

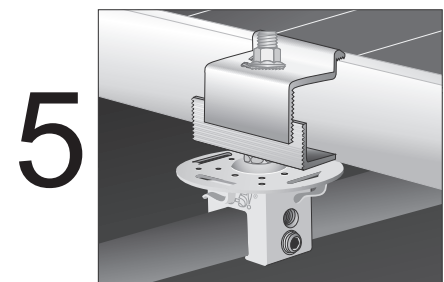
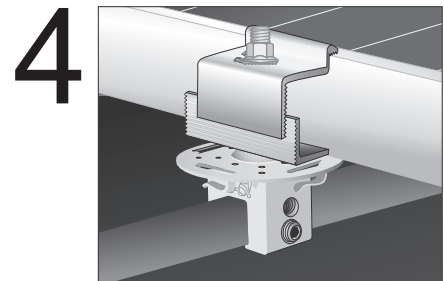
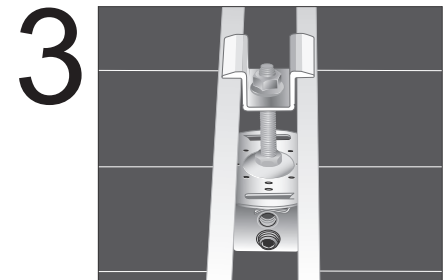
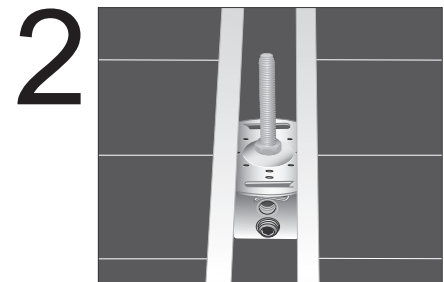
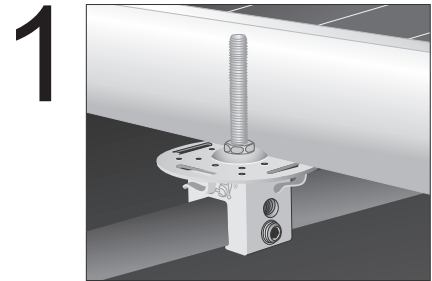
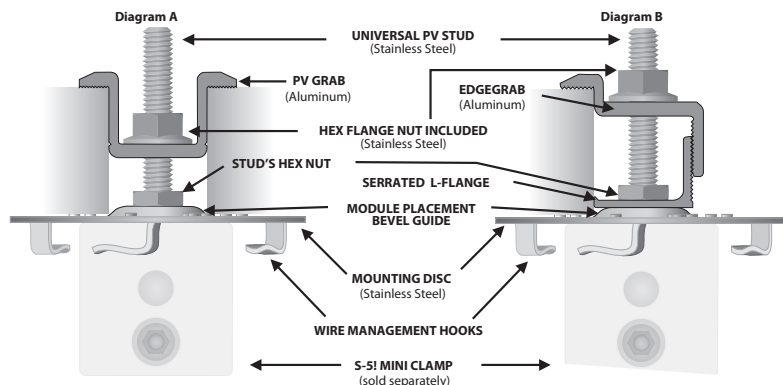
Installation Instructions

S-5!® Warning! Please use these products responsibly! Visit our website or contact your S-5! distributor for detailed installation instructions and available load test results. The user and/or the installer of these parts is responsible for all necessary engineering and design for the intended use of these parts in an assembly or application. Note that a continuous ground must be followed in accordance with National Electric Code (NEC), ANSI/NFPA 70. Installation in Canada must be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1. For UL Subject 2703 Listed assemblies use with PV Modules having a maximum fuse rating of 25A or less. For ETL UL-1703 Listed Model Number MD40-B-300S use with PV Modules having a maximum fuse rating of 15A or less. Prior to installation, contact the local code Authority Having Jurisdiction (AHJ) to determine the proper grounding requirements.

