



## FACTORY ASSEMBLED INSULATED SANDWICH PANELS USING PUF

User should check the validity of the Certificate by contacting Member Secretary, BMBA at BMTPC or the Holder of this Certificate.

Name and Address of Certificate Holder:  
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**PERFORMANCE APPRAISAL CERTIFICATE**


**FOR**

**FACTORY ASSEMBLED INSULATED  
SANDWICH PANELS USING PUF**

**ISSUED TO**

**M/s Metecno (India) Pvt. Ltd., Chennai**

**STATUS OF PAC No: 1058-P/2021**

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## **PART 1 CERTIFICATION**

**1.1 Certificate Holder:** **M/s Metecno (India) Pvt. Ltd.**  
No. 138/30, 2<sup>nd</sup> Floor, Florida Towers  
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### **1.2 Description of System**

#### **1.2.1 Name of the System – Factory Assembled Insulated Sandwich Panels using Polyurethane Foam (PUF)**

#### 1.2.2 Brief Description

The panels are factory assembled insulated sandwich panels consisting of an insulating layer ‘sandwiched’ between two layers of metal sheets. The panels are manufactured using rigid Polyurethane Foam (PUF) bonded between pre-coated steel sheets to produce profiled finish panels. The steel sheets can either be PPGI or PPGL, and, with a maximum thickness of 0.8 mm. An insulation core provides insulation and sturdy bonding for better structural stability and facilitates better load bearing capacity and wider spans for panels.

These panels can be used for both walling and roofing applications. Structures built using these panels can incorporate MEP (mechanical, electrical and plumbing) services along with architectural elements/features such as coving, cantilevers, mezzanine floors etc. The design and engineering of structures are done following guidelines specified in Indian Standards.

### **1.3 Size and profiles of Panels**

#### 1.3.1 Size of panels

Panels are available in thickness from 30 mm to 120 mm, with standard width of 1000 mm and length as per customer requirement.

### 1.3.2 Profiles of the Panels

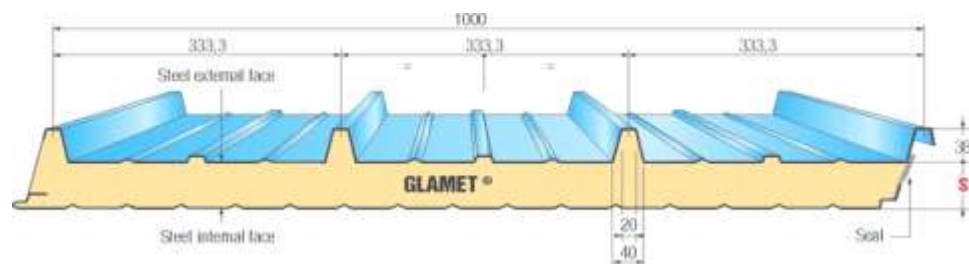
#### 13.2.1 Glamet panels

Glamet panels are manufactured in accordance with a system patented by Metecno and consists of a profile external steel facing, an internal flat liner with an insulation core of PUF. The panels have a mechanism of panel-to-panel interlocking which provides an effective seal. The panels are suitable for general purpose and application in roofing for buildings and shelters. However, it is also suitable for wall and ceiling applications. The Metecno patented mechanism ensures precise interlocking, dimensional accuracy and also eliminates the risk of air gaps and thermal bridging. All joints are covered with butyl tape, sealants and flashings.

Facing Options: Pre-painted galvanized steel/aluminium, stainless steel and craft paper and perforated metal sheet for inner skin.

