

Roof Mounting System

Standard (XRS) and Light (XRL) Rails with Integrated Grounding

**Conforms to UL SUB 2703*

2013 Edition v1.12

This Installation Manual was created to assist the assembly of the IronRidge Standard (XRS) and Light (XRL) Rail Mounting Systems with Integrated Grounding.

Standard (XRS) and Light (XRL) Rails with Integrated Grounding

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Introduction

The IronRidge Standard (XRS) and Light (XRL) Rail Systems are flexible and straightforward roof mounting solutions for a wide variety of solar photovoltaic (PV) needs. Due to their modular design, they can easily handle a multitude of panel sizes and quantities.

Installer Responsibility

The installer is solely responsible for:

- I. Complying with all applicable local or national building codes, including any that may supersede this manual;
- II. Ensuring that IronRidge and other products are appropriate for the particular installation and the installation environment;
- III. Ensuring that all structural support members, including the roof, its rafters, and connections, can support the array under all code level loading conditions;
- IV. Using only IronRidge parts and installer-supplied parts as specified by IronRidge. Substitution parts may void the warranty;
- V. Ensuring that anchoring devices including lag screws have adequate pullout strength and shear capacities as installed;
- VI. Maintaining the waterproof integrity of the structural support or roof, including selection of appropriate flashing;
- VII. Ensuring safe installation of all electrical aspects of the PV array;
- VIII. Ensuring that PV module is installed per module manufacturer's installation requirements; the PV module manufacturer accepts clamping and grounding methods described in this manual; that PV module is UL or CE listed and verification of PV Module's capacity to support the loads associated with the given array;
- IX. Ensuring correct and appropriate design parameters are used in determining the design loading used for the specific installation. Parameters, such as snow loading, wind speed, exposure and topographic factor should be confirmed with the local building official or a licensed professional engineer.

Customer Support

IronRidge makes every effort to ensure your mounting kit is easy to install. If you need assistance at any point in your installation or have suggestions on how we can improve your experience, call customer support at 1-800-227-9523 or email us at support@ironridge.com.

Tools Required For Assembly

Torque wrenches are required to assemble the rails. The sockets will need to support the following size hex heads:

Hex Head Size	Component
5/16"	#10 Hardware and #12 Self-drilling/tapping screws
7/16"	1/4" Hardware (Clamps)
9/16"	3/8" Hardware (L-feet)



Torque Values

Use the following torque values in this assembly.

Bolt Size	Required Torque Value
#10	32 in-lbs Dry (27 in-lbs Lubricated)
#12	84 in-lbs Dry (73 in-lbs Lubricated)
1/4-20	84 in-lbs Dry (73 in-lbs Lubricated)
1/4-20 (End Clamps)	65 in-lbs Dry (55 in-lbs Lubricated)
3/8-16	236 in-lbs (201 in-lbs Lubricated)

Module Clamp Table

<u>Module Thickness</u>		<u>Part Numbers</u>	
Millimeters	Inches	End Clamp	Grounding Mid Clamp
31.0 - 32.5	1.22 - 1.28	29-7000-125	RS-GD-MCL-200
33.3 - 34.8	1.31 - 1.37	29-7000-134	RS-GD-MCL-200
34.8 - 36.8	1.37 - 1.45	29-7000-224	RS-GD-MCL-225
39.0 - 41.0	1.53 - 1.61	29-7000-157	RS-GD-MCL-225
41.1 - 42.7	1.62 - 1.68	29-7000-165	RS-GD-MCL-250
42.7 - 44.2	1.68 - 1.74	29-7000-171	RS-GD-MCL-250
45.0 - 47.0	1.77 - 1.85	29-7000-214	RS-GD-MCL-250
46.7 - 48.3	1.84 - 1.90	29-7000-187	RS-GD-MCL-275
49.0 - 51.1	1.93 - 2.01	29-7000-204	RS-GD-MCL-275
57.4 - 58.9	2.26 - 2.32	29-7000-230	Unsupported

Component List

The IronRidge Standard and Light Rail System with Integrated Grounding contains the following parts:

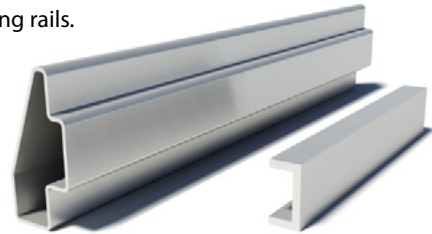
Standard (XRS) and Light (XRL) Rail

Attaches to L-foot and provides support for the PV modules.



