

## EcoFoot2+ Install Guide Appendix - UL2703 Qualification

Ecolibrium Solar® EcoFoot2+ Flat-Roof Ballasted Racking System

Ecolibrium Solar's EcoFoot2+ product has been tested in accordance with the ANSI/UL2703-2015 Standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels. This testing standard includes subjecting samples of the racking to temperature and humidity cycling to simulate component aging, electrical bonding tests on all system components, system grounding tests, tests to verify that use of the system does not increase the risk of fire, and module-specific mechanical load testing.

EcoFoot2+ racking maintains a Class A fire rating when installed in landscape or portrait orientation according to the installation instructions, on a low slope roof Class A roof with Type 1 and Type 2 modules. For roofs with lower fire ratings, the existing rating is maintained when EcoFoot2+ is used.

EcoFoot2+ module clamps and wind deflectors are certified as recognized components under UL2703 for system electric bonding when installed with the below listed modules. Rows within an array, having a fuse rating of up to 25 amps, may be grounded via a single properly sized ground lug acting as a Grounding Electrode Conductor (GEC). The Ecofoot2+ install guide contains instructions for bonding and grounding modules if deviation from standard installation is required. Per UL2703, the EcoFoot2+ system creates a continuous bonded structure with all the below listed modules when installed per instructions in the install guide.

Mechanical load testing has been conducted in 2 ways. Firstly, load testing has been completed on system components that have been subject to temperature and humidity cycle tests. This verifies the long-term stability of all materials and components used. Secondly, the modules listed below have been mechanically load tested to the UL2703 standard. The module manufacturer and all approved module series are listed with the resulting load ratings in the table below.

**UL2703 System Label:** The label shown below is stamped into to the Wind Deflector (identified as component E in the installation guide).



The Date Code ABCYZZ shown above will appear on production parts, letters defined as follows:

- ABC shall be an acronym for identifying the source factory
- Y shall be the Quarter of the year (i.e. 1, 2, 3, 4) of manufacture
- ZZ shall be the last 2 digits of the year of manufacture

The modules below are listed for mechanical loading, grounding and bonding according to UL2703. The table continues on subsequent pages.

*Note: "XXX" represents module wattage*

| Manufacturer                            | Module Series       | Downforce Design Load w/Mid-span Supports | Downforce Design Load w/o Mid-span Supports | Uplift Design Load |
|---|---------------------|---|---|--------------------|
| Boviet Solar                            | BVM6612 P-XXX       | 50 psf                                    | 30 psf                                      | 11.8 psf           |
|   | BVM6612 P-XXX (BB)  |   |   |                    |
|   | BVM6612-M-XXX       |   |   |                    |
|   | BVM6612 M-XXX (BB)  |   |   |                    |
|   | BVM6610P-XXX        |   |   |                    |
|   | BVM6610M-XXX        |   |   |                    |
|   | BVM6610M (BB)-XXX   |   |   |                    |
| BVM6610P (BB)-XXX                       |                     |   |   |                    |
| Canadian Solar                          | CS6P-XXXP           | N/A                                       | 30 psf                                      | 30 psf             |
|   | CS6P-XXXM           |   |   |                    |
|   | CS6X-XXXP           | 50 psf                                    | 38 psf                                      | 15 psf             |
|   | CS6U-XXXP           | 50 psf                                    | 25 psf                                      | 13.3 psf           |
|   | CS6U-XXXM           |   |   |                    |
|   | CS6U-XXXP (1500V)   |   |   |                    |
| CS6U-XXXM (1500V)                       |                     |   |   |                    |
| ET Solar                                | ET-M672XXXWW        | 40 psf                                    | 20 psf                                      | 15.0 psf           |
|   | ET-M672XXXWB        |   |   |                    |
|   | ET-P672XXXWW        |   |   |                    |
|   | ET-P672XXXWB        |   |   |                    |
|   | ET-M672XXXBB        |   |   |                    |
|   | ET-P672XXXBB        |   |   |                    |
| Hansol                                  | HSXXTD-AN4          | 35 psf                                    | 20 psf                                      | 15.0 psf           |
|   | HSXXTD-AN3          |   |   |                    |
|   | HSXXUD-AN1          |   |   |                    |
| Hanwha Q Cells<br>(continued next page) | Q.PRO BFR-G4 XXX    | 55 psf                                    | 20 psf                                      | 15.1 psf           |
|   | Q.PLUS BFR-G4.1 XXX |   |   |                    |
|   | Q.PRO BFR-G4.1 XXX  |   |   |                    |
|   | Q.PRO BFR-G4.3 XXX  |   |   |                    |
|   | Q.PEAK-G4.1 XXX     |   |   |                    |
|   | Q.PEAK-G4.1/MAX XXX |   |   |                    |
|   | Q.PEAK BLK G4.1 XXX |   |   |                    |
|   | Q.PRO G4 XXX        |   |   |                    |
|   | Q.PLUS G4 XXX       |   |   |                    |
|   | Q.PEAK-G4.1/TAA XXX |   |   |                    |

