COMPLETE RAIL-BASED RACKING SYSTEM

INSTALLATION GUIDE

REVISION DATE: 12/09/20

VERSION: v2.3
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CLICKFIT

The UL 2703 certified ClickFit is one of the fastest installing rail-based systems in the industry. Thanks to its Click-In Rail assembly, the rails can be connected to any of EcoFasten’s composition shingle, tile and metal roof mounts in seconds without the need for fasteners or tools. The ClickFit system is made of robust materials, such as aluminum and coated steel, to ensure resistance to corrosion and longevity. ClickFit is tested in extreme weather, wind, fire, and snow conditions.

FEATURES

- Tool and fastener free rail attachment
- Fully integrated bonding
- Click-on Mid & End Clamps
- Compatible with a variety of EcoFasten roof attachments
INTRODUCTION

This manual describes the installation of the ClickFit mounting system for photovoltaic modules on steep-slope roofs. Described within are details for composition shingle and tile, attachments for ClickFit System. Other roof types as well as all other installation manuals can be found for download at www.EcoFastenSolar.com.

GENERAL INSTALLATION CONDITIONS

Failure to observe the requirements in this document can lead to the exclusion of all guarantees and product liability. EcoFasten Solar reserves the right to amend this document without prior notice.

STABILITY AND CONDITION OF THE ROOF

The roof must be in good condition and strong enough to support the weight of the modules, including the additional equipment, wind and snow loads. When in doubt, consult with the engineer of record, and/or the local building inspector.

APPLICATION RANGE OF CLICKFIT

Refer to Compatibility module list at the end of this document. Please refer to the Ecofasten ClickFit span tables for system structural certification and allowable spans.

WARRANTY

Guarantee according to the warranty conditions and general terms and conditions of EcoFasten Solar. These conditions can be found on the website at www.EcoFastenSolar.com.

LIABILITY

EcoFasten Solar cannot accept any liability whatsoever for damage or injury caused by not taking adequate safety precautions or (accurately) following the instructions given, or resulting from negligence during the installation of the product and any corresponding accessories specified in this document.
The ClickFit mounting system consists of patented adjustable tile hooks and L feet, rails, and the installation materials required for the mounting of photovoltaic modules on composition shingle or tile roofs. For simplicity, tile hooks and L feet will be referred to as “attachments”.

**ATTACHING TO THE ROOF**

The attachments are fastened to the rafters. Attachments are height-adjustable to level the system on uneven roof surfaces.

**ATTACHING THE RAIL**

The rail assembles to the attachments with a click-connector, or Clicker. The rail simply clicks into place without the use of any tools.

**ATTACHING THE MODULES**

The modules are attached to the rails by means of mid clamps and end clamps.

Installer must review module and any 3rd party manufacturer’s documentation for compatibility and compliance with warranty terms and conditions.
SYSTEM COMPONENTS REQUIRED

CLICKFIT RAIL  
RAIL SPLICE  
TILE HOOK

L-FOOT  
END CAP  
MID CLAMP

END CLAMP

SYSTEM COMPONENTS ACCESSORIES

MLPE CLIP  
MLPE MOUNT  
MODULE JUMPER
INSTALLATION GUIDE

**Class A System fire rating with Type 1 & 2 PV modules. Any module-to-roof gap is permitted, with no skirt required. This rating is applicable with any roof attachment.**

### UL 2703 MARKING EXAMPLE:

![UL 2703 Marking Example](image)

### TORQUE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque (in-lb)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag Screw</td>
<td>N/A</td>
<td>Fully Seat. Use visual indicator of the black EPDM ring around the bonded washer for torquing.</td>
</tr>
<tr>
<td>Mid-Clamp</td>
<td>144</td>
<td></td>
</tr>
<tr>
<td>End-Clamp</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td>Rail Clicker Leveling Bolt</td>
<td>142</td>
<td>Pre-torqued upon delivery. Applies to Tile Hook and L-Foot/Clicker</td>
</tr>
<tr>
<td>Hook Height Bolt</td>
<td>N/A</td>
<td>Lightly clamp hook to flush with top of next tile row</td>
</tr>
<tr>
<td>Ground Lug</td>
<td>N/A</td>
<td>Refer to specific ground lug manufacturer's installation manual</td>
</tr>
<tr>
<td>MLPE Clip</td>
<td>144</td>
<td></td>
</tr>
<tr>
<td>MLPE Mount</td>
<td>144</td>
<td></td>
</tr>
</tbody>
</table>

System components should be periodically re-inspected for loose components, loose fasteners, and corrosion such that if found, the affected components are to be immediately replaced.
• Refer to span tables, local jurisdiction, or engineer of record specifications when determining setbacks from roof edges, attachment spans, etc.