Surface finish: Colour coated PPGI/PPGL with Regular Modified Polyester (RMP), Silicone Modified Polyester (SMP), Super Durable Polyester (SDP) and Polyvinylidene fluoride (PVDF) coating systems

Detail of this panel is shown below :



#### 1.3.1.2 Monowall panel

Monowall is self-supporting insulation material for use in industrial and commercial buildings and refrigerated rooms with positive temperature. They can be used as partition as façade cladding with permanent finishing and can be integrated well with structural glazing, curtain walls, windows and other type of fenestrations and openings. The Metecno patented mechanism ensures precise interlocking, dimensional accuracy and eliminates the risk of air gaps and thermal bridging and joints are covered with butyl tape, sealants and flashings.

Facing Options: Pre-painted galvanized steel/aluminum, stainless steel and craft paper and perforated metal sheet for inner skin.

Surface finish: Colour coated PPGI/PPGL with RMP, SMP, SDP and PVDF coating systems

Profile of this panel is given below:



### 1.3.1.3 Superwall

Superwall panels are self-supporting polyurethane insulation material based panel system, with a concealed-fixing method for high quality industrial and commercial buildings, where good aesthetics are paramount.

The special double labyrinth joint of this panel, provide mechanical resistance and insulation superior to any other wall panel product of this kind, the panel external micro-V increases the aesthetic appeal of this panel, which can be oriented both vertically and horizontally as required.

Due to the particular shape of the joint, blind fastening are applied to the V-cut on the male edge of the outside sheet. Two screws with center distance of 30mm should be used for each panel and each stud. Outside walls are made mounting such panels one next to the other.

The Metecno patented mechanism ensures precise interlocking, dimensional accuracy and eliminates the risk of air gaps and thermal bridging and joints are covered with butyl tape, sealants and flashings.

Facing Options: Pre-painted galvanized steel/aluminium, stainless steel and craft paper and perforated metal sheet for inner skin.

Surface finish: Colour coated PPGI/PPGL with RMP, SMP, SDP and PVDF coating systems

Profile of this panel is given below:



## 1.4 Applications and Precautions to be taken

1.4.1 These panels are factory assembled composite panels having high strength-weight ratio and ensuring structural stability on the building envelope. These are used for residential and commercial buildings, school & training centers, steel structures, modular & monolithic cabinets, management blocks & site offices, guard room/ porta cabins, etc.

1.4.2 Precautions to be taken while lifting panels:

- To prevent panels from damage while lifting, carefully pick up bundles one at a time. Sling the package by using a rocker arm and nylon belts. Insert wooden boards between the package and the belts. The wooden boards will have to be approximately 2cm longer than the package width.
- Do not store more than three packages one on top of another, and place spacers or boards between them.
- Place the package on a flat and rigid surface, and position polystyrene spacers or wooden boards at max. 1 m intervals.
- Panels will have to be stored slightly sloping in order to help possible condensation flow and to prevent backwater.
- Store packages under cover; if this is impossible, protect them with rainproof membranes. Make sure that the goods are appropriately aerated.
- Any protective film should not be exposed to direct sunbeams and, in any case, should be removed within 45 days after the date when the panels are prepared.
- Extreme care should be taken to avoid bumping and snatching of the bundles when lifting.
- When panels have to be moved one by one due to building yard needs, they should be always carried as shown in the illustration.
- While removing individual panel from bundle, never drag a panel from a bundle or across other surfaces. It will scratch and damage the panel coating / finish. Always lift panels when removing from bundle.

## 1.5 Basis of Assessment

### 1.5.1 Scope of Assessment

1.5.1.1 Suitability of factory assembled insulated sandwich panels produced on a continuous manufacturing line are for non load bearing walling and roofing applications. These are used for various buildings types such as residential, industrial, commercial, school etc.