Install S-5! mini clamp. See mini clamp installation instructions.

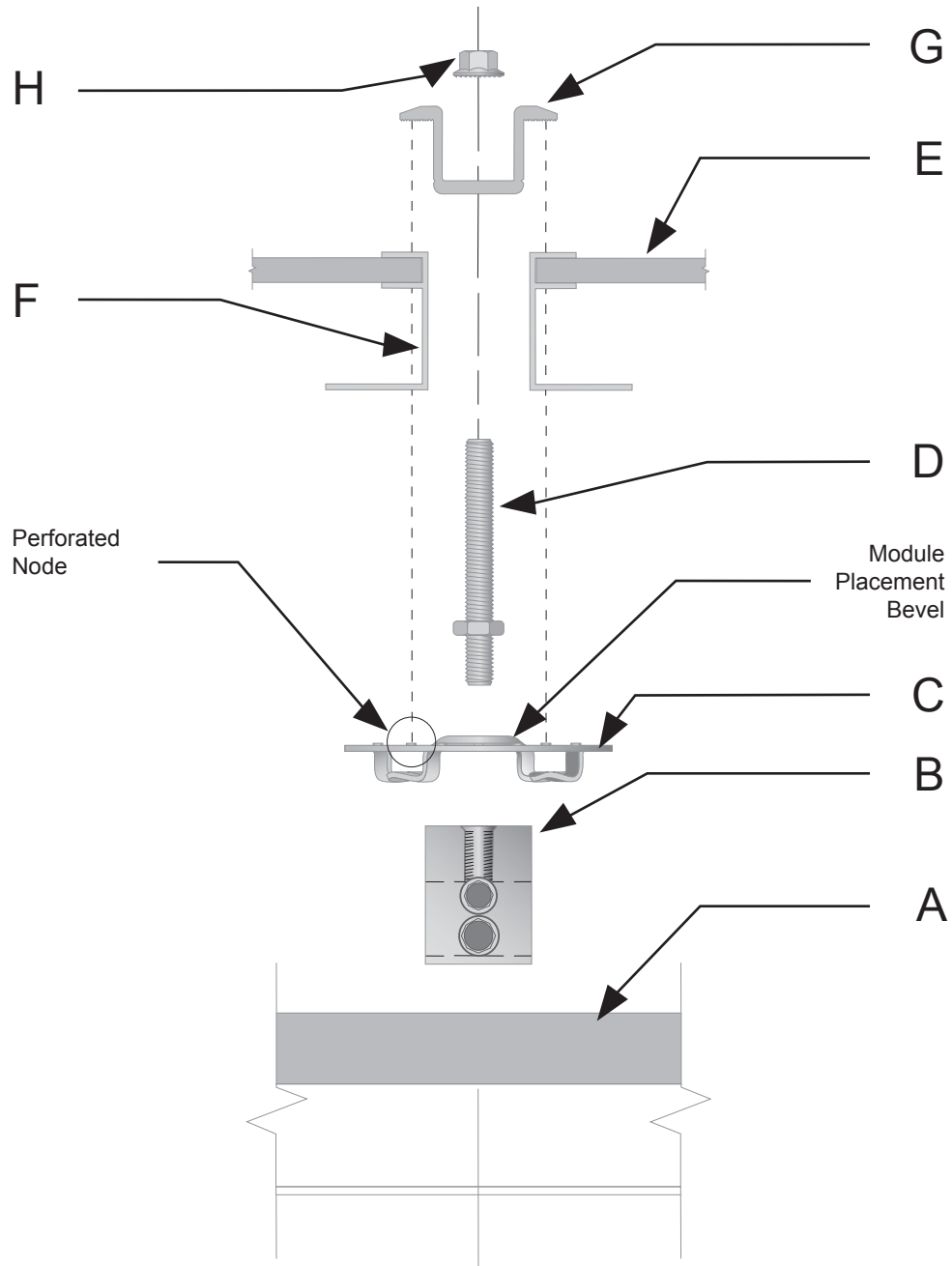
1. Place mounting disc on the S-5! mini clamp. Secure Universal PV stud through the mounting disc into the S-5! mini clamp. Using a 13 mm deep-well socket on the PV stud's hex nut, tighten universal PV stud to 140–160 inch pounds. Install one PV frame on top of the mounting disc utilizing the module placement bevel guide to ensure proper placement.
2. Install a second PV frame on top of the mounting disc again utilizing the module placement bevel guide to ensure proper placement.
3. Install the universal PV anchor grab to the universal PV stud, with the flanged nut to secure the two PV frames (see Diagram A). Tighten flange nut to 100–120 inch pounds.
4. For end/edge conditions, use the EdgeGrab™. There are two assembly options for the EdgeGrab, dependent upon the PV frame thickness. For frame thicknesses 30–48 mm, install the EdgeGrab by placing the serrated L-flange on top of the mounting disc (see Diagram B). Then, drive the universal PV stud through the serrated L-flange and the mounting disc, and into the S-5 mini clamp. The serrated L-flange will be positioned beneath the stud's hex nut. Using a 13 mm deep-well socket, tighten the universal PV stud to 140–160 inch pounds. Next, set the PV module atop the mounting disc, making the thin edge of the serrated L-flange flush against the PV frame. Slide the top component of the EdgeGrab onto the stud, allowing the serrated sides to interlock at the appropriate height. Add the flange nut to the stud to secure the PV frame. Tighten flange nut to 100–120 inch pounds.
5. For frame thicknesses 34–51 mm, position the serrated L-flange atop the stud's hex nut. Proceed with the remainder of Step 4.

