EzQuik™

Model 2012

Ground Mounting System

GMS-V2 Installation Manual

(AS/NZ1170.2-2021)

MicroSolar System Pty Ltd

MicroSolar System

EzQuik™ Aluminum Solar PV Module Mounting System

CONTENTS

SECTION 1 INTRODUCTION

1.1 *EzQuik*

Thank you for choosing ***EzQuik***.

This manual provides easy step-by-step planning and installation instructions.

MicroSolar System Pty Ltd is the company designing and wholesaling ***EzQuik*** Aluminium Solar PV Module Ground Mounting System. The optimized design of ***EzQuik*** mounting system is one of the most widely used mounting system, with carefully designed and engineered components which focusses on both competitive prices and installation efficiency.

The mounting systems are compliant with applicable local or Australian/New Zealand building codes:

AS 1170.2 (2021) part 2:	Wind Loads
AS 4100	Steel
AS 2050	Installation of Roof Tiles
AS/NZS 3000:2007	Wiring Rules
AS/NZS 5033:2005	Installation of photovoltaic (PV) arrays

1.2 Why *EzQuik*

- ***EzQuik*** *Mounting System* provides absolutely SAFE products; by using high strength material and providing most reasonable design along with certified engineer reports.
- Two steps EASY installation! Only **Plug** and **Drill** to fix connections with ***EzQuik*** *T-Bolt*.
- Internal build-in earthing with NO extra jobs needed; Make installation EASIER and FASTER! Refer to Clause 5.2.4
- Smart design smart size, make transport EASIER and CHEAPER!

1.3 Before You Begin

Verity that all components are included and consistent with you order.

To avoid conflicts, never modify or combine the system with components that are not made by **MSS**. Otherwise, warranty provided for this system will be voided.

This manual provides detailed instruction of system structure installation and fixing of PV modules on the system. Before putting up this system, please make sure foundation of the installation venue meets the requirements from local authority. Also, please make sure product model number matches the one showing on the installation manual. And confirm you have prepared all essential tools. In order to speed up the installation process and improve accuracy, MSS recommends using laser level meter to check the level of system and position of Post support.

SECTION 2 INSTALLER'S RESPONSIBILITY

Please read this manual thoroughly before installing ***EzQuik*** *Aluminium Solar PV Module Ground Mounting System.*

This manual provides engineer supporting documentations for building permit applications within Australia and New Zealand in relation to *Aluminium Solar PV Module Ground Mounting System* and also provide planning and installation assembly instructions for the s*ystem*.

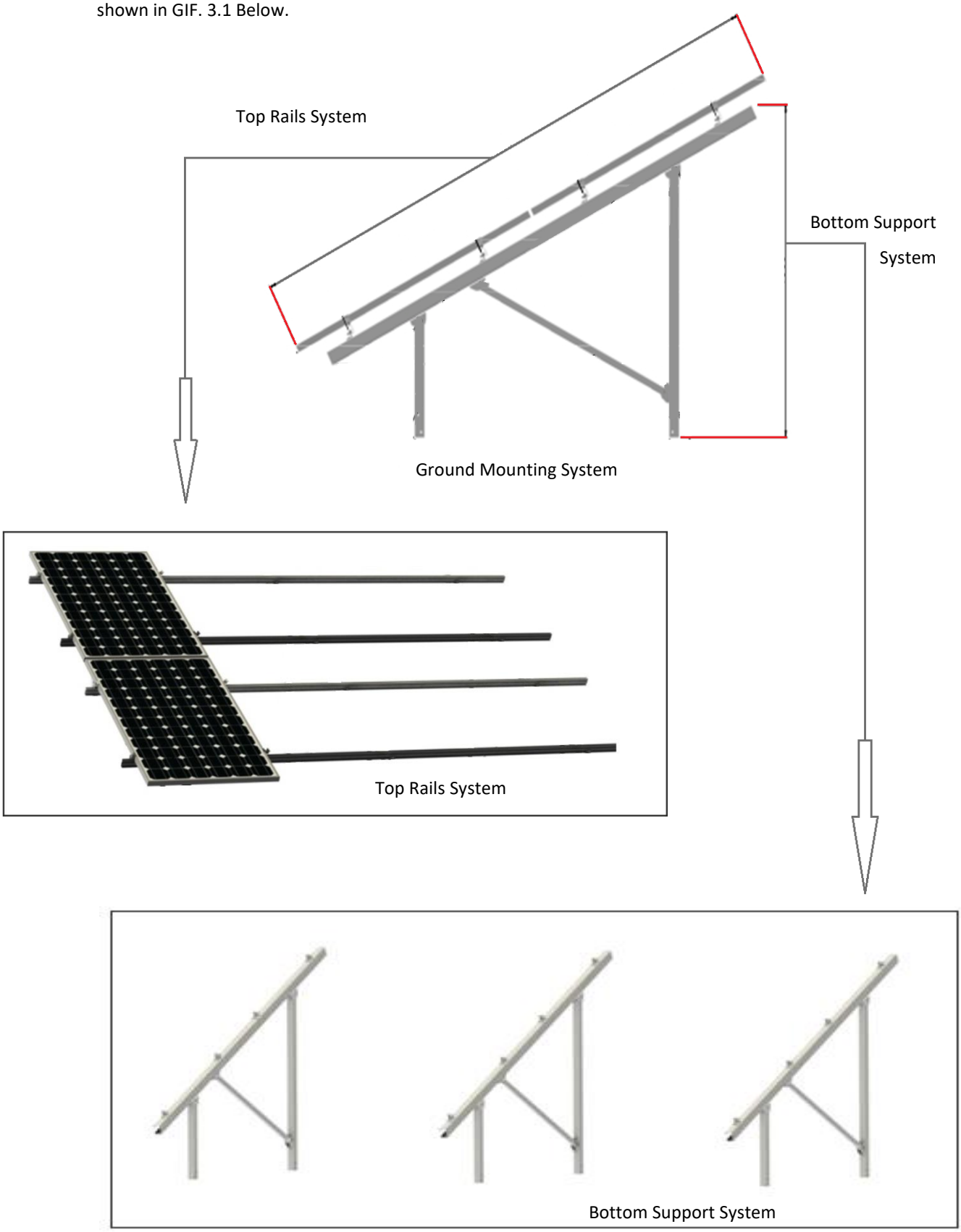
When *Aluminium Solar PV Module Ground Mounting System* is installed in accordance with the guidelines provided, it is required to be installed structurally adequate and meet the ground structural requirements of the different wind regions in Australia and New Zealand in accordance with the following standards: AS 1170.2 SAA part 2 Loading Code – Wind Loads, AS2050 Installation of roof tiles, AS3000 Wiring Rules and AS5033 Installation of PV arrays.

