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TONGUE & GROOVE (T-G) PANELS

CSI Division: 07 00 00-THERMAL AND MOISTURE PROTECTION

**CSI Section: 07 40 00—RoofingPanels
07 42 00—Wall Panels**

1.0 SCOPE OF EVALUATION

1.1 Compliance to the following codes & regulations:

- 2018, 2015, and 2012 International Building Code® (IBC)
- 2018, 2015, and 2012 2009 International Residential Code® (IRC)
- 2020 Florida Building Code, Building – Supplement attached
- 2020 Florida Building Code, Residential – Supplement attached

1.2 Evaluated in Accordance with:

- 2016/S1-18, 2012, and 2007 with Supplement 2 (2010) North American Specification for the Design of Cold-Formed Steel Structural Members (AISI)
- ASCE 7-2016 and 7-2010 Minimum Design Loads for Buildings and Other Structures

1.3 Properties assessed:

- Structural

2.0 PRODUCT USE

The Tongue and Groove (T-G) panels are insulated structural composites that are used to construct walls, floors, and roofs in Type V construction. When used in Types I through IV construction, documentation shall be submitted to the Building Official in accordance with Chapter 6 and Sections 718 and 2603 of the IBC as required for the specific project. Use in Types I through IV construction is outside the scope of this report. Walls may be either load-bearing or non-load bearing. This panelized system is available for both residential and commercial applications. The panels comply with IBC Section K107 as prefabricated construction. The panels are permitted where an engineering design is submitted in accordance with Section R301.1.3 of the IRC.

3.0 PRODUCT DESCRIPTION

3.1 Product Information: T-G panels are manufactured with expanded polystyrene foam plastic insulation and light gauge galvanized steel to create an insulated lightweight structural composite panel. Evaluation the foam plastic is outside the scope of this report. The light gauge steel members (stiffeners) support loads and are flush with each face of the panel. The light gauge steel load-bearing stiffeners are separated and bonded to the Expanded Polystyrene (EPS) insulation that provides a thermal break between faces. Panels are manufactured by applying a thermosetting adhesive coating to the steel and then subjecting the framing members to low-pressure molding.

3.1.1 Framing: The framing members (stiffeners) are light-gauge galvanized steel embedded in both faces of the panel. Stiffeners are spaced at 16 inches (406 mm) or 24 inches (610 mm) on center. The light gauge material is roll-formed from Nos. 24, 20, 18, or 16 gauge steel sheets bent to shape for use in the panel, as shown in Figure 1 of this report.

3.1.2 Tracks: Panel ends are supplied with Nos. 18, 20, or 24 gauge galvanized or galvalume coated steel tracks.

3.1.3 Upper Header: In wall panels, the upper header is metal. The header width shall match the EPS core thickness.

3.1.4 Panel: The standard manufactured panel is 48 inches (1219 mm) wide. Standard panel lengths are 8 feet (2438 mm), 9 feet (2743 mm), 10 feet (3048 mm), or 12 feet (3658 mm). In addition, custom widths and lengths may be formed. Standard panel thicknesses are 3½ inches (89 mm), 5½ inches (140 mm), and 7½ inches (190 mm), as illustrated in Figure 1 of this report. The T-G fastening system provides for an opening for a wire chase between panels.

3.1.5 Connector/Shear Plate: Connector/shear plates are light gauge steel with a minimum thickness of No. 20 gauge, as shown in Table 2 of this report. The plate area shall be no smaller than 3-inch-by-5- inch (76 mm-by-127 mm).

3.1.6 Self-tapping Screws: The screws shall be No.8 by ½-inch-long (12.7 mm), self-tapping, and produced from steel complying with AISI 1018 or equivalent. Steel hardness shall meet the Rockwell C44 minimum hardness value.

3.2 Material Information

3.2.1 Expanded Polystyrene (EPS): EPS panels shall be manufactured in accordance with ASTM C578. The flame-spread index and smoke density index shall be less than 25 and 450, respectively, at a minimum density of 1.3 pounds per cubic foot (20.8 kg/m³). Evaluation of the EPS is outside

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

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the scope of this report. EPS panel density varies with thickness, as summarized in Table 1 of this report.

TABLE 1—EPS Densities

Thickness		Density			
		Minimum		Nominal	
Inches	(mm)	Pcf ^a	(g/l) ^b	Pcf ^a	(g/l) ^b
3.5	89	1.25	20	1.50	24.0
5.5	140	0.9	14	1.0	16
7.5	190	0.9	14	1.0	16

^apounds per cubic foot ^bgrams per liter

3.2.2 Panel Steel: All steel members shall be manufactured in accordance with ASTM A653 SS, Grade 37, and coated with ASTM A924 G60 galvanizing/galvalume. In this evaluation report, steel thickness refers to the minimum uncoated base-metal thickness. The design thickness is based on AISI uncoated values, as noted in Table 2 of this report.

TABLE 2—Light Gauge Metal Coil Thickness (inches)

Gauge	Uncoated		Coated (Galvanized)		
	Minimum	Nominal	AISI Design	Abs min	Nominal
24	0.0209	0.0239	0.022	0.0236	0.0276
22	0.0269	0.0299	0.0283	0.0296	0.0336
20	0.0329	0.0359	0.0346	0.0356	0.0396
18	0.0428	0.0478	0.0451	0.0466	0.0516
16	0.0538	0.0598	0.0566	0.0575	0.0635

3.2.3 Thermosetting Adhesive: A Thermosetting neoprene/phenol adhesive is applied to steel stiffeners and tracks prior to molding the panel.

4.0 DESIGN AND INSTALLATION

4.1 Design

4.1.1 Design Loads: Design loads shall be determined in accordance with the applicable code and manufacturer’s design manual. The design may be based on Allowable Stress Design (ASD) or Load Resistance Factor Design (LRFD). Both the allowable design load and the load causing failure are provided in load Tables 3 through 9 of this report. These two types of loadings are consistent with the IBC and are provided to give the designer a choice.

4.1.1.1 Wall Bearing Loads: Axial compressive Loads may act on a wall panel as a point load (lbs), or distributed load (lbs/ft). Table 3 of this report shows allowable (ASD) or capacity (LRFD) of a point load acting on two stiffeners or studs (one on each face) of a panel. If a point load is between stiffeners, the top plate shall be sized for the location of the load on the plate.

