EVALUATION REPORT Number: 686

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SERIES 300 ROOF PANEL

CSI Section:
07 61 00 Sheet Metal Roofing

1.0 RECOGNITION

Series 300 Roof Panel has been evaluated for use as an exterior standing seam metal roof covering panel. The structural properties of the Series 300 Roof Panel comply with the intent of the provisions of the following codes and regulations:

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

2.0 LIMITATIONS

Use of the Series 300 Roof Panel recognized in this report is subject to the following limitations:

2.1 Metal panels used in roof applications shall be applied to a solid or closely fitted deck, except where the roof covering is specifically designed to be applied to spaced support members. The panel installation tables within this report provide applicable substrate limitations.

2.2 Calculations demonstrating compliance with this report shall be submitted to the building official for approval. The calculations shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

2.3 The minimum allowable roof panel slopes shall conform to IBC Section 1507.4.2 or IRC Section R905.10.2.

2.4 Roof panel flashing requirements, when applicable, shall comply with IBC Section 1503.2 and 1503.3 or IRC Sections R903.2 and R903.3. Underlayment shall be installed in accordance with IBC Section 1507.4.5 or IRC Section R905.10.5 where applicable wind conditions occur.

2.5 For load combinations that include wind uplift, the nominal wind load shall be permitted to be multiplied by 0.67 provided the conditions in AISI S100-12, Appendix A Section D6.2.1a Conditions (a) through (g) are satisfied.

2.5.1 Compliance with Conditions (a) and (d) through (g) shall be satisfied by conformance to the panel installation tables within this report. Compliance with Conditions (b) and (c) shall be the responsibility of the registered design professional. Conditions (b) and (c) are listed here:

Condition (b): The wind load shall be calculated using ASCE/SEI 7 for components and cladding.

Condition (c): The area of the roof being evaluated is in Zone 2 (edge zone) or Zone 3 (corner zone), as defined in ASCE/SEI 7, i.e., the 0.67 factor does not apply to the field of the roof (Zone 1). The nominal wind load applied to Zone 2 or Zone 3, after the 0.67 multiplier is applied, shall not be less than the nominal wind load applied to the field of the roof (Zone 1).

2.6 For modifications of panel installations, design of partial panels, panel penetrations and other panel discontinuities shall consider effects on strength and stiffness and be the responsibility of the registered design professional in accordance with IBC Section 1604.4, using rational engineering mechanics or in accordance with the manufacturer's installation instructions as approved by the building official.

2.7 Product Performance

2.7.1 Fire Resistance: Roof assemblies with steel panels complying with the requirements of IBC Section 1505.2 Exception No.2, or IRC Section R902.1 Exception No.2, are considered Class A roof assemblies. In accordance with IBC Section 1505 or IRC Section R902, for other conditions, roof assemblies with the Series 300 Roof Panel shall be listed as Class A, B, or C in accordance with ASTM E108 or UL 790 by an approved testing agency or shall be considered as non-classified roofing. Innovative Metals Company, Inc. shall be contacted for information on specific listed assemblies.

2.7.2 Air and Water Infiltration: Air and water infiltration resistance is outside the scope of this report. Weather protection shall comply with Section 2.4 of this report.

2.7.3 Hail Resistance: Hail resistance is outside the scope of this report.

2.7.4 Wind-Blown Debris Resistance: Wind-blown debris resistance is outside the scope of this report.

2.7.5 Use of the Series 300 Roof Panels as protection of glazed openings located in wind-borne debris regions is outside the scope of this report.

2.7.6 Use of the Series 300 Roof Panels as lateral load resisting elements in roof diaphragms is outside the scope of this report.

2.8 Series 300 Roof Panels are manufactured in Norcross, GA.

3.0 PRODUCT USE

3.1 Series 300: Series 300 Roof Panel comply with the requirements for metal roof panels in Chapter 15 of the IBC, and Section R905 of the IRC. Series 300 Roof Panels design, and installation shall be in accordance with the referenced codes in Section 1.0 of this report, and The Innovative Metals Company, Inc. product published installation instructions. Where conflicts occur, the more restrictive shall govern.

3.1.1 Design: The section properties, determined using AISI S100-12, North American Specification for the Design of Cold-Formed Steel Structural Members, are shown in Tables 1.3 and 1.8 of this report; and ADM1-2015, Aluminum Design Manual: Part 1-A Specification for Aluminum Structures are shown in Table 1.13 of this report.

The LRFD uniform positive and negative loads for both aluminum I-Span Anchor and No. 16-gauge standard clips are shown in Tables 1.4 through 1.7; Tables 1.9 through 1.12; and Tables 1.14 through 1.17, respectively.

The LRFD clip/fastener attachment combinations and factored wind load capacities are for both aluminum I-Span Anchor and No. 16-gauge standard clips shown in Tables 1.1 and 1.2 of this report.

3.1.2 Installation: Roof slope shall comply with IBC Section 1507.4.2 or IRC Section R905.10.2.

3.1.2.1 The Series 300 No. 20 GA, No. 22 GA and No. 24 GA Steel Roof Panels using I-Span Anchors: The Series 300 No. 20, No. 22, and No. 24-gauge steel roof panels shall be installed in a continuous run without end-laps using the aluminum I-Span anchors described in Section 4.3.1 of this report. The fasteners used to attach the I-Span anchors to the sheathing or supports shall be two ¼" – 14 x 1- ¼" HWH DP3 self-drilling tapping screws per anchor, spaced at a maximum of 72 inches (mm) on center and through the roof sheathing to steel purlins of 2-½ x 8 x No.12 gauge framing having a minimum yield strength of 50 ksi (345 MPa) and complying with the applicable codes in Section 1.0 of this report. Partial panels shall be fastened 2 inches (50.8 mm) from edges and a maximum of 12 inches (305 mm) on center with ¼" – 14 x 1- 1/4" HWH DP3 self-drilling tapping screws to metal track along the panel edge. Sections 4.4 and 4.5 of this report have details for other fasteners and substrates.

3.1.2.2 Series 300 No. 20 GA, No. 22 GA and No. 24 GA Steel Roof Panels using No.16-gauge Standard Clips: The Series 300 No. 20, No. 22, and No. 24-gauge steel roof panels shall be installed in a continuous run without end-laps using No. 16-gauge standard clips described in Section 4.3.2 of this report. The installation is the same as described in Section 3.1.2.1, except using the No.16-gauge standard clips.

The sealant installation to the roof panel assembly shall be in accordance with the sealant manufacturer's installation instructions.