• Mark the perimeter and corners of the array on the roof surface.
  *Add 3/4” to account for the gap between modules in each direction*

• Draw or snap chalk lines where the rails will be installed,(refer to module manufacturer specs to determine allowable mounting locations).

• Locate rafters within the area of the array. It may be necessary to shift the array East or West on the roof in order to fall within the rail cantilever specs (1/ 3) of span).

• Stagger rafters every row if required by the local jurisdiction, engineer of record, or company policy.
PRE-INSTALLING RAIL SPLICES

1. Determine the number of rails required per row of modules.
2. Insert a rail splice into one rail. *Do not push it past the center bump.*
3. Slide the next rail onto the rail splice until the two rail ends meet.
4. Repeat steps 2 and 3 until the desired length is achieved. *This is usually easiest to do from the ground.*
FLASHING AND L FEET
Installation of flashing and L feet

- ClickFit for comp shingle roofs uses EcoFasten Solar’s GFl watertight flashing system
- Other roof types may use different EcoFasten Solar attachments, see www.EcoFastenSolar.com for more information.

Installation Steps:

1. Locate rafter lines.
2. Drill 1/4” pilot holes at all attachment points and back fill using roof-compatible sealant.
3. Separate shingles where flashing is to be installed. Insert the flashing so the top portion is under the next row of shingles North. Ensure the flashing is pushed to the third-course of shingle to prevent water infiltration through the vertical joints between shingles.
4. Align GFl flashing hole with pilot hole. Insert the lag bolt with pre-installed bonded washer through the L foot and EPDM grommet. Tighten the lag bolt until a ring of EPDM is visible around the circumference of the bonded washer.

*Note the orientation of the L foot and Clicker. The two Clicker “arms” should be facing downslope*
INSTALLING TILE HOOKS

1. Locate rafters on the roof, mark the tiles to be removed. Hint: In some cases rafter tails are visible at the eaves of the roof, making it easy to find the rough location of the rafters. In other cases, the fascia board may have nail heads visible where it was attached to the rafters. In the worst-case a row of tiles may need to be moved to determine the rafter locations.

2. Slide the tile at the desired location upward to expose the roof sub surface. If the tile is to be notched, or if using a replacement flashing, remove it entirely. Clean the sub surface with a brush to remove any debris that could affect the sealing.

3. Locate the rafter center and mark it.

4. Place the tile hook with the hook itself in the valley of the next tile below. Drill one 1/4” pilot hole in the rafter center, taking care to keep the hook in the valley of the tile below. Backfill this hole with a roof-compatible sealant. For flat tiles, try to avoid having the hook land directly under a joint between tiles, this will create a larger gap or more notching than necessary.

5. Install one 5/16” x 4” lag screw on the row of holes closest to the tile hook arm. If possible, install the screw in one of the three holes directly next to the arm. If the lag screw must be installed in one of the seven holes furthest from the arm (denoted by the red rectangle below), install three deck screws in the pattern shown by the green circles below.

6. Adjust the height of the tile hook as necessary using the bolt shown in the fourth image.

7. Flash the surrounding area and lag screw head with roof-compatible sealant as necessary. Refer to Tile Hook Subflashing Installation guide on the next page.

8. Replace the tile that was moved and/or removed, or install the tile replacement flashing. If it is to be notched, mark the tile for notching. Notching can be done with a grinding wheel or by using a chisel.
TILE HOOK SUB-FLASHING INSTALLATION

TOOLS REQUIRED:
Caulking Gun, Roofing Mast applicator

MATERIALS REQUIRED:
Roofing Mastic, Reinforcing fabric, roof sealant

Apply a continuous line of the roofing manufacturer’s approved sealant on the underside of the ClickFit tile hook sub-flashing to form a U-shape around the raised edges.

Lower the sub-flashing over the tile hook base. It may be necessary to move adjacent tiles to easily lower the sub-flashing onto the roof deck.

Place the sub-flashing over the base of the tile hook so the flashing covers the entire base.

EcoFasten recommends following the TRI guidelines three-course sealing method. Start the three-course sealing method by applying a layer of roofing mastic over the edges of the tile hook sub-flashing.

Place strips of reinforcing fabric over mastic to cover approximately 2” from the edge of the sub-flashing in both directions. Place strips on the side first, then the top edge.

