Solar Construction RFQ , Attachment A - Technical Documents

Content

NUANCE ENERGY
Revolutionary Solar Racking Structures

OSPREY
PowerRack

Spec Sheet - Standard Ground Mount

The Osprey Power Rack has the following key specifications

- Technology neutral design compatible with a variety of solar panel manufacturers, with 3 designs to choose from: OPR LTE, OPR LTE-HD, and OPR MAX.
- Pre-engineered to hold 12, 16, 20, or 24 solar panels in a landscape orientation.
- Total power output of up to 12.96 kW (24 x 540w solar modules).
- Compliant with UL 2703 and features self-bonding mid clamps.
- Meets ASCE 7-16 standards and is rated as Category 1.
- Withstands wind loads of up to 130 mph and snow loads of up to 70+ psf (custom options available).
- Fixed tilt orientation of 15° to 35°, with custom options up to 45°.
- Engineered for use on N/S sloped terrain (up to 10°) and E/W sloped terrain (up to 5°).
- Pre-assembled legs with adjustable height of 24" to 51" (front legs) and telescoping square tube legs to 101" (rear legs).
- Small footprint with a spacing of 74" to 82.5" between front and rear legs.
- Standard finish options of ZAM275 or galvanized (G90) steel, with other options available.
- Comes with a 20-year limited product warranty.
- Made in the USA (available option).

Sustainable Solution

- No need for a geotechnical report, as soil conditions can be verified in real-time using the proprietary Osprey PowerJack.
- No concrete is required, reducing the environmental impact of the installation.
- Utilizes up to 30 cubic feet of earth above each anchor, with the soil and sediment acting as a natural ballast to hold the PowerRack in place.
- The use of handheld tools reduces the need for heavy equipment or machinery, further reducing the environmental impact of the installation.
- Less mobilization to the site, reducing the carbon emissions (CO_2) of the project.
- 100% removable with no long-term environmental impact after the life of the system.
- 100% transportable, with the "Lift and Shift" capability to move the renewable capital asset as needed.

100% modular and scalable, with a universal table design.

- Based on pre-engineered solar arrays and patented earth anchor foundation technology.
- Designed to be installed using handheld tools.
- Composed of interchangeable components that can be used to assemble multiple table sizes (4x3x2, 4x4x2, 4x5x3, and 4x6x4).
- Stock and inventory efficient, with kitted and boxed hardware and fewer SKUs.
- The longest component measures 98 inches.
- Stocked on wooden pallets for ease of handling.
- Delivered in a van or box truck, or can be transported in the back of a pickup truck.
- Easy and safe to handle, with convenient material handling options.

Structural Engineering

- Structural analysis report: The Osprey Power Rack comes with a comprehensive report including analysis for all 50 US states, covering various loads that impact its structural integrity.
- Site-specific SSM: A site-specific and stamped structural engineering report (SSM) is available for an additional fee, providing detailed information for building code compliance and permits. Provided by licensed engineers.

Saving Time and Money - 2MW commercial project

- Quick installation: The Osprey Power Rack can be installed in an average time of less than 60 minutes with a 3-4 person crew.
- Low labor cost: The cost of installation is less than $0.12 per watt, which includes the cost of racking, foundation, solar panels, and anchor load testing.
- Significant time and cost savings: Using the Osprey Power Rack can save up to 416 man hours (52 days) per 2MW commercial project, and up to $144,640 per 2MW project.

NUANCE ENERGY
Revolutionary Solar Racking Structures

OSPREY
PowerRack

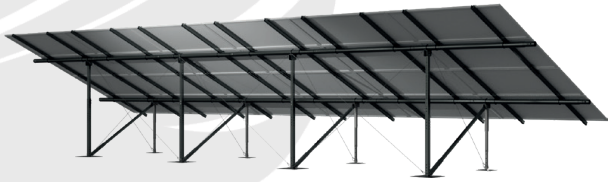
OSPREY PowerRack™ MAX

4x3x2

4x5x3

4x4x3

4x6x4



OSPREY PowerRack™ LTE-HD

4x4x3

4x5x4

OSPREY PowerRack™ LTE

4x3x2

4x5x3

4x4x2

4x6x4

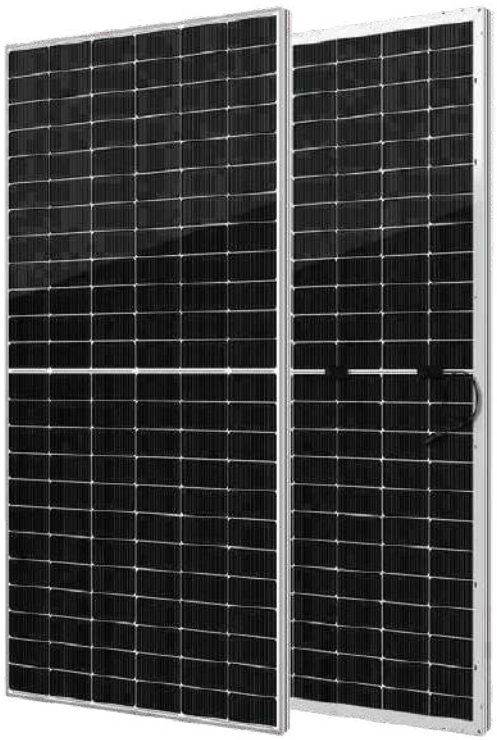
SEG SOLAR

www.segsolar.com

YUKON N Series

Half-Cell N-Type Bifacial Module

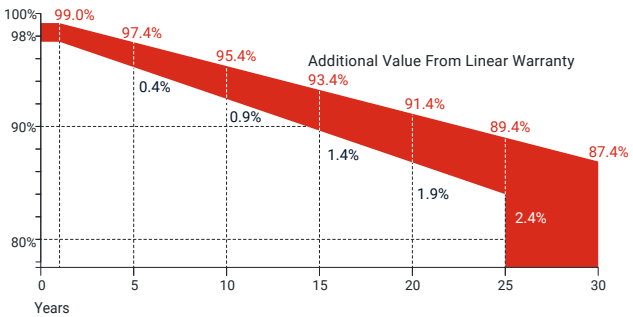
580-595Wp Module Power Output | **23.03%** Max Efficiency



Key Features

- High module conversion efficiency
- Better temperature coefficient
- Super multi busbar technology
- Low attenuation long warranty
- Superior load capacity
- Higher bifaciality
- USA based liability insurance
- Houston, Texas based company

Warranty



15 Years Guarantee on product material and workmanship

30 Years Linear power output warranty

Product Certification

IEC61215; IEC61730; UL61215; UL61730	
IEC62804	PID
IEC61701	Salt Mist
IEC62716	Ammonia Resistance
IEC60068	Dust and Sand
IEC61215	Hailstone
Fire Type (UL61730): Type 29	
ISO14001:2015; ISO9001:2015; ISO45001:2018	

Intertek · PV CYCLE · CE · TÜV SÜD · DEKRA · CALIFORNIA ENERGY COMMISSION · FSEC

About SEG Solar

Founded in 2016, SEG is a leading vertically integrated PV manufacturer headquartered in Houston, Texas, U.S., and is dedicated to delivering reliable and cost-effective solar modules to the utility, commercial, and residential markets. By the end of 2024, SEG had shipped over 6 GW of solar modules worldwide and have achieved a module production capacity of 6 GW.

Download Datasheet

YUKON N Series SEG-XXX-BTA-BG-144Cells

Electrical Characteristics

Module Type	SEG-580-BTA-BG			SEG-585-BTA-BG			SEG-590-BTA-BG			SEG-595-BTA-BG		
	Front STC	Front NOCT	Back STC	Front STC	Front NOCT	Back STC	Front STC	Front NOCT	Back STC	Front STC	Front NOCT	Back STC
Maximum Power -Pmp(Wp)*	580	437	464	585	441	468	590	445	472	595	449	476
Open Circuit Voltage -Voc(V)	51.95	50.29	51.93	52.16	50.56	52.14	52.37	50.79	52.35	52.58	51.02	52.56
Short Circuit Current -Isc(A)	13.84	11.08	11.08	13.89	11.12	11.12	13.94	11.17	11.17	13.99	11.22	11.22
Maximum Power Voltage -Vmp(V)	44.02	41.42	44.00	44.22	41.64	44.20	44.43	41.86	44.41	44.64	42.08	44.62
Maximum Power Current -Imp(A)	13.17	10.55	10.55	13.23	10.59	10.59	13.28	10.63	10.63	13.33	10.67	10.67
Module Efficiency(%)		22.45			22.65			22.84			23.03	
Power Tolerance(W)	(0, +4.99)											
Maximum System Voltage	1500V DC											
Maximum Series Fuse Rating	30 A											
Bifaciality	80±10%											

STC: Irradiance 1000 W/m² module temperature 25°C AM=1.5 NOCT: Irradiance 800W/m² ambient temperature 20°C module temperature 45°C wind speed: 1m/s

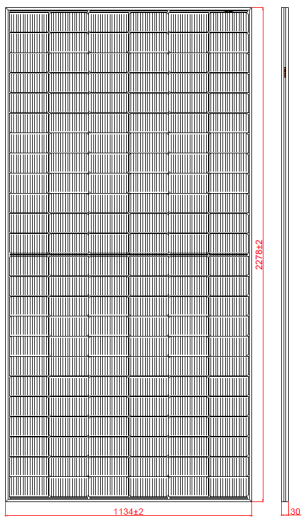
*Measuring tolerance: ±3%

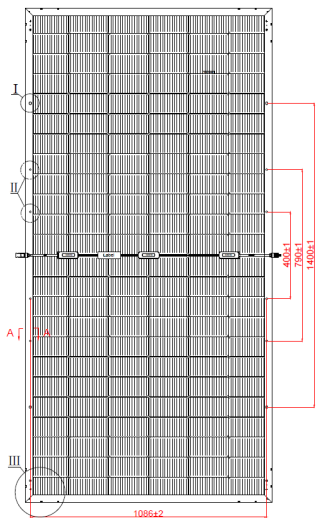
Mechanical Specifications

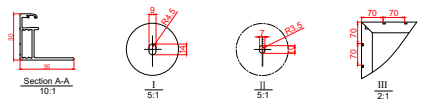
External Dimension	2278 x 1134 x 30 mm
Weight	32.0 kg
Solar Cells	N-Type Mono 144 pcs(72 x 2)
Front Glass	2.0 mm AR coating semi-tempered glass
Back Glass	2.0 mm Semi-tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP68 / 3 diodes
Connector Type	PV-CO02-xy or MC4
Cable Type Cable Length	12 AWG PV Wire(UL) Portrait: 400 mm(+) / 200 mm(-) Landscape: 1200 mm(+) / 1200 mm(-) or customized length
Mechanical Load(Front)	5400 Pa / 113 psf*
Mechanical Load(Rear)	2400 Pa / 50 psf*

*Refer to SEG installation manual for details

Technical Drawing







*Refer to SEG installation manual for details

Temperature Characteristics

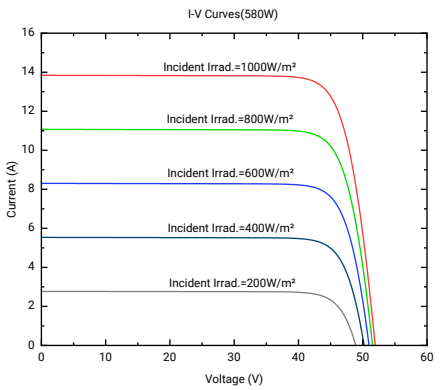
Pmax Temperature Coefficient	-0.30 %/°C
Voc Temperature Coefficient	-0.25 %/°C
Isc Temperature Coefficient	+0.046 %/°C
Operating Temperature	-40~+85 °C
Nominal Operating Cell Temperature (NOCT)	45±2 °C

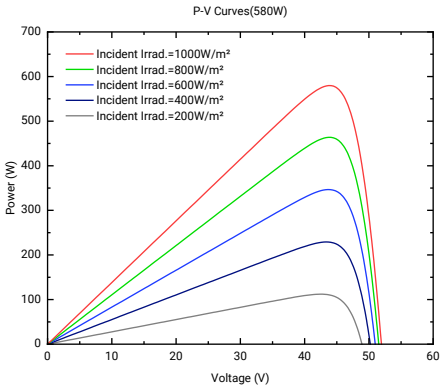
Packing Configuration

Container*	20'GP	40'HQ	40'HQ (For USA)
Pieces per Pallet	36	36	36
Pallets per Container	4	20	16
Pieces per Container	144	720	576

*Refer to the SEG container technical documentation for 53' box trailer or other trucks loading quantity

Curves of PV Module





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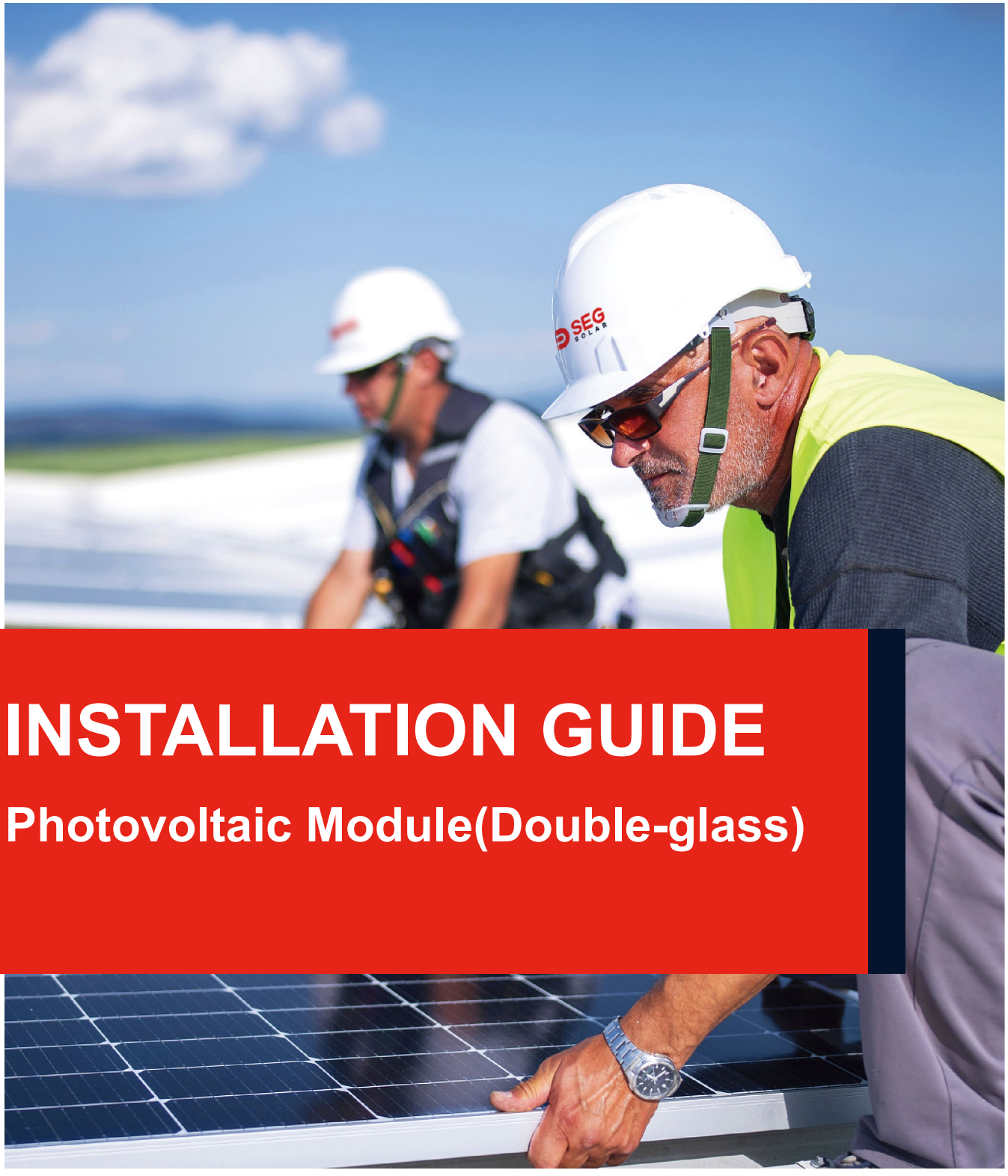


INSTALLATION GUIDE

Photovoltaic Module(Double-glass)

SEG BORN AND RAISED IN THE USA

2024 V4.0

TABLE OF CONTENTS

WARNING!

