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DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION

Section: 07 40 00 – Roofing and Siding Panels

REPORT HOLDER:

Kingspan Insulated Panels, Inc.
720 Marion Road
Columbus, OH 43207
www.kingspanpanels.com

REPORT SUBJECT:

DESIGNWALL 2000 and DESIGNWALL 4000 Foam Core Insulated Metal Panels

1.0 SCOPE OF EVALUATION

This Research Report addresses compliance with the following Codes:

- 2018, 2015 and 2012 *International Building Code (IBC)*

Note: This report references sections from the 2018 codes. Earlier versions of the codes may have different section numbers.

The DESIGNWALL 2000 and DESIGNWALL 4000 Foam Core Panels have been evaluated for the following properties:

- Structural
- Fire Resistance
- Water Penetration

2.0 USES

The DESIGNWALL 2000 and DESIGNWALL 4000 Panels are intended for use as exterior cladding on non-load bearing walls. The panels are used in locations where combustible, non-fire-resistance-rated building construction is permitted by the IBC and on buildings of Type I, II, III, or IV construction as further described in Section 5.5.

3.0 DESCRIPTION

3.1 General:

The DESIGNWALL 2000 and DESIGNWALL 4000 Panels are sandwich panels with metal facings and foam plastic

insulation cores. The panels are 24, 30, or 36 inches wide and up to 30 feet in length, and are available in thicknesses of 2, 2.5, 3, and 4 inches. Panels are formed with straight ends and double tongue and groove interlocking edges along the length of the panels. See Figures 1 and 2.

3.2 Panel Core:

The DESIGNWALL 2000 panel consists of a polyisocyanurate core laminated to the metal facings using a structural panel laminating adhesive. The core of the panel has a nominal density of 2.0 pcf.

The DESIGNWALL 4000 panel consists of a continuously poured-in-place polyisocyanurate core or Kingspan's proprietary Quadcore. The density of the panel core is 2.3 pcf for the polyisocyanurate core and 2.2 pcf for Quadcore.

3.3 Panel Facings:

Panels are manufactured with steel or aluminum facings.

3.3.1 Steel panel facings are minimum 24 gauge steel on the interior face and minimum 22 gauge steel on the exterior face, conforming to ASTM A653 SS Grade 33 with a G90 galvanized coating.

3.3.2 Aluminum panel facings are 0.040 inch ASTM B209 3003 H14 on both faces.

3.3.3 The panel facings are finished with a fluoropolymer (PVDF) multi-coat system using Kynar™ 500 color coat, applied over an epoxy primer.

3.3.4 Panel facings are available in flat or micro-rib profiles.

4.0 PERFORMANCE CHARACTERISTICS

4.1 Allowable Load Capacity:

Allowable positive and negative transverse wind loads based on panel stiffness, strength, and fastener capacity are set forth in Tables 2 through 7.



4.2 The panels, when installed in accordance with this report, provide a weather-resistive exterior wall envelope, as evidenced by testing in accordance with ASTM E331 per the requirements of IBC Section 1402.2.

4.3 The foam plastic core has a flame spread index and a smoke developed index not exceeding 25 and 450, respectively, when tested in accordance with ASTM E84.

4.4 All panel finishes have a Class A classification: flame spread rating not exceeding 25 and a smoke developed index not exceeding 450, in accordance with IBC Section 803.1.

4.5 Wall assemblies constructed in accordance with Intertek Design Number [KIP/IMWP 30-01](#) for Designwall 2000 and KIP/IMWP 30-02 for Designwall 4000 (see Section 5.5) with steel-faced DESIGNWALL 2000 and DESIGNWALL 4000 Foam Core Panels, respectively, comply with IBC Section 2603.5 for walls of any height in Type I, II, III, or IV construction permitted to be of non-fire-resistance-rated construction.

5.0 INSTALLATION

5.1 General Installation:

Panels may be installed in either a vertical or horizontal orientation. The panels are fastened to steel framing support members with clips and fasteners as described in Section 5.2. Structural support members shall provide a minimum panel bearing width of 1-5/8 inches.

5.2 Fasteners:

Panels are attached to the steel supports with 14 gauge stainless steel panel clips (See Figure 3 and 4) fastened with minimum two 1/4-14 HWH zinc coated Tek 3 self-tapping screws.