The installer is solely responsible for:

- Complying with all applicable local or national building codes, including any that may supersede this manual;
- Ensuring that MSS and other products are appropriate for the particular installation and the installation environment;
- Ensuring that the site has enough space for whole ground system.
- Ensuring that the ground has enough strength to support whole ground system under all code level loading conditions.
- Using only MSS parts and installer-supplied parts as specified by MSS (substitution of parts may void the warranty and invalidate the letters of certification in all MSS publications);
- Ensuring that lag screws have adequate pullout strength and shear capacities as installed;
- Verifying the strength of any alternate mounting used in lieu of the lag screws.
- Ensuring safe installation of all electrical aspects of the PV array;

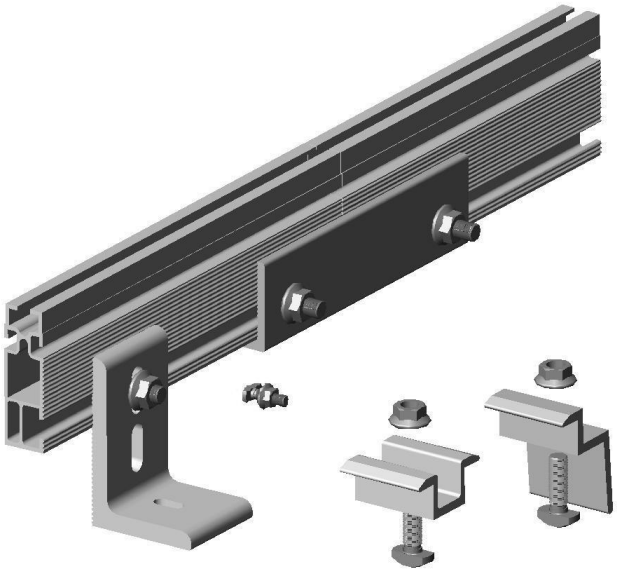
SECTION 3 *EzQuik* GROUND MOUNTING SYSTEM COMPONENTS

EzQuik Ground Mounting System includes two parts – Top Rails System and Bottom Support System. As shown in GIF. 3.1 Below.



GIF. 3.1 Ground Mouning System components

3.1 Top Rails System Components



1. **Rails** – Two rows of rails were often used to support one PV modules array. Rails are 3400mm in length, with surface anodized and manufactured with Aluminium extrusion.

2. **Rail Splicer** – Used to join and align rails into one single continuous rail line; as well as achieve rigidity in strength and act as thermal expansion joint. Splicers are 150mm in length, predrilled, anodized surface and manufactured with Aluminium extrusion.

3. **Clamp L-Feet** – Use to secure rails on Bottom Support System. Clamp L-Feet provide anodized surface and are manufactured with Aluminium extrusion.

4. **MSS T-bolt** – Provide in combination with M8 stainless steel flange nut. Used as fasteners to connect footings and parts to rails.

5. **Mid Clamp** – Installed in between the PV modules with M8 stainless steel T-blots and flange nuts provided and used to attach PV modules to rails. Mid Clamps provide anodized surface and are manufactured with Aluminium extrusion.

6. **End Clamp** – Used to attach PV modules to rails with M8 stainless steel T-bots and flange nuts provided. End Clamp provide anodized surface and are manufactured with Aluminium extrusion.

7. **MSS Earthing Lug** – Provide attaching point for earthing cables, and is installed either on top or on the side of the rails. Only one Earthing Lug would be required for each module array.

3.2 Bottom Support System Components

1. **Ground Foot (GPSF) –** A type of Bottom Support System footing used on site with concrete ground pre-existed.

2. **Post Anchor (GPSA) –** A type of Bottom Support System footing used on non-concrete surface ground. Concrete foundation required to be filled on site.

3. **Earth Auger (GPEA) –** A type of Bottom Support System footing used for large projects. Soil capacity test and pile driver required.

4. **Bottom Support Frames –** Main body of Bottom Support System; made by material Q235 (ASTM A36) steel; Including front post, back post, beam, brace, joint, and fasteners.

SECTION 4 PLANNING YOUR *EzQuik* INSTALLATION ON GROUND

4.1 Design Considerations – Wind

First of all, decide the wind region where the property is located.
The Australian Standards AS 1170.2 is to be considered, regarding the following:

- The regional design wind speeds;
- Local requirements and covenants determined by State and/or local statutory authorities.

The installation specifications given in this manual are based on a wind speed for ultimate strength of 73m/s (ultimate serviceability wind speed in Region D, see BSC Consulting Engineers Structural Certificate) and is designed to support installations using ***EzQuik*** Aluminium Solar PV Module Ground Mounting System manufactured by MSS. This is suitable for sites in Australian Regions A, B and New Zealand. For installation specifications for designated cyclonic areas i.e. Region C and D it is also advisable to refer this manual or to consult your local building engineer.

4.1.1 Wind Force

The pressure that wind created must be considered when specifying system structures and materials. In most situations, when wind comes across module surface, negative pressure (lifting force) will exert on the module and the negative pressure will be much greater than the weight of a PV panel (FIG. 4.2.1). Therefore, determining the wind force affecting the site is essential to identify the appropriate level of security installation.

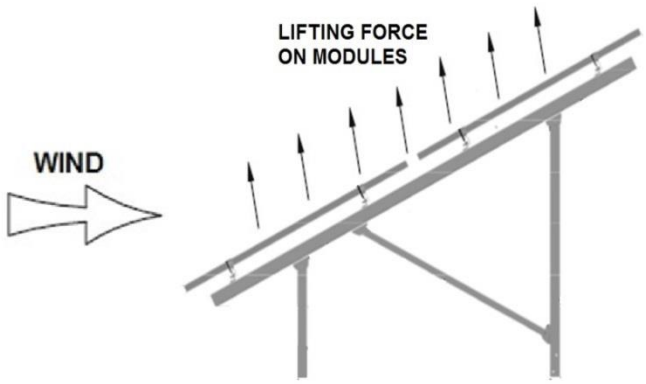


Figure 4.2.1 LIFTING FORCE ON MODULE

4.1.2 Basic Wind Speed

AS 1170.2 and AS 4055 provide information on wind speeds generally affecting different regions of Australia and New Zealand (FIG. 4.2.2 and TABLE 4.2.2). Wind regions are pre-defined for all of Australia and New Zealand by AS 1170.2 SAA Loading Code – Wind Loads. The wind region has nothing to do with surrounding topography or buildings.