3.1.2.3 Series 300 0.040-inch and 0.050-inch Aluminum Roof Panels using I-Span Anchors: The Series 300 0.040-inch and 0.050-inch aluminum roof panels shall be installed in a continuous run without end-laps using the aluminum I-Span anchors described in Section 4.3.1 of this report. The fasteners used to attach the I-Span anchors to the sheathing or supports shall be two ¼" – 14 x 1- ¼" HWH DP3 self-drilling tapping screws per clip, spaced at a maximum of 72 inches (mm) on center and through the roof sheathing to steel purlins of 2-½ x 8 x No.12 gauge framing having a minimum yield strength of 50 ksi (345 MPa) and complying with the applicable codes in Section 1.0 of this report. Partial panels shall be fastened 2 inches (50.8 mm) from edges and a maximum of 12 inches (305 mm) on center with ¼" – 14 x 1- 1/4" HWH DP3 self-drilling tapping screws to metal track along the panel edge. Sections 4.4 and 4.5 of this report have details for other fasteners and substrates.

3.1.2.4 Series 300 0.040-inch and 0.050-inch Aluminum Roof Panels using No. 16-gauge Standard Clips: The Series 300 0.040-inch and 0.050-inch aluminum roof panels shall be installed in a continuous run without end-laps using No.16-gauge standard clips described in Section 4.3.2 of this report. The installation is the same as described in Section 3.1.2.3, except using the No.16-gauge standard clips.

The sealant installation to the roof panel assembly shall be in accordance with the sealant manufacturer's installation instructions.

4.0 PRODUCT DESCRIPTION

4.1 Series 300 Roof Panels: The Series 300 Roof Panels are available in the profiles as illustrated in the figures accompanying the tables in this report. All panels are provided with a painted finish. The panel profiles are available in lengths and widths and thickness gauges as follows:

Products evaluated within this report:	Maximum Width(s) (inches):	Steel Gauge No.(s)/Aluminum thickness:
Series 300 – Steel	18	20 ga., 22 ga., 24 ga.
Series 300 – Alum.	18	0.050 or 0.040 inches

Note: 1 inch = 25.4 mm

4.2 Base Material:

4.2.1 Series 300: All No. 20, No. 22 and No. 24 gauge panels are manufactured from steel sheet with AZ55 aluminum-zinc alloy coatings conforming to ASTM A792 SS Grade 40, or from steel sheet with G90 galvanized coatings conforming to ASTM A653 SS Grade 40.

The 0.050-inch (1.27 mm) thick and 0.040-inch thick (1.02 mm) panels are manufactured from 3105-H25 aluminum alloy in accordance with ASTM B209.

4.3 Clips/Anchors: All panels within this report shall be installed with a concealed fastening system (not visible from panel exterior). Panels shall be attached to supports with either No. 16-gauge standard clips or aluminum I-Span anchors using self-drilling tapping screws as described in Sections 3.1.2.1 through 3.1.2.4 of this report.

4.3.1 The I-Span Anchors have a minimum thickness of 0.062-inches (1.52 mm) and are formed extruded from 6005-T5 aluminum alloy in accordance with ASTM B209. I-Span Anchors shall be supplied by Innovative Metals Company, Inc. Clip and are shown in Figures 1.1 and 1.2 of this report.

4.3.2 The No. 16-gauge standard clips are formed from steel with either AZ55 aluminum-zinc alloy or G90 galvanized coatings conforming to ASTM A792 or ASTM A653 SS minimum Grade 33, respectively. The No. 16-gauge standard clips shall be supplied by Innovative Metals Company, Inc. and are shown in Figure 1.3 of this report.

4.4 Fasteners:

4.4.1 Two ¼ - 14 x 1¼" HWH DP3 self-drilling tapping screws are used to attach the I-Span Anchors or No.16-gauge standard clips to the 2½ x 8 x No. 12-gauge steel purlins tested in accordance with ASTM E1592 and described in Sections 3.1.2.1 through 3.1.2.4 of this report.

4.4.2 The Triangle Fasteners #14-13 DP1 Consealor pancake head to attach No. 16-gauge standard clips or aluminum I-Span anchors into steel and wood roof substrates have been calculated using AISI S100-12, Section E4. Self-tapping metal-to-metal fasteners shall comply with ASTM C1513. Fasteners installed into preservative- or fire-retardant-treated wood shall comply with the IBC shall be 300 series stainless steel or designed specifically for use with treated wood.

4.5 Substrates: Series 300 Roof Panels may be installed over the following substrates including, but not limited to, the following:

- Cold formed steel in accordance with AISI S100-12
- Dimensional lumber in accordance with ANSI/AWS National Design Specification (NDS)®
- Plywood and OSB in accordance with DOC PS-1 and DOC PS-2

Tables 1.1 and 1.2 of this report provide applicable substrate and fastening limitations. For other support conditions, structural calculations complying with the applicable code shall be submitted to the building official for approval.

5.0 IDENTIFICATION

Each bundle of panels shall have a visible product identification label affixed to it. Labels shall include the name and address of the manufacturer (Innovative Metals Company, Inc.), the model number, the IAPMO-UES Mark of Conformity, and the evaluation report number (ER-686) identifies the products listed in this report. Either Mark of Conformity may be used as shown below:

or

IAPMO UES ER-686

6.0 SUBSTANTIATING DATA

6.1 Data submitted in accordance with IAPMO UES Evaluation Criteria For Single Skin Steel Roof and Wall Panels, EC011, revised January 2022.

6.2 Data in accordance with the Aluminum Design Manual, 2015, ADM1-2015.

6.3 Test reports are from laboratories in compliance with ISO/IEC 17025.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Series 300 Roof Panels to assess conformance to the codes listed in Section 1.0 of this report and serves as documentation of product certification. Products are manufactured at locations noted in Section 2.8 of this report under a quality control program with periodic inspections under the surveillance of IAPMO UES.

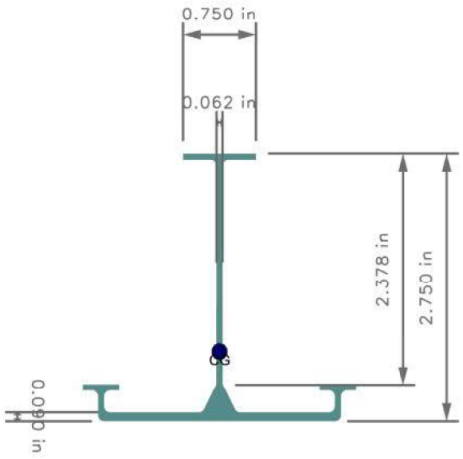
For additional information about this evaluation report please visit www.uniform-es.org or email at info@uniform-es.org

Contents

General Notes:

I-Span Anchor and No.16- Gauge Standard Clip attachments properties and figures are provided below to illustrate the attachment means of the I-Span Anchor and No.16 Gauge Standard Clips to the roof structure.

