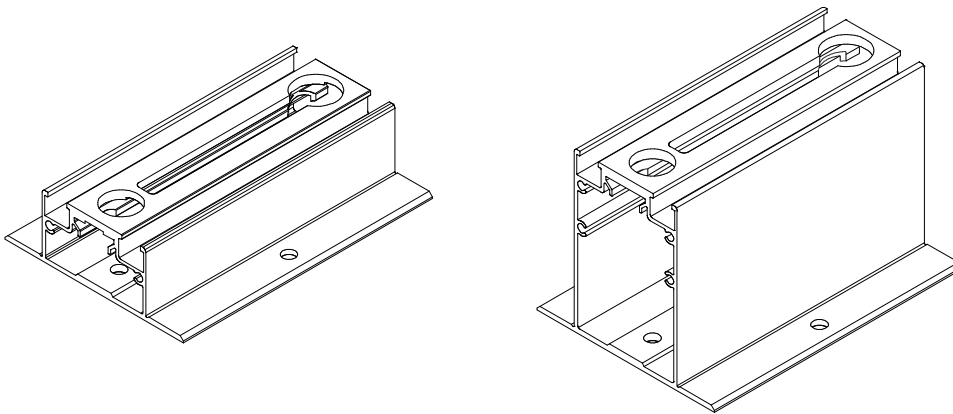


INSTALLATION MANUAL

RT-[E]Mount E Mount AIR



Contents

• INTRODUCTION	-----1
• SYSTEM FIRE RATINGS	-----2
• BONDING/GROUNDING of MODULES	-----2
• PERIODICAL INSPECTION	-----2
• Tools & Supplies Required for Assembly	-----3
• INSTALLATION SAFETY	-----2
PART A: Materials	-----4
PART B: Landscape Layout	-----7
PART C: Portrait Layout	-----31
PART D: Electrical Setup	-----50

Roof Tech, Inc.

92 Hamilton Dr. Suite A
Novato, California 94949
TEL (415) 382-1036

Contents

• Introduction	1
• System Fire Ratings	2
• Bonding/Grounding of Modules	2
• Periodical Inspection	2
• Tools & Supplies Required for Assembly	3
• Installation Safety	3
PART A: Materials	4
PART B: Landscape Layout	7
1. Installation of Brackets	7
(1) Bracket Layout	
(a) Rafter Installation	7
(b) Roof Deck Installation	10
(2) Bracket Installation	13
2. Installation of Panels	22
3. Eaves Cover: Skirt (Optional, E Mount AIR only)	29
PART C: Portrait Layout	31
1. Installation of Brackets	31
(1) Bracket Layout	31
(2) Bracket Installation	34
2. Installation of Panels	42
PART D: Electrical Setup	50
1. Cable Management Options	50
2. Mounting on the Module Frame	50
3. Cable Mounting Bracket (Optional)	51
4. Grounding Setup	52
5. Micro-inverter Bracket (Optional, E Mount AIR only)	55

Introduction

Please review this manual thoroughly before installing your Roof-Tech system. Aside from reading this manual, please review the PE Stamped Engineering Certification for the Roof-Tech [E]Mount and E Mount AIR Solar products for your State. This manual provides supporting documentation for the installation of Roof-Tech's [E]Mount and E Mount AIR products.

We recommend installer to carefully review the instructions provided by the PV module manufacturer and become acquainted with OSHA's safety procedures prior to installing the PV system.

The installer is solely responsible for:

- Handling and installing the PV modules according to the manufacturer's instruction.
- Complying with all applicable local or national building codes, standards and industry best practices including any code that may supersede this manual.
- Ensuring that Roof-Tech's and other products are appropriate for the particular installation and the installation location.
- Ensuring that the roof, its rafters, connections, and other structural support members can support the array under all code level loading conditions.
- Using only Roof-Tech parts and installer-supplied parts as specified by Roof-Tech. (Substitution of parts may void the warranty and invalidate the letters of certification.)
- Verifying the strength of any alternate mounting devices used in lieu of the anchoring screws.
- Maintaining the waterproof integrity of the roof.



Attention

To maintain the flashing performance, avoid installation when the temperature is below 22F or above 176F.

- Ensuring safe installation of all electrical and mechanical aspects of the PV array.
- Ensuring correct and appropriate design parameters are used in determining the design loading used for design of the specific installation. Parameters, such as snow loading, wind speed, exposure and topographic factor should be confirmed with the local building official or a licensed professional engineer.

System Fire Ratings

Roof Slope	Mount	Module*1	Gap*2	Skirt (Wind Deflector)	Fire Rating*3
Steep Slope (≥2/12)	E-Mount	Type 1	Any	—	Class A
	E-Mount AIR	Type 1	Any	—	Class A
Low Slope (<2/12)	E-Mount	Type 1	1-1/8"	—	Class A
	E-Mount AIR	Type 1	3"	Required	Class A

*1: Module Type per UL 1703 (November 18, 2014).

*2: Distance between the bottom of the module frame and the roof covering.

*3: Class A fire rated PV systems can be installed on Class A, B, and C roofs.

Bonding / Grounding of Modules

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 instruction.

Periodical Inspection

Roof Tech Inc. recommends inspecting installed racking system periodically for loose components, loose fasteners and any corrosion. If found, those components are to be re-tighten, or replaced immediately.

Tools & Supplies Required for Assembly

Tools needed for building the array

- Hex bit socket (13 mm) : Long socket
- Hex bit socket (8 mm)
- Measuring tape
- Chalk line
- Torque wrench
- Scissors

Torque Values for Dry Bolts : 12 Nm applied to Middle and End Clamps.

Installation Safety

The installation process requires working on sloped and elevated building surfaces, in outdoor weather conditions, using tools and heavy components designed for the generation of electricity.

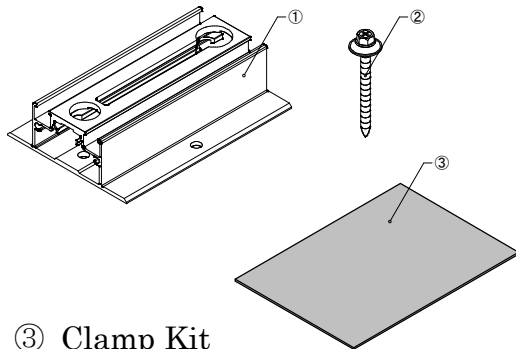
- Use properly anchored fall protection equipment.
- Use caution to prevent objects from falling or dropping off the roof area.
- Cordon off ground areas directly beneath the roof work area when possible.
- Always use personal protection equipment such as safety glasses, gloves, etc.
- Do not perform installation in excessively wet, windy, or inclement weather conditions.
- When working in hot weather, work crews should take care to prevent symptoms of over-heating or dehydration.
- Use proper lifting and carrying techniques when handling heavy components at the job site. If conditions are challenging for moving PV modules to the roof area, use a mechanical lift.
- Follow best practices when working around high-voltage electrical equipment.
- Do not anchor fall protection equipment to roof mounts, or any other inappropriate roof structure.

PART A: Materials

1. Items with RT-[E]Mount

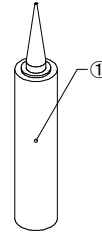
① [E]Mount Bracket Set

	Item
①	[E]Mount
②	Screw 5.0×60
③	Butyl Spacer



② Roof sealant

	Item
①	Roof sealant

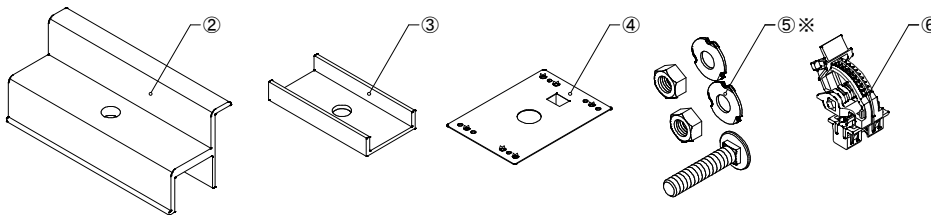


※Recommended Product

- Henry : 208R, 209, 925 (Black)
- Geocel:S2, S4 (Black)
- Sashco : Through the Roof
- Boss : 125 (Black)

③ Clamp Kit

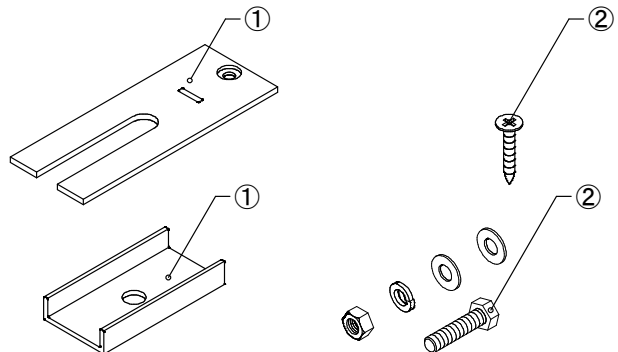
	Item
①	Middle Clamp
②	End Clamp
③	Panel Spacer
④	Bonding Plate
⑤	Carriage Bolt M8-**
⑥	Cable Holder



※ The nuts in RTM-MCB45BK-B-00 are silver and black.
The nuts in RTM-MCB50 and 55BK-B-00 are black.

④ Shims

	Item
①	Shim
②	Thread-forming Screw 5.0×16



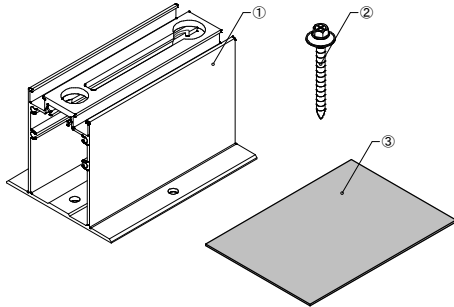
⑤ Stopper Set (Portrait only)

	Item
①	Stopper
②	M6-25 Bolt Set

2. Items with E Mount AIR

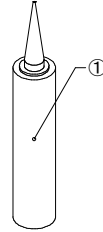
① E Mount AIR Bracket Set

	Item
①	[E]Mount AIR
②	Screw 5.0×60
③	Butyl Spacer



② Roof sealant

	Item
①	Roof sealant

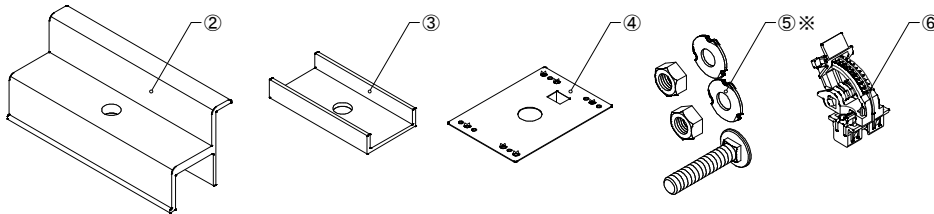
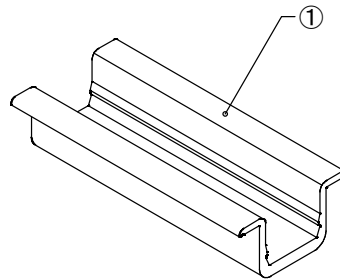


※Recommended Product

- Henry : 208R, 209, 925 (Black)
- Geocel : S2, S4 (Black)
- Sashco : Through the Roof
- Boss : 125 (Black)

③ Clamp Kit

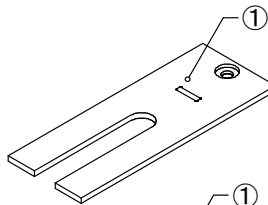
	Item
①	Middle Clamp
②	End Clamp
③	Panel Spacer
④	Bonding Plate
⑤	Carriage Bolt M8-**
⑥	Cable Holder



※ The nuts in RTM-MCB45BK-B-00 are silver and black.
The nuts in RTM-MCB50 and 55BK-B-00 are black.

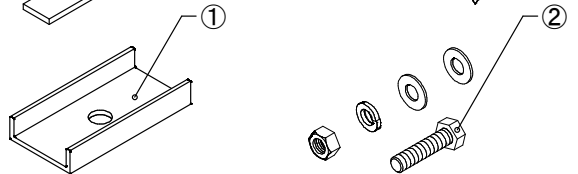
④ Shims

	Item
①	Shim
②	Thread-forming Screw 5.0×16



⑤ Stopper Set (Portrait only)

	Item
①	Stopper
②	M6-25 Bolt Set



3. Module Clamp Table

Clamp	Panel Frame Height	Item ID	Description
End Clamp	31 mm	RTM-E31BK-B	RT-[E]Mount End Clamp 31 mm kit CARTON
	33 mm	RTM-E33BK-B	RT-[E]Mount End Clamp 33 mm kit CARTON
	35 mm	RTM-E35BK-B	RT-[E]Mount End Clamp 35mm kit CARTON
	40 mm	RTM-E40BK-B	RT-[E]Mount End Clamp 40 mm kit CARTON
	46 mm	RTM-E46BK-B	RT-[E]Mount End Clamp 46 mm kit CARTON
	50 mm	RTM-E50BK-B	RT-[E]Mount End Clamp 50 mm kit CARTON
Middle Clamp	31 – 40 mm	RTM-MCB45BK-B	RT-[E]Mount Middle Clamp kit CB45 CARTON
	46 mm	RTM-MCB50BK-B	RT-[E]Mount Middle Clamp kit CB50 CARTON
	46 – 50 mm	RTM-MCB55BK-B	RT-[E]Mount Middle Clamp kit CB55 CARTON

4. Grounding···Lugs & Straps

All electrical installation and procedures should be conducted by skilled, licensed and bonded electricians. All work must comply with all national, state and local installation procedures, product and safety standards. These standards include but are not limited to applicable National Electrical Code NEC 690 and NEC 250, National Electrical Installation Standards (NEIS™), UL Standards, and OSHA Regulations.

Note: **Maximum Series Fuse Rating of 20 A.**

Grounding, Bonding Lugs and Straps are not provided by Roof Tech Inc.

1) BURNDY

• WEEB LUG

①	WEEB-LUG-6.7
②	WEEB-LUG-6.7AS
③	WEEB-LUG-8.0
④	WEEB-LUG-8.0AS
⑤	WEEB-LUG-8.2MS
⑥	WEEB-LUG-15.8

• WEEB-BONDING JUMPER

①	WEEB-BNDJMP6.7
②	WEEB-BNDJMP6.7AS
③	WEEB-BNDJMP8.0
④	WEEB-BNDJMP8.0AS
⑤	WEEB-BNDJMP8.2MS
⑥	WEEB-BNDJMP9
⑦	WEEB-BNDJMP12
⑧	WEEB-BNDJMP24
⑨	WEEB-BNDJMP36

2) ILSCO

• ILSCO Dual Rated Lay-In Ground Lug type SGB

①	SGB-4
---	-------

• ILSCO Dual Rated Lay-In Ground Lug type GBL

①	GBL-4
②	GBL-4SS

• ILSCO Copper Lay-In Ground Lug Direct Burial type GBL-DB

①	GBL-4DB
②	GBL-4DB-14
③	GBL-4DBT
④	GBL-4DBT-14

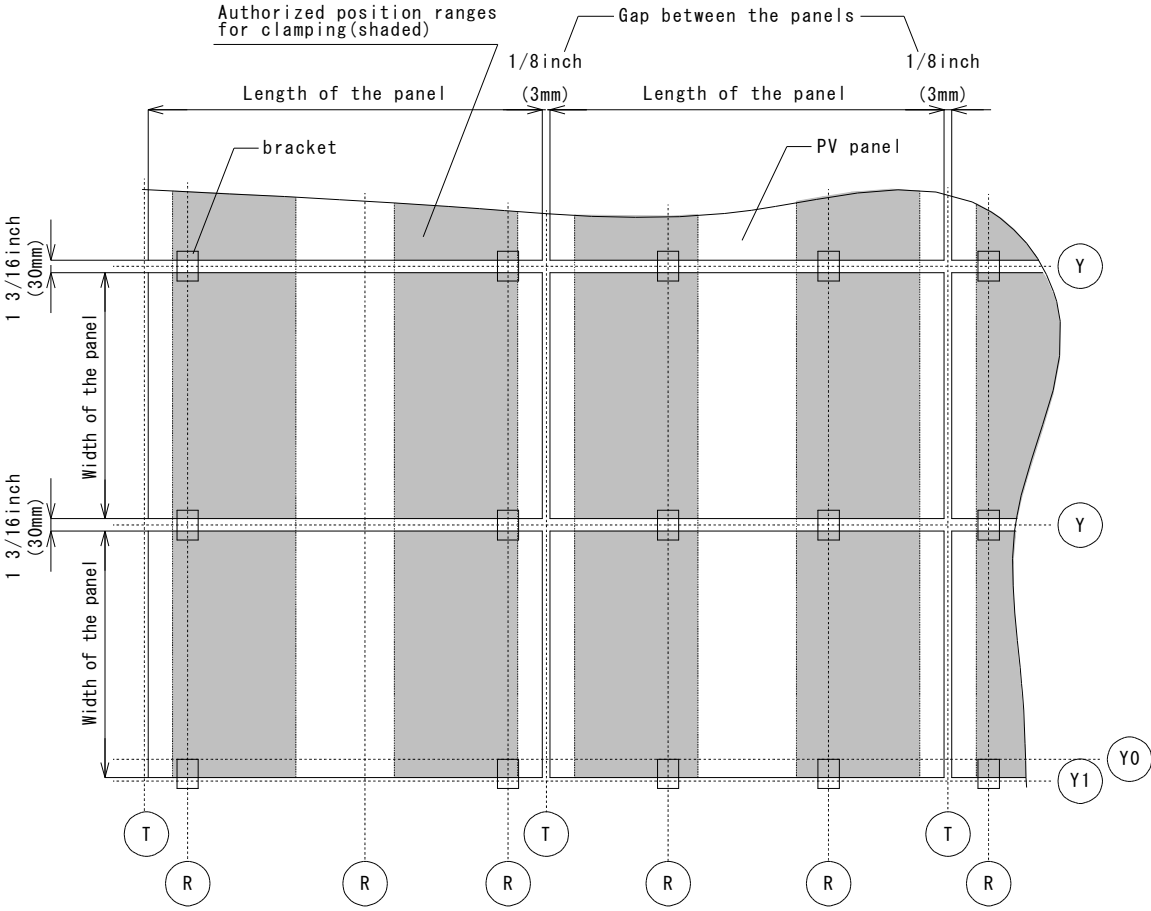
PART B Landscape Layout

1. Installation of Brackets

(1) Brackets Layout

a) Installation on the RAFTER

Example (Scale: Not to Scale)



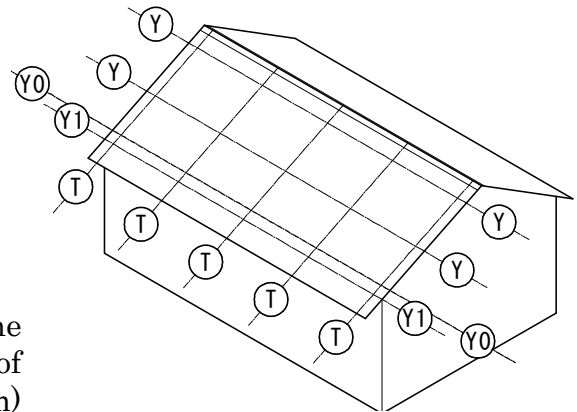
Note: Minimum distance $1/8$ inch (3 mm) between panels.