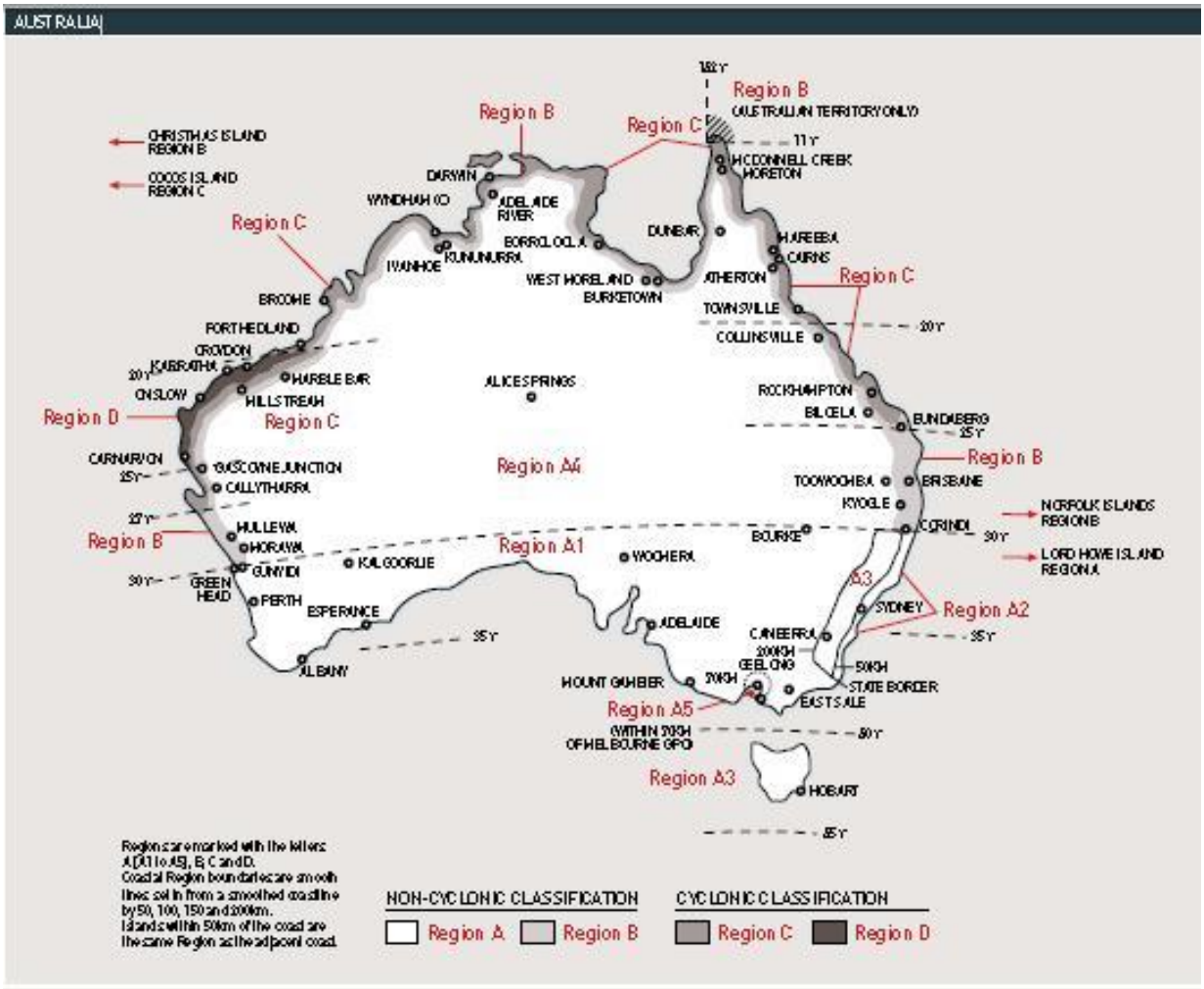


FIGURE 4.2.2(A) WIND REGIONS – AUSTRALIA

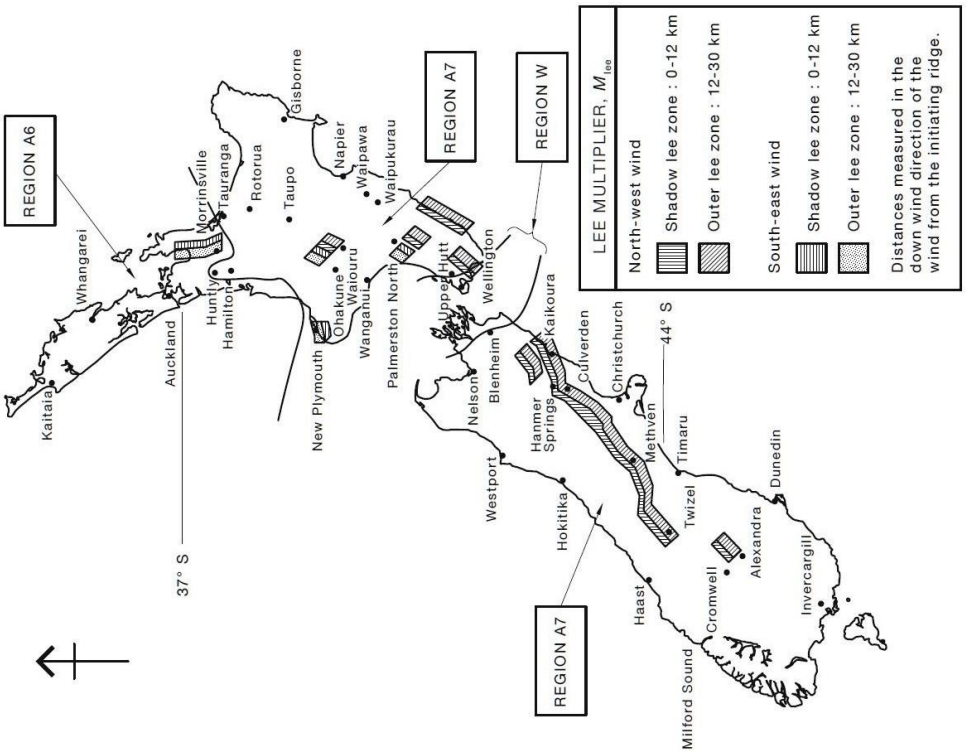


FIGURE 4.2.2(B) WIND REGIONS – NEW ZEALAND

Source from: AS/NZ 1170.2

TABLE 4.2.2 THE SERVICEABILITY REGIONAL WIND SPEEDS

Regions	Vp (m/s)
A	41
B	49
C	57
D	69

Source from: Report on Adequacy of Bracketry to Support Solar Panels on Rooves for MicroSolar System Pty Ltd.

