August 11, 2020

Everest Solar Systems, LLC
2835 La Mirada Drive
Suite A
Vista, CA 92081

RE: ***MiniRail XPRess PV Panel Mounting System Evaluation***
Gable Roofs (7°<θ≤20°, 20°< θ≤27°, 27°<θ≤45°)

To whom it may concern:

Please see the attached comprehensive structural analysis of the Everest Solar MiniRail XPRess Solar PV Mounting System for typical installations in the State of California. When installed per the conditions and design criteria described herein, the Everest Solar MiniRail - XPRess PV Mounting System is compliant with the sections of the design reference documents noted below.

Design Reference Documents

- *California Building Code 2019 (Volume 1 & 2)*
- *California Residential Code 2019*
- ASCE/SEI 7-16 – *Minimum Design Loads for Buildings and Other Structures*
- *2010 Aluminum Design* Manual, by the Aluminum Association
- AAMA / TIR 1991 *"Metal Curtain Wall Fasteners",* American Architectural Manufacturer's Association
- SSMA ICBO ER-4943P *"Product Technical Information,"* Steel Stud Manufacturer's Association
- Additional fastener load test data provided by EJOT UK LTD
- Installation per Minirail XPRess System Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.)
- Section and materials data provided by Everest Solar Systems

Overview

The MiniRail XPRess PV-panel roof mounting system consists of extruded 17" aluminum support rails, module clamps, and galvanized or stainless steel fasteners between points of attachment on an existing metal roof. Attachment of the MiniRail XPRess Mounting System to the existing roof structure shall be the responsibility of the installer and should be analyzed by a registered design professional where required by the local authority having jurisdiction.

Methods & Design Parameters

Applicable combinations of dead, wind, and snow loads were evaluated in accordance with current code requirements to determine allowable stresses in components and fasteners.

Design wind pressures were determined using Components and Cladding calculations in Chapter 26-30 of ASCE 7-16, using the loading parameters listed below. Configurations not conforming to these parameters will require additional analysis. Calculation of applicable roof snow load should be based upon ground snow load maps and equations and factors of ASCE 7-16, Chapter 7 and applicable sections of the 2019 CBC. For designated Case Study areas noted in the California Building Code 2019 (Volume 1 & 2), refer to local jurisdiction requirements for snow and wind load determination. Seismic criteria were not considered per provisions of ASCE 7-16 Section 13.1.4.

Loading Parameters:

- Ground snow load: 60 PSF (max.)
- Ultimate 3-second gust wind speed (V) = 150 mph (max.)
- Building roof mean height: 30 ft. or less
- Roof wind pressure region: Zones 1, 2e, 2r, 2n, 3e, 3r
- Wind exposure: B, C & D
- Panel orientation: Portrait/Landscape
- Panel installation angle: Flush with roof slope
- Module type: 72 cell modules or other modules of equal or lesser area (41”x82.5”)
- Roof slope (θ): Gable Roofs (7°<θ≤20°, 20°< θ≤27°, 27°< θ≤45°)
- Minimum metal roof deck thickness 26 gauge (reference tables attached)

Design Results

The allowable minimum roof gauges for rail attachment of the system are principally controlled by applicable wind (speed, exposure, pressure zone) and snow loads to the structure. Fastener allowable uplift and shear at attachment points typically govern minimum roof gauge.

Refer to MiniRail - XPRess calculations for allowable minimum roof gauge based on combinations of these loading parameters. If loading parameters are exceeded by those listed above, refer to Everest Solar Systems for engineering support.

Installation Notes

The following guidelines apply to all installations using the MiniRail product line:

- Calculations assume four independent fasteners per rail, two on each end of each rail
- Installations over roof overhangs is not advised
- Observe all local jurisdictional requirements regarding roof setback requirements

Summary

This assessment has provided design validation for code-compliant installations of the MiniRail XPRess PV Mounting system in the State of California. For all configurations, refer to Everest Solar Systems for engineering support.

This report does not provide analysis of any existing structures, as may be required by the local authority having jurisdiction.

We appreciate the opportunity to have assisted you with this project. Should you have any further questions regarding this analysis, please feel free to contact us by phone or email.