Note: When ProteaBracket™ is used in conjunction with the S-5-PV Kit, an additional nut is required during installation to secure the universal PV stud and mounting disc to ProteaBracket's slotted L-flange.



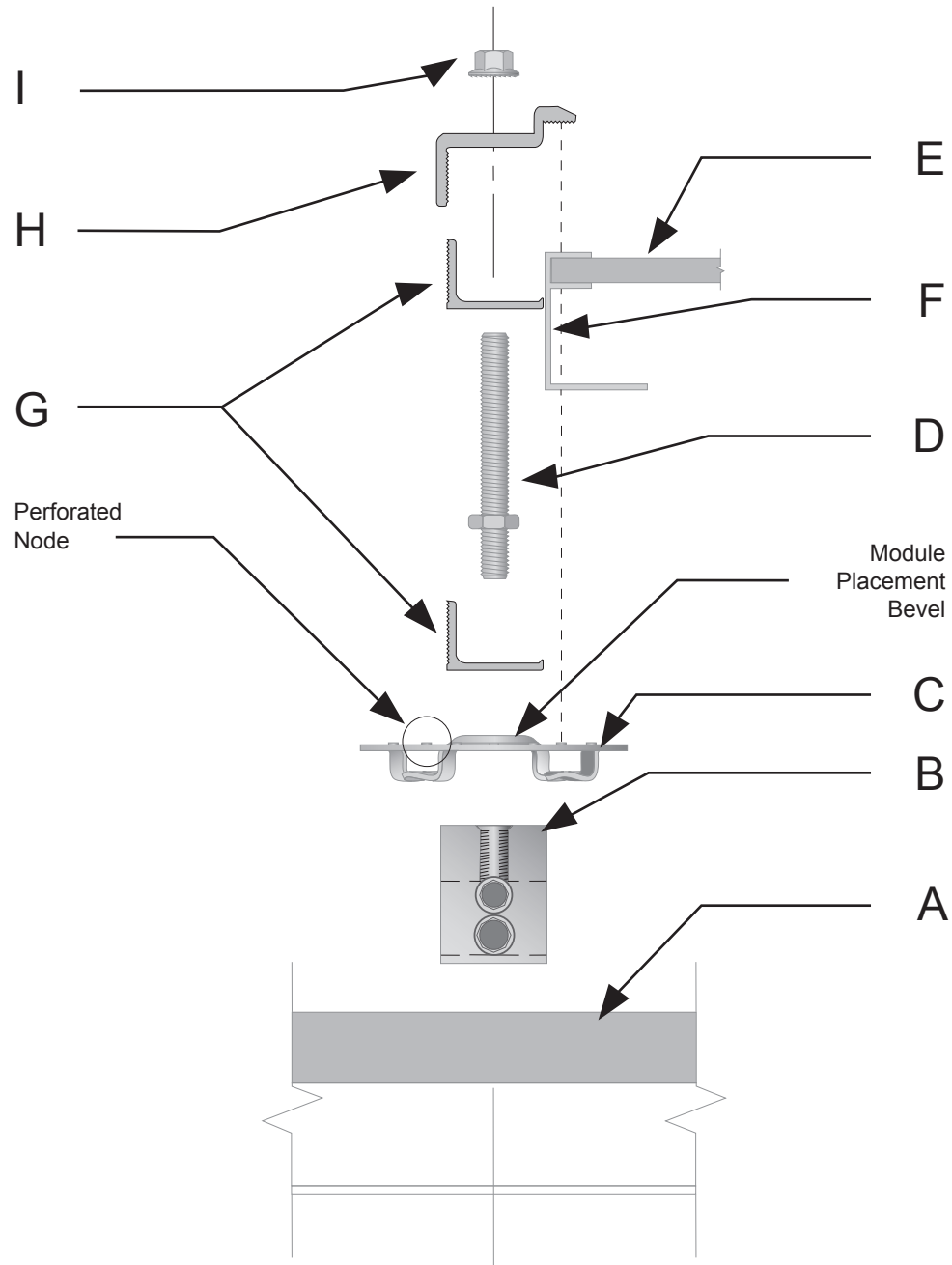
PV Mounting Assembly

Field Condition



- A. Standing Seam Metal Roof
- B. S-5!® Mini Clamp (Sold separately)
- C. Stainless Steel Mounting Disc
- D. Stainless Steel M8-1.25x68 mm Universal PV Stud w/hex nut (Tensioned between 140 and 160 inch pounds)
- E. Glass
- F. Module Frame Cross Section (Frame thickness from 1.3" [33 mm] to 2.5" [64 mm])
- G. Universal PV Grab
- H. Stainless Steel M8-1.25 Hex Flange Nut (Tensioned between 100 and 120 inch pounds)

EdgeGrab™ Edge Condition



- A. Standing Seam Metal Roof
- B. S-5!® Mini Clamp (Sold separately)
- C. Stainless Steel Mounting Disc
- D. Stainless Steel M8–1.25x68 mm Universal PV Stud w/hex nut (Tensioned between 140 and 160 inch pounds)
- E. Glass
- F. Module Frame Cross Section (Frame thickness from 1.3" [33 mm] to 2.5" [64 mm])
- G. EdgeGrab™ Serrated L-Flange (See installation instructions, Steps 4 and 5, for details on EdgeGrab)
- H. EdgeGrab Serrated Top Component (See installation instructions, Steps 4 and 5, for details on EdgeGrab)
- I. Stainless Steel M8–1.25 Hex Flange Nut (Tensioned between 100 and 120 inch pounds)

S-5!® suggestions for spacing of S-5! mini clamps for PV arrays.

The following suggestions assume that determination has been made that the roof to which the S-5! mini clamps will be attached is structurally adequate. Any loads imposed on the S-5! mini clamps will be transferred to the panels. Panel seams must have sufficient flexural strength to carry these loads. Panels must also be adequately attached to the building structure, and the structure must be sufficient to carry these loads. The makers of S-5! mini clamps make no representations with respect to these variables. It is the responsibility of the user to verify this information, or seek assistance from a qualified design professional if necessary.

