



EVALUATION SUBJECT: TONGUE & GROOVE (T-G) & SHIP LAP (S-L) PANELS

REPORT HOLDER:
ThermaSteel Inc.
609 West Rock Road
Radford, Virginia 24141

**CSI Division: 07-THERMAL AND MOISTURE
PROTECTION**
CSI Section: 07410—Metal Roof and Wall Panels

1.0 SCOPE OF EVALUATION

1.1 Compliance to the following codes & regulations:

- 2015, 2012, 2009, & 2006 International Building Code® (IBC)
- 2015, 2012, 2009 & 2006 International Residential Code® (IRC)

1.2 Evaluated in Accordance with:

- 2012, 2007 with Supplement 2 (2010) & 2001 North American Specification for the Design of Cold-Formed Steel Structural Members (AISI)
- ASCE 7-2005 & 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) and Ship-Lap (S-L) panels are insulated structural composites that are used to construct walls, floors and roofs in Type V construction. 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 and S-L panels are manufactured with expanded polystyrene foam plastic insulation and light gauge galvanized steel to create an insulated lightweight structural composite panel. 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 gage 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 or wood with a minimum nominal height of 2 inches (net 1½ inches (38 mm)). Nominal timber header dimensions in inches are: 2x4; 2x6; and 2x8. 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 Figures 1 and 2 of this report. The T-G fastening system provides for an opening for a wire chase between panels. The type of panel, T-G or S-L, available for a given project is a function of the equipment in the plant where the panels will be manufactured.

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 nominal density of 1.3 pounds





per cubic foot (20.8 grams/liter). EPS panel density varies with thickness, as summarized in Table 1 of this report.

Table 1. EPS Panel Density

Thickness		Density			
		Minimum		Maximum	
inches	(mm)	pcf ^a	(g/l) ^b	pcf	(g/l)
3.5	89	1.25	20.0	1.55	24.8
5.5	140	0.9	14.4	1.3	20.8
7.5	190	0.9	14.4	1.3	20.8

^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	0.0220	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. 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 uniform distributed transverse allowable (ASD) and failure (LRFD) loads. Single span deflections for service live loads is 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. The panel performance does not include the contributions from “gypsum”, “OSB” or “cross-bracing”. 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.

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

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

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:

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

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

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 detailed to resist shear with or without additional shearing or strapping. 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 (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: All panels (T-G or S-L) 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: Both T-G and S-L 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 in accordance with Figure 2 of this report. 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 3 of this report.

4.2.3 Exterior and Interior Wall Panels: Each exterior and interior wall panel shall be attached to 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) and Ship Lap (S-L) Panels described in this report complies with, or is a suitable alternate to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Standards: Both T-G and S-L "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 Permits: Structural calculations shall be performed and submitted to the code official 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, specification, 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 Panel Usage: T-G and S-L Panels are recognized for use in Type V construction.

5.4 Thermal Barrier Interior Separation: Except as provided for in IBC Section 2603.4.1 and 2012 IBC Section 2603.10, 2009 and 2006 IBC Section 2603.9 and IRC Sections R316.5 and R316.6, S-L and T-G Panels shall be separated from the interior of a building by a thermal barrier of minimum 1/2 inch (12.7 mm) thick gypsum wallboard or other approved material in accordance with IBC 2603.4. Thermal barrier exceptions in 2012 IBC Sections 2603.4.1.1 through 2603.4.1.14, 2009 or 2006 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 Roofing: Roof covering, flashing and underlayment shall be in accordance with IBC Chapter 15 or IRC Chapter 9 and approved by the code official. The use with hot-asphalt or hot-coal roof coverings are outside the scope of this report

5.6 Vapor Barrier: Both T-G and S-L 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 Termites: In areas where the probability of termite infestation is very heavy in accordance with 2012 IBC Figure 2603.9, 2009 and 2006 IBC Figure 2603.8, and IRC Figure R301.2(6) installation is limited in accordance with 2012 IBC section 2603.9, 2009 and 2006 IBC Section 2603.8.