Apply a final layer of mastic to completely cover the reinforcing fabric. The flashing is now installed and sealed.
INSTALLING THE RAIL

1. Place the rail in the Clickers.

2. Ensure the rails extend a minimum of 2” past the last attachments in each row and that each rail is aligned with the next row North and/or South.

3. Roll the rail into each Clicker, an audible “click” should be heard. If attachments are extremely misaligned it may be necessary to loosen the leveling bolt, snap the Clicker onto the rail, then re-tighten the leveling bolt to 142 in-lbs.

4. Level the rail if necessary by loosening the bolt attaching the Clicker to the L foot or tile hook.

*Ensure the tab on the Clicker is aligned with the rail edge as shown to the left.
MODULE INSTALLATION

1 INSTALL THE END CLAMPS ON EACH RAIL ON WHATEVER END YOU ARE STARTING WITH.
- 1a Snap the end clamp onto the rail.
- 1b Slide the end cap onto the rail.
- 1c Turn the leg of the end clamp around the cap.

2 PLACE MODULE
Place the module on the rail, ensuring the module junction box is up-slope.*

3 ALIGN AND TIGHTEN
Slide the module to the end clamp and align it with the array corners. Tighten the end clamp to 96 in-lb
INSTALLING ADDITIONAL MODULES

1. CLICK IT ON
   Click a mid clamp onto each rail.

2. SLIDE IT UP
   Slide the mid clamps until they are flush with the side of the existing module.

3. PLACE AND TIGHTEN
   Place and slide the next module firmly against the mid clamps. Align the bottom edges of the modules. Tighten mid clamps to 144 in-lb.
INSTALLING END CLAMPS AT THE END OF A ROW

1. Install the last mid clamps in the row.

2. Measure the rails from the last mid clamp to the module width plus 1".

3. Cut the rails at this mark. There is some adjustment in the end cap/clamp so it does not need to be a perfect cut.

4. Install end clamps and end caps, tighten to 96 in-lb

Alternative method:

1. Install the last module in the row, tighten the mid clamps.

2. Using a circular saw with a metal blade, or carefully with a reciprocating saw, cut the rail approximately 1” past the edge of the last module.

3. Install end clamps and end caps, tighten to 96 in-lb

Replace the tile that was moved and/or removed, or install the tile replacement flashing. If it is to be notched, mark the tile for notching. Notching can be done with a grinding wheel or by using a chisel.
BONDING AND GROUNDING

BONDING PATHS
All bond paths are carried either module-to-module through the mid clamp, or module-to-module through the module jumper shown below (bond paths shown in green):

1 ground lug per continuous array
NECESSARY COMPONENTS
One of the following grounding lugs (or any UL2703 Compliant ground Lug):

- BurndyCL50-1TN Ground Lug (UL 2703 - E3514343 / UL 467-E9999)
- ILSCO SGB-4 Ground Lug (UL 2703 - E354420 / UL 467 - E34440)
- ILSCO GBL-40BT (UL2703 - E354420 / UL467 - E34440)
- ILSCO GBL-4DBTH (UL 2703 - E354420 / UL 467 - E34440)
- ILSCO GBL-455 (UL 2703 - E354420 / UL 467 - E34440)

*Equipment grounding wire should be sized in accordance with the National Electrical Code, NFPA70 and a minimum of 1/4” clearance is required between bare copper wires and aluminum components.
MLPE MOUNT INSTALLATION

Lower the MLPE Mount to the rail

Tilt and hook the mount around the top “dog ear” of the rail

Set the MLPE Mount flush with the top of the rail

Slide the microinverter flange between the MLPE Mount and the serrated bolt flange

Tighten the bolt to 144 in-lbs

Repeat this process for all other microinverter and/or optimizer installations

MLPE MOUNT IS COMPATIBLE WITH:

Enphase Products: M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ, IQ7, IQ 7A, IQ 7+, IQ 7X, Q Aggregator
SolarEdge Products: P300, P320, P340, P370, P400, P405, P485, P505, P600, P700, P730, P800p, P800s, P850, P860
WIRE CLIP INSTALLATION

1. With the ClickFit Rail in place and the Wire Clip in hand, place the wire end on either side of the rail. With the wire end touching the bottom lip of the rail, roll and click-in the Wire Clip to the opposite end of the rail. You will hear an audible click when the Wire Clip is set in place.
INSTALL ROCKIT CLIP 2.0 ACCESSORY

- Install the RockIt Clip 2.0
- Slide the RockIt Clip 2.0 onto the lip of the micro-inverter/power optimizer.
- Slide the micro-inverter/power optimizer into the opposite lip of the module frame.
- Tighten the bolt to 144 in-lb to clamp the RockIt Clip 2.0 to the module frame and the micro-inverter/power optimizer to the Rock-It Clip 2.0.
- Ensure that the lip on the clip is tight against the frame and that the micro-inverter/power optimizer flange is tight against the clip flange to avoid rotation during tightening.