Internal Splice

Provides a structural connection when connecting rails.



L-Foot

Attaches to the roof and supports rails.



End Clamp

Secures PV modules to rails utilizing the rail top slot.



Grounding Mid Clamp

Secures PV modules to rails and provides grounding to the rail and between the two adjacent modules.



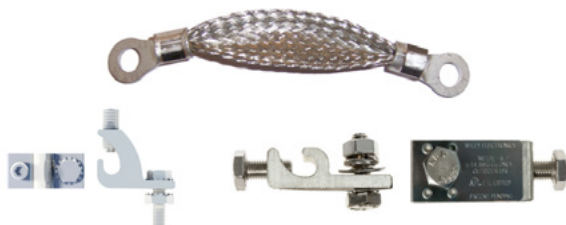
End Cap

Caps off the end of the rail and prevents the collection of debris inside rail.



Grounding Solutions

Rail to Rail Grounding Strap and Grounding Lugs.



Wire Clips

Wire management for rails.

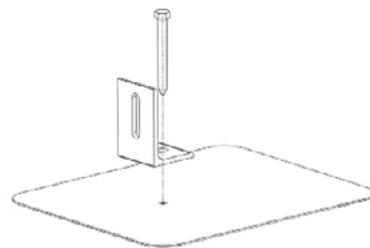


Assembly Steps

Step 1. Install Applicable Roof Flashing and L-feet

- Determine the appropriate flashing required for your roof type and project. Install flashing per manufacturer's requirements.
- Mount all the L-feet to the roof in the desired locations using a minimum 5/16" x 3" long Lag Bolt. The 5/16" Lag Bolt attached to a structural roof member such as a rafter. For metal or tile roofs, install a mount suitable for the application, per mount manufacturer's requirements.

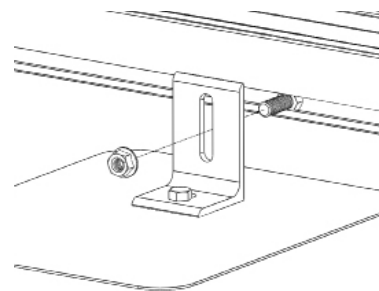
Note: The roof attachment spacings are defined by many variables such as site conditions, rail type and roof structure. Refer to the IronRidge Certification letters or online Design Assistant to determine appropriate attachment spacing.



Step 2. Attaching Rails To L-Feet

- Slide the 3/8" bolts into rail side slot. Space bolts to match the L-feet spacing.
- Loosely attach rail to L-feet using 3/8" hardware. Position rail at desired height and level. Once level torque 3/8" hardware to 236 in-lbs (dry). Move to Step 3 for Rail to Rail Connections then repeat Step 2 for each L-foot connection.

Note: Attaching rails to L-Feet may be performed before or after making rail-to-rail connections, depending on the installer's preference.

