Axial Compressive Stress

$$\frac{1.8 \cdot P}{P_a} + \frac{1.67 \cdot M_x}{M_{ax}} \leq 1.0$$

Where:

P = Required compressive axial strength of H-SIS-SAG section

P_a = Available compression axial strength of H-SIS-SAG section

M_x = Required flexural strength of H-SIS-SAG section

M_{ax} = Available flexural strength of H-SIS-SAG section

6.11 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[23]

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.[24]

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.[25]

8 Installation

8.1 *Installation Procedure to Produce a Complete H-SIS-SAG 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 2" XPS foam plastic insulation factory adhered to a proprietary laminate. The laminate faces the exterior and is attached to structural members a maximum of 24″ o.c. All panel edges and ends require the exterior sheathing to be glued and fastened to a structural member.

8.1.3.1.1 Sheathing joints shall be butted at framing members.

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-SIS-SAG 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″ wafer head self-drilling screws.

8.1.3.2.2.1 Screws are driven through the exterior sheathing and into the flanges of the CFS structural members at 48" o.c. along the panel edges and 48" o.c. in the field.

8.1.4 *Structural Member:*

8.1.4.1 CFS structural members are listed in the tables in **Section 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-SIS-SAG Component*

8.2.1 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.

8.2.2 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.

8.3 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 Wall bracing based on AISI S230, Method A, provisions adjusted with equivalency factors from **Table 34**

9.1.2 In-plane lateral wall testing in accordance with ASTM E564

9.1.3 Cyclic wall testing in accordance with ASTM E2126

9.1.4 Transverse load testing in accordance with ASTM E330

9.1.5 Basic wind speed calculations in accordance with ASCE/SEI 7 performed by DrJ Engineering

9.1.6 Compression resistance calculations in accordance with AISI S240 and AISI S100 performed by DrJ Engineering

9.1.7 Uplift resistance and large-scale foam shear testing in accordance with ASTM E72

9.1.8 Pull-off resistance testing in accordance with ASTM C1860

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

9.1.10 Thermal resistance testing in accordance with ASTM C518

9.1.11 Vapor permeance testing in accordance with ASTM E96

9.1.12 Water resistance testing in accordance with ASTM D779

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

9.1.14 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.[26]

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

10 Findings

10.1 As outlined in **Section 6**, H-SIS-SAG 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's installation instructions, H-SIS-SAG shall be approved for the following applications:

10.2.1 Prescriptive wall bracing as described in **Table 3** through **Table 34**.

10.2.2 Structural performance as described in **Table 35** through **Table 50**.

10.2.3 Thermal performance as described in **Table 51**.

10.2.4 Water vapor permeance as described in **Table 52**.

10.2.5 Water resistance as described in **Section 6.5.3 and Table 53**.

10.2.6 Fire performance characteristics as described in **Table 54**.

10.2.7 Use without a thermal barrier as described in **Table 55**.

10.2.8 Impact resistance as described in **Table 56**.

10.2.9 Cladding attachment through 2″ H-SIS-SAG Sheathing as described in **Table 57** and **Table 58**

10.2.10 Design properties as listed in **Table 59** through **Table 62**.

10.3 Unless exempt by state statute, when H-SIS-SAG 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 (IRC Section R104.2.2 and IFC Section 104.2.3[27] 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:**[28] Building regulations require that the building official shall accept duly authenticated reports.[29]

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.[30]

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 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:

11.3.1 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.

11.3.2 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.

11.3.2.1 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.

11.3.2.2 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.

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

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

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

11.3.6 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.

11.3.7 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.

11.4 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.

11.5 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).

11.6 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 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.

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 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 2024 version of the codes and the standards referenced therein. This material, product, design, service, and/or method of construction also complies with the 2000-2024 versions of the referenced codes and the standards referenced therein.

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

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

22 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

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

24 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

25 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

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

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