Best Regards,

Shawn P. Kelley

Digitally signed by Shawn P. Kelley
Date: 2020.08.20 14:19:14 -04'00'

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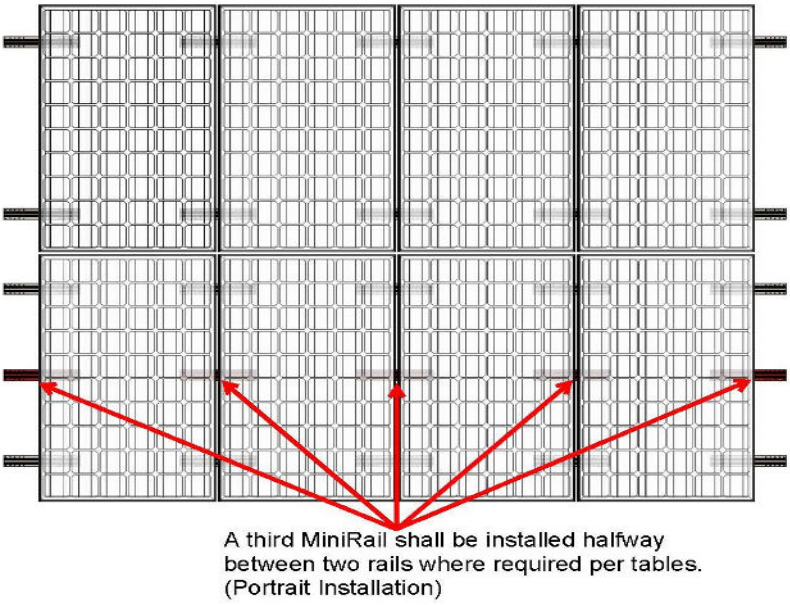
Attachments:
1. Table 1.1: Maximum Reaction Loads at Screws from Tables 2.1 thru 4.18 Snow & Wind Loads
2. Figure 1 – Mini Rail Attachment Diagram for Portrait and Landscape (2-Rail & 3-Rail Condition)
3. Tables 2.1 thru 2.27 – Minimum Roof Gauge, Gable Roofs, Exposure "B"
4. Tables 3.1 thru 3.27 – Minimum Roof Gauge, Gable Roofs, Exposure "C"
5. Tables 4.1 thru 4.18 – Minimum Roof Gauge, Gable Roofs, Exposure "D"

Table 1.1: Maximum Reaction Loads at Screws from Tables 2.1 thru 4.18 Snow & Wind Loads		
Roof Gauge	Reactions per Screw (lbs.)	
	Max Shear	Max Tension
26 ga	75	63
24 ga	75	99
22 ga	75	122



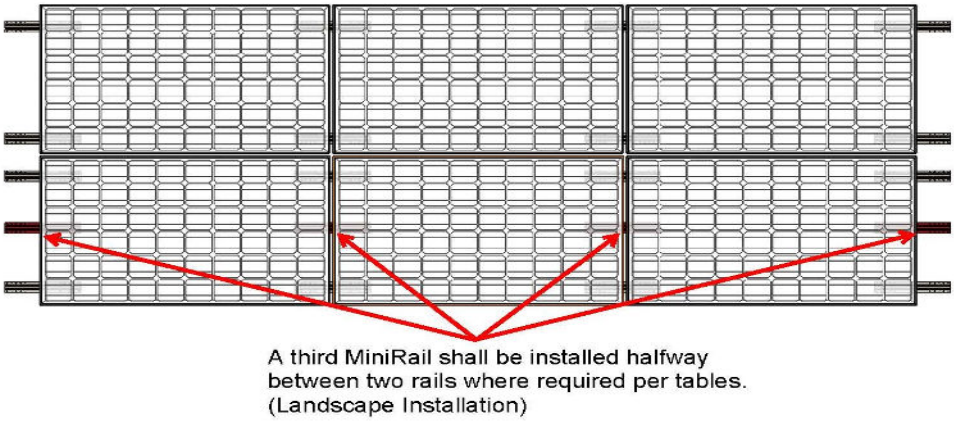


Figure 1 – Mini Rail Attachment Diagram for Portrait and Landscape (2-Rail & 3-Rail Condition)