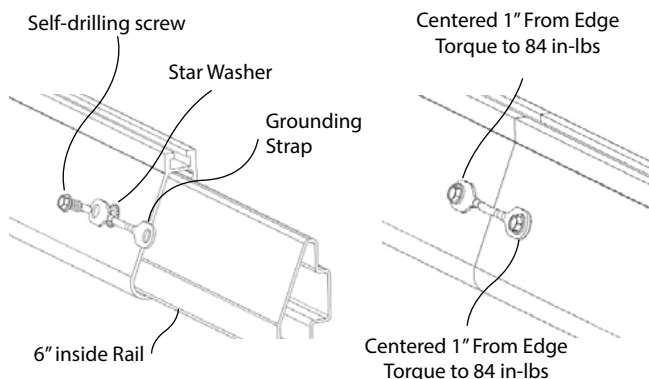


Step 3. Rail to Rail Connections

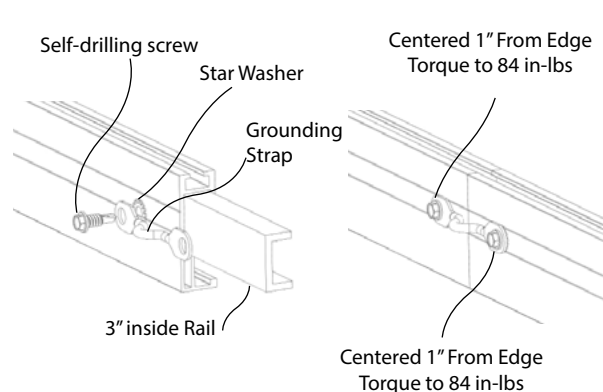
 *Note: This connection requires proper grounding on rails with grounding lugs by using one of the two following Rail to Rail Connection methods. For rails without lugs, use the Internal Splice and self-drilling screws without the grounding strap and star washers (See Page 8). For rows exceeding 50 feet of rail, IronRidge recommends the Rail to Rail Expansion Joint. Expansion joints prevent the potential buckling of rails due to thermal expansion. At the installer's discretion, a Rail to Rail Expansion Joint may also be used at lengths of less than 50 feet of rail.*

Rail to Rail (Basic) Connection

- Insert internal splice into first rail then secure splice with hardware and Grounding Strap (9AWG). Attach and assemble as shown.
- Next, slide second rail over splice and secure with hardware on opposite end of Grounding Strap.
- Repeat this procedure for remaining Rail to Rail Connections. (Use Grounding Strap only on rails with lugs.)



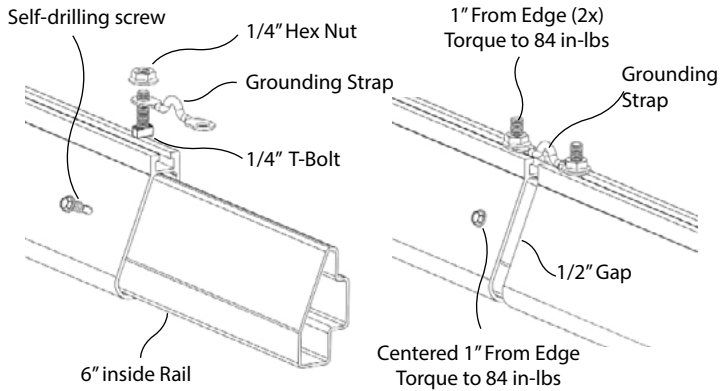
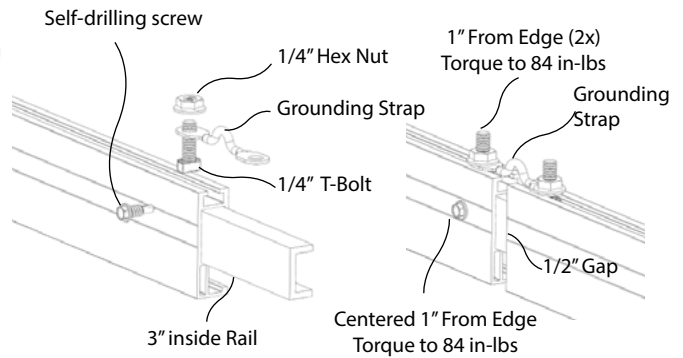
Standard Rail



Light Rail

Rail to Rail Expansion Joint

- Insert splice into first rail then secure splice with self-drilling screw.
- Attach hardware and Grounding Strap (9AWG) one (1) inch from end of rail as shown below.
- Next, slide the second rail over the splice and attach other end of Grounding Strap with hardware. (Use Grounding Strap only on rails with lugs.)

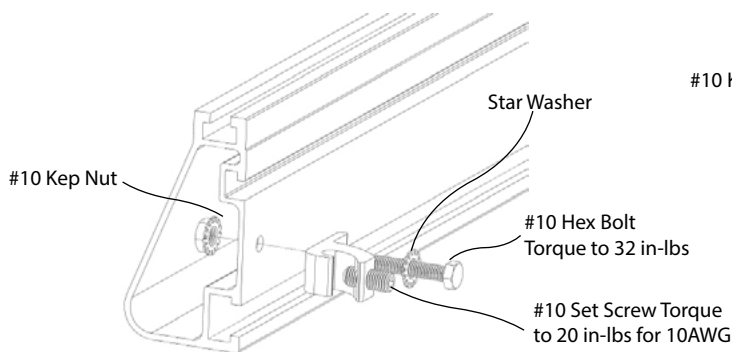
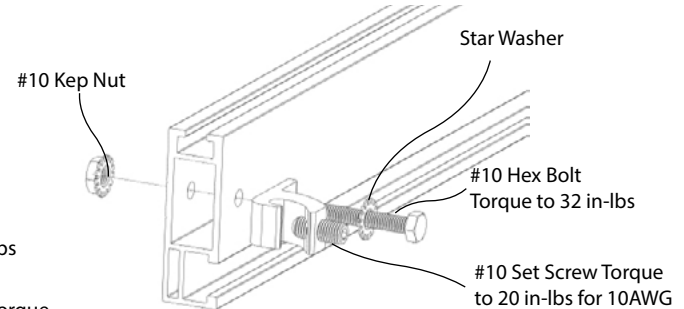