LANDSCAPE
BRACKET LAYOUT

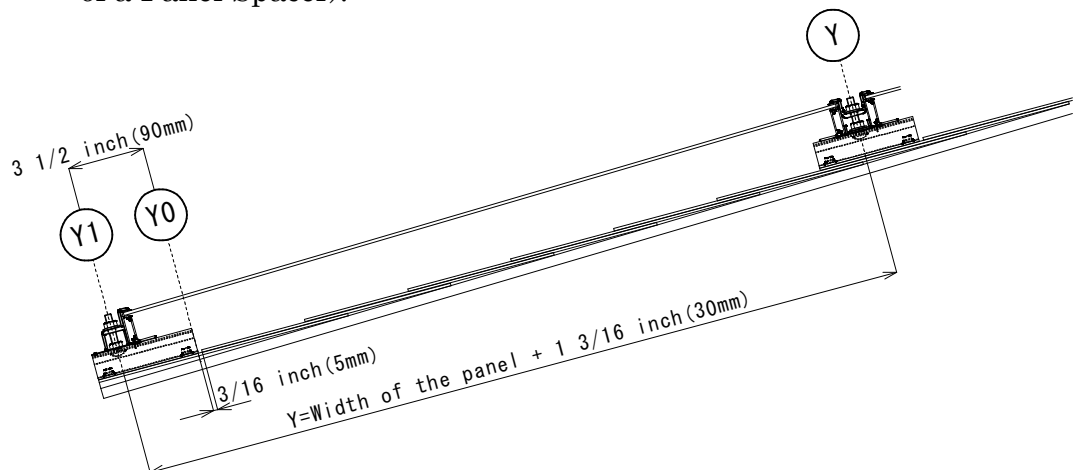
① Chalk line according to the layout plans to indicate brackets position.

(i) Line Y0: For the upper edge of the first row of brackets. It shall be $\frac{3}{16}$ inch (5 mm) lower from the edge of the upper composite shingle.

(ii) Line Y1: Delineates the location of the carriage bolt for the first row of modules. $3\text{-}\frac{1}{2}$ inch (90 mm) lower from Line Y0.



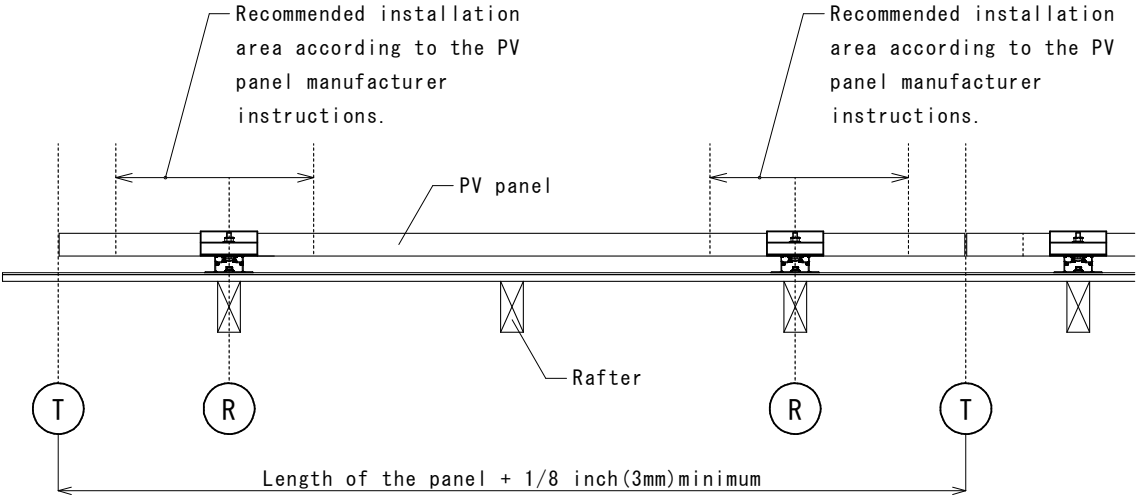
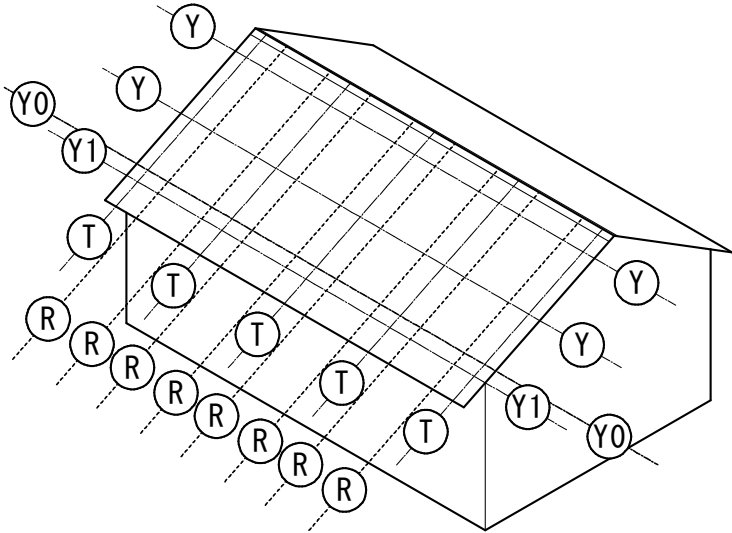
(iii) Line Y: Center of brackets of the second and after rows. The distance between Y1-Y and Y-Y shall be the width of panel (see figure of previous page) plus $1\text{-}\frac{3}{16}$ inch (30 mm, equivalent to the width of a Panel Spacer).



(iv) Line T: Line delineate the edge of a panel or center line of the gap between consecutive panels. The distance between T Lines shall be the length of a panel (see figure of previous page) plus the gap width. The gap width of $\frac{1}{8}$ inch (3 mm) is the minimum gap recommended.

② Aligning the brackets. Choose the most suitable rafter for the array, then draw chalk lines to mark their center.

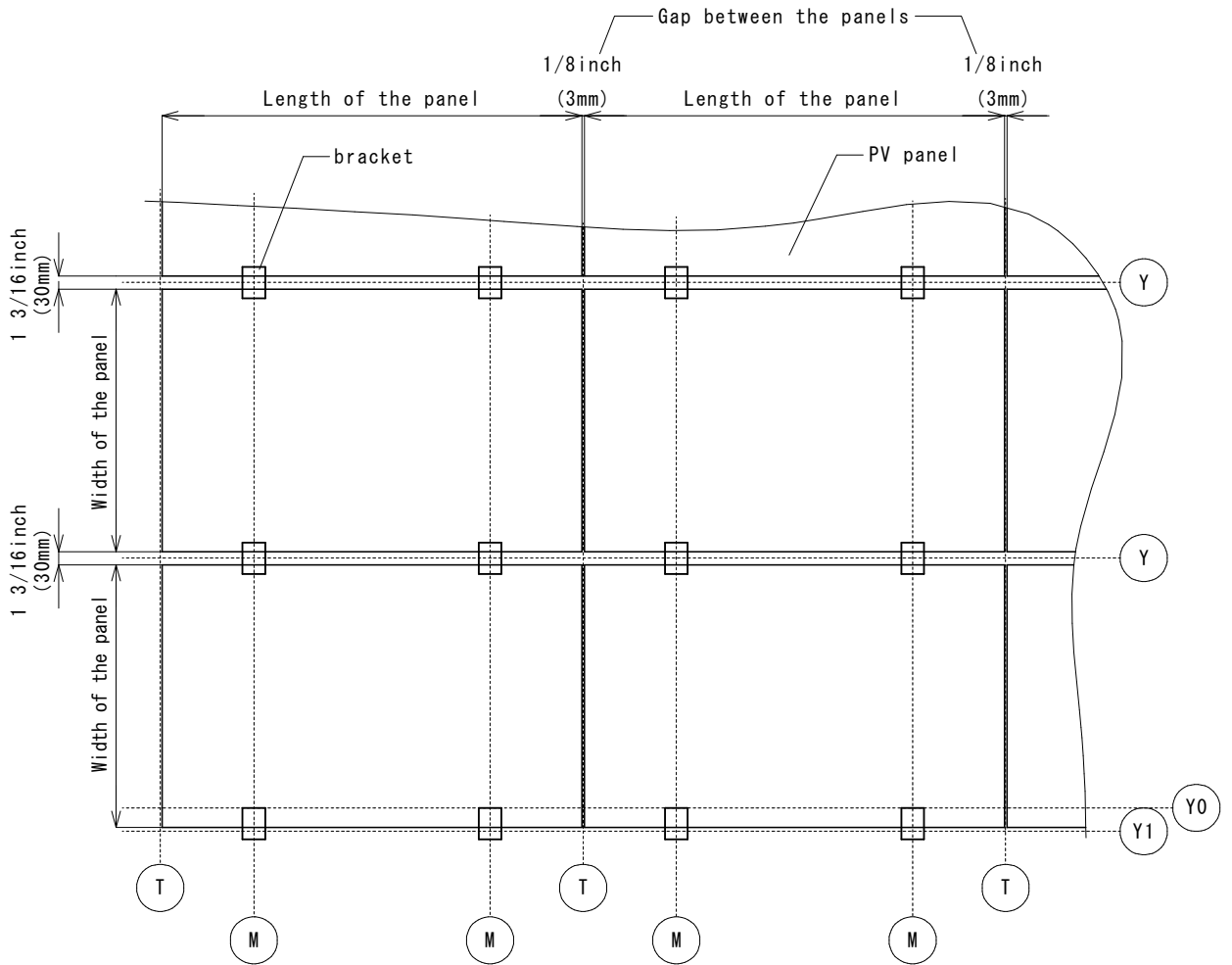
(i) Line R: Rafter center line.



LANDSCAPE
BRACKET LAYOUT

b) Installation on the **DECK**

Example (Scale: Not to Scale)



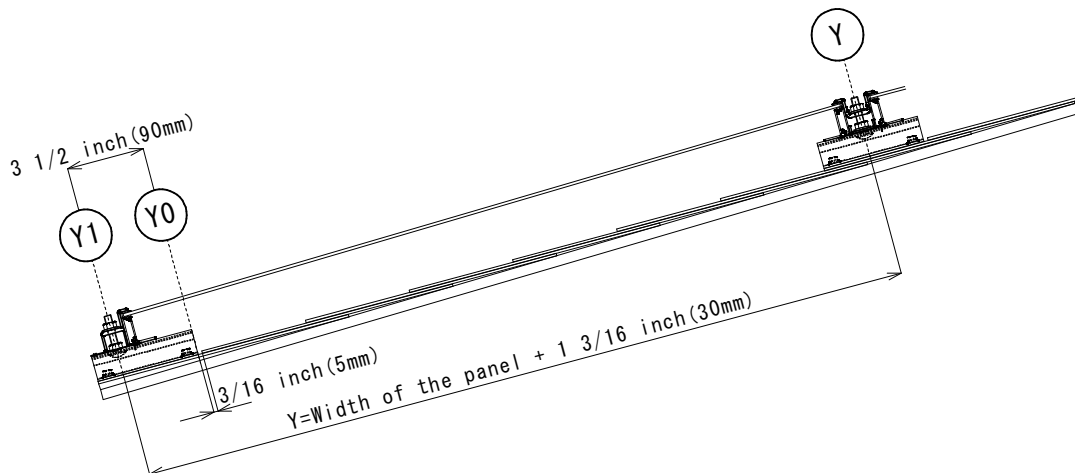
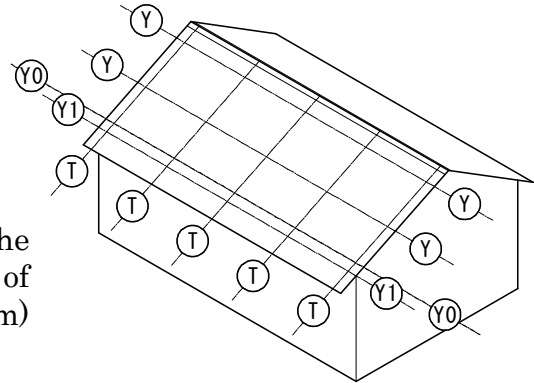
Note: Minimum distance 1/8 inch (3 mm) between panels.

① Chalk line according to the layout plans to indicate brackets position.

(i) Line Y0: For the upper edge of the first row of brackets. It shall be $\frac{3}{16}$ inch (5 mm) lower from the edge of the upper composite shingle.

(ii) Line Y1: Delineates the location of the carriage bolt for the first row of module. $3\frac{1}{2}$ inch (90 mm) lower from Line Y0.

(iii) Line Y: Center of brackets of the second and after rows. The distance between Y1-Y and Y-Y shall be the width of panel (see figure of previous page) plus $1\frac{3}{16}$ inch (30 mm, equivalent to the width of a Panel Spacer).

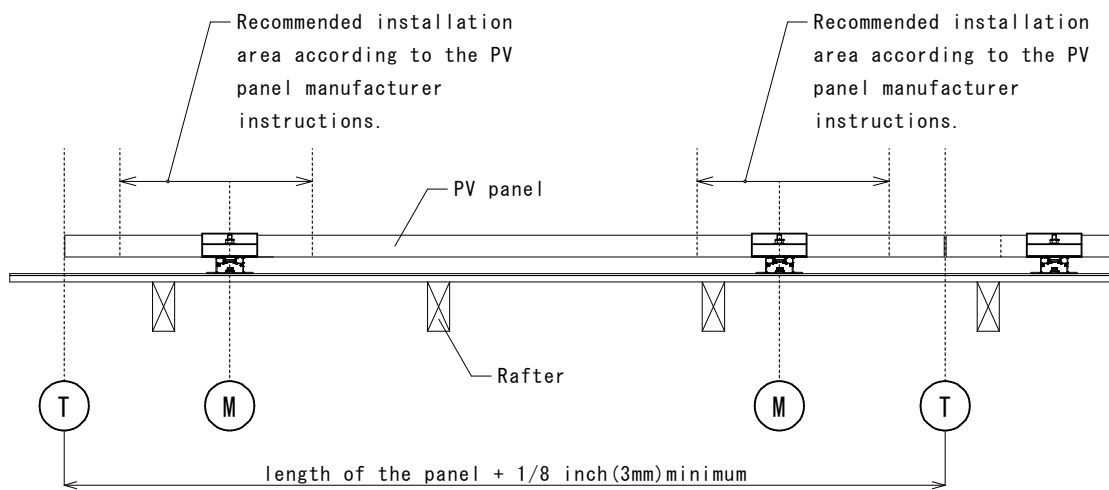
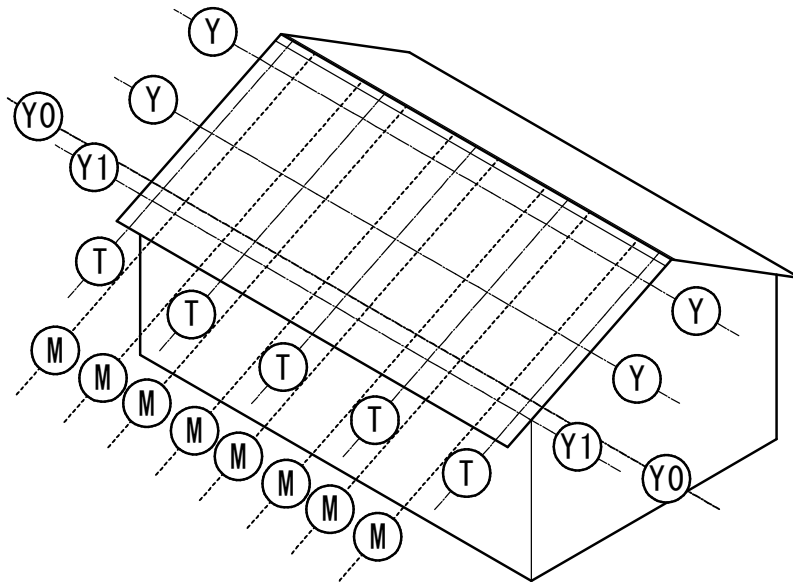


(iv) Line T: Line delineate the edge of a panel or center line of the gap between consecutive panels. The distance between T Lines shall be the length of a panel (see figure of previous page) plus the gap width. The gap width of $\frac{1}{8}$ inch (3 mm) is recommended, but any other width you prefer can be used.

LANDSCAPE
BRACKET LAYOUT

② Position the brackets. Make a chalk line according to the PV module installation instruction.

(i) Line M: Bracket center line.

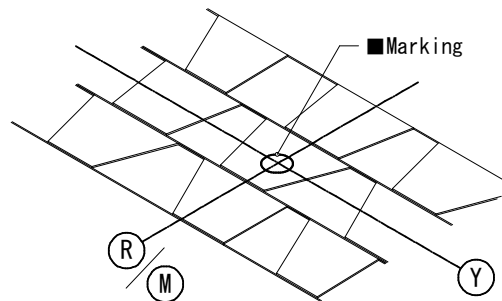
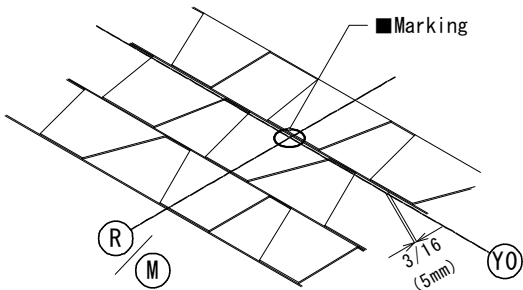
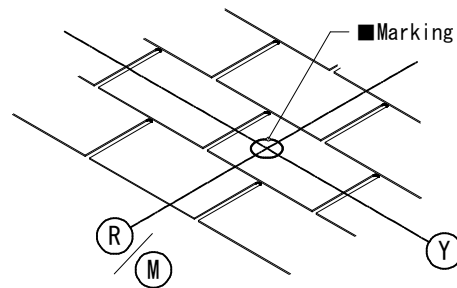
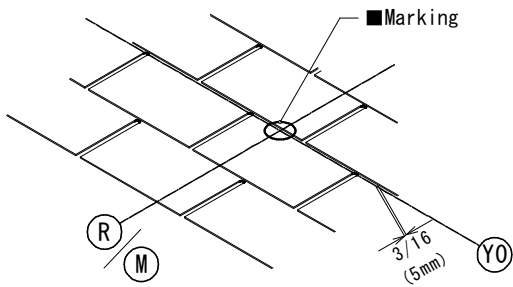


(2) Bracket Installation

! Attention

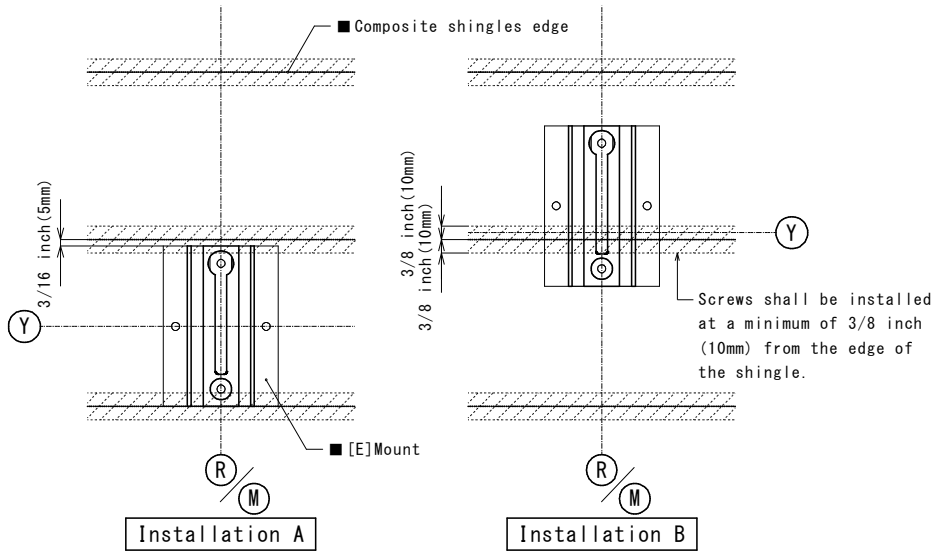
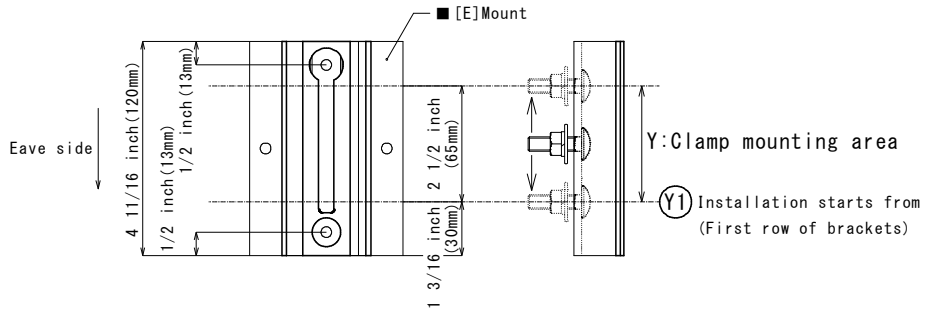
To maintain the flashing performance, avoid installation when the temperature is below 22F or above 176F.