FIGURE 1.1: I-Span Anchor – Material Properties and Figures (Typical)



Extruded I-Span Anchor Properties

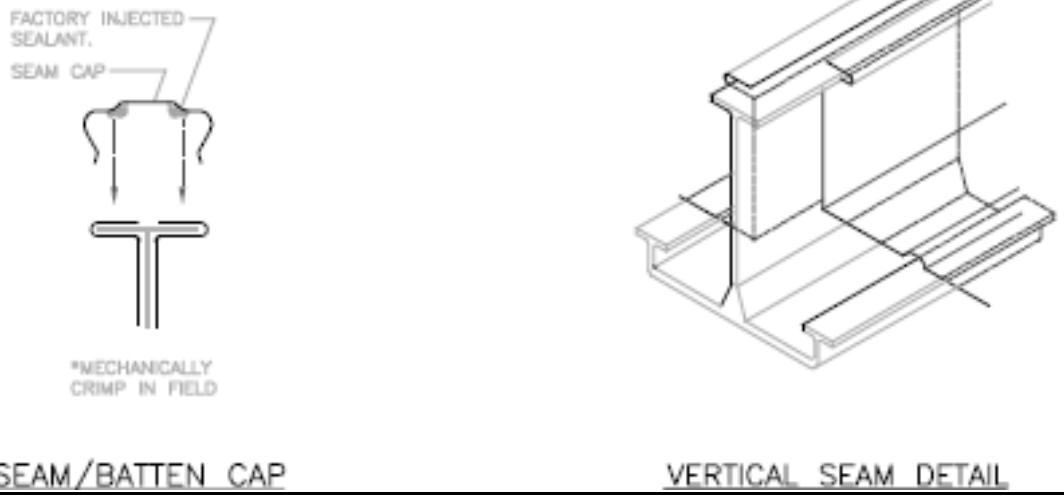
Thickness	0.0620 in. (min)	S_{xe} (top)	0.2380 in^3	ϕP_n (E-OF)	1.99 k
Type	6005-T5	S_{xe} (bot)	0.6790 in^3	ϕP_n (I-OF)	2.79 k
F_y	33 ksi (min)	I_x	0.4850 in^4	ϕV_n	2.724 k
E	10,000 ksi				

For SI: 1 inch = 2.54 mm; 1 ksi = 6.89 MPa; 1 kip = 1000 lbs.

Notes:

1. For gravity load conditions, panels are not subject to web crippling conditions. I-Span Anchors have been evaluated for web crippling effects and limiting conditions, and if applicable, have been included in the load tables.
2. Series 300 roof panels do not provide lateral load resistance (diaphragm action).
3. Series 300 roof panels have not been tested to determine any lateral restraint which may be provided to supporting roof purlins.
4. Section properties are calculated in accordance with the AISI S100-12, North American Specification for the Design of Cold-Formed Steel Structural Members.
5. E is the modulus of elasticity.
6. F_y is the yield strength.
7. I_{xe} is the effective moment of inertia about the cross-section about the x-axis.
8. M_n is the nominal bending strength.
9. P_n is the nominal strength in tension or compression.
10. S_{xe} is the effective section modulus about the x-axis.
11. V_n is the nominal shear strength.

FIGURE 1.2: I-Span Anchor Details



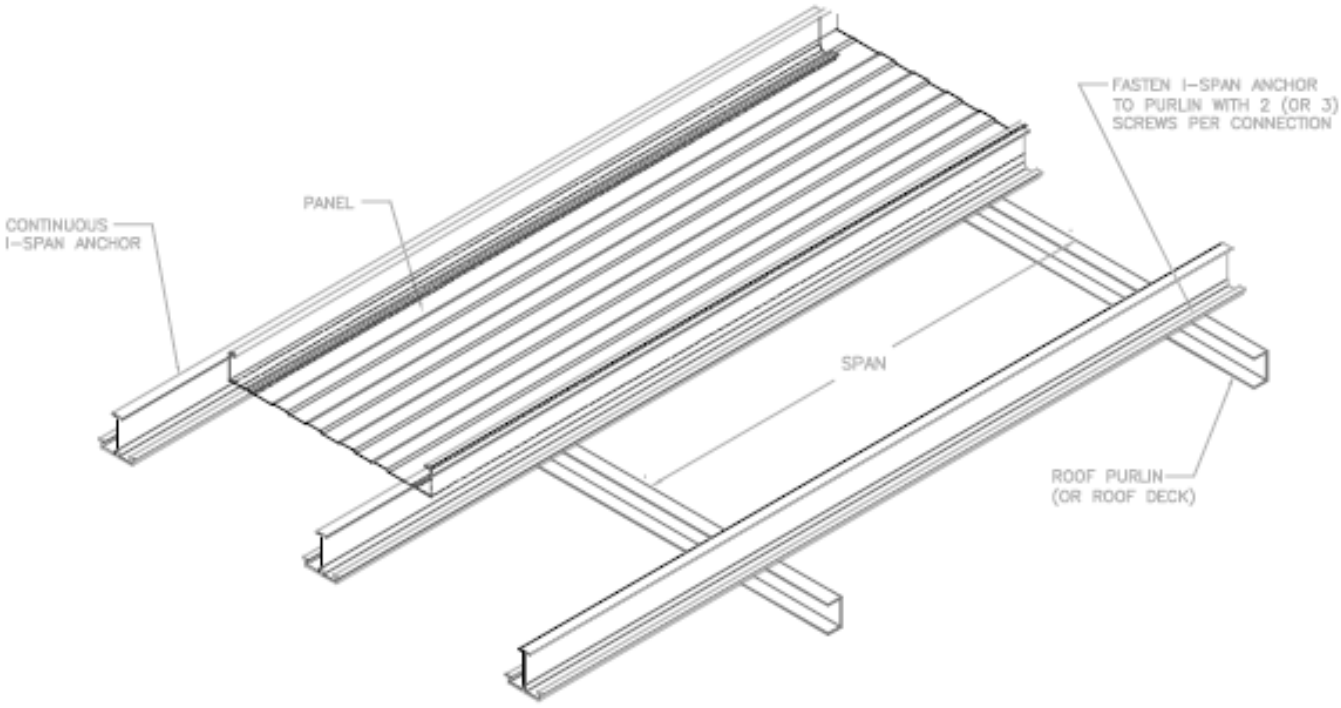
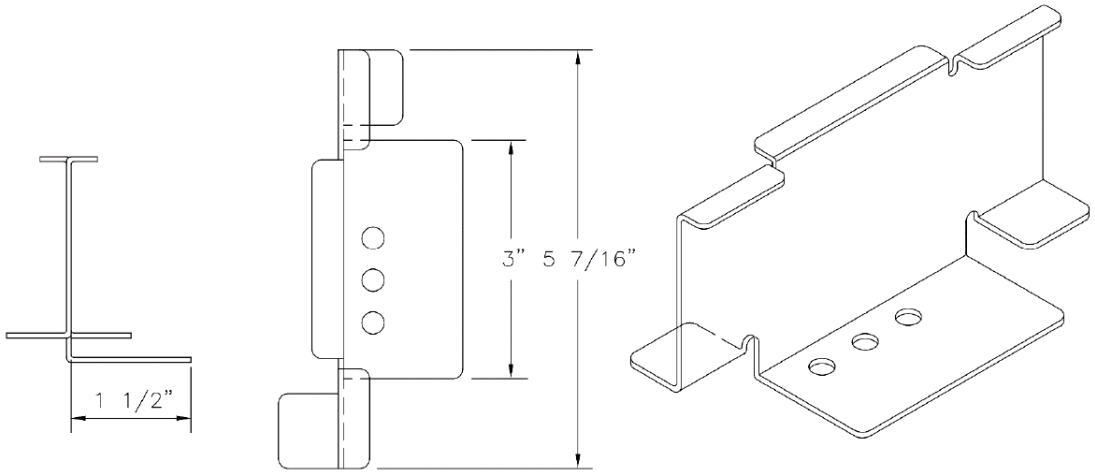