* Note.

- All the Region A (1 – 7) are defined as Region A
- All the areas in New Zealand are defined as Region A
- This manual provides sufficient information for ***EzQuik*** PV module mounting system being installed on any roof less than 15 meters of height. Please call MSS for assistance if required.

4.2 Bottom Support System Planning

The number of Bottom Support System required is determined by the size of project and system spacing. For ***EzQuik*** Ground Mounting System, the maximum Bottom Support System spacing is determined by the wind zone as below. TABLE 4.2

TABLE 4.2 MAXIMUM BOTTOM SUPPORT SPACING

Wind Zone	A	B	C	D
Wind Speed Vp (m/s)	41	48	59	73
System Spacing (mm) (for GPSF)	2200	2200	1800	1800
System Spacing (mm) (for GPSA)	1700	1700	-	-

Source: *BSC Consulting Engineer Structural Certificate.*

4.3 Footing Types for Bottom Support System

We have three different types of footing used for Bottom Support System; each footing has its own characteristics. As shown in FIG. 4.3. Different types footing should be used according to different conditions.

Ground Foot (GPSF)

Post Anchor (GPSA)

Earth Auger (GPEA)

FIG. 4.3 Three types of footing

4.3.1 MSS *EzQuik* Ground Foot (GPSF)

GPSF is the easiest and most common footing to be installed on concrete surface which are required to be on the same horizontal level. To install the system, the only step required is to bolt the footing to the concrete surface.

For installations on **soil** ground, a concrete foundation for each footing with same horizontal level is required to be constructed before installation. In another word, GPSF is the preferable footing type when concrete foundation already exists.

The volume and size of the foundation should follow MSS requirements, please refer to TABLE 4.3.5. For maximum footing spacing, please refer to TABLE 4.2.

4.3.2 MSS *EzQuik* Post Anchor (GPSA)

GPSA is the best choice for non-concrete surface ground; there are no site requirements needed to install GPSA footing. Only on-site digging and filling in concrete for each foot is required to install this type of footing. By using the Temporary Support Tools (*F-Pliers* and *Camping Strips* especially designed by MSS) to support and adjust the structure during installation, the GPSA footing can be installed while waiting the concrete foundation to be set. As well as that, the concrete foundations are not required to be on the same horizontal level. Comparing with installation method, the GPSA footing greatly decrease the installation time and labour cost.

The volume and size of the concrete foundation should follow MSS requirements. Please refer to TABLE 4.3.5. For maximum footing spacing, please refer to TABLE 4.2.

NOTE: Please refer to Clause 6.1 for further information about Temporary Support Tools

4.3.3 MSS *EzQuik* Earth Auger (GPEA)

The GPEA footing is a type of footing which is especially designed for large scale construction projects (usually more than 500KW). Specialized construction equipment – Pile Driver is used to drive the footing into the ground, which replace the concrete foundation. As this type of footing do not require any concrete foundation; in order to achieve the best cost performance, large scale construction project is ideal.

However, soil load capacity should be tested across the site and approved by local qualified civil engineer before installation.

For maximum footing spacing, please refer to TABLE 4.2; to achieve maximum accuracy please refer to the local qualified civil engineer.

4.3.4 Compare of Footings

	GPSA	GPSF	GPEA
Geological conditions	None	None	Test required
Construction equipment	Normal	Normal	Special equipment required
Labour-time	H+1	H+4	H
Relative cost of the project (below 300kw)	Low	Medium	High
Relative cost of the project (more than 500kw)	Low	High	Low

4.3.5 Concrete Foundation Size

The minimum size of concrete foundation for GPSF and GPSA should be installed according to the TABLE 4.3.5 bellow.

TABLE 4.3.5 Minimum Concrete Foundation Size

WIND ZONE		A	B	C	D
WIND SPEED Vp (m/s)		41	48	59	73
FOUNDATION	FRONT	300x300x300	300x300x300	300x300x300	300x300x300
SIZE (mm)	REAR	650x650x650	700x700x700	700x700x700	700x700x800
CONCRETE	FRONT	0.027	0.027	0.027	0.027
VOLUME (m^3)	REAR	0.275	0.343	0.343	0.392

Source: *BSC Consulting Engineer Structural Certificate.*

4.4 Rail Spacing

Each module requires two rails to support. According to the structure of the Footing System, the spacing between every two sets of rails is 720mm. The spacing between the rails of the modules is fixed for each row from 900 to 1100mm. (Under special cases, please contact MicroSolar System Pty Ltd for confirmation).

* Note.
  - The Ground Mounting System allows panels with sizes of 808 mm x 1600mm and 1100 mm x 1800 mm to be installed. Under special circumstances, please contact MSS.
  - Rail overhang must be equal or less than 23 % of the Footing System spacing required.
  - Rails should not extend more than 390 mm from the edge of Panels.

SECTION 5 INSTALLING *EzQuik* PV MODULES

Please follow the recommended step by step instructions for installing the ***EzQuik*** *PV Module*.

5.1 Step One: Install Bottom Support System

Install Bottom Support System on ground. According to the project needs and site conditions, please choose one of the Bottom Support System foot bellow and follow the installation methods. Please refer to the TABLE 4.2 in Clause 4.2 for maximum footing spacing.