The photovoltaic module produces electricity when exposed to the sun or other light sources. For your safety and the safety of others, please read the entire installation and assembly instruction manual carefully prior to installation. Please carefully read the following installation and safety instructions. Non-compliance with these instructions may void the module warranty.

1 GENERAL INFORMATION

Thanks for choosing SEG Photovoltaic Modules (hereafter referred to as “PV Module”), This Guide is to give information on how to apply SEG PV modules properly.

Installers must read and understand this Guide prior to installation. For any questions, please contact our technical department (technic@segsolar.com) for further information. Installers should follow all safety precautions described in this Guide as well as local codes when installing a module.

Keep this Guide in a safe place for future reference (care and maintenance) and in case of sale or disposal of the PV modules.

1.1 APPLICABLE PRODUCTS

This document is applicable to the series of PV modules as listed below:

Type 1 166	SEG-XXX-BMB-BG(1755×1038×30, 1791×1052×30)
	SEG-XXX-BMA-BG(2095×1038×30, 2131×1052×30)
Type 2 182	SEG-XXX-BMD-BG, SEG-XXX-BTD-BG(1722×1134×30)
	SEG-XXX-BMB-BG, SEG-XXX-BTB-BG(1909×1134×30)
	SEG-XXX-BMA-BG, SEG-XXX-BTA-BG(2278×1134×30)
	SEG-XXX-BMZ-BG, SEG-XXX-BTZ-BG(2465×1134×30)
Type 3 210	SEG-XXX-BMC-BG, SEG-XXX-BTC-BG(2384×1303×33)
	SEG-XXX-BMB-BG, SEG-XXX-BTB-BG(2172×1303×33)
	SEG-XXX-BTC-BG(2382×1134×30)
Type 4 156&158.75	SEG-XXX-BMA-BG/DG(2045×1008×30), SEG-XXX-BPA-DG(2018×998×30)
	SEG-XXX-BMB-BG/DG(1720×1008×30), SEG-XXX-BPB-DG(1696×998×30)
	SEG-XXX-BMZ-BG(2198×1008×30)

1.2 PRODUCT IDENTIFICATION

Each module has two Barcode stickers which have the same unique serial No. of each module and one label sticker.

Barcode 1: Laminated into PV modules. Barcode 2: Stick on the backside of PV modules.

Label: Stick on the backside of PV modules, contains characteristics parameters of the PV modules.

Check the serial No. in the barcode with the packing list when unpacking. Provide PV module serial No when you need support from SEG on particular PV modules.

2 SAFETY

2.1 GENERAL SAFETY

Be careful when unpacking, transporting, and storing the modules. They are subject to breakage if they are not handled and installed properly. It is recommended not to take them out of the packaging until the moment of the installation. During installation, please use soft materials to protect the modules from contacting directly with the ground, concrete or tiles. Otherwise scratches or glass breakages may occur.

- The PV module is used in systems operating at greater than 50 VDC or 240 W where general access is anticipated. The PV module is certified for safety through UL 61730 and within this application class are also certified to meet the requirements for fire safety Type 1 or 29.
- The PV modules shall be properly grounded in accordance with the instructions in this Guide or the requirements of the National Electrical Code.
- Installing PV modules requires specialized skills and knowledge. Installation should only be performed by qualified personnel, electrical connections require a licensed electrician, where applicable according to local code and law (i.e., the NEC for the USA and CEC for Canada).
- Installers should assume all risks of injury that might occur during installation, including, but not limited to, the risk of electric shock.
- One single PV module may generate more than 30V DC when exposed to direct sunlight. Access to a DC voltage of 30V or more is potentially hazardous.
- PV modules convert light energy to DC electrical energy, which are designed for outdoor use. PV modules can be mounted onto ground, rooftop, vehicles or boats etc. The proper design of support structures lies within responsibility of the system designers and installers.
- Do not use mirrors or other magnifiers to concentrate sunlight onto the PV modules.
- When installing the PV modules, abide to all local, regional, and national statutory regulations. Obtain a building permit if necessary.
- Only use equipment, connectors, wiring, and support frames compatible with the PV modules.
- Storage Temperature:-10℃～40℃, Storage Humidity:≤70%RH.
- Modules should operate at environmental temperature of between -40 to +85℃.

2.2 HANDLING SAFETY

- Do not lift the PV module by grasping the module's junction box or electrical leads.
- Do not stand or step on the PV modules or place heavy objects onto it.
- Do not drop the PV module or allow objects to fall on the PV module.
- Do handle with care when move, transport and install the PV modules.
- Do not lean modules on other objects.
- Do apply soft protector to separate the modules when stacking modules and ensure the safety.
- Do not attempt to disassemble the PV modules, and do not remove any attached nameplates or components from the PV modules.
- Do not apply paint or adhesive to the PV module top surface.
- Do not use PV modules with broken glass which has danger of electrical shock.
- Do not handle panels in wet condition unless has appropriate protection.
- Do not expose PV module to sunlight until installation to avoid unnecessary degradation.

2.3 INSTALLATION SAFETY

- Installation shall be in conformity with UL standard, Safety Standard for Electrical Installations.
- Do not disconnect under load.
- Do not touch conductive parts of PV modules, such as terminals which can result in burns, sparks and lethal shock whether or not the PV module is connected.
- Do not touch the PV module unnecessarily during installation.
- Do not work in the rain, snow or windy conditions.
- Do not expose the artificially sunlight to PV modules. Completely cover the PV module with an opaque material during installation to prevent electricity from being generated.
- Do not drill holes on the modules of broke the encapsulation on the module side.
- Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic objects while installing or troubleshooting.
- Only use insulated tools that are qualified for working on electrical installations.
- Follow the safety regulations for all other system components, including wires and cables, connectors, charging regulators, inverters, storage batteries, recharge- able batteries, etc.
- Under normal outdoor conditions the current and voltage generated will differ from those listed on the datasheet. When design systems, current and short-circuit current should be multiplied by a factor of 1.25 to determine components ratings.
- Only use connectors compatible with the PV module connectors. Removing the connectors without prior authorization will invalidate the warranty.
- Do not dismantle installed modules to another project, which may invalidate the warranty.

2.4 FIRE SAFETY

- The fire rating for this module is only valid when the product is installed as specified in the mechanical mounting instructions in this document.
- Consult your local authority for Guidelines and requirements for building or structural fire safety.
- Do not use PV modules near equipment or in places where flammable gases may be generated.
- Follow local codes and laws when install the modules.

3 INSTALLATION

3.1 GENERAL INSTALLATION PRINCIPLE

- Module can be installed in both landscape and portrait modes(as shown in table 1).

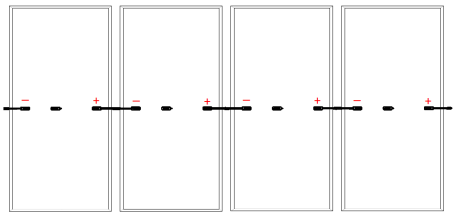
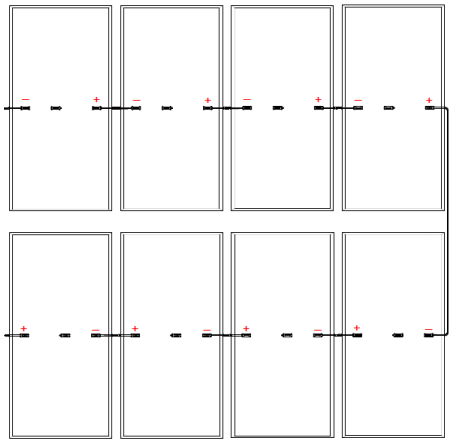
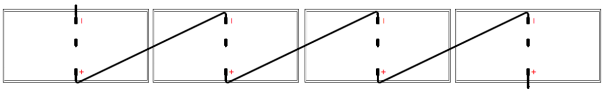
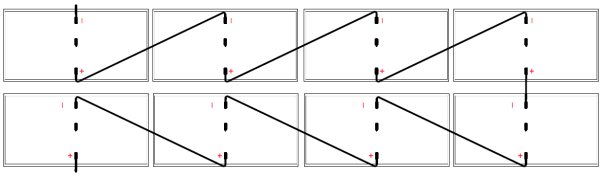
Module type	Wiring configurations
Type 1 166 SEG-XXX-BMB-BG SEG-XXX-BMA-BG Type 2 182 SEG-XXX-BMD-BG SEG-XXX-BTD-BG SEG-XXX-BMB-BG SEG-XXX-BTB-BG SEG-XXX-BMA-BG SEG-XXX-BTA-BG SEG-XXX-BMZ-BG SEG-XXX-BTZ-BG Type 3 210 SEG-XXX-BMC-BG SEG-XXX-BTC-BG SEG-XXX-BMB-BG SEG-XXX-BTB-BG Type 4 156 & 158.75 SEG-XXX-BMB-BG SEG-XXX-BPB-BG SEG-XXX-BMA-BG SEG-XXX-BPA-BG SEG-XXX-BMZ-BG	 Portrait installation one row  Portrait installation two rows  Landscape installation one row  Landscape installation two rows

Table 1

- The clamp shall not shade the front side of the cells.
- The PV modules shall be installed high enough to keep it away from potential shading, flying sands, snow and water.
- It is recommended to install the PV modules 30cm away from the ground to make sure ventilation.
- It is recommended to install the bifacial modules 1m away from the ground or roof to maintain the energy yield of module rear side.
- Appropriate installation structures shall be chosen to meet required mechanical load.
- It is recommended to install the PV modules with minimum angle of 10 degree to make the dust easily to be washed off.
- It is recommended to keep minimum 2cm gap between PV modules for thermal expansion of materials.

- Install PV modules appropriately according to corresponding mechanical load need.

3.2 LOCATION AND ANGLE SELECTION

It is recommended to install PV modules where has excellent sunlight resources. In the Northern Hemisphere, the module should typically face south, and in the Southern Hemisphere, the modules should typically face north. The most optimistic installation angle varies according to different latitudes and longitudes; please consult experts with appropriate knowledge background when determining the installation locations and angles.

When choosing a site, avoid trees, buildings or obstructions, which could cast shadows on the solar photovoltaic modules. Shading causes hotspot and loss of output, even though the factory fitted bypass diodes of the PV module will minimize such effect.

Do not install the PV module near naked flame or flammable materials.

Do not install the PV module in a location where it would be immersed in water or constantly exposed to water from a sprinkler or fountain etc.

3.3 SCREW INSTALLATION

The dual glass module with frame is designed for screw installation. It needs the screws, bolts, nuts, and washers to fix the bracket(as shown in Fig 1). Sufficient torque should be applied to the bolts to ensure stable reinforcement. The reference torque value for M8 screw is 16~20N*M. The reference torque value for M6 screw is 9~12N*M.

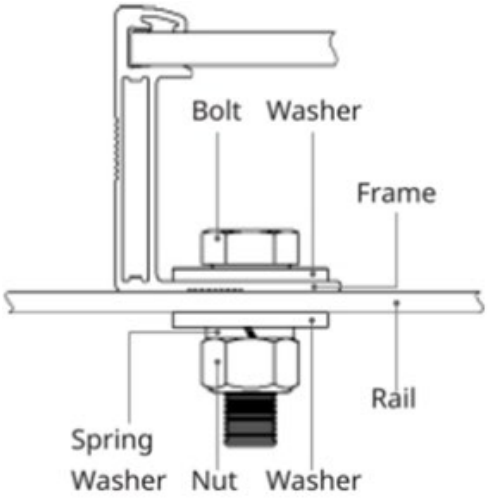
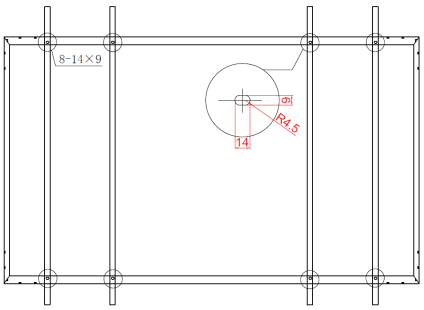
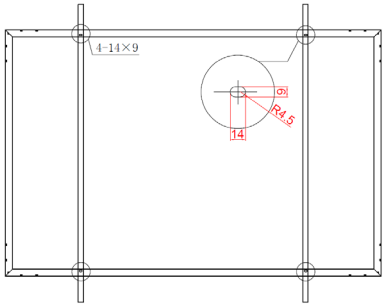


Figure 1 Screw installation

Mounting hole(mm)	Recommended bolt size
14×9	M8
10×7	M6

Bolts for different mounting holes

<table>
<tr><th colspan="2">Module type</th><th colspan="3">Load(Pa)</th><th>Installation Drawing</th></tr>
<tr><td>Type 1
166</td><td>SEG-XXX-BMB-BG
SEG-XXX-BMA-BG</td><td rowspan="3">+5400/
-2400
(8 holes)</td><td rowspan="3">+2400/
-2400
(Outer
4
holes)</td><td rowspan="3">+2400/
-2400
(Inner 4
holes)</td><td rowspan="3"> 

8 mounting holes</td></tr>
<tr><td>Type 2
182</td><td>SEG-XXX-BMB-BG
SEG-XXX-BTB-BG
SEG-XXX-BMZ-BG
SEG-XXX-BTZ-BG</td></tr>
<tr><td>Type 4
156&158.75</td><td>SEG-XXX-BMB-BG
SEG-XXX-BPB-BG
SEG-XXX-BMA-BG
SEG-XXX-BPA-BG
SEG-XXX-BMZ-BG</td></tr>
<tr><td>Type 2
182</td><td>SEG-XXX-BMD-BG
SEG-XXX-BTD-BG
SEG-XXX-BMA-BG
SEG-XXX-BTA-BG</td><td colspan="3" rowspan="2">+5400/-2400</td><td rowspan="2"> 

4 mounting holes</td></tr>
<tr><td>Type 3
210</td><td>SEG-XXX-BMC-BG
SEG-XXX-BTC-BG
SEG-XXX-BMB-BG
SEG-XXX-BTB-BG</td></tr>
</table>

Table 2

3.4 CLAMP INSTALLATION

The dual glass module with frame is also designed for clamp installation. It needs the clamps, bolts, nuts and washers to fix on the bracket(as shown in figure 4 and figure 5). Sufficient torque should be applied to the bolts to ensure stable reinforcement. The reference torque value for M8 screw is 16~20N*M.

Figure 2 Double-side clamp

Figure 3 Single-side clamp

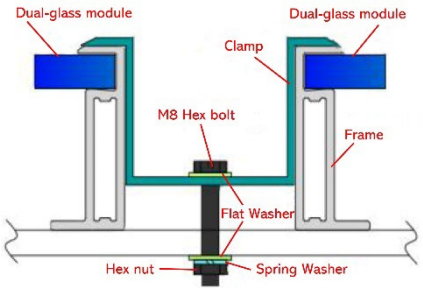


Figure 4 Double-side clamp installation

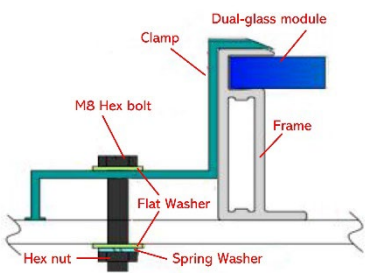
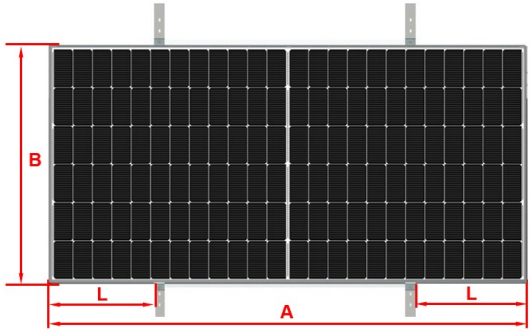


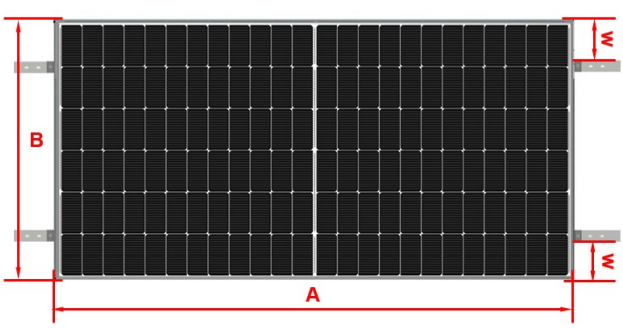
Figure 5 Single-side clamp installation

In order to ensure that the modules can withstand a downward force of up to 5400 Pa (550 kg/m^2), the modules shall be fixed on the bracket with the long side of the module, using a minimum of four clamps. Please make sure to use at least of two purlins behind the modules to support the modules.

