TPO MEMBRANE SYSTEM

Installation & Application Guide for

PEB INSULATED roof panels

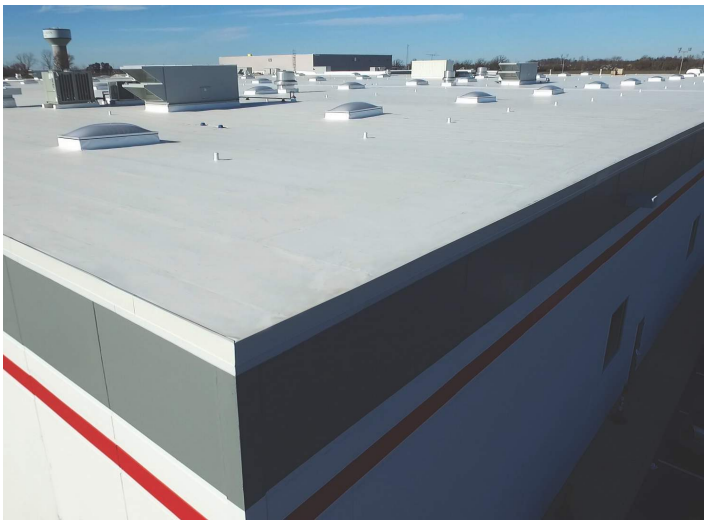
GreenShield
Heatshielding & Waterproofing Your Roof

Covers GreenShield™ TPO membrane products:

GS TPO 1.2 RF FR
GS TPO 1.5 RF FR
GS TPO 1.2 RF BG S
GS TPO 1.5 RF BG S

www.greenshield.co.in

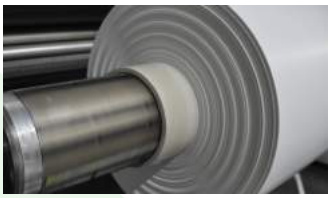
Introduction



This application guide provides standard procedures for the application of GS TPO membranes of insulated roof panels using mechanically fastened or adhered system upon the roof. Such systems typically apply on cold storages, large shopping centers and warehouses that use insulated roof and wall panels around the building.

The step-by-step directions and illustrations provide solutions to your installation questions and assist you for top quality application of GreenShield™ TPO Membrane system

GreenShield™ TPO Membrane Products, covered under this installation system:



1: GS TPO 1.2 & 1.5 RF FR: 1.2 / 1.5 mm thick, scrim reinforced TPO membrane, suitable for loosely laid / mechanically fastened / ballasted exposed systems.

2: GS TPO 1.2 & 1.5 RF BG S: 1.2 / 1.5 mm thick, TPO membrane, with fleece backing suitable for adhered exposed systems.

Contents

1 EQUIPMENT LIST

Below is a list of equipment that may be required for specific type of installation.

Handy Equipment & Tools

1. Gloves	10 .Scissors
2. Drill Bits (Carbide, Steel)	11. Silicone Rubber Roller
3. Measuring Tape	12. Utility Knives
4. Seam Probe	13. First Aid Kit / Box
5. Eye Protection	14. Rags
6. Brooms	15. Personal Protection Equipment (PPE)
7. Chalk Line	16. Lawn or Linoleum Roller
8. Wire Brush	17. Writing / Marking Instruments
9. Caulk Gun	18. Brushes & Trowels

Powered Equipment

1. Screw Guns	5. 10,000 – 20,000 watt generator
2. Robot Welder	6. Extension Cord
3. Electric Drill	7. Hand Held Hot Air Welder Machine
4. Hammer Drill	8. Automatic Roller Hot Air Welder Machine

Other Equipment

1. Rivet Gun	10. Screwdriver Set
2. Hammer	11. Aluminum Tape
3. Pull Out Tester	12. Adhesive Application Gun
4. T-Square	13. Metal Crimpers
5. Reciprocal & Circular Saw	14. Vice – Grip Pliers
6. Hand Saw	15. Stirring Sticks
7. Paddle Mixer	16. Ladder
8. Tongs	17. Shovels
9. Rubber Mallet	18. Mixing Vessels