5.1.1 Installing MSS *EzQuik* Ground Foot (GPSF)

Please refer to Clause 4.3.1 to find the site condition which is suitable for GPSF footing.

a) Dig holes and then construct the concrete foundation for each foot or for the whole site according to the project need.

b) Set up the support system frames; attach GPSF to frames by using two *Hex Head Bolts M12x70* with flange nuts provided.

c) Attach the GPSF to concrete foundation with two of M12 expansion screws. As shown in FIG. 5.1.1

d) Set up the support system frames; attach frames to GPSF by using two *Hex Head Bolts M12x70* with flange nuts provided.

e) Install Top Rails System. Please refer to Clause 5.2.

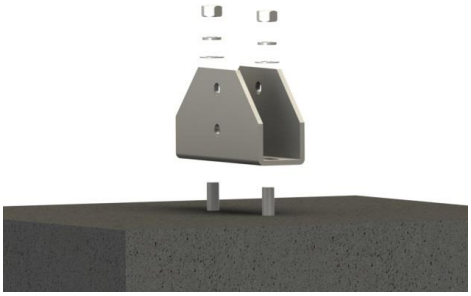


FIG. 5.1.1 Attach the GPSF to concrete foundation

*Note.

- Please make sure the concrete foundation surface is constructed at same horizontal level in each row.
- Please make sure in each row all support systems are in straight line and parallel to each other.
- Please refer to TABLE 4.3.5 for holes size and concrete foundation size.
- Step (c) and (d) cannot start until the concrete foundation is completely set.
- Skip a) and note above, if concrete foundation / surface already exist.
- Please use the M12 expansion screw with a grade greater than 5.8.

5.1.2 Installing MSS *EzQuik* Post Anchor (GPSA)

Please refer to Clause 4.3.2 to find the site condition which is suitable for GPSA footing.

a) Set up the support system frames. Then attach GPSA to the frames by using two *Hex Head Bolts M12x70* with flange nuts provided.
b) Dig holes, then position Bottom Support System to the right place with temporary supports (F-tool and camping strips. Please refer to Clause 6.1).
c) Construct the concrete foundation to bury the GPSA footing. Make sure the concrete should be sloped away from the center. As shown in FIG.5.1.2.
d) Top Rails System can be installed while waiting concrete to be set. Please Refer to Clause 5.2
e) Remove and collect temporary support tools.

*Note.

- Please make sure all the Bottom Support Systems are positioned at same horizontal level in each row.
- Please make sure in each row all support systems are in straight line and parallel to each other.
- Please refer to Clause 6.1 for further information about temporary supports.
- Please refer to TABLE 4.3.5 for holes and concrete foundation size.

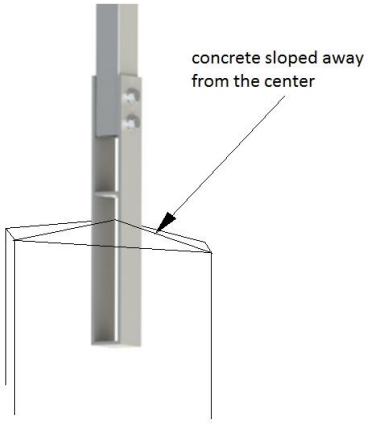


FIG.5.1.2 Bury GPSA with concrete foundation

5.1.3 Installing MSS *EzQuik* Earth Auger (GPEA)

Please refer to Clause 4.3.3 to find the site condition which is suitable for GPEA footing.

a) Before installation, soil load capacity should be tested across the site and approved by local qualified civil engineer.

b) Use Pile Driver to drive all GPEA footings into the ground according to the location required.

c) Set up the support system frames. Then attach the frames to GPEA with GPSA as connection; by using two M12 *Hex Head Bolts* with flange nuts provided. As shown in FIG. 5.1.3.

d) Install Top Rails System. Please refer to Clause 5.2.

*Note.

- Please make sure all the GPEA are positioned at same horizontal level in each row.
- Please make sure in each row all support systems are in straight line and parallel to each other.

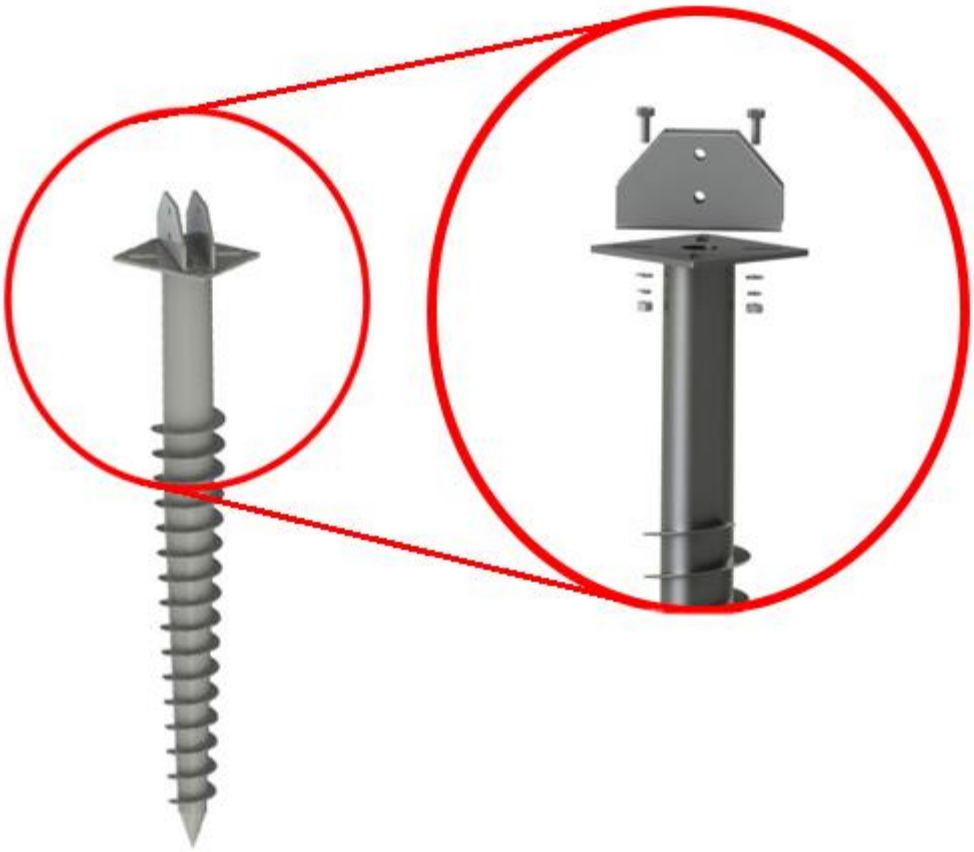


FIG.5.1.3 Attach the frames to GPEA with GPSA as connection.