5.3 Dual Tongue and Groove Joint Sealant:

DESIGNWALL 2000 panel joints are sealed with extruded thermoplastic rubber gaskets. Gaskets are applied to side joints of adjacent panels before panel engagement. The panels are interlocked to make continuous seal contact. Installation proceeds along the wall elevation with successive panels being in accordance with the manufacturer's installation instructions. DESIGNWALL

4000 panel joints are sealed with an extruded thermoplastic rubber gasket on the exterior tongue and groove interlock, and a 1/4 inch bead of non-skinning butyl sealant on the interior tongue and groove interlock.

5.4 Flashing:

Flashing must be installed in accordance with Section 1404.4 of the IBC including, but not limited to, panel ends, eaves, openings, and corners. The flashing and trim are attached to the panels with 14 TEK 1 HWH or No. 10 by 3/4 inch Philips pan-head, self-tapping, self-drilling screws. Pop rivets may also be used in accordance with the manufacturer's installation instructions.

5.5 Use on Exterior Walls of Type I, II, III, or IV Construction:

Steel-faced panels may be used on non-fire-resistance-rated exterior walls of buildings of Type I, II, III, or IV construction of any height, when the construction conforms with Intertek Design Number [KIP/IMWP 30-01 for Designwall 2000 and KIP/IMWP 30-02 for Designwall 4000](#).

Vertical butt joints must be sealed with VJ-4F extruded flame retardant gasket (supplied by Kingspan) inserted between panels; the panels have "trimless ends", which fold the exterior face steel over the panel end for 7/8 inches (see Figure 5). Panel ends are attached in typical fashion, using two 1/4-14 HWH zinc coated Tek 3 self-tapping screws with 14 gauge stainless steel clips at the top side of each horizontally installed panel, while the bottom side is engaged to the preceding panel. The vertical gap between "trimless" ends of consecutive panels is nominally 1/2 inch wide.

6.0 CONDITIONS OF USE

The DESIGNWALL 2000 and DESIGNWALL 4000 Panels described in this Research Report comply with the Codes listed in Section 1.0 of this report, subject to the following conditions:

6.1 Installation must comply with this Research Report, the manufacturer's published installation instructions, and the applicable Code. In the event of a conflict between the manufacturer's instructions and this report, this report governs.





6.2 Wall panel installation shall be limited to non-load bearing walls.

6.3 DESIGNWALL 2000 and DESIGNWALL 4000 Panels may be installed without the thermal barrier required by IBC Section 2603.4.

6.4 DESIGNWALL 2000 and DESIGNWALL 4000 Panels may be installed on buildings of Types I, II, III, and IV construction, permitted to be of non-fire-resistance-rated construction, as follows:

6.4.1 One-Story Buildings: Panels up to 4 inches thick in buildings equipped throughout with automatic sprinkler system in accordance with IBC Section 903.3.1.1.

6.4.2 Buildings of Any Height: Wall assemblies described in Intertek Design Number [KIP/IMWP 30-01](#) and [KIP/IMWP 30-02](#).

6.5 Details on wall framing must be approved by the Code Official prior to installation.

6.6 Design wind pressure derived from nominal design wind speeds (V_{asd}) in accordance with IBC Section 1609.3.1 shall not exceed the allowable wind load pressure given in Tables 2 through 7.

6.7 All construction plans and calculations for load conditions must be submitted to the Code Official for approval.

6.8 DESIGNWALL 2000 Panels are manufactured in Columbus, Ohio and Modesto, CA. DESIGNWALL 4000 Panels are manufactured in Caledon, ON. The Kingspan manufacturing plants are under an approved quality system with inspections by Intertek Testing Services NA, Inc.

7.0 SUPPORTING EVIDENCE

7.1 Data in accordance with ICC-ES Acceptance Criteria for Sandwich Panels AC04, dated February 2012 (editorially revised July 2015); Acceptance Criteria for

Sandwich Panel Adhesives AC05, dated June 2009 (editorially revised July 2015); and Acceptance Criteria for Foam Plastic Insulation AC12, dated June 2012 (editorially revised May 2016).