Mini-Rail System (2-Rails)
Gable Roof 7° to 20°

Ground Snow (Pg, psf)	TABLE 2.1: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	24	24	24
20	26	26	26	24	24	24
30	26	26	26	24	24	24
40	26	26	26	24	24	24
50	26	26	26	24	24	24
60	26	26	26	24	24	24

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 2.2: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	22	22	-
20	24	24	24	22	22	-
30	24	24	24	22	22	-
40	24	24	24	22	22	-
50	24	24	24	22	22	-
60	24	24	24	22	22	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 2.3: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	22	22	-	-
20	24	24	22	22	-	-
30	24	24	22	22	-	-
40	24	24	22	22	-	-
50	24	24	22	22	-	-
60	24	24	22	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Mini-Rail System (2-Rails)
Gable Roof 7° to 20° - Exposed Panels[2]

Ground Snow (Pg, psf)	TABLE 2.4: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	24	22	-
20	24	24	24	24	22	-
30	24	24	24	24	22	-
40	24	24	24	24	22	-
50	24	24	24	24	22	-
60	24	24	24	24	22	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

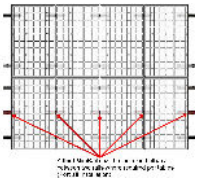
Ground Snow (Pg, psf)	TABLE 2.5: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	22	22	-	-	-	-
20	22	22	-	-	-	-
30	22	22	-	-	-	-
40	22	22	-	-	-	-
50	22	22	-	-	-	-
60	22	22	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

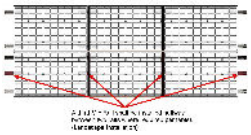
Ground Snow (Pg, psf)	TABLE 2.6: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	-	-	-	-	-	-
20	-	-	-	-	-	-
30	-	-	-	-	-	-
40	-	-	-	-	-	-
50	-	-	-	-	-	-
60	-	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 7° to 20° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 2.7: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	24	24	24
20	26	26	26	24	24	24
30	26	26	26	24	24	24
40	26	26	26	24	24	24
50	26	26	26	24	24	24
60	26	26	26	24	24	24

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 2.8: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	22	22	-
20	24	24	24	22	22	-
30	24	24	24	22	22	-
40	24	24	24	22	22	-
50	24	24	24	22	22	-
60	24	24	24	22	22	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 2.9: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	22	22	-	-
20	24	24	22	22	-	-
30	24	24	22	22	-	-
40	24	24	22	22	-	-
50	24	24	22	22	-	-
60	24	24	22	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Mini-Rail System (2-Rails)
Gable Roof 20° to 27°

Ground Snow (Pg, psf)	TABLE 2.10: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	26	26	24
20	26	26	26	26	26	24
30	26	26	26	26	26	24
40	26	26	26	26	26	24
50	26	26	26	26	26	24
60	26	26	26	26	24	24

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 2.11: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	24	24	24	24	22
20	26	24	24	24	24	22
30	26	24	24	24	24	22
40	26	24	24	24	24	22
50	24	24	24	24	24	22
60	24	24	24	24	24	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 2.12: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	24	22	22
20	24	24	24	24	22	22
30	24	24	24	24	22	22
40	24	24	24	24	22	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Mini-Rail System (2-Rails)
Gable Roof 20° to 27° - Exposed Panels[2]

Ground Snow (Pg, psf)	TABLE 2.13: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	24	24	22
20	26	26	24	24	24	22
30	26	26	24	24	24	22
40	26	26	24	24	24	22
50	26	26	24	24	24	22
60	26	24	24	24	24	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

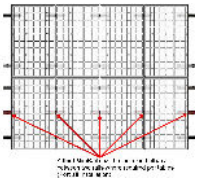
Ground Snow (Pg, psf)	TABLE 2.14: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	22	-	-	-
20	24	24	22	-	-	-
30	24	24	22	-	-	-
40	24	24	22	-	-	-
50	24	24	22	-	-	-
60	24	24	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

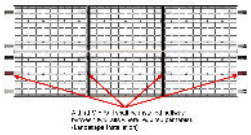
Ground Snow (Pg, psf)	TABLE 2.15: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	22	22	-	-	-
20	24	22	22	-	-	-
30	24	22	22	-	-	-
40	24	22	22	-	-	-
50	24	22	22	-	-	-
60	24	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 20° to 27° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 2.16: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	26	26	24
20	26	26	26	26	26	24
30	26	26	26	26	26	24
40	26	26	26	26	26	24
50	26	26	26	26	26	24
60	26	26	26	26	26	24