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

5.9 Fabrication: T-G and S-L Panels are fabricated at ThermaSteel Inc. facilities under a quality control program that complies with the minimum requirements for IAPMO UES Listee's Quality Assurance System.

5.10 Foam plastic: 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.

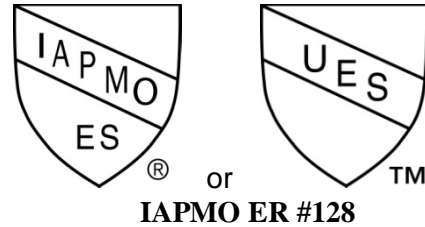
6.0 SUBSTANTIATING DATA

6.1 Test Reports: Test results 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.

6.2 Panel Selection: Load tables in this report were developed based on calculations to resist yielding, local buckling, and lateral buckling in accordance with the 2001 - 2012 North American Specification for the Design of Cold-Formed Steel Structural Members (AISI), 2006, 2009, 2012 and 2015 International Building Code (IBC), 2006, 2009, 2012 and 2015 International Residential Code, ASCE 7-05 and ASCE 7-10 and verified with ASTM E72 test data.

7.0 IDENTIFICATION

The T-G and S-L Panels are identified by a label that notes the manufacturer's name, product name, and IAPMO UES's Mark of Conformity and the Uniform Evaluation Report number (ER-128).



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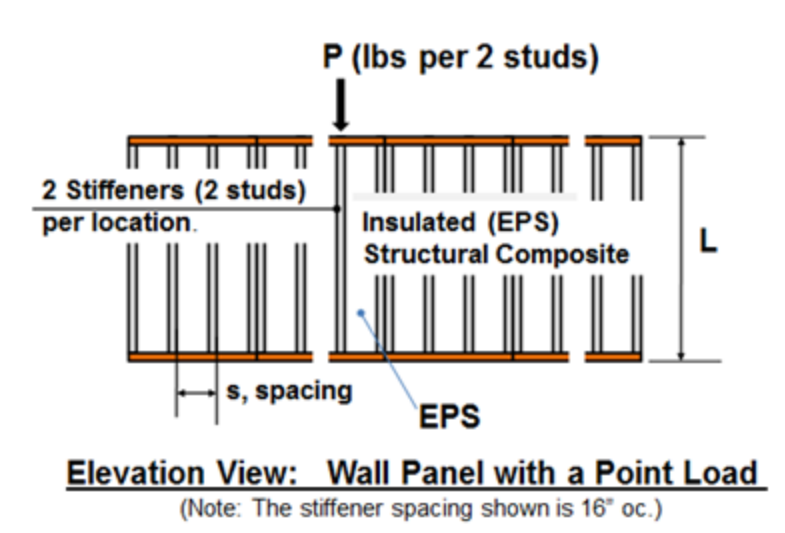


Table 3. Concentrated Axial Design Load per 2 Stiffeners (one on each face)

Length(f)	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	2,455	2,821	3,660	1,535	1,763	2,287
9	d.o.	2,455	2,821	3,660	1,535	1,763	2,287
10	d.o.	2,455	2,821	3,660	1,535	1,763	2,287
12	d.o.	2,455	2,821	3,660	1,535	1,763	2,287
8	20	4,612	5,004	6,210	2,882	3,127	3,881
9	d.o.	4,612	5,004	6,210	2,882	3,127	3,881
10	d.o.	4,612	5,004	6,210	2,882	3,127	3,881
12	d.o.	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	d.o.	9,209	9,977	11,143	5,756	6,236	6,965
10	d.o.	8,708	9,977	11,019	5,442	6,236	6,887
12	d.o.	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	d.o.	12,907	13,324	13,918	8,067	8,327	8,699
10	d.o.	12,207	13,040	13,761	7,629	8,150	8,601
12	d.o.	10,727	12,406	13,406	6,704	7,754	8,379



Table 4. 3.5" thick panel; Stiffeners (350T75-Mils) at 16" o.c.; no gypsum or siding.

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 (350T75-Mils) at 24" o.c.; no gypsum or siding.