4.1.1.2 Transverse Loads: Panels may be used to support floor or roof loads. Tables 4 through 9 of this report provide uniformly distributed transverse allowable (ASD) and failure

(LRFD) loads. Single span deflections for service live loads are also given.

4.1.1.3 Shear Racking Loads: Panels resist seismic and wind through shear. ASTM E72 shear racking tests were conducted on both single panel and double panel (96-inch) widths. Shear racking resistance values in Tables 10 to 14 of this report are based on no gravity loads. These tables account for wall failure (yielding, local buckling, or lateral buckling) of the studs at the leading edge (a strength criterion) and an IBC code racking limit (a service limit). Axial compressive strength (LRFD) or allowable load (ASD) at leading edge studs are provided in Table 16 of this report. The tables provide both LRFD and ASD provisions for checking the strength of the panel. The racking limit between floors is h/50 (0.02h) where h is the height between floors. These tables also provide an allowable racking shear and shear stiffness so the IBC code racking deformation limits may be met. Code-based gravity and (seismic or wind) load combinations shall be checked for the leading stud. This reaction shall meet Equations EQ-1 and EQ-2 in which the subscript “a” is allowable and “n” is nominal.

$$\text{ASD: } R_c \leq R_a \quad (\text{EQ-1})$$

$$\text{LRFD: } (R_u = R_c) \leq \phi R_n \quad (\text{EQ-2})$$

4.1.1.4 Load Interaction: If loading conditions result in a simultaneously applied axial and transverse load, the Equations EQ-3 or EQ-4 shall be used:

$$\text{ASD: } \left(\frac{p}{p_a} \right) + \left(\frac{w}{w_a} \right) \leq 1 \quad (\text{EQ-3})$$

$$\text{LRFD: } \left(\frac{p_u}{\phi p_n} \right) + \left(\frac{w_u}{\phi w_n} \right) \leq 1 \quad (\text{EQ-4})$$

The axial compressive loads may be either distributed or a point load; p is an axial load and w is a transverse load. The subscript “a” is allowable, “n” is nominal, and “u” is factored.

4.1.1.5 In-Plane Loads: Panels may be used to resist in-plane shear in all seismic design categories. Panels may be light-frame load-bearing or light-frame non-load bearing elements. The design coefficients and factors for seismic force resisting systems shall be as shown in Table 15 of this report.

4.1.2 Limitations of the Load Tables: Tabulated loads listed in the load tables may be used for shorter spans or shorter heights. Extrapolation of panel lengths is outside the scope of this report. The EPS minimum density for 3.5-inch-thick (88.9 mm) structural panels is 1.5 pcf (24 kg/m³).

4.1.3 Scope: Other supporting elements typically used to brace against design loads such as siding, wood structural



sheathing (OSB or Plywood), and gypsum board are outside the scope of this report.

4.2 Installation: Panels shall be installed in accordance with the items listed in this report, the manufacturer's installation instructions, and IBC Section 2603. Where conflicts occur, the more restrictive shall govern.

4.2.1 Panel to Panel Connection: T-G Panels shall be connected to each other by shear plate connectors. Each panel has a steel channel that runs full length along the edges of the outside and inside facings. The facings butt to the edge of the next panel. A minimum of four equally spaced connector/shear steel plates (maximum spacing of 2 feet-6 inches (762 mm)) shall be attached with three self-tapping screws to each framing member. The connector/shear plate shall be applied on both faces of the panels.

4.2.2 Corners: Corners are joined in accordance with the details shown in Figure 2 of this report.

4.2.3 Exterior and Interior Wall Panels: Each exterior and interior wall panel shall be attached to the top and bottom tracks with self-tapping screws. Three self-tapping screws shall be provided at inside and outside faces where track and stud (stiffener) intersect. If required, a second top track or wood top plate may be installed.

4.2.4 Roof and Floor Panels: Each roof and floor panel shall have an in-plane boundary element field-installed across the width of the top and bottom of the panel similar to the top and bottom tracks of exterior and interior wall panels.

4.2.5 Cladding Attachment

4.2.5.1 Exterior Walls: Exterior wall panels shall be protected with a water-resistive barrier in accordance with IBC Chapter 14. Exterior wall panels shall be protected with a code complying exterior wall covering. The exterior wall coverings shall be installed in accordance with applicable codes and the manufacturer's recommendations. Thermal barriers are required in accordance with Section 5.4 of this report.

4.2.5.2 Interior Walls: The interior wall panels shall be covered with an approved interior wall covering. Installation methods shall be approved by the building official and in accordance with the IBC or IRC. Thermal barriers are required in accordance with Section 5.4 of this report.

4.2.5.3 Roof: The roof covering, flashing, and underlayment, shall be installed in accordance with IBC Chapter 15 and approved by the building official. Thermal barriers are required in accordance with Section 5.6 of this report. Minimum roof slope shall be in accordance with IBC Chapter 15 or IRC Chapter 9. The roof shall provide for proper drainage.

4.2.5.4 Floor: Floor panels shall be covered with an approved floor covering. Installation methods shall be in accordance with the current IBC. Thermal barriers are required in accordance with Section 5.4 of this report.

5.0 LIMITATIONS

The Tongue & Groove (T-G) Panels described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 T-G "Manufactured Panel Building Systems" shall be identified and installed in accordance with this report, the manufacturer's instructions, the IBC or IRC, AISI S100, and ASCE 7. Where conflicts occur, the more restrictive shall govern.

5.2 When required, structural calculations shall be performed and submitted to the building official by the permit applicant for approval to size panels to carry the applied loads. Calculations shall also be performed to resist in-plane shear, panel connections, top and bottom plate connections, upper header size, lintel types and sizes for openings, anchors between walls and floor, and supporting structure. The plans, specifications, structural calculations, and other construction documents shall be prepared by a registered design professional when required by the statutes of the jurisdiction where the panels are used.

5.3 T-G Panels are recognized for use in Type V construction. When used in Types I through IV construction, documentation shall be submitted to the Building Official in accordance with Chapter 6 and Sections 718 and 2603 of the IBC as required for the specific project. Use in Types I through IV construction is outside the scope of this report.