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 2.17: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	24	24	24	24	22
20	26	24	24	24	24	22
30	26	24	24	24	24	22
40	26	24	24	24	24	22
50	26	24	24	24	24	22
60	26	24	24	24	24	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 2.18: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	24	22	22
20	24	24	24	24	22	22
30	24	24	24	24	22	22
40	24	24	24	24	22	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Mini-Rail System (2-Rails)
Gable Roof 27° to 45°

Ground Snow (Pg, psf)	TABLE 2.19: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e/2r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	26	24	24
20	26	26	26	24	24	24
30	26	26	26	24	24	24
40	26	26	26	24	24	24
50	26	26	24	24	24	24
60	26	24	24	24	24	24

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 2.20: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/3r- (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	24	24	22
20	26	26	26	24	24	22
30	26	26	26	24	24	22
40	26	26	24	24	24	22
50	26	24	24	24	24	22
60	24	24	24	24	24	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 2.21: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3e - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	24	24	22
20	24	24	24	24	24	22
30	24	24	24	24	24	22
40	24	24	24	24	24	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Mini-Rail System (2-Rails)
Gable Roof 27° to 45° - Exposed Panels[2]

Ground Snow (Pg, psf)	TABLE 2.22: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e/2r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	24	22	22
20	24	24	24	24	22	22
30	24	24	24	24	22	22
40	24	24	24	24	22	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

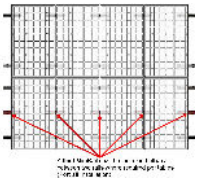
Ground Snow (Pg, psf)	TABLE 2.23: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/3r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	24	22	-
20	24	24	24	24	22	-
30	24	24	24	24	22	-
40	24	24	24	24	22	-
50	24	24	24	24	22	-
60	24	24	24	24	22	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

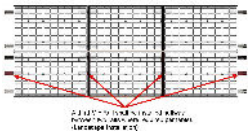
Ground Snow (Pg, psf)	TABLE 2.24: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3e - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	22	-	-	-
20	24	22	22	-	-	-
30	24	22	22	-	-	-
40	24	22	22	-	-	-
50	24	22	22	-	-	-
60	24	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 27° to 45° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 2.25: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e/2r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	26	24	24
20	26	26	26	26	24	24
30	26	26	26	26	24	24
40	26	26	26	24	24	24
50	26	26	26	24	24	24
60	26	26	26	24	24	24

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 2.26: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/3r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	26	26	26	24	24	22
20	26	26	26	24	24	22
30	26	26	26	24	24	22
40	26	26	26	24	24	22
50	26	26	26	24	24	22
60	26	26	24	24	24	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 2.27: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3e - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure B					
	110	115	120	130	140	150
0	24	24	24	24	24	22
20	24	24	24	24	24	22
30	24	24	24	24	24	22
40	24	24	24	24	24	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Mini-Rail System (2-Rails)
Gable Roof 7° to 20°

Ground Snow (Pg, psf)	TABLE 3.1: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	24	24	22	22
20	24	24	24	24	22	22
30	24	24	24	24	22	22
40	24	24	24	24	22	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 3.2: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	22	22	22	-	-	-
20	22	22	22	-	-	-
30	22	22	22	-	-	-
40	22	22	22	-	-	-
50	22	22	22	-	-	-
60	22	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 3.3: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	22	-	-	-	-	-
20	22	-	-	-	-	-
30	22	-	-	-	-	-
40	22	-	-	-	-	-
50	22	-	-	-	-	-
60	22	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Mini-Rail System (2-Rails)
Gable Roof 7° to 20° - Exposed Panels[2]

Ground Snow (Pg, psf)	TABLE 3.4: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	22	22	22	-	-	-
20	22	22	22	-	-	-
30	22	22	22	-	-	-
40	22	22	22	-	-	-
50	22	22	22	-	-	-
60	22	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