- ① Mark the location at the intersection of the Y0 or Y Line and R/M Line.
(Top of the first row bracket.)



LANDSCAPE
BRACKET INSTALLATION

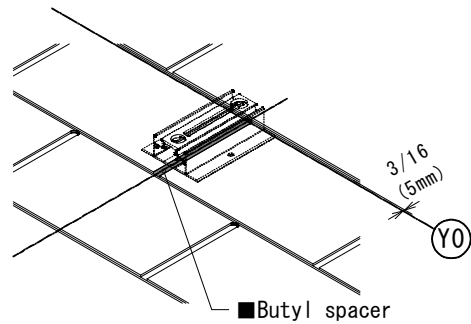
② Choose “A” or “B” installation at each bracket location.



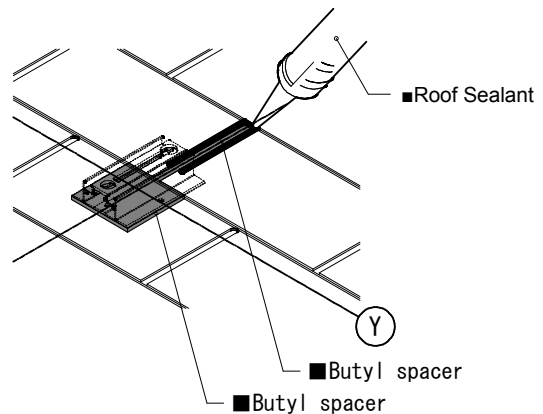
! Attention

Minimum clearance between mounting screws and the edge of the roofing shingle shall be 3/8 inch (10 mm).

- ③ Adjust the butyl tape layer to match the height of the upper shingle. When there is a gap, a slit, or a difference in the height, at the mounting location of the bracket, use additional butyl tape.

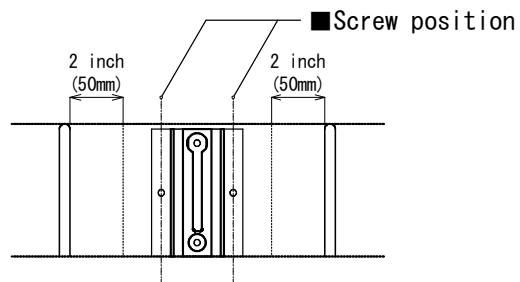


- When there is a slit at the installation spot, cut the butyl tape to match and place it in the slit. The slit must be filled with butyl tape.

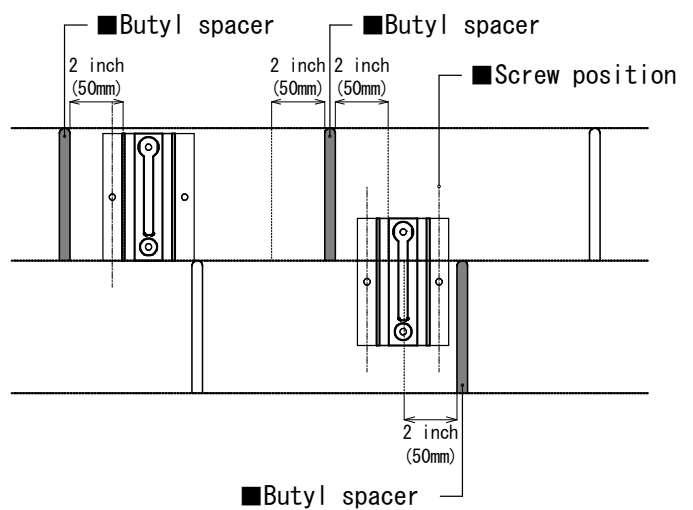


- When there is a slit on the upper side of the bracket, cut the butyl tape to match the slit shape. And apply roof sealant around the butyl tape.

Notice that the roof sealant is only used to add additional protective layer to the butyl tape.



- Best to position the bracket 2 inches away from the slit.

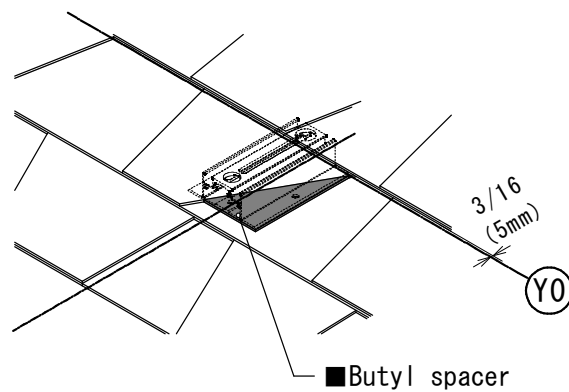


- If the mounting screw is within 2 inches, fill the slit with butyl tape.

LANDSCAPE BRACKET INSTALLATION

- When there are gaps in the position to install, cut butyl tape to the shape and place it.

Note: Each bracket comes with a butyl tape stuck on, and is supplied with an additional tape.

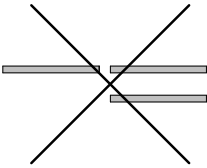
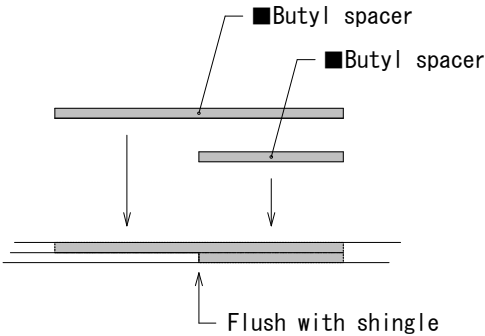


Attention

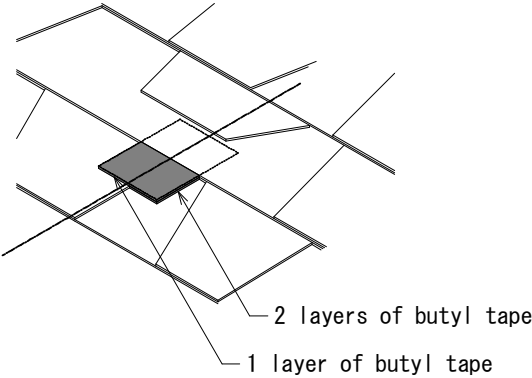
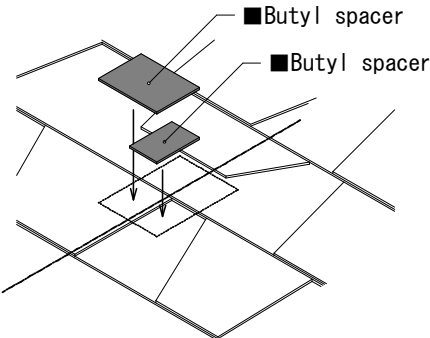
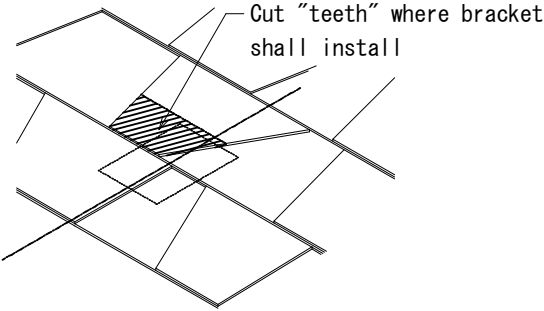
Peel off the protection paper from both side of butyl tape.

[Case 1]

- Use butyl tape to level the surface of the composite shingle roof.



Note: Do not splice the butyl tape.



LANDSCAPE
BRACKET INSTALLATION

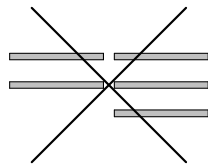
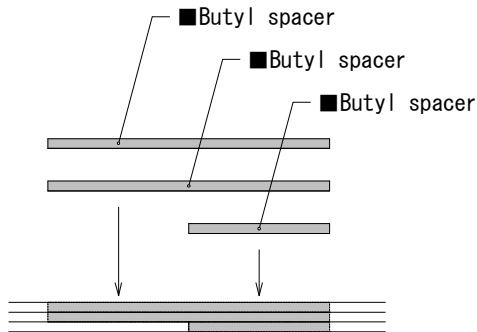
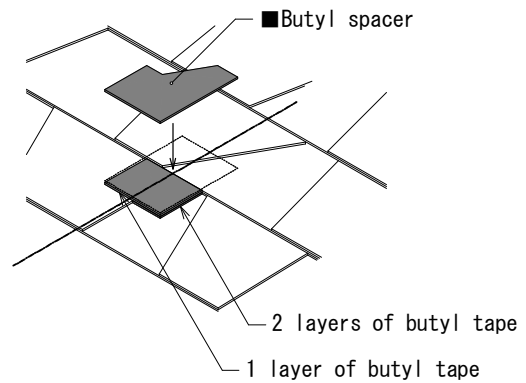
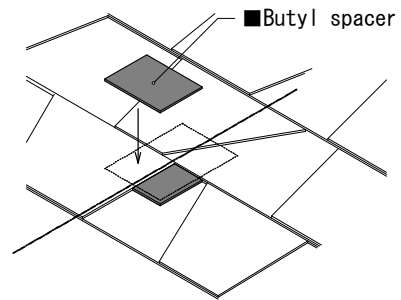
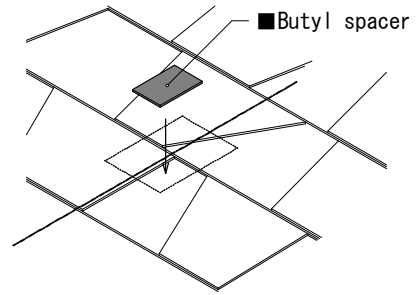
[Case 2]

- Building layers of butyl for the bracket to be mounted over the teeth region of composite shingle roofs.

We recommend 4 layers maximum.

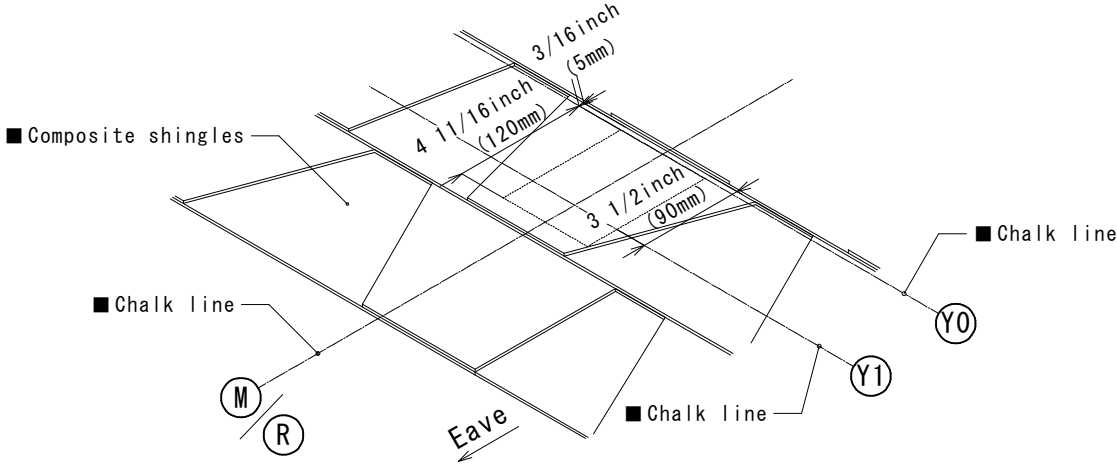
Layer 1 is built on the bottom of the bracket already.

The following layers must be cut to shape to cover the surface of the bracket at each location, assuring a completely flat surface.



Note: Do not splice the butyl tape.

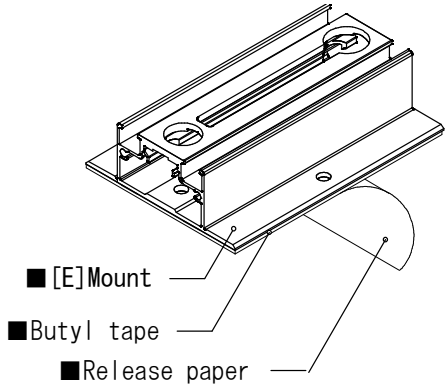
- ④ Starting eave edge installation
brackets shall be installed per
installation A.



- ⑤ Peel off the protective paper
from the butyl tape.

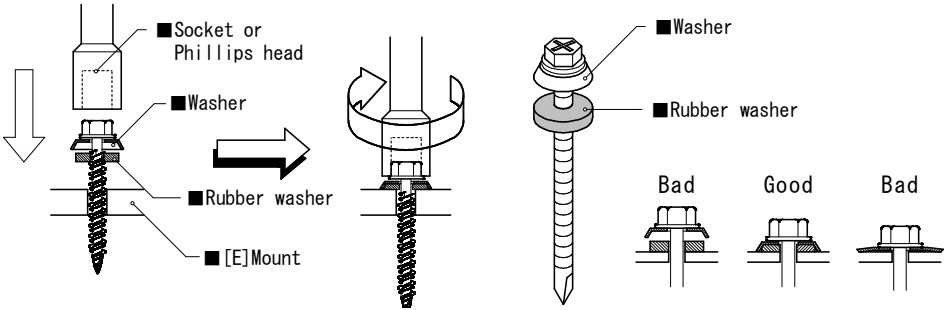
! Attention

Do not leave any protective paper on the surface of the butyl tape, it can cause an improper seal and may allow water intrusion under the bracket.



! Attention

Note: Do not set the 5.0 × 60 mm screw too tight.
The washer should not move.



(Note: Setting the screws too tight, screws may cause the roof to deform.)

LANDSCAPE
BRACKET INSTALLATION

⑥ Installing the bracket.

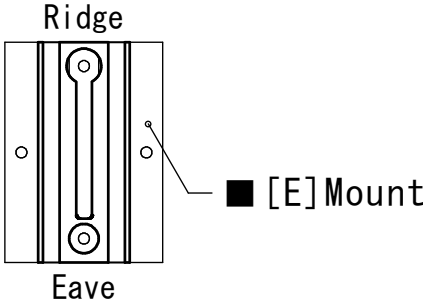
Place the brackets at the specified position with butyl tape and make sure the butyl attaches well to the roofing surface.

Set the bracket with 2 each (for RAFTER), or 4 each (for DECK), 5.0 × 60 mm stainless wood screw using 8 mm × L110 mm socket.

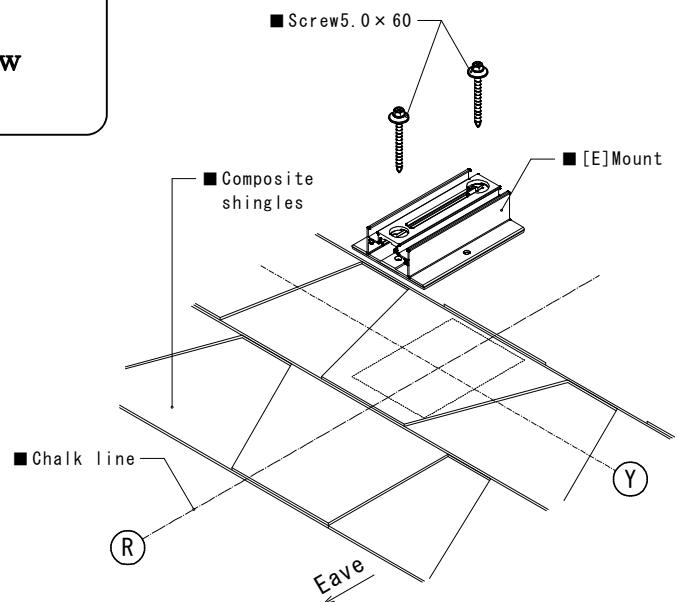
After completing process, make sure the brackets are securely fit to the composite shingle.

! Attention

- Note: [E]Mount must be installed with the larger hole on the bracket facing the top of the roof.



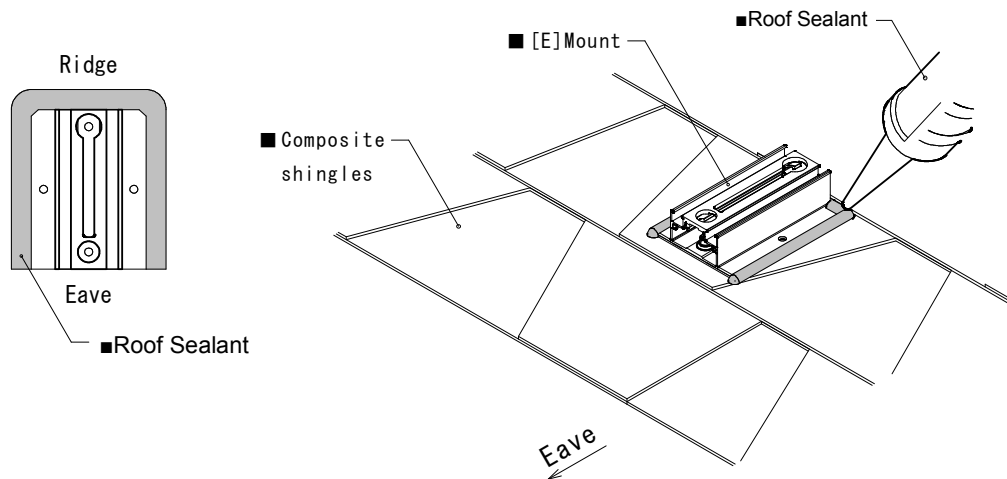
- Note: 5.0 × 60 mm wood screw must hit the rafter.



- ⑦ Apply roof sealant around the brackets, the top and each side edge of the brackets.

Cover the exposed butyl tape with roof sealant.

Do not seal the bottom of the brackets.



! Attention

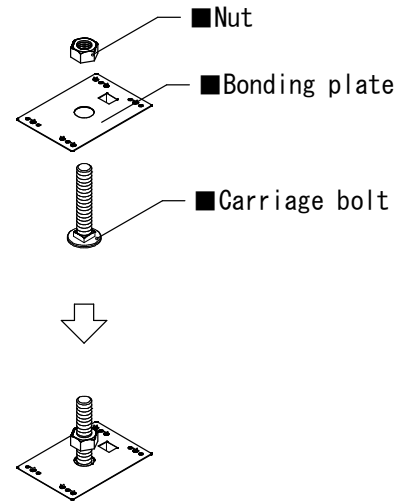
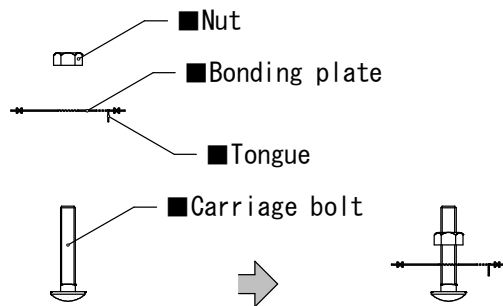
You may verify that screws come out from the deck panel together with butyl rubber, that indicates good flashing performance.

2. Installation of Panels

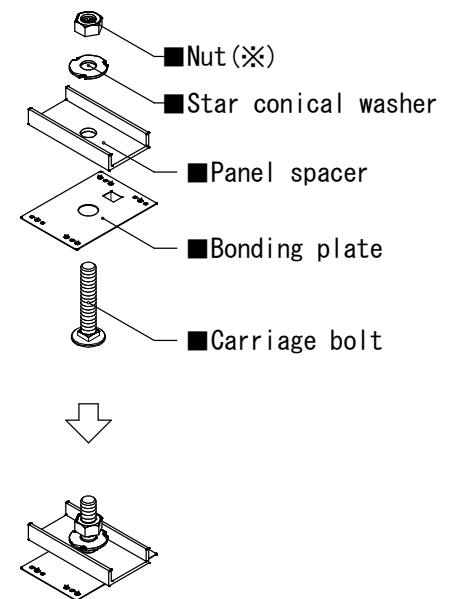
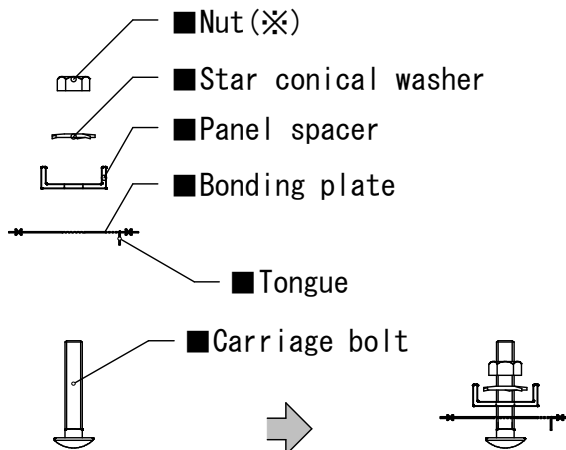
(1) Preparation

The pre-assembly of the carriage bolt set can save time on the roof.