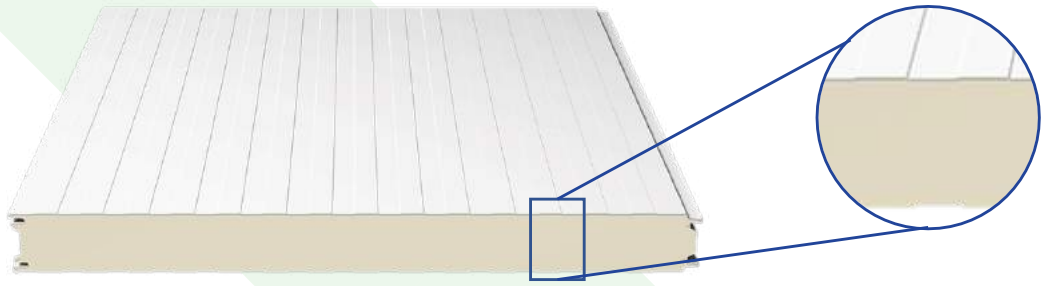
Structural Requirement

A roof or deck is expected to be structurally sound to support and restraint the roofing system. It should also pose enough strength to withstand all anticipated loads, foot or construction traffic, rain and wind loads. It should also be able carry the weight of application workers and the equipment without showing signs of deflection at any point.

Here in this application guide, GreenShield is referring roof as a supporting substrate to the GreenShield system; irrespective of the fact that roof may be built for furnishing or sound control purpose. To perform this application process, the roof or deck must be rigid.

Surface Requirement

Here, the roof substrate is an insulated roof panel, that is primarily 0.5 / 0.7mm thick metal sheet on 2 sides of a PUR/PIR insulation – a sandwiched panel, primarily used for insulated buildings. These panels are low-rib with almost no corrugations and look like this:



For application on panel roofs, the surface must be free of large cracks, undulations, torn roof edges and should be as smooth as possible. There should be no large holes or sharp changes in elevation of the surface. All sharp undulations from metal fasteners or ripped roof edges must be cleared and repaired, prior to installation. If so, discuss the feasibility with GreenShield experts. Before system application is commenced, the roof or deck should be inspected thoroughly by the roofing applicator, the building contractor and the property owner's representative to identify if it fulfils the given conditions. Roof-mounted equipment should rest on structural framing of the building, not on the GreenShield roofing system. Any water seepage or leak resulting from rooftop mounted equipment are not covered under the GreenShield warranty.

Before application all roof mounted equipment must be removed prior to installation and must be re-installed on frame structure and not directly on the membrane. Special termination is required around the structural installation. Speak to GS expert for more details on this.

Surface preparation includes, but not limited to, smoothening and filling all holes, irregularities and depressions before the system is applied. Post that, complete the moisture scan and make sure any wet surface or materials are clean and dry. Carefully sweep all roof surface to eliminate all dirt and debris. Grind and cut out large chunks or blisters on roofs. Repair cracks and holes in roof especially those larger than ¼" wide.

Slope Requirement

Providing a proper slope for water to drain off is a mandatory requirement of the site, before GS TPO system can be installed. For PEB roof decks, the slope must conform to proper gradient for water drain-off and roof must be free from any kind of water accumulation or ponding during testing.