| Manufacturer            | Module Series            | Downforce Design Load w/Mid-span Supports | Downforce Design Load w/o Mid-span Supports | Uplift Design Load |        |
|-------------------------|--------------------------|---|---|--------------------|--------|
| Hanwha Q Cells (con't.) | Q.PEAK BLK G4.1/TAA XXX  | 55 psf                                    | 20 psf                                      | 15.1 psf           |        |
|                         | Q.PLUS BFR G4.1/TAA XXX  |   |   |                    |        |
|                         | Q.PLUS BFR G4.1/MAX XXX  |   |   |                    |        |
|                         | B.LINE PLUS BFR G4.1 XXX |   |   |                    |        |
|                         | B.LINE PRO BFR G4.1 XXX  |   |   |                    |        |
|                         | Q.PRO EC-G4.4 XXX        |   |   |                    |        |
|                         | Q.PLUS L-G4.2 XXX        | 33 psf                                    | 30 psf                                      | 10.2 psf           |        |
|                         | Q.PEAK L-G4.2 XXX        |   |   |                    |        |
|                         | Q.PLUS L-G4.1 XXX        |   |   |                    |        |
|                         | Q.PLUS L-G4 XXX          |   |   |                    |        |
|                         | Q.PRO L-G4 XXX           |   |   |                    |        |
|                         | Q.PRO L-G4.1 XXX         |   |   |                    |        |
|                         | Q.PRO L-G4.2 XXX         |   |   |                    |        |
|                         | B.LINE PLUS L-G4.2 XXX   |   |   |                    |        |
|                         | B.LINE PRO L-G4.1 XXX    |   |   |                    |        |
|                         | B.LINE PRO L-G4.2 XXX    |   |   |                    |        |
|                         | Heliene                  | 72M-XXX                                   | 34 psf                                      | 25 psf             | 15 psf |
|                         |                          | 72M-XXX BLK                               |   |                    |        |
| 72P-XXX                 |                          |   |   |                    |        |
| 60P-XXX                 |                          |   |   |                    |        |
| 60M-XXX                 |                          |   |   |                    |        |
| 60M-XXX HOME PV         |                          |   |   |                    |        |
| Hyundai                 | HiS-MXXXTI               | 40 psf                                    | 30 psf                                      | 10.2 psf           |        |
|                         | HiS-SXXXTI               |   |   |                    |        |
|                         | HiS-MXXXRI               | 33.3 psf                                  | 20 psf                                      | 15 psf             |        |
|                         | HiS-SXXXRI               |   |   |                    |        |
| HiS-SXXXKI              |                          |   |   |                    |        |
| Jinko                   | JKMXXXP-60               | N/A                                       | 30 psf                                      | 30 psf             |        |
|                         | JKMXXXP-72               |   | 30 psf                                      | 15 psf             |        |
| LG                      | LGXXN2W-G4               | N/A                                       | 35 psf                                      | 15 psf             |        |
|                         | LGXXN2W-A5               | 30 psf                                    | 18.8 psf                                    | 15 psf             |        |
|                         | LGXXN1C-A5               |   |   |                    |        |
|                         | LGXXN1K-A5               |   |   |                    |        |
|                         | LGXXS1C-A5               |   |   |                    |        |
|                         | LGXXS2W-A5               |   |   |                    |        |
|                         |                          |   |   |                    |        |
| LONGi                   | LR6-72-XXXM              | 40 psf                                    | 20 psf                                      | 15 psf             |        |
|                         | LR6-72HV-XXXM            |   |   |                    |        |
|                         | LR6-72HPH-XXXM           | 30 psf                                    | 20 psf                                      | 15 psf             |        |