5.2 Step Two: Install Top Rails System

Install the Top Rails System on top after complete installing the Bottom Support System. Follow the recommended step by step instructions for installation.

a) Join the rails with splicer.
b) Attach the rails to the bottom support system using L-Feet with T-bolts provided.
c) Install PV modules using end and mid clamps.
d) Earthing the System.

5.2.1 Joining rails with splices

If length required, two or three rails can be joined together as one continuous rail using ***EzQuik*** *Splice(s).*
Keep rail slots clear from debris and roof grit. External matter will cause bolts to bind as the slide into the slots.
Place the *Splice* into the right position, 1-1.5mm gap should be left between the rails to allow thermal expansion; and bolt it to the rail slots with the *T-Bolts M8x25* with flange nuts provided. (FIG. 5.2.1)
Attach the rails together by using *Splices* before mounting the rails to the footings. Try to avoid using more than two splicers within one continuous rail line.

Figure 5.2.1 Join two rails together using Splice.

Structure –wise, the *Splice* joiner is not as strong as the rail itself. Please note that each rail should always be supported by more than one footing on either sides of the splice.

Please contact MicroSolar System Pty Ltd when experiencing special cases or concerning about thermal expansion issues.

5.2.2 Attach the rails to the Bottom Support System

The *Clamp L-feet (MSCLFT)* provided are used to connect Top Rails System and Bottom Support System. Attach the *Clamp L-feet* to Bottom Support System with the Hex Head Bolt M6x20 and flange nuts provided. Then attach the rails to *Clamp L-feet* with T-bolts M8x25 and flange nuts. Trim rails if needed.

* Note.

- Please keep the straightness of continuous rail(s). The deviation of straightness should not be more than 35mm in every 3.4m.
- *MSS* ***EzQuik*** *L-feet* bracket can be used instead of *Clamp L-feet* if needed.

- Rail overhang must be equal or less than 23 % of the Footing System spacing required.

5.2.3 Installing Modules

For the first module, use the Plug and Drill method; lay the first module with end clamps at the aligned end of each rail using the T-bolts and nuts provided. Please allow minimum 15mm space between the rail end and the end clamps, shown in. Center and align the module as needed, and securely tighten the flange nuts, (15Nm), as shown in FIG. 5.2.3.1

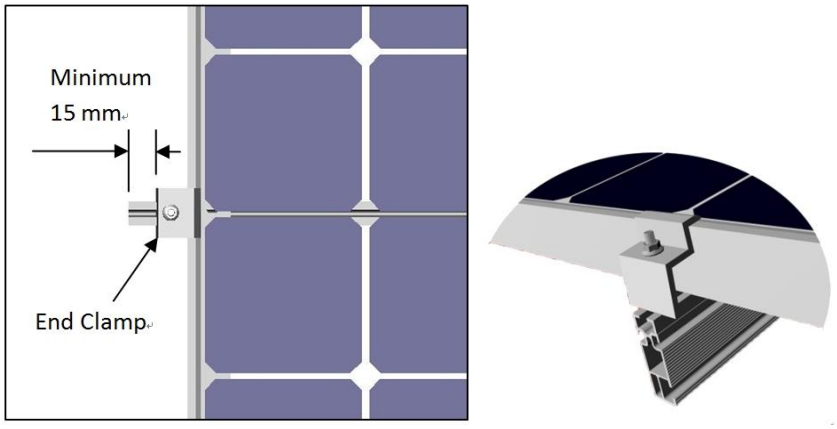


FIGURE 5.2.3.1 Installing the first module with End Clamp

For other modules, use the Plug and Drill method; align the second module next to the first module side by side with mid clamps installed in between. Secure the mid clamps with the T-bolts and flange nuts provided, and then tighten the flange nuts (15Nm), as shown in FIG. 5.2.3.2

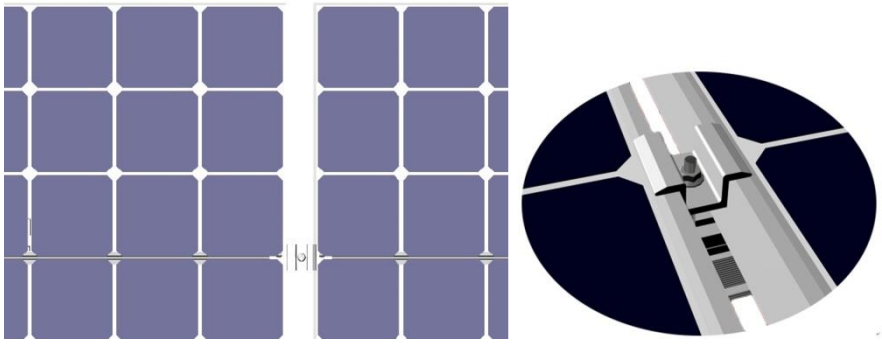
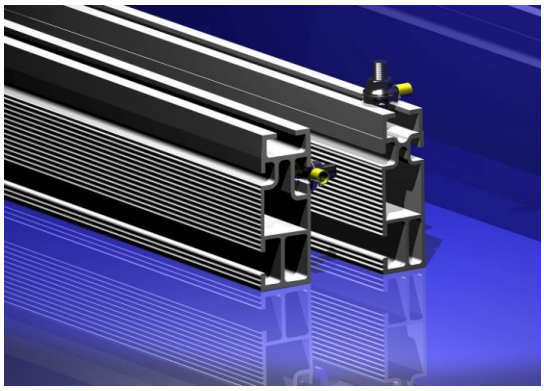


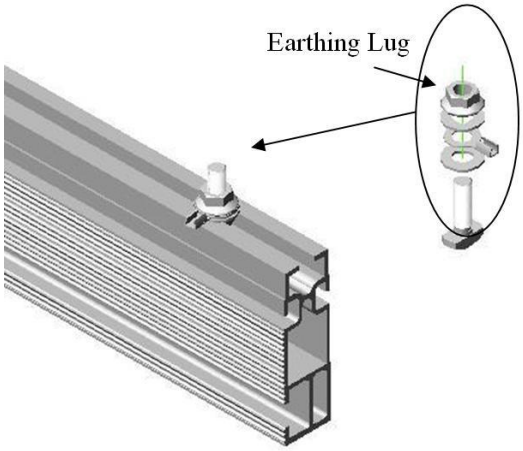
Fig. 5.2.3.2 Installing the second module with Mid Clamp

Repeat the procedure until all modules are installed. Attach the outside edge of the last module to the rail with end clamps. Trim off any excess rail. Allow minimum 15mm between the end clamp and the end of the rail.