### 1.5.2 Assessment

1.5.2.1 Assessment of the suitability of the Continuous Sandwich (PUF) Panels is based on:

- Typical Erection Method Statement (Manual) giving details of Work execution process, unloading, storage etc. of panels and Safety measures to be taken.
- Test Report of test carried out on PUF panel as IS-11239 (Parts 2,3,4,5,9,11 & 12) and ASTM C-518:2017 by Atharva Lab, Delhi in 2020
- Certified under ISO: 9001-2015 in 2018.
- Brief Evaluation Report of Ignitability Evaluation carried out on PUF panel as per BS 476-Part 5 by CSIR, Roorkee in 2009.
- Tests conducted on PUF closed joint system for air and water tightness on 60mm thick PUF panel as per ASTM and AAMA standards at Façade India Testing Inc, Mumbai in 2015
- Brief Evaluation Report of Surface Spread of Flame carried out on PUF panel as per BS 476-Part 7 by CBRI, Roorkee in 2009.
- Test Report of tests carried out to determine the physical characteristics of 50mm thick PUF panel as per IS 11239 (Part 1):1985 by CIPET (Central Institute of Plastics Engineering and Technology), Chennai in 2008.

## 1.6. Design Consideration

1.6.1 The system is intended for use where Architectural drawings are available and satisfy the various requirements. The Architect and Engineer designer team of the concerned developer/ owner (client) is responsible for the drawings and overall building design to comply with the various regulatory requirements applicable to the area.

1.6.2 The building to be constructed using Sandwich (PUF) Panels shall be designed by competent structural engineer in accordance with the specifications following relevant codal



requirements, manufactured as per the details worked out in design and constructed by trained persons only with technical support or supervision by qualified engineers and builders, based on structural designs, seismic evaluation & wind forces and as per the details given in the Construction Manual and this PAC.

- 1.6.3 The structural engineers and building designers associated with such type of construction should be thoroughly familiar with the various structural aspects. It is also recommended that Architects and Construction Engineers who undertake such building design and construction gain familiarity with the properties and materials, characteristics of Sandwich (PUF) Panels and its applications.
- 1.6.4 The design engineer shall liaise with the engineer of the developer for design of the foundation.
- 1.6.5 The design assumptions, detailed calculations, references to necessary and detailed design drawings shall be made available on demand, if required. The structural design calculations should clearly demonstrate structural integrity and stability including connection details.
- 1.6.6 Any other requirement regarding safety against earthquake need to be ensured by the designer as per prevailing codal requirements.
- 1.6.7 In addition, the roof made with these panels should preferably be slanted & clearly be used as non-approachable roof.
- 1.6.8 The proper care for no breakage at the edges needs to be taken by the manufacturer & user both.

## **1.7 Conditions of Certification**

1.7.1 *Technical Conditions* -- Raw materials and the finished panels shall conform to the requirements of the prescribed specifications.

1.7.2 *Erection Manual*

Typical Erection Method Statement (Manual) giving details of Work execution process, unloading, storage etc. of panels and Safety measures to be taken need to be supplied by the manufacturer to the Client.

### 1.7.3 Quality Assurance

The Certificate Holder shall implement & maintain a quality assurance system in accordance with Scheme of Quality Assurance (SQA) given in **Annex-A** attached with this Certificate.

### 1.7.4 Durability

Sandwich panels are typically single piece, prefabricated, modular, factory made units which consist of an insulating layer of rigid polyurethane foam between two layers of metals sheets. It provides effective insulation & long lasting strong bonding of insulation core which gives added structure stability to facilitate higher loading & wider span length.

As per the details submitted with the application (Year 2020), the insulated sandwich panel by the manufacturer used in 2006 has maintained structural stability & dimensional stability all these years.

### 1.7.5 Handling of User Complaints

1.7.5.1 The Certificate holder shall provide quick redressal to consumer/user complaints proved reasonable & genuine and within the conditions of warranty provided by it to customer/purchaser

1.7.5.2 The Certificate holder shall implement the procedure included in the SQA. As part of PACS Certification he/she shall maintain data on such complaints with a view to assess the complaint satisfaction and suitable preventive measures taken.

## 1.8 Certification

1.8.1 On the basis of assessment given in Part 3 of this Certificate & subject to the conditions of certification, use & limitations set out in this Certificate and if selected, installed & maintained as set out in Part 1 & 2 of this Certificate, the sections covered by this Certificate are fit for use as set out in the Scope of Assessment.