7.2 Test reports in conformance with ASTM E84 and NFPA 285.

7.3 Test reports for water penetration resistance in conformance with ASTM E331.

8.0 IDENTIFICATION

The DESIGNWALL 2000 and DESIGNWALL 4000 Panels are identified by a marking bearing the Report holder's name, the product name, flame spread and smoke developed indices, the Intertek Mark, and the Code Compliance Research Report number (CCRR-1037).



9.0 OTHER CODES

This section is not applicable.

10.0 CODE COMPLIANCE RESEARCH REPORT USE

10.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

10.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

10.3 Reference to the Intertek website address: <https://bpdirectory.intertek.com> is recommended to ascertain the current version and status of this report.





TABLE 1 – PRODUCTS EVALUATED

Panel Designation	Profile	
	Exterior	Interior
DESIGNWALL 2000 and DESIGNWALL 4000	Flat or Micro-Rib with non-directional embossed or smooth surface texture	Flat or Micro-Rib with non-directional embossed or smooth surface texture

TABLE 2 – TABLE 7: ALLOWABLE WIND LOADS (PSF)

- Allowable loads are applicable to wind design pressure derived from nominal wind speed (V_{osd}) per IBC Section 1609.3.1.
- Allowable loads are based on the lesser of deflection, and panel strength, with consideration of the effects of fastener location and fastener-to-panel connection on the allowable negative loads. Limiting factor for each allowable load is identified by the following notations:
 - (N) Negative Load/Connection Design Strength (2.0 SF applied to max. test load)
 - (S) Core Shear Design Strength (3.0 SF applied to shear strength per ASTM C273)
 - (B) Flexural Bending Design Strength (Allowable compressive stress per ADM and AISI S100 for aluminum and steel facing respectively)
 - (D) Deflection at L/180 (Core Shear Modulus, $G = 276$ psi)
- Design strength for panel connection addresses panel clip-to-panel connection only. Allowable load may be lower based upon the design value of fasteners in supporting structural framing and shall be checked by a qualified engineer.
- Allowable loads for double span and triple span apply to continuous panels installed over three supports and four supports respectively. Supports are equally spaced.

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TABLE 2 - Allowable Positive and Negative Transverse Loads 24 Inch Wide Panel - 22 Gauge Exterior/24 Gauge Interior Steel Skin												
Panel Thickness (Inches)	Span Between Supports (Feet) / Single Span											
	4		6		8		10		12		14	
2	66	D	40	D	27	D	19	D	13	D	-	-
2.5	84	S	52	D	35	D	25	D	19	D	14	D
3	90	S	60	S	44	D	32	D	24	D	18	D
4	102	S	68	S	51	S	41	S	34	S	27	D
Panel Thickness (Inches)	Span Between Supports (Feet) / Double Span											
	4		6		8		10		12		14	
2	67	D	42	D	29	D	22	D	17	D	13	D
2.5	80	S	52	S	38	S	28	D	22	D	17	D
3	87	S	56	S	41	S	32	S	26	S	22	S
4	98	N	64	S	47	S	37	S	30	S	25	S
Panel Thickness (Inches)	Span Between Supports (Feet) / Triple Span											
	4		6		8		10		12		14	
2	67	D	42	D	29	D	22	D	16	D	13	D
2.5	78	S	50	S	37	S	28	D	22	D	17	D
3	85	S	54	S	40	S	31	S	26	S	22	D
4	97	S	63	S	46	S	36	S	30	S	25	S



TABLE 3 - Allowable Positive and Negative Transverse Loads 30 Inch Wide Panel - 22 Gauge Exterior/24 Gauge Interior Steel Skin												
Panel Thickness (Inches)	Span Between Supports (Feet) / Single Span											
	4		6		8		10		12		14	
2	66	D	40	D	27	D	19	D	13	D	-	-
2.5	84	S	52	D	35	D	25	D	19	D	14	D
3	89	N	59	N	44	D	32	D	24	D	18	D
4	89	N	59	N	44	N	36	N	30	N	25	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Double Span											
	4		6		8		10		12		14	
2	67	D	42	D	29	D	22	D	17	D	13	D
2.5	78	N	52	S	38	S	28	D	22	D	17	D
3	78	N	52	N	39	N	31	N	26	S	22	S
4	78	N	52	N	39	N	31	N	26	N	22	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Triple Span											
	4		6		8		10		12		14	
2	67	D	42	D	29	D	22	D	16	D	13	D
2.5	78	S	50	S	37	S	28	D	22	D	17	D
3	85	S	54	S	40	S	31	S	26	S	22	D
4	89	N	59	N	45	N	36	N	30	S	25	S