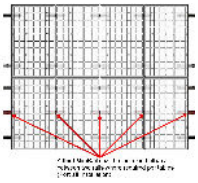
Ground Snow (Pg, psf)	TABLE 3.5: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	-	-	-	-	-	-
20	-	-	-	-	-	-
30	-	-	-	-	-	-
40	-	-	-	-	-	-
50	-	-	-	-	-	-
60	-	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

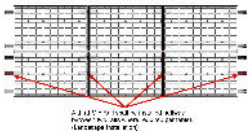
Ground Snow (Pg, psf)	TABLE 3.6: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	-	-	-	-	-	-
20	-	-	-	-	-	-
30	-	-	-	-	-	-
40	-	-	-	-	-	-
50	-	-	-	-	-	-
60	-	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 7° to 20° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 3.7: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	24	24	22	-
20	24	24	24	24	22	-
30	24	24	24	24	22	-
40	24	24	24	24	22	-
50	24	24	24	24	22	-
60	24	24	24	24	22	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 3.8: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	22	22	22	-	-	-
20	22	22	22	-	-	-
30	22	22	22	-	-	-
40	22	22	22	-	-	-
50	22	22	22	-	-	-
60	22	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 3.9: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	22	-	-	-	-	-
20	22	-	-	-	-	-
30	22	-	-	-	-	-
40	22	-	-	-	-	-
50	22	-	-	-	-	-
60	22	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Mini-Rail System (2-Rails)
Gable Roof 20° to 27°

Ground Snow (Pg, psf)	TABLE 3.10: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	26	26	26	24	24	24
20	26	26	26	24	24	24
30	26	26	26	24	24	24
40	26	26	26	24	24	24
50	26	26	24	24	24	24
60	26	26	24	24	24	24

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 3.11: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	22	22	-	-
20	24	24	22	22	-	-
30	24	24	22	22	-	-
40	24	24	22	22	-	-
50	24	24	22	22	-	-
60	24	24	22	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 3.12: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	22	-	-	-
20	24	24	22	-	-	-
30	24	24	22	-	-	-
40	24	24	22	-	-	-
50	24	22	22	-	-	-
60	24	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Mini-Rail System (2-Rails)
Gable Roof 20° to 27° - Exposed Panels[2]

Ground Snow (Pg, psf)	TABLE 3.13: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	24	22	22	-
20	24	24	24	22	-	-
30	24	24	24	22	-	-
40	24	24	24	22	-	-
50	24	24	24	22	-	-
60	24	24	24	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

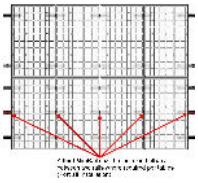
Ground Snow (Pg, psf)	TABLE 3.14: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	-	-	-	-	-	-
20	-	-	-	-	-	-
30	-	-	-	-	-	-
40	-	-	-	-	-	-
50	-	-	-	-	-	-
60	-	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

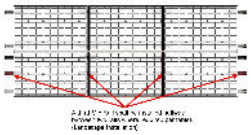
Ground Snow (Pg, psf)	TABLE 3.15: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	-	-	-	-	-	-
20	-	-	-	-	-	-
30	-	-	-	-	-	-
40	-	-	-	-	-	-
50	-	-	-	-	-	-
60	-	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 20° to 27° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 3.16: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	26	26	26	24	24	24
20	26	26	26	24	24	24
30	26	26	26	24	24	24
40	26	26	26	24	24	24
50	26	26	26	24	24	24
60	26	26	26	24	24	24

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 3.17: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	22	22	22	-	-
20	24	22	22	22	-	-
30	24	22	22	22	-	-
40	24	22	22	22	-	-
50	24	22	22	22	-	-
60	24	22	22	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 3.18: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	22	22	-	-	-
20	24	22	22	-	-	-
30	24	22	22	-	-	-
40	24	22	22	-	-	-
50	24	22	22	-	-	-
60	24	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Mini-Rail System (2-Rails)
Gable Roof 27° to 45°

Ground Snow (Pg, psf)	TABLE 3.19: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e/2r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	26	24	24	24	24	22
20	24	24	24	24	24	22
30	24	24	24	24	24	22
40	24	24	24	24	22	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 3.20: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/3r- (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	24	24	22	22
20	24	24	24	24	22	22
30	24	24	24	24	22	22
40	24	24	24	24	22	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Ground Snow (Pg, psf)	TABLE 3.21: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3e - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	22	22	-	-
20	24	24	22	22	-	-
30	24	24	22	22	-	-
40	24	24	22	22	-	-
50	24	24	22	22	-	-
60	24	24	22	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