- ① For the bottom and top row clamps : Pre-assemble the Carriage bolt with the Bonding plate and Hex Nut per illustration. The tongue of the bonding plate shall face down towards the carriage bolt head.



- ② For the middle clamps and Skirt option : Pre-assemble the Carriage bolt with the Bonding plate, Spacer, Star conical washer and Hex Nut per illustration. The tongue of the bonding plate shall face down towards the carriage bolt head.

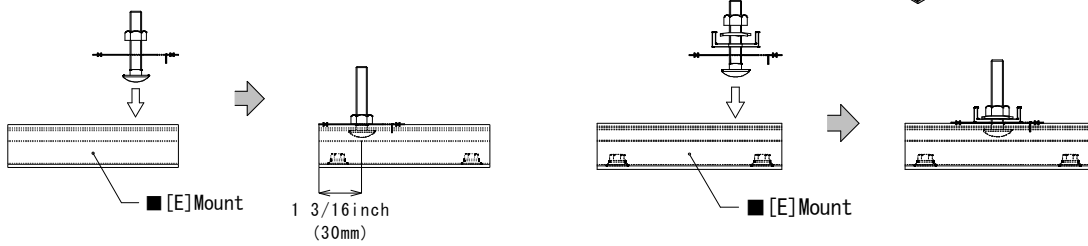
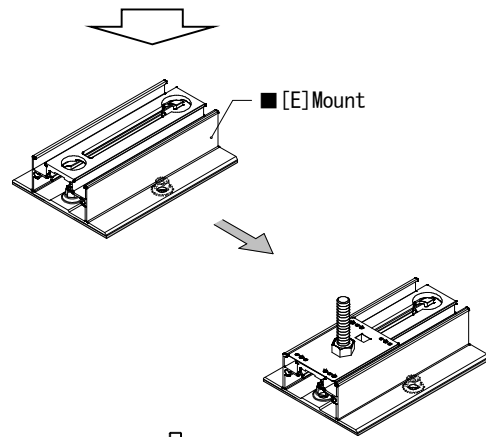
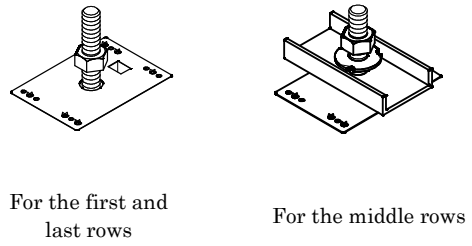


! Attention

(※) Silver:RTM-MCB45BK-B
Black :RTM-MCB50 and 55BK-B

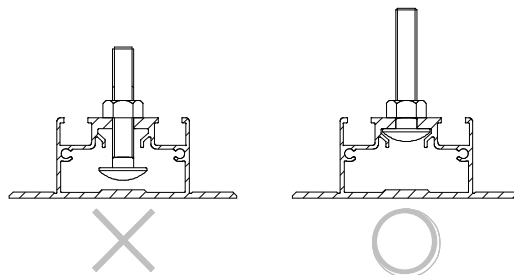
(2) Aligning and Leveling of the Brackets

- ① Insert the carriage bolt head into the T-slot of the bracket, then hand-tighten the nut. Bonding plate shall be installed with the tongue facing down and towards the opening for the carriage bolt head.



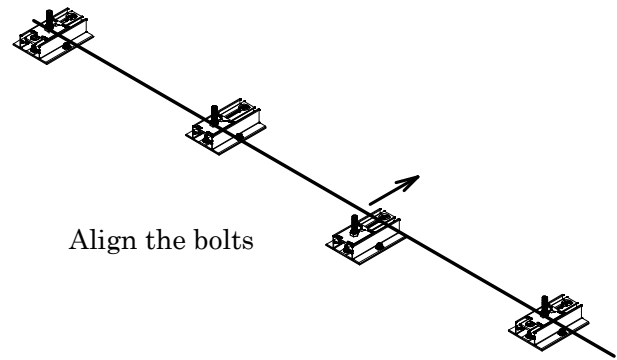
For the first and last rows

For the middle rows



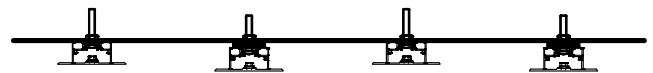
LANDSCAPE
PANEL INSTALLATION

- ② Stretch a string line tight along the Y1 line between the first and last brackets in the first row.

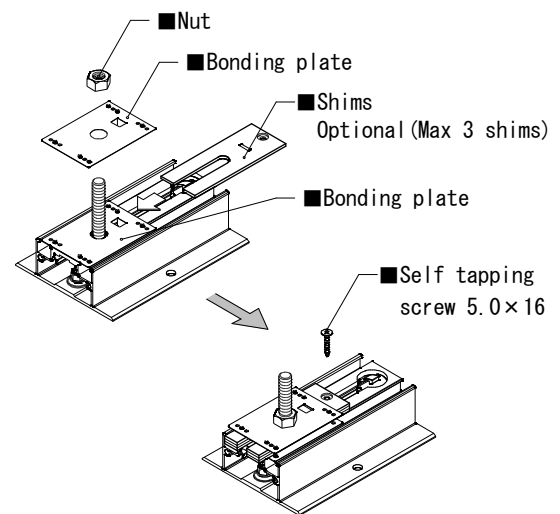


- ③ Align the carriage bolt positions of all the brackets in the row, using the string as a guide.

- ④ Next, level the height of the brackets using max. of 3 shims.

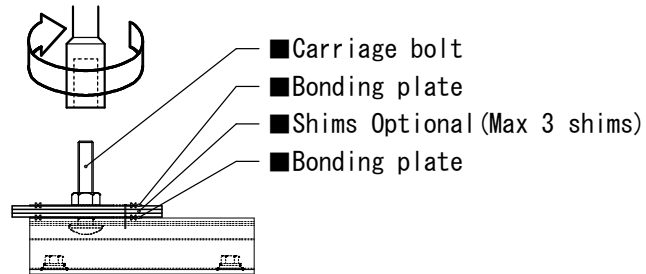


- ⑤ If shims are to be used to level the brackets, remove the nut, conical washer and spacer (Middle Clamps only), add the shims (3 max.) with the additional bonding plate right on top of the shims with the tongue bent flat. Then, place the spacer, conical washer and nut back following the previous procedure.



- ⑥ If two or three shims are used, set the thread-forming screw 5.0 x 16 to secure and bond the shims.

- ⑦ Set the carriage bolt and nut to torque 110 in-lbs (12 Nm).



- ⑧ After aligning the first row horizontally, follow the same aligning and leveling process vertically on far right and far left columns. Then align each remaining row of the array (in any order).

For the rows other than the first one, leave the carriage bolts and nuts hand-tightened.



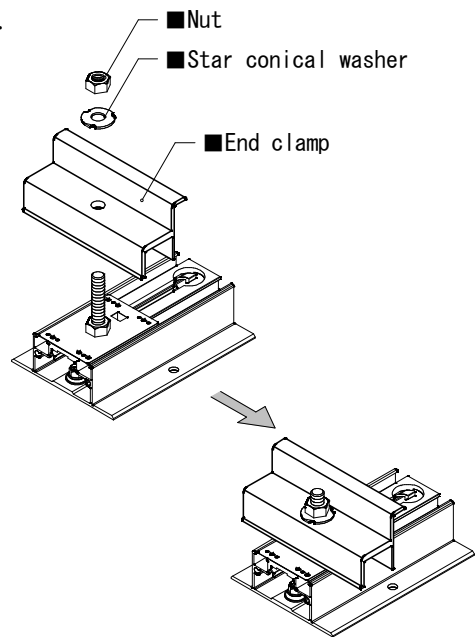
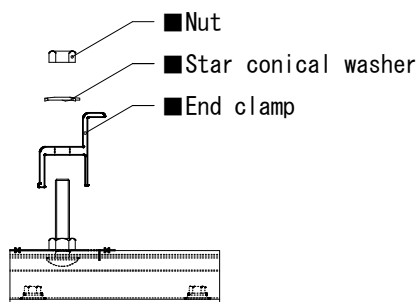
Attention

- **Note:** It is important to replace the bonding plate once it is used such as a panel replacement for instance.

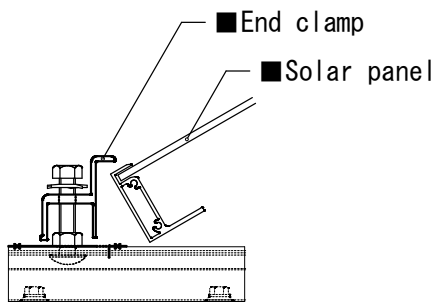
If you are installing the Eaves Cover (Skirt) for E Mount AIR,
Skip to "3. Eaves Cover : Skirt (Optional, E Mount AIR only)" on page 29.

(3) End Clamp Installation

- ① Install the End clamp with star conical washer and nut as it is shown on picture. Hand-tighten the nut, but keep clamp loose for the PV frame to slide in.

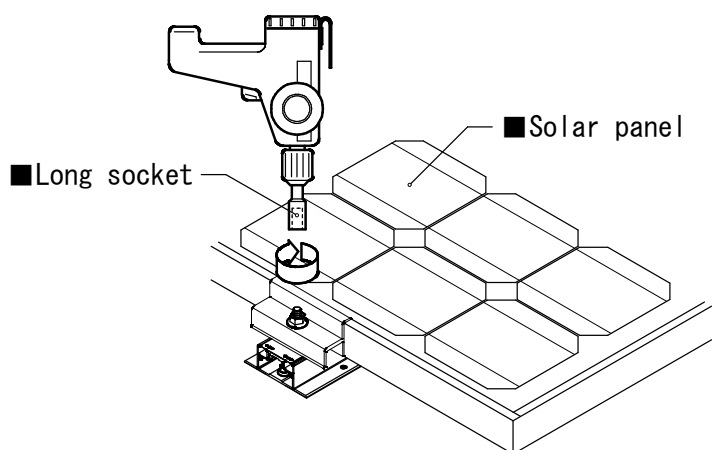


- ⑦ Place the PV panel on the bracket.



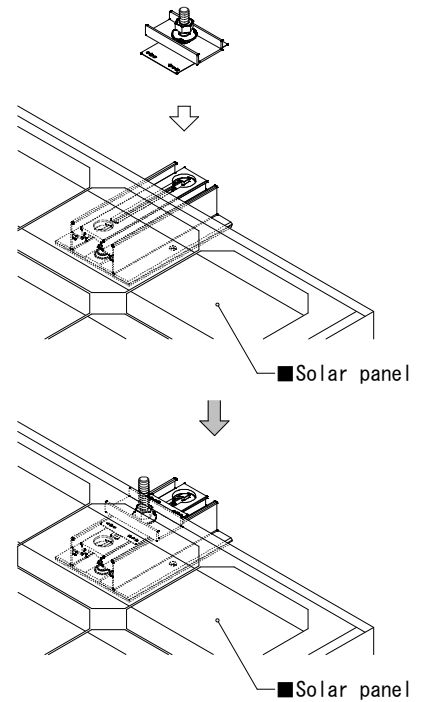
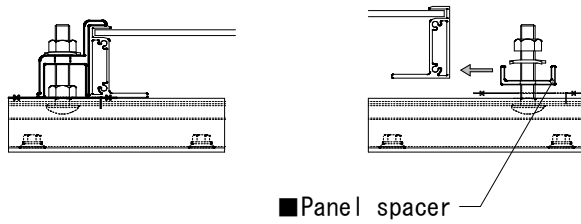
- ⑧ Make any adjustment then tighten the nut to 110 in-lbs (12 Nm).

- ⑨ Repeat ⑦ and ⑧ for all the first row panels.



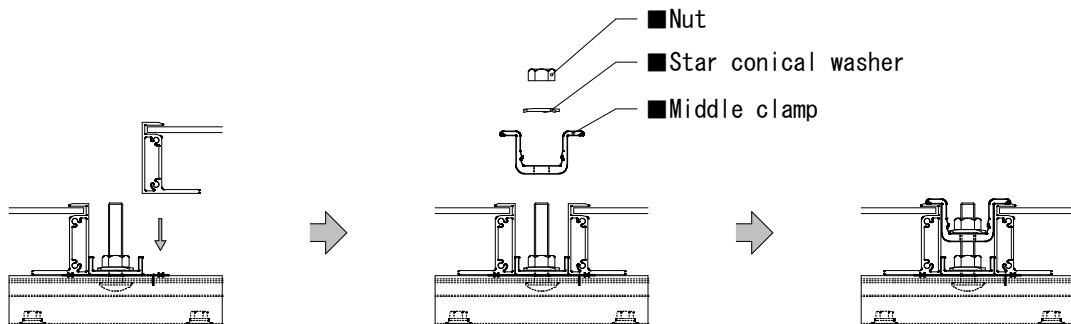
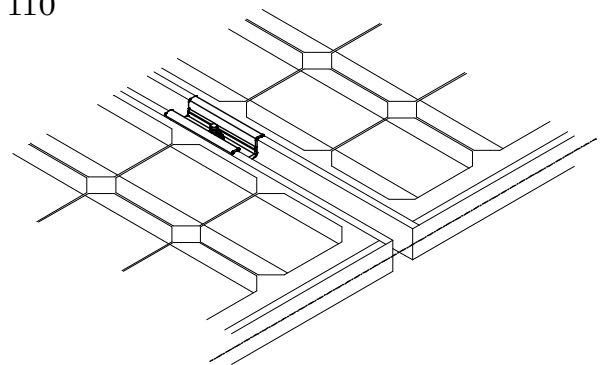
(4) Middle Clamp Installation

- ① Slide the panel spacer until it is flush to the frame of the panel already installed.



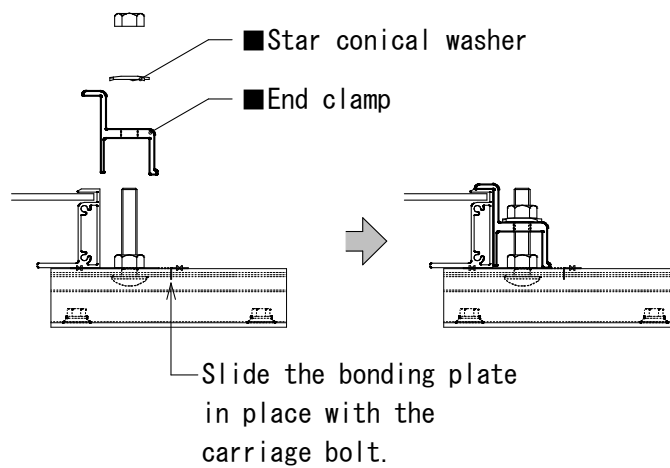
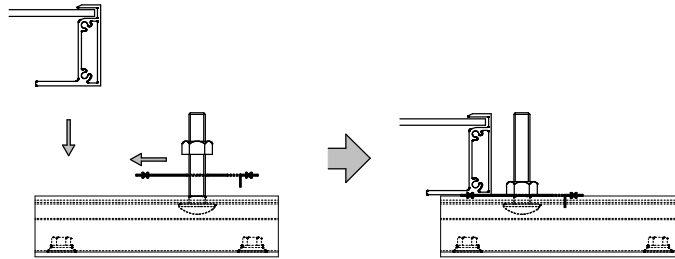
- ② If necessary, add or delete shims for further leveling. When shims are used, follow the procedures ⑤ and ⑥ on page 24. Then tighten the Panel spacer to 110 in-lbs (12 Nm).

- ③ Set the next Panel in place and install a Middle clamp with a nut and a star conical washer. Once the panel is at the correct and final position, set the nut to 110 in-lbs (12 Nm) torque.



(5) Upper End Clamp Installation

- ① Slide the Carriage Bolt with the Bonding Plate underneath the PV Panel. Then install the End clamp with star conical washer and nut as it is shown on picture.



For Cable Management Go to “PART D: Electrical Setup” on page 50

3. Eaves Cover: Skirt (Optional, E Mount AIR only)

! Attention

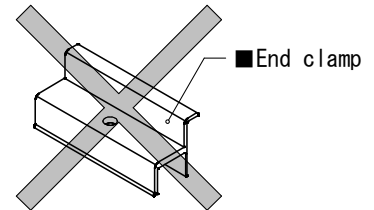
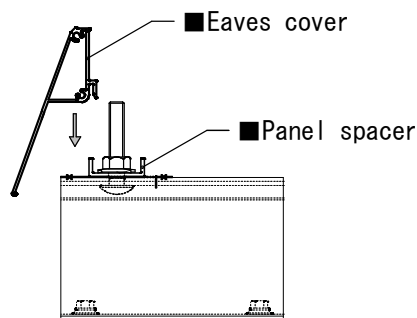
Skirt is not recommend in areas where the ground snow exceeds 40 PSF.

The Skirt when installed across 2 adjacent rows of PV modules will create a bonding path that replaces the bonding clamps.

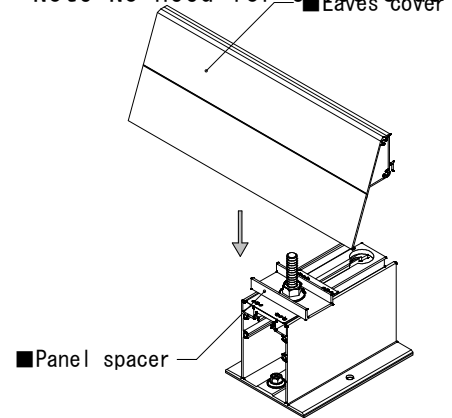
Install Middle clamps for skirt installation on eaves side of the array.

(1) Install the first row

- ① Slide the skirt into the spacer.

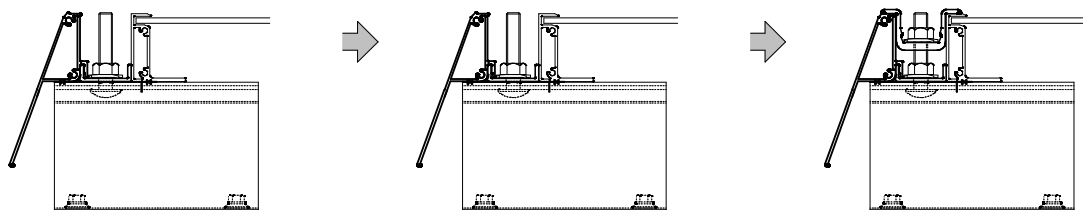
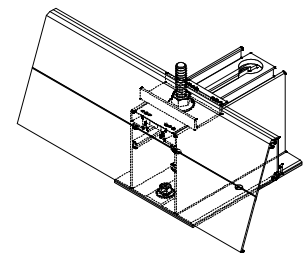
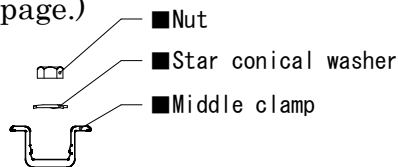


Note: No need for eaves side ■ Eaves cover

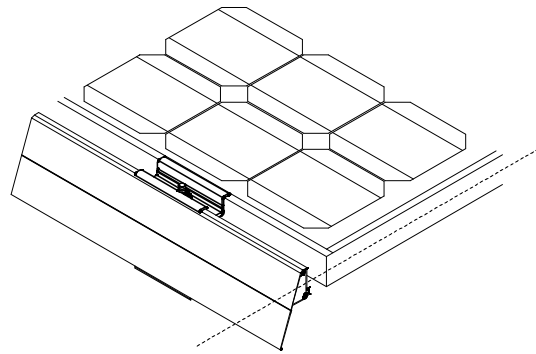
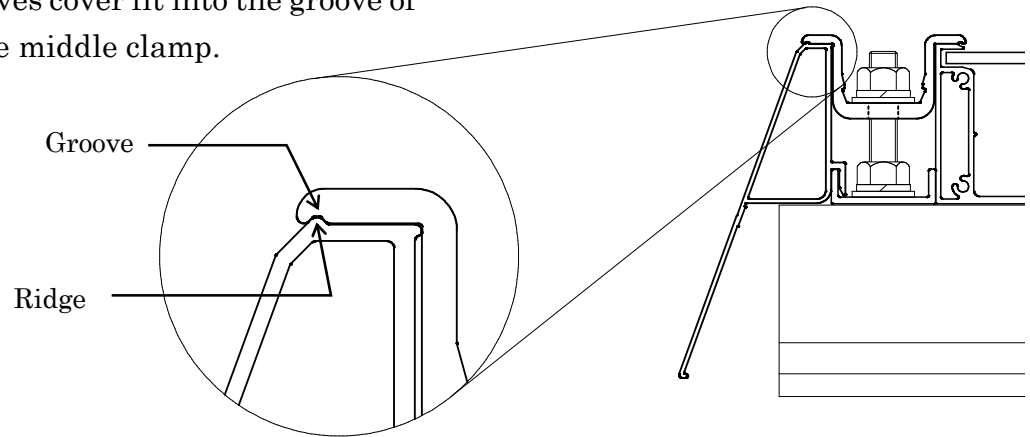


- ② Set the Panel in place and install a Middle clamp with a nut and a star conical washer. Once the panel is at the correct and final position, set the nut to 110 in-lbs (12 Nm) torque.