FIGURE 1.3: No. 16 Gauge Standard Clip – Material Properties and Figures (Typical)



16 Gauge Standard Clip Properties

Thickness	0.0566 in. (min)	S_{xe} (top)	0.1520 in^3	ϕP_n (E-TF)	0.473 k
Type	A653/A792 SS-33	S_{xe} (bot)	0.2454 in^3		
F_y	33 ksi (min)	I_x	0.2634 in^4		
E	29,500 ksi				

For SI: 1 inch = 2.54 mm; 1 ksi = 6.89 MPa; 1 kip = 1000 lbs.

Notes:

1. For gravity load conditions, panels are not subject to web crippling conditions, but I-Span Anchors have been evaluated for web crippling effects and limiting conditions, if applicable, have been included in the load tables.
2. Series 300 roof panels do not provide lateral load resistance (diaphragm action).
3. Series 300 roof panels have not been tested to determine any lateral restraint which may be provided to supporting roof purlins.
4. Section properties are calculated in accordance with the AISI S100-12, North American Specification for the Design of Cold-Formed Steel Structural Members.
5. Two ¼" - 14 x 1 ¼ HWH DP3 fasteners used in the design is subject to approval by the building official for each project.
6. E is the modulus of elasticity.
7. F_y is the yield strength.
8. I_{xe} is the effective moment of inertia about the cross-section about the x-axis.
9. M_n is the nominal bending strength.
10. P_n is the nominal strength in tension or compression.
11. S_{xe} is the effective section modulus about the x-axis.

TABLE 1.1 – Fastener Wind Uplift Design Load – Steel Substrates:

	Nominal Thickness of Steel Deck or Purlin	T1.1 - Fastener Wind Uplift Design Load, PSF Consealor #14-13 DP1 Screws in Steel Substrates										
		Clip Spacing (Span) in Feet										
		6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
2 Screws per Clip	26 ga (0.018")	24.8	27.0	29.7	33.0	37.2	42.5	49.6	59.5	74.3	99.1	148.7
	25 ga (0.021")	30.3	33.1	36.4	40.4	45.5	52.0	60.7	72.8	91.0	121.3	182.0
	24 ga (0.024")	34.7	37.8	41.6	46.2	52.0	59.4	69.3	83.2	104.0	138.7	208.0
	22 ga (0.030")	43.3	47.3	52.0	57.8	65.0	74.3	86.7	104.0	130.0	173.3	260.0
	20 ga (0.036")	51.9	56.6	62.3	69.2	77.8	89.0	103.8	124.5	155.7	207.6	311.3
	18 ga (0.048")	69.2	75.5	83.1	92.3	103.8	118.7	138.4	166.1	207.7	276.9	415.3
	16 ga (0.060")	86.6	94.4	103.9	115.4	129.8	148.4	173.1	207.7	259.7	346.2	519.3
	14 ga (0.075")	108.2	118.1	129.9	144.3	162.3	185.5	216.4	259.7	324.7	432.9	649.3
3 Screws per Clip	26 ga (0.018")	37.2	40.5	44.6	49.6	55.8	63.7	74.3	89.2	111.5	148.7	223.0
	25 ga (0.021")	45.5	49.6	54.6	60.7	68.3	78.0	91.0	109.2	136.5	182.0	273.0
	24 ga (0.024")	52.0	56.7	62.4	69.3	78.0	89.1	104.0	124.8	156.0	208.0	312.0
	22 ga (0.030")	65.0	70.9	78.0	86.7	97.5	111.4	130.0	156.0	195.0	260.0	390.0
	20 ga (0.036")	77.8	84.9	93.4	103.8	116.8	133.4	155.7	186.8	233.5	311.3	467.0
	18 ga (0.048")	103.8	113.3	124.6	138.4	155.8	178.0	207.7	249.2	311.5	415.3	623.0
	16 ga (0.060")	129.8	141.6	155.8	173.1	194.8	222.6	259.7	311.6	389.5	519.3	779.0
	14 ga (0.075")	162.3	177.1	194.8	216.4	243.5	278.3	324.7	389.6	487.0	649.3	974.0

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1lbf = 4.448 N; 1 psf = 47.9 Pa

1. The nominal strength for fastener pull-out and pull-over for extruded I-Span Anchor and No.16-gauge Standard Clip has been calculated in accordance with AISI S100-12 E4.4, and fastener tension as reported by the manufacturer in accordance with AISI S100-12 E4.4.3. The limiting condition was used in determining the design strength shown for each clip spacing.
2. Design loads are factored loads for use with LRFD Load Combinations. A resistance factor, Φ, of 0.50 has been applied in accordance with AISI S100-12 E4.
3. The steel substrate is taken as Grade 50, F_u = 65 ksi (minimum), except that the No. 26 gauge is taken as Grade 80, F_u = 62 ksi (minimum).
4. Fastener loads for wind uplift design strength are based upon 18 inches on-center panel seam spacing.
5. Fastener loads shown in this table may be higher than the wind uplift capacity of the panel and clip system; refer to applicable tables in this report specific to the panel and clip system under consideration.