5.2.4 Earthing the System

EzQuik *Aluminium Solar PV Module Mounting System* has internal build-in earthing system. No extra earthing job is needed during installation; just connect earthing cables through one ***EzQuik*** *Earthing Lug* which is bolted on each module array after finish Modules installation. As shown in FIG. 5.2.4





Note: For the purpose of Earthing, only one Earthing Lug would be required to be installed on one rail in every one system. The design and manufacture of ***EzQuik*** products ensure the system meets Earthing requirement.

FIGURE 5.2.4 ***EzQuik*** internal build-in system and Earthing Lug

SECTION 6 SPECIAL PARTS

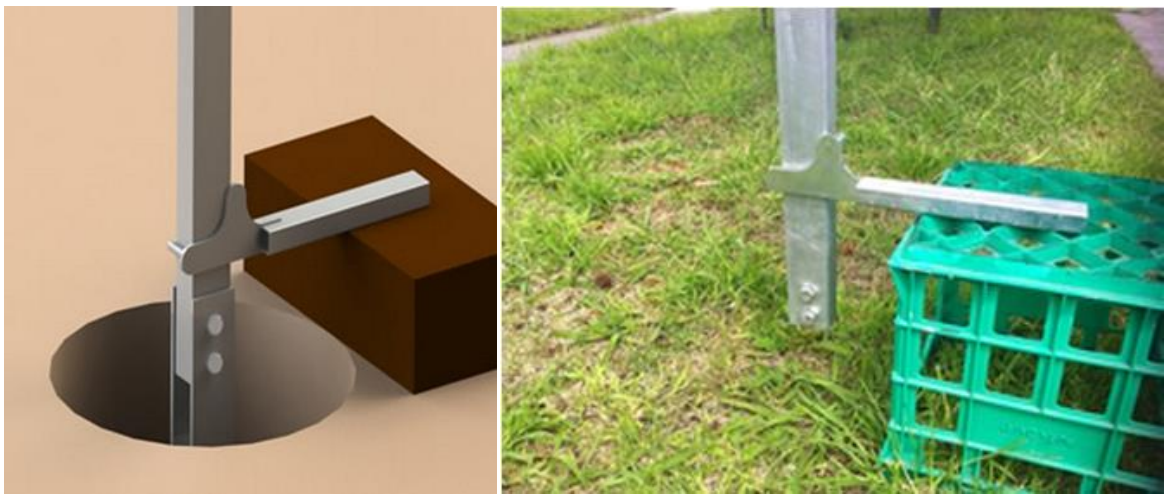
6.1 Temporary Support Tools

MSS provide convenient temporary support tools – F-Pliers and Camping Strips to allocate Bottom Support System GPSA footing during the installation. As shown in FIG 6.1.1. With the Temporary Support Tools, the installation time shall be efficiently shortened.

FIG 6.1.1 F-Pliers and Camping Strips

Advantage one: Temporary support tools' easy operation process shortens installation time.

During the installation of GPSA footing, the Bottom Support System can be lifted up with F-Pliers and positioned at any height and anywhere. The F-Pliers is designed with Self-Locking property between two surfaces, which allows the tool to be locked on anywhere of the support system legs to adjust position accordingly. With the help of any object found on the site, F-Pliers can be effortlessly used to modify the height to needed. As shown in FIG .6.1.2, the F-Pliers are used in combination with brick and milk bracket from the site.



F-Pliers is used in combination with brick F-Pliers is used in combination with milk bracket

FIG. 6.1.2. Modify the height by using F-Pliers

Advantage two: With temporary support tools, Top Rails System and modules can be installed and completed before the concrete foundation is set.

Using Camping Strips to position and stretch the strips on both sides of the Bottom Support System to keep it vertical and stable then, and then start Top Rails System and modules as shown in FIG. 6.1.3.

