VOSLAR

SOLAR ROOF MOUNTING SYSTEM INSTALLATION MANUAL

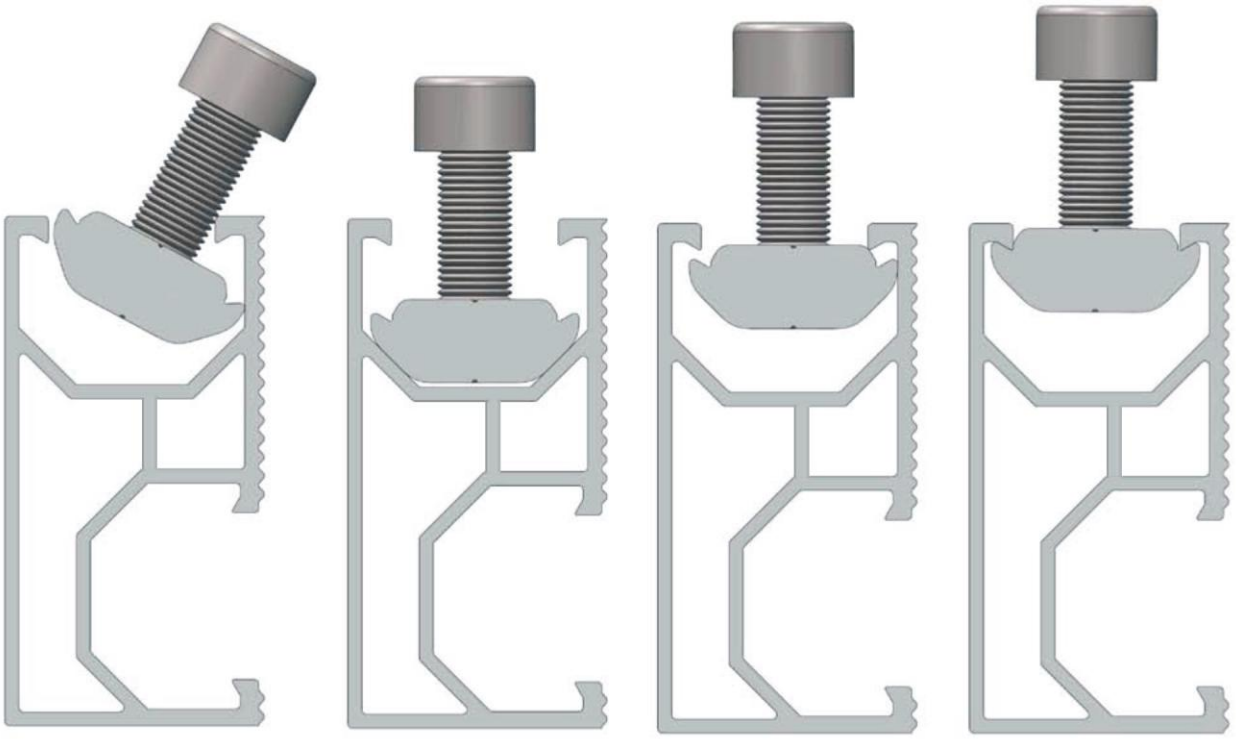
MODEL NAME: VS-ROOF HOOK

JIANG YIN AO YIN ENERGY CO.,LTD

CONTENTS

GENERAL INFORMATION

Thank you for choosing the Voslar roof mounting system. Made from custom-built aluminum extrusions and components,Voslar's innovated design and improved frame strength greatly simplify solar panel installation.The easy installation four steps make the D-Modules can be put into the D Rail on any position quickly.So, the D-Modules is pre-assembly with the clamp to save your install time.



Easy installation four steps

Voslar's versatile design makes it suitable for a wide variety of building types and zones including residential, commercial and remote environments.

Voslar is backed by a 10-year warranty (Fire Rated:C) .

SAFETY AND INSTALLER RESPONSIBILITIES

1. Handling and Installing Voslar

It is critically important that safety practices are observed when installing

※ Do not throw or roughly handle any Voslar components.

※ Do not bring Voslar system into contact with sharp or heavy objects.

※ Do not modify Voslar components in any way. The exchange of bolts,drilling of holes, bending or any other physical changes not described in standard installation procedure will void the warranty.

※ It is the installer's responsibility to verify the integrity of the structure to which Voslar components is fixed. Roofs or structures with rotten/rusted bearers, undersized bearers, excessively spaced bearers,or any other unsuitable substructure cannot be used with Voslar components, and installation on such structures will void the warranty,and could result in death or serious injury.

2. Wind and Climate Design

Determining the wind pressures applies to your Voslar system install site, taking into account roof shape and geographic location. Sufficient guidance is given in this document, but you may wish to procure a copy of these standards.

※ REMEMBER average wind speeds are higher for structures mounted closer to the roof perimeter zone (edge). Refer to 'Fixing within Roof Installation Zone' for more information)

※ Make sure your installation complies with local and national building codes. Take into account relevant design parameters (wind speed,exposure and topographic factor) when determining the loading for the installation.

※ If alternative fasteners are used to fix the framing to the roof (assuming supplied fasteners are unsuitable for any reason), all screw fasteners must be of equal or greater strength to those supplied with your Voslar system order.

Caution »»

Installation of this product is to be performed only by professionally trained installers.Any attempt by an unqualified person to install this product could result in death or serious injury.

TECHNICAL SPECIFICATIONS

1.Applications

※ Commercial and residential buildings
※ Marine applications and remote areas

2.Features

※ 6005-T5 Aluminum extrusion
※ Innovated designed of the D-Modules, which can be pre-assembly with the clamp, make the installation easy and quick.
※ Suitable for difference conditions and the most solar panels at present market.
※ Significantly higher strength-to-weight ratio than other framing products,providing improved efficiency due to greater frame spans, inherentcorrosion resistance resulting in low ongoing maintenance and an extended product life.
※ Anodized finish

3.Material

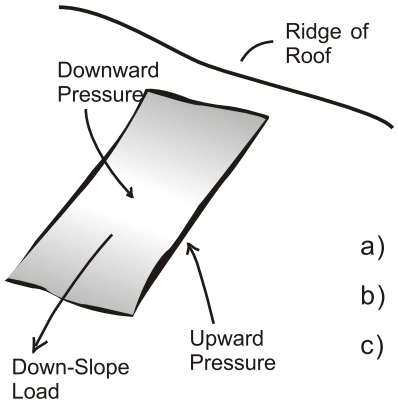
Material	Tensile strength	
	Ultimate	Yield
6005-T5 Aluminum Extruded	260MPa	240Mpa
Stainless Steel 304	635MPa	235MPa
Stainless Steel A2-70	700MPa	450Mpa

4.Installation condition

Roof slope	0° to 60°
Building height	Up to 20m
Mounting structure	Timber
Roof types	Flat or pitched steel and tile
System angle	Flushed with the roof

Note: if the condition is over the table list, please contact us to confirm.