TABLE 1.2 – Fastener Wind Uplift Design Load – Wood Substrates:

	Nominal Thickness of Wood Deck	T1.2 - Fastener Wind Uplift Design Strength, PSF Consealor #14-13 DP1 Screws in Wood Substrates										
		Clip Spacing (Span) in Feet										
		6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
2 Screws per Clip	7/16" OSB	13.6	14.8	16.3	18.1	20.4	23.3	27.2	32.6	40.8	54.4	81.6
	19/32" OSB	29.1	31.7	34.9	38.8	43.6	49.8	58.1	69.8	87.2	116.3	174.4
	23/32" OSB	40.6	44.3	48.7	54.2	60.9	69.6	81.2	97.5	121.9	162.5	243.7
	1/2" Plywood	38.6	42.1	46.3	51.4	57.9	66.1	77.2	92.6	115.7	154.3	231.5
	5/8" Plywood	42.2	46.1	50.7	56.3	63.3	72.4	84.4	101.3	126.7	168.9	253.3
	3/4" Plywood	55.6	60.7	66.8	74.2	83.5	95.4	111.3	133.5	166.9	222.6	333.9
	2x4 SYP	88.1	96.1	105.7	117.5	132.1	151.0	176.2	211.4	264.3	352.4	528.5
3 Screws per Clip	7/16" OSB	20.4	22.3	24.5	27.2	30.6	35.0	40.8	49.0	61.2	81.6	122.4
	19/32" OSB	43.6	47.6	52.3	58.1	65.4	74.7	87.2	104.6	130.8	174.4	261.6
	23/32" OSB	60.9	66.5	73.1	81.2	91.4	104.5	121.9	146.2	182.8	243.7	365.6
	1/2" Plywood	57.9	63.1	69.4	77.2	86.8	99.2	115.7	138.9	173.6	231.5	347.2
	5/8" Plywood	63.3	69.1	76.0	84.4	95.0	108.6	126.7	152.0	190.0	253.3	380.0
	3/4" Plywood	83.5	91.1	100.2	111.3	125.2	143.1	166.9	200.3	250.4	333.9	500.8
	2x4 SYP	132.1	144.1	158.6	176.2	198.2	226.5	264.3	317.1	396.4	528.5	792.8

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1lbf = 4.448 N; 1 psf = 47.9 Pa

1. The nominal strength for fastener withdrawal for extruded I-Span Anchor and No.16-gauge Standard Clip has been provided by the manufacturer based on physical test results in each listed wood substrate.
2. Design loads are factored loads for use with LRFD Load Combinations. A resistance factor, Φ, of 0.40 has been applied in accordance with AWC-NDS.
3. Fasteners were tested in full thread embedment into each OSB and plywood substrate. The 1-inch minimum fastener penetration specified for the wood species values applies to the usable thread length and this minimum depth does not include the tapered portion of the fastener. For fastener penetrations above 1-inch the pull-out values may be proportionally adjusted in accordance with the NDS.
4. Fastener loads for wind uplift design strength are based upon 18 inches on-center panel seam spacing.
5. Fastener loads shown in this table may be higher than the wind uplift capacity of the panel and clip system; refer to applicable tables in this report specific to the panel and clip system under consideration.

1.0 IMETCO Series 300 Roof Panel

FIGURE 1.4 – Series 300 – No.22 or 20 Gauge:

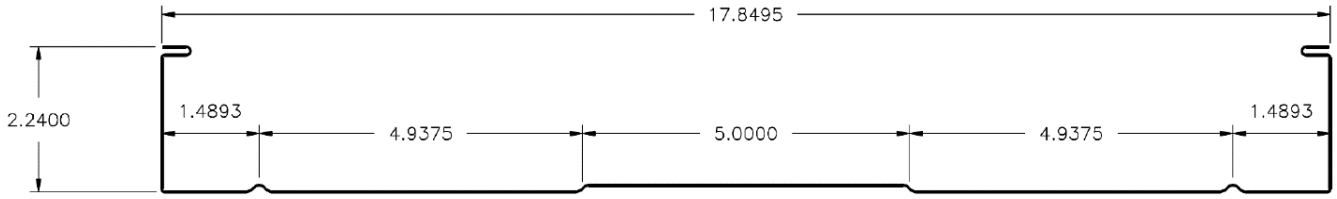


TABLE 1.3 – No. 22 Gauge Steel Section Properties:

22 GA Steel x 18" Panel Properties

Thickness	0.0285 in. (nom)	S_{xe} (top)	0.1719 in^3	$øM_n$ (top)	30.55 k-in
Type	A653/A792 SS-40	S_{xe} (bot)	0.8485 in^3	$øM_n$ (bot)	6.19 k-in
Width	18 in. (nom)	Ix (eff)	0.3230 in4	$øV_n$	2.532 k
F_y	40 ksi				
E	29,500 ksi				

For SI: 1 inch = 2.54 mm; 1 ksi = 6.89 MPa; 1 kip = 1000 lbs.

Notes:

1. Section properties are calculated in accordance with the AISI S100-12, North American Specification for the Design of Cold-Formed Steel Structural Members.
2. The section properties also shall be used for the No. 20 gauge (0.0340 inch) panels.
3. The No. 20 and No. 22 GA panel loads may be designed by a registered design professional using the Section Properties in Table 1.3 of this report.
4. E is the modulus of elasticity.
5. F_y is the yield strength.
6. I_{xe} is the effective moment of inertia about the cross-section about the x-axis.
7. M_n is the nominal bending strength.
8. S_{xe} is the effective section modulus about the x-axis.
9. V_n is the nominal shear strength.