Standard Rail

Light Rail

Step 4. Equipment Grounding

Note: In order to properly ground the PV modules and IronRidge components to the equipment ground, a grounding lug or Lay-in Lug must be attached to one (1) rail near the end of each row. This connection requires the use of one of the two following lugs. All electrical installation and procedures should be conducted by skilled, licensed and bonded electricians.

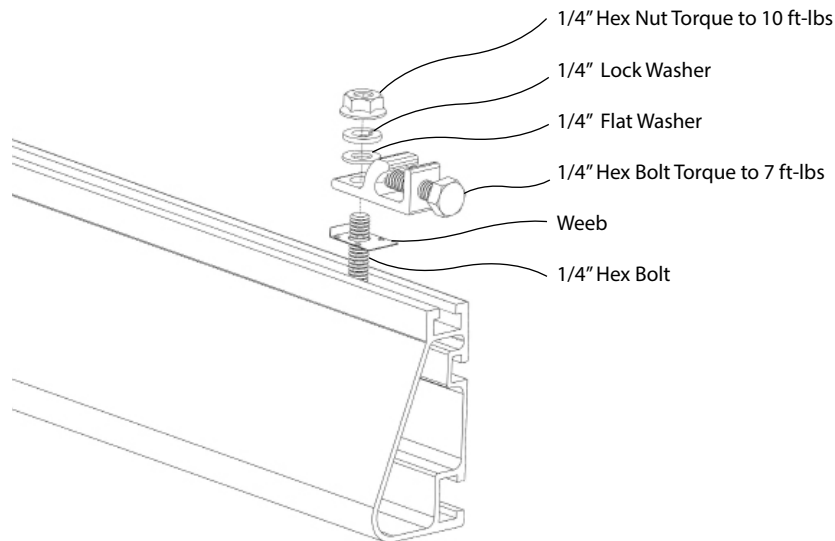
IronRidge Grounding Lug

- Using a 13/64" or #7 drill bit, drill a hole through one side of the Standard Rail (both sides for Light Rail), a minimum of 1/2" from the end of the rail; roughly centered on internal cavity of rail as shown below. (Debur as needed)
- Next assemble the Grounding Lug with the provided #10-32 Machine Screw, #10 Star Washer and #10 Kep Nut.
- Install a minimum 10AWG solid copper grounding conducting wire. Torque to 20 in-lbs for 10AWG, 25 in-lbs for 8AWG, or 35 in-lbs for 4 and 6AWG.

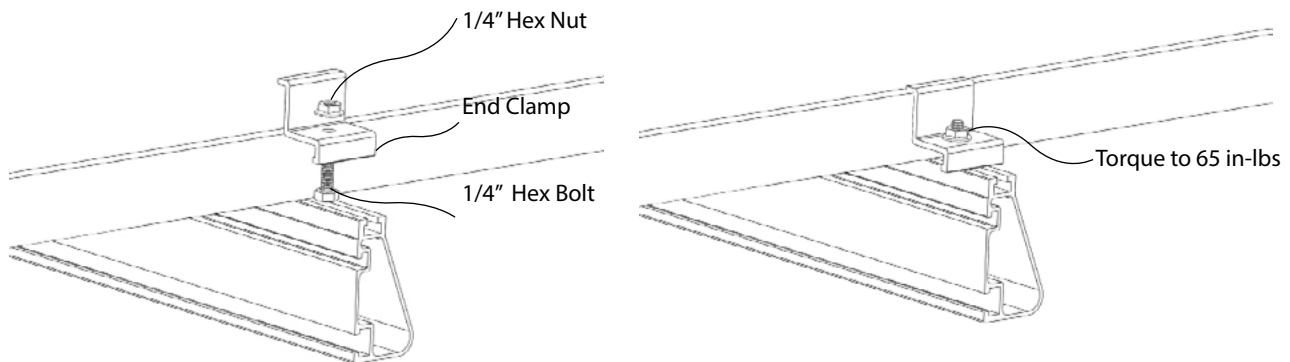

Standard Rail

Light Rail

Wiley Grounding Lug (WEEB-6.7)