GS TPO Relaxation Requirement

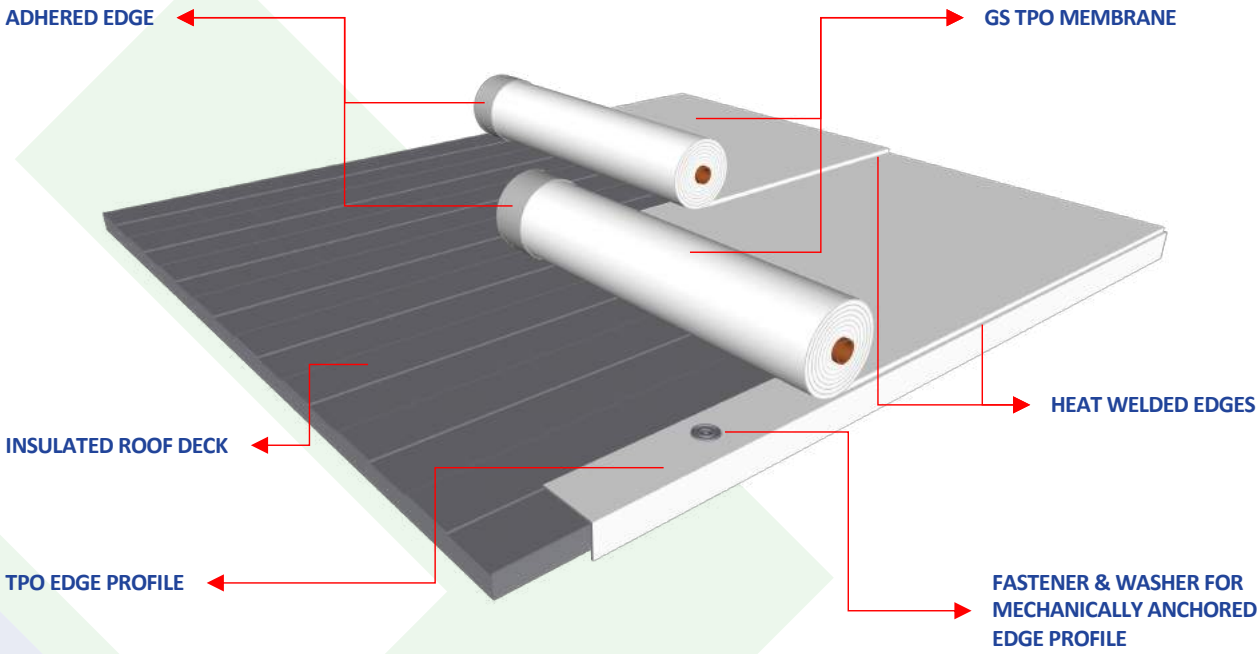
After the surface is fully prepared in accordance with the GreenShield™ guidelines, unpack and unroll GreenShield™ TPO Membrane and position without stretching. Let the membrane relax for up to 30 – 45 minutes and inspect for any damages.

3

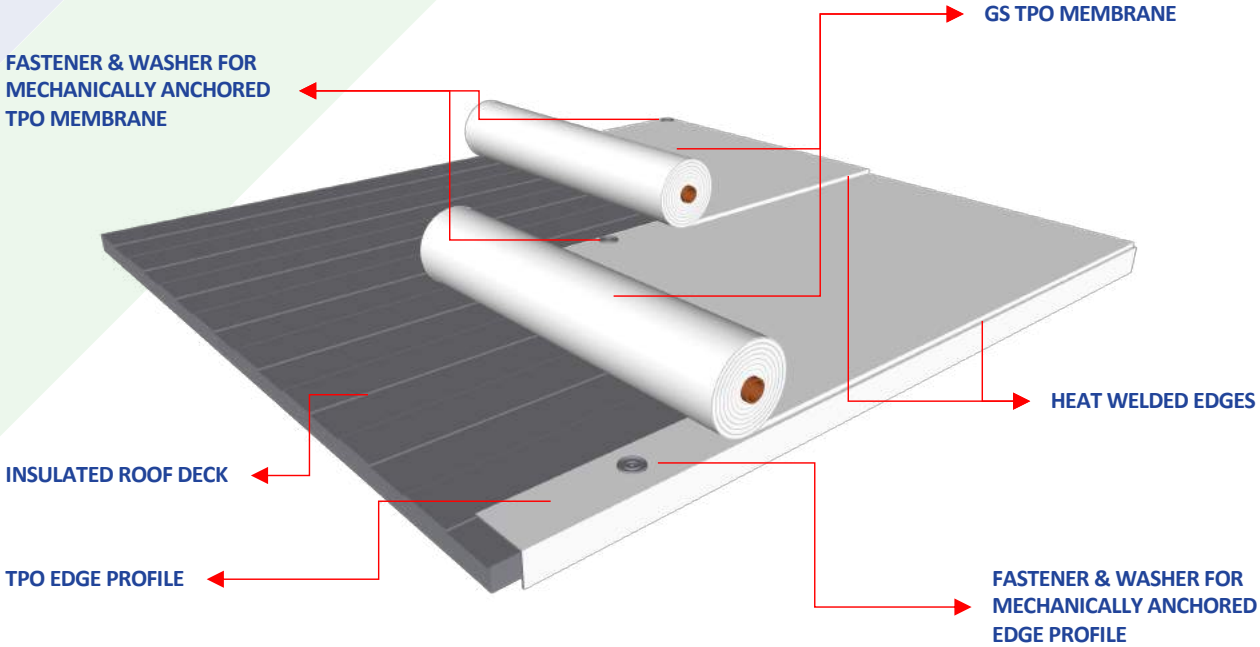
APPLICATION ON PEB ROOF

There are several ways to install TPO roofing on Insulated PEB roof panels

1. **LOOSELY LAID** – where one edge of TPO membrane is adhered to the panel using suitable adhesives – anchoring the membrane to the roof, which is then overlapped with TPO membrane and heat welded. The overlap protects the adhered edge below, not exposing it to external weathering. Since this system does not puncture the insulated roof panel, there is no chance of any leakage. The roof edges of the building are covered with TPO edge trims, mechanically anchored and heat welded with TPO on top, preventing any wind from blowing beneath the TPO or roof.