ROCKIT CLIP 2.0 IS COMPATIBLE WITH:

- **AP SYSTEMS:** QS1, YC600
- **DARFON:** MIG240, MIG300, G320, G640
- **ENPHASE:** M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ7, IQ 7A, IQ 7+, IQ 7X, Q Aggregator
- **SMA:** “RoofCommKit-P2-US, TS4-R Module Retrofit Kits (TS4-R-S, TS4-R-O, TS4-R-F)”
- **SOLAREDGE:** M1600, P300, P320, P340, P370, P400, P401, P405, P485, P505, P600, P700, P730, P800p, P800s, P801, P850, P860, P950, P960
- **TIGO:** “Tigo Access Point (TAP), TS4-R-X (where X can be F, M, O, or S), TS4-R-X-DUO (where X can be M, O, or S), TS4-A-X (where X can be F, 2F, O, O-DUO, or S)”
- **SEE PAGE 22 FOR COMPATIBLE MODULE LIST**
UL2703 CERTIFIED MODULES

This racking system may be used to ground and/or mount a PV module complying with UL 1703 or UL61730 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.

Unless otherwise noted, “xxx” refers to the module power rating and both black and silver frames are included in the certification.

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>LIST OF UL2703 APPROVED MODULES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adani</td>
<td>Adani modules with 35 and 40mm frames</td>
</tr>
<tr>
<td></td>
<td>ASX-Y-ZZ-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “X” can be B, M or P, “Y” can be 6 or 7, and “ZZ” can be blank, PERC, B-PERC, or AB-PERC</td>
</tr>
<tr>
<td>Amerisolar</td>
<td>Amerisolar modules with 35, 40 and 50 mm frames</td>
</tr>
<tr>
<td></td>
<td>AS-bYxxxZ</td>
</tr>
<tr>
<td></td>
<td>Where “b” can be 5 or 6; “Y” can be M, P, M27, P27, M30, or P30; and “Z” can be blank, W, or WB</td>
</tr>
<tr>
<td>Aptos Solar</td>
<td>Aptos modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>DNA-yyyy-zz23-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “yy” can be 120 or 144; and “zz” can be blank, W, or WB</td>
</tr>
<tr>
<td>Astronergy Solar</td>
<td>Astronergy modules with 30, 35, 40, and 45 mm frames</td>
</tr>
<tr>
<td></td>
<td>aaSMbbyyC/zz-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “aa” can be CH or A; “bb” can be 60, 66, or 72; “yy” can be blank, 10 or 12; “C” can be M,</td>
</tr>
<tr>
<td></td>
<td>P, M(BL), M-HC, M(HL)-HC, P-HC, M(DG), or M(DGT); and “zz” can be blank, W, or BH</td>
</tr>
<tr>
<td>ASUN</td>
<td>ASUN modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>ASUN-xxx-YYZZ-aa</td>
</tr>
<tr>
<td></td>
<td>Where “YY” can be 60 or 72; “ZZ” can be M, or MHS; and “aa” can be blank or BB</td>
</tr>
<tr>
<td>Auxin</td>
<td>Auxin modules with 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>AXN6y6zAxxx</td>
</tr>
<tr>
<td></td>
<td>Where “y” can be M or P; “z” can be 08, 09, 10, 11, or 12; and “A” can be F or T</td>
</tr>
<tr>
<td>Axitec</td>