5. Mechanical loading



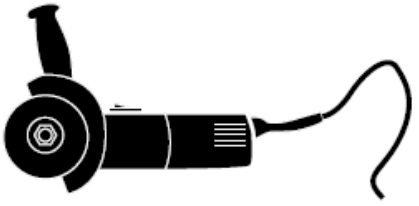
a) Downward Pressures-10 psf allowable load.
b) Upward Pressure - 5 psf allowable load.
c) Down-Slope Load-5.0 psf allowable load.

Caution »»

Refer to the section “Designing Your System” before attempting installation. Failure to correctly establish the requirement of the proposed installation site is dangerous and will void the framing warranty

TOOLS FOR INSTALLATION

The following tools are required for the installation:

※ 6 mm Allen key or hexagonal driver bit. If using a 6mm driver bit, make sure the cordless power tool used for the driving has a hand-tight clutch setting a fine (soft) impact drive to prevent damage to the fragile glass panels and threads on the Structure.	
※ Cordless drill; Drill or impact driver for driving roof material fixings	
※ Angle grinder; For terracotta tile roof installation, and angle grinder fitted with a continuous edge diamond tipped tile0cutting blade; gloves, hearing protection, a face protection mask, and a suitably rated breathing protection mask for all people in proximity of grinding	
※ Gloves; Protect the hazard of the sharp corners.	
※ Cord or color pen; Mark the installation position;	
※ Spirit level	
※ Rule	
※ If necessary, timber to shim the roof hooks	

COMPONENTS DESCRIPTION

VS-Rail

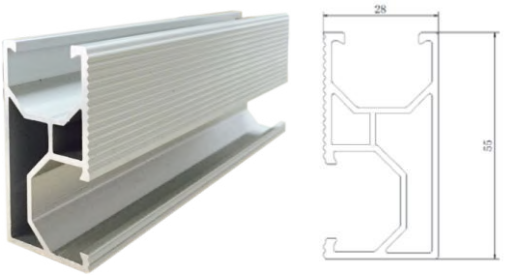
※ hold each panel row

※ length can be customized

※ 6005-T5 extruded aluminum

Standard Rail Length	
808~826mm wide panels	990~1020mm wide panels
2560mm (3 panels)	
3405mm (4 panels)	4200mm (4 panels)

※The length of VS-Rail can be customized.(1.05m~15.90m)
※The installation direction of panels can be customized.(horizontal or vertical)



VS Rail Splice Kit

※ Extend VS Rail to any length as required by the quantity or width of the solar panels

※ Include 2pcs M8*20 bolts,2pcs M8 spring washers, 2pcs M8,OD18 lock washers

Inter Clamp Kit for Framed Modules

※ Fit between two panels

※ Fastened with a 6mm Allen key

※ Standard pre-assembly for the usual panels with thickness 30, 35, 40, 46, 50, 57mm

※ Include 1pc M8 bolt,1pc M8 spring washer,1pc nut

Type	Bolt
Inter clamp kit 35	M8*45
Inter clamp kit 40	M8*50
Inter clamp kit 46	M8*55
Inter clamp kit 50	M8*60

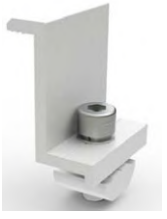
End Clamp Kit for Framed Modules

※ Hold the edge of each end panels

※ Fastened with a 6mm Allen key

※ Standard pre-assembly for the usual panels with thickness 30, 35, 40, 46, 50, 57mm

※ Include 1pc M8*25 bolt,1pc M8 spring washer,1pc nut



Adjustable End Clamp Kit

※ Hold the edge of each end panels

※ Fastened with a 6mm Allen key

※ Adjustable for the panels with thickness from 25~60mm

※ Include 1pc M8*25 bolt,1pc M8 spring washer,1pc nut

Grounding Lug

※ Fix the wire

※ Material:Cu

※ Include 1pc M8*25 bolt,1pc M8 spring washer, 1pc M8,OD18 lock washer,1pc nut,1pcM6*15 bolt

Grounding Clip

※ Electric Conduction

※ Material:Stainless steel

Rubber Pad

※ Wearing Pads

※ Change in time

COMPONENTS DESCRIPTION

Variety of Roof Hook	
Stainless Steel Roof Hook 1 # ※ Fix to the rafter below Roman tile roof ※ Include 3pcs st6.3x60 wood screws ※ Include 1pc M8*25 bolt,1pc M8 spring washer, 1pc M8,OD18 lock washer,1pc nut	
Stainless Steel Roof Hook 2 # ※ Fix to the rafter below flat tile roof ※ Include 2pcs st6.3x60 wood screws ※ Include 1pc M8*25 bolt,1pc M8 spring washer, 1pc M8,OD18 lock washer,1pc nut	
Stainless Steel Roof Hook 3 # ※ Side fix to the rafter below Roman tile roof ※ Include 3pcs st6.3x60 wood screws ※ Include 1pc M8*25 bolt,1pc M8 spring washer, 1pc M8,OD18 lock washer,1pc nut	
Stainless Steel Roof Hook 4# ※ Fix to the rafter on slate tile roof ※ Include 3pcs st6.3x60 wood screws ※ Include 1pc M8*25 bolt,1pc M8 spring washer, 1pc M8,OD18 lock washer,1pc nut	
Aluminum Tin Roof Hook 5# ※ Fix to the purlin on tin roof ※ 1pc st6.3*80 wood screw and 1pc rubber pad ※ Include 1pc M8*25 bolt,1pc M8 spring washer, 1pc M8,OD18 lock washer,1pc nut	
Aluminum Tin Roof Hook H04 ※ Fix to the purlin on tin roof ※ 1pc M10*200 bolt and 3 pcs hexagon nuts with flange ※ Include 1pc M8*25 bolt,1pc M8 spring washer, 1 pc M8,OD 18 lock washer, 1pc nut	
Stainless Steel Roof Hook 6# ※ Fix to the rafter below Roman tile roof ※ Include 3pcs st6.3x60 wood screws ※ Include 1pc M8*25 bolt,1pc M8 spring washer, 1pc M8,OD18 lock washer,1pc nut	