The selection and installation of the clamps shall obey the requirement according to table 3. Otherwise, the module may not satisfy the mechanical load and have the risk of broken.



Drawing 1: Clamp installation on long side



Drawing 2: Clamp installation on short side

Module type		Installation Drawing 1			Installation Drawing 2		
		Clamp Length	L (mm)	Load (Pa)	Clamp Length	W (mm)	Load (Pa)
Type 1 166	SEG-XXX-BMB-BG(1755×1038×30)	⩾50mm	A/8~A/4	+5400/ -2400	⩾50mm	B/8~B/4	+3600/ -2400
	SEG-XXX-BMA-BG(2095×1038×30)						
Type 2 182	SEG-XXX-BMD-BG(1722×1134×30) SEG-XXX-BTD-BG(1722×1134×30)	⩾50mm	A/8~A/4	+5400/ -2400	⩾50mm	B/8~B/4	+3600/ -2400
	SEG-XXX-BMB-BG(1909×1134×30) SEG-XXX-BTB-BG(1909×1134×30)						
	SEG-XXX-BMA-BG(2278×1134×30) SEG-XXX-BTA-BG(2278×1134×30)						
	SEG-XXX-BMZ-BG(2465×1134×30) SEG-XXX-BTZ-BG(2465×1134×30)	⩾50mm	A/8~A/4	+5400/ -2400	/	/	/
Type 3 210	SEG-XXX-BMC-BG(2384×1303×33) SEG-XXX-BTC-BG(2384×1303×33)	⩾80mm	A/8~A/4	+5400/ -2400	⩾80mm	B/8~B/4	+2400/ -2400
	SEG-XXX-BMB-BG(2172×1303×33) SEG-XXX-BTB-BG(2172×1303×33)						
	SEG-XXX-BTC-BG(2382×1134×30)						
Type 4 156&158.75	SEG-XXX-BMB-BG(1720×1008×30) SEG-XXX-BPB-BG(1696×988×30)	⩾50mm	A/8~A/4	+5400/ -2400	⩾50mm	B/8~B/4	+3600/ -2400
	SEG-XXX-BMA-BG(2045×1008×30) SEG-XXX-BPA-BG(2018×998×30)						
	SEG-XXX-BMZ-BG(2198×1008×30)						

Table 3

3.5 TRACKER INSTALLATION

SEG modules also have compatibility with tracker systems in the industry. The maximum load that SEG module can achieve is as listed in Table 4.(For detailed installation drawings and installation method, please refer to installation manual of tracker supplier.)

Module type		Tracker system	Installation	Load (Pa)
Type 2 182	SEG-XXX-BMA-BG SEG-XXX-BTA-BG	Nextracker	400mm hole distance	+2400/-2400
			790mm hole distance	+3150/-2550
	SEG-XXX-BTA-BG	GameChange GC763-2.50-1 Max-Span C Channel Purlin	400mm and 790mm panel mounting locations	+2400/-3400
			790mm panel mounting locations	+2000/-2600
	SEG-XXX-BMZ-BG SEG-XXX-BTZ-BG	Nextracker	400mm hole distance	+2094/-812
Type 3 210	SEG-XXX-BMC-BG SEG-XXX-BTC-BG	Nextracker	400mm hole distance	+1854/-941
			790mm hole distance	+2171/-1053

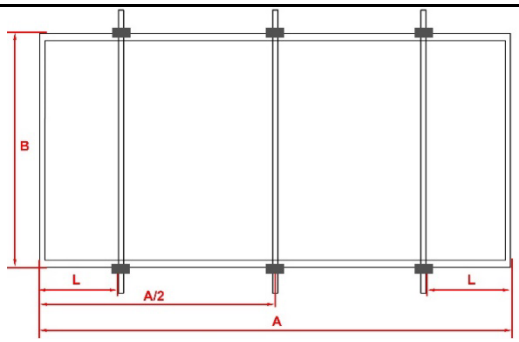
Table 4

3.6 OTHER INSTALLATION

Method A: six clamps installation

SEG provides a special installation method that installs six clamps on the long side of the frame(as shown in Drawing 3).

It is recommended to use a clamp with length of ≥80 mm and thickness of ≥4 mm, aluminum alloy 6005-T6.



Drawing 3: six clamps installation

Module type		Clamp length	L (mm)	Load (Pa)
Type 2 182	SEG-XXX-BMA-BG(2278×1134×30) SEG-XXX-BTA-BG(2278×1134×30)	≥80mm	A/8~A/4	+5400/-3600

Table 5

Method B: four screws add four clamps installation

For 182-BMA/BTA modules, SEG provides a special installation method that installs four screws and at the same location add four clamps on the long side of the frame(as shown in Drawing 4).

The screws with 4 holes are recommend to use special rectangular washers(as shown in Fig 6). The minimum thickness of the washer is 2 mm. It is also recommended to use a clamp with length of ≥80 mm and thickness of ≥4 mm, aluminum alloy 6005-T6.

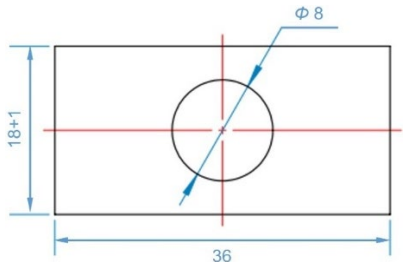
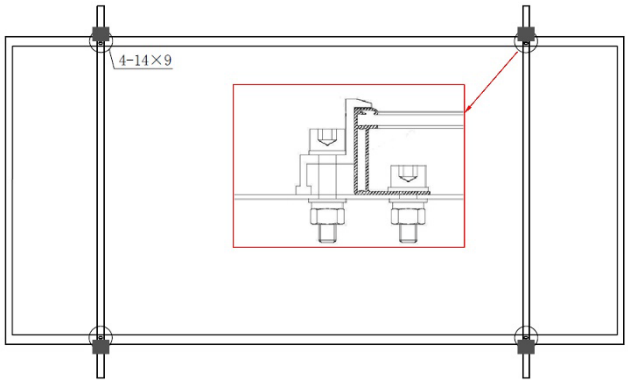


Figure 6 Special rectangular washer



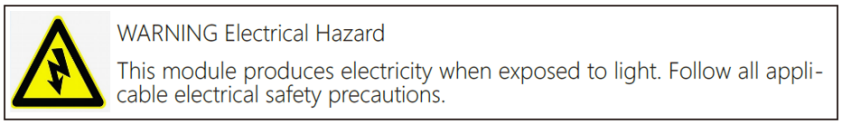
Drawing 4: four screws and four clamps installation

Module type		Clamp length	Load (Pa)
Type 2 182	SEG-XXX-BMA-BG(2278×1134×30) SEG-XXX-BTA-BG(2278×1134×30)	≥80mm	+5400/-3600

Table 6

SEG provides reference installation methods for areas with high load requirements, as shown above. The system designer and the installer are responsible for correctly calculating the loads and ensuring that the supporting structure meets all the applicable requirements.

3.7 ELECTRICAL INSTALLATION



- ONLY qualified personnel can install or perform maintenance work on these PV modules.
- BE AWARE of dangerous high DC voltage when connecting module.
- DO NOT damage or scratch the rear surface of the module.
- DO NOT handle or install module when they are wet.

The wiring components shall be compatible with the PV modules.

The PV modules connected in serial shall have similar current. The Voc of one PV string shall be no higher than the maximum system voltage, the Voc temperature coefficient feature and the extreme low temperature of the installation location must be taken into consideration when calculate the Voc of the PV string.

The PV modules connected in parallel shall have similar Voltage. The Isc temperature coefficient feature and the extreme high temperature of installation location must be taken into consideration when calculate the Isc of the PV array.

Please refer to local regulations to determine the system wire's size, type, and temperature.

The cross-sectional area and cable connector capacity must satisfy the maximum short-circuit of PV system (For a single component, we recommended the cross-sectional area of cables is 4mm^2 and the rated current of connectors is more than 15A),

otherwise cables and connectors will become overheating for large current. Please pay attention: the temperature limit of cables is 85°C and the temperature limit of the connector is 105°C.

A qualified system designer or integrator should always be consulted.

Building permits, inspections, and approvals by the local utility are generally required.

Before installation, make sure that the connector is well protected and there should be no foreign matter such as soil, sand, and gravel in the connector. If any, it must be cleaned before installation. If the connector is damaged or deformed, the connector must be replaced before use; if there is no spare connector, please contact SEG in time.

Remark: If conversion cable is needed, see Table 1 for details.

3.8 GROUNDING

All module frames must be properly grounded.

Observe all local electric codes and regulations.

A bonding or toothed washer is required to make proper and reliable electrical grounding connection with the anodized aluminum frame.

Devices listed and identified for grounding metallic frames of PV modules are permitted to ground the exposed metallic frames of the module to grounded mounting structures.

Consider using a lay-in lug, rated for outdoor use, if the module grounding conductor is to be larger than 10 AWG.

When using lay-in lugs, the grounding conductor should be inserted into the opening indicated in figure 6, and secured using the set screw.

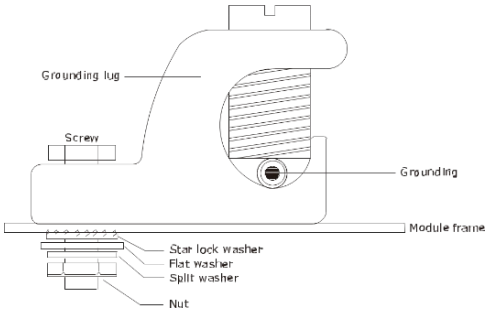


Figure 6 Grounding installation of PV module

Expect for equipment grounding, SEG recommends the negative pole of PV module array is connected to earth during all PV system installations. That will keep optimal performance of PV Power Plants, which are located in a hot, high humidity climate and high Maximum System Voltage.

To acquire the best power output, SEG recommends clients install modules with anti-PID inverters.

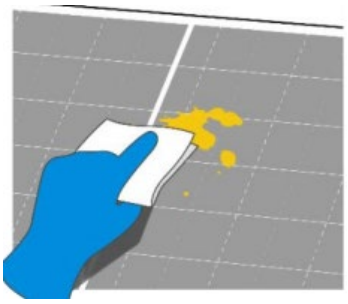
4 MAINTENANCE

SEG recommends the following maintenance items to ensure optimal performance of the module.

Caution: observe the maintenance instructions for all components used in the system, such as support frames, charging regulators, inverters, batteries, etc.

4.1 CLEANING

SEG PV modules require proper cleaning procedures to ensure optimal performance. Professional installers must read and follow these guidelines carefully to prevent death, injury, or property damage. Inappropriate cleaning procedures can void the SEG warranty.



When cleaning the modules, ensure that the water temperature is within the range of -5°C to 10°C compared to the module temperature. Use a soft and clean cloth, sponge, or soft-bristled brush to wipe the photovoltaic module. Avoid using cleaning tools that can wear out glass, EPDM, silicon, aluminum alloys, or steel. For greasy dirt or other stubborn substances, use conventional household glass cleaning agents. However, avoid using alkaline and strong acidic solvents like hydrofluoric acid, alkali, or acetone.

If the modules are installed horizontally (0° tilt angle), they need to be cleaned more frequently since they lack the "self-cleaning" function of those installed at 10° or larger tilt angles. The back surface of monofacial modules usually does not require cleaning. However, when cleaning the back of the bifacial module, avoid using sharp objects that may cause damage or penetrate the base material. All other cleaning requirements for the back surface are the same as the front side.

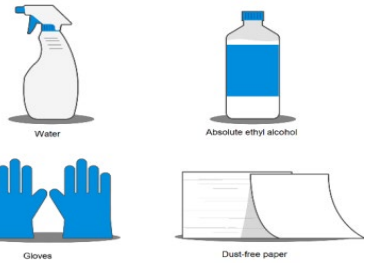
When cleaning solar panels, there is a risk of damaging the modules and array components which can increase the potential hazard of electric shock. Therefore, do not clean the modules during the hottest time of the day as this can cause thermal stress on the modules. Additionally, cracked or broken modules can also result in electric shock due to leakage currents. To avoid this, thoroughly inspect the modules for cracks, damage, and loose connections before cleaning.

Furthermore, it's recommended to wear suitable protective clothing, such as insulating gloves, while cleaning the modules. However, do not immerse the modules, either partially or totally, in water or any other cleaning solutions. Also, avoid using lubricants and organic solvents to clean the connectors.

When cleaning the modules, avoid stepping on them and do not inject water into the backside of the modules or cables. It is important to keep the connectors clean and dry to prevent electric shock and fire hazards.

CLEANING METHODS

Method A: Compressed Water



Water Quality Requirements:

pH: between 6 and 8

Calcium Carbonate Concentration (Water Hardness): 600 mg/L or less

It is recommended to use soft water for washing.

The maximum recommended water pressure is 4 MPa (40 bar).

Method B: Compressed Air

SEG recommends using compressed air to clean soft dirt such as dust from solar modules. However, this method should only be used if it is effective enough to clean the modules considering the on-site conditions.

Method C: Wet Cleaning

If there is excessive soiling on the module surface, a mild agitating method like a non-conductive brush or sponge can be used with caution. It is important to ensure that any brushes or agitating tools are made of non-conductive materials to minimize the risk of electric shock. Also, they should not be abrasive to the glass or aluminum frame. In case of grease, an environmentally friendly cleaning agent may be used with caution.

Method D: Cleaning Robot

If a cleaning robot is used for dry cleaning, it should have a soft plastic brush material that won't scratch the glass surface or aluminum alloy frame of the module during and after the cleaning process. Additionally, the weight of the cleaning robot should not be too heavy. It is important to use the cleaning robot properly as any resulting module damage or power attenuation will not be covered by SEG's warranty.

4.2 THE VISUAL INSPECTION OF THE MODULES

Inspect the modules visually to find if there are appearance defects, especially:

- Whether the module glass is broken.
- If there is burning vestige on the backsheet.
- Corrosion along the cells' bus-bar. The corrosion is caused by the dampness infiltrated into the modules when the surface encapsulation material is damaged during the installation or transportation.
- Check if any obstacles shading the PV modules.

4.3 INSPECTION OF THE CONNECTOR AND CABLE

- Check the encapsulation of the connector with the cable.
- Check the sealing gel of the junction box to ensure it is not cracked or creviced.

Please ensure that all cables are firmly connected and kept away from water areas and direct sunlight.

5 PARAMETERS

The parameters may be updated from time to time, accurate parameters please check on our website: http://www.segsolar.com or email our technical support team: technic@segsolar.com.

SEG MANUFACTURING INC.