TABLE 1.4 – Anchor Wind Negative (Uplift) Design Load:

	T1.4 Series 300 Panel/Anchor Wind Uplift Design Load, PSF 22 GA or 20 GA Steel with 18" o.c. Seam Spacing Extruded I-Span Anchor Anchor Span in Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Max. Design Load, PSF	128.0	129.8	131.5	133.3	135.0	136.8	138.6	140.3	142.1	143.8	145.6

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1 psf = 47.9 Pa

1. The wind uplift nominal strength has been determined according to the procedures of AISI S906, with a resistance factor, Φ =0.80 in accordance with AISI S100-12 D6.2.1.
2. Design loads shown are factored loads for use with LRFD load combinations.
3. The allowable service load deflections for metal roof panels shall be taken as L/60.
4. Wind uplift design loads may be further limited by the design strength of the anchor fasteners into the roof substrate. The tests conducted in accordance with ASTM E1592, shown in this table, utilized two ¼" -14 x 1.25" HWH self-drilling tapping screws per anchor/ purlin connection. For other fastener types or roof substrates, the fastener design strength shall be designed by the registered design professional.
5. Tables 1.1 and 1.2 of this report have been provided for the fastener design strength of a frequently used screw type into typical metal and wood roof substrates.

TABLE 1.5 – Anchor Uniform Positive (Gravity) Design Load:

	T1.5 - Series 300 Panel/Anchor Uniform Positive (Gravity) Design Load, PSF 22 GA or 20 GA Steel with 18" o.c. Seam Spacing Extruded I-Span Anchor Anchor Span in Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Single Span, PSF	163.7	194.8	235.7	291.0	368.3	481.0	654.7	942.7	1,327	1,769	2,653
Two Span, PSF	248.0	270.5	297.6	330.7	372.0	425.1	496.0	595.2	744.0	992.0	1,488
Three Span, PSF	255.7	304.3	338.2	375.8	422.7	483.1	563.6	676.4	845.5	1,127	1,691

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1lbf = 4.448 N; 1 psi = 6.895 MPa

1. Applicable section properties of panel and I-span anchors provided within this report have been determined in accordance with AISI S100-12.
2. The positive nominal strength and resistance factor have been determined by evaluating panel bending, shear, deflection, and interaction of bending and shear, load transfer (reaction) through the I-span anchors.
3. Design loads are factored loads for use with LRFD Load Combinations.
4. Values for the three-span condition may be conservatively used for more than 3 spans.

TABLE 1.6 – Clip Wind Negative (Uplift) Design Load:

	T1.6 - Series 300 Panel/Clip Wind Uplift Design Load, PSF 22 GA or 20 GA Steel with 18" o.c. Seam Spacing Standard 16 GA Clip Anchors										
	Clip Spacing (Span), Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Max. Design Load, PSF	44.0	54.2	64.3	74.5	84.6	94.8	105.0	115.1	125.3	135.4	145.6

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1 psf = 47.9 Pa

1. The wind uplift nominal strength has been determined according to the procedures of AISI S906, with a resistance factor, Φ =0.80 in accordance with AISI S100-12 D6.2.1.
2. Intermediate design values have been determined based on linear interpolation between tested values based on Section 5.4.3.2 of EC011-2019.
3. Design loads shown are factored loads for use with LRFD load combinations.
4. The allowable service load deflections for metal roof panels shall be taken as L/60.
5. Wind uplift design loads may be further limited by the design strength of the anchor fasteners into the roof substrate. The tests conducted in accordance with ASTM E1592, shown in this table, utilized two ¼" -14 x 1.25" HWH self-drilling tapping screws per anchor/ purlin connection. For other fastener types or roof substrates, the faster design strength shall be designed by the registered design professional.
6. Tables 1.1 and 1.2 of this report have been provided for the fastener design strength of a frequently used screw type into typical metal and wood roof substrates.

TABLE 1.7 – Clip Uniform Positive (Gravity) Design Load:

	T1.7 - Series 300 Panel/Clip Uniform Positive (Gravity) Design Load, PSF 22 GA or 20 GA Steel with 18" o.c. Seam Spacing Standard 16 GA Clip Anchors										
	Clip Spacing (Span) in Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Single Span, PSF	76.4	90.9	110.0	135.8	157.3	179.8	209.8	251.7	314.7	419.6	629.3
Two Span, PSF	42.0	45.8	50.3	55.9	62.9	71.9	83.9	100.7	125.9	167.8	251.7
Three Span, PSF	47.7	52.0	57.2	63.6	71.7	81.7	95.4	114.4	143.0	190.7	286.1

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1lbf = 4.448 N; 1 psf = 47.9 Pa

1. Applicable section properties of panel and clip anchors provided within this report have been determined in accordance with AISI S100-12.
2. The positive nominal strength and resistance factor have been determined by evaluating panel bending, shear, deflection, and interaction of bending and shear, load transfer (reaction) through the clip anchors.
3. Design loads are factored loads for use with LRFD Load Combinations.
4. Values for the three span condition may be conservatively used for more than 3 spans.

FIGURE 1.5 – Series 300 – No. 24 Gauge:

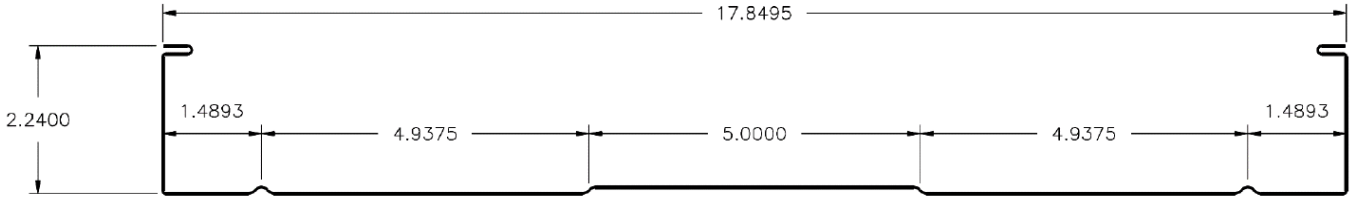


TABLE 1.8 – No. 24 Gauge Steel Section Properties:

24 GA Steel x 18" Panel Properties

Thickness	0.0225 in. (nom)	S_{xe} (top)	0.1238 in^3	$øM_n$ (top)	22.11 k-in
Type	A653/A792 SS-40	S_{xe} (bot)	0.6142 in^3	$øM_n$ (bot)	4.46 k-in
Width	18 in. (nom)	Ix (eff)	0.2330 in4	$øV_n$	1.613 k
F_y	40 ksi				
E	29,500 ksi				

For SI: 1 inch = 2.54 mm; 1 ksi = 6.89 MPa; 1 kip = 1000 lbs.

Notes:

1. Section properties are calculated in accordance with the AISI S100-12, North American Specification for the Design of Cold-Formed Steel Structural Members.
2. The 24 GA panel loads may be designed by a registered design professional using the Section Properties in Table 1.8 of this report.
3. E is the modulus of elasticity.
4. F_y is the yield strength.
5. I_{xe} is the effective moment of inertia about the cross-section about the x-axis.
6. M_n is the nominal bending strength.
7. S_{xe} is the effective section modulus about the x-axis.
8. V_n is the nominal shear strength.