Variety of Screws	
Wood Screw ※ With pad	
Socket Head Screw	

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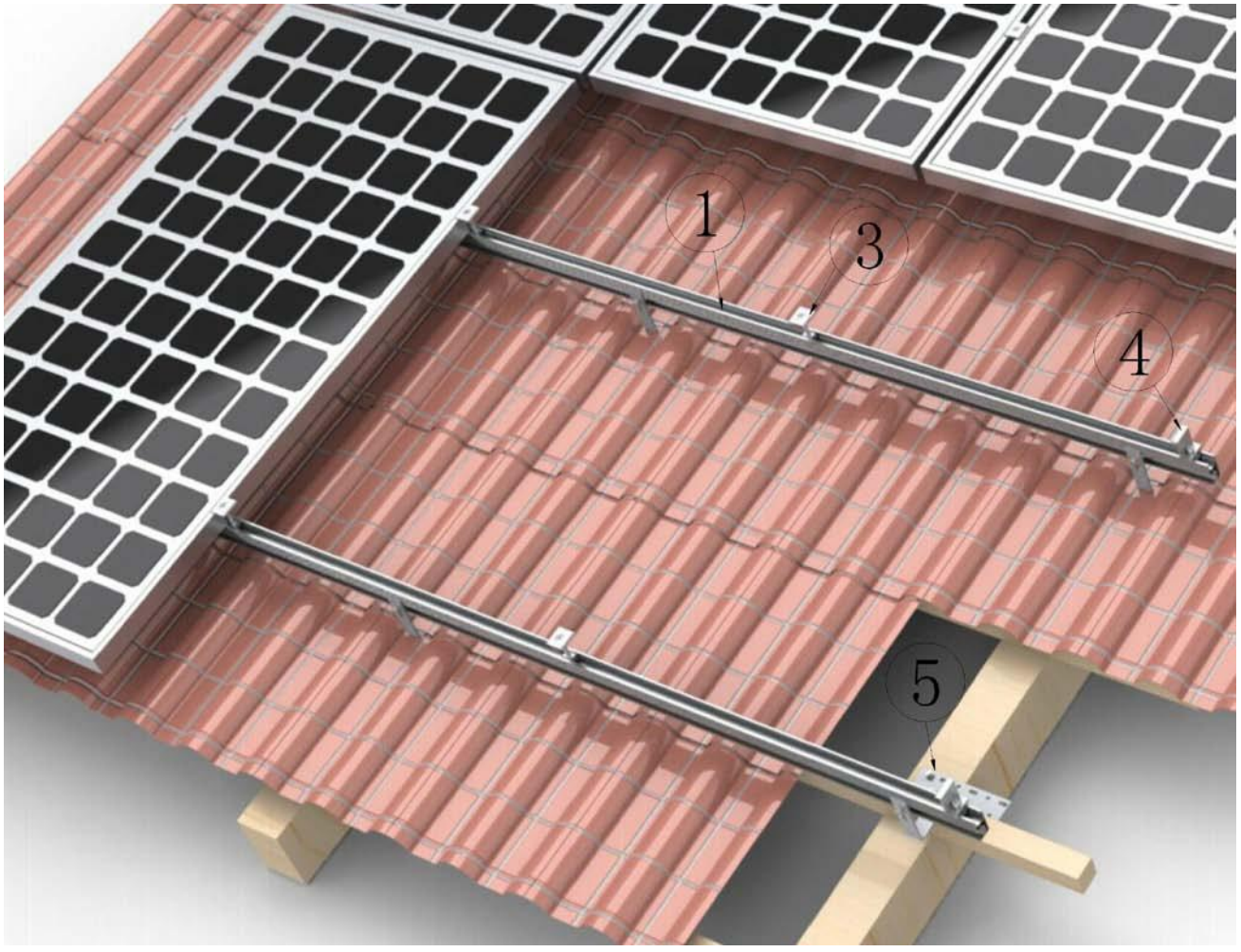
SYSTEM OVERVIEW

All components of the system are listed below. The version and quantities of the parts can vary, depending of

※ Type of roof
※ Number of modules
※ Type of module
※ Site specifics

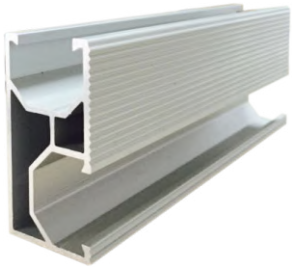


① VS Rail	② VS Rail Splice (Optional)
③ Inter Clamp	④ End Clamp
⑤ Roof hook	

SYSTEM OVERVIEW

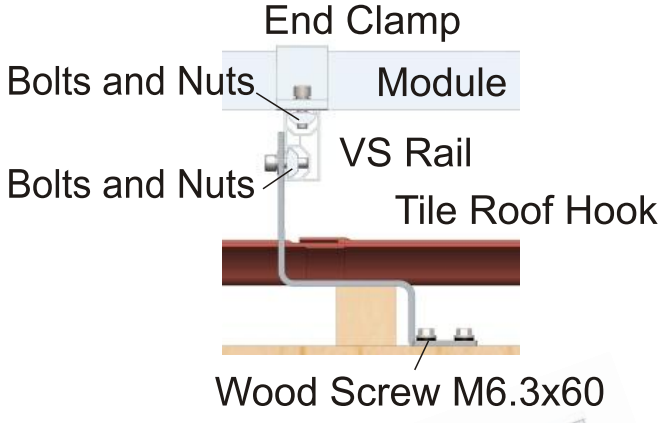
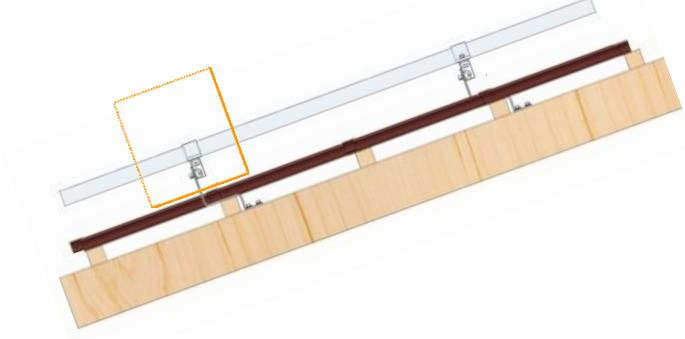
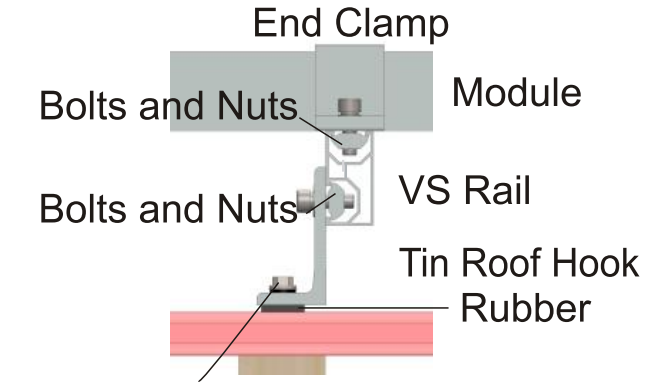
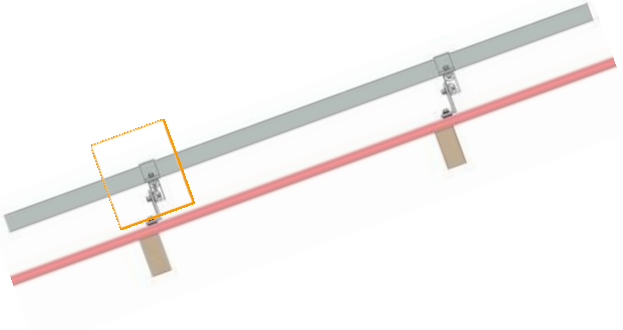
Show Details