(See figures in the next page.)



- ③ Be sure that the ridge of the eaves cover fit into the groove of the middle clamp.

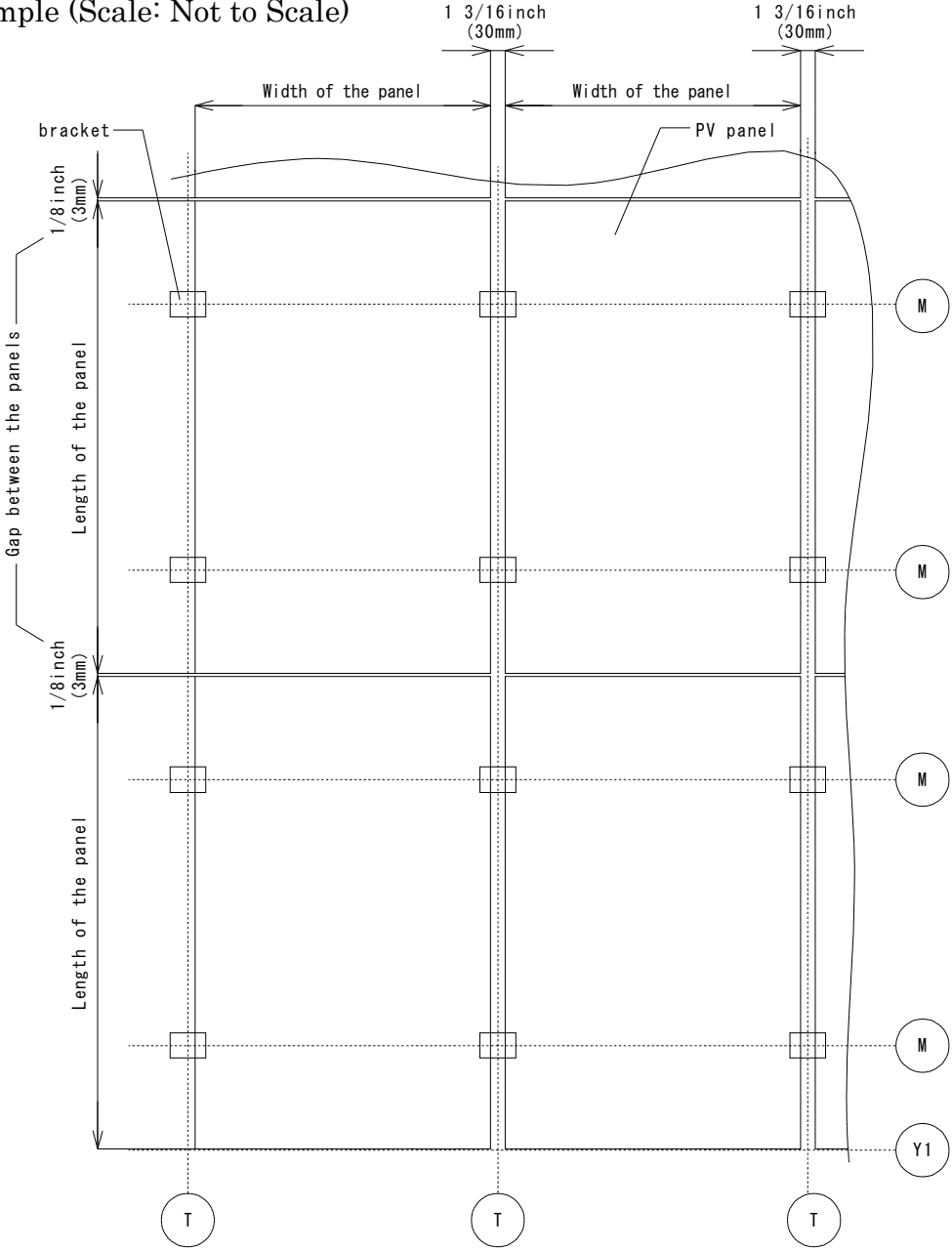


Back to “(4) Middle Clamp Installation” on Page 27.

PART C Portrait Layout

1. Installation of Brackets (1) Brackets Layout (Deck only)

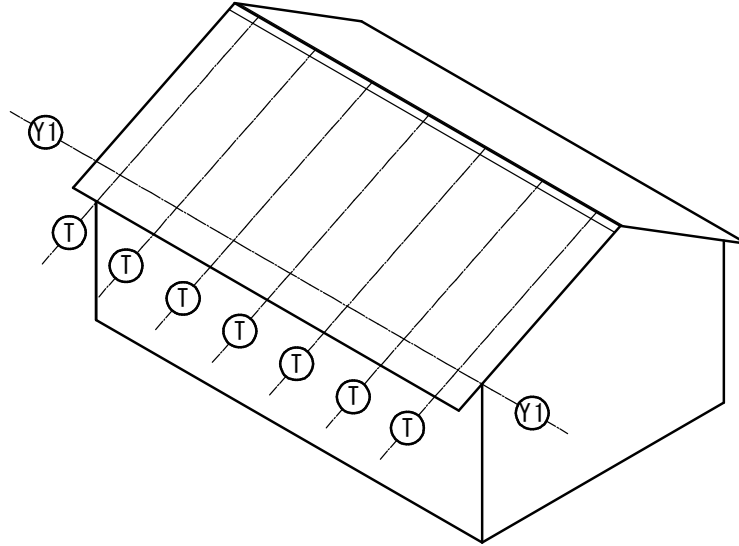
Example (Scale: Not to Scale)



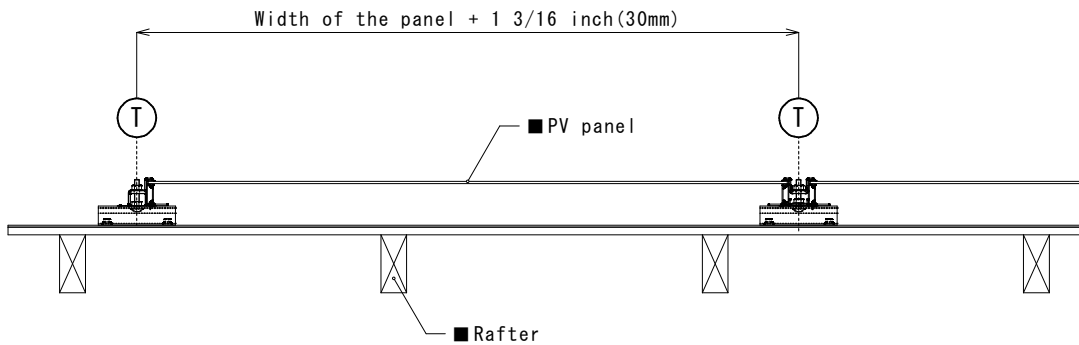
Note: Minimum distance $1/8$ inch (3 mm) between panels.

PORTRAIT
BRACKET INSTALLATION

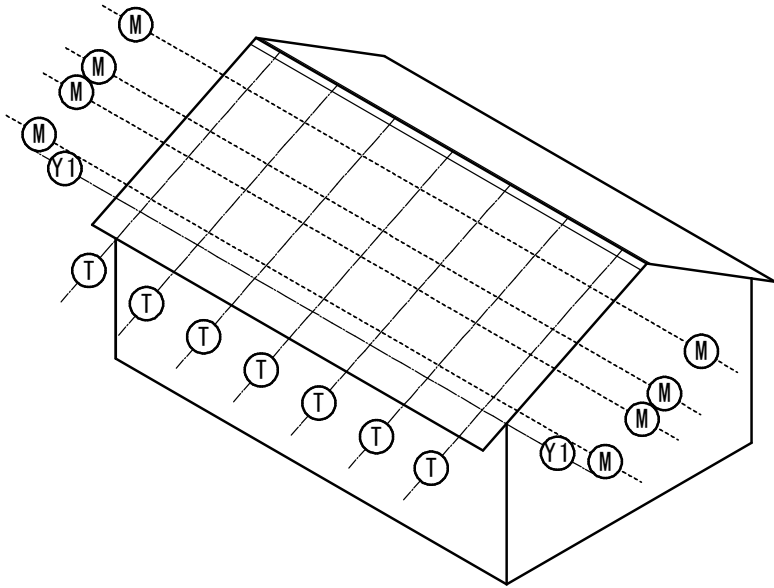
- ① Chalk the lines according to the layout plans to indicate brackets positions.



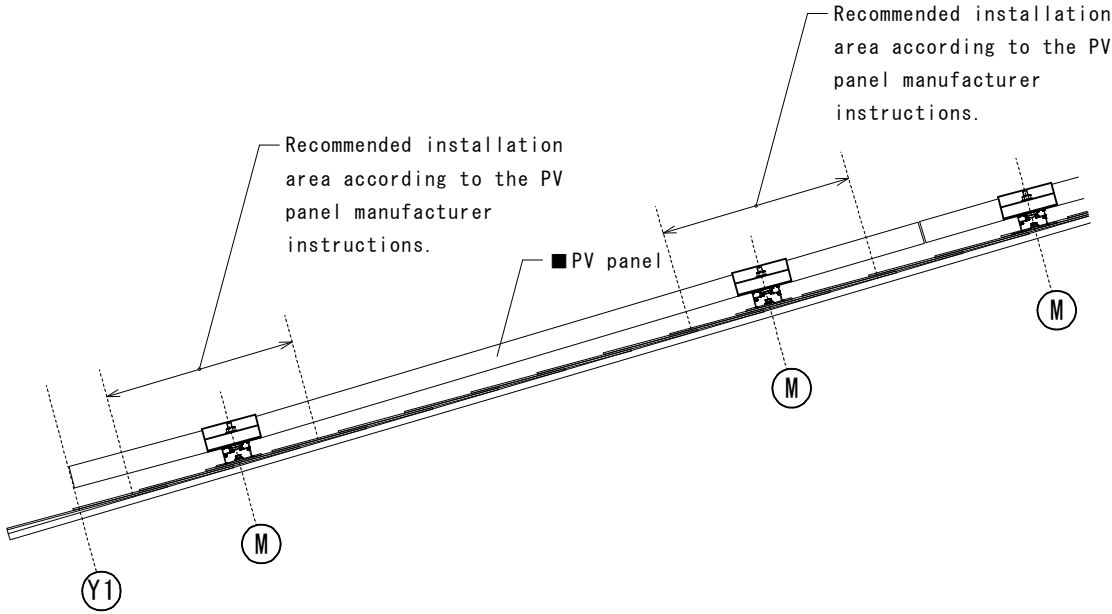
- (i) Line Y1: Delineates the location of the first row of modules.
- (ii) Line T: Center of the brackets. The distance between the lines shall be the width of the panel plus $1 \frac{3}{16}$ inch (30 mm, equivalent to the width of the Panel Spacer).



② Position the brackets. Make a chalk line according to the PV module installation instruction.



(i) Line M: Bracket center line.
Refer to the PV panel manufacturer's instruction for adequate installation area.

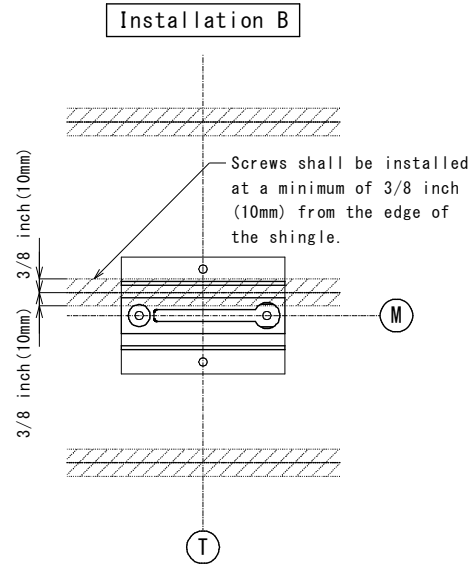
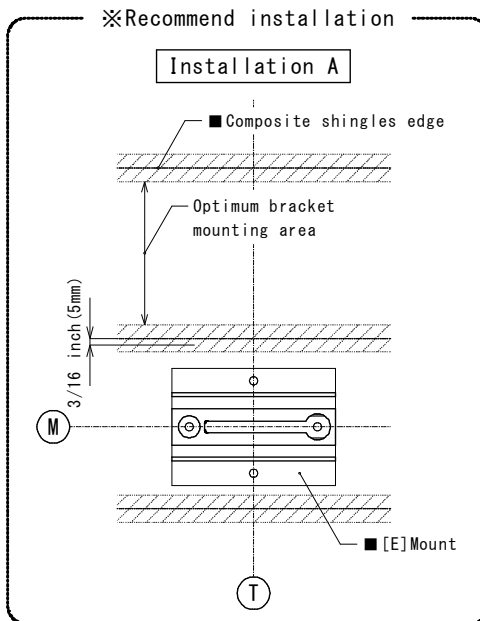
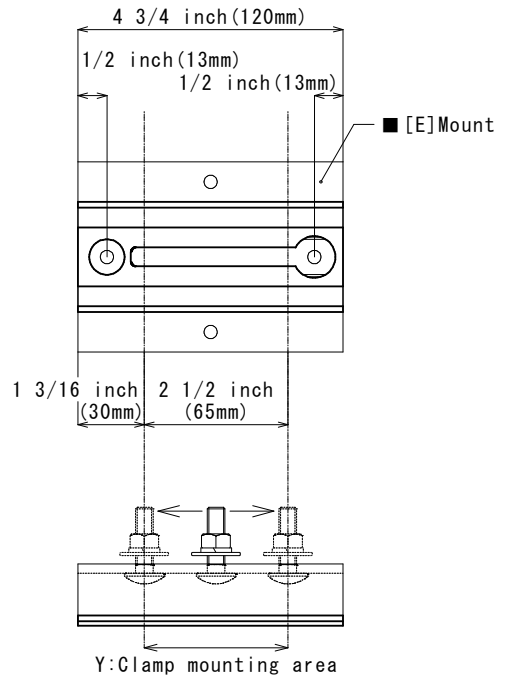


(2) Bracket Installation

! Attention

To maintain the flashing performance, avoid installation when the temperature is below 22F or above 176F.

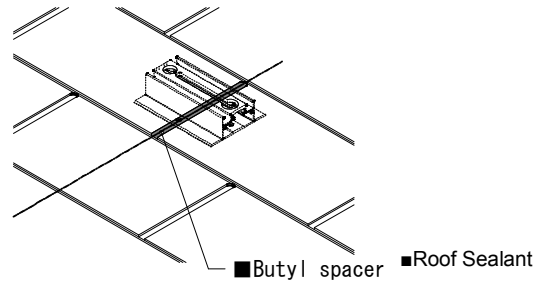
- ① Mark the location at the intersection of the T Line and M Line.
- ② Choose “A” or “B” installation at each bracket location.



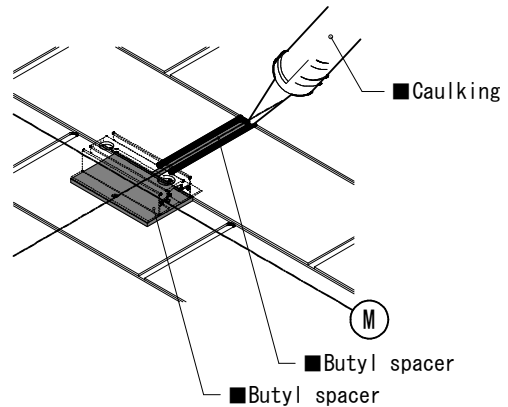
! Attention

Edge of the roofing Shingle shall be 3/16 inch (5 mm) from the edge of the bracket.

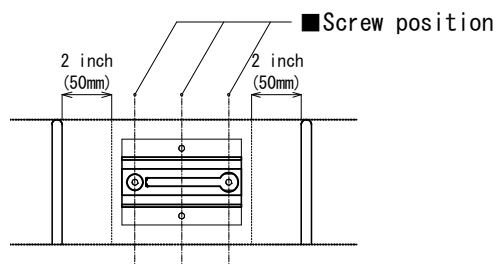
- ③ Adjust the butyl tape layer to match the height of the upper shingle. When there is a gap, a slit, or a difference in the height, in the mounting location of the bracket, use additional butyl tape.



- When there is a slit at the installation spot, cut the butyl tape to match and place it in the slit. The slit must be filled with butyl tape.

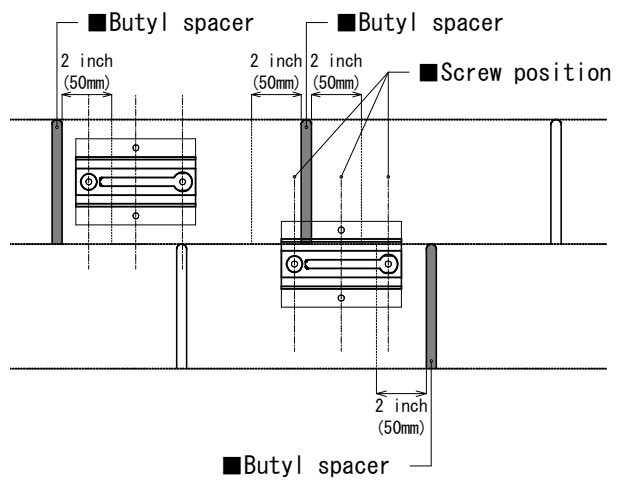


- When there is a slit on the upper side of the bracket, cut the butyl tape to match the slit shape. And apply roof sealant around the butyl tape.



- Best to position the bracket 2 inches away from the slit.

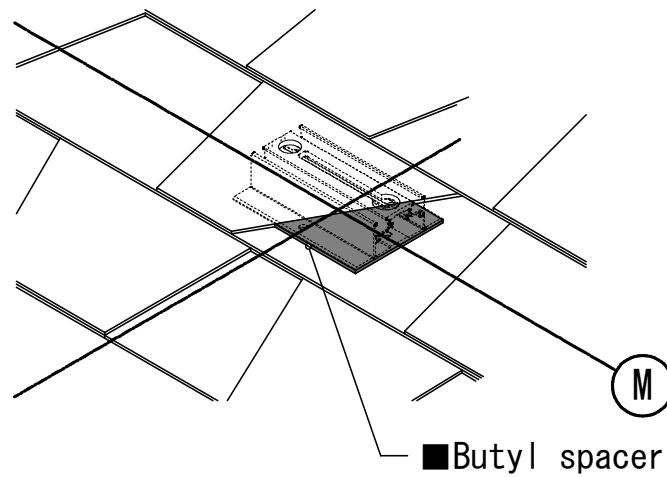
- If the screw comes to closer to slit (less than 2 inches), fill the slit with butyl tape.



PORTRAIT
BRACKET INSTALLATION

- When there are gaps in the position to install, cut butyl tape in the shape of the gap and place it.

Note: Each bracket comes with butyl tape installed, and is supplied with an additional tape.