TABLE 4 - Allowable Positive and Negative Transverse Loads 36 Inch Wide Panel - 22 Gauge Exterior/24 Gauge Interior Steel Skin												
Panel Thickness (Inches)	Span Between Supports (Feet) / Single Span											
	4		6		8		10		12		14	
2	66	D	40	D	27	D	19	D	13	D	-	-
2.5	74	N	49	N	35	D	25	D	19	D	14	D
3	74	N	49	N	37	N	30	N	24	D	18	D
4	74	N	49	N	37	N	30	N	25	N	21	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Double Span											
	4		6		8		10		12		14	
2	65	N	42	D	29	D	22	D	17	D	13	D
2.5	65	N	44	N	33	N	26	N	22	N	17	D
3	65	N	44	N	33	N	26	N	22	N	19	N
4	65	N	44	N	33	N	26	N	22	N	19	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Triple Span											
	4		6		8		10		12		14	
2	67	D	42	D	29	D	22	D	16	D	13	D
2.5	74	N	49	N	37	S	28	D	22	D	17	D
3	74	N	49	N	37	N	30	N	25	N	21	N
4	74	N	49	N	37	N	30	N	25	N	21	N





TABLE 5 - Allowable Positive and Negative Transverse Wind Loads 24 Inch Wide Panel - 0.040 Inch Aluminum Skin												
Panel Thickness (Inches)	Span Between Supports (Feet) / Single Span											
	4		6		8		10		12		14	
2	60	S	34	D	21	D	14	D	-	-	-	-
2.5	76	S	46	D	29	D	20	D	14	D	-	-
3	86	N	57	D	37	D	26	D	18	D	13	D
4	86	N	58	N	43	N	35	N	28	D	20	B
Panel Thickness (Inches)	Span Between Supports (Feet) / Double Span											
	4		6		8		10		12		14	
2	55	S	35	S	25	D	18	D	13	D	10	D
2.5	70	S	45	S	33	S	24	D	18	D	14	D
3	79	N	52	N	39	N	31	D	23	D	18	D
4	79	N	52	N	39	N	31	N	26	N	22	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Triple Span											
	4		6		8		10		12		14	
2	54	S	35	S	25	D	18	D	13	D	-	-
2.5	69	S	44	S	33	S	24	D	18	D	13	D
3	83	S	53	S	39	S	31	D	23	D	17	D
4	89	N	60	N	45	N	36	N	30	N	26	N

TABLE 6 - Allowable Positive and Negative Transverse Wind Loads 30 Inch Wide Panel - 0.040 Inch Aluminum Skin												
Panel Thickness (Inches)	Span Between Supports (Feet) / Single Span											
	4		6		8		10		12		14	
2	60	S	34	D	21	D	14	D	-	-	-	-
2.5	69	N	46	D	29	D	20	D	14	D	-	-
3	69	N	46	N	35	N	26	D	18	D	13	D
4	69	N	46	N	35	N	28	N	23	N	20	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Double Span											
	4		6		8		10		12		14	
2	55	S	35	S	25	D	18	D	13	D	10	D
2.5	63	N	42	N	31	N	24	D	18	D	14	D
3	63	N	42	N	31	N	25	N	21	N	18	N
4	63	N	42	N	31	N	25	N	21	N	18	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Triple Span											
	4		6		8		10		12		14	
2	54	S	35	S	25	D	18	D	13	D	-	-
2.5	69	S	44	S	33	S	24	D	18	D	13	D
3	71	N	48	N	36	N	29	N	23	D	17	D
4	71	N	48	N	36	N	29	N	24	N	20	N