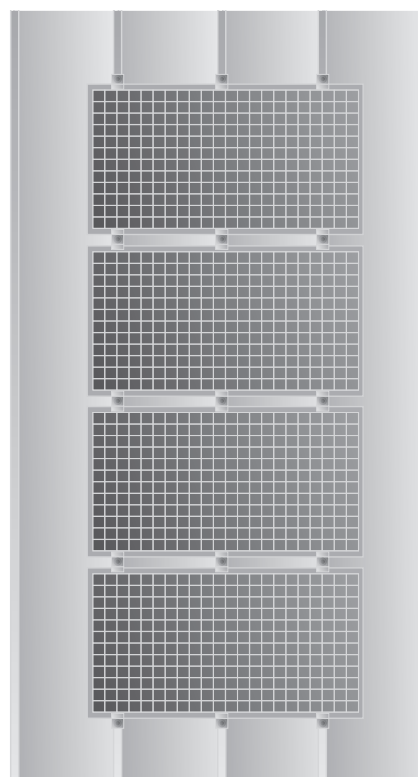
The key to frequency and spacing of attachment points for PV frames utilizing the S-5-PV Kit is to distribute loads to the metal standing seam panels in a manner that is consistent with the intended distribution of loads from the roof panels into the building structure. With very few exceptions, the attachment of a single S-5! mini clamp to the seam will be stronger than a single point of attachment of the seam to the building structure. Hence the "weak link" is not the S-5! mini clamp but the attachment clips that hold the metal panels to the building structure, or the beam strength of the roof panel seam itself.

The most conservative approach to the spacing/frequency of PV frame attachment to the roof is to determine the spacing/frequency of the roof's attachment to the building structure, then duplicate it at minimum. Determining panel attachment spacing in one axis is very simple. Standing seam panels' attachment will be made using concealed hold-down clips within the seam area of the panel. So, in that axis, the clip spacing is the same as the seam spacing. The location of the clips along the seam (in the other axis) can be determined by a) consultation with the roof system manufacturer or installer, b) checking from the underside or, c) close examination from the topside along the seam.

There will usually be a slight, but detectable, deformation of the seam at the clip location visible from the roof's topside. Many standing seam roof systems are installed on "pre-engineered" steel buildings. The attachment spacing in that industry is typically 5'-0" and is readily apparent by inspecting the spacing of the structural purlins to which the panel clips are attached from the roof underside (interior of the building).

If, for instance, the panel clips are spaced 5'-0" on center along the seam, then use the 5'-0" dimension as a maximum spacing for the S-5! mini clamps. (S-5! mini clamps may also be spaced at closer centers, but not wider.) When modules are attached directly without racking in the landscape orientation, this spacing dimension is dictated by the smallest dimension of the PV frame. Using the roof panel clip spacing as a maximum spacing template for S-5! mini clamps is a sound practice, whether the PV modules are attached directly to S-5! mini clamps, or to a racking system and then to the S-5! mini clamp (and panel seams). To evenly distribute loads, it is also necessary that each seam be involved in the finished assembly. Thus, every time a seam is traversed, it should be attached. Such an attachment scheme should evenly distribute wind loads into the building structure through the panels and their attachment, as was intended in the original roof construction assembly.

Please note these are only suggestions. Wind dynamics are complex, and S-5! advises review of the planned PV frame attachment design by a qualified professional who understands wind effects and metal roof design and construction. In certain solar installations, a design professional may determine that seams can be skipped as points of attachment, but this determination must be made on a job-specific basis.



S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. For maximum holding strength, setscrews should be tensioned and re-tensioned as the seam material compresses. Clamp setscrew tension should be verified using a calibrated torque wrench between 160 and 180 inch pounds when used on 22ga steel, and between 130 and 150 inch pounds for all other metals and thinner gauges of steel. Consult the S-5! website at www.S-5.com for published data regarding holding strength. Copyright 2014, Metal Roof Innovations, Ltd. S-5! products are patent protected. S-5! aggressively protects its patents, trademarks, and copyrights.