Email: info@segsolar.com

Web: www.segsolar.com

SEG Headquarters: 10625 Telge Road, Houston, TX 77095

NUANCE ENERGY
Revolutionary Solar Racking Structures

INSTALLATION MANUAL FOR OSPREY POWERRACK™

ETL CLASSIFIED

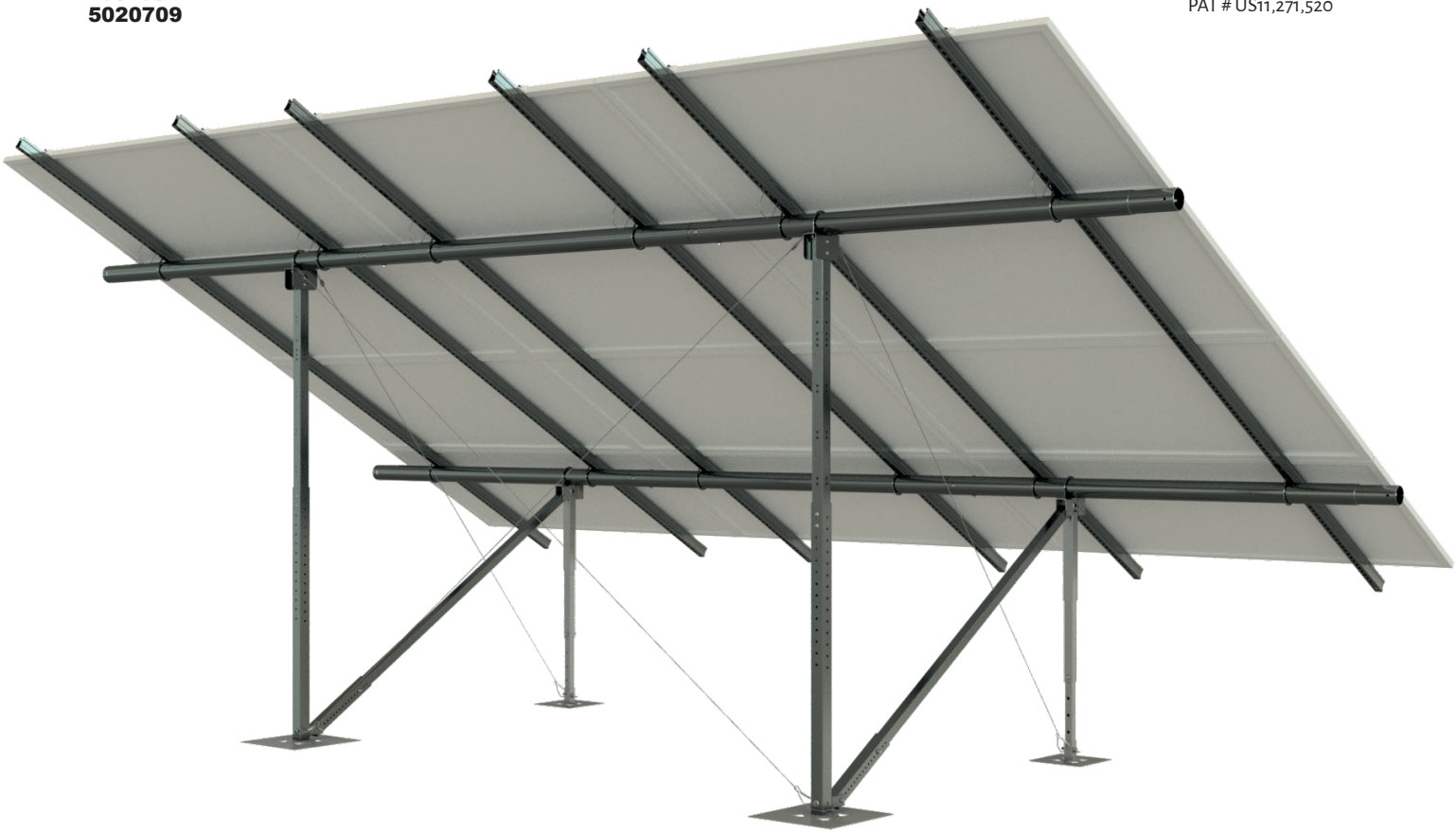
CONFORMS TO UL2703*

CERTIFIED TO CSA TIL A-40*

Intertek 5020709

PATENTED

PAT # US 10,622,938 and
PAT # US11,271,520



- UL2703 & CSA TIL-A40
- Custom Engineered to Exceed Applicable ASCE, IBC, and UL Standards
- Electrically Bonded System
- 30 Amp Maximum Fuse Rating
- Full Module Compatibility
- Landscape Orientation
- Maximum Capacity of PV Modules:
  - 4x3 - 12 modules
  - 4x4 - 16 modules
  - 4x5 - 20 modules
  - 4x6 - 24 modules
- Linear Option for Larger Projects

INSTALLATION MANUAL FOR OSPREY POWERRACK™

Table of Contents

INSTALLATION MANUAL FOR OSPREY POWERRACK™

Introduction

This manual is an installation guide for the Osprey PowerRack™, rather than a comprehensive technical engineering manual. It focuses on the assembly and installation of the Osprey PowerRack™ system.

The Osprey PowerRack™ offers an alternative approach to ground-mounted solar system engineering, design, and construction, revolutionizing the way these systems are engineered and installed. The Osprey PowerRack™ employs patented earth anchor foundations to secure the system to the ground beneath each table. Earth anchors have a proven track record of over 100 years in various applications such as slope stabilization, retention walls, marine tethering, and municipal drainage systems, among others.

By utilizing Earth Anchor Foundation Technology, the construction team can securely fasten Osprey tables to the soil, enabling real-time testing, which often eliminates the need for geotechnical reports or impact studies. For special cases, please contact a Nuance representative.

Product Summary and Intellectual Property

The Osprey PowerRack™ is engineered to these standards and certifications.

- Meets or Exceeds 2019 California Building Code.
- Meets or Exceeds 2018 International Building Code (IBC).
- Certified for grounding and bonding per UL2703* & CSA TIL A40*.
- Osprey tables can be engineered to sustain wind loads up to 140 MPH and Snow Loads up to 60 PSF.
- Structural Packets are provided and engineered and signed by 3rd party structural engineer.
- Site Specific Memos are available for every project.
- Our product names and product designs have been protected in the United States Patent and Trademark office and utility and methodology patents have been granted under (PAT # US 10,622,938 and PAT # US11,271,520), as well as multiple international patents.

Certification Notes

- UL2703* to be used only in combination with the modules that include this specific rack system in the module manufacturers installation manual.
- UL2703* classified for ground and bonding only.
- CSA TIL A-40* mechanical load need further evaluation before installation.

Safety

The safety of individuals and property must always be prioritized. All installation personnel should be required to wear personal protective eyewear, clothing, footwear, and any other protective gear that complies with the Contractor's Injury and Illness Protection Plan (IIPP) and meets OSHA requirements for the given site.

The majority of the components that make up the Osprey PowerRack™ are made of steel. These components are heavy and may have sharp edges, posing a risk of injury if not handled properly. Personnel should exercise caution during the assembly of the unit, as components can create pinching hazards. It is the responsibility of each individual to work with care and attentiveness

INSTALLATION MANUAL FOR OSPREY POWERRACK™

Tools and Equipment

The Osprey PowerRack™ is designed to be easy to assemble, therefore no special equipment is required to assemble the rack. The following list demostrates the recommended tools that are used for the assembly of the Osprey PowerRack™. The list below is merely a guide; individual installers may find alternative tools and methods that fit their needs.

Training Videos

Coming soon. Contact a Nuance Energy representative for latest installation videos.

Hand Tools

Impact Driver/Drill		2" Corded SDS Max Style Rotary Hammer		SAE and Metric Socket Set	
SAE and Metric Wrench Set		Torque Wrench		Tape Measure	
Digital Angle Level		Shovel/Pick		String Line	
Socket Set Adapter		4ft Bubble Level		SDS Max Drill Bit*	

Equipment

Portable Generator		Osprey TALON Load Testing Tool		Anchor Installation Drive Rod*		1/8" Aligment Punch		Portable Bandsaw for Metal	

*For testing Anchors please check manual supplied with the Nuance Energy Anchor Testing Device.
*Load test device, drive rod and drill bit can be purchased through Nuance Energy.

Approved Module List

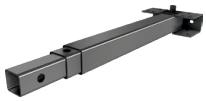
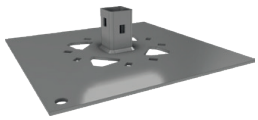
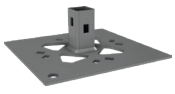
The following solar modules have been evaluated and tested to Standard UL2703* and CSA TIL A-40*.

	MANUFACTURER	MODEL NUMBERS
1	Canadian Solar	CS6X-310|315|320P, CS6X-P-FG, CS6K-P-FG, CS6K-M, CS6K-MAB, CS6P-P, CS6P-P-SD, CS6V-M, CS6W-530|535|540|545|550|555 MB-AG
2	Certainteed Corp.	CTxxxM00-03, CTxxxM10-03, CTxxxM11-03
3	CSUN	CSUNxxx-72MH (xxx can be 355 – 375 with 5 watt interval) QSAR 255-60M, QSAR 260-60M, QSAR 265-60M, QSAR 270-60M, CSUN310-60MH-BB
4	GCL	P6/72-330, M6/72H 365-400
5	Hansol	HSxxx-UD-AN1, HSxxx-UB-AN1
6	Hanwha Q Cells	Q.PRO BFR G4|G4.1|G4.3, Q.PLUS BFR G4.1, Q.PRO G4, Q.PLUS G4, Q.PRO L G4.1, Q.PLUS L G4.1|G4.2, Q.PEAK-G4.1|G4.1/MAX, Q.PEAK BLK G4.1, Q.PEAK L G4.2, HSL72P6-PC-3-xxxT (xxx = power class), Q.Peak Duo L-G5.2 380-395
7	JA Solar	JAM6(K)-72-xxx/PR
8	Jinko	JKM xxx P-60, JKM xxx PP-60, JKM xxx M-60, JKM xxx M-60B, JKMS xxx PP-60, JKMS xxx P-60, JKMSxxx-72, JKMxxxP-72, JKMSxxxP-72, JKMxxxM-72, JK07A (JKMSxxxPP-60 & JKMSxxxPP-72), JK07B (JKMSxxxPP-60), JKMxxx PP-60(Plus), JKM xxx PP-60B, JKM xxx M-60B, JKMSxxxM-60, JKMSxxxM-60-EP, JKM xxx P-72B, JKMxxxPP-72, JKMxxxPP-72B, JKMxxxPP-72(Plus), JKMSxxxPP-72, JKMxxxM-72-V, JKMxxxPP-72-V, JKMxxx-72L-V, JKMxxx-72HL-V, JKMxxxM-60L, JKMxxxM-60BL, JKMxxxM-60HL
9	LG	LGxxxN1C-G4, LGxxxN1W-G4, LGxxxS1C-G4, LGxxxS1W-G4, LGxxxN1K-G4, LGxxxN2C-B3, LGxxxN2W-B3, LGxxxN1C-A5, LGxxxS1C-A5, LGxxxN2W-A5, LGxxxS2W-A5, NeON 2 Bifacial LGxxxN2T-A5
10	Mission	MSExxxSQ5T
11	Seraphim	SEG-6MA-xxx WW
12	Sunpower	SPR-X21-xxx, SPR-E20-xxx, SPR-P17
13	Talesun	TP572, TP596, TP654, TP660 (35mm/40mm), TP672, Hipor M350+ (40mm), Talesun Smart (35mm) M = Mono P = Poly B = Black T = Transparent (H) = 1500V without (H) is 1000V, TP6H72M / TP6H72(H)
14	Trina	TSM-PD14, TSM-PD05, TSM-PD05.08, TSM-PD05.05, TSM-PEG5, TSM-PEG5.07, TSM-PEG14, TSM-PEG40.07, TSM-DD14A(II), TSM-330-DD14A(II), TSM-335-DD14A(II), TSM-340-DD14A(II), TSM-345-DD14A(II), TSM-350-DD14A(II), TSM-355-DD14A(II), TSM-DD06M.05, TSM-DE15H(II)
15	URE Sola	D6MxxxH4A
16	Yingli	YL xxxP-29b, YL xxxP-35b
17	Phono Solar	PS-xxxMH-24/TH, PS-xxx-60, PS-xxx-72
18	HT Solar	HT72-156M-V, HT60-156(M) (NDV) (-F), HT72-156(M/P)
19	Renesola	JCxxxM-24/Abw, Virus II 250-260W with 5 watt Interval, 156 Series 270-275W
20	Longi	LR6-72BP 355-375M 72 CELL, LR6-60 (40mm), LR6-72 (40mm), LR6-60 HV (40mm), LR6-72 HV (40mm), LR6-60 PH (40mm), LR6-72 PH (40mm), LR6-60 PE (40mm), LR6-72 PE (45mm), LR6-60 BK (40mm Black frame), LR6-72 BK (40mm Black frame), LR6-60 PB (40mm Black frame), LR6-72 PB (45mm Black frame) Number in paranthesis signifies frame profile height, LR6-72-xxxM, LR6-72HVxxxM, LR6-72BK-xxxM, LR6-72PE-xxxM, LR6-72PHxxxM, LR6-72PB-xxxM, LR6-60-xxxM, LR6-60BK-xxxM, LR6-60PE-xxxM, LR4-60HPB/HIBxxxM, LR4-60HPH/HIH-xxxM, LR4-72HPH/HIH-xxxM, LR6-72BP-xxxM, LR672HBD/HIBDxxxM, LR6-60BP-xxxM, LR6-60HBD/HIBD-xxxM
21	REC	REC-320TP2M, PEAK Energy Series, PEAK Energy BLK2 Series, PEAK Energy 72 Series, TWINPEAK 2 SERIES, TWINPEAK 2 BLK2 SERIES, TWINPEAK SERIES
22	Risen	RSM72-6-xxxM/5BB, RSM72-6 (MDG) (M), RSM60-6
23	Heliene	72M, 36M, 60M, 60P, 72P
24	Axitec	AC-xxxMH/120S (AXIblackpremium HCSeries), AXIblackpremium 60 (35mm), AXIpower 60 (35mm), AXIpower 72 (40mm), AXIpremium 60 (35mm), AXIpremium 72 (40mm)
25	Freedom forever	FF-MP-BBB-400

*Classified to UL2703 and CSA TIL A-40 for bonding and grounding only.

INSTALLATION MANUAL FOR OSPREY POWERRACK™

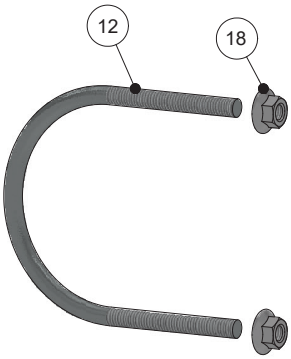
General Component List

ITEM	DESCRIPTION	SPECIFICATION (IN)	PART NUMBER	PREVIEW
STRUCTURAL COMPONENTS				
1	EAST WEST BEAM	Ø101.6mm	OPR-823-11-235-098	
2	UNIVERSAL EXTERNAL LEG	▢70x70mm	OPR-823-14-215-054	
3	UNIVERSAL INTERNAL LEG	▢60x60mm	OPR-823-14-215-060	
4	LATERAL BRACE INTERNAL	▢50x50mm	OPR-823-14-215-078	
5	LATERAL BRACE EXTERNAL	▢60x60mm	OPR-823-14-215-018	
6	FRONT LEG	TRAILER JACK	OPR-810-11-530-051	
7	NS PURLIN	UNI2.56X1.65	OPR-822-11-215-186	
BRACKETS				
8	NORTH BRACKET	PL11.5X5.8	OPR-823-10-115-012	
9	LATERAL BRACKET	PL9.31X2.0	OPR-823-09-115-008	
FOUNDATION				
10	18" FOUNDATION MAX	PL18X18X25	UNV-011-03-345-018	
11	12" FOUNDATION MAX	PL12X12X25	UNV-011-03-345-012	

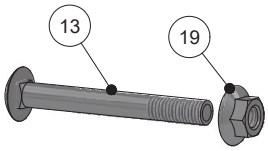
INSTALLATION MANUAL FOR OSPREY POWERRACK™

Hardware

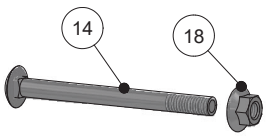
ITEM	DESCRIPTION	SPECIFICATION (IN)	PART NUMBER
12	EW U-BOLT TUBE	3/8-16-4OD U-BOLT	OPR-831-050-U04
13	ANKLE BOLTS	1/2-13-4.5" CARRIAGE BOLT	OPR-831-050-012-X45
14	CARRIAGE SWAGE BOLTS	3/8-16-4.5" CARRIAGE BOLT	OPR-831-050-038-X45
15	CARRIAGE BOLTS GENERAL	3/8-16-3.5" CARRIAGE BOLT	OPR-833-050-038-X35
16	PAL BOLTS	1/2-13-3" HEX HEAD BOLT	OPR-833-050-012-B3
17	LAT BOLTS	3/8-16-3.5" HEX HEAD BOLT	OPR-833-050-038-B3
18	3/8" NUTS	3/8-16 SERRATED NUT	UNV-031-050-038-N38
19	1/2" NUTS	1/2-13 SERRATED NUT	OPR-831-050-012-N12
20	END CLAMPS	SOLAR MASTERS	UNV-051-050-E05
21	MID CLAMPS	SOLAR MASTERS	UNV-051-050-M05
22	CABLE BRACE	18FT 4MM CABLE BRACE	OPR-811-500-C18