TABLE 7 - Allowable Positive and Negative Transverse Wind Loads 36 Inch Wide Panel - 0.040 Inch Aluminum Skin												
Panel Thickness (Inches)	Span Between Supports (Feet) / Single Span											
	4		6		8		10		12		14	
2	58	N	34	D	21	D	14	D	-	-	-	-
2.5	58	N	38	N	29	N	20	D	14	D	-	-
3	58	N	38	N	29	N	23	N	18	D	13	D
4	58	N	38	N	29	N	23	N	19	N	16	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Double Span											
	4		6		8		10		12		14	
2	52	N	35	N	25	D	18	D	13	D	10	D
2.5	52	N	35	N	26	N	21	N	17	N	14	D
3	52	N	35	N	26	N	21	N	17	N	15	N
4	52	N	35	N	26	N	21	N	17	N	15	N
Panel Thickness (Inches)	Span Between Supports (Feet) / Triple Span											
	4		6		8		10		12		14	
2	54	S	35	S	25	D	18	D	13	D	-	-
2.5	60	N	40	N	30	N	24	N	18	D	13	D
3	60	N	40	N	30	N	24	N	20	N	17	N
4	60	N	40	N	30	N	24	N	20	N	17	N

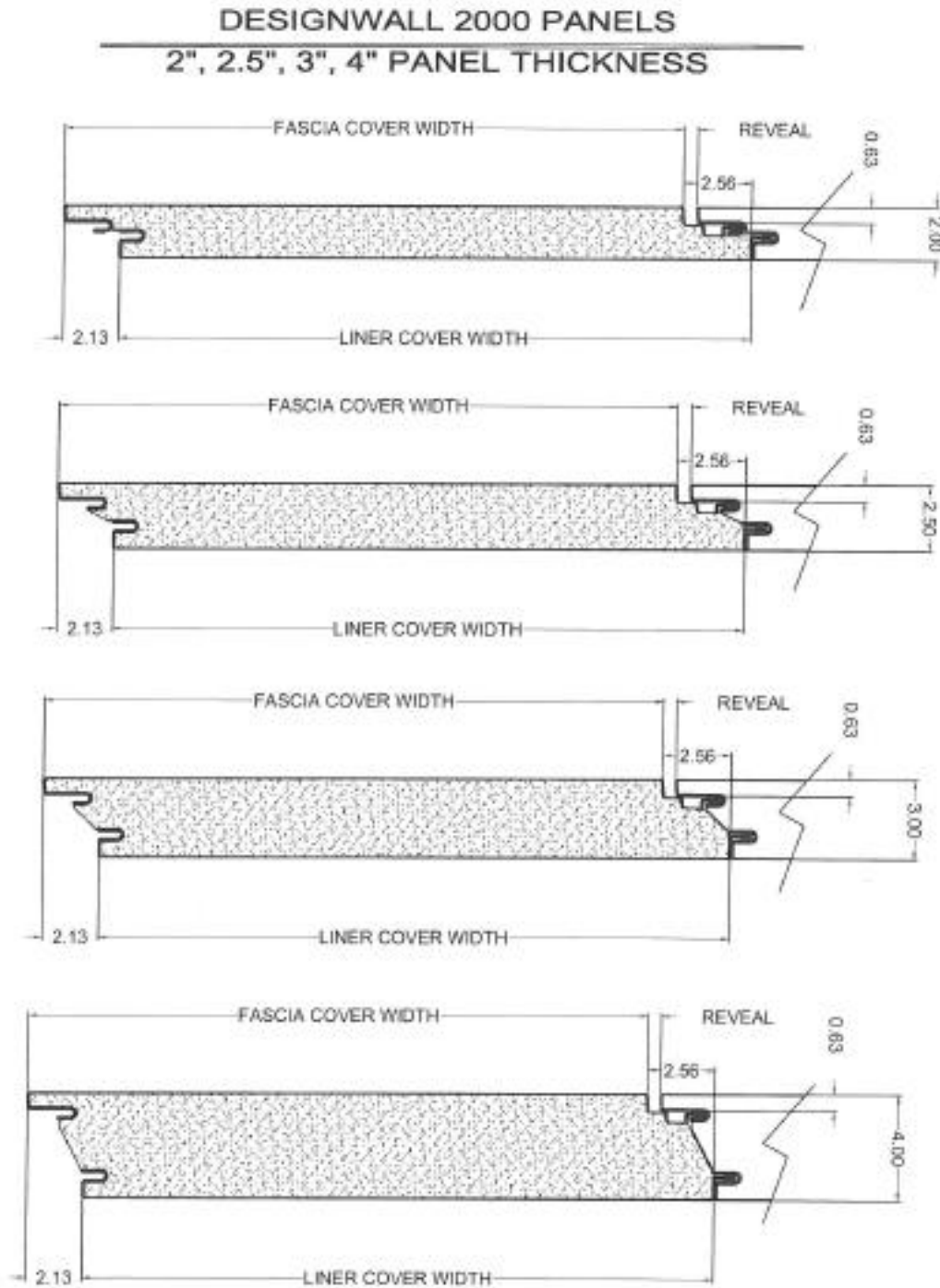


Figure 1a – DESIGNWALL 2000 Panel



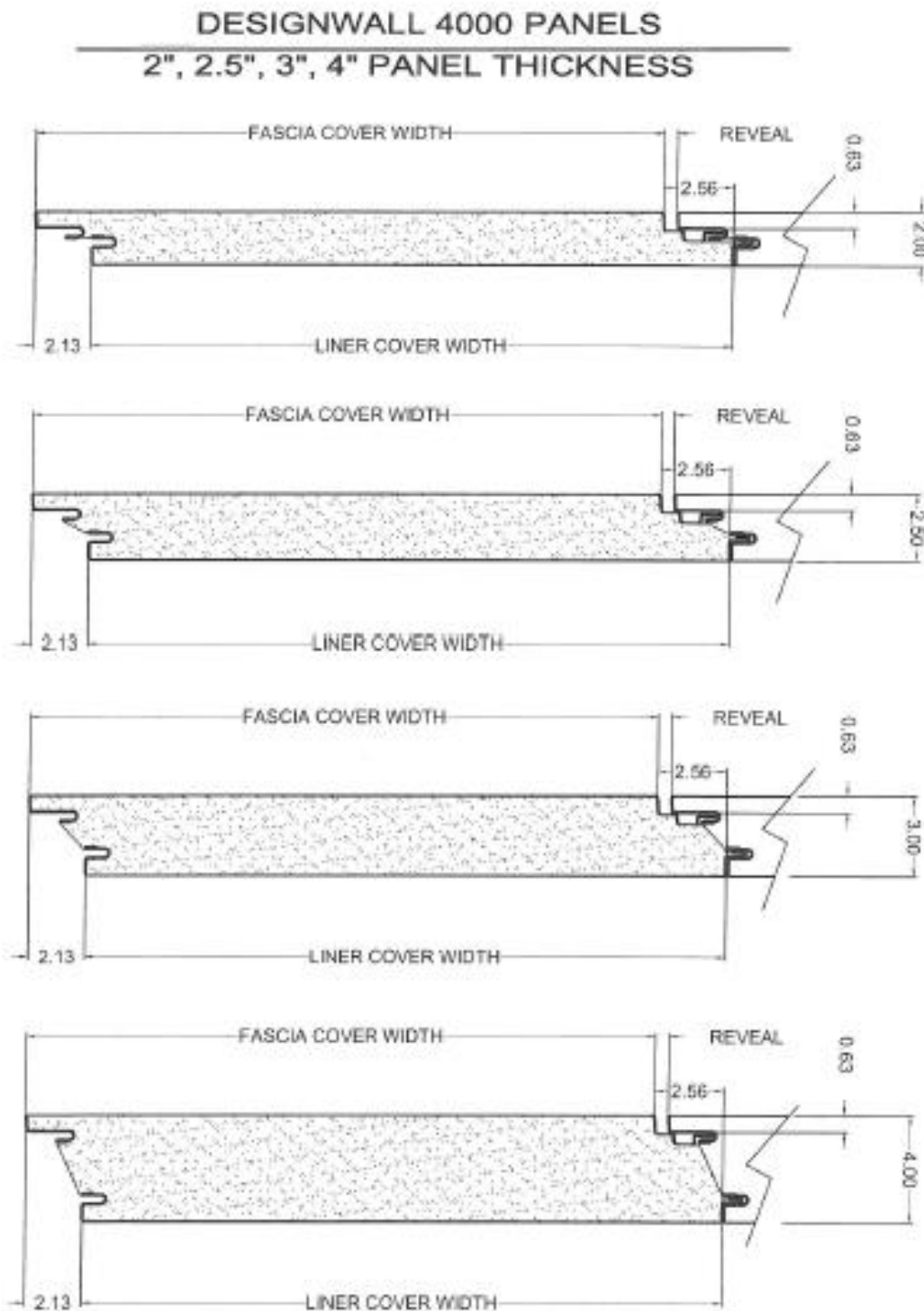


Figure 1b – DESIGNWALL 4000 Panel



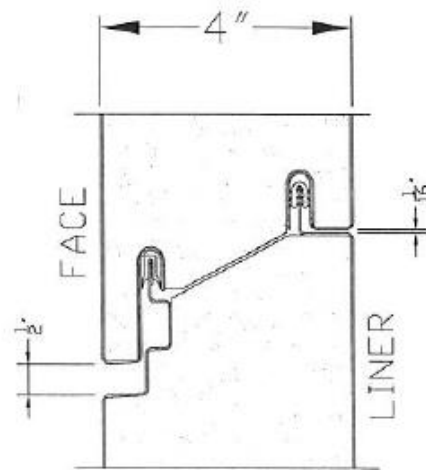


Figure 2 – Dual Tongue and Groove Joint Engagement