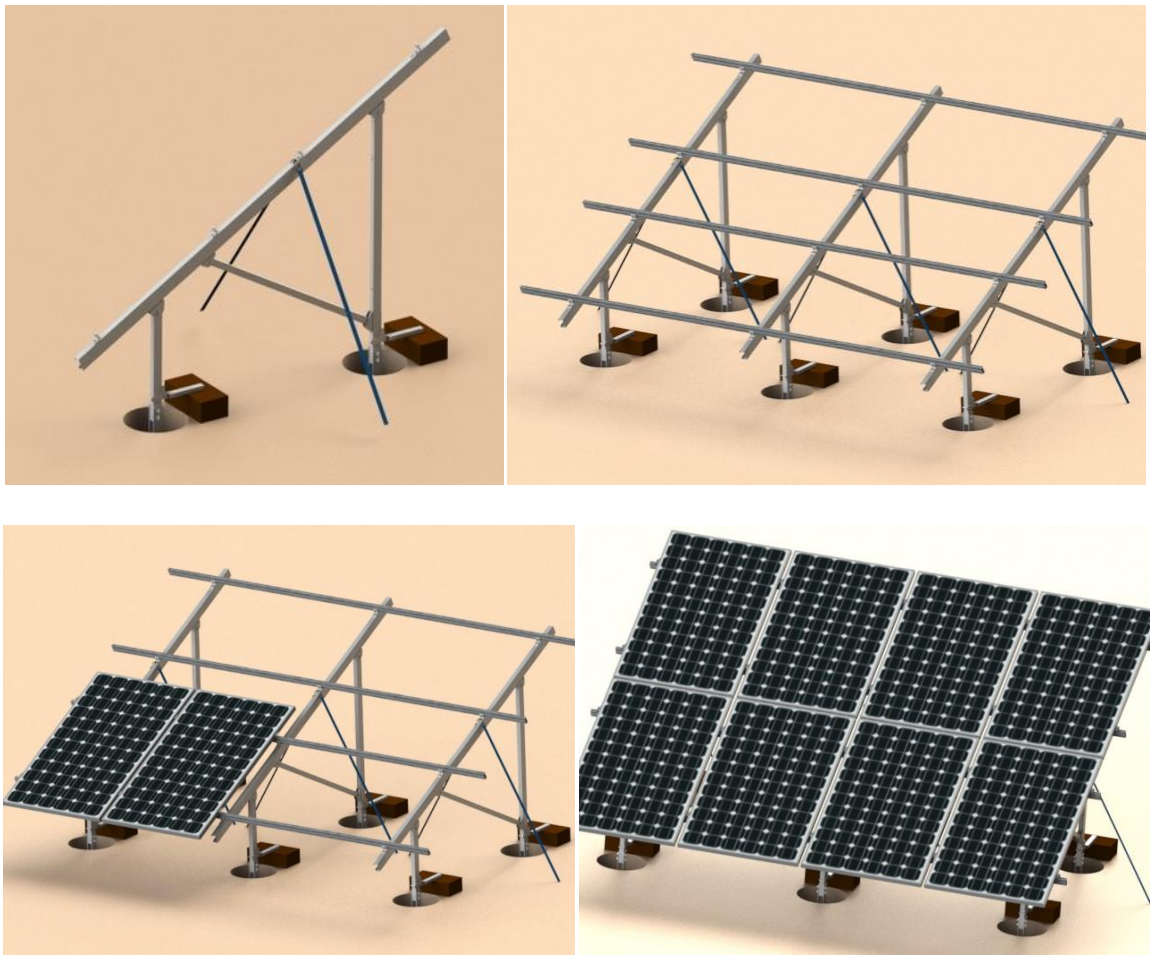


FIG. 6.1.3. Allocate Bottom Support System with temporary support tools and install Top Rails System and modules

Because of the two advantages above, using temporary support tools makes installation time efficiently shorten. Therefore, makes GPSA be the best footing.

SECTION 7 ACCESSORIES

Cable Tie – MSS provide four types of Cable Ties used for tie up cables, as shown in Fig. 7.1

MCT200 – Stainless Steel Cable Tie 4.6x200mm

MCT250 – Stainless Steel Cable Tie 4.6x250mm

MCT300 – Stainless Steel Cable Tie 4.6x300mm

MCT350 – Stainless Steel Cable Tie 4.6x350mm

FIG. 7.1 Cable Tie

Labels – MSS provide labels for Sydney and Melbourne areas according to local standards, as shown in Fig. 7.2

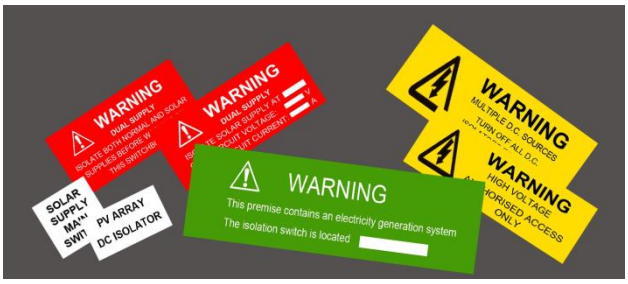


FIG. 7.2 Labels

Earthing chip – Used in combination with Earthing Lug depending on the size of wire, as shown in Fig. 7.3

FIG. 7.3 Earthing Chip

Cable Clip-Rail – Clip used on rails to clip cables, as shown in Fig. 7.4

FIG. 7.4 Cable Clip for rails.

Cable Clip-Panel – Clip used on panels to clip cables, as shown in Fig. 7.5

FIG. 7.5 Cable Clip for panels.

Out Lock – Used to lock DC isolator switch using Allen Key, as shown in Fig. 7.6

FIG. 7.6 Out Lock used to lock DC isolator switch.

Rail Edge Cover – MSS provide the rail edge cover for safety purposes. As well as make rails visually pleased. As shown in Fig. 7.7

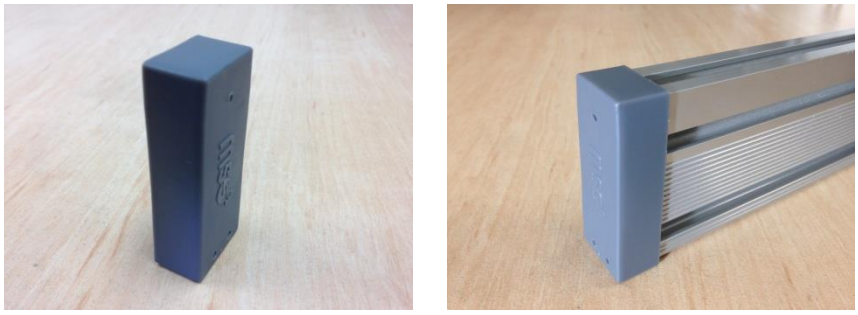


FIG. 7.7 Rail Edge Cover.

SECTION 8 SUPPORT

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SECTION 9 MAINTENANCE AND WARRANTY

9.1 Maintenance

Please maintain ***EzQuik*** Mounting System in every eight years:

- Examine and tighten all fasteners, including Rails and Brackets connections
- Examine and fasten all mid and end – clamps.
- Examine all surfaces for aluminium parts for corrosions. If corrosions occur, replacement is needed.
- Please consult with MSS for special situations.

9.2 Warranty

10 years Limited Product Warranty

To the original purchaser of our products, MicroSolar System Pty Ltd, warrants that all products shall be free of defects in material and workmanship for a period of 10 years at its first installation site, from the date of installation or 60 days after purchase.

The warranty does not apply to any foreign residue deposited on the finish. All installations in corrosive atmospheric conditions are excluded. This warranty does not cover damage to the product that occurs during its shipment, storage, or installation.

This warranty shall be voided if installation of the product is not performed in accordance with MSS's written installation instructions and design specifications therein, or if the product has been modified, repaired, or reworked in a manner not previously authorized by MSS in writing, or if the product is installed in an environment for which it was not designed.

MSS shall not be liable for consequential, contingent or incidental damages arising out of the use of the product by purchaser under any circumstances.

Within the specified warranty period, the product shall be reasonably proven to be defective for MSS to repair or replace the defective product, or any part thereof, in MSS's sole discretion. Such repair or replacement shall completely satisfy and discharge all of MSS's liability with respect to this limited warranty. Under no circumstances shall MSS be liable for special, indirect or consequential damages arising out of or related to use by purchaser of the product.

Manufacturers of related items, such as PV modules and flashings, may provide written warranties of their own. MSS's limited warranty covers only its product, and not related items.

APPENDICES