Gauge	Ht (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 2001, 2007 with S2 (2010), and 2012 AISI S100; IBC 2006, 2009 2012 and 2015; and IRC 2006, 2009, 2012 and 2015.

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 accounts for yielding, local buckling, and lateral torsional buckling.



Table 6. 5.5" Thick Panel; Stiffeners (350T75-Mils) at 16" o.c.; no gypsum or siding.

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
24	8	2,821	1,763	88	55	80	60	40
24	9	2,821	1,763	74	46	64	48	32
24	10	2,821	1,763	60	38	52	39	26
24	12	2,821	1,763	42	26	35	26	17
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 (350T75-Mils) at 24" o.c.; no gypsum or siding.

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
24	8	2,116	1,322	63	39	66	50	33
24	9	2,116	1,322	49	31	52	39	26
24	10	2,116	1,322	40	25	41	31	20
24	12	2,116	1,322	28	17	27	20	13
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), and 2012 AISI S100; IBC 2006, 2009, 2012 and 2015; and IRC 2006, 2009, 2012 and 2015.

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 accounts for yielding, local buckling, and lateral torsional buckling.



Table 8. 7.5" Thick Panel; 350T75-Mils at 16" o.c.; no gypsum or siding.

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
24	8	3,311	2,069	115	72	65	49	33
24	9	3,311	2,069	91	57	56	42	28
24	10	3,311	2,069	74	46	48	36	24
24	12	3,311	2,069	51	32	36	27	18
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; 350T75-Mils at 24" o.c.; no gypsum or siding.

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
24	8	2,483	1,552	77	48	60	45	30
24	9	2,483	1,552	61	38	50	38	25
24	10	2,483	1,552	49	31	42	32	21
24	12	2,483	1,552	34	21	31	23	15
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 2001, 2007 with S2 (2010), and 2012 AISI S100; IBC 2006, 2009, 2012 and 2015; and IRC 2006, 2009, 2012 and 2015.

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 accounts for yielding, local buckling, and lateral torsional buckling.



Table 10. 3.5" (1.5 pcf) Thick Panel (Shear Racking with No Gravity Loads); no gypsum or siding

Stiffeners 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); no gypsum or siding

Stiffeners 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	373	233	512	266.5	364	227	510	266.5
24	1.5	9	349	218	508	235.0	325	203	506	235.0
24	1.5	10	303	189	504	210.0	294	184	503	210.0
24	1.5	12	253	158	501	173.9	247	154	495	173.9
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); no gypsum or siding

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	8	362	226	126	65.9	357	223	126	65.9
24	1	9	342	214	126	58.3	318	198	126	58.3
24	1	10	291	182	126	52.3	286	179	125	52.3
24	1	12	239	149	126	43.9	239	150	125	43.9
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); no gypsum or siding

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	489	305	694	361.6	367	229	692	361.6
24	1.5	9	457	286	688	318.3	328	205	685	318.3
24	1.5	10	399	249	681	283.9	297	185	252	283.9
24	1.5	12	335	209	674	233.9	250	156	666	233.9
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); no gypsum or siding

Stiffeners 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	8	470	294	172	89.7	463	289	172	89.5
24	1	9	444	277	171	79.4	412	258	171	79.2
24	1	10	379	237	171	71.2	372	232	171	71.1
24	1	12	312	195	172	59.6	311	195	170	58.9
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	Height Limitations (ft) by SDC*					
			C_d	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 and NP denotes Not Permitted