1. Install grounding lug per manufacturer's recommendations as shown below (same for both Light and Standard Rails).
2. Install minimum 6-10AWG solid copper grounding conducting wire.

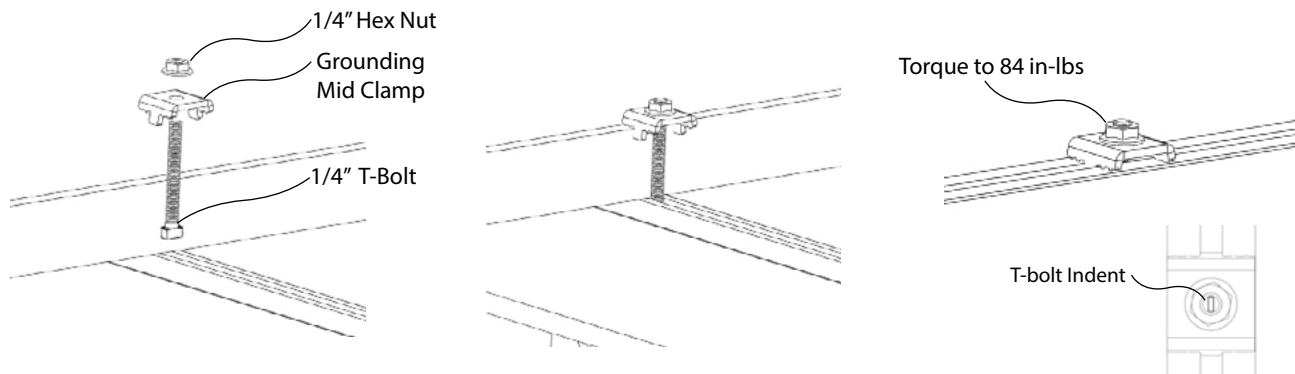

Step 5. Installing Modules
End Clamp

- A. Place the first PV module in position on the rails. Module should be a minimum of 1.5" from end of rail.
- B. Next, secure End Clamp on rail as shown. Ensure End Clamp is securely hooked over top of module.
- C. Repeat with end clamp on the other rail.




Grounding Mid Clamp

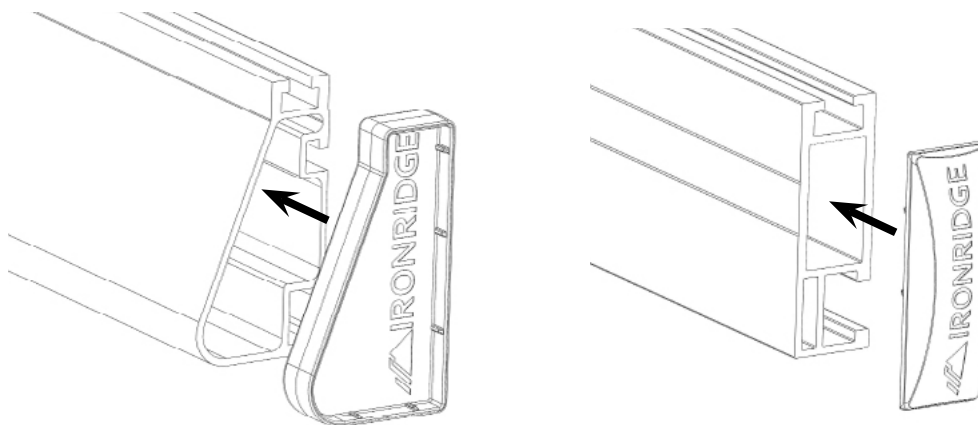
- D. Once the first PV module is in place, loosely assemble hardware and Grounding Mid Clamp as shown below.
- E. Next, slide second PV module into position underneath the Grounding Mid Clamp and secure with hardware. Ensure the Grounding Mid Clamp teeth are in contact with both of the PV module frames and the T-Bolt is properly aligned in track. T-Bolt indent should be perpendicular to rail.
- F. Repeat steps for other clamp and modules.