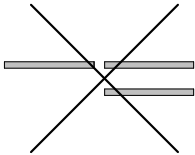
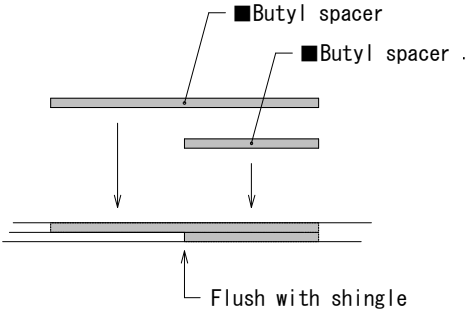


Attention

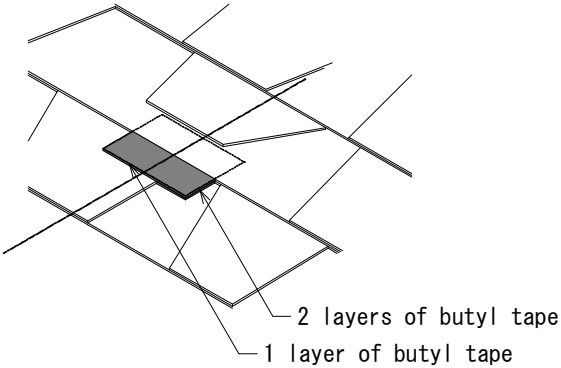
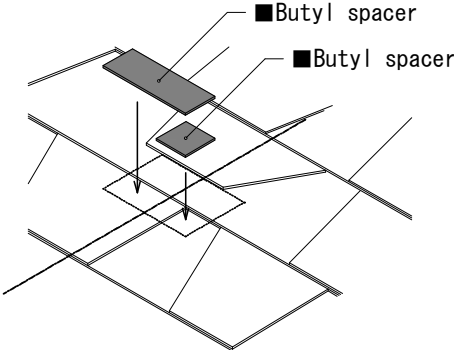
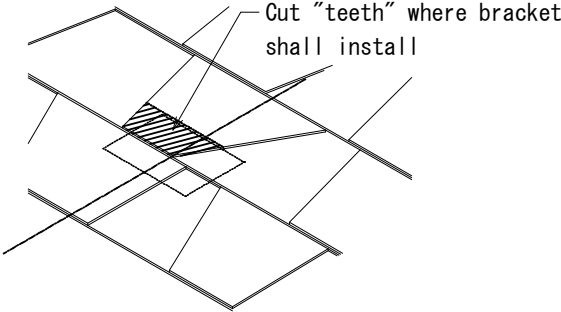
Peel off the protection paper
from both sides of butyl tape.

[Case 1]

- Use butyl tape to level the surface of the composite shingle roof.



Note: Do not splice the butyl tape.



PORTRAIT
BRACKET INSTALLATION

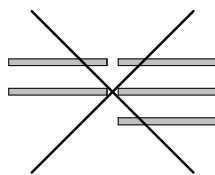
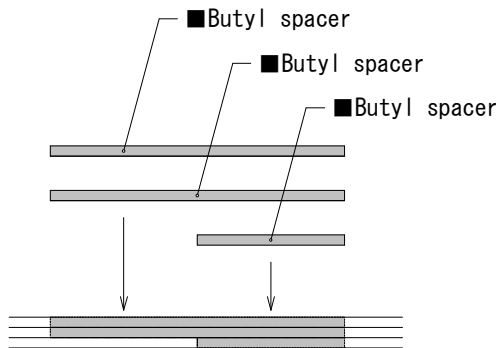
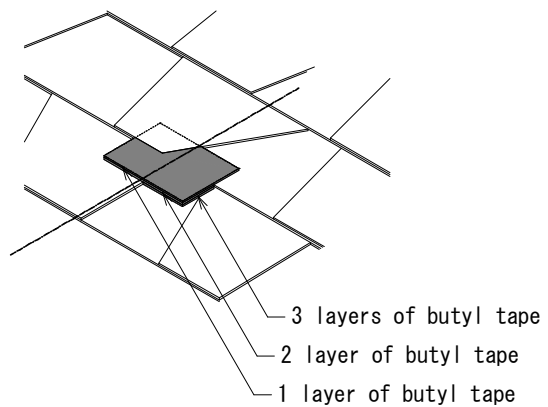
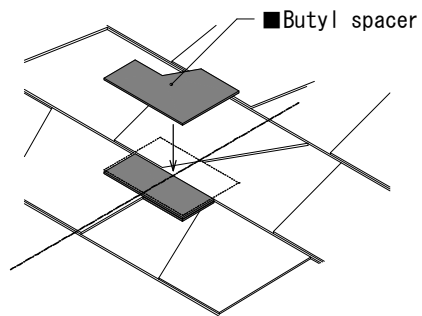
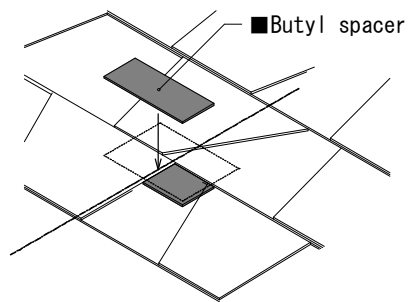
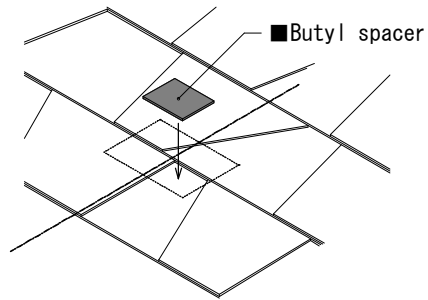
[Case 2]

- Build layers of butyl for the bracket to be mounted over the teeth region of composite shingle roofs.

A maximum of 4 layers are acceptable.

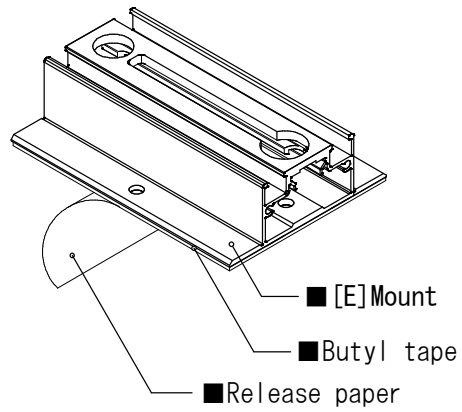
Layer 1 is built on the bottom of the bracket already.

The following layers must be cut to shape to cover the surface of the bracket at each location, assuring a completely flat surface.



Note: Do not splice the butyl tape.

- ④ Peel off the protective paper from the butyl tape.



Attention

Do not leave any protective paper on the surface of the butyl tape, it can cause an improper seal and may allow water intrusion under the bracket.

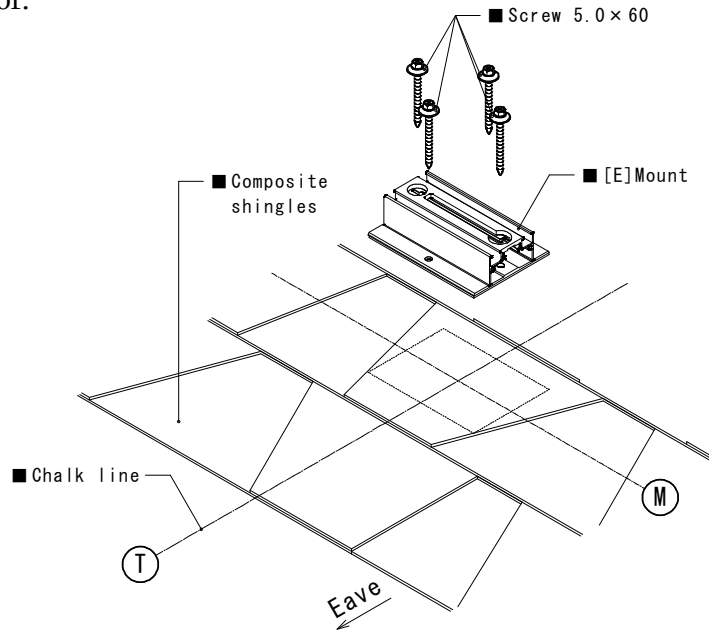
**PORTRAIT
BRACKET INSTALLATION**

⑤ Installing the bracket.

Place the brackets into position and make sure the butyl attaches well to the roofing surface.

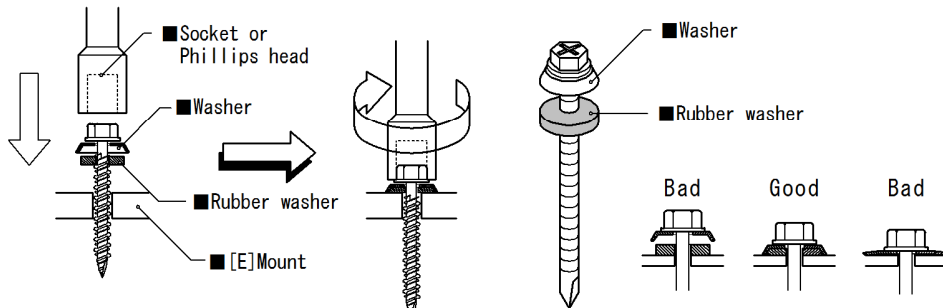
Set the bracket with 4 each 5.0×60 mm stainless wood screw using 8 mm×L110 mm socket.

After completing process, make sure the brackets are securely fit to the roof.



! Attention

**Note: Do not set the 5.0×60 mm screw too tight.
The washer should not move.**

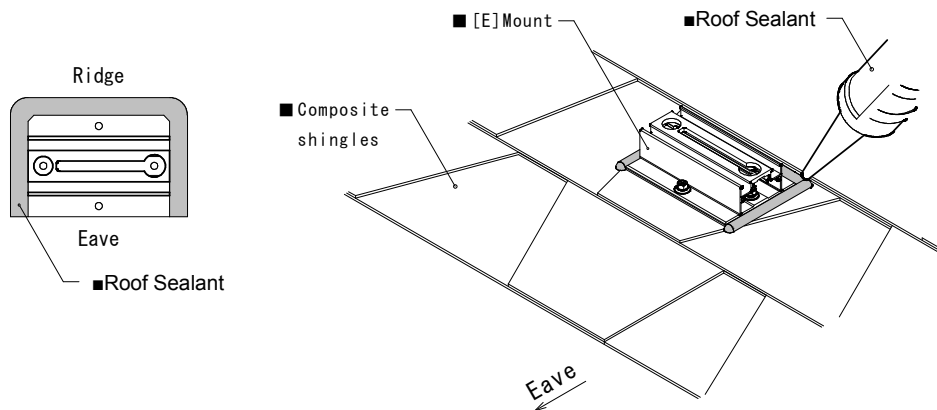


(Note: Setting the screws too tight, screws may cause the roof to deform.)

- ⑥ Apply Roof Sealant around the brackets, the top and each side edge of the brackets.

Cover the exposed butyl tape with roof sealant.

Do not seal the bottom of the brackets.



Attention

You may verify that screws come out from the deck panel together with butyl rubber, that indicates good flashing performance.

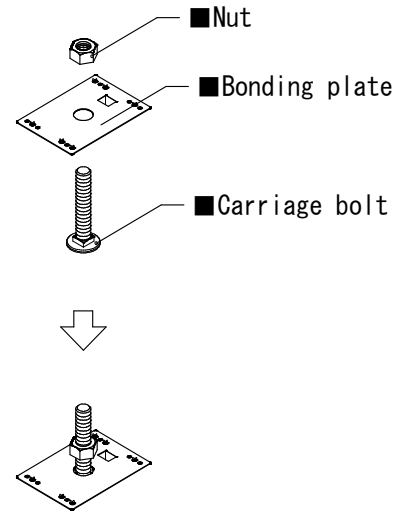
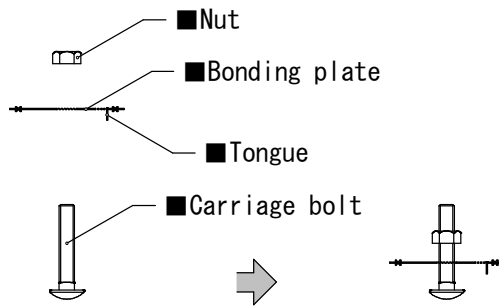
2. Installation of Panels

(1) Preparation

The pre-assembly of the carriage bolt set can save time on the roof.

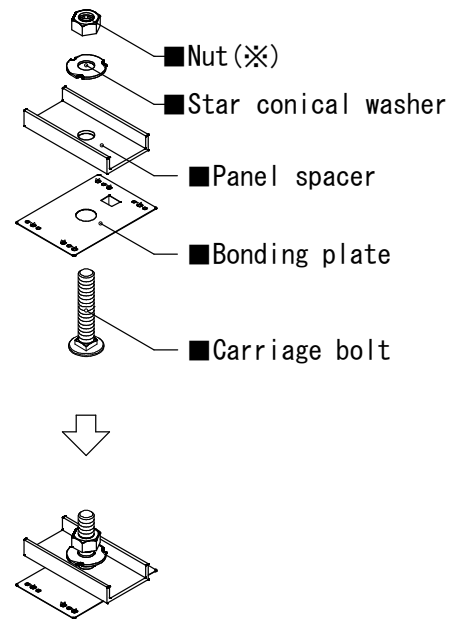
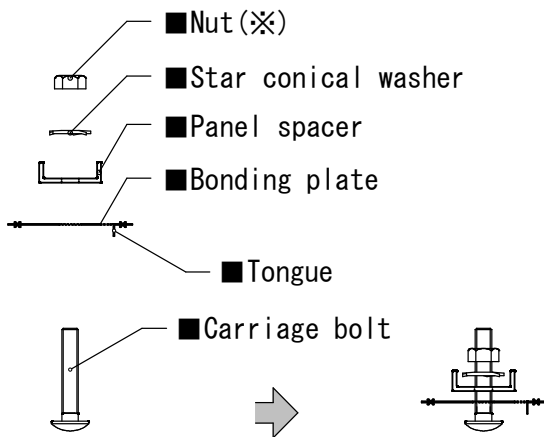
- ① For the far left and far right column clamps : Pre-assemble the Carriage bolt with the Bonding plate and Hex Nut per illustration.

The tongue of the bonding plate shall face down towards the carriage bolt head.



- ② For the middle column clamps : Pre-assemble the Carriage bolt with the Bonding plate, Spacer, Star conical washer and Hex Nut per illustration.

The tongue of the bonding plate shall face down towards the carriage bolt head.



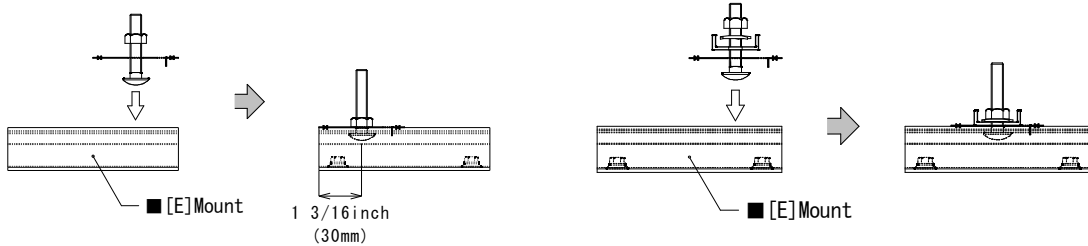
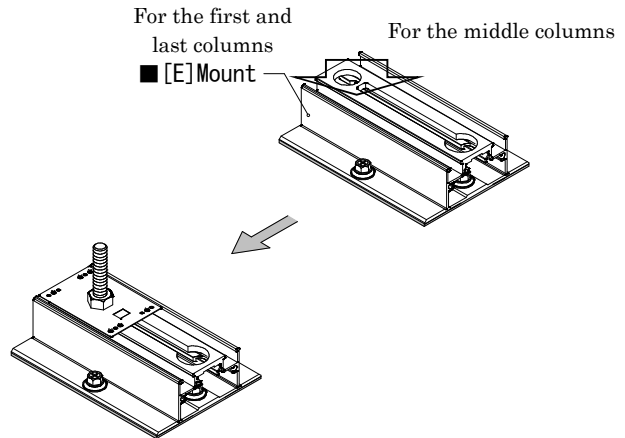
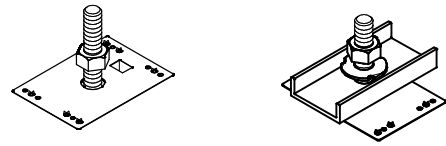
! Attention

(※) Silver : RTM-MCB45BK-B
 Black : RTM-MCB50 and 55BK-B

(2) Aligning and Leveling of the Brackets

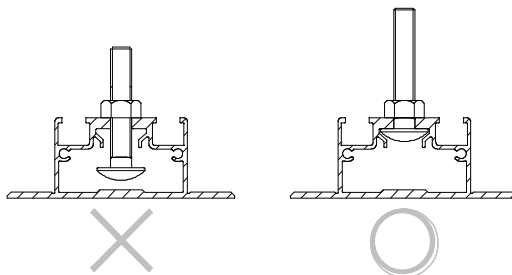
- ① Insert the carriage bolt head into the T-slot of the bracket, then hand-tighten the nut.

Bonding plate shall be installed with the tongue facing down and towards the opening for the carriage bolt head.



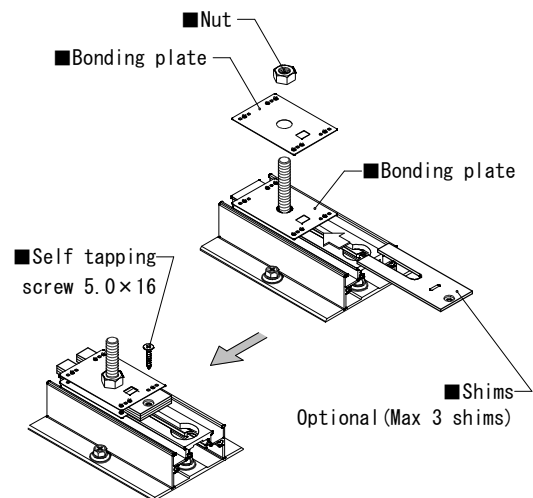
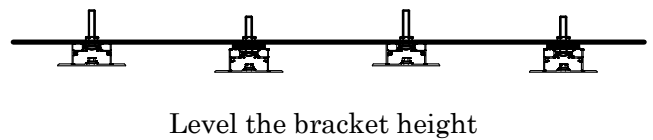
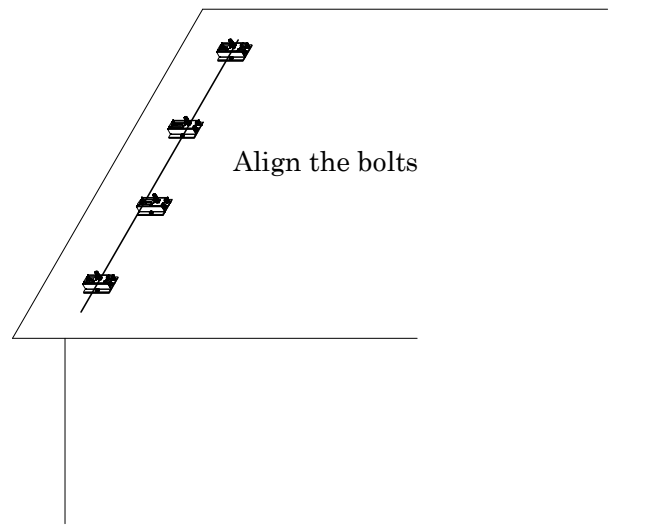
For the first and last columns

For the middle columns

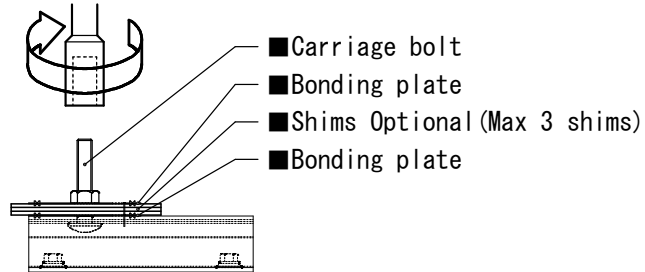


**PORTRAIT
PANEL INSTALLATION**

- ② Stretch a string line tight along the far left T line between the first and last brackets in the first column.
- ③ Align the carriage bolt positions of all the brackets in the column, using the string as a guide.
- ④ Next, level the height of the brackets using max of 3 shims.
- ⑤ If shims are to be used to level the brackets, remove the nut, conical washer and spacer (Middle Clamps only), add the shims (3 max.) with the additional bonding plate right on top of the shims with the tongue bent flat. Then, place the spacer, conical washer and nut back following the previous procedure.
- ⑥ If two or three shims are used, set the thread-forming screw 5.0×16 to secure and bond the shims.