①



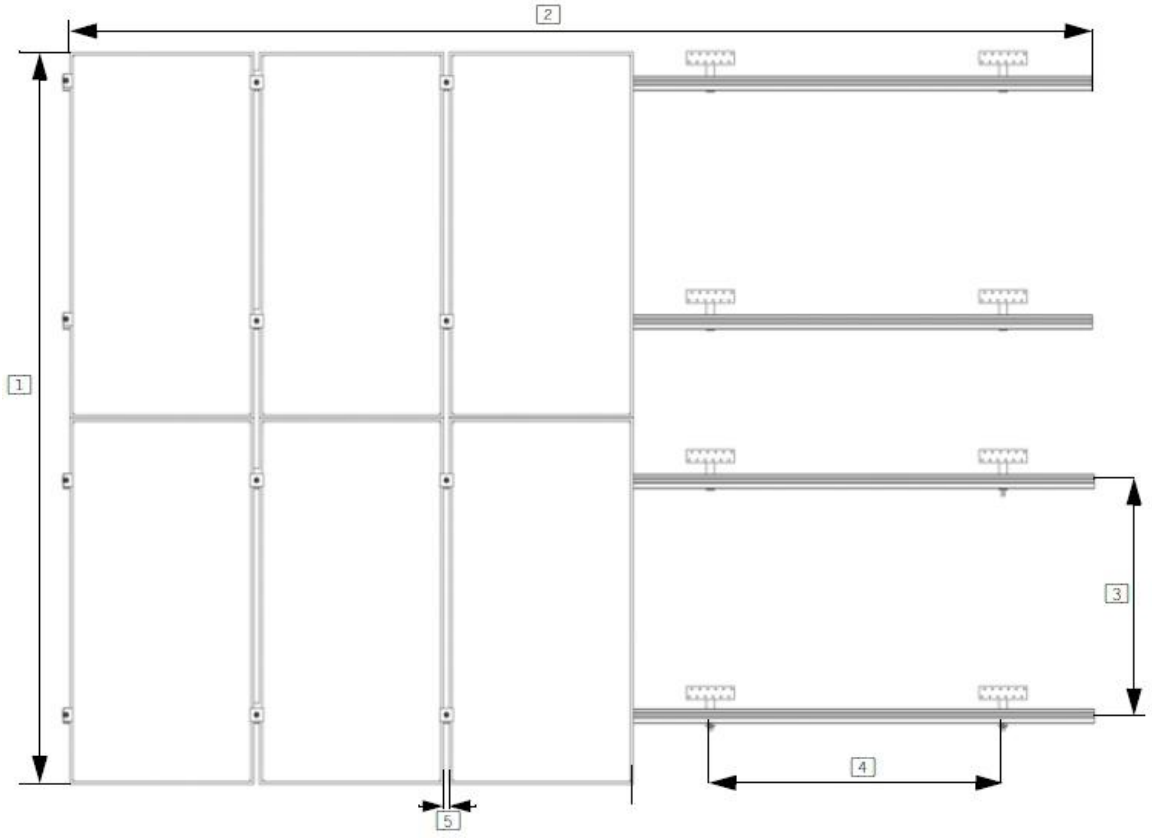
②

⑤

Tile Roof	Tin Roof
 	 

DESIGNING THE MODULE FIELD

Below, the distances between roof connections for a portrait installation are specified. Clamp-on roof hooks need to be installed in specific distances, depending on the distance of rafters and the stoical conditions.



1 Height of the module field: module height x number of modules vertically

2 Width of the module field: number of modules horizontally x (width of the module + 18 mm)+32 mm

3 Distance between roof connections vertically (according to the clamping points pre-defined by the module producer): Quarter-points of the modules, about 1/2 of module height.

4 Distance between roof connections horizontally: Depending on the distance between rafters and on the static requirements (please see the Chapter 8 on page 11).

5 Distance between modules: 17 mm

When positioning the modules, please take into consideration

※ That the values above are

※ That dimensions of tiles or other roof covering and the position of the rafters define the precise actual horizontal distance between roof connections

※ That the distance between roof laths defines the precise actual vertical distance between roof connections.

PLANNING

1.Determine the wind region of your installation site

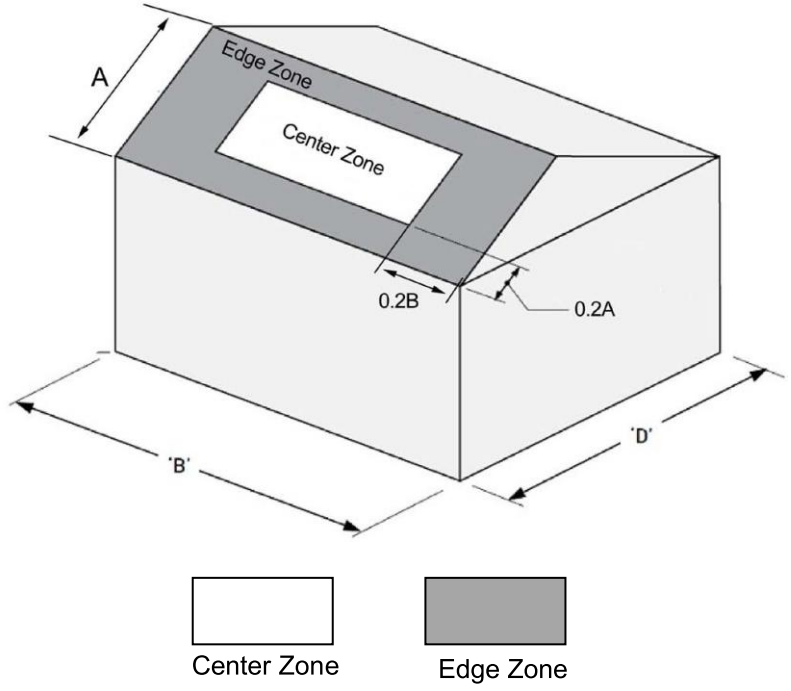
Region A	A≤ 41msec
Region B	41msec < B≤ 48msec
Region C	48msec < C≤ 56msec
Region D	56msec < D≤ 66msec

2. Determine the height of your installation site

This document provides sufficient information for Voslar system installation height less than 20 meters. If your installation site is more than 20 meters in height, please contact Voslar to obtain engineering data to support your installation.