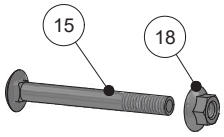
Torque:
32ft-lbs



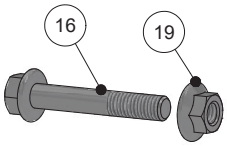
Torque:
32ft-lbs



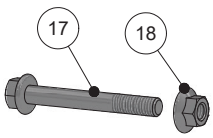
Torque:
32ft-lbs



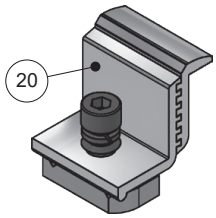
Torque:
32ft-lbs



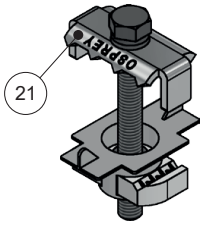
Torque:
64ft-lbs



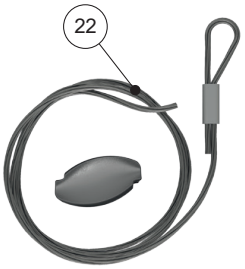
Torque:
32ft-lbs



Torque:
11ft-lbs



Torque:
11ft-lbs



Install by hand apply tension using Tension tool. Do not overtension as this can shift structure

INSTALLATION MANUAL FOR OSPREY POWERRACK™

Fastener Installation Instructions

This overview provides a guide for installing fasteners recommended by Nuance Energy to ensure structural integrity and an adequate bonding path:

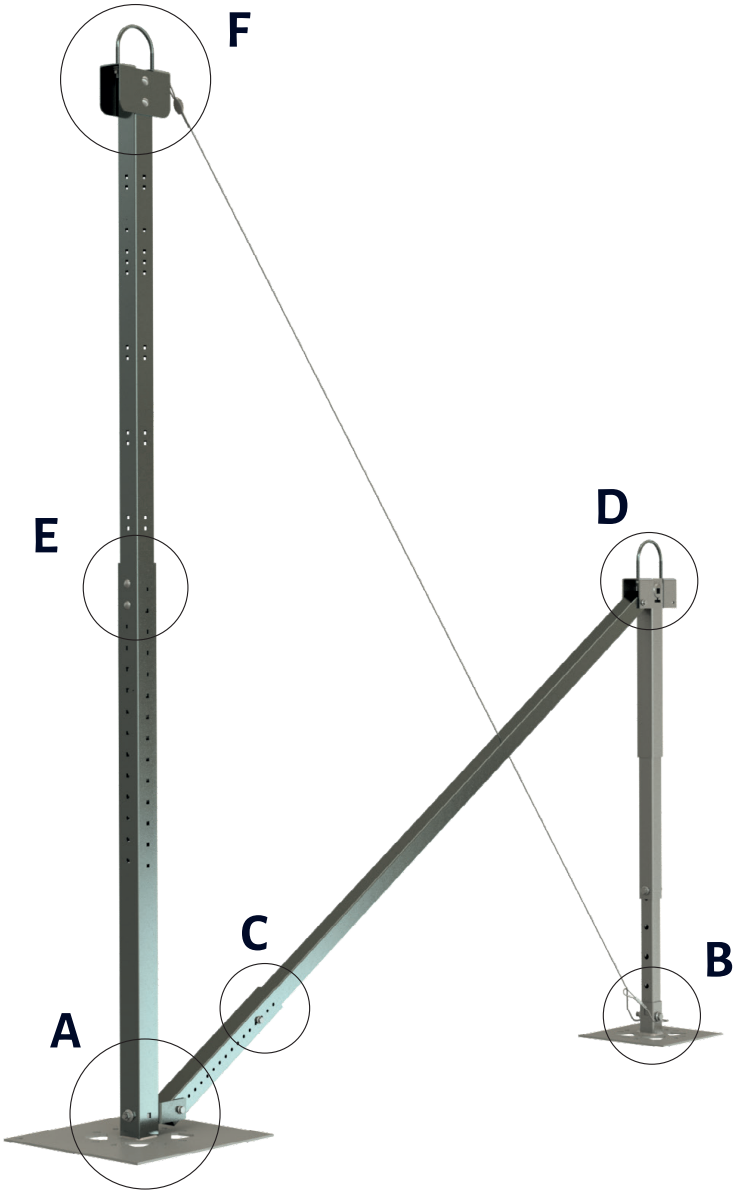
- Install the fastener through the components, making sure that the bolt is flush against the rack.
- Thread the nut by hand to prevent cross-threading.
- Tighten the nut using an impact drill. Carriage bolts will not require back wrenching, as they locate using the square holes in the components. Standard hardware will need back wrenching to prevent slipping.
- Make sure that the hardware is not over-torqued by the impact drill, as this could deform structural components and/or strip the hardware.
- Set the torque wrench to the matching torque based on the fastener size.
- Apply torque using the torque wrench until an adequate load is applied.
- Mark the fastener using a paint marker to facilitate a faster quality control (QC) process.
- East West beam squaring
- Purlin leveling squaring

Cable Bracing Installation Instructions

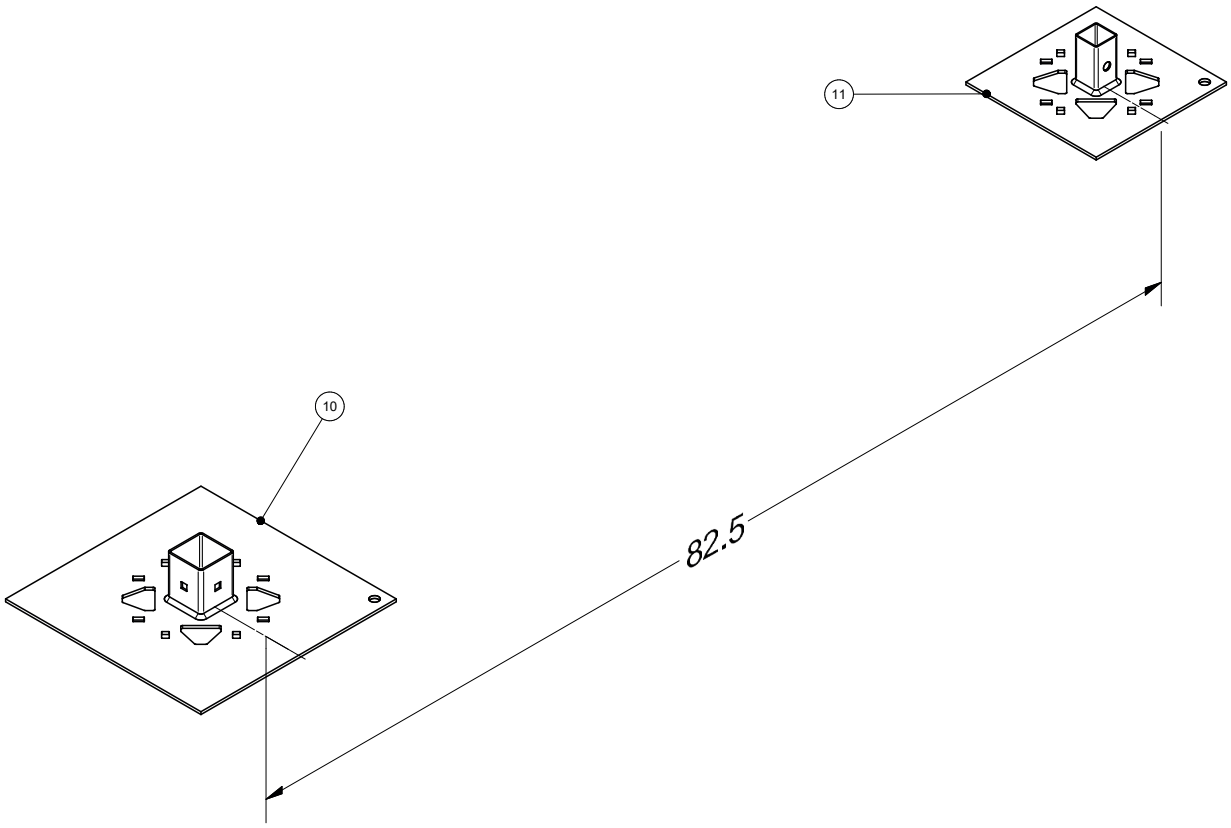
This overview covers the recommended methods for installing cable bracing. Note: Cable bracing should be installed last, as it will ease the installation process and prevent the movement of structural components that are not yet tight or square.

- Install the loop end of the bracing at the U-Bolt Gap.
- Insert the tag end of the brace through the tensioner, ensure tensioner is more than 18" away from the loop location.
- Loop the brace around the component, making sure that the cable cannot slide or slip from its position.
- Insert the looped end of the cable into the opposing side of the tensioner, leaving at least 6" of cable through the tensioner.
- Pull the cable by hand until it is taut.
- Set the tension tool to the predetermined tension for the brace and attach the tool to the tensioner, clamping the loose end of the cable to the jaws of the tool.
- Apply tension to the cable, ensuring that the assembly does not move during this step.
- Once the tension is reached, the tool will notify the user with an audible click.
- Using paint markers, mark the cable at four locations closest to the tensioner on the wire for quality control (QC).

PowerRack Assembly Instructions



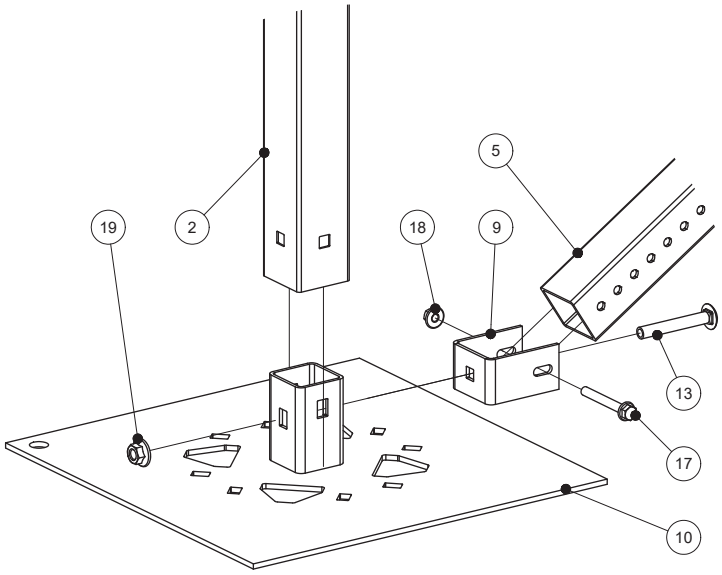
INSTALLATION MANUAL FOR OSPREY POWERRACK™



ITEM	DESCRIPTION
10	18" FOUNDATION MAX
11	12" FOUNDATION MAX

INSTALLATION MANUAL FOR OSPREY POWERRACK™

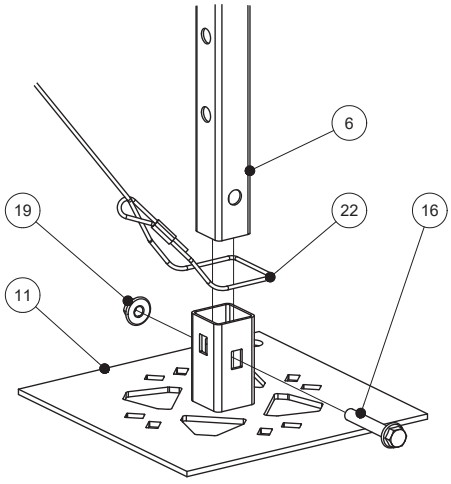
A Rear Base Plate Assembly

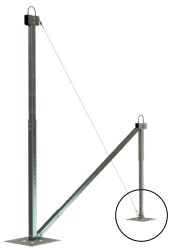


ITEM	DESCRIPTION
2	UNIVERSAL EXTERNAL LEG
5	LATERAL BRACE EXTERNAL
9	LATERAL BRACKET
10	18" FOUNDATION MAX
13	ANKLE BOLTS
17	LAT BOLTS
18	3/8" NUTS
19	1/2" NUTS

* Leg components will vary in length based on tilt angle, loading conditions. Assembly instructions are identical.

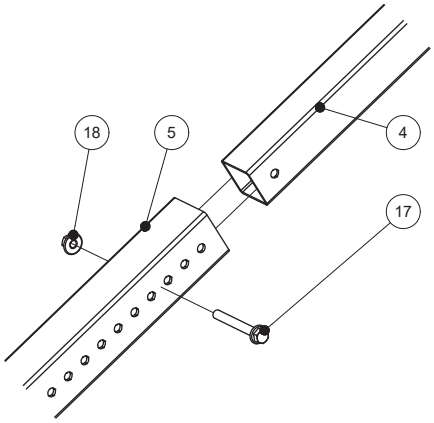
B Front Base Plate Assembly





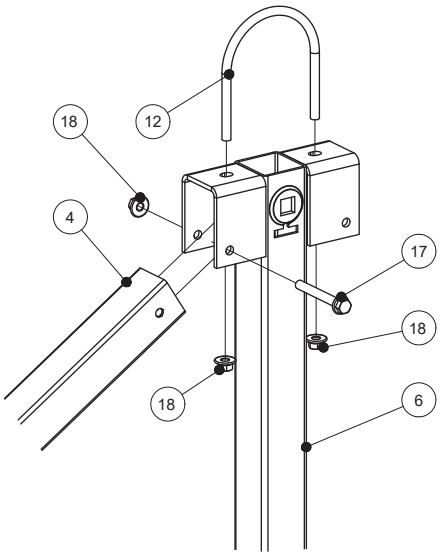
ITEM	DESCRIPTION
6	FRONT LEG
11	12" FOUNDATION MAX
16	PAL BOLTS
19	1/2" NUTS
22	CABLE BRACE

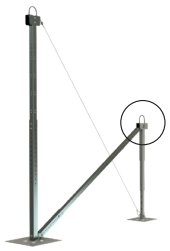
C Diagonal Lateral Brace



ITEM	DESCRIPTION
4	LATERAL BRACE INTERNAL
5	LATERAL BRACE EXTERNAL
17	LAT BOLTS
18	3/8" NUTS

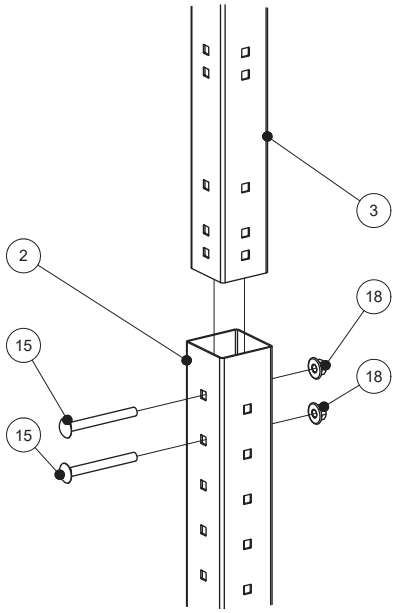
D Front Top Bracket Assembly





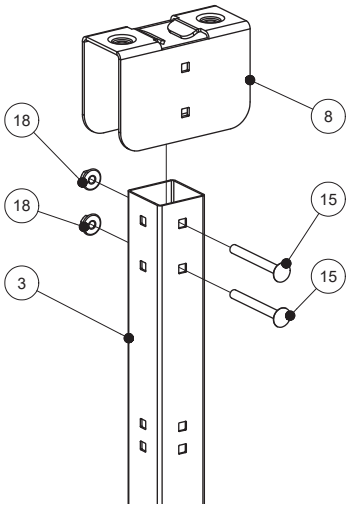
ITEM	DESCRIPTION
4	LATERAL BRACE INTERNAL
6	FRONT LEG
12	EW U-BOLT TUBE
17	LAT BOLTS
18	3/8" NUTS

