Photovoltaic (PV) panels on the roof of The House on Village Lane, built with Safal Steel Colorplus® AZ150.

Technical Bulletin

Photovoltaic (PV) Panels

Guidelines for good practice when installing photovoltaic panels on a metal roof.

Introduction

The installation of a Photovoltaic System utilises renewable natural resources to minimise our impact on the environment in the place of electricity generated using carbon fuels.

To ensure the performance of Safal Steel's prime Colorplus® or Zincal® material when used in conjunction with an integrated PV panel system, please follow these guidelines of the installation and maintenance process below. This will ensure that the metal roofing system maintains its weather tightness and durability.

Fig 1. Typical examples of framed PV panel mounted on metal roofing.

1. Integrated Project Design to Ensure Durability

The durability of a metal roof is impacted by both the PV panel system and roofing assembly, so both should be considered during the design and installation process, and in follow-on maintenance routines.

Roof System Design and Assembly

Profiled roof sheeting under a PV panel should be considered as an unwashed area sheltered from normal rainfall. Its durability will be impacted by a list of factors. Below are the major considerations:

1. Purlin Spacing

To ensure the roofing assembly performs over the lifespan of the project it, is advised that load calculations are performed at design phase to incorporate adequate purlin frequency. The absence of which can lead to water ponding and premature corrosion.

2. Roof Slope

The lower the roof slope, the greater the opportunity for moisture and dirt to be entrapped for extended periods, compromising the roof.

3. Roof Surface

A profiled sheet with an aged surface will have a tendency to retain a higher degree of dirt and/or moisture which will be aggravated by a low roof slope.

4. Profile Type

The lifespan of the integrated construction assembly will be enhanced by the use of an appropriate concealed fix, which requires no protrusions into the roof sheeting, reducing the risk of premature corrosion from entrapped moisture, debris or leaves.

Photovoltaic (PV) Panel System: Materials and Assembly

The PV Panel assembly also has an impact on the durability and water tightness of a Colorplus® or Zincal® roof. The main considerations regarding PV Panel assembly are listed below:

1. Panel Materials

- **Frame Material**
  The Aluminium-Zinc coating alloy used for Zincal® is more compatible with an aluminium framed PV panel than with most other metals.
- **Glass Material**
  We advise using low iron, alkali-free and lead-free glass with an anti-reflective coating which does not generate titanium oxide or zinc oxide.

Fig 2. Typical pierced fix installation. The exposed fasteners can contribute to the entrapment of moisture, debris and leaves.

Fig 3. Typical concealed fix installation which provides a smooth fastener-free drainage surface.

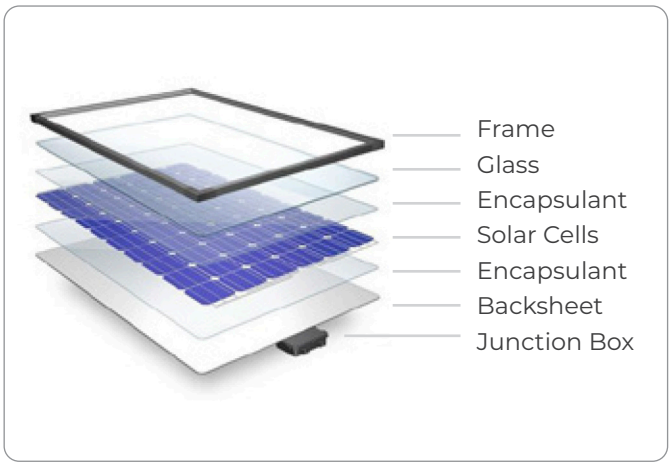

Fig 4. Typical PV Panel Assembly

Fig 5. The preferred clamp type is a non-piercing clamp.

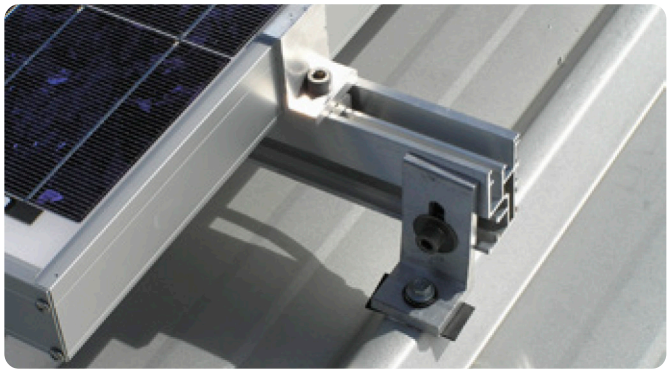

Fig 6. A pierced fix clamp type which is not recommended.

2. PV Panel Assembly and Design

- **Bracket Design and Composition**
  A clamp made from aluminium is preferred as it is compatible with the Aluminium-Zinc coating alloy used on Zincal®. If a galvanized clamp is used, an isolation tape or low-carbon barrier between the clamp and the sheet is recommended.

Fig 7. A pierced fix clamp type which is not recommended.

- **Clearance of the PV panel from the roof sheeting surface**

  The designed clearance should accommodate:

  1. Sufficient access for cleaning, maintenance and inspections.
  2. Free air flow, ensuring quick drying of the roof sheeting beneath the PV Panel.
  3. Adequate space to be self-cleaning, ensuring no build-up of debris, entrapped moisture or other contaminants.

Fig 8. A pierced fix clamp type which is not recommended.

- **PV Panel Slope**

  A sloped PV panel configuration offers advantages as it ensures rapid run off of rainfall, condensation and water used during maintenance washdowns.

  It further promotes easy drying of the roof sheeting, and minimises the accumulation of contaminants. This will minimise the impact of water run off on the roof sheeting.

2. PV Panel Installation Practices

- Neutral cure sealants should be used.
- Metals such as lead, brass, copper and stainless steel should not be in direct contact with a Colorplus® or Zincal® roof.
- Timber should not be in direct contact with a Colorplus® or Zincal® roof.
- Electrical cables should not lie in the pans or be situated as to create a barrier to the washing off of water, debris or contaminants.
- The earthing of the PV panel installation should be approved by an authorised engineer.

Maintenance During Installation

1. Remove any swarf created during installation – clean off daily using water and a soft broom or brush.
2. The PV panel arrangement should allow for ease of access during maintenance and inspection.
3. It is recommended that walkways are installed to ensure no damage or abrasion to the roof sheeting surface. Ensure that they are of aluminium-coated steel, or similar alloy which is compatible with the Colorplus® or Zincal® material.

Fig 9. Typical high installation activity.

Fig 10. The need for correct walkways is important on a PV Panel arrangement.

3. Project Maintenance

PV Panel installations require a regular maintenance schedule, usually being cleaned and checked 3 to 4 times annually.

Ensure that the contaminants washed from the PV Panels are removed from the roof sheeting at once, also removing any debris and contaminants below the PV Panel array.

Fig 11 and 12. Sloped PV Panels are easily cleaned and washed.

Note: Typical information required is supplied in this document. Any project specific requirements need to be discussed with Safal Steel prior to installation.