3.Determine Roof Installation Roof Areas

Voslar system can be installed anywhere on a roof but fixing centers are required to be reduced at ridges and edges. The diagram below shows the area of higher wind loadings within 0.2A and 0.2Bof a roof edge ridge (where A and B are the planned dimension of the building).



The following table will help you determine the maximum rail support spacing for your project.
Also note that if the roof slope is less than 10 degree the reduction on spacing does not apply.

4. Determine the Maximum Rail Support Spacing

a. Please use the following table to determine the VS Rail support spacing for tile roof installations.

For Up To 1700mm Long Panel(2Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	2400	1740	1710	1200	1070	755	660	465
10Meters	2050	1445	1360	1000	965	680	595	420
15Meters	1950	1305	1280	890	895	590	545	/
20Meters	1850	/	1200	/	835	/	495	/

For Up To 1700mm Long Panel(3Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	3300	1740	2610	1200	1970	755	1560	465
10Meters	2950	1445	1870	1000	1865	680	1495	420
15Meters	2850	1305	1790	890	1795	590	1445	/
20Meters	2750	/	1710	/	1735	/	1395	/

For Up To 2100mm Long Panel(2Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	1980	1390	1360	965	855	680	520	370
10Meters	1630	1150	1130	800	775	545	475	335
15Meters	1530	1010	1050	690	705	455	425	/
20Meters	1430	/	970	/	645	/	375	/

PLANNING

For Up To 2100mm Long Panel(3Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	2880	1390	2260	965	1755	680	1420	370
10Meters	2530	1150	2030	800	1675	545	1375	335
15Meters	2430	1010	1950	690	1605	455	1325	/
20Meters	2330	/	1870	/	1545	/	1275	/

For Up To 2200mm Long Panel(2Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	1700	1155	1125	810	710	630	425	305
10Meters	1350	955	975	665	650	455	395	280
15Meters	1250	815	895	555	580	365	345	/
20Meters	1150	/	815	/	520	/	295	/

For Up To 2200mm Long Panel(3Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	2600	1155	2025	810	1610	630	1325	305
10Meters	2250	955	1875	665	1550	455	1295	280
15Meters	2150	815	1795	555	1480	365	1245	/
20Meters	2050	/	1715	/	1420	/	1195	/

For Up To 2200mm Long Panel(4Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	3500	1155	2925	810	2510	630	2225	305
10Meters	3150	955	2775	665	2450	455	2195	280
15Meters	3050	815	2695	555	2380	365	2145	/
20Meters	2950	/	2615	/	2320	/	2095	/

- **Min.50mm embedment to existing timber rafters.**

b. Please use the following table to determine the base rail support spacing for Tin roof installations.

For Up To 1700mm Long Panel(2Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	1600	1220	1150	845	720	530	450	325
10Meters	1350	1010	950	700	650	475	400	290
15Meters	1250	950	880	660	600	445	370	/
20Meters	1150	/	820	/	560	/	340	/

For Up To 1700mm Long Panel(3Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	2500	1220	2050	845	1620	530	1350	325
10Meters	2250	1010	1850	700	1550	475	1300	290
15Meters	2150	950	1780	660	1500	445	1270	/
20Meters	2050	/	1720	/	1460	/	1240	/

PLANNING

For Up To 2100mm Long Panel(2Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	1350	975	940	675	600	420	350	260
10Meters	1100	810	780	560	530	380	330	235
15Meters	1000	750	710	520	480	350	300	/
20Meters	900	/	650	/	440	/	270	/

For Up To 2100mm Long Panel(3Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	2250	975	1840	675	1500	420	1250	260
10Meters	2000	810	1680	560	1430	380	1230	235
15Meters	1900	750	1610	520	1380	350	1200	/
20Meters	1800	/	1550	/	1340	/	1170	/

For Up To 2200mm Long Panel(2Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	1185	810	800	560	520	345	285	215
10Meters	935	675	665	465	450	315	280	200
15Meters	835	615	595	425	400	285	255	/
20Meters	735	/	535	/	360	/	235	/

For Up To 2200mm Long Panel(3Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	2085	810	1700	560	1420	345	1185	215
10Meters	1835	675	1565	465	1350	315	1180	200
15Meters	1735	615	1495	425	1300	285	1155	/
20Meters	1635	/	1435	/	1260	/	1135	/

For Up To 2200mm Long Panel(4Rails)								
Max.Support Spacing(mm)								
Installation	RegionA		RegionB		RegionC		RegionD	
Height(m)	Center	Edge	Center	Edge	Center	Edge	Center	Edge
5Meters	2985	810	2600	560	2320	345	2085	215
10Meters	2735	675	2465	465	2250	315	2080	200
15Meters	2635	615	2395	425	2200	285	2055	/
20Meters	2535	/	2335	/	2160	/	2035	/

- **Min. 35mm embedment to existing timber batten.**
- **Min. steel batten/ purlin thickness=0.6mm.**