E Rear Leg Assembly



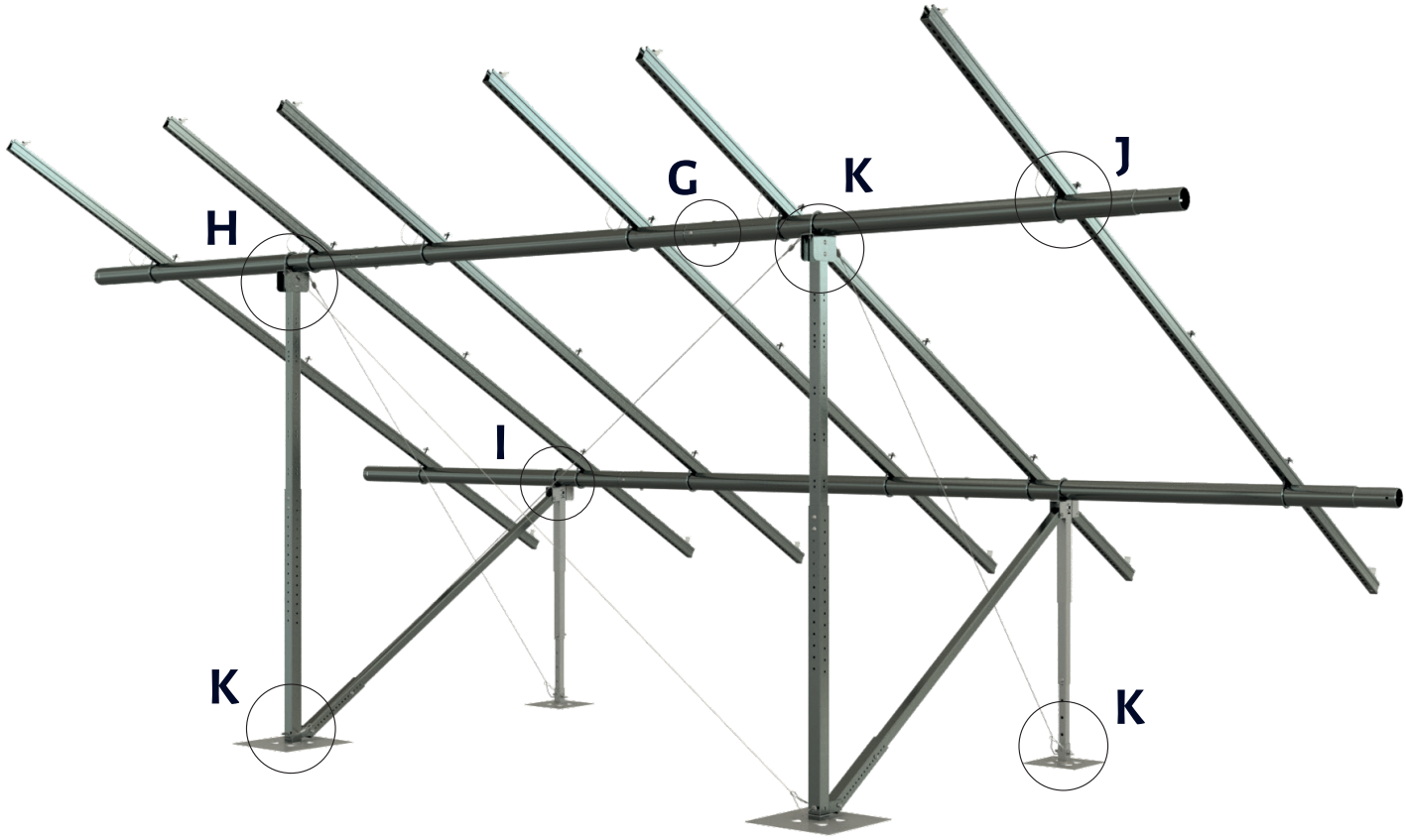
ITEM	DESCRIPTION
2	UNIVERSAL EXTERNAL LEG
3	UNIVERSAL INTERNAL LEG
15	CARRIAGE BOLTS GENERAL
18	3/8" NUTS

F Rear Top Bracket Assembly

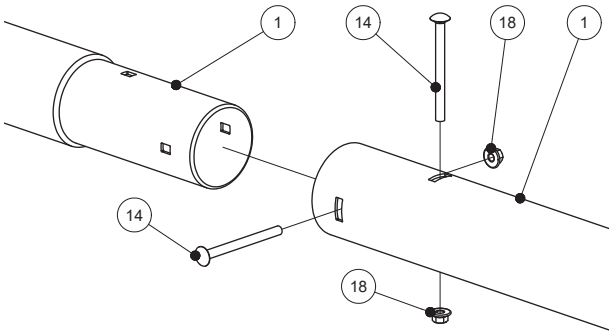


ITEM	DESCRIPTION
3	UNIVERSAL INTERNAL LEG
8	NORTH BRACKET
15	CARRIAGE BOLTS GENERAL
18	3/8" NUTS

INSTALLATION MANUAL FOR OSPREY POWERRACK™

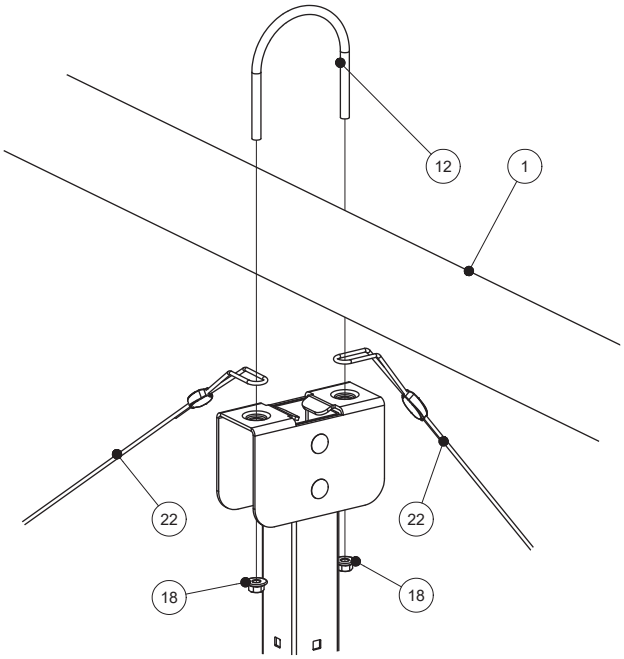


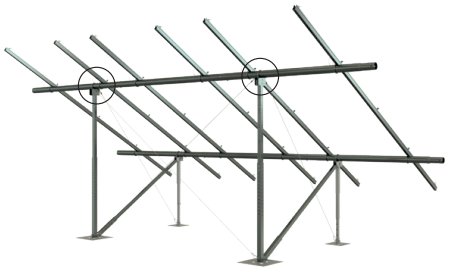
G Easy West Tube Assembly



ITEM	DESCRIPTION
1	EAST WEST BEAM
14	CARRIAGE SWAGE BOLTS
18	3/8" NUTS

H East West Tube Installation

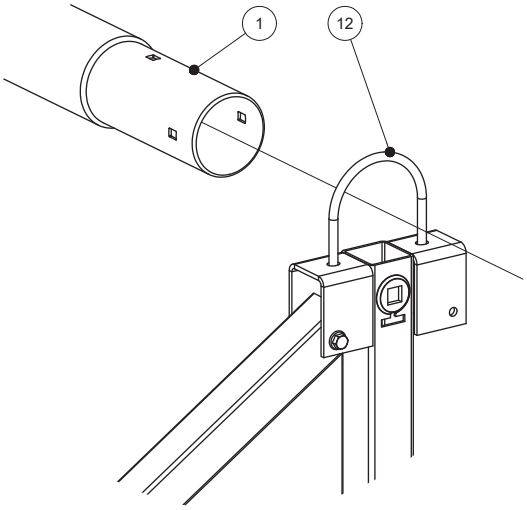


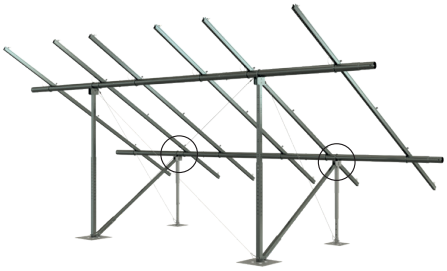


ITEM	DESCRIPTION
1	EAST WEST BEAM
12	EW U-BOLT TUBE
18	3/8" NUTS
22	CABLE BRACE

INSTALLATION MANUAL FOR OSPREY POWERRACK™

I Front Leg Assembly

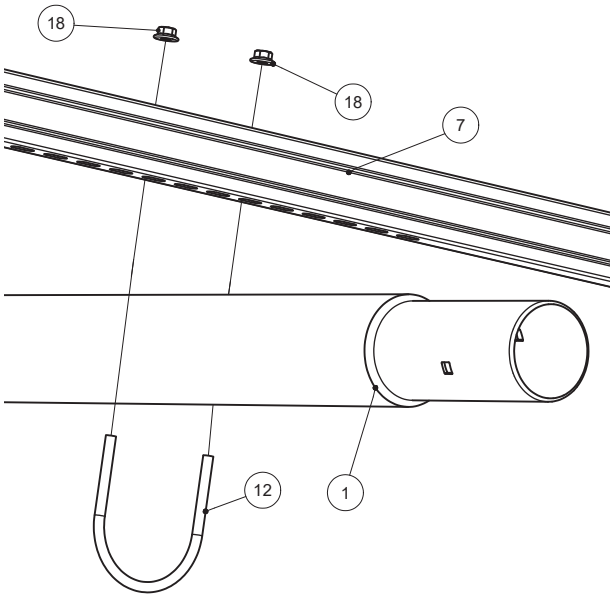


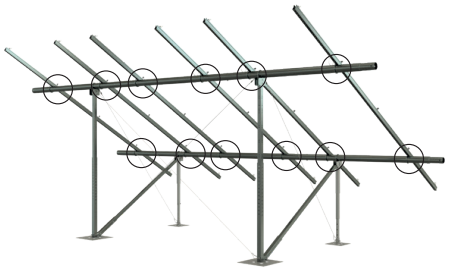


ITEM	DESCRIPTION
1	EAST WEST TUBE
12	EW U-BOLT TUBE

* Verify Beams are level and square prior to purlin installation.

J Purlin Installation

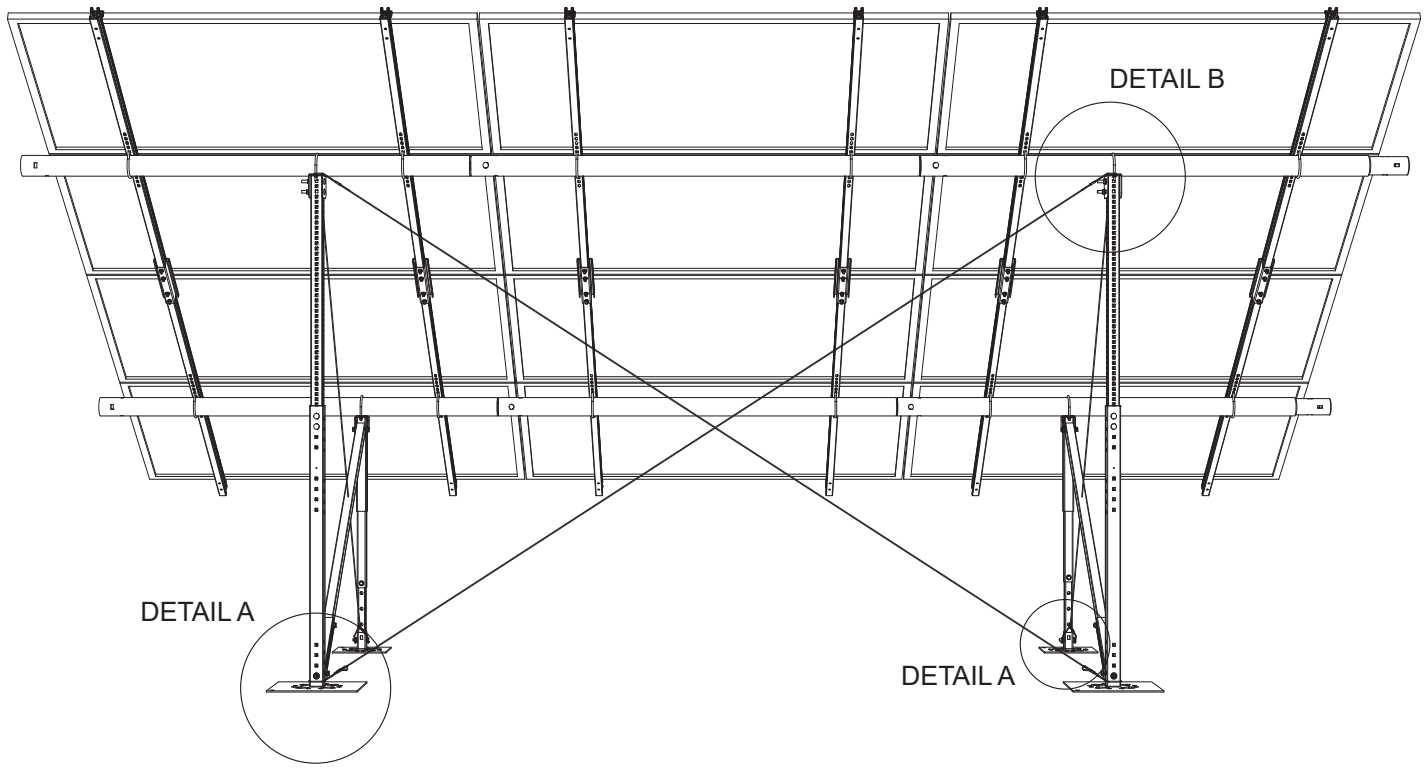




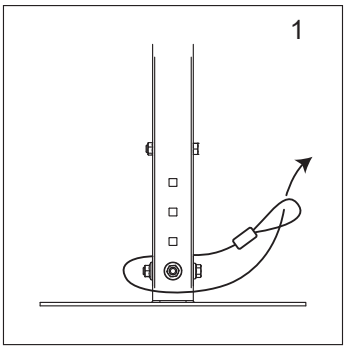
ITEM	DESCRIPTION
1	EAST WEST BEAM
7	NS PURLIN
12	EW U-BOLT TUBE
18	3/8" NUTS

* Ensure exterior purlins are square and at the correct tilt prior to installing interior purlins.