2. **MECHANICALLY FASTENED** – where the TPO membrane is mechanically anchored in the roof panels using fasteners and washers, which are then overlapped with TPO membrane and heat welded. The overlap completely encapsulates the fastener, which is not exposed to any external weathering – ensuring no water, heat seeps into the insulated panel. The roof edges of the building are covered with TPO edge trims, mechanically anchored and heat welded with TPO on top – thus completely encapsulating the system, preventing any wind from blowing beneath the TPO or roof.



Installation Methodology: Mechanically Fastened

Step 1: Unroll the membrane, spread it over the roof and allow it to remain in this position for approximately 30 minutes to 45 minutes to relieve stresses induced in the process of manufacture and storage.

Step 2: Cut membrane to required size and kept ready for the installation.

Step 3: Lay the membranes such that the membrane installation starts from the lowest point of the slope, gradually moving upwards enabling overlaps to shed water easily, without restrictions. All overlap edges shall be 50mm while building edge end laps over edge TPO will be 100mm. GS TPO Membrane is designed as exposed grade and has UV and weathering resistance and can be left exposed without any protection.

Step 4: Anchor the membrane on to the roof deck using fasteners and washers designed for mechanically fastening membrane over the substrate. Membrane is to to be held in place properly to avoid wrinkles and air bubble pockets, making sure by firmly pressing the membrane down.

Step 5: Laps are to be heat welded using automated weld machine or hand-held weld gun, depending on the site condition. Roll with a PU roller to ensure seams and laps are secure. Check the seams with a seam probe to verify complete welding of edges.

Step 6: Termination of membrane around roof edges: Mechanically fasten the TPO edge profile onto roof edge using fasteners and washers. The edge profile must cover the edge L properly, ensuring no gaps for wind movement below the profile. Then heat weld the membrane completely overlapping and encapsulating the edge profile and fasteners. This will ensure safety from wind uplift.

Step 7: Termination of membrane around vertical upstands: Around upstands, the membrane is mechanically fastened on the vertical surface and aluminium strips are fastened to hold the membrane in place. The strips are overlapped with TPO - further heat welded and edges are sealed with Epoxy / PU sealant

Step 8: All corners, edges are overlapped with corner joints and heat welded in place for securing the membrane and protecting corners from weakening / loosen over time. Review section 4 for more details.

Installation Methodology: Loosely Laid, Partially Adhered

Step 1: Unroll the membrane, spread it over the roof and allow it to remain in this position for approximately 30 minutes to 45 minutes to relieve stresses induced in the process of manufacture and storage.

Step 2: Cut membrane to required size and kept ready for the installation.

Step 3: Lay the membranes such that the membrane installation starts from the lowest point of the slope, gradually moving upwards enabling overlaps to shed water easily, without restrictions. All overlap edges shall be 50mm while building edge end laps over edge TPO will be 100mm. GS TPO Membrane is designed as exposed grade and has UV and weathering resistance and can be left exposed without any protection. Lay the membrane such that the edge with 100 mm fleece backing is towards the fastening edge, while the plain edge is towards the heat welding side

Step 4: Apply GS EPA 2 component adhesive system, designed for adhering TPO to metal roof substrate. Use a trowel and create a bedding thickness of 1.5 to 2 mm of adhesive over the roof panel, making sure that the adhesive is contacted well with the roof within open time of the adhesive. Press the fleece side of the membrane on to this adhesive bed properly to avoid wrinkles and air bubble pockets, made sure by using rollers on top of membrane, firmly pressing it down.

Step 5: Laps are to be heat welded using automated weld machine or hand-held weld gun, depending on the site condition. Roll with a PU roller to ensure seams and laps are secure. Check the seams with a seam probe to verify complete welding of edges.

Step 6: Termination of membrane around roof edges: Mechanically fasten the TPO edge profile onto roof edge using fasteners and washers. The edge profile must cover the edge L properly, ensuring no gaps for wind movement below the profile. Then heat weld the membrane completely overlapping and encapsulating the edge profile and fasteners. This will ensure safety from wind uplift.