TABLE 1.9 – Anchor Wind Negative (Uplift) Design Load:

	T1.9 - Series 300 Panel/Anchor Wind Uplift Design Load, PSF 24 GA Steel with 18" o.c. Seam Spacing Extruded I-Span Anchor Anchor Span in Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Max. Design Load, PSF	96.2	97.4	98.6	99.7	100.9	102.1	103.3	104.5	105.6	106.8	108.0

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1 psf = 47.9 Pa

1. The wind uplift nominal strength has been determined according to the procedures of AISI S906, with a resistance factor, Φ =0.80 in accordance with AISI S100-12 D6.2.1.
2. Intermediate design values have been determined based on linear interpolation between tested values based on Section 5.4.3.2 of EC011-2019.
3. Design loads shown are factored loads for use with LRFD load combinations.
4. The allowable service load deflections for metal roof panels shall be taken as L/60.
5. Wind uplift design loads may be further limited by the design strength of the anchor fasteners into the roof substrate. The tests conducted in accordance with ASTM E1592, shown in this table, utilized two ¼" -14 x 1.25" HWH self-drilling tapping screws per anchor/ purlin connection. For other fastener types or roof substrates, the faster design strength shall be designed by the registered design professional.
6. Tables 1.1 and 1.2 of this report have been provided for the fastener design strength of a frequently used screw type into typical metal and wood roof substrates.
7. Results may be applied to steel Series 300 panels of thicker gauge and/or narrower width.

TABLE 1.10 – Anchor Uniform Positive (Gravity) Design Load:

	T1.10 - Series 300 Panel/Anchor Uniform Positive (Gravity) Design Load, PSF 24 GA Steel with 18" o.c. Seam Spacing Extruded I-Span Anchor Anchor Span in Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Single Span, PSF	142.3	169.3	204.9	253.0	320.2	418.2	569.2	819.6	1,281	1,769	2,653
Two Span, PSF	248.0	270.5	297.6	330.7	372.0	425.1	496.0	595.2	744.0	992.0	1,488
Three Span, PSF	222.3	264.6	320.2	375.8	422.7	483.1	563.6	676.4	845.5	1,127	1,691

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1lbf = 4.448 N; 1 psf = 47.9 Pa

1. Applicable section properties of panel and I-span anchors provided within this report have been determined in accordance with AISI S100-12.
2. The positive nominal strength and resistance factor have been determined by evaluating panel bending, shear, deflection, and interaction of bending and shear, load transfer (reaction) through the I-span anchors.
3. Design loads are factored loads for use with LRFD Load Combinations.
4. Values for the three-span condition may be conservatively used for more than 3 spans.
5. Results may be applied to steel Series 300 panels of thicker gauge and/or narrower width.

TABLE 1.11 – Clip Wind Negative (Uplift) Design Load:

T1.11 - Series 300 Panel/Clip Wind Uplift Design Load, PSF 24 GA Steel with 18" o.c. Seam Spacing Standard 16 GA Clip Anchors										
	Clip Spacing (Span), Feet									
	Span, ft	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Max. Design Load, PSF		44.8	51.8	58.8	65.9	72.9	79.9	86.9	94.0	101.0	108.0

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1 psf = 47.9 Pa

1. The wind uplift nominal strength has been determined according to the procedures of AISI S906, with a resistance factor, Φ =0.80 in accordance with AISI S100-12 D6.2.1.
2. Design loads shown are factored loads for use with LRFD load combinations.
3. Intermediate design values have been determined based on linear interpolation between tested values based on Section 5.4.3.2 of EC011-2019.
4. The allowable service load deflections for metal roof panels shall be taken as L/60.
5. Wind uplift design loads may be further limited by the design strength of the anchor fasteners into the roof substrate. The tests conducted in accordance with ASTM E1592, shown in this table, utilized two ¼" -14 x 1.25" HWH self-drilling screws per anchor/ purlin connection. For other fastener types or roof substrates, the faster design strength shall be designed by the registered design professional.
6. Tables 1.1 and 1.2 of this report have been provided for the fastener design strength of a frequently used screw type into typical metal and wood roof substrates.
7. Results may be applied to steel Series 300 panels of thicker gauge and/or narrower width.

TABLE 1.12 – Clip Uniform Positive (Gravity) Design Load:

T1.12 - Series 300 Panel/Clip Uniform Positive (Gravity) Design Load, PSF 24 GA Steel with 18" o.c. Seam Spacing Standard 16 GA Clip Anchors										
	Clip Spacing (Span) in Feet									
	Span, ft	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Single Span, PSF		65.5	79.2	97.8	123.8	161.7	209.8	251.7	314.7	419.6	629.3
Two Span, PSF		45.8	50.3	55.9	62.9	71.9	83.9	100.7	125.9	167.8	251.7
Three Span, PSF		52.0	57.2	63.6	71.7	81.7	95.4	114.4	143.0	190.7	286.1

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1lbf = 4.448 N; 1 psf = 47.9 Pa

1. Applicable section properties of panel and anchors provided within this report have been determined in accordance with AISI S100-12.
2. The positive nominal strength and resistance factor have been determined by evaluating panel bending, shear, deflection, and interaction of bending and shear, load transfer (reaction) through the clip anchors.
3. Design loads are factored loads for use with LRFD Load Combinations.
4. Values for the three span condition may be conservatively used for more than 3 spans.
5. Results may be applied to steel Series 300 panels of thicker gauge and/or narrower width.

FIGURE1.6 – Series 300 – 0.040-inch and 0.050-inch thick Aluminum:

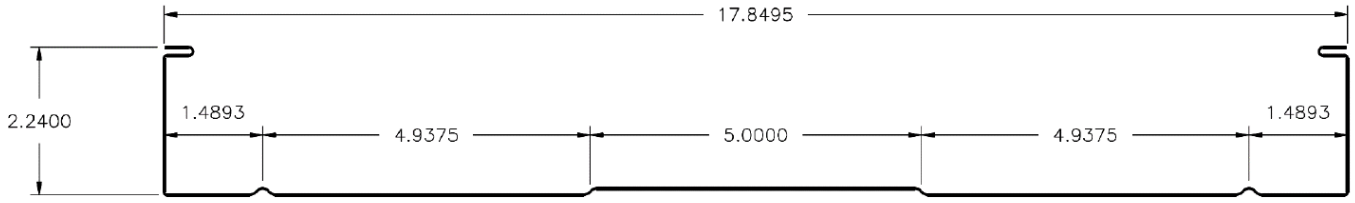


TABLE 1.13 – 0.040-thick Aluminum Section Properties:
.040" Aluminum x 18" Panel Properties

Thickness	0.040 in. (nom)	Ix (top)	0.450 in4	$øM_n$ (top)	4.02 k-in
Type	3105-H25	Ix (bot)	0.430 in4	$øM_n$ (bot)	5.42 k-in
Width	18 in. (nom)			$øV_n$	1.340 k
F_y	19 ksi				
E	10,100 ksi				

For SI: 1 inch = 2.54 mm; 1 ksi = 6.89 MPa; 1 kip = 1000 lbs.