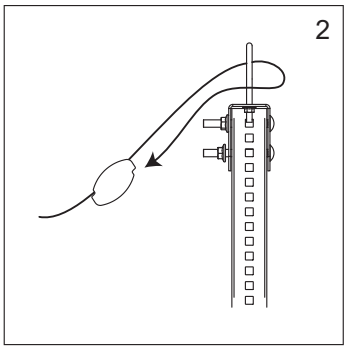
K Cable Brace Installation

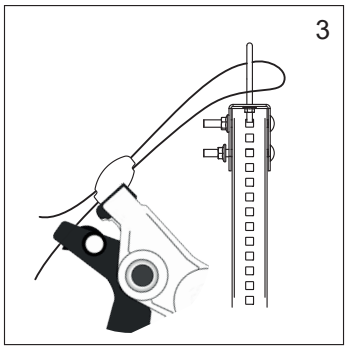


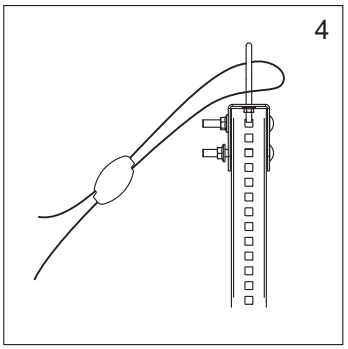
DETAIL A



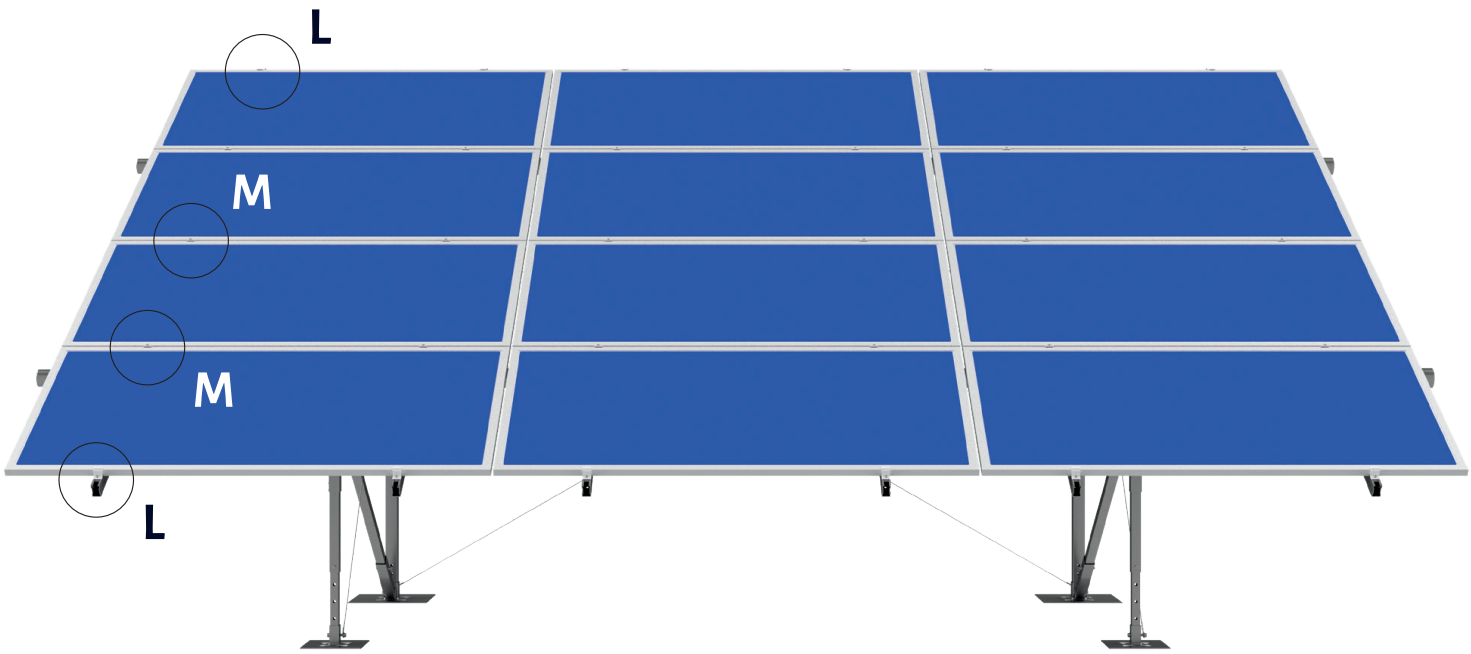
DETAIL B





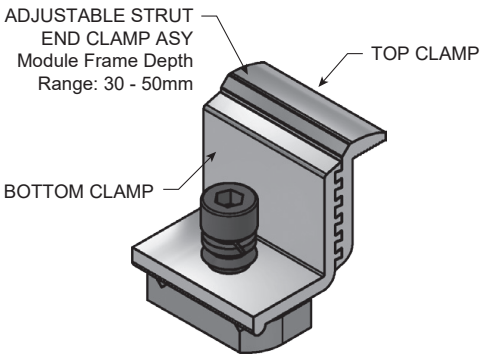


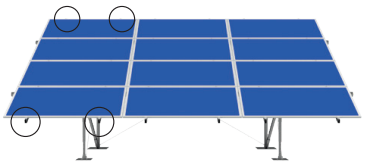
INSTALLATION MANUAL FOR OSPREY POWERRACK™



INSTALLATION MANUAL FOR OSPREY POWERRACK™

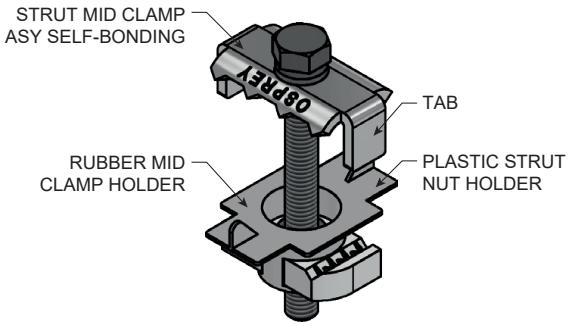
L

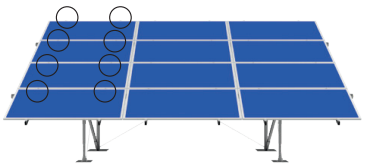




ITEM	DESCRIPTION
21	END CLAMPS 12

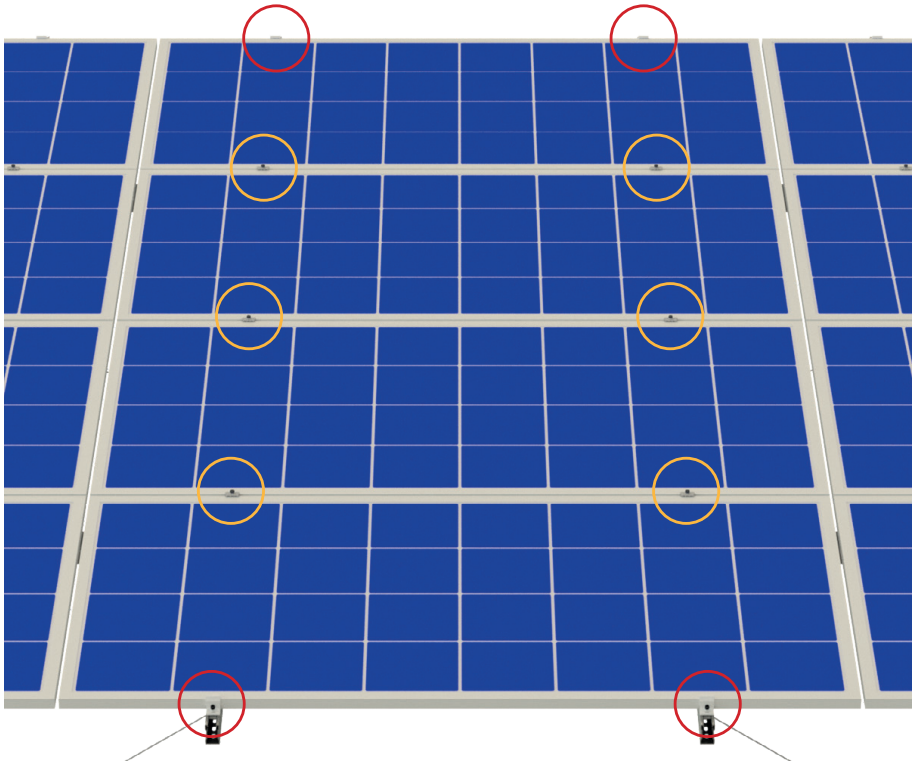
M

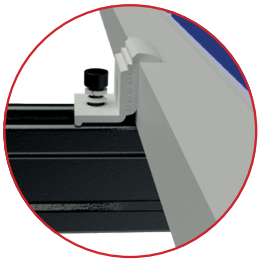


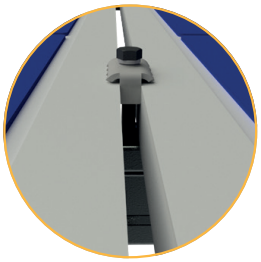


ITEM	DESCRIPTION
22	MID CLAMPS 18

INSTALLATION MANUAL FOR OSPREY POWERRACK™



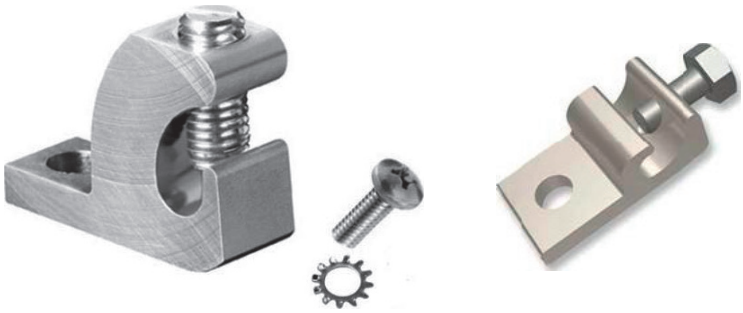




INSTALLATION MANUAL FOR OSPREY POWERRACK™

Grounding and Bonding

Once the solar panels have been installed connect each solar panel using a UL Listed bonding lug and attach this lug to a copper wire. This assembly is then connected to the ground rod. Please note that Nuance does not provide any electrical components.



Bonding Path

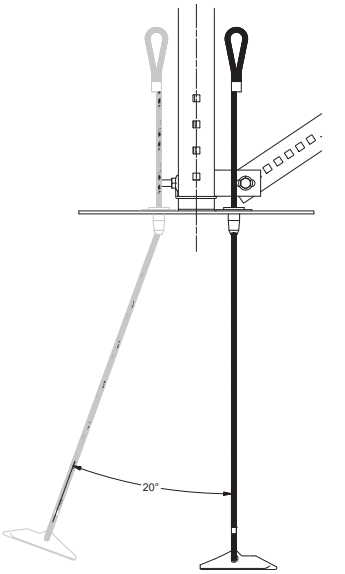
1. Place the lug over the hole, positioning the star washer between the bottom of the grounding lug and the rear chassis. Insert the bolt and torque the grounding assembly.
2. Insert a #4 to #10 AWG copper wire into the lug and tighten the lug set screw onto the copper wire. Torque to 35 in-lbs for #4-6 AWG wire and to 30 in-lbs for #8-10 AWG. The minimum grounding conductor to be used is #10 AWG copper.
3. Connect the grounding electrode conductor to a ground rod or equivalent ground according to the National Electric Code.
4. For multiple rows of Osprey PowerRack™ units, connect each row's strut rail with an appropriately sized grounding conductor and run it in conduit with string wires to the next row according to the maximum fuse rating of the module string. For example, a bare #6 copper wire is rated for 200A. If this string is rated for 15A DC, then 13 strings can be connected to a single ground rod. If the string has a 20A DC rating, then 10 strings of Power
5. Rack units can connect to the single ground rod.
6. For large solar arrays, multiple ground rods will be required.
7. Nuance Energy does not supply any electrical components. Solar components can be added to the strut channel of each rail using Spring Channel Nuts and flanged bolts. Another option is to drill through the back of the rails and/or chassis members and tap or use flanged bolts to connect components to the frames. Please note that Nuance Energy does not supply these materials at this time.

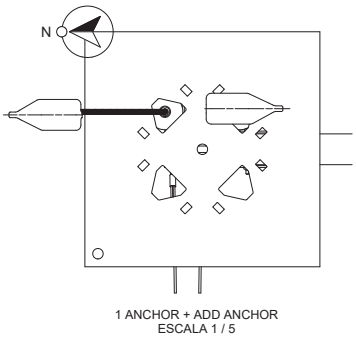
Anchor Install Guide

This is a guide covering the requirements of installing anchors with the Osprey PowerRack. The installation of 1,2 and, 3 anchors vary depending on the application. Please use this as a reference in the field when installing anchors. Contact a Nuance Representative with any questions.

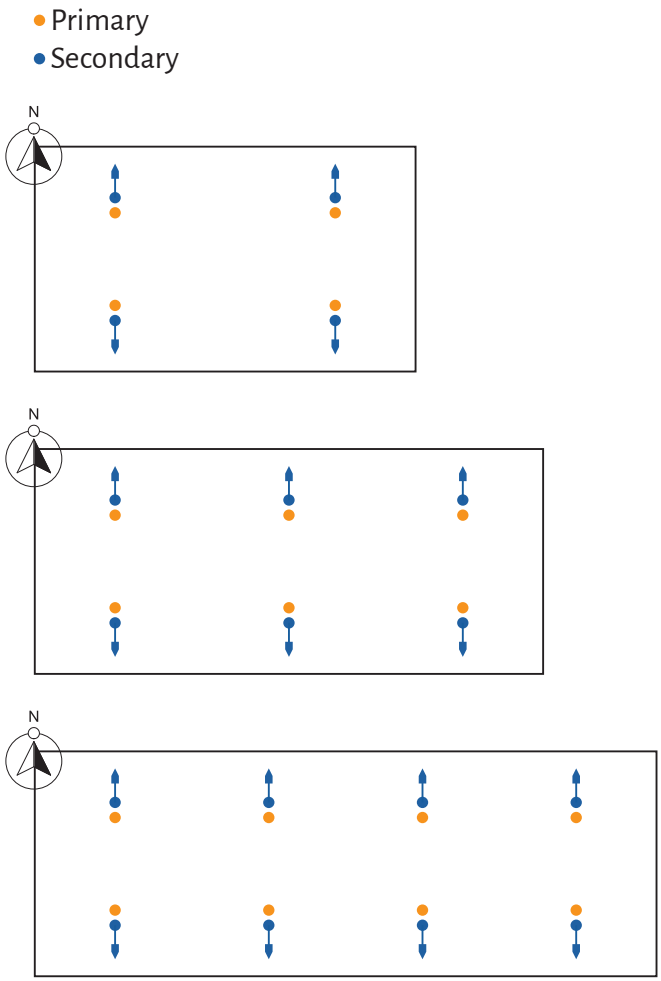
1 Anchor + Anchor

When one anchor is required it is necessary to install the anchor vertically at a 90 degree angle. There is a tolerance of ±5 degrees during installation. If the required load is not reached install a second anchor 20 degrees from vertical. When working with the North Shoe plate the anchor must be installed north, when working with the south anchor the anchor must be installed South.



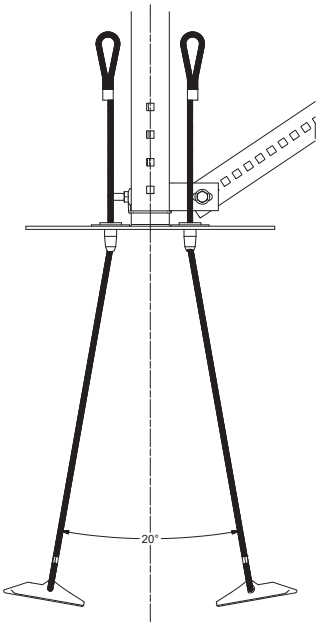


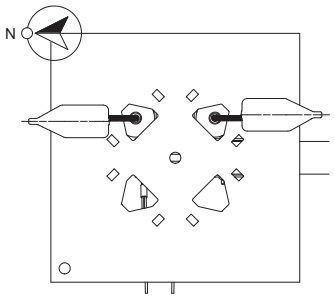
1 ANCHOR + ADD ANCHOR
ESCALA 1 / 5



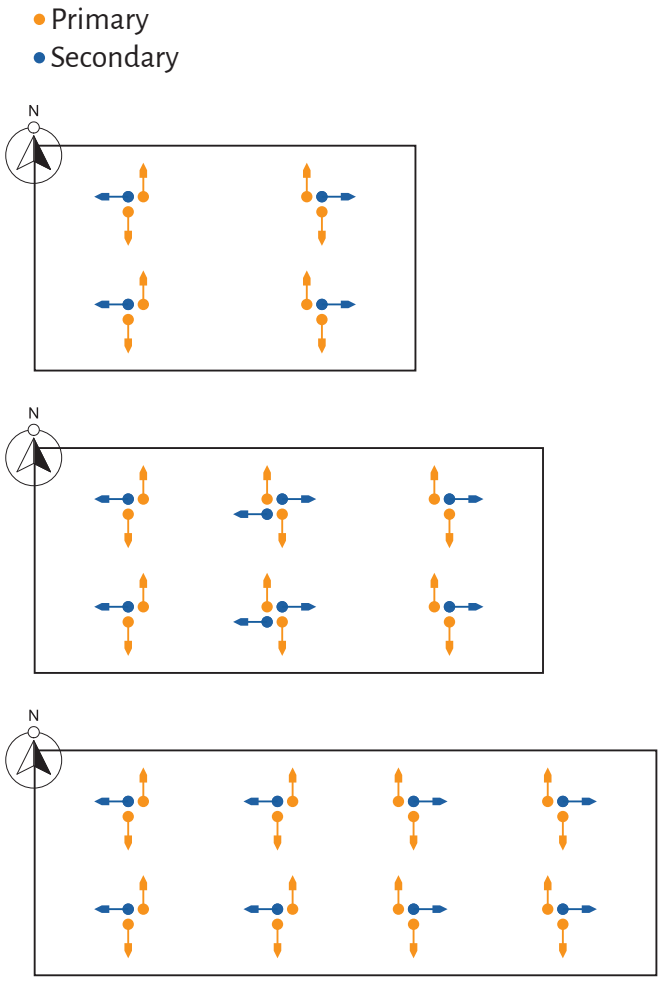
2 Anchors

When installing 2 anchors the anchors must be arranged facing north and south, each anchor must be installed 10 degrees outward from vertical. One anchor is to be pointing North and the second South. If the desired load is not reached an additional anchor must be used. For exterior anchors the third anchor must be installed towards the exterior in the East or West direction. Interior foundations either way is acceptable.