- ⑦ Set the carriage bolt and nut to torque 110 in-lbs (12 Nm).



- ⑧ After aligning the first column vertically, follow the same aligning and leveling process horizontally on the first and last rows. Then align each remaining column of the array (in any order).

For the columns other than the first one, leave the carriage bolts and nuts hand-tightened.



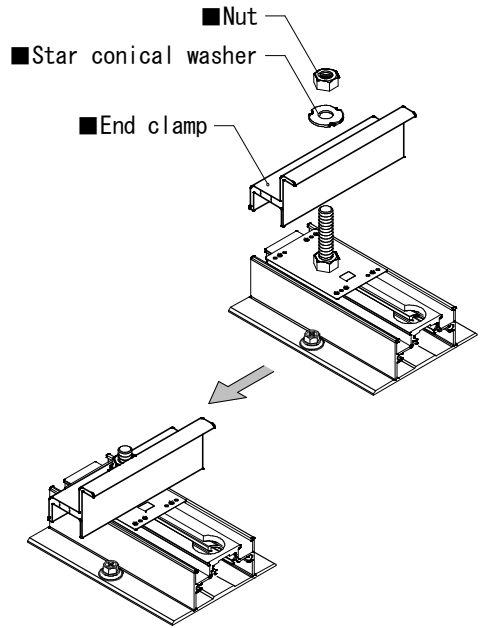
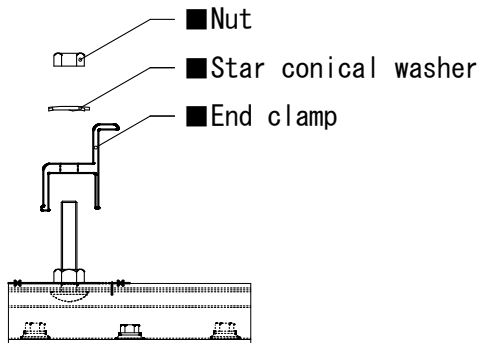
Attention

- **Note:** It is important to replace the bonding plate once it is used such as a panel replacement for instance.

(3) Installation of the First Column

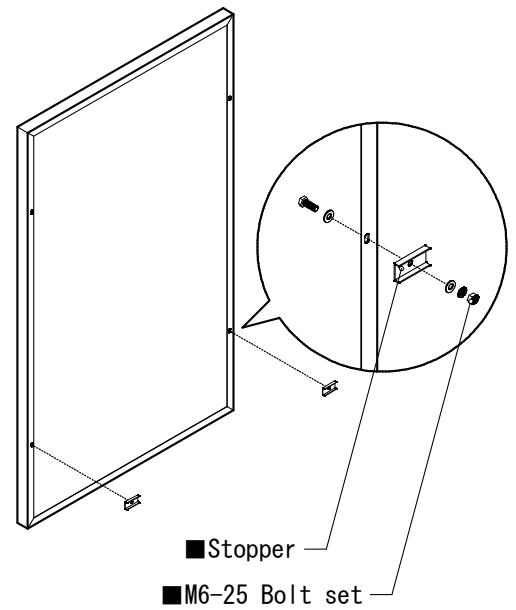
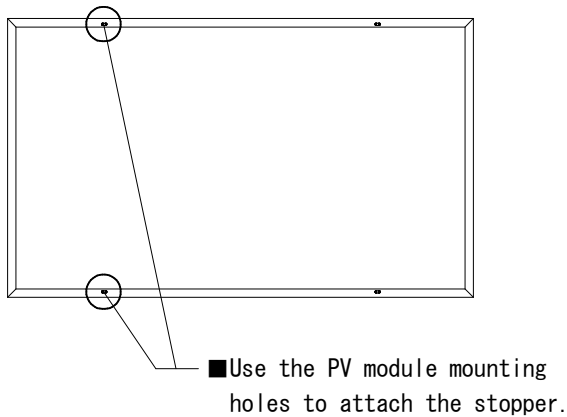
- ① Install the End clamp with star conical washer and nut as it is shown on picture.

Hand-tighten the nut, but keep clamp loose for the frame to slide in.

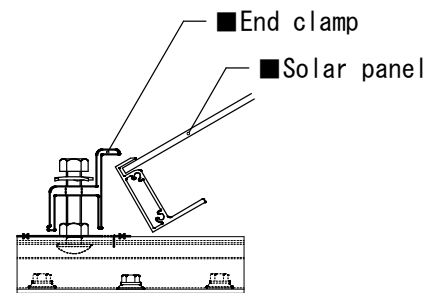
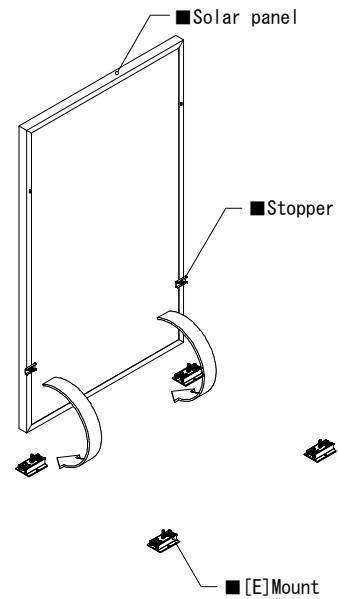
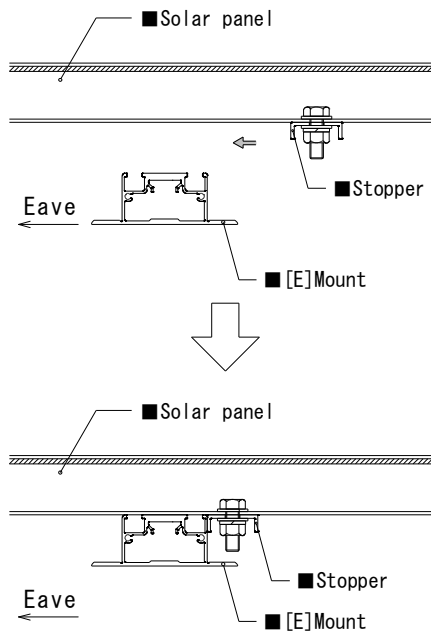


- ② Installation steps for the stopper
 (The panel stopper allows the installer to quickly align the array up when the bottom brackets are perfectly lined up.)

Tighten the M8 bolt.



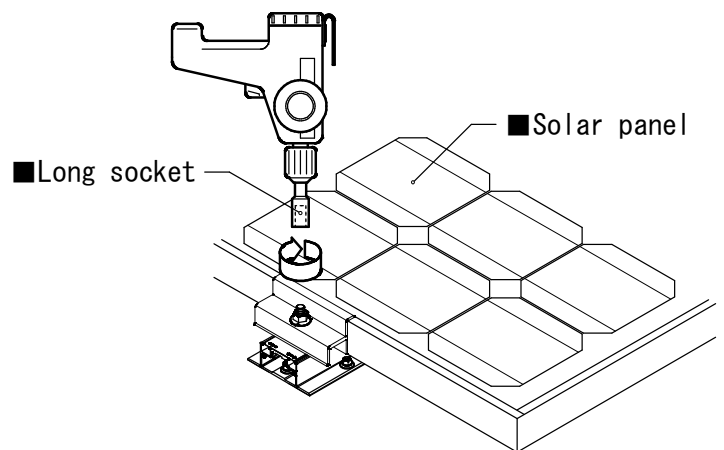
- ③ The stopper is to be installed on the panels of the lowest row only.



- ④ Place the PV panel on the bracket.

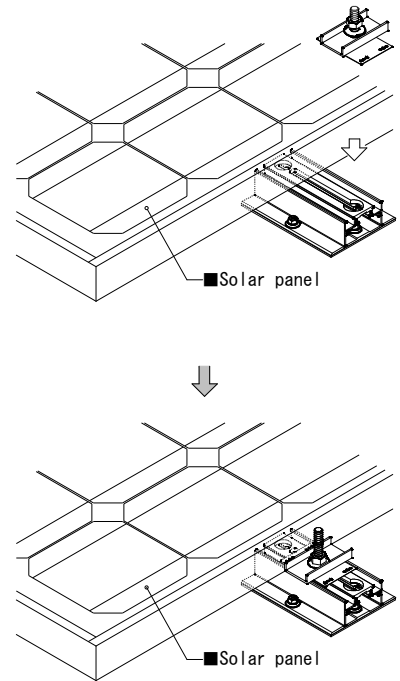
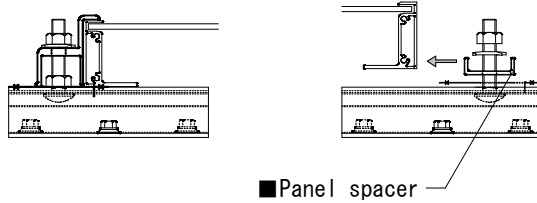
- ⑤ Make any adjustment and tighten the nut to 110 in-lbs (12 Nm).

- ⑥ Repeat ④ and ⑤ for all the first column panels.

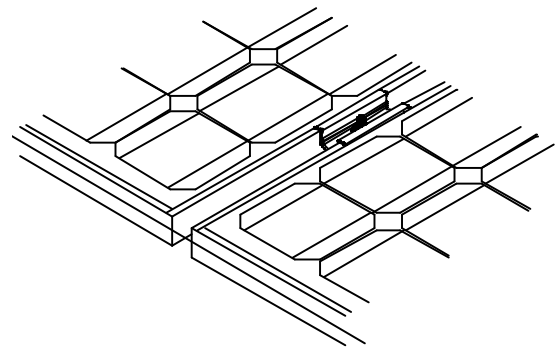


(4) Middle Clamp Installation

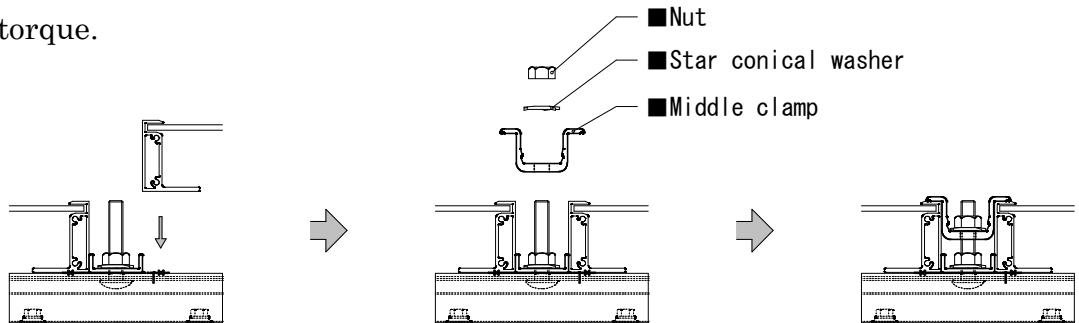
- ① Slide the panel spacer until it is flush to the frame of the panel already installed.



- ② If necessary, add or delete shims for further leveling. When shims are used, follow the procedures ⑤ and ⑥ on page 44. Then tighten the Panel spacer to 110 in-lbs (12 Nm).

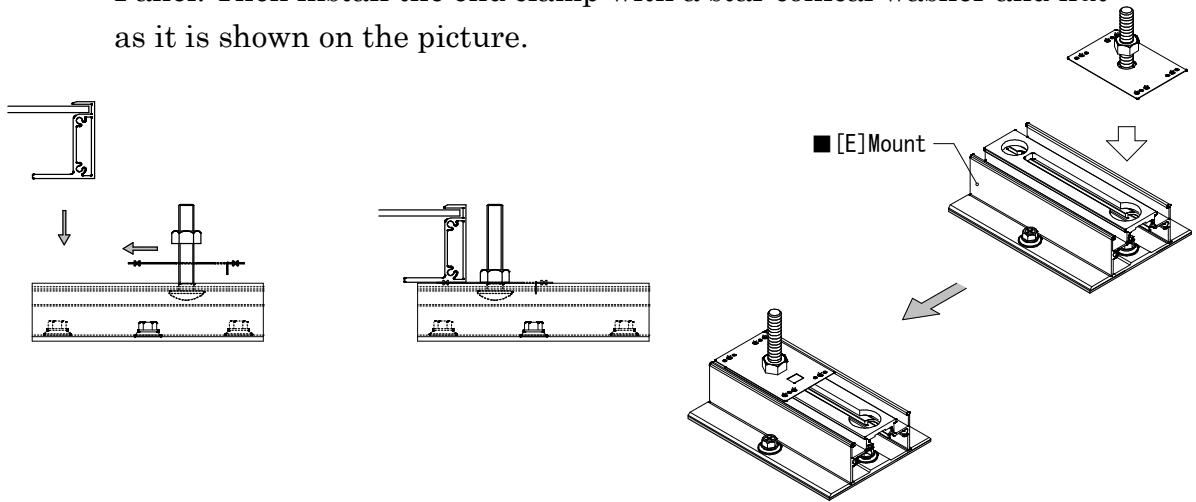


- ③ Set the net Panel in place and install Middle clamp with a nut and a star conical washer. Once the panel is at the correct and final position, set the nut to 110 in-lbs (12 Nm) torque.

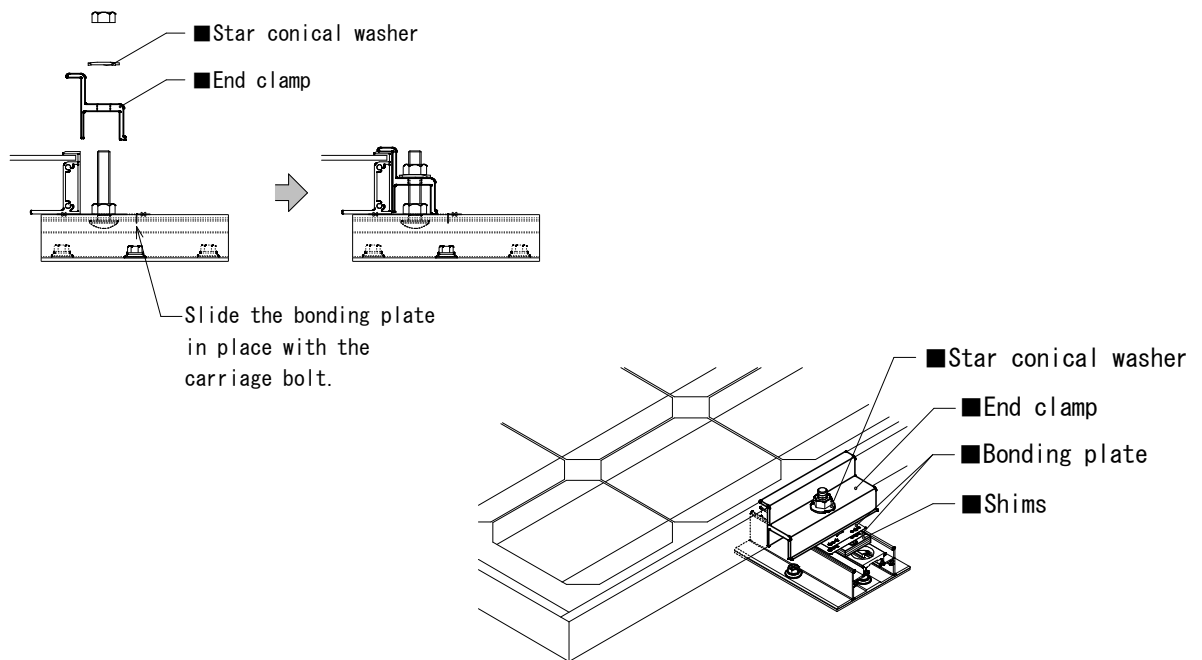


(5) End Clamp Installation

- ① Slide the carriage bolt with the bonding plate underneath the PV Panel. Then install the end clamp with a star conical washer and nut as it is shown on the picture.



- ② Tighten it to 110 in-lbs (12 Nm).



PART D Electrical Setup

1. Cable Management Options

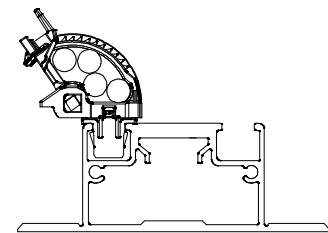
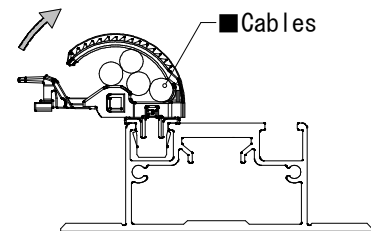
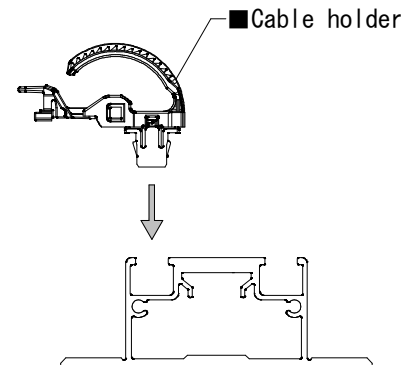
- ① Cable holder can fit into the brackets as it is shown in the picture.
- ② Place the cables into the holding area and close the clamp. You can hear a click when it is secured.

Note : If the cable holder need to be opened, simply pinch and pull by hand.

Also, it can be easily removed from the bracket simply slide it out.

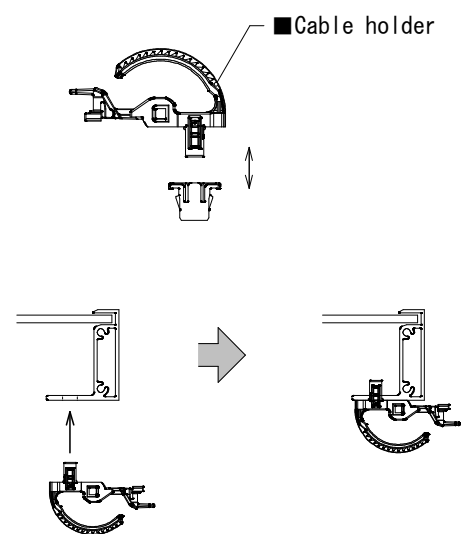
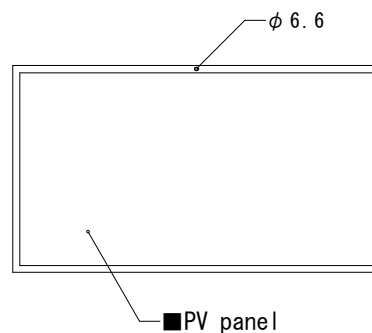
Note : Cable holder can hold 3 to 4 cables depend on the thickness of the cables.

AWG size	Number of Cables to be hosted
8, 10	2
12	3
14	4



2. Mounting on the Module Frame

- ① Cable holder can fit through a $\phi 6.6$ mm hole on a panel frame. Cable holder can be separated at the bottom part (grommet).