Mini-Rail System (2-Rails)
Gable Roof 27° to 45° - Exposed Panels[2]

Ground Snow (Pg, psf)	TABLE 3.22: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e/2r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	22	-	-	-
20	24	22	22	-	-	-
30	24	22	22	-	-	-
40	24	22	22	-	-	-
50	24	22	22	-	-	-
60	24	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

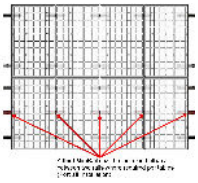
Ground Snow (Pg, psf)	TABLE 3.23: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/3r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	22	22	22	-	-	-
20	22	22	22	-	-	-
30	22	22	22	-	-	-
40	22	22	22	-	-	-
50	22	22	22	-	-	-
60	22	22	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

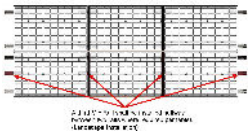
Ground Snow (Pg, psf)	TABLE 3.24: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3e - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	-	-	-	-	-	-
20	-	-	-	-	-	-
30	-	-	-	-	-	-
40	-	-	-	-	-	-
50	-	-	-	-	-	-
60	-	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 27° to 45° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 3.25: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e/2r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	26	24	24	24	24	22
20	26	24	24	24	24	22
30	26	24	24	24	24	22
40	24	24	24	24	22	22
50	24	24	24	24	22	22
60	24	24	24	24	22	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 3.26: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/3r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	24	24	22	-
20	24	24	24	24	22	-
30	24	24	24	24	22	-
40	24	24	24	24	22	-
50	24	24	24	24	22	-
60	24	24	24	24	22	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 3.27: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3e - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure C					
	110	115	120	130	140	150
0	24	24	22	22	-	-
20	24	24	22	22	-	-
30	24	24	22	22	-	-
40	24	24	22	22	-	-
50	24	24	22	22	-	-
60	24	24	22	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Mini-Rail System (2-Rails)
Gable Roof 7° to 20°

Ground Snow (Pg, psf)	TABLE 4.1: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	24	24	24	22	-	-
20	24	24	24	22	-	-
30	24	24	24	22	-	-
40	24	24	24	22	-	-
50	24	24	24	22	-	-
60	24	24	24	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

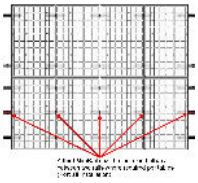
Ground Snow (Pg, psf)	TABLE 4.2: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	22	-	-	-	-	-
20	22	-	-	-	-	-
30	22	-	-	-	-	-
40	22	-	-	-	-	-
50	22	-	-	-	-	-
60	22	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

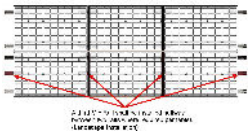
Ground Snow (Pg, psf)	TABLE 4.3: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	-	-	-	-	-	-
20	-	-	-	-	-	-
30	-	-	-	-	-	-
40	-	-	-	-	-	-
50	-	-	-	-	-	-
60	-	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 7° to 20° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 4.4: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	24	24	24	22	-	-
20	24	24	24	22	-	-
30	24	24	24	22	-	-
40	24	24	24	22	-	-
50	24	24	24	22	-	-
60	24	24	24	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 4.5: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	22	-	-	-	-	-
20	22	-	-	-	-	-
30	22	-	-	-	-	-
40	22	-	-	-	-	-
50	22	-	-	-	-	-
60	22	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 4.6: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 7° to 20°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	-	-	-	-	-	-
20	-	-	-	-	-	-
30	-	-	-	-	-	-
40	-	-	-	-	-	-
50	-	-	-	-	-	-
60	-	-	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Mini-Rail System (2-Rails)
Gable Roof 20° to 27°

Ground Snow (Pg, psf)	TABLE 4.7: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	26	24	24	24	24	22
20	26	24	24	24	24	22
30	26	24	24	24	24	22
40	26	24	24	24	24	22
50	24	24	24	24	24	22
60	24	24	24	24	24	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