5.Verify acceptable Rail End Overhang

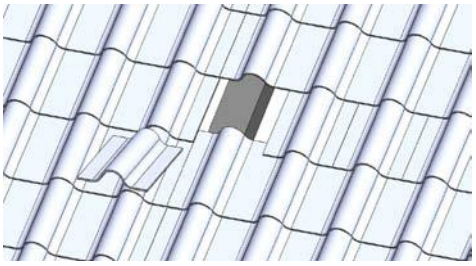
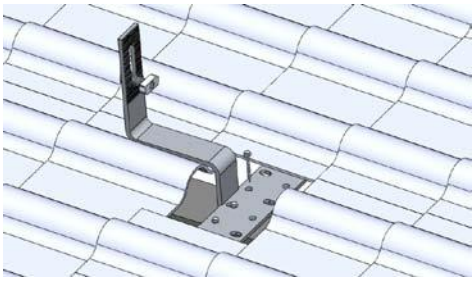
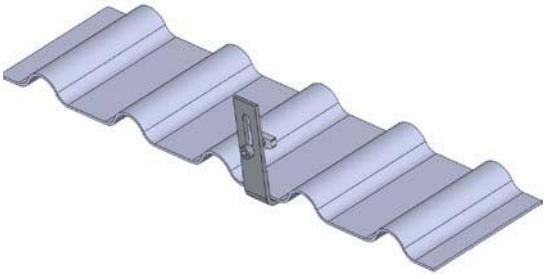
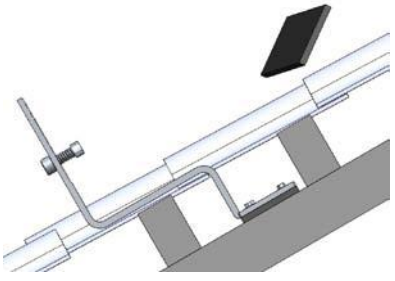
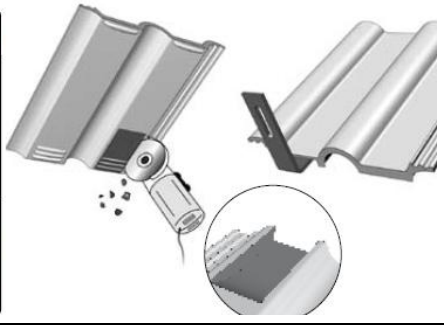
Rail End Overhang must equal 50 percent or less of foot spacing. Thus, if foot spacing is 1200mm, the Rail End Over hang can be up to 600mm. In this case, two feet can support a rail of as much as 2400mm (1200mm between the feet and 600mm of overhang at each end).

6.Determine Roof Slope

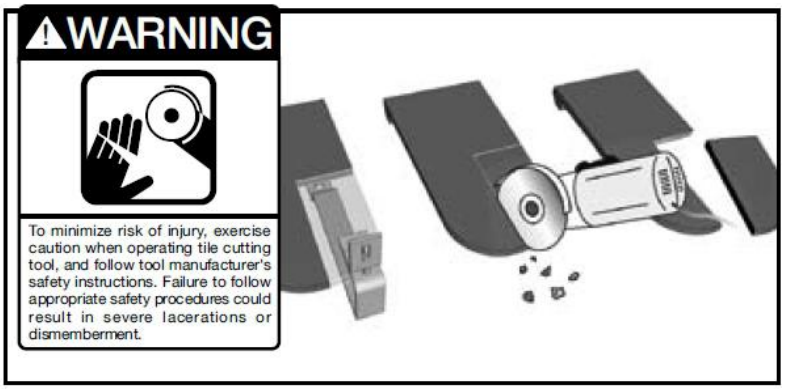
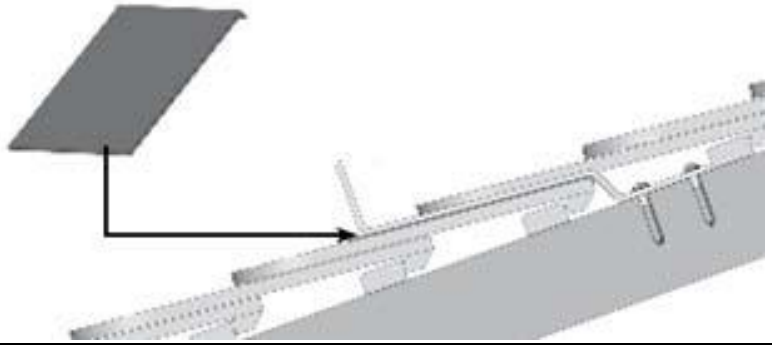
Voslar system can be used for roof slope up to 60 degrees. Please verify the Installation site roof slope should be between 0 degrees and 60 degrees.

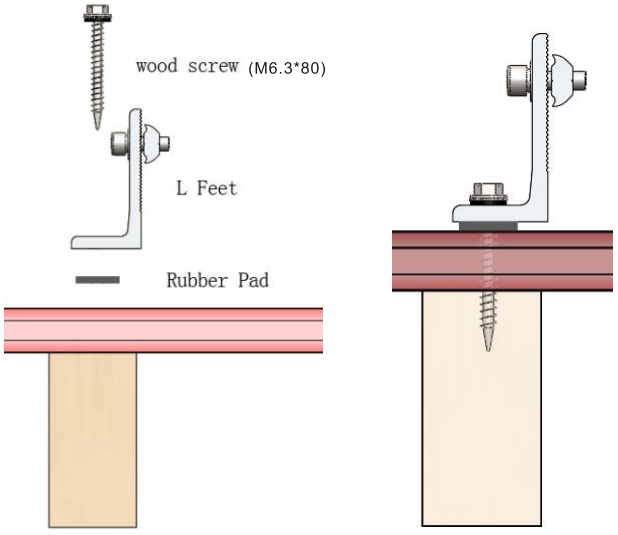
Published

INSTALLATION

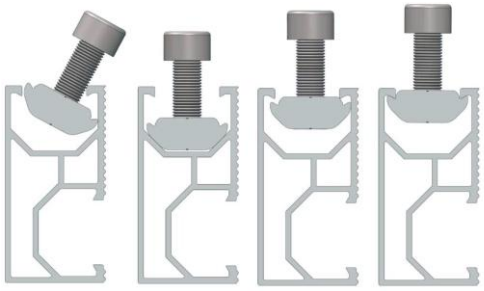
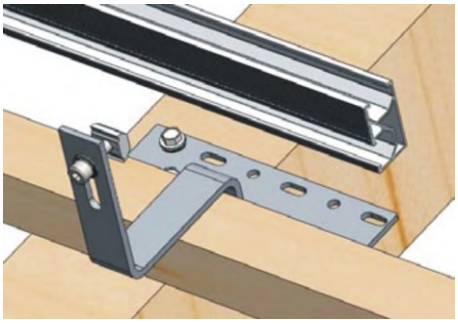
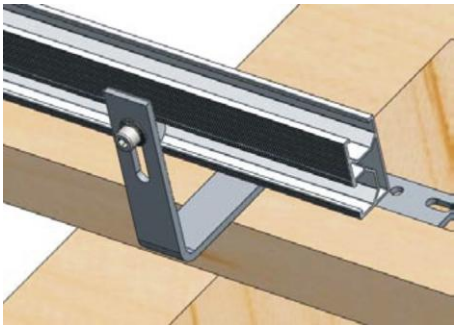
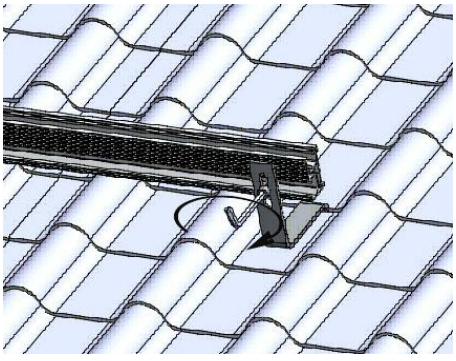
Install on Roman Tile Roof	
1. Remove the roof tiles at the marked positions or simply lift them up slightly.	
2. Input the roof hook to the wooden beam. Fix the roof hooks with 3x wood screws (M6.3x60) ※Tighten the screws in the situation when the roof undamaged.	
3. Cover the hooks by the removed tile	
4. The roof hook must not press against the roof tile. Place it flat. If necessary, shim the roof hook with wood.	 Wrong Correct
5. If necessary, use an angle grinder or hammer to cut a concavity in the tile that covers the roof hook at the point where the roof hook comes through. (Caution! Must not use fixed roof hook as a ladder, as this extreme point load could damage the tile below.	 