## PART 2 CERTIFICATE HOLDER'S TECHNICAL SPECIFICATION

### 2.1 General

2.1.1 The PAC holder shall manufacture these panels in accordance with the requirements specified in the relevant Standards (See Part 5). In addition it shall follow the Company standards specifying requirements of these sections for various materials used in the manufacturing of the panels.

### 2.2 Specifications for the System

#### 2.2.1 Specification

The manufacturer shall only use the raw materials supplied with the relevant documents as laid down in the prescribed Quality Assurance Plan. The raw materials shall be subject to agreed controls and tests by the manufacturer before acceptance.

#### 2.2.2 Technical Specifications

##### 2.2.2.1 Raw materials

Sr. No.	Description of raw materials	Name & address of the suppliers
1	Prepainted Steel	JSW/Bhushan/Asian
2	PUF/PIR chemicals	Huntsman/Dow/BASF
<b>GENERAL SPECIFICATION FOR PREPAINTED GALVANIZED STEEL SHEET COILS</b> PPGI - STEEL COILS		
SL. No.	PARAMETERS	TECH. SPECIFICATIONS / STANDARDS
1	PRODUCT NAME	PPGI - STEEL SHEET COILS
2	REFERENCE STANDARDS	ASTM.A 755
3	STRIP THICKNESS (TCT) -mm	0.5 TO 0.8
4	STRIP WIDTH - mm	1060 TO 1220
5	SUBSTRATE MATERIAL	Zinc coating as per ASTM A653/ A 653M with steel base as per ASTM Std.
6	SUBSTRATE COATING MASS Gms/m <sup>2</sup> , SUBSTRATE COATING MASS CLASS	90 TO 275 , Z90,Z120; Z150; Z180 & Z275 as per ASTM Std. or As mutually agreed
7	GRADE DESIGNATION	Gr 50/ Gr80 / CS Type A,B as per ASTM std.
8	YIELD STRENGTH - Mpa Min.	280 For Gr 40,340 for Gr 50 & 550 for Gr 80.
9	PAINT TYPE	Regular Polyester / Silicon polyester / PVDF
10	PAINT COATING THICKNESS (DFT)	Top coat 18 to 22 microns (+5 microns primer), Back Coat 5 to 8 microns (Including Primer).
11	GLOSS	15-80% at 60 degrees ASTM D 523

### 2.3. Inspections & Testing

Inspections & testing shall be done at appropriate stages of manufacturing process. The inspected panels shall be stored & packed to ensure that no damage occurs during transportation. As part of quality assurance, regular in process inspections shall be carried out by the trained personnel of the PAC holder.

### 2.4 Manufacturing Machinery & Equipment

As per the details supplied, the manufacturer has various machines and equipment of required capacities and specifications for manufacturing, testing and installation of the panels. Details of the machines are available with the manufacturer.

### 2.5 Manufacturing Process

Process Flow Chart is given in **Annex B**.

### 2.6 Installation Procedure

#### 2.6.1.1 Preliminaries

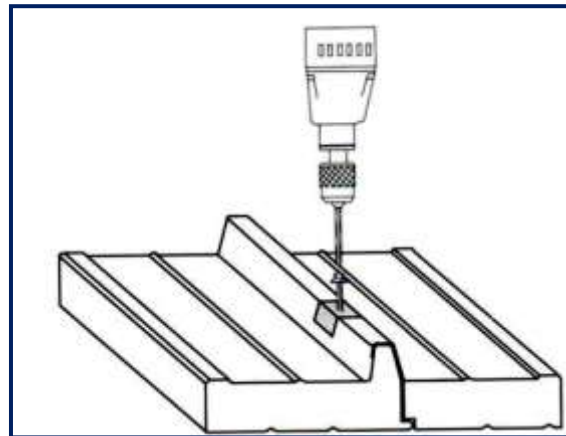
- Check that the storage has been carried out according to the directions in 1.4.2
- Check that the panel support structures are level.
- Position the packages of panels near the points of use.
- Prepare a fixed or cradle scaffold, according to the working height, 30/40 cm far from the external edge of the main columns and comply with the rules on safety in the workplace.
- Control that all workers are equipped with individual safety equipment according to current regulations.
- Prepare all the power supply lines for tools according to current regulations.
- Prepare the panel lifting vehicles.
- In addition to the traditional scaffolding, when assembling wall panels horizontally, automatic scaffolds with platform can be profitably used.
- These platforms may be either the type with masts starting from the ground or the self-propelled type with telescopic arms