| Manufacturer | Module Series             | Downforce Design Load w/Mid-span Supports | Downforce Design Load w/o Mid-span Supports | Uplift Design Load |        |          |          |
|--------------|---------------------------|---|---|--------------------|--------|----------|----------|
| ReneSola     | JCXXM-24/Ab               | N/A                                       | 30 psf                                      | 15 psf             |        |          |          |
|              | JCXXM-24/Bb               |   | 30 psf                                      | 30 psf             |        |          |          |
| REC          | RECXXTP2 BLK2             | 50 psf                                    | 26 psf                                      | 15 psf             |        |          |          |
|              | RECXXTP2 BLK              |   |   |                    |        |          |          |
|              | RECXXTP2                  |   |   |                    |        |          |          |
|              | RECXXTP                   |   |   |                    |        |          |          |
|              | RECXXTP BLK               |   |   |                    |        |          |          |
|              | RECXXPE                   |   |   |                    |        |          |          |
|              | RECXXPE BLK               |   |   |                    |        |          |          |
|              | RECXXTP2SB 72 XV          |   |   |                    |        |          |          |
|              | RECXXTP2S 72 XV           |   |   |                    | 20 psf | 15.5 psf | 15 psf   |
|              | RECXXTP2S 72              |   |   |                    |        |          |          |
| Talesun      | TP672P-XXX                | 30 psf                                    | 20 psf                                      | 12 psf             |        |          |          |
|              | TP672M-XXX                |   |   |                    |        |          |          |
| Trina        | TSM-XXX PA05.08           | N/A                                       | 30 psf                                      | 30 psf             |        |          |          |
|              | TSM-XXXDD14A(II)          | 40 psf                                    | 30 psf                                      | 15 psf             |        |          |          |
|              | TSM-XXXDE14A(II)          |   |   |                    |        |          |          |
|              | TSM-XXXPE14A              |   |   |                    |        |          |          |
| TSM-XXXPD14  |                           |   |   |                    |        |          |          |
| S-Energy     | SNXXP-15                  | 30 psf                                    | 20 psf                                      | 10 psf             |        |          |          |
|              | SNXXP-10                  |   |   |                    |        |          |          |
|              | SNXXM-10                  |   |   |                    |        |          |          |
|              | SNXXM-10 (40T)            |   |   |                    |        |          |          |
|              | SNXXP-10 (40T)            |   |   |                    |        |          |          |
| Silfab       | SLG-M XXX                 | 30 psf                                    | 13.9 psf                                    | 13.1 psf           |        |          |          |
|              | SLG-P XXX                 |   |   |                    |        |          |          |
|              | SLG-X XXX                 |   |   |                    |        |          |          |
|              | SSG-M XXX                 |   |   |                    |        |          |          |
|              | SSG-P XXX                 |   |   |                    |        |          |          |
|              | SLA-M XXX                 |   |   |                    |        |          |          |
|              | SLA-P XXX                 |   |   |                    |        |          |          |
|              | SLA-X XXX                 |   |   |                    | 40 psf | 30 psf   | 13.3 psf |
|              | SSA-P XXX                 |   |   |                    |        |          |          |
|              | SSA-M XXX                 |   |   |                    |        |          |          |
| SolarWorld   | SW Poly Pro               | N/A                                       | 30 psf                                      | 30 psf             |        |          |          |
|              | SW Poly 2.5               |   |   |                    |        |          |          |
|              | Sunmodule Plus SW Mono    |   |   |                    |        |          |          |
|              | Sunmodule Protect SW Mono |   |   |                    |        |          |          |
| Yingli       | YLXXP-29b                 | N/A                                       | 30 psf                                      | 30 psf             |        |          |          |
|              | YLXXC-30b                 |   |   |                    |        |          |          |