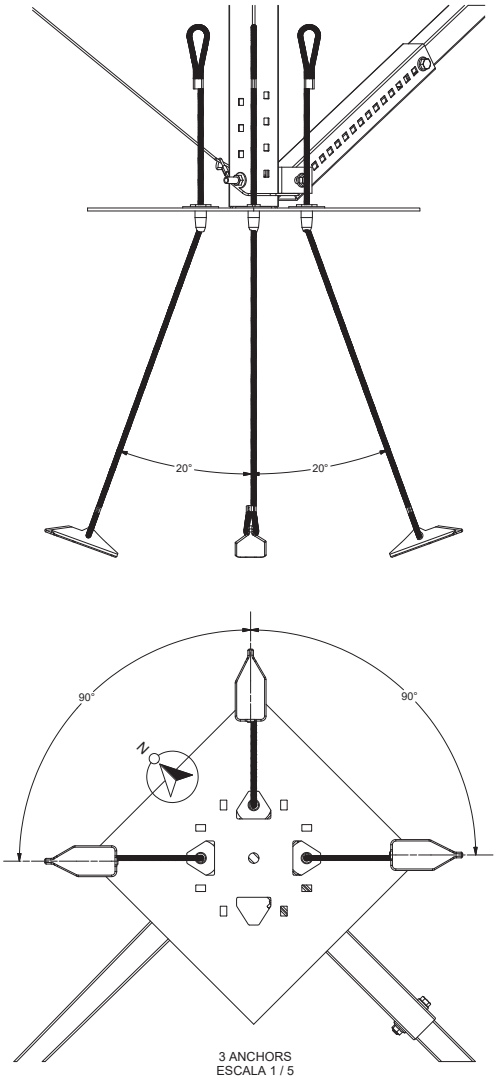


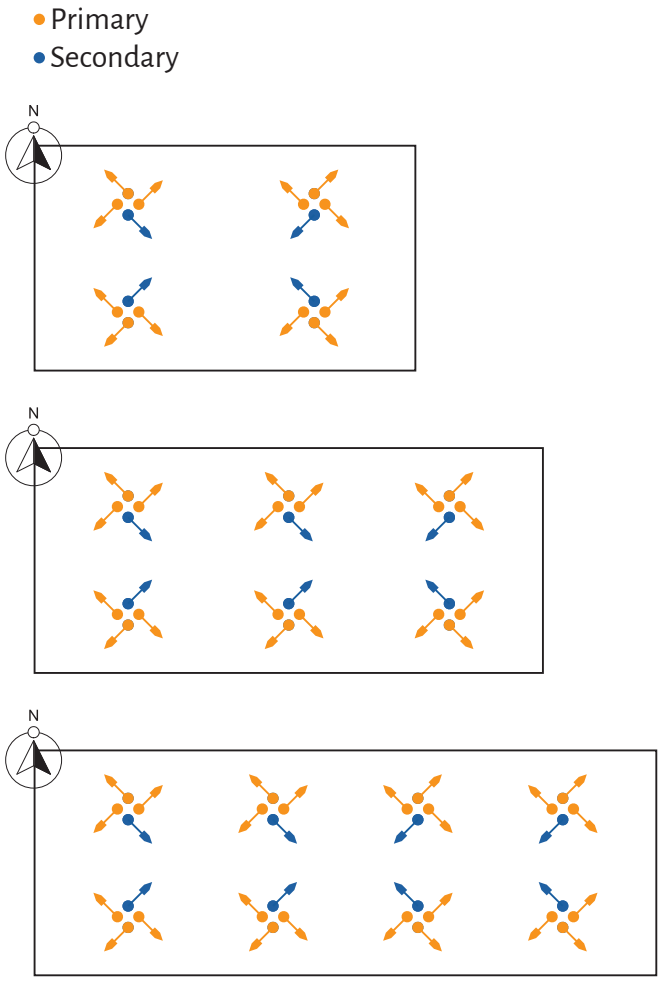
2 ANCHORS
ESCALA 1 / 5



3 Anchors

When installing 3 anchors they must be installed at a 20 degree angle from vertical. Additionally the 3 anchors must be installed away from each other to ensure their capacities don't interfere. Use the holes in the shoe plates as arrows towards where the anchors should point. Preferably the anchors shall be at 90 degrees from each other, however due to the structure some variation is acceptable.





INSTALLATION MANUAL FOR OSPREY POWERRACK™

Installer Warning and Notice

It is crucial to carefully read and comprehend the installation manual provided before installing, wiring or operating our product in your PV system. Failure to comply with all instructions and procedures could result in product damage, and most importantly, cause severe injury or even death. It is essential to ensure that all PV systems and Osprey PowerRack™ installations meet the National Electric Code standards. Installers hold the sole responsibility of complying with code and safety regulations, and the consequences thereof

WARNING!	
	PV modules generate electricity when exposed to light and are electrically live when mounted. This DC electricity can pose danger to the installer, user, and/or property. Any contact with electrically active module terminals can result in arcing; leading to shocks, fires, burns, and/or death. Use caution around utility power lines that may be near the work area. Never work when lighting is present. Insure good earth-bonding as part of a lighting protection system.

⚠ DANGER!	
	Electrical shock potential of PV modules increases with higher parallel currents and series voltage connections. The PV installer must assume all inherent risk of property damage and/or personal injury related to the mishandling of PV modules during installation and safety standards. These standards include but are not limited to applicable National Electrical Code (NEC®) sections, UL Standards, OSHA Regulations, State or Local Fire Marshall Codes, NFPA 70E. Installation must comply with NEC 250 (Grounding and Bonding), NEC 690 (Solar Photovoltaic Systems), CSA 22.1 (Safety Standard for Electrical Installations), Canadian Electrical Code Part 1, and all other applicable state, provincial, and local electrical code requirements. Dual Rack Solar Racking Systems must be used with UL1703 listed equipment including but not limited to; PV modules, combiners and disconnects.

⚠ DANGER!	
	Avoid electrical injures by preventing the accidental or unintentional release of hazardous energy. Modules produce electricity when exposed to light. To avoid electric shock and injury, completely cover the front of the module with an opaque material before making any electrical connections. Lock out/tag out and disconnect the PV system from all electrical energy before any maintenance or cleaning. NEVER disconnect or connect modules under load. NEVER disconnect the earth bond to the array.

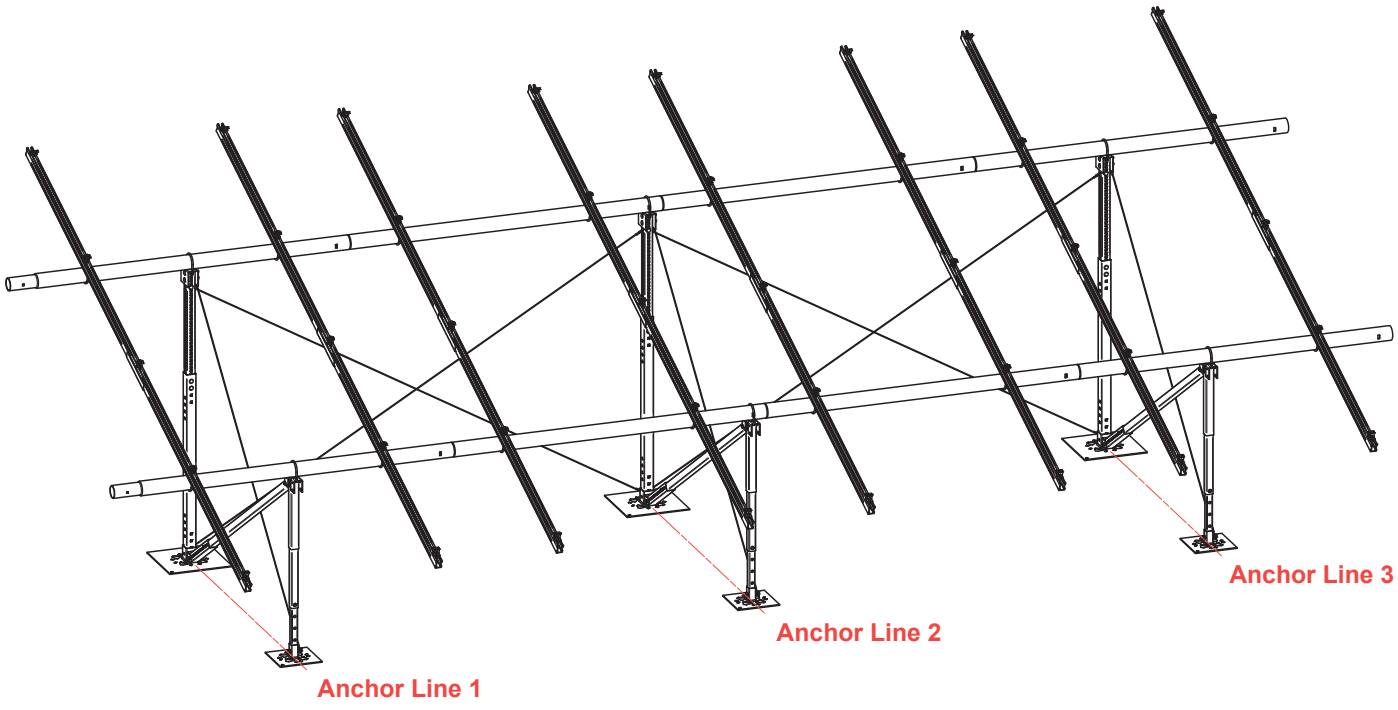
~ END OF INSTALLATION MANUAL ~

Installation and Testing of Earth Anchors

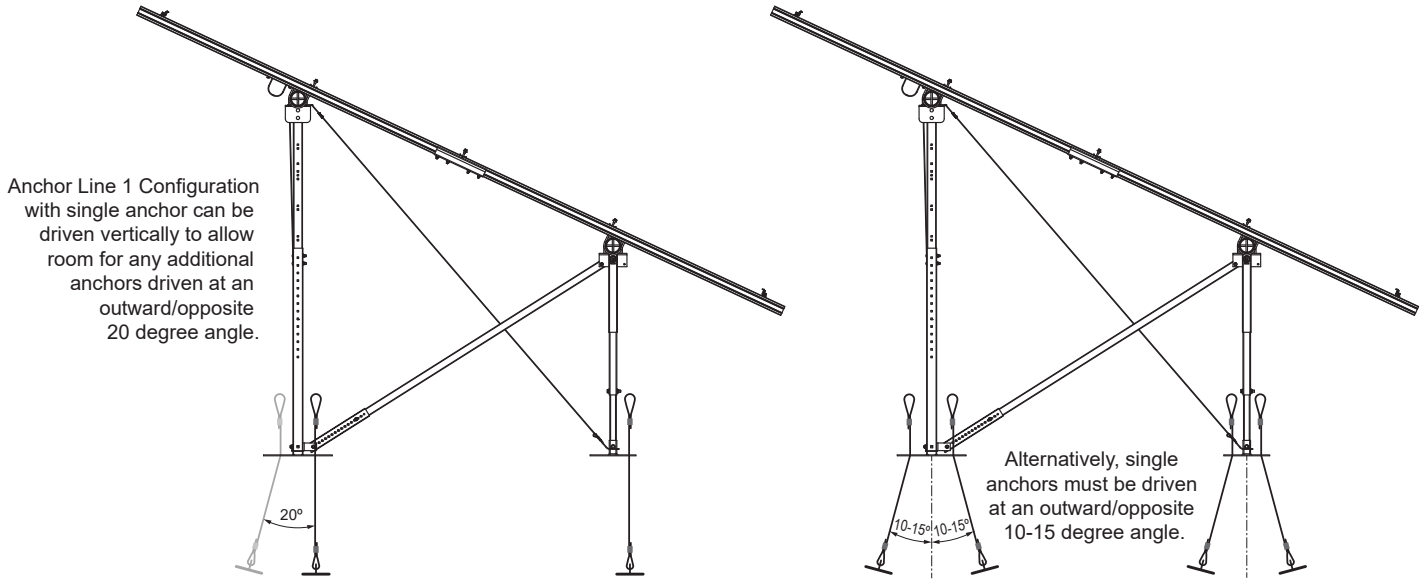
After completing the Osprey PowerRACK™ table unit assembly, ensuring proper alignment, squaring, leveling, and splicing to the next tables, the installers must commence the installation of Earth Anchors. Each Base Plate must contain a minimum of one Earth Anchor, and all anchors must undergo rigorous load testing. In certain cases of severe frost or extremely hard soil, our Drill Bit as specified on page 5 may be required to create pilot holes for the anchors. It's important to note that these pilot holes are not wide enough to accommodate the anchor's passage through solid rock. In such cases, we use epoxy spin-in Chemical capsule methods, HOG All Thread with a 3/4" Drill Bit purchased from a source other than Nuance Energy, or our NEW Galvanized Expansion Rock Anchors that utilize our current 13/8" dia. drill bits. For more details, see the Supplementary Earth Anchor Instructions.

To comply with safety regulations, installers must request Structural Calculations packets directly from Nuance. Installers are responsible for selecting the appropriate design values and anchor quantity based on live pull testing results or via SSM request. It is recommended to purchase additional anchors to account for unforeseen circumstances.

Nuance Energy's website offers Site-Specific Memo's (SSM) upon RFQ request, which provides project site-specific parameters and PE stamps.



INSTALLATION MANUAL FOR OSPREY POWERRACK™



Disclosure Statement

The Installer, responsible for the installation and assembly of Nuance Energy's Osprey PowerRack™ Product, acknowledges and agrees to the following terms:

- The Installer has read the Manufacturer's Installation Manual version 6 or newer and is aware of the section on Anchor Installation and requirements.
- The Installer shall assemble and install the Product and Anchors to Nuance Energy's specifications as required in this Manual.
- The Installer must install Anchors at no less than a 10-15 degree angle (unless using rock anchors) into the soil facing outward from the racking system and in the opposite direction of Product leg support assemblies.
- Nuance Energy reserves the right to void its Manufacturer's warranty of the Product if the Installer or the Buyer's representative fails to sign this Disclosure Statement before installing the Product.
- Due to potential ground settling, it is recommended that the contractor revisit the site up to one year after installation to re-cinch the wedge grips on the anchors to the base plates and realign the system if necessary. After the first year, ground settling should not occur again but should be monitored annually.

Buyer: _____ Date: _____
NAME OF CONTRACTOR

Buyer's Rep: _____ Date: _____
NAME OF CONTRACTOR

Anchor Load Test Proof Form

The required load test values will be provided through your SSM and can be obtained directly from Nuance Energy. It is important to keep in mind any special considerations when using multiple anchors per leg.	To be eligible for a 20-year warranty from Nuance Energy, submit this information online within 60 days of installation at Nuanceenergy.com/warranty.

It is recommended to purchase additional anchors for each project in case loads cannot be reached with required number of anchors.

Extra anchors can be obtained through our Distributor Partners or directly from Nuance Energy as required.

PROJECT SIZE (DC):		**CONTRACTOR:**	
TILT:		**PROJECT NAME:**	
PANEL COUNT:			
WIND SPEED/(ACSE 7 EDITION):		**SITE ADDRESS:**	
SNOW LOAD:			

ANCHOR REDUCTION TABLE		
REQUIRED ANCHORS PER SSM		1 ADDITIONAL ANCHOR
ANCHORS REQUIRED	REVISED CAPACITY FACTOR	REDUCED VALUE
1	100%	60%
2	67%	38%
3	45%	24%
4	34%	N/A

Anchor Reduction Table Notes:

The (%) Capacity Factor represents the percentage of the required (uplift) loading requirements (lbs) per foundation of the Osprey Unit. The specific loading requirements for your project are indicated in the site specific memo (SSM).

If 1 anchor is required per foundation, then each anchor must achieve 100% of the specified loading requirements. If 2 anchors are required per foundation, then each anchor must achieve at least 67% of the specified loading requirements. And so on...

If 2 anchors are pull tested and do not achieve the 67% capacity factor, then an additional anchor can be driven and pull tested. In this case, all 3 anchors must achieve at least 38% (Column 3) of the specified loading requirements.

INSTALLATION MANUAL FOR OSPREY POWERRACK™

Array Number		SSM Required Load	Individual Anchor Load	Recorded Test Values Per Anchor							
				East		East/Center		West/Center		West	
1	Front			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
	Rear			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
2	Front			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
	Rear			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
3	Front			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
	Rear			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
4	Front			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
	Rear			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
5	Front			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
	Rear			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
6	Front			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
	Rear			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
7	Front			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
	Rear			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
8	Front			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4
	Rear			1	2	1	2	1	2	1	2
				3	4	3	4	3	4	3	4

*Loads are all in pounds.

Duplicate this worksheet and use multiple pages for bigger projects.

Signature: _____ Date: _____