#### 2.6.1.2 Roof Panel

##### 2.6.1.2.1 Fastener installation

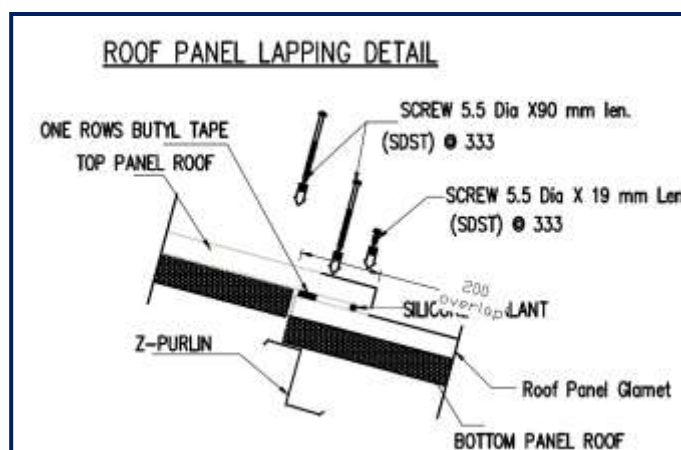
It must be ensured that the fasteners are installed at locations indicated on the building drawings. It is easy to misjudge the location of the structural member, resulting

in a fastener off the structural member or below the sealant at the end lap. The fastener shall be driven in until it is tight and the washer is firmly seated. A slight extrusion of neoprene around the washer is a good visual tightness check.



#### 2.6.1.2.2 Orientation of panels before lifting

For maximum weather-tightness, start laying panels from the end of the building that will be in the leeward or the worst-anticipated prevailing weather. It is much easier and safer to turn panels on the ground than up on the roof. Before lifting panels on to the roof, it must be checked that this is the correct way up and the overlapping side is towards the edge of the roof from which side installation will start. Bundle of panels shall be placed over or near firm supports, not at mid span of roof members.



### 2.6.1.2.3 Roof paneling sequence

It is advised that both sides of the ridge of a building be sheeted simultaneously. When lifting panels onto the roof frame for laying and fastening, care should be taken to make sure all panels are the correct way up with the overlapping side towards the edge of the roof from which installation will commence.

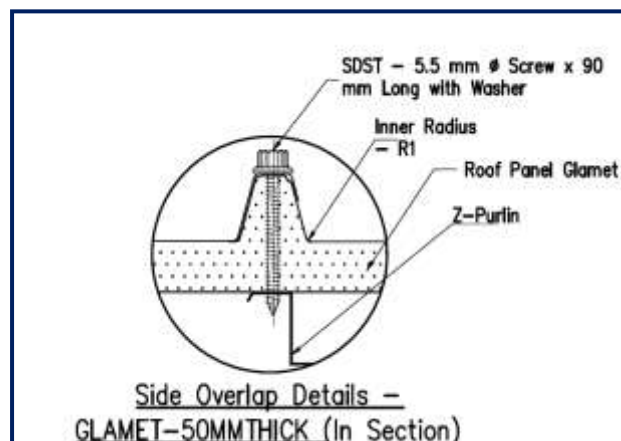
### 2.6.1.2.4 Installation of the first roof panel

The roof panel shall be set in place over the inside closure ensuring the major ribs of the panel rest properly with the inside closure. The panel edge shall be aligned with the edge of the end wall roof line.