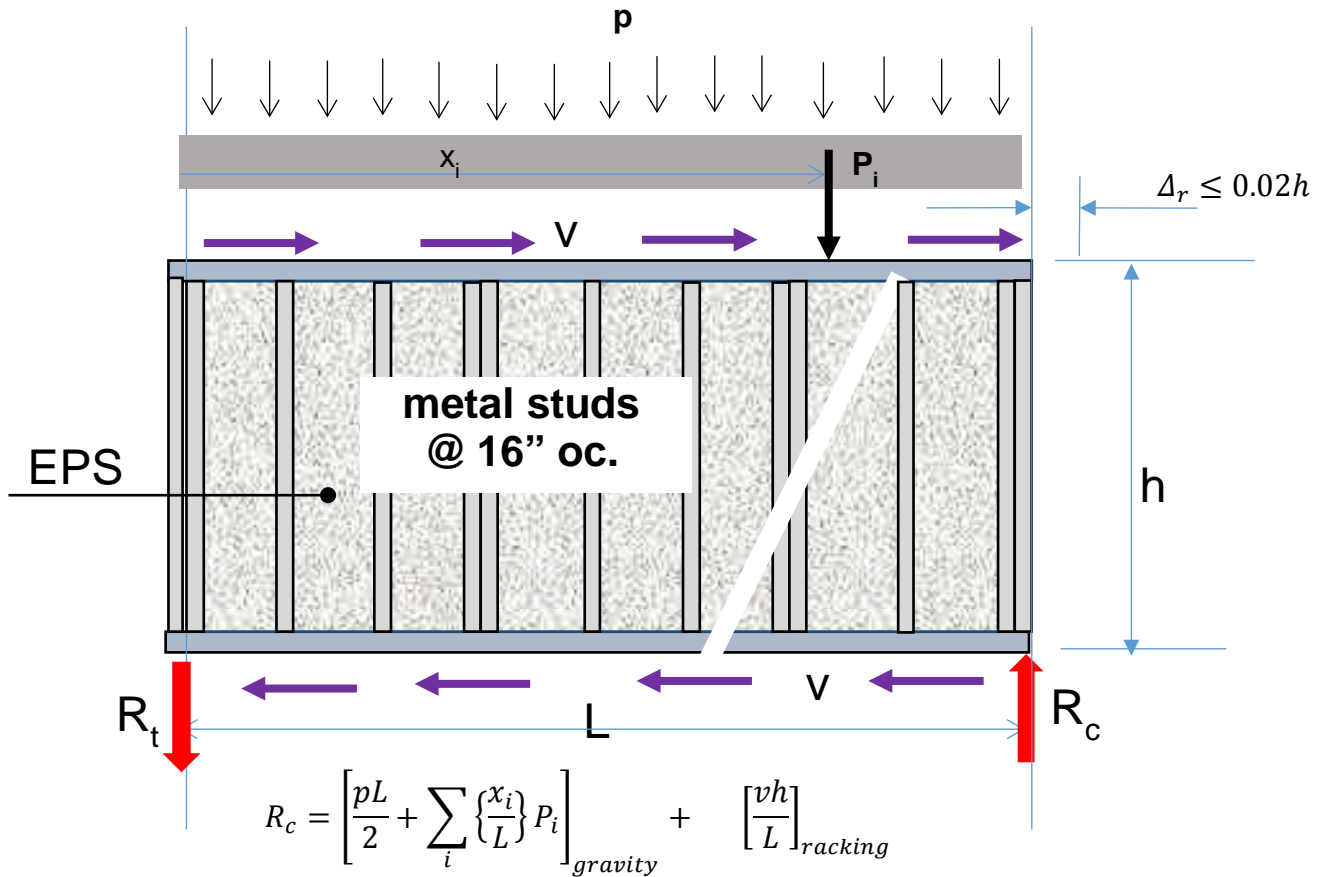


Table 16: Limiting stud force (Rc); see above

Gage	Ht h (ft)	3.5 "		5.5 "		7.5 "	
		LRFD ∅Rn (kips)	ASD Ra (kips)	LRFD ∅Rn (kips)	ASD Ra (kips)	LRFD ∅Rn (kips)	ASD Ra (kips)
24	8	3.07	1.92	3.53	2.21	4.57	2.86
24	9	3.07	1.92	3.53	2.21	4.57	2.86
24	10	3.07	1.92	3.53	2.21	4.57	2.86
24	12	3.07	1.92	3.53	2.21	4.57	2.86
20	8	5.76	3.60	6.25	3.91	7.76	4.85
20	9	5.76	3.60	6.25	3.91	7.76	4.85
20	10	5.76	3.60	6.25	3.91	7.76	4.85
20	12	5.76	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 and S-I Structural Insulated Composite Panels