5.4 Except as provided for in IBC 2018, 2015, 2012 Section 2603.4.1 and 2012 IBC Section 2603.10, 2009 IBC Section 2603.9 and IRC Sections R316.5 and R316.6, T-G Panels shall be separated from the interior of a building by a thermal barrier of minimum ½ inch (12.7 mm) thick gypsum wallboard or other approved material in accordance with IBC 2603.4. Thermal barrier exceptions in 2018, 2015, 2012 IBC Sections 2603.4.1.1 through 2603.4.1.14, 2009 IBC Sections 2603.4.1 through 2603.13, and IRC Sections R316.5 and R316.6, do not apply to foam plastic insulation used as an interior wall or ceiling finish in plenums.

5.5 Roof covering, flashing, and underlayment shall be in accordance with IBC Chapter 15 or IRC Chapter 9 and approved by the building official. The use with hot-asphalt or hot-coal roof coverings are outside the scope of this report.

5.6 T-G panels are manufactured with an expanded polystyrene core (EPS). The EPS core has a permeability rating sufficient to not require a vapor barrier.



5.7 In areas where the probability of termite infestation is very heavy in accordance with 2018, 2015, and 2009 IBC Figure 2603.8, 2012 IBC Figure 2603.9, and IRC Figure R301.2(6), installation is limited in accordance with 2018, 2015, 2009 IBC Section 2603.8, or 2012 IBC Section 2603.9.

5.8 Field-cutting of the panel, and panel alteration, are outside the scope of this report.

5.9 T-G Panels are fabricated at ThermaSteel Inc. facilities in Radford, Virginia under a quality control program that complies with the minimum requirements for IAPMO UES Listee's Quality Assurance System.

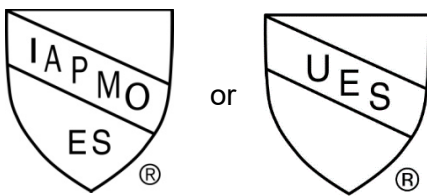
5.10 Foam plastic insulation used in the panels shall be listed in a product evaluation report showing compliance with requirements of IBC Chapter 26 from an approved and accredited certification agency or other nationally recognized certification program accepted by IAPMO Uniform Evaluation Services.

6.0 SUBSTANTIATING DATA

Test reports are from laboratories in compliance with ISO/IEC 17025. Test data was in accordance with the Standard Test Methods of Conducting Strength Tests of Panels for Building Construction, ASTM E72.

7.0 IDENTIFICATION

The T-G Panels are identified by a label that notes the manufacturer's name, product name, IAPMO UES's Mark of Conformity, and the Uniform Evaluation Report number (ER-128). Either Mark of Conformity may be used as shown below:

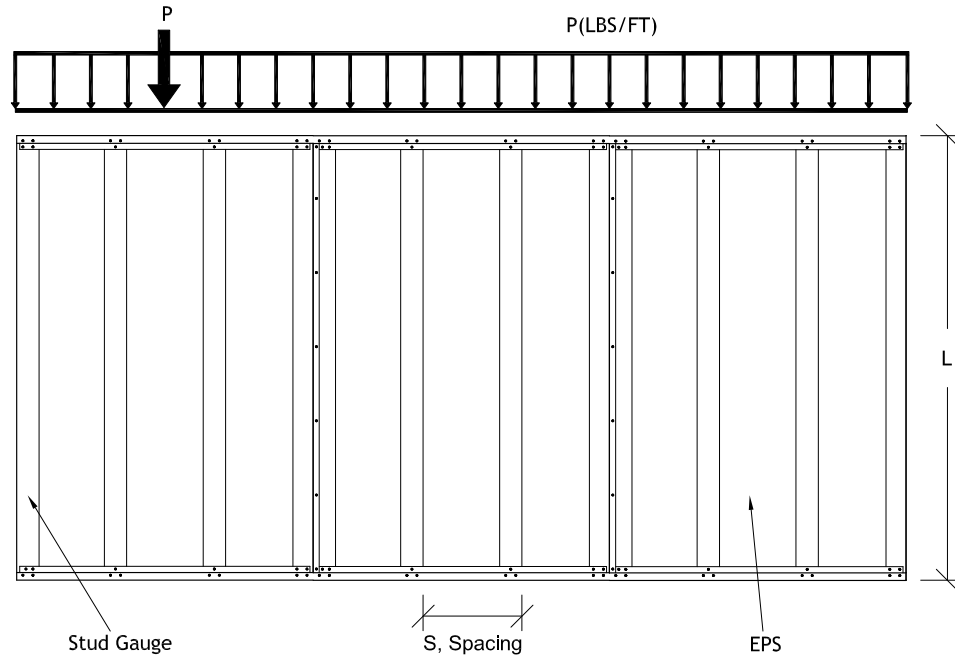


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8.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed out by IAPMO Uniform Evaluation Service on ThermaSteel Inc. Tongue & Groove (T-G) Panels to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification. Products are manufactured at locations noted in Section 5.9 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report please visit www.uniform-es.org or email at info@uniform-es.org



Elevation View: Wall Panel with a Point Load and/or Distributed Load

TABLE 3 - Concentrated Axial Design Load per 2 Stiffeners¹ (one on each face)

Length (ft)	Gauge	Strength, LRFD (ϕP_n)			Allowable, ASD (P_a)		
		3.5" (lbs)	5.5" (lbs)	7.5" (lbs)	3.5" (lbs)	5.5" (lbs)	7.5" (lbs)
8	24	2432	---	---	1,535	---	---
9	24	2432	---	---	1,535	---	---
10	24	2432	---	---	1,535	---	---
12	24	2432	---	---	1,535	---	---
8	20	4,612	5,004	6,210	2,882	3,127	3,881
9	20	4,612	5,004	6,210	2,882	3,127	3,881
10	20	4,612	5,004	6,210	2,882	3,127	3,881
12	20	4,612	5,004	6,210	2,882	3,127	3,881
8	18	9,682	9,977	11,233	6,051	6,236	7,020
9	18	9,209	9,977	11,143	5,756	6,236	6,965
10	18	8,708	9,977	11,019	5,442	6,236	6,887
12	18	7,649	9,938	10,735	4,781	6,211	6,709
8	16	13,568	13,583	14,059	8,480	8,489	8,787
9	16	12,907	13,324	13,918	8,067	8,327	8,699
10	16	12,207	13,040	13,761	7,629	8,150	8,601
12	16	10,727	12,406	13,406	6,704	7,754	8,379

¹3.5-inch panels are made with 350S075-mils type studs at each face. 5.5-inch and 7.5-inch panes are made with 362S162-mils type studs at each face.