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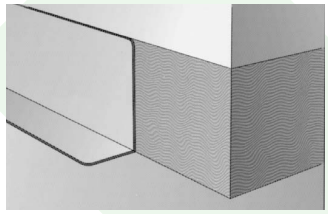
4

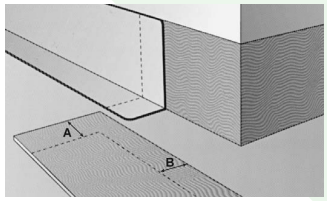
CORNER, EDGE, FLASHING INSTALLATION

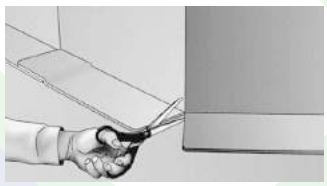
Corner and Joint Terminations

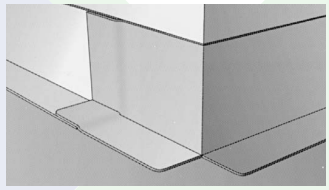
The GS TPO Membrane is flexible and easy to mould into shapes and corners. To ensure proper coverage of critical corners and joints, using an experienced applicator engineer is important.

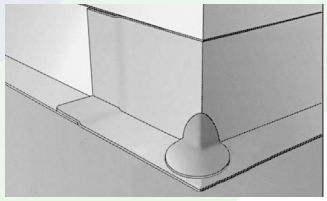
Using hand-held hot air gun, heat up the membrane to make it malleable and then push into corners. On cooling the membrane will take shape. Further corners need to be cut, spliced and over welded to provide proper coverage and rain-coating of the substrate below. Figure below provides details of how membrane is installed around corners.

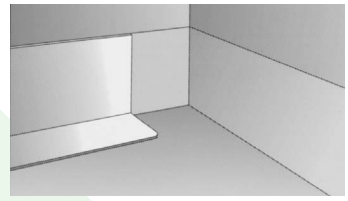


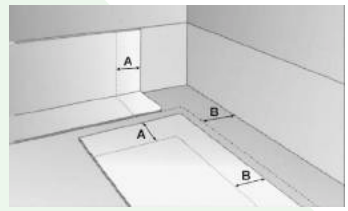


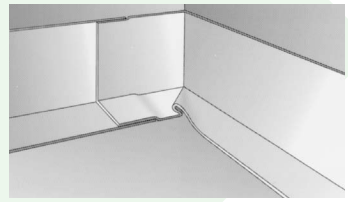


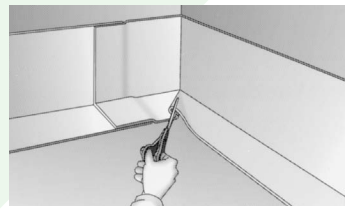


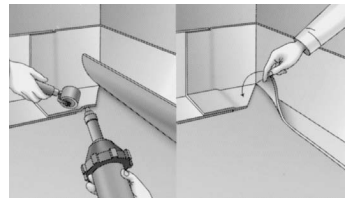


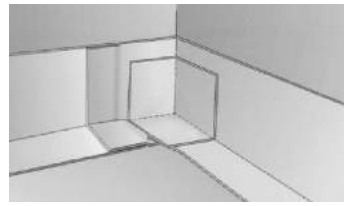


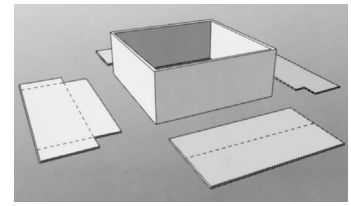


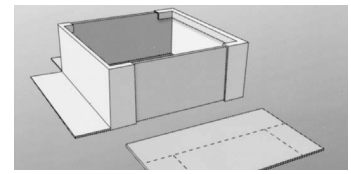


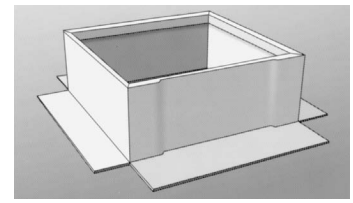


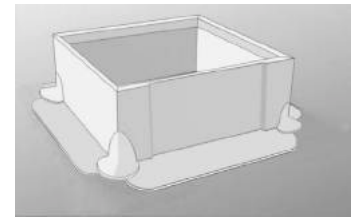












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