

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 below listed modules are listed for mechanical loading, grounding and bonding according to UL2703. The table continues next page. *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	50 psf	38 psf	15 psf
	CS6X-XXXP			
	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	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			
	Q.PEAK BLK G4.1/TAA XXX			
	Q.PLUS BFR 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.PLUS BFR G4.1/MAX XXX	55 psf	20 psf	15.1 psf
	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			
Hyundai	HIS-MXXXTI	40 psf	30 psf	10.2 psf
	HIS-SXXXTI			
Jinko	JKMXXXP-60	N/A	30 psf	30 psf
	JKMXXXP-72			
LG	LGXXXN2W-G4	N/A	35 psf	15 psf
	LGXXXN2W-A5			
	LGXXXN1C-A5	30 psf	18.8 psf	15 psf
	LGXXXN1K-A5			
	LGXXXS1C-A5			
	LGXXXS2W-A5			
LONGi	LR6-72-XXXM	40 psf	20 psf	15 psf
	LR6-72HV-XXXM			
ReneSola	JCXXXM-24/Ab	N/A	30 psf	15 psf
	JCXXXM-24/Bb			
REC	RECXXTP2 BLK2	50 psf	26 psf	15 psf
	RECXXTP2 BLK			
	RECXXTP2			
	RECXXTP	20 psf	15.5 psf	15 psf
	RECXXTP BLK			
	RECXXPE			
	RECXXPE BLK			
RECXXTP2SB 72 XV				



Manufacturer	Module Series	Downforce Design Load w/Mid-span Supports	Downforce Design Load w/o Mid-span Supports	Uplift Design Load
Talesun	RECXXTP2S 72 XV	30 psf	20 psf	12 psf
	RECXXTP2S 72			
	TP672P-XXX			
	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	SNXXXP-15	30 psf	20 psf	10 psf
	SNXXXP-10			
	SNXXXM-10			
	SNXXXM-10 (40T)			
	SNXXXP-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	40 psf	30 psf	13.3 psf
	SLA-M XXX			
	SLA-P XXX			
	SLA-X XXX			
	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	YLXXXP-29b	N/A	30 psf	30 psf
	YLXXXC-30b			

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>Modules Added:</p> <p>Boviet Solar BVM6612 P-XXX BVM6612 P-XXX (BB) BVM6612-M-XXX BVM6612 M-XXX (BB) BVM6610P-XXX BVM6610M-XXX BVM6610M(BB)-XXX BVM6610P(BB)-XXX</p> <p>Hyundai HiS-M3XXTI HiS-S3XXTI</p> <p>Canadian Solar CS6U-XXXXP CS6U-XXXXM CS6U-XXXXP (1500V) CS6U-XXXXM (1500V)</p> <p>ReneSola JCXXXM-24/Bb</p> <p>Silfab SLG-M XXX SLA-P XXX SLA-X XXX SLG-P XXX SLG-X XXX SSA-P XXX SSA-M XXX SSG-M XXX SSG-P XXX</p> <p>Modules Updated: Jinko JKMXXXM-72 LG LGXXXN2W-G4 ReneSola JCXXXM-24/Ab</p>	5/17/17
1.2	<p>Modules Added</p> <p>Canadian Solar CS6P-XXXXM</p> <p>ET Solar ET-M672XXXWW</p>	9/18/17



Release Notes		
Revision	Reason	Effective Date
1.2 (con't.)	ET-M672XXXWB ET-P672XXXWW ET-P672XXXWB ET-M672XXXBB ET-P672XXXBB Hanwha Q Cells Q.PRO BFR-G4.1 XXX Q.PEAK-G4.1 XXX Silfab SLA-M XXX SSA-M XXX SolarWorld SW Poly Pro SW Poly 2.5 Sunmodule Plus SW Mono Sunmodule Protect SW Mono Talesun TP672P-XXX TP672M-XXX Yingli YLXXXC-30b Modules Updated: Silfab SLG-M XXX SLG-P XXX SLG-X XXX SSG-M XXX SSG-P XXX SLA-P XXX SLA-X XXX SSA-P XXX Hanwha Q Cells Q.PRO BFR-G4 XXX Q.PLUS BFR-G4.1 XXX Q.PRO BFR-G4.3 XXX Q.PEAK BFR-G4.1 XXX (removed) 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	



Release Notes		
Revision	Reason	Effective Date
1.2 (con't.)	Q.PEAK BLK G4.1/TAA XXX 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 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 Jinko JKMXXM-72 changed to JKMXXP-72	
1.3	Modules Added: S-Energy SNXXP-15 SNXXP-10 SNXXM-10 SNXXM-10 (40T) SNXXP-10 (40T) LG LGXXN2W-A5 LGXXN1C-A5 LGXXN1K-A5 LGXXS1C-A5 LGXXS2W-A5 REC RECXXTP2 BLK2 RECXXTP2 BLK RECXXTP2 RECXXTP RECXXTP BLK RECXXPE RECXXPE BLK	12/06/2017



Release Notes		
Revision	Reason	Effective Date
1.3 (con't.)	Modules Revised: Canadian Solar CS6X-XXXP (50 psf downforce w/mid-span supports added) LG LGXXXN2W-G4 (Max. downforce w/out mid-span support changed to 35 psf)	
1.4	Modules Added: LR6-72-XXXM LR6-72HV-XXXM	1/22/18
1.5	Modules Added: RECXXTP2SB 72 XV RECXXTP2S 72 XV RECXXTP2S 72	4/13/18
1.6	Modules Added: Trina TSM-XXXDD14A(II) TSM-XXXDE14A(II) TSM-XXXPE14A TSM-XXXPD14 Hansol BHSXXTD-AN4 HSXXTD-AN3 HSXXXUD-AN1	7/16/18

Ecolibrium Solar® is a registered trademark of Ecolibrium Solar, Inc. EcoFoot2+™ is a trademark of Ecolibrium Solar, Inc. Copyright © 2018 by Ecolibrium Solar, Inc. All rights reserved.