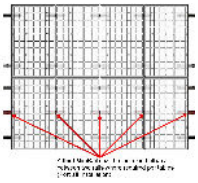
Ground Snow (Pg, psf)	TABLE 4.8: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	24	22	22	-	-	-
20	24	22	22	-	-	-
30	24	22	22	-	-	-
40	24	22	22	-	-	-
50	24	22	22	-	-	-
60	24	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

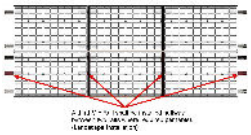
Ground Snow (Pg, psf)	TABLE 4.9: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	22	22	-	-	-	-
20	22	22	-	-	-	-
30	22	22	-	-	-	-
40	22	22	-	-	-	-
50	22	22	-	-	-	-
60	22	22	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 20° to 27° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 4.10: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	26	24	24	24	24	22
20	26	24	24	24	24	22
30	26	24	24	24	24	22
40	26	24	24	24	24	22
50	26	24	24	24	24	22
60	26	24	24	24	24	22

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 4.11: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/2r/3e - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	22	22	22	-	-	-
20	22	22	22	-	-	-
30	22	22	22	-	-	-
40	22	22	22	-	-	-
50	22	22	22	-	-	-
60	22	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 4.12: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3r - (Roof Slope 20° to 27°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	22	22	-	-	-	-
20	22	22	-	-	-	-
30	22	22	-	-	-	-
40	22	22	-	-	-	-
50	22	22	-	-	-	-
60	22	22	-	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Mini-Rail System (2-Rails)
Gable Roof 27° to 45°

Ground Snow (Pg, psf)	TABLE 4.13: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e/2r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	24	24	24	22	22	-
20	24	24	24	22	22	-
30	24	24	24	22	22	-
40	24	24	24	22	22	-
50	24	24	24	22	22	-
60	24	24	24	22	22	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

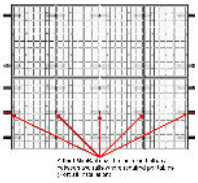
Ground Snow (Pg, psf)	TABLE 4.14: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/3r- (Roof Slope 27° to 45°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	24	24	24	22	-	-
20	24	24	24	22	-	-
30	24	24	24	22	-	-
40	24	24	24	22	-	-
50	24	24	24	22	-	-
60	24	24	24	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

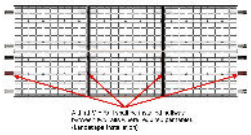
Ground Snow (Pg, psf)	TABLE 4.15: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3e - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	22	22	22	-	-	-
20	22	22	22	-	-	-
30	22	22	22	-	-	-
40	22	22	22	-	-	-
50	22	22	22	-	-	-
60	22	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.

ASCE 7-16
Roof Height: 30'



Mini-Rail System (3-Rails)
Gable Roof 27° to 45° - Exposed Panels[2]



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Ground Snow (Pg, psf)	TABLE 4.16: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 1/2e/2r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	24	24	24	22	22	-
20	24	24	24	22	22	-
30	24	24	24	22	22	-
40	24	24	24	22	22	-
50	24	24	24	22	22	-
60	24	24	24	22	22	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 4.17: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 2n/3r - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	24	24	24	22	-	-
20	24	24	24	22	-	-
30	24	24	24	22	-	-
40	24	24	24	22	-	-
50	24	24	24	22	-	-
60	24	24	24	22	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.

Ground Snow (Pg, psf)	TABLE 4.18: MINIMUM STEEL ROOF GAUGE FOR RAIL ATTACHMENT[1] ROOF ZONE 3e - (Roof Slope 27° to 45°)					
	Wind Speed - Exposure D					
	110	115	120	130	140	150
0	22	22	22	-	-	-
20	22	22	22	-	-	-
30	22	22	22	-	-	-
40	22	22	22	-	-	-
50	22	22	22	-	-	-
60	22	22	22	-	-	-

1. Minirail XPRess System per Assembly Instructions with specified number of JT3-2-13 (6mm diam.) or JF3-2-12 (5.5mm diam.) fasteners, reference Table 1.1 for maximum reactions.
2. γ_E = 1.5. Refer to 29.4-7 in ASCE 7-16 for exposed panel definition.