# EcoFoot2<sup>+</sup>



## Notes:

- *Testing is underway for module data listed as N/A and will be available soon.*
- *Testing for loads on downslope are not required for ballasted racking.*
- *The above list is not exhaustive. New modules are being tested on an ongoing basis. Contact Ecolibrium Solar directly for specific module information and Letters of Completion from TÜV Rheinland.*

| Release Notes |  |                |
|---------------|--|----------------|
| Revision      | Reason   | Effective Date |
| 1.0           | Initial Release  | 4/25/17        |
| 1.1           | <p><b>Modules Added:</b></p> <p><b>Boviet Solar</b><br/>                     BVM6612 P-XXX<br/>                     BVM6612 P-XXX (BB)<br/>                     BVM6612-M-XXX<br/>                     BVM6612 M-XXX (BB)<br/>                     BVM6610P-XXX<br/>                     BVM6610M-XXX<br/>                     BVM6610M(BB)-XXX<br/>                     BVM6610P(BB)-XXX</p> <p><b>Hyundai</b><br/>                     HiS-M3XXTI<br/>                     HiS-S3XXTI</p> <p><b>Canadian Solar</b><br/>                     CS6U-XXXP<br/>                     CS6U-XXXM<br/>                     CS6U-XXXP (1500V)<br/>                     CS6U-XXXM (1500V)</p> <p><b>ReneSola</b><br/>                     JCXXXM-24/Bb</p> <p><b>Silfab</b><br/>                     SLG-M XXX<br/>                     SLA-P XXX<br/>                     SLA-X XXX<br/>                     SLG-P XXX<br/>                     SLG-X XXX<br/>                     SSA-P XXX<br/>                     SSA-M XXX<br/>                     SSG-M XXX<br/>                     SSG-P XXX</p> <p><b>Modules Updated:</b><br/>                     Jinko JKMXXXM-72<br/>                     LG LGXXN2W-G4<br/>                     ReneSola JCXXXM-24/Ab</p> | 5/17/17        |
| 1.2           | <p><b>Modules Added</b></p> <p><b>Canadian Solar</b><br/>                     CS6P-XXXM</p> <p><b>ET Solar</b><br/>                     ET-M672XXXWW<br/>                     ET-M672XXXWB<br/>                     ET-P672XXXWW</p>   | 9/18/17        |

| Release Notes |   |                |
|---------------|---|----------------|
| Revision      | Reason  | Effective Date |
| 1.2 (con't.)  | <p>ET-P672XXXWB<br/>                     ET-M672XXXBB<br/>                     ET-P672XXXBB</p> <p><b>Hanwha Q Cells</b><br/>                     Q.PRO BFR-G4.1 XXX<br/>                     Q.PEAK-G4.1 XXX</p> <p><b>Silfab</b><br/>                     SLA-M XXX<br/>                     SSA-M XXX</p> <p><b>SolarWorld</b><br/>                     SW Poly Pro<br/>                     SW Poly 2.5<br/>                     Sunmodule Plus SW Mono<br/>                     Sunmodule Protect SW Mono</p> <p><b>Talesun</b><br/>                     TP672P-XXX<br/>                     TP672M-XXX</p> <p><b>Yingli</b><br/>                     YLXXXC-30b</p> <p><b>Modules Updated:</b></p> <p><b>Silfab</b><br/>                     SLG-M XXX<br/>                     SLG-P XXX<br/>                     SLG-X XXX<br/>                     SSG-M XXX<br/>                     SSG-P XXX<br/>                     SLA-P XXX<br/>                     SLA-X XXX<br/>                     SSA-P XXX</p> <p><b>Hanwha Q Cells</b><br/>                     Q.PRO BFR-G4 XXX<br/>                     Q.PLUS BFR-G4.1 XXX<br/>                     Q.PRO BFR-G4.3 XXX<br/>                     Q.PEAK BFR-G4.1 XXX (removed)<br/>                     Q.PEAK-G4.1/MAX XXX<br/>                     Q.PEAK BLK G4.1 XXX<br/>                     Q.PRO G4 XXX<br/>                     Q.PLUS G4 XXX<br/>                     Q.PEAK-G4.1/TAA XXX<br/>                     Q.PEAK BLK G4.1/TAA XXX<br/>                     Q.PLUS BFR G4.1/TAA XXX<br/>                     Q.PLUS BFR G4.1/MAX XXX<br/>                     B.LINE PLUS BFR G4.1 XXX</p> |                |