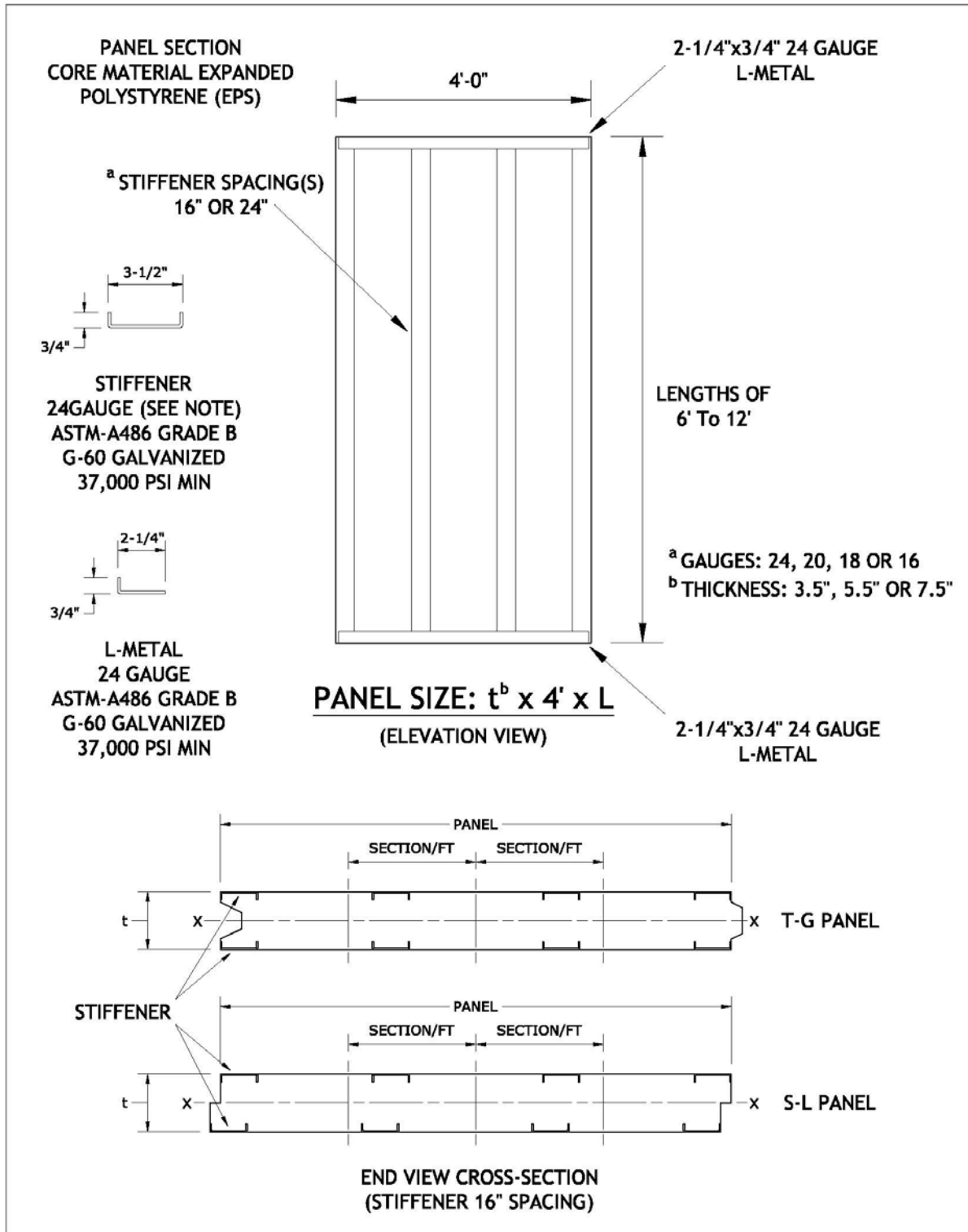


Figure 2 T-G/S-L Fastening System for Two Adjacent Panels