<td>Axitec Modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>AC-xxxY/aaZZb</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be M, or P or MH; “aa” can be blank, 125- or 156--; “ZZ” can be 54, 60, 72, 120,</td>
</tr>
<tr>
<td></td>
<td>or 144; “b” can be S, X, V, XV, or MX</td>
</tr>
<tr>
<td>MANUFACTURER</td>
<td>LIST OF UL2703 APPROVED MODULES</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>Boviet</td>
<td>Boviet modules with 35 and 40mm frames</td>
</tr>
<tr>
<td></td>
<td>BVM66aaYY-xxxBcc</td>
</tr>
<tr>
<td></td>
<td>Where “aa” can be 9, 10 or 12; “YY” is M, or P; and “B” can be blank, L or S; and “cc” can be blank, H, H-BF, H-HC, HC-BF or H-HC-BF</td>
</tr>
<tr>
<td>BYD</td>
<td>BYD modules with 35 mm frames</td>
</tr>
<tr>
<td></td>
<td>BYDxxxAY-ZZ</td>
</tr>
<tr>
<td></td>
<td>Where “A” can be M6, P6, MH or PH; “Y” can be C or K; and “ZZ” can be 30 or 36</td>
</tr>
<tr>
<td>Canadian Solar</td>
<td>Canadian Solar modules with 30, 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>CSbY-xxxZ</td>
</tr>
<tr>
<td></td>
<td>Where “b” can be 1, 3 or 6; “Y” can be H, K, L, P, U, V, W, or X; and “Z” can be M, P, MS, PX, M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, or MS-SD</td>
</tr>
<tr>
<td>CertainTeed</td>
<td>CertainTeed modules with 35 and 40 frames</td>
</tr>
<tr>
<td></td>
<td>CTxxxYZZZ-AA</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be M, P, or HC; “ZZ” can be 00,01, 10, or 11; and “AA” can be 01, 02, 03, or 04</td>
</tr>
<tr>
<td>CSUN</td>
<td>Csun modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>YYxxx-zzAbbbb</td>
</tr>
<tr>
<td></td>
<td>Where “YY” is CSUN or SST; “zz” is blank, 60, or 72; and “A” is blank, P or M; “bb” is blank, BB, BW, or ROOF</td>
</tr>
<tr>
<td>Dehui</td>
<td>Dehui modules with 35 and 40mm frames</td>
</tr>
<tr>
<td></td>
<td>DH-MYYYZZ-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “YYY” can be 760, 772, 860, 872; and “Z” can be B or W</td>
</tr>
<tr>
<td>Ecosolergy</td>
<td>Ecosolargy modules with 35, 40, and 50 mm frames</td>
</tr>
<tr>
<td></td>
<td>ECOxxxYzzA-bbbD</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be A, H, S, or T; “zz” can be 125 or 156; “A” can be M or P; “bb” can be 60 or 72; and “D” can be blank or B</td>
</tr>
<tr>
<td>ET Solar</td>
<td>ET Solar modules with 35, 40, and 50 mm frames</td>
</tr>
<tr>
<td></td>
<td>ET-Y6ZZxxxAA</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be P, L, or M; “ZZ” can be 60 or 72 or 72BH; and “AA” can be WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC</td>
</tr>
<tr>
<td>Flex</td>
<td>Flex modules with 35, 40, and 50 mm frames</td>
</tr>
<tr>
<td></td>
<td>FXS-xxxYY-ZZ;</td>
</tr>
<tr>
<td></td>
<td>Where “YY” can be BB or BC; and “ZZ” can be MAA1B, MAA1W, MAB1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W</td>
</tr>
</tbody>
</table>
## MANUFACTURER