INSTALLATION

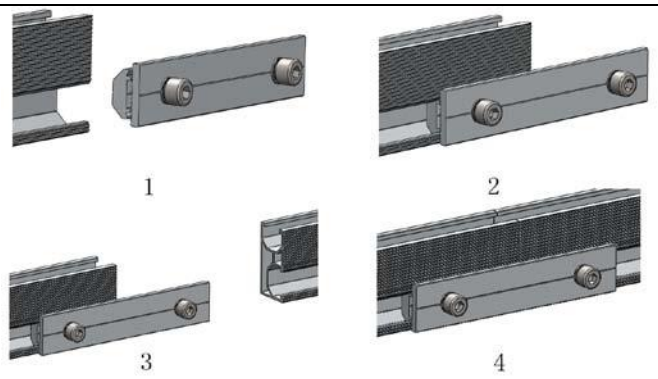
Install on Plain Tile Roof	
6. Mark roof hook installation points, and cut recesses for hooks into plain tiles/slate at each installation point.	
7. Cut titanium zinc metal sheets to fit and install them under the roof hooks. Fix the roof hooks to the rafter using two 6.3 x 60 mm wood screws.	

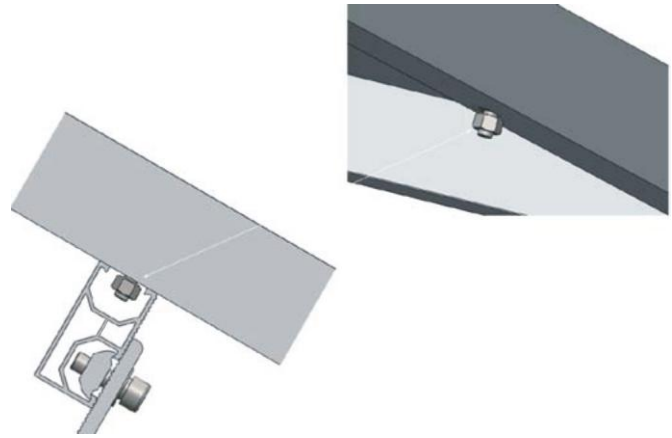
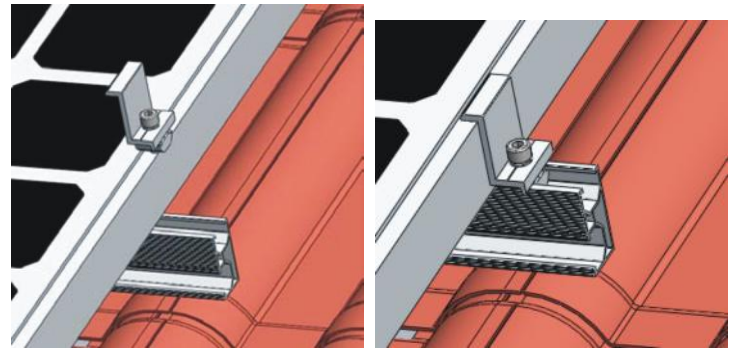
Install on Tin Roof	
8. Mark roof hook installation points and use the power tool to drill the wood screw through the point to fasten the L feet with the purlin. ※Tighten the screws in the situation when the roof undamaged.	

INSTALLATION

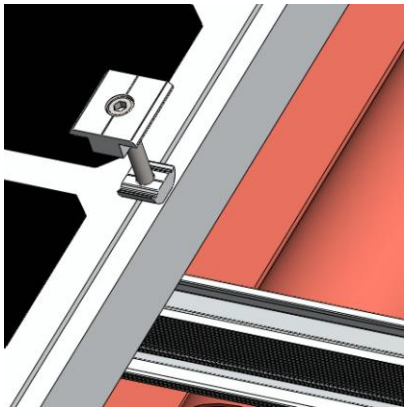
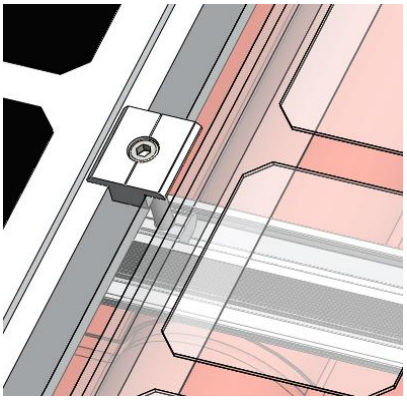
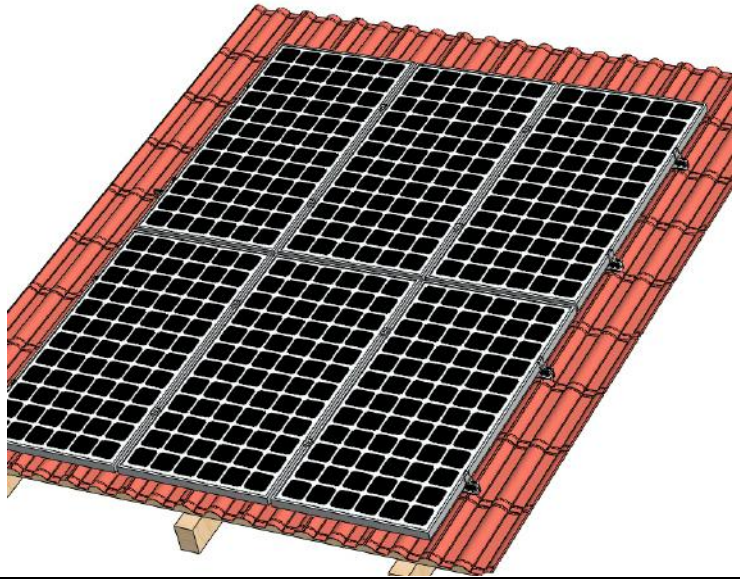
Install The VS-Rail	
9. D-Module quick mount. Four steps to quick mount the D-Module into VS-Rail channel. Move the assembly to it's desired final position, and fastens firmly in place by torque bolt to 10Nm.	
10. Connect the roof hook with the VS Rail. a. Insert the D-Module into the side channel of the VS Rail as the step 9 shown. b. Adjust the VS Rail to be level. c. Fasten the bolt. ※ Torsion: 23-25N.m	  