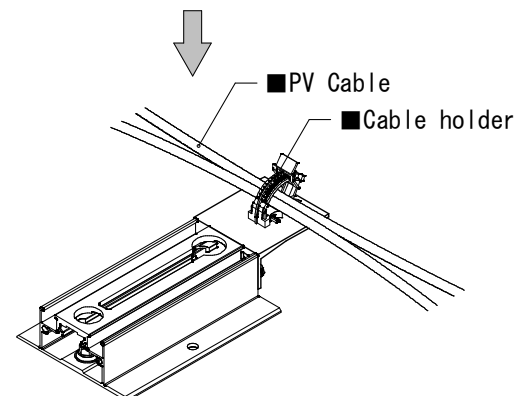
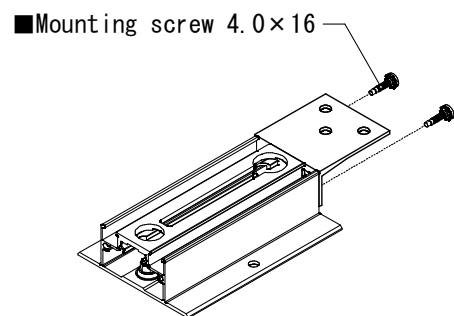
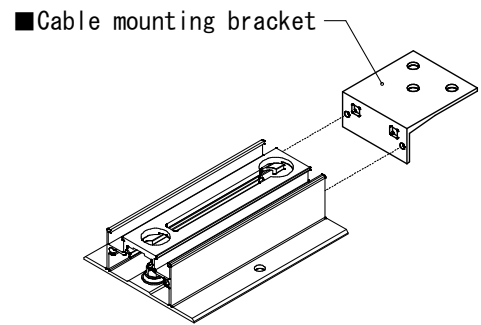
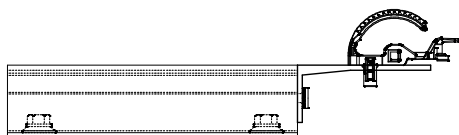
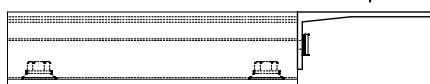
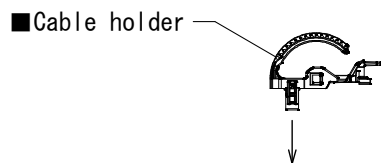
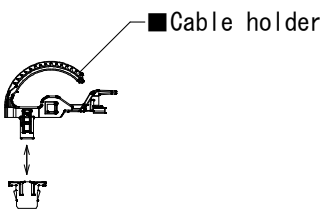
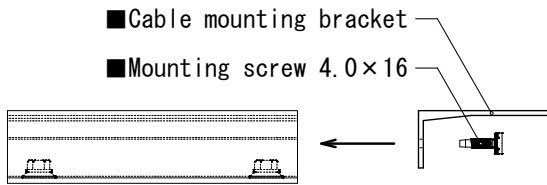
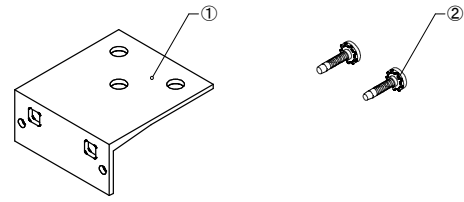


3. Cable Mounting Bracket (Optional)

Optional

① Shims

	Item
①	Cable mounting bracket
②	Mounting screw 4.0×16



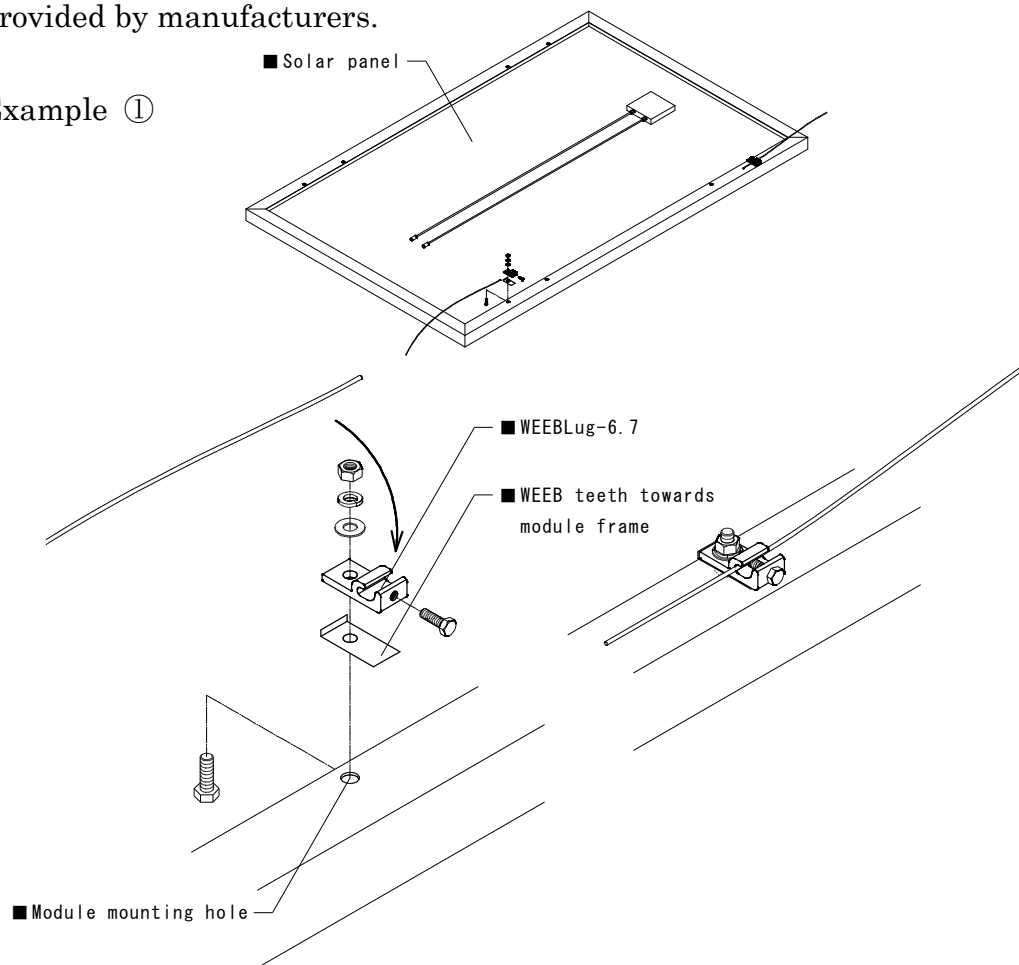
4. Grounding Setup

All electrical installation and procedures should be conducted by skilled, licensed and bonded electricians. All work must comply with all national, state and local installation procedures, product and safety standards. These standards include but are not limited to applicable National Electrical Code NEC 690 and NEC 250, National Electrical Installation Standards (NEIS™), UL Standards, and OSHA Regulations.

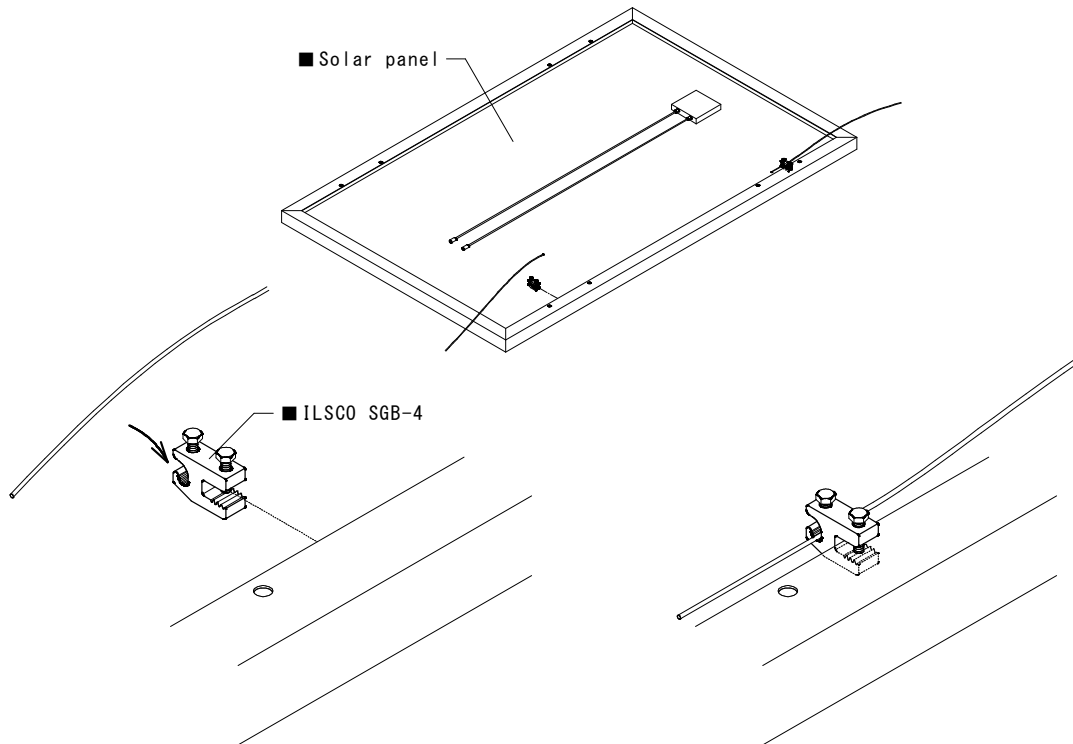
[E]Mount and E Mount AIR hardware are classified to UL 2703 and it is to be used with UL 1703 listed PV modules and must be installed per PV module manufacturer's installation instructions.

We recommend the use of either the Weeb-6.7 or IlSCO SGB-4 Grounding lug with a minimum 10 AWG solid copper grounding conductor. Grounding lug shall be installed per manufacturers' instructions, using the hardware provided by manufacturers.

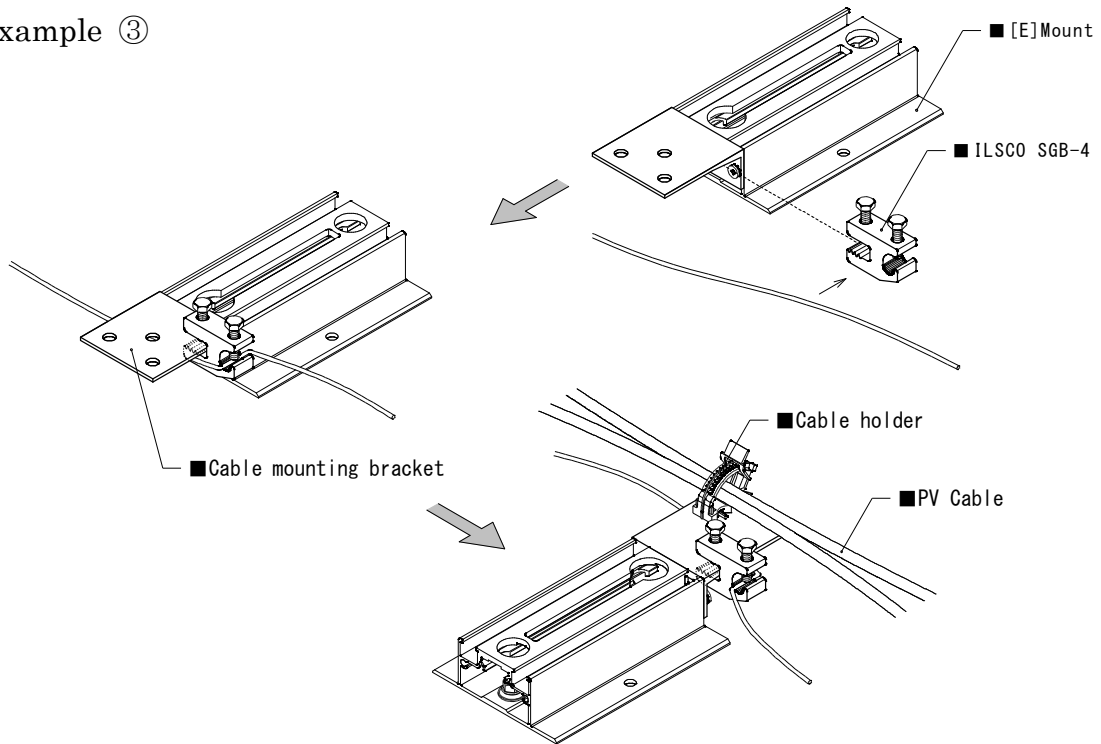
Example ①



Example ②

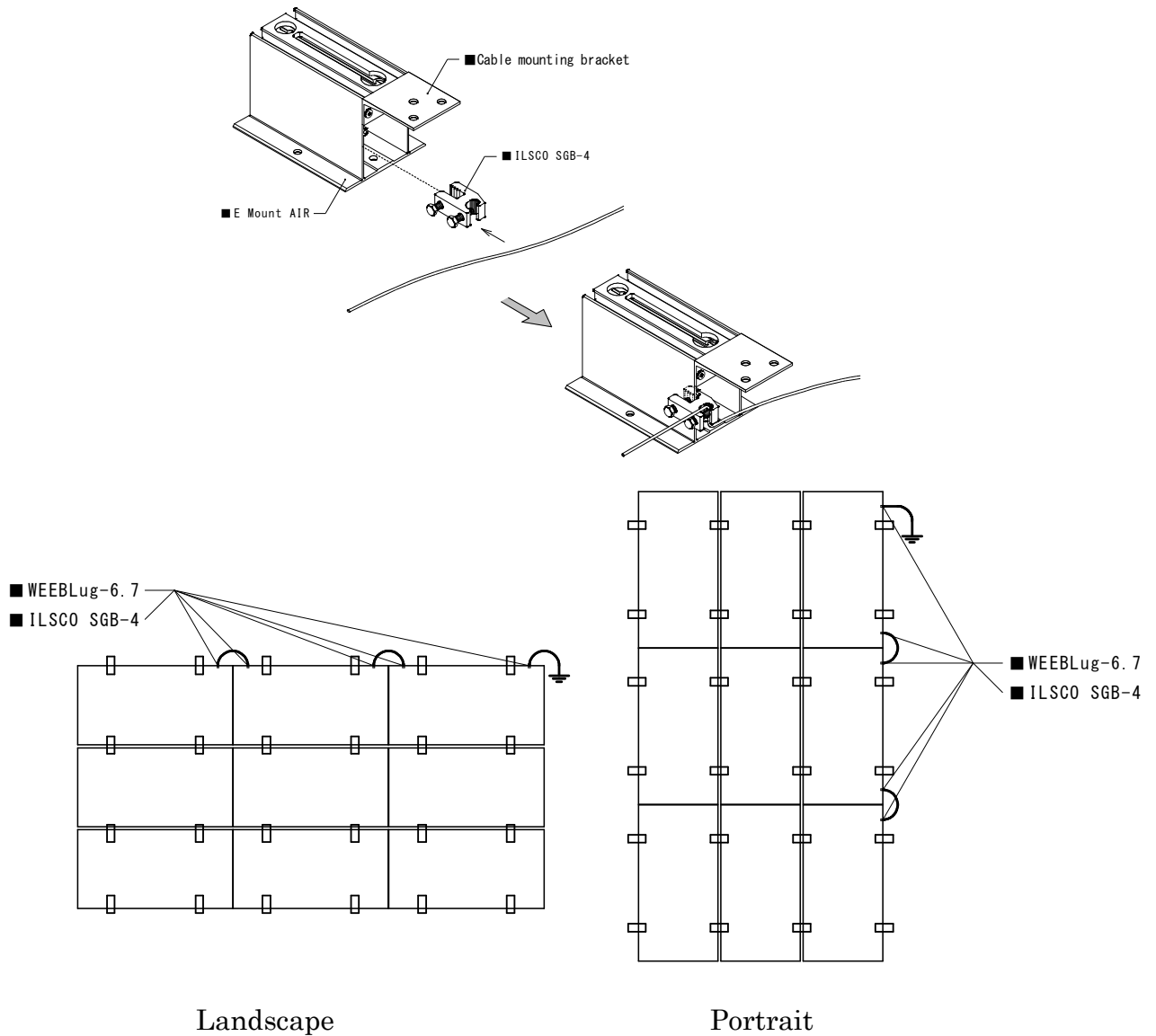


Example ③



ELECTRICAL SETUP

Example ④ (E Mount AIR only)



In order to properly ground the PV modules and the brackets to the equipment ground, a grounding lug or lay-in lug must be attached to the PV module at the end of each row.

Note: **Maximum Series Fuse Rating of 20A.**

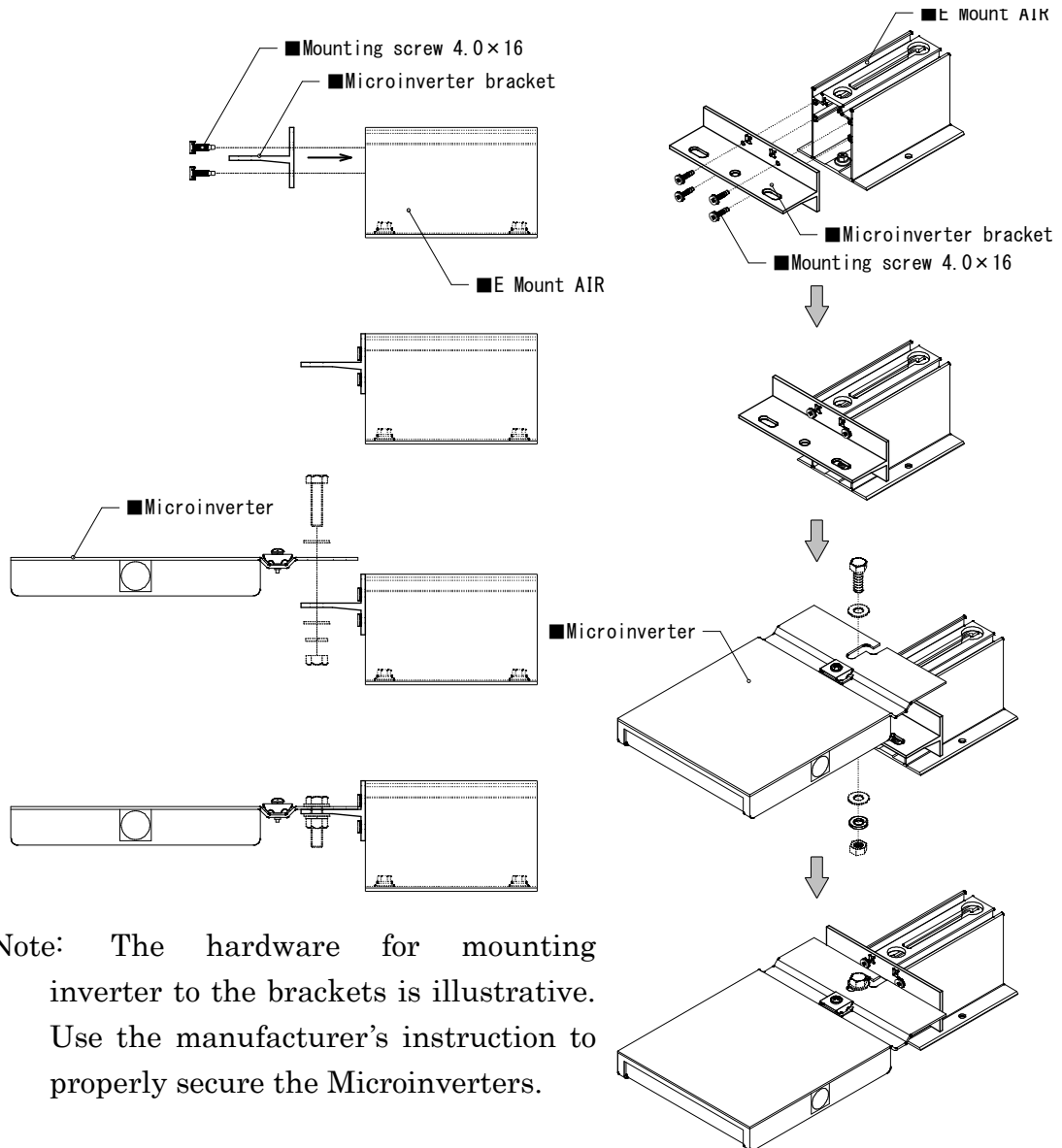
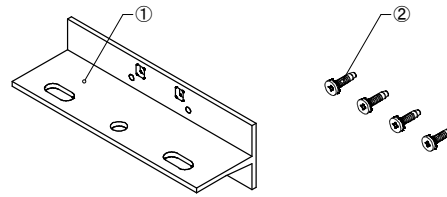
Grounding, Bonding lugs and Straps are not provided by Roof Tech Inc.
(See page 6)

5. Micro-inverter Bracket (Optional, E Mount AIR only)

Optional

① Microinverter bracket

	Item
①	Microinverter bracket
②	Mounting screw 4.0×16



Customer Support

If you need assistance at any point of your installation or have suggestions on how can we improve your experience, call Roof-Tech customer support.

(415)382-1036

April 30, 2015