### GCL
GCL modules with 35 mm and 40 mm frames
GCL-ab/YY xxx
Where “a” can be M or P; “b” can be 3 or 6; and “YY” can be 60, 72, 72H, or 72DH

### GigaWatt Solar
Gigawatt modules with 40 mm frames
GWxxxYY
Where “YY” can be either PB or MB

### Hansol
Hansol modules with 35 and 40 frames
HSxxxYY-zz
Where “YY” can be PB, PD, PE, TB, TD, UB, UD, or UE; and “zz” can be AH2, AN1, AN3, AN4, HH2, HV1, or JH2

### Hanwha Solar
Hanwha Solar modules with 40, 45, and 50 mm frames
HSLaaP6-YY-1-xxxZ
Where “aa” can be either 60 or 72; “YY” can be PA or PB; and “Z” can be blank or B

### Hanwha Q CELLS
Hanwha Q CELLS Modules with 32, 35, 40, and 42mm frames
aaYY-ZZ-xxx

### Heliene
Heliene modules with 40 mm frames
YYZZxxxA
Where “YY” can be 36, 60, 72, or 96; “ZZ” can be M, P, or MBLK; and “A” can be blank, HomePV, or Bifacial

### HT-SAAE
HT-SAAE modules with 35 and 40 mm frames
HTyy-156Z-xxx
Where “yy” can be 60 or 72, “Z” can be M, P, M-C, P-C, M(S), M(VS), M(V), P(V), M(V)-C, P(V)-C
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>LIST OF UL2703 APPROVED MODULES</th>
</tr>
</thead>
</table>
| **Hyundai**  | Hyundai modules with 33, 35, 40 and 50 mm frames  
|              | HiY-SxxxZZ  
|              | Where “Y” can be A, D, M or S; and “ZZ” can be HG, HI, KI, MI, MF, MG, PI, RI, RG, RG(BF), RG(BK), SG, TI, or TG |
| **Itek**     | Itek Modules with 40 and 50 mm frames  
|              | IT-xxx-YY  
|              | Where “YY” can be blank, HE, or SE, or SE72 |
| **JA Solar** | JA Solar modules with 30, 35, 40 and 45 mm frames  
|              | JAyyzz-bbww-xxx/aa  
|              | Where “yy” can be M, P, M6 or P6; “zz” can be blank, (K), (L), (R), (V), (BK), (FA), (TG), (FA)(R), (L)(BK), (L)(TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); “bb” can be 48, 60, or 72; “ww” can be D09, S01, S02, S03, S06, S09, S10, or S12; and “aa” can be BP, MR, SI, SC, PR, 3BB, 4BB, 4BB/RE, 5BB |
| **Jinko**    | Jinko modules with 35 and 40 mm frames  
|              | JKMMyxxxZZ-aa  
|              | Where “Y” can either be blank or S; “ZZ” can be M, P, or PP; and “aa” can be blank, 60, 60B, 60H, 60L, 60BL, 60HL, 60HB, 60HBL, 6HBL-EP, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 7RL3-V, 7RL3-TV, 72, 72B, 72-J4, 72B-J4, 72(Plus), 72-V, 72H-V, 72L-V, 72HL-V, 72-MX, 72H-BDVP, 72HL-TV, or 72HL-V-MX3 |
| **Kyocera**  | Kyocera Modules with 46mm frames  
|              | KYxxxZZ-AA  
|              | Where “Y” can be D or U; “ZZ” can be blank, GX, or SX; and “AA” can be LPU, LFU, UPU, LPS, LB, LFB, LFB2, LB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5CF, 5UC, 6BC, 6FC, 6PP, 6MPA, 6MCA, or 6MPA |
| **LG**       | LG modules with 35, 40, and 46 mm frames  
|              | LGxxxYaZ-bb  
|              | Where “Y” can be A, E, M, N, Q, S; “a” can be 1 or 2; “Z” can be C, K, T, or W; and “bb” can be A3, A5, B3, G3, G4, J5, K4, L5, N5, or V5 |
| **Longi**    | Longi modules with 30, 35 and 40 mm frames  
|              | LRa-YYZZ-xxxM  
|              | Where “a” can be 4 or 6; “YY” can be blank, 60 or 72; and “ZZ” can be blank, BK, BP, HV, PB, PE, PH, HBD, HIB, HIH, HPB, HPH, or HIBD |
| **Mission Solar** | Mission Solar modules with 33 and 40 mm frames  
|              | MSEbbxxxZZaa  
<p>|              | Where “bb” can be blank or 60A; “ZZ” can be blank, MM, SE, SO, SQ, SR, or TS; and “aa” can be blank, 1J, 4J, 4S, 5K, 5T, 60, 6J, 6S, 6W, 6K, 8K, 8T, or 9S |</p>
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<tr>
<th>MANUFACTURER</th>
<th>LIST OF UL2703 APPROVED MODULES</th>
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</table>
| Mitsubishi                | Mitsubishi modules with 46 mm frames  
PV-MYYxxxZZ  
Where “YY” can be LE or JE; and “ZZ” can be either HD, HD2, or FB                                                                                                                                                                 |
| Motech                    | IM and XS series modules with 40, 45, and 50 mm frames                                                                                                                                                                            |
| Next Energy Alliance      | Next Energy Alliance modules with 35 and 40mm frames  
yyNEA-xxxZZ  
where “yy” can be blank or US; “ZZ” can be M, MB or M-60                                                                                                                                      |
| Neo Solar Power           | Neo Solar Power modules with 35 mm frames  
D6YxxxZZaa  
Where “Y” can be M or P; “ZZ” can be B3A, B4A, E3A, E4A, H3A, H4A; and “aa” can be blank, (TF), ME or ME (TF)                                                                                           |
| Panasonic (HIT)           | Panasonic modules with 35 and 40 mm frames  
VBHNxxxXYzzA  
Where “YY” can be either KA, RA, SA or ZA; “zz” can be either 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18; and “A” can be blank E, G or N                                                                                      |
| Panasonic (EverVolt)      | Panasonic modules with 30 mm frames  
EVPVxxxA  
Where “A” can be blank or K                                                                                                                                                                                                   |
| Peimar                    | Peimar modules with 40 mm frames  
SbxxxYzz  