Notes:

1. Section properties are calculated in accordance with the ADM1-2015, Aluminum Design Manual: Part 1-A Specification for Aluminum Structures.
2. The section properties also shall be used for the 0.050-inch panels.
3. The 0.050- and 0.040-inch aluminum panel loads may be designed by a registered design professional using the Section Properties in Table 1.13 of this report.
4. E is the modulus of elasticity.
5. F_y is the yield strength.
6. I_{xe} is the effective moment of inertia about the cross-section about the x-axis.
7. M_n is the nominal bending strength.
8. V_n is the nominal shear strength.

TABLE 1.14 – Anchor Wind Negative (Uplift) Design Load:

	T1.14 - Series 300 Panel/Anchor Wind Uplift Design Load, PSF .040" or .050" Aluminum with 18" o.c. Seam Spacing Extruded I-Span Anchor										
	Anchor Span in Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Max. Design Load, PSF	108.0	112.4	116.8	121.2	125.6	130.0	134.4	138.8	143.2	147.6	152.0

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1 psf = 47.9 Pa

1. The wind uplift nominal strength has been determined according to the procedures of AISI S906, with a resistance factor, Φ =0.80 in accordance with AISI S100-12 D6.2.1.
2. Design loads shown are factored loads for use with LRFD load combinations.
3. Intermediate design values have been determined based on linear interpolation between tested values based on Section 5.4.3.2 of EC011-2019.
4. The allowable service load deflections for metal roof panels shall be taken as L/60.
5. Wind uplift design loads may be further limited by the design strength of the anchor fasteners into the roof substrate. The tests conducted in accordance with ASTM E1592, shown in this table, utilized two ¼" -14 x 1.25" HWH self-drilling tapping screws per anchor/ purlin connection. For other fastener types or roof substrates, the faster design strength shall be designed by the registered design professional.
6. Tables 1.1 and 1.2 of this report have been provided for the fastener design strength of a frequently used screw type into typical metal and wood roof substrates.

TABLE 1.15 – Anchor Uniform Positive (Gravity) Design Load:

	T1.15 - Series 300 Panel/Anchor Uniform Positive (Gravity) Design Load, PSF .040" or .050" Aluminum with 18" o.c. Seam Spacing Extruded I-Span Anchor										
	Anchor Span in Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Single Span, PSF	136.9	162.9	197.1	243.4	308.0	402.3	547.6	788.5	1,232	1,769	2,653
Two Span, PSF	198.4	216.4	238.1	264.5	297.6	340.1	396.8	476.2	595.2	793.6	1,190
Three Span, PSF	213.9	254.6	304.4	338.2	380.5	434.8	507.3	608.7	760.9	1,015	1,522

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1lbf = 4.448 N; 1 psf = 47.9 Pa

1. Applicable section properties of panel and I-span anchors provided within this report have been determined in accordance with ADM1-2015.
2. The positive nominal strength and resistance factor have been determined by evaluating panel bending, shear, deflection, and interaction of bending and shear, load transfer (reaction) through the I-span anchors.
3. Design loads are factored loads for use with LRFD Load Combinations.
4. Values for the three span condition may be conservatively used for more than 3 spans.

TABLE 1.16 – Clip Wind Negative (Uplift) Design Load:

	T1.16 Series 300 Panel/Clip Wind Uplift Design Load, PSF .040" or .050" Aluminum with 18" o.c. Seam Spacing Standard 16 GA Clip Anchors										
	Clip Spacing (Span), Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Max. Design Load, PSF	44.8	55.5	66.2	77.0	87.7	98.4	109.1	119.8	130.6	141.3	152.0

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1 psf = 47.9 Pa

1. The wind uplift nominal strength has been determined according to the procedures of AISI S906, with a resistance factor, Φ =0.80 in accordance with AISI S100-12 D6.2.1.
2. Design loads shown are factored loads for use with LRFD load combinations.
3. Intermediate design values have been determined based on linear interpolation between tested values based on Section 5.4.3.2 of EC011-2019.
4. The allowable service load deflections for metal roof panels shall be taken as L/60.
5. Wind uplift design loads may be further limited by the design strength of the anchor fasteners into the roof substrate. The tests conducted in accordance with ASTM E1592, shown in this table, utilized two ¼" -14 x 1.25" HWH self-drilling tapping screws per anchor/ purlin connection. For other fastener types or roof substrates, the faster design strength shall be designed by the registered design professional.
6. Tables 1.1 and 1.2 of this report have been provided for the fastener design strength of a frequently used screw type into typical metal and wood roof substrates.

TABLE 1.17 – Clip Uniform Positive (Gravity) Design Load:

	T1.17 Series 300 Panel/Clip Uniform Positive (Gravity) Design Load, PSF .040" or .050" Aluminum with 18" o.c. Seam Spacing Standard 16 GA Clip Anchors										
	Clip Spacing (Span) in Feet										
	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Single Span, PSF	49.6	59.1	71.5	88.2	111.7	145.9	198.5	251.7	314.7	419.6	629.3
Two Span, PSF	42.0	45.8	50.3	55.9	62.9	71.9	83.9	100.7	125.9	167.8	251.7
Three Span, PSF	47.7	52.0	57.2	63.6	71.5	81.7	95.4	114.4	143.0	190.7	286.1

For SI: 1 inch = 25.4 mm; 1 foot =305 mm; 1lbf = 4.448 N; 1 psf = 47.9 Pa

1. Applicable section properties of panel and clip anchors provided within this report have been determined in accordance with ADM1-2015.
2. The positive nominal strength and resistance factor have been determined by evaluating panel bending, shear, deflection, and interaction of bending and shear, load transfer (reaction) through the clip anchors.
3. Design loads are factored loads for use with LRFD Load Combinations.
4. Values for the three span condition may be conservatively used for more than 3 spans.