A nylon thread, projected from the eave strut, shall be used to give correct distance and line. A chalk line shall be used to mark the location and maintain straight line of screws, thus avoiding miss-drilling and possible leakage. The panel shall be secured to the structure with appropriate fasteners. The fasteners will be installed after the overlapping is installed.

### 2.6.1.2.5 Sealing the side laps

The side lap sealant shall be applied to the weather side edge of the lower major. The sealant should only be applied to clean, dry surfaces. Press firmly along the length of the sealant to insure proper adhesion. The adjoining panel shall be installed positioning the overlapping rib with care. Required size pilot holes for the lap fasteners shall be drilled at the centre of the clearance holes in the overlapping panel. The lap shall be stitched with the self-fastening fasteners supplied with the screw line. Sealant shall not be placed inside of the screw line.



### 2.6.1.2.6 Installation of remaining roof panels

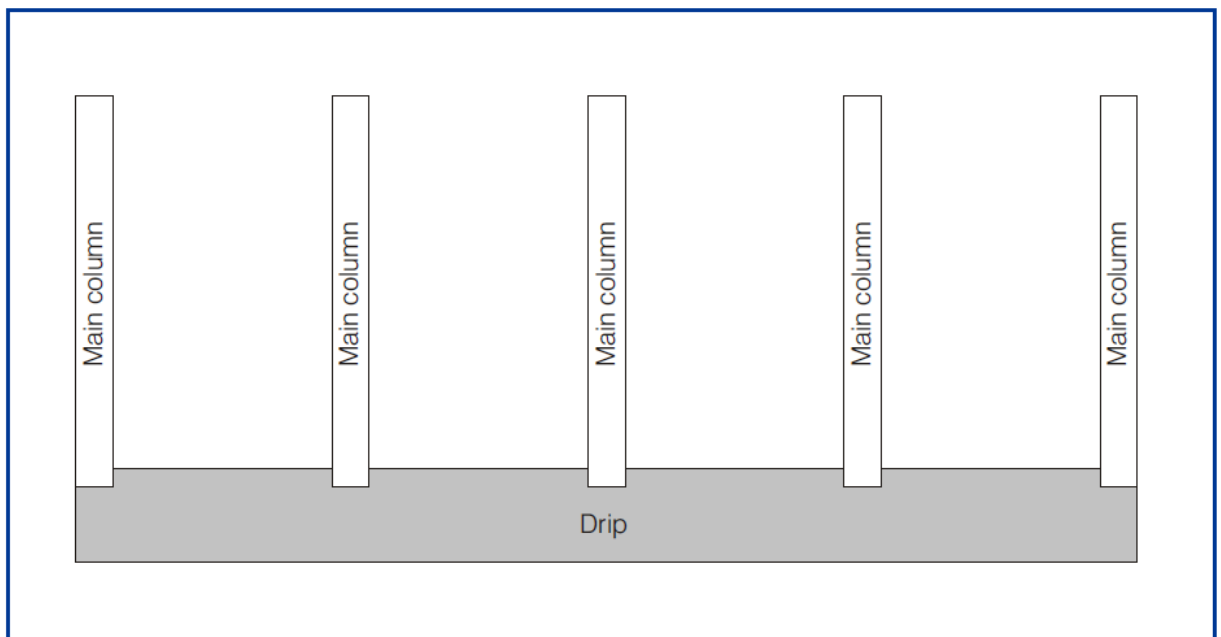
With the first panel run installed & secured and side lap sealant applied, the second panel run may be started. The eave shall be prepared with an inside closure and sealant. The panel shall be positioned so that the overlapping ribs will rest properly. Proper overhang and panel coverage shall be checked. The major ribs of the two panels shall be stitched together and panels attached to the purlins.