Where “b” can be G, M or P; “Y” can be M or P; and “zz” can be blank, (BF), or (FB)                                                                                                                                              |
| Philadelphia Solar        | Philadelphia modules with 35 and 40 mm frames  
PS-YzzAA-xxx  
Where “Y” can be M or P; “zz” can be 60 or 72; and “AA” can be blank or (BF)                                                                                                                                              |
| Phono Solar               | Phono Solar modules with 35, 40, and 45 mm frames  
PSxxxY-ZZ/A  
Where “Y” can be M, M1, MH, or M1H or P; “ZZ” can be 20 or 24; and “A” can be F, T, U, or TH                                                                                                                                 |
| Recom                     | Recom modules with 35 and 40 mm frames  
RCM-xxx-6yy  
Where “yy” can be MA, MB, ME or MF                                                                                                                                                                                            |
| REC Solar                 | REC modules with 30, 38 and 45 mm frames  
RECxxxYYZZ  
Where “YY” can be AA, M, NP, PE, PE72, TP, TP2, TP2M, TP2SM, TP2S, or TP3M; and “ZZ” can be blank, Black, BLK, BLK2, SLV, or 72                                                                 |
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| ReneSola                     | **ReneSola** modules with 35, 40 and 50 mm frames  
|                              | AAxxxY-ZZ  
|                              | Where “AA” can be SPM(SLP) or JC; “Y” can be blank, F, M or S; and “ZZ” can be blank, Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, Db-b, or 24/Bb                                |
| Renogy                       | **Renogy** Modules with 40 and 50 mm frames  
|                              | RNG-xxxY  
|                              | Where “xxx” is the module power rating; and “Y” can be D or P                                                                                                                                                    |
| Risen                        | **Risen** Modules with 35 and 40 mm frames  
|                              | RSMyy-6-xxxZZ  
|                              | Where “yy” can be 60, 72, 120, 132 or 144; and “ZZ” can be M or P                                                                                                                                          |
| S-Energy                     | **S-Energy** modules with 35 and 40mm frames  
|                              | SABB-CCYY-xxxxZ  
|                              | Where “A” can be C, L or N; “BB” can be blank, 20, 40 or 45; “CC” can be blank, 60 or 72; “YY” can be blank, MAE, MAI, MBE, MBI, MCE or MCI; and “Z” can be V, M-10, P-10 or P-15                  |
| Seraphim Energy Group        | **Seraphim** modules with 35 and 40 mm frames  
|                              | SEG-aYY-xxxZZ  
|                              | Where “a” can be blank, 6 or B; “YY” can be blank, MA, MB, PA, or PB; and “ZZ” can be blank, BB, BG, BW, HV, WB, WW, BMB, BMA-HV, BMB-HV                                                                 |
| Seraphim USA                 | **Seraphim** modules with 40 and 50 mm frames  
|                              | SRP-xxx-6YY-ZZ  
|                              | Where “xxx” is the module power rating; and “YY” can be MA, MB, PA, PB, QA-XX-XX, and QB-XX-XX; ZZ is blank, BB or HV                                                                                   |
| Sharp                        | **Sharp** modules with 35 and 40 mm frames  
|                              | NUYYxxxx  
|                              | Where “YY” can be SA or SC                                                                                                      |
| Silfab                       | **Silfab** Modules with 38 mm frames  
|                              | SYY-Z-xxxxAb  
|                              | Where “YY” can be IL, SA, LA, SG or LG; “Z” can be blank, M, P, or X; “A” can be blank, B, H, M, N; and “b” can be A, L, G, or T                                                                 |
| Solaria                      | **Solaria** modules with 40 mm frames  
|                              | PowerXT xxxY-ZZ  
|                              | Where “Y” can be R or C; and “ZZ” can be AC, BD, BX, BY, PD, PM, PM-AC, PX, PW, WX or WZ                                                                                                                             |
| Solarcity (Tesla)            | **Solarcity modules with 40 mm frames**  
|                              | SCxxxYY  
<p>|                              | Where “YY” can be blank, B1 or B2                                                                                              |</p>
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| SolarTech                        | SolarTech modules with 42 mm frames  
|                                  | STU-xxxYY  
|                                  | Where “YY” can be PERC or HJT                                                                                                                                                                                                     |
| SolarWorld AG                    | SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31, 33 or 46 mm frames  