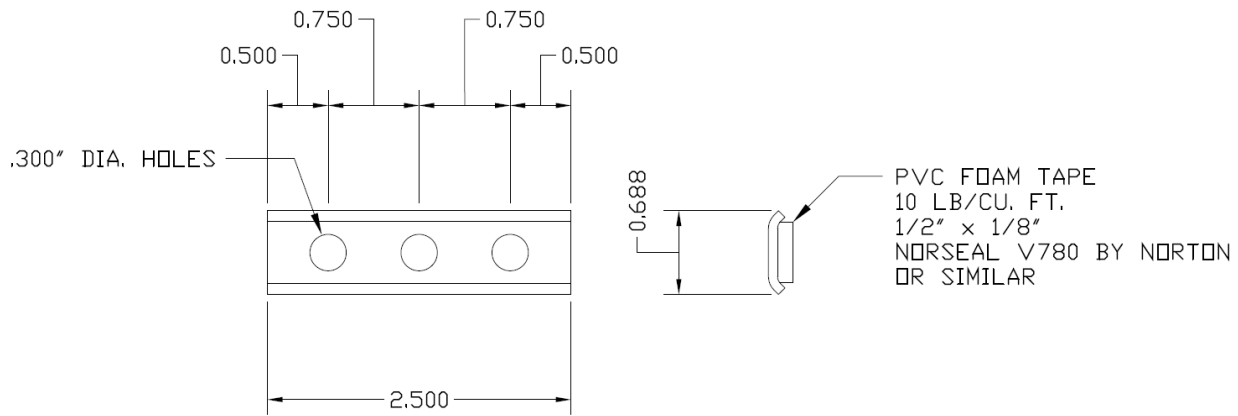


Figure 3 – Stainless Steel Hidden Clip

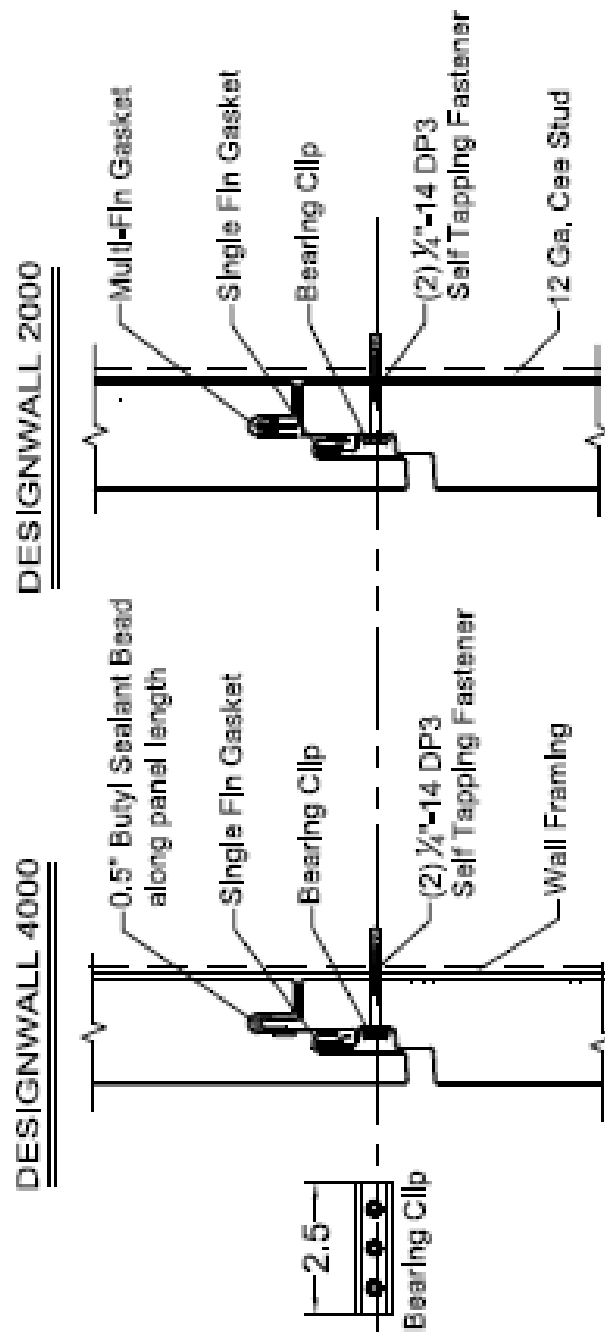


Figure 4 – Designwall 2000 and Designwall 4000 Installation Details for the Dual Tongue and Groove Joint

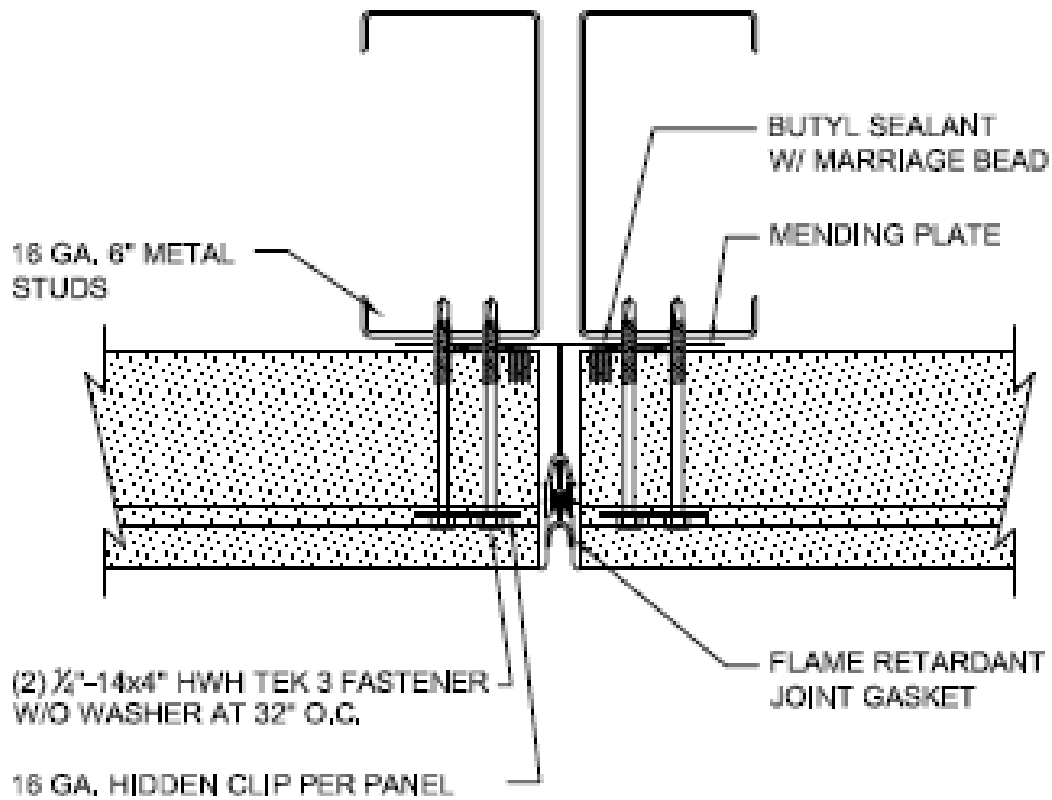


Figure 5 – DESIGNWALL 2000 and DESIGNWALL 4000 Vertical Butt Joint Detail