INSTALLATION

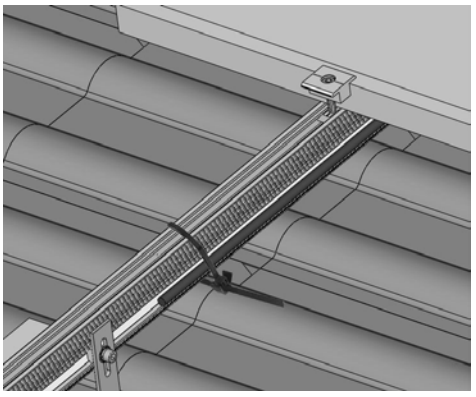
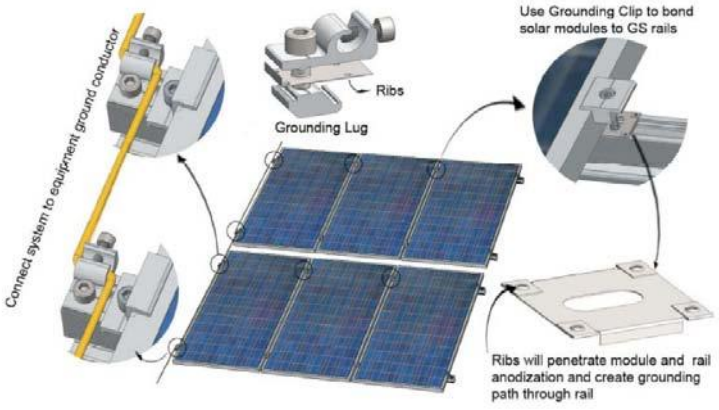
11. VS Rail connect a. Put the VS Rail Splice into the side channel of the VS Rail about 75mm, then fasten the M8 Bolt. b. Put the other VS Rail into the other side of the VS Rail Splice and fasten the other M8 bolt. ※ Torsion:23-25N.m	

Install the module	
12. Installing anti-slip protection The anti-lip protection is only necessary on the lowermost row of modules. At first, fit two bolts M6*20 and nuts into the lower holes of each module. Then place the first module of the bottom row so that the anti-slip protection sits in the rail channel of the lowest row of rails ※ Torsion:23-25N.m	
13. Fixing the outer modules by End clamp. a. Put the end clamp kit into the top channel of the VS-Rail as the step 9. b. Push the side of module to firmly against the end clamp and then fasten the bolt. ※ Torsion:23-25N.m	

INSTALLATION

14. Fixing the inter modules by inter clamp. a. Put the inter clamp kit into the top channel of the VS-Rail as the step 9. b. Push the Inter-module clamp firmly against the already fixed module. c. Push the next module against the other side of the module-inter clamp. d. Tighten the bolt ※ Torsion:23-25N.m	 
15. Installing the further rows of modules	

INSTALLATION

Cable tie and Grounding	
16. Tie cable with the rail a. Tie the cable with the rail using the zip tie	
17. Grounding Please see the Voslar Grounding System Installation Guide.	

WARRANTY

1. To be used only in combination with modules that include this specific rack system in their installation manual.
   Fire Rated：C
   The minimum distance between module and roof is 8.5cm.
2.This racking system may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.

JIANG YIN AO YIN ENERGY CO.,LTD warrants that its Voslar Panel Mounting System is free from defects in materials and workmanship for a period of 10 years from the date on which the Frame is purchased from Voslar, on the terms set out in this warranty.

In the event that the Frame does not conform to this warranty during the Warranty Period, Voslar will, at its option, either repair or replace the Frame or pay the cost of having the Frame repaired or replaced. To the extent permitted by law, Voslar's total liability under this warranty will in no circumstances exceed the repair or replacement of the Frame or payment of the cost of having the Frame repaired or replaced. In the event of replacement of the Frame, any remaining part of the Warranty Period will be transferred to the replacement Frame.

This warranty will not apply to any defect or damage to the Frame arising directly or indirectly from:

1.Shipment or storage of the Frame;

2.Improper installation, maintenance, repair or use of the Frame;

3. Normal wear and tear;

4. Misuse, neglect, abuse, accidental damage or modification to the Frame;

5. Failure to observe the instructions set out in the System Manual; or

6. Power failure, power surges, lightning, fire, explosion, flood, extreme weather conditions, environmental disasters or other causes outside Voslar's control, as determined by Voslar in its sole discretion.

This warranty does not cover, and under no circumstances will Voslar be liable for, any costs associated with the removal, shipping, handling or re-installation of the Frame or the costs of sending personnel to any site to repair or replace the Frame. This warranty is only provided to the original purchaser of the Voslar panels mounting system (Purchaser) or, where the Purchaser is an installer or builder who on-supplies the Frame to another party, to that other party (End-User). This warranty is not transferable.

Where an End-User wants make a claim under this warranty, the End-User must in the first instance contact the installer or builder from whom the Frame was purchased.

This warranty will not apply to any claims received by Voslar after the expiration of the Warranty Period. Voslar makes no warranties, express or implied, other than the warranties made herein, and specifically disclaim all other warranties, representations and conditions to the extent permitted by law. To the extent permitted by law, in no circumstances will Voslar be liable for direct, indirect, special or consequential damages arising from a defective Frame or for any damage or injury to persons or property. Voslar's aggregate liability, if any, in damages or otherwise, will not exceed the invoice value of the Frame at the time of purchase from Voslar.

Any provision contained in this warranty which is prohibited or unenforceable in any jurisdiction will be deemed to be ineffective to the extent of such prohibition or unenforceability and will not invalidate the remaining provisions nor affect the validity or enforceability of that provision in any other jurisdiction.

REVISION HISTORY

Table:Revision History

Revision Number	Revision Date	Reason for change	Document Author
01	2019-08-08	Initial Release	Jason
02	2020-05-08	Information Update	Jason