### 2.6.1.2.7 Sealing the end laps

At the panel end laps, sealant shall be placed across the full panel below the fastener line. The panel end laps shall have a minimum overlap located over a purlin as per respective erection drawings. The fasteners shall be located on the centre of the flange of purlins.

## 2.6.2. *Wall Panel*

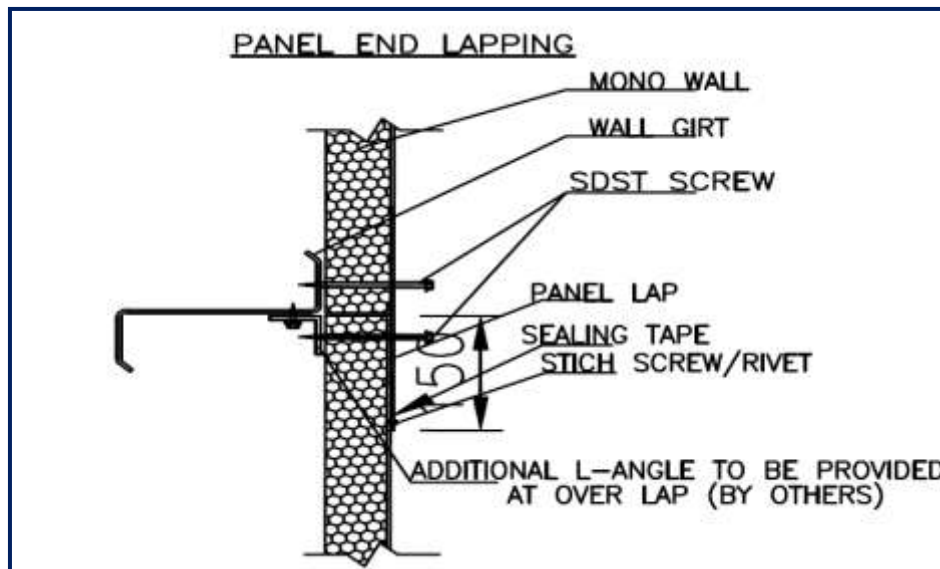
Metecno wall panels, depending on the distances between centers of the main columns, can be assembled on single, double and multiple spans. Due to space limitations, only the assembly on double spans is illustrated here. For single and multiple spans, adopt similar assembly methods.



### 2.6.2.1 Fastener installation

It must be ensured that the fasteners are installed at

locations indicated on the building drawings. It is easy to misjudge the location of the structural member, resulting in a fastener off the structural member or below the sealant at the end lap. The fastener shall be driven in until it is tight and the washer is firmly seated. A slight extrusion of neoprene around the washer is a good visual tightness check. The fasteners shall be installed by drilling holes on the ridge and not on the valley.



#### 2.6.2.2 Checking flatness and overhang

Before starting work it must be ensured that:

- The supports for cladding are truly in the same plane
- The overhangs of panels from the top and bottom supports shall not exceed the limit, whilst also overhanging at least 50 mm into gutters. Necessary adjustments shall be made before laying panels, because it will be difficult or impossible to rectify later.

#### 2.6.2.3 Positioning first panel

First panel shall be positioned before fixing to ensure that it is correctly located in relation to other parts of the building.

It must be checked that the panel:

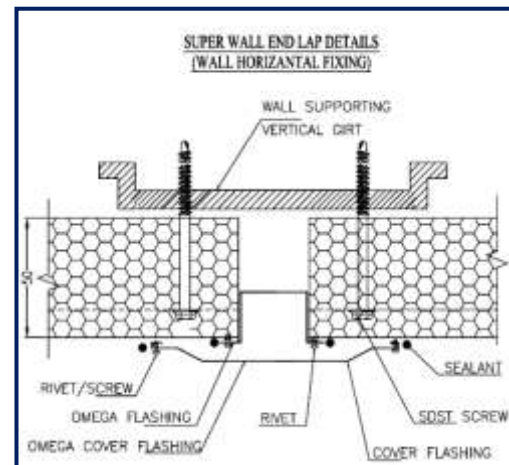
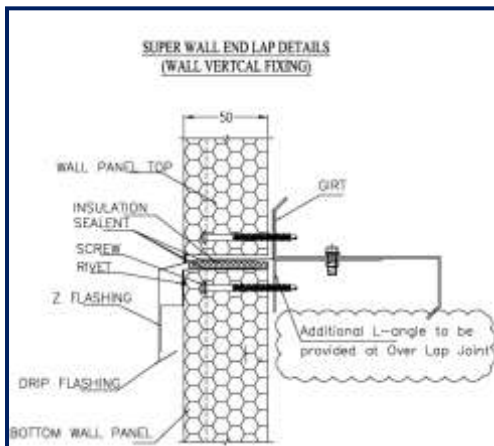
- Aligns with the end-wall (or its barge or fascia), the type of flashing or capping treatment to be used; and
- Aligns correctly at its ends in relation to the gutter and ridge (or parapet or transverse wall).

#### 2.6.2.4 Positioning other panels



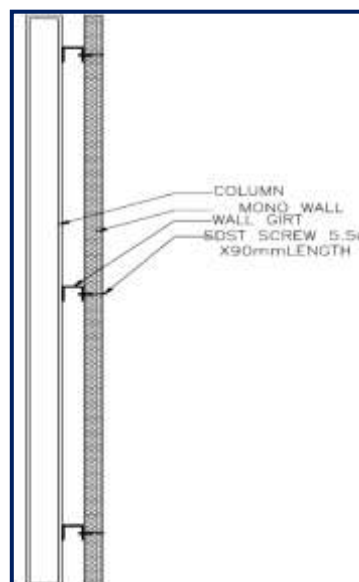
Before assembling the second panel, check that the joints are thoroughly clean. After fixing the first panel in position, other panels shall be aligned using:

- The long edge of the previous pane;
- A measurement from the end of the panel to the fascia or purlin at the gutter. Gutter-end of all panels shall be kept in a straight line.
- Each panel shall be fixed completely before laying the next; or
- The panel shall be fixed tightly to ensure it can't move, all panels shall be laid completely and then all the intermediate fasteners shall be placed



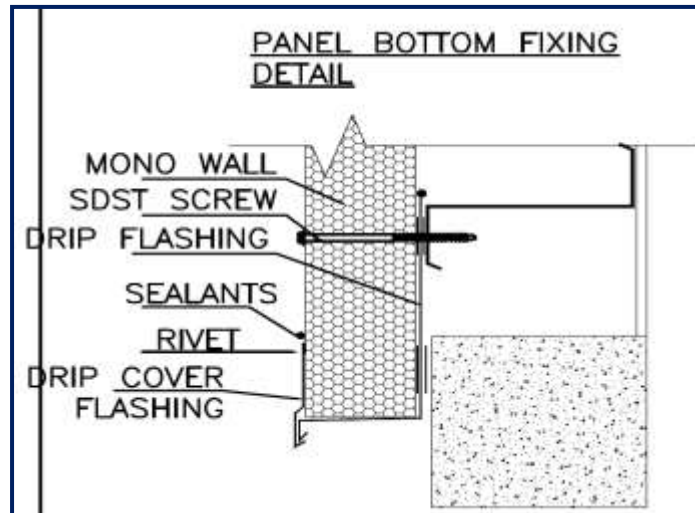
### 2.6.2.5 Checking alignment

It must be checked that each panel is parallel with the adjacent panel and gap is within the allowed limit.



### 2.6.2.6 Wall panel fixing with floor

Wall panel of 80 mm for outer wall shall be fixed with U-channel of size 40x82x40x1.2mm on floor. U-channel shall be fixed with M6x65mm dash fastener at 300mm c/c spacing.