End Clamp

- G. Secure the last PV Module with an End Clamp repeating steps above.

Step 6. Installing End Caps

- A. Firmly press End Caps on with hand or rubber mallet.



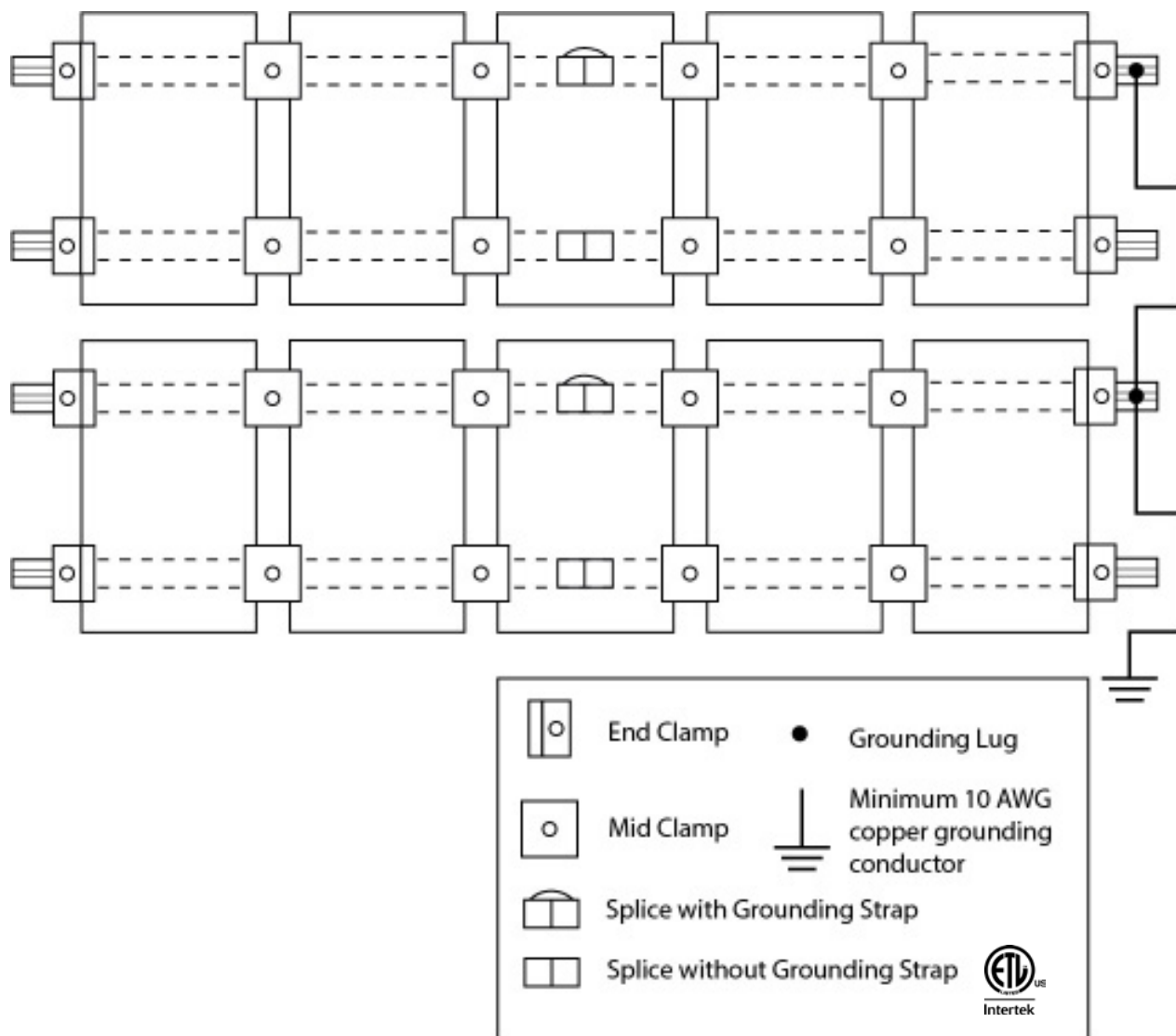


Electrical Considerations

Note: IronRidge Standard (XRS) and Light (XRL) Rail Mounting Systems with Integrated Grounding must be used with UL1703 listed PV modules and must be installed per PV module manufacturer's installation instructions. All electrical installation and procedures should be conducted by skilled, licensed and bonded electricians or solar contractor. All work must comply with all national, state and local installation procedures, product and safety standards. These standards include but are not limited to applicable National Electrical Code (NEC®) sections, National Electrical Installation Standards (NEIS™), UL Standards, and OSHA Regulations.