|                                  | SW-xxx                                                                                                                                                                                                                      |
| SolarWorld Americas              | SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33 mm frames  
|                                  | SWA-xxx                                                                                                                                                                                                                     |
| Sonali                           | Sonali Modules with 40 mm frames  
|                                  | SSxxx                                                                                                                                                                                                                        |
| Stion                            | Stion Thin film modules with 35 mm frames  
|                                  | STO-xxx or STO-xxxA                                                                                                                                                                                                         |
| SunEdison                        | SunEdison Modules with 35, 40 & 50 mm frames  
|                                  | SE-YxxxZABCDE  
|                                  | Where “Y” can be B, F, H, P, R, or Z; “Z” can be 0 or 4; “A” can be B,C,D,E,H,I,-  
|                                  | J,K,L,M, or N ; “B” can be B or W; “C” can be A or C; “D” can be 3, 7, 8, or 9; and “E” can be 0, 1 or 2                                                                                                                  |
| Suniva                           | Suniva modules with 35, 38, 40, 46, and 50 mm frames  
|                                  | OPTxxx-AA-B-YYY-Z  
|                                  | MVXxxx-AA-B-YYY-Z  
|                                  | Where “AA” is either 60 or 72; “B” is either 4 or 5; “YYY” is either 100,101,700,1B0, or 1B1; and “Z” is blank or B                                                                                                           |
| Sunpower                         | Sunpower standard (G3 or G4) or InvisiMount (G5) 40 and 46 mm frames  
|                                  | SPR-Zb-xxx-YY  
|                                  | Where “Z” is either A, E, P or X; “b” can be blank, 17, 18, 19, 20, 21, or 22; and “YY” can be blank, BLK, COM, C-AC, D-AC, E-AC, BLK-E-AC, G-AC, BLK-C-AC, or BLK-D-AC                                                                 |
| Sunspark                         | Sunspark modules with 40 mm frames  
|                                  | SYY-xxxZ-A  
|                                  | Where “YY” can be MX or ST; and “Z” can be M, MB, M3, M3B, P or W; and “A” can be 60 or 72                                                                                                                                 |
| Suntech                          | Suntech Modules with 35, 40 and 50mm frames  
|                                  | STPxxxx-zy/aa  
<p>|                                  | Where “y” is blank or S; and “z” can be 20, 24, A60 or A72U; and “aa” can be Vd, Vem, Vfw, Vfh, Wdb, Wde, Wd, or Wfhb                                                                                                         |</p>
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| Talesun      | Talesun modules with 35 and 40mm frames  
TP6yZZaaxxx-b  
Where “y” can be blank, F, H, or L; “ZZ” can be 60 or 72; “aa” can be M, M(H), or P; and “b” can be blank, B, T, or (H) |
| Trina        | Trina Modules with 30, 35, 40 and 46mm frames  
TSM-xxxYYZZ  
Where “YY” can be DD05, DD06, DD14, DE14, DE15, DEG15, PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15 ; and “ZZ” can be blank, .05, .08, .10, .18, .08D, .18D, .82, .002, .005, 08S, A, A.05, A.08, A.10, A.18, A(II), A.05(II), A.08(II), A.082(II), A.10(II), A.18(II), H, H(II), H.05(II), H.08(II), HC.20(II), HC.20(II), M, M(II), M.05(II), MC.20(II) |
| URE          | URE modules with 35 mm frames  
DyZxxxHaa  
Where “y” can be 6 or 7; “Z” can be K or M; and “aa” can be H3A, H4A, or H8A |
| Vikram       | Vikram solar modules with 40 mm frames  
VSyy.ZZ.AAA.bb  
Where “yy” can be M, P, MBB, MH, MS, MHBB, or PBB; “ZZ” can be 60 or 72; “AAA” is the module power rating; and “bb” can be 03.04 or 05 |
| VSUN         | VSUN modules with 35 and 40 mm frames  
VSUNxxx-YYz-aa  
Where “YY” can be 60, 72, 120, or 144; “z” can be M, P, MH, PH, or BMH; and “aa” can be blank, BB, or BW |
| Waaree       | Waaree modules with 40mm frames  
WSyy-xxx  
where “yy” can be blank, M or MB |
| Winaico      | Winaico modules with 35 and 40 mm frames  
Wsy-xxxZa  
Where “y” can be either P or T; “Z” can be either M, P, or MX; and “a” can be blank or 6 |
| Yingli       | Panda, YGE, YGE-U, and YLM series modules with 35, 40, and 50 mm frames |
INSTALLER RESPONSIBILITIES

Periodic reinspection of components shall be performed to verify that there is no corrosion detrimental to system strength and electrical conductivity, no loose bolts, and/or other variables that could compromise array safety. Any corroded or damaged components shall be immediately replaced.

### End Clamps

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<th>Frame Thickness</th>
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### Mid Clamps

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<tr>
<td>40-50 mm</td>
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