TABLE 4 - 3.5" Thick Panel; Stiffeners at 16" o.c.

Gauge	L (ft)	Axial Distributed Loads (plf) ^a		1.5 pcf (EPS): Transverse Loads (psf) ^b				
		Strength	Service	Strength	Service loads			
		LRFD (ϕp_n)	ASD (p_a)	LRFD (ϕw_n)	ASD (w_a)	L/180	L/240	L/360
24	8	2,432	1,520	56	35	47	35	24
24	9	2,432	1,520	45	28	45	34	23
24	10	2,432	1,520	36	23	34	25	17
24	12	2,432	1,520	25	16	20	15	10
20	8	4,612	2,882	56	35	89	67	44
20	9	4,612	2,882	50	31	66	49	33
20	10	4,612	2,882	45	28	50	37	25
20	12	4,612	2,882	36	22	30	23	15
18	8	9,729	6,081	56	35	107	80	54
18	9	9,729	6,081	50	31	80	49	33
18	10	9,729	6,081	45	28	61	46	30
18	12	8,630	5,394	37	23	37	28	19
16	8	13,568	8,480	56	35	125	93	62
16	9	12,907	8,067	50	31	94	70	47
16	10	12,207	7,629	45	28	72	54	36
16	12	10,727	6,704	37	23	45	34	22

TABLE 5 - 3.5" Thick Panel; Stiffeners at 24" o.c.

Gauge	L (ft)	Axial Distributed Loads (plf) ^a		1.5 pcf (EPS): Transverse Loads (psf) ^b				
		Strength	Service	Strength	Service loads			
		LRFD (ϕp_n)	ASD (p_a)	LRFD (ϕw_n)	ASD (w_a)	L/180	L/240	L/360
24	8	1,841	1,151	43	27	44	33	22
24	9	1,841	1,151	34	21	31	24	16
24	10	1,841	1,151	27	17	23	17	12
24	12	1,841	1,151	19	12	14	10	7
20	8	3,459	2,162	56	35	64	48	32
20	9	3,459	2,162	48	30	47	35	23
20	10	3,459	2,162	39	24	35	26	17
20	12	3,459	2,162	27	17	21	16	10
18	8	7,297	4,560	56	35	79	59	39
18	9	7,297	4,560	50	31	58	35	23
18	10	7,297	4,560	45	28	43	33	22
18	12	6,472	4,045	35	22	26	20	13
16	8	10,176	6,360	56	35	93	70	46
16	9	9,680	6,050	50	31	69	51	34
16	10	9,155	5,722	45	28	52	39	26
16	12	8,045	5,028	37	23	32	24	16

Loadings comply with 2007 with S2 (2010), 2012 and 2016 AISI S100; IBC, 2009 2012 2015 and 2018; and IRC, 2009, 2012 2015 and 2018.

LRFD: Capacity factor, $\phi=0.8$ (axial & flexure); $\phi=0.5$ (shear); ASD: Factor of safety = 2.0

(a) Values account for yielding, local buckling, and lateral buckling.

(b) Values account for yielding, local buckling, and lateral torsional buckling.



TABLE 6 - 5.5" Thick Panel; Stiffeners at 16" o.c.

Gauge	L (ft)	Axial Distributed Loads (plf) ^a		1 pcf (EPS): Transverse Loads (psf) ^b				
		Strength	Service	Strength	Service loads			
		LRFD (ϕp_n)	ASD (p_a)	LRFD (ϕw_n)	ASD (w_a)	L/180	L/240	L/360
20	8	5,000	3,125	88	55	94	70	47
20	9	5,000	3,125	78	49	77	58	39
20	10	5,000	3,125	70	44	64	48	32
20	12	5,000	3,125	59	37	45	34	22
18	8	9,977	6,236	88	55	101	76	51
18	9	9,977	6,236	78	49	84	58	39
18	10	9,977	6,236	70	44	71	53	35
18	12	9,938	6,211	59	37	51	38	25
16	8	13,583	8,489	88	55	107	80	53
16	9	13,324	8,327	78	49	90	67	45
16	10	13,040	8,150	70	44	76	57	38
16	12	12,406	7,754	59	37	56	42	28

TABLE 7 - 5.5" Thick Panel; Stiffeners at 24" o.c.

Gauge	L (ft)	Axial Distributed Loads (plf) ^a		1 pcf (EPS): Transverse Loads (psf) ^b				
		Strength	Service	Strength	Service loads			
		LRFD (ϕp_n)	ASD (p_a)	LRFD (ϕw_n)	ASD (w_a)	L/180	L/240	L/360
20	8	3,750	2,344	88	55	81	61	41
20	9	3,750	2,344	78	49	65	49	33
20	10	3,750	2,344	70	44	53	40	26
20	12	3,750	2,344	59	37	36	27	18
18	8	7,483	4,677	88	55	90	67	45
18	9	7,483	4,677	78	49	73	49	33
18	10	7,483	4,677	70	44	60	45	30
18	12	7,453	4,658	59	37	42	31	21
16	8	10,187	6,367	88	55	96	72	48
16	9	9,993	6,246	78	49	79	59	40
16	10	9,780	6,113	70	44	66	49	33
16	12	9,305	5,816	59	37	47	35	23

Loadings comply with 2001, 2007 with S2 (2010), 2012, and 2016 AISI S100; IBC 2009, 2012, 2015, and 2018, and IRC 2009, 2012, 2015, and 2018.

LRFD: Capacity factor, $\phi=0.8$ (axial & flexure); $\phi=0.5$ (shear); ASD: Factor of safety = 2.0

(a) Values account for yielding, local buckling, and lateral buckling.

(b) Values account for yielding, local buckling, and lateral torsional buckling.



TABLE 8 - 7.5" Thick Panel; Stiffeners at 16" o.c.

Gauge	L (ft)	Axial Distributed Loads (plf) ^a		1 pcf (EPS): Transverse Loads (psf) ^b				
		Strength	Service	Strength		Service Loads		
		LRFD (ϕP_n)	ASD (P_a)	LRFD (ϕW_n)	ASD (W_a)	L/180	L/240	L/360
20	8	6,205	3,878	120	75	70	52	35
20	9	6,205	3,878	107	67	60	45	30
20	10	6,205	3,878	96	60	52	39	26
20	12	6,205	3,878	80	50	40	30	20
18	8	11,233	7,020	120	75	72	54	36
18	9	11,143	6,965	107	67	62	45	30
18	10	11,019	6,887	96	60	55	41	27
18	12	10,735	6,709	80	50	43	32	21
16	8	14,059	8,787	120	75	73	55	37
16	9	13,917	8,698	107	67	64	48	32
16	10	13,761	8,601	96	60	56	42	28
16	12	13,405	8,378	80	50	44	33	22

TABLE 9 - 7.5" Thick Panel; Stiffeners at 24" o.c.