Basic Grounding Diagram

- IronRidge Grounding Lugs and Wiley Electronics, LLC #WEEB-6.7 are approved for use with this system.
- The Rail to Rail (Splice) Connection requires proper grounding on rails with grounding lugs by using one of the two Rail to Rail Connection methods described in Step 3 of this manual.
- A minimum 10 AWG solid copper grounding conductor must be used to properly ground the system, as shown below.



Warranty Information

Effective for IronRidge, Inc. ("IronRidge") mounting structure components ("Products") manufactured after April 1st, 2012, IronRidge provides the following warranties, for Products installed properly and used for the purpose for which the Products are designed:

- finishes shall be free of visible defects, peeling, or cracking, under normal atmospheric conditions, for a period of three (3) years from the earlier of (i) the date of complete installation of the Product or (ii) thirty days after the original purchaser's date of purchase of the Product ("Finish Warranty");
- components shall be free of structurally-related defects in materials for a period of ten (10) years from the earlier of (i) the date of complete installation of the Product or (ii) thirty days after the original purchaser's date of purchase of the Product;
- components shall be free of functionally-related manufacturing defects for a period of twenty (20) years from date of manufacture.

The Finish Warranty does not apply to: (a) surface oxidation of the galvanized steel components or any foreign residue deposited on Product finish; and (b) Products installed in corrosive atmospheric conditions, as defined solely by IronRidge; corrosive atmospheric conditions include, but are not limited to, conditions where Product is exposed to corrosive chemicals, fumes, cement dust, salt water marine environments or to continual spraying of either salt or fresh water. The Finish Warranty is VOID if (c) the practices specified by AAMA 609 & 610-02 – "Cleaning and Maintenance for Architecturally Finished Aluminum" (www.aamanet.org) are not followed by Purchaser for IronRidge's aluminum based components; and (d) if the practices specified by ASTM A780 / A780M - 09 "Standard Practice for Repair of Damaged and Uncoated Areas of HotDip Galvanized Coatings" are not followed by Purchaser for IronRidge's galvanized steel-based components.

The warranties above do not cover any parts or materials not manufactured by IronRidge, and exclude nonfunctionally-related defects, as defined solely by IronRidge. The warranties do not cover any defect that has not been reported to IronRidge in writing within twenty (20) days after discovery of such defect.

In the event of breach of or non-compliance with the warranties set forth above, IronRidge's sole obligation and liability, and the sole and exclusive remedy for such breach or non-compliance, shall be correction of defects by repair, replacement, or credit, at IronRidge's sole discretion. Such repair, replacement or credit shall completely satisfy and discharge all of IronRidge's liability with respect to these warranties.

Refurbished Product may be used to repair or replace the defective components. Transportation, installation, labor, or any other costs associated with Product replacement are not covered by these warranties and are not reimbursable. These warranties additionally do not cover (a) normal wear, or damage resulting from misuse, overloading, abuse, improper installation (including failure to follow professional instruction and certification), negligence, or accident, or from force majeure acts including any natural disasters, war or criminal acts; and (b) Products that have been altered, modified or repaired without written authorization from IronRidge or its authorized representative; and (c) Products used in a manner or for a purpose other than that specified by IronRidge. A formal document proving the purchase and the purchase date of the Product is required with any warranty claim.

Except as set forth above, IronRidge sells the Products on an "AS IS" basis, which may not be free of errors or defects, and ALL EXPRESS OR IMPLIED REPRESENTATIONS AND WARRANTIES, INCLUDING ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUALITY, WORKMANLIKE EFFORT, CORRESPONDENCE TO DESCRIPTION, DESIGN, TITLE OR NON-INFRINGEMENT, OR ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE OR TRADE PRACTICE, ARE HEREBY DISCLAIMED.