| Release Notes |  |                |
|---------------|--|----------------|
| Revision      | Reason   | Effective Date |
| 1.2 (con't.)  | B.LINE PRO BFR G4.1 XXX<br>Q.PRO EC-G4.4 XXX<br>Q.PLUS L-G4.2 XXX<br>Q.PEAK L-G4.2 XXX<br>Q.PLUS L-G4.1 XXX<br>Q.PLUS L-G4 XXX<br>Q.PRO L-G4 XXX<br>Q.PRO L-G4.1 XXX<br>Q.PRO L-G4.2 XXX<br>B.LINE PLUS L-G4.2 XXX<br>B.LINE PRO L-G4.1 XXX<br>B.LINE PRO L-G4.2 XXX<br><b>Jinko</b><br>JKMXXM-72 changed to JKMXXP-72   |                |
| 1.3           | <b>Modules Added:</b><br><b>S-Energy</b><br>SNXXP-15<br>SNXXP-10<br>SNXXM-10<br>SNXXM-10 (40T)<br>SNXXP-10 (40T)<br><b>LG</b><br>LGXXN2W-A5<br>LGXXN1C-A5<br>LGXXN1K-A5<br>LGXXS1C-A5<br>LGXXS2W-A5<br><b>REC</b><br>RECXXTP2 BLK2<br>RECXXTP2 BLK<br>RECXXTP2<br>RECXXTP<br>RECXXTP BLK<br>RECXXPE<br>RECXXPE BLK<br><b>Canadian Solar</b><br>CS6X-XXXP (50 psf downforce w/mid-span supports added)<br><b>LG</b><br>LGXXN2W-G4 (Max. downforce w/out mid-span support changed to 35 psf) | 12/06/2017     |
| 1.4           | <b>Modules Added:</b><br>LR6-72-XXXM<br>LR6-72HV-XXXM  | 1/22/18        |



| Release Notes |  |                |
|---------------|--|----------------|
| Revision      | Reason   | Effective Date |
| 1.5           | <b>Modules Added:</b><br>RECXXTP2SB 72 XV<br>RECXXTP2S 72 XV<br>RECXXTP2S 72   | 4/13/18        |
| 1.6           | <b>Modules Added:</b><br><b>Trina</b><br>TSM-XXXDD14A(II)<br>TSM-XXXDE14A(II)<br>TSM-XXXPE14A<br>TSM-XXXPD14<br><b>Hansol</b><br>BHSXXTD-AN4<br>HSXXTD-AN3<br>HSXXUD-AN1       | 7/16/18        |
| 1.7           | <b>Modules Added:</b><br><b>Hyundai</b><br>HiS-MXXXRI<br>HiS-SXXXRI<br>HiS-SXXXKI  | 5/7/19         |
| 1.8           | <b>Modules Added:</b><br><b>Longi</b><br>LR6-72HPH-XXXM<br><b>Heliene</b><br>72M-XXX<br>72M-XXX BLK<br>72P-XXX<br>60P-XXX<br>60M-XXX<br>60M-XXX HOME PV<br>60M-XXX BLK HOME PV | 1/28/20        |

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