Gauge	L (ft)	Axial Distributed Loads (plf) ^a		1 pcf (EPS): Transverse Loads (psf) ^b				
		Strength	Service	Strength	Stress	Service Deflection		
		LRFD (ϕP_n)	ASD (P_a)	LRFD (ϕW_n)	ASD (W_a)	L/180	L/240	L/360
20	8	4,654	2,909	120	75	66	49	33
20	9	4,654	2,909	107	67	56	42	28
20	10	4,654	2,909	96	60	48	36	24
20	12	4,654	2,909	80	50	36	27	18
18	8	8,424	5,265	120	75	69	51	34
18	9	8,358	5,223	107	67	59	42	28
18	10	8,264	5,165	96	60	51	38	25
18	12	8,051	5,032	80	50	39	29	19
16	8	10,544	6,590	120	75	71	53	35
16	9	10,438	6,524	107	67	61	46	30
16	10	10,321	6,450	96	60	53	40	27
16	12	10,054	6,284	80	50	41	31	21

Loadings comply with 2007 with S2 (2010), 2012, and 2016 AISI S100; IBC 2009, 2012, 2015 and 2018; and IRC 2009, 2012, 2015 and 2018.

LRFD: Capacity factor, $\phi=0.8$ (axial & flexure); $\phi=0.5$ (shear); ASD: Factor of safety = 2.0

a) Values account for yielding, local buckling, and lateral buckling.

(b) Values account for yielding, local buckling, and lateral torsional buckling.



TABLE 10 - 3.5" (1.5 pcf) Thick Panel (Shear Racking with No Gravity Loads)

Stiffners Gage	EPS Density (pcf)	h (ft)	Stud Spacing @ 16" o.c.				Stud Spacing @ 24" o.c.			
			Limiting Shear Force		Displ: $\Delta r \leq 0.02h$		Limiting Shear Force		Displ: $\Delta r \leq 0.02h$	
			LRFD:(ϕv_n)	ASD:(v_a)	Force	Stiffness	LRFD:(ϕv_n)	ASD:(v_a)	Force	Stiffness
			(plf)	(plf)	v_d (plf)	k(plf/in)	(plf)	(plf)	v_d (plf)	k(plf/in)
24	1.5	8	327	204	327	170.5	314	196	327	170.5
24	1.5	9	301	188	325	150.7	280	175	325	150.7
24	1.5	10	259	162	324	134.9	252	158	323	134.9
24	1.5	12	215	134	323	112.3	212	132	320	112.3
20	1.5	8	593	370	329	171.2	585	365	328	171.2
20	1.5	9	527	329	327	151.4	521	325	327	151.4
20	1.5	10	478	299	326	135.8	470	294	325	135.8
20	1.5	12	402	251	324	112.3	393	246	323	112.3
18	1.5	8	1,239	774	329	171.5	1,225	765	329	171.5
18	1.5	9	1,092	682	328	151.8	1,037	648	327	151.8
18	1.5	10	897	561	327	136.2	1,184	740	326	136.2
18	1.5	12	662	413	325	112.8	650	406	324	112.8
16	1.5	8	1,731	1,082	330	171.8	1,671	1,044	339	171.8
16	1.5	9	1,466	916	328	152.1	1,451	907	328	152.1
16	1.5	10	1,252	783	328	136.5	1,237	773	327	136.5
16	1.5	12	923	577	326	113.1	909	568	325	113.1

TABLE 11 - 5.5" (1.5pcf) Thick Panel (Shear Racking with No Gravity Loads)

Stiffners Gage	EPS Density (pcf)	h (ft)	Stud Spacing @ 16" o.c.				Stud Spacing @ 24" o.c.			
			Limiting Shear Force		Displ: $\Delta r \leq 0.02h$		Limiting Shear Force		Displ: $\Delta r \leq 0.02h$	
			LRFD:(ϕv_n)	ASD:(v_a)	Force	Stiffness	LRFD:(ϕv_n)	ASD:(v_a)	Force	Stiffness
			(plf)	(plf)	v_d (plf)	k(plf/in)	(plf)	(plf)	v_d (plf)	k(plf/in)
20	1.5	8	650	406	515	268.4	639	399	514	267.9
20	1.5	9	579	362	511	236.7	569	356	511	236.6
20	1.5	10	526	329	509	212.2	514	321	508	211.9
20	1.5	12	444	277	256	175.0	431	270	248	174.7
18	1.5	8	1,288	805	517	269.2	1,270	794	516	268.6
18	1.5	9	1,191	744	513	237.6	1,150	719	512	237.2
18	1.5	10	1,040	650	512	213.2	1,020	638	511	212.8
18	1.5	12	872	545	507	176.1	851	532	506	175.8
16	1.5	8	1,746	1,091	518	269.6	1,687	1,054	529	275.7
16	1.5	9	1,527	954	515	238.5	1,505	941	514	238.1
16	1.5	10	1,350	844	513	213.8	1,329	831	512	213.4
16	1.5	12	1081	675	509	176.9	1,059	662	508	176.6



TABLE 12 - 5.5" (1 pcf) Thick Panel (Shear Racking with No Gravity Loads)

Stiffners Gage	EPS Density (pcf)	h (ft)	Stud Spacing @ 16" o.c.				Stud Spacing @ 24" o.c.			
			Limiting Shear Force		Displ: $\Delta r \leq 0.02h$		Limiting Shear Force		Displ: $\Delta r \leq 0.02h$	
			LRFD: (ϕv_n)	ASD: (v_a)	Force	Stiffness	LRFD: (ϕv_n)	ASD: (v_a)	Force	Stiffness
			(plf)	(plf)	v_d (plf)	k(plf/in)	(plf)	(plf)	v_d (plf)	k(plf/in)
20	1	8	636	397	127	66.0	629	393	126	65.9
20	1	9	594	371	142	65.9	560	350	126	58.4
20	1	10	511	319	126	52.5	505	315	126	52.4
20	1	12	428	267	125	43.6	422	264	125	43.5
18	1	8	1,264	790	127	66.0	1,254	784	127	65.9
18	1	9	1,174	734	126	58.5	1,116	697	126	58.4
18	1	10	1,015	634	126	52.6	1,005	628	126	52.5
18	1	12	845	528	124	43.1	836	522	126	43.6
16	1	8	1,718	1,074	127	66.1	1,652	1,032	132	68.5
16	1	9	1,499	937	126	58.5	1,488	930	126	58.5
16	1	10	1,323	827	126	52.6	1,312	820	126	52.5
16	1	12	1052	658	126	43.7	1,042	651	126	43.6

TABLE 13 - 7.5" (1.5 pcf) Thick Panel (Shear Racking with No Gravity Loads)

Stiffners Gage	EPS Density (pcf)	h (ft)	Stud Spacing @ 16" o.c.				Stud Spacing @ 24" o.c.			
			Limiting Shear Force		Displ: $\Delta r \leq 0.02h$		Limiting Shear Force		Displ: $\Delta r \leq 0.02h$	
			LRFD: (ϕv_n)	ASD: (v_a)	Force	Stiffness	LRFD: (ϕv_n)	ASD: (v_a)	Force	Stiffness
			(plf)	(plf)	v_d (plf)	k(plf/in)	(plf)	(plf)	v_d (plf)	k(plf/in)
20	1.5	8	815	509	700	364.8	643	402	514	364.8
20	1.5	9	728	455	694	321.3	586	367	511	321.3
20	1.5	10	661	413	691	287.8	533	333	508	287.8
20	1.5	12	560	350	682	236.7	451	282	248	236.7
18	1.5	8	1,463	914	703	366.2	1,277	798	702	366.2
18	1.5	9	1,339	837	698	323.0	1,138	711	698	323.0
18	1.5	10	1,160	725	695	289.6	1,027	642	693	289.6
18	1.5	12	954	596	687	238.5	858	536	686	238.5
16	1.5	8	1,819	1,137	705	367.3	1,699	1,062	719	367.3
16	1.5	9	1,609	1,005	701	324.7	1,514	946	700	324.7
16	1.5	10	1,438	899	698	290.7	1,371	857	697	290.7
16	1.5	12	1,181	738	691	239.9	1,066	666	690	239.9



TABLE 14 - 7.5" (1 pcf) Thick Panel (Shear Racking with No Gravity Loads)

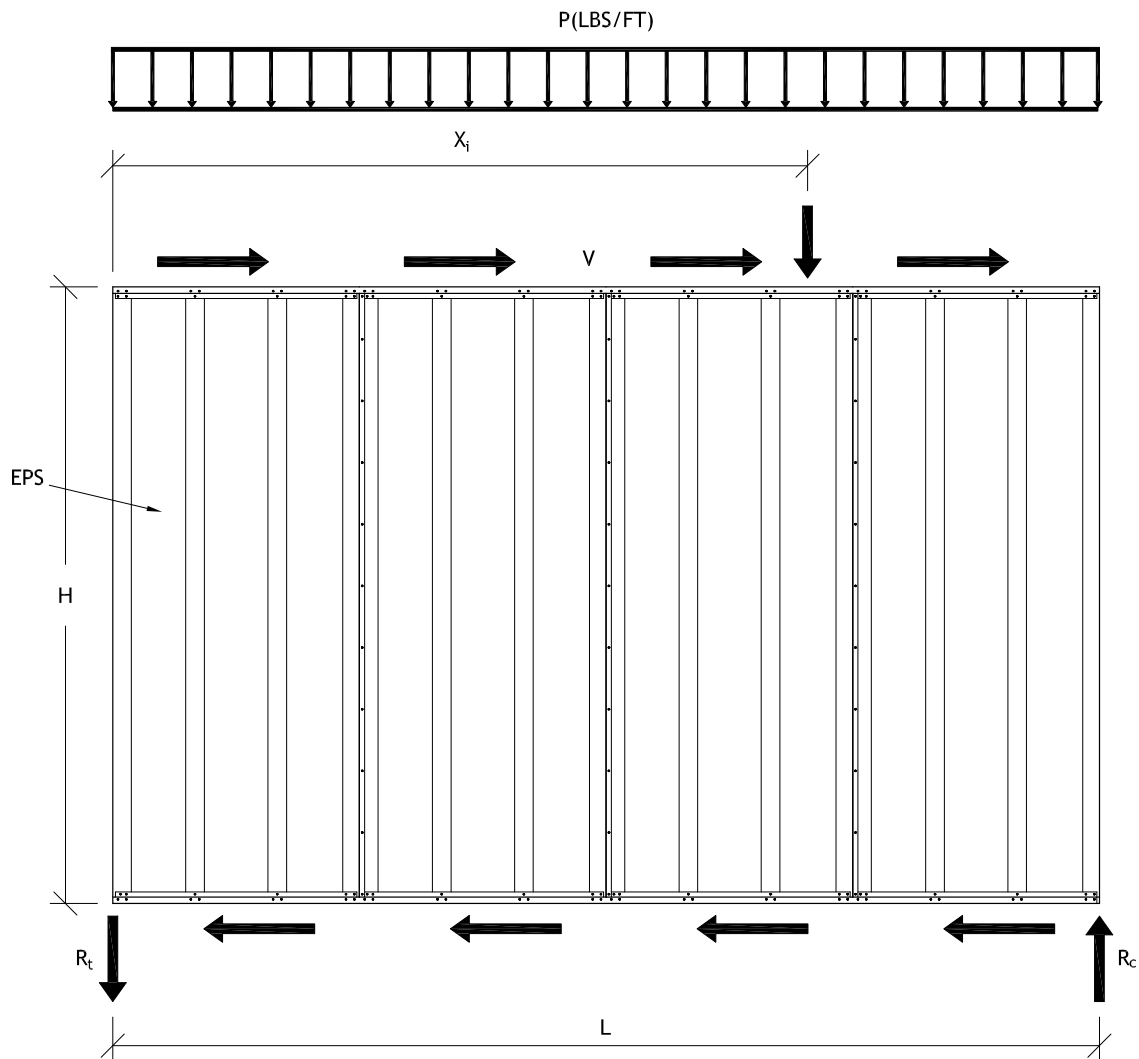
Stiffners Gage	EPS Density (pcf)	h (ft)	Stud Spacing @ 16" o.c.				Stud Spacing @ 24" o.c.			
			Limiting Shear Force		Displ: $\Delta r \leq 0.02h$		Limiting Shear Force		Displ: $\Delta r \leq 0.02h$	
			LRFD:(ϕv_n)	ASD:(v_a)	Force	Stiffness	LRFD:(ϕv_n)	ASD:(v_a)	Force	Stiffness
			(plf)	(plf)	v_d (plf)	k(plf/in)	(plf)	(plf)	v_d (plf)	k(plf/in)
20	1	8	791	495	173	89.9	783	489	172	89.7
20	1	9	701	438	172	79.6	697	435	172	79.5
20	1	10	636	398	172	71.5	628	393	171	71.4
20	1	12	534	334	171	59.3	525	328	171	59.2
18	1	8	1,427	892	173	90.0	1,414	884	172	90.0
18	1	9	1,313	821	172	79.7	1,248	780	172	79.7
18	1	10	1,124	703	172	71.6	1,112	695	172	71.6
18	1	12	954	596	171	59.4	905	566	171	59.4
16	1	8	1,781	1,113	173	90.1	1,715	1,072	179	90.1
16	1	9	1,570	981	172	79.8	1,557	973	172	79.8
16	1	10	1,400	875	172	71.7	1,386	866	172	71.7
16	1	12	1,141	713	171	59.5	1,128	705	171	59.5

TABLE 15 - Design Coefficients and Factors for Seismic Force Resisting Systems

System Type	R	Ω_0	C_d	Height Limitations (ft) by SDC*				
				B	C	D	E	F
Light-frame walls sheathed with wood structural panels rated for shear resistance or steel sheets	6.5	3	4	NL	NL	65	65	65
Light-frame wall systems using flat strap bracing	4	2	3.5	NL	NL	65	65	65
Plain panels braced only by EPS	3	2	3	45	45	45	NP	NP

* NL denotes No Limit.

* NP denotes Not Permitted.



Metal studs @ 16" oc.

$$R_c = \left[\frac{pL}{2} + \sum_i \left\{ \frac{x_i}{L} \right\} P_i \right]_{gravity} + \left[\frac{vh}{L} \right]_{racking}$$



EVALUATION REPORT

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TABLE 16 - Limiting Stud Force (Rc); see above

Gage	Ht h (ft)	3.5 "		5.5 "		7.5 "	
		LRFD ϕR_n (kips)	ASD R_a (kips)	LRFD ϕR_n (kips)	ASD R_a (kips)	LRFD ϕR_n (kips)	ASD R_a (kips)
		20	8	5.67	3.60	6.25	3.91
20	9	5.67	3.60	6.25	3.91	7.76	4.85
20	10	5.67	3.60	6.25	3.91	7.76	4.85
20	12	5.67	3.60	6.25	3.91	7.76	4.85
18	8	12.10	7.56	12.47	7.79	14.04	8.78
18	9	11.51	7.19	12.47	7.79	13.93	8.71
18	10	10.88	6.80	12.47	7.79	13.77	8.61
18	12	9.56	5.98	12.42	7.76	13.42	8.39
16	8	16.96	10.60	16.98	10.61	17.57	10.98
16	9	16.13	10.08	16.65	10.41	17.40	10.88
16	10	15.26	9.54	16.3	10.19	17.20	10.75
16	12	13.41	8.38	15.51	9.69	16.76	10.48



FIGURE 1 - Typical T-G Structural Insulated Composite Panels

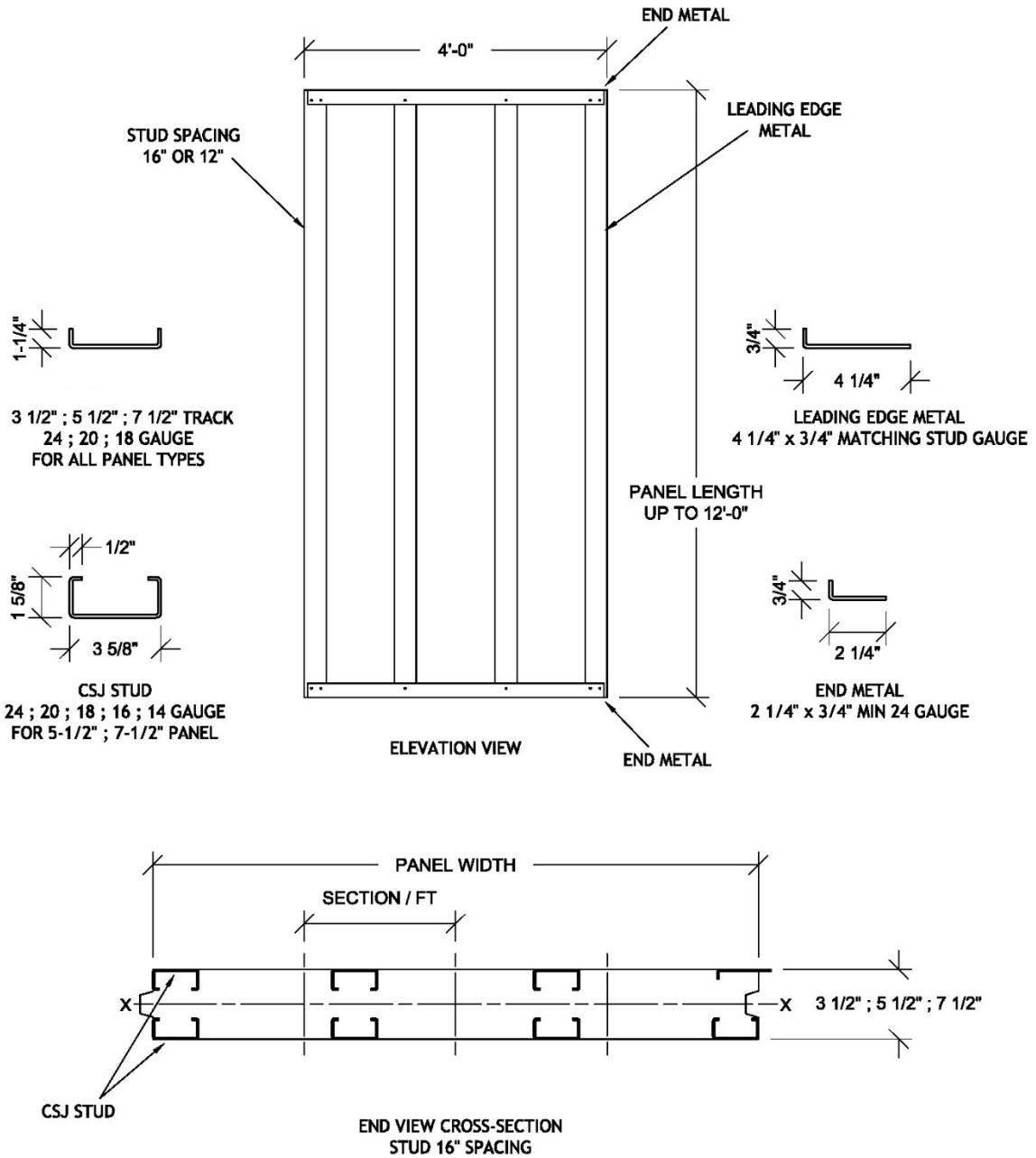
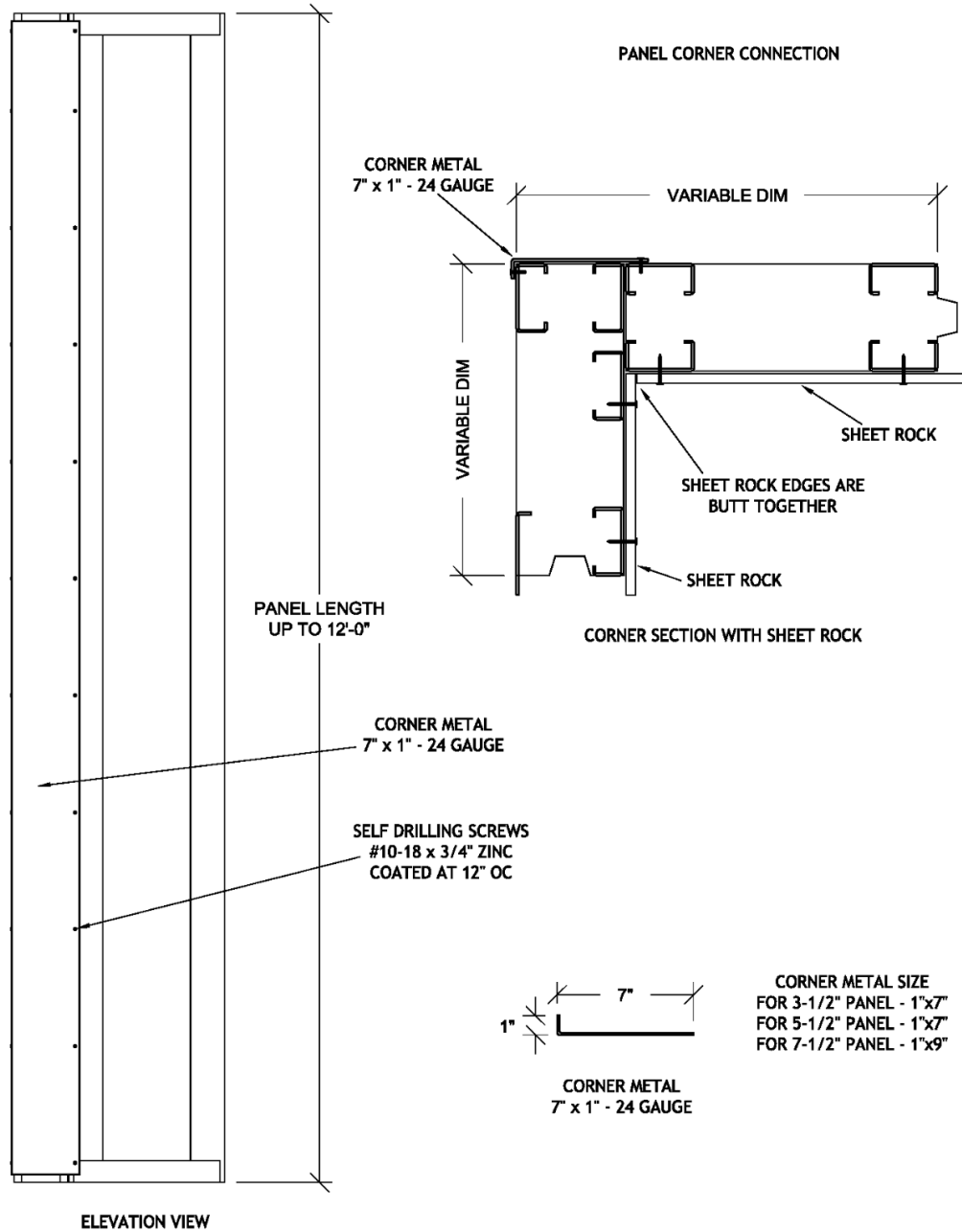




FIGURE 2 - T-G Wall Corner Detail and Gypsum Installation





FLORIDA SUPPLEMENT

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TONGUE & GROOVE (T-G) PANELS

CSI Division: 07 00 00-THERMAL AND MOISTURE PROTECTION

CSI Section: 07 40 00—Roofing
07 42 00—Wall Panels

1.0 RECOGNITION

The ThermaSteel, Inc. Tongue and Groove (T-G) panels, as recognized in IAPMO UES ER-128, have been evaluated for compliance with the following code:

- 2020 Florida Building Code®—Building
- 2020 Florida Building Code®—Residential

2.0 LIMITATIONS

Tongue and Groove (T-G) panels recognized in IAPMO UES ER-128 are subject to the following limitations:

2.1 Design requirements shall be determined in accordance with the Florida Building Code®—Building.

2.2 Use and installation of Tongue and Groove (T-G) panels shall be in accordance with the 2018 International Building Code® or 2018 International Residential Code® provisions, as applicable, of IAPMO UES ER-128, unless otherwise noted in this supplement.

2.3 Evaluation for compliance with the High Velocity Hurricane Zone provisions of the Florida Building Code®—Building and the Florida Building Code®—Residential of Tongue and Groove (T-G) panels is outside the scope of this supplement.

2.4 Verification that the report holder’s quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission (or the building official when the report holder does not possess an approval by the Commission), to provide oversight and determine that the products are being manufactured as described in this evaluation report to establish continual product performance shall be provided for products falling under Section (5)(d) of Florida Rule 61G20-3.009.

2.5 This supplement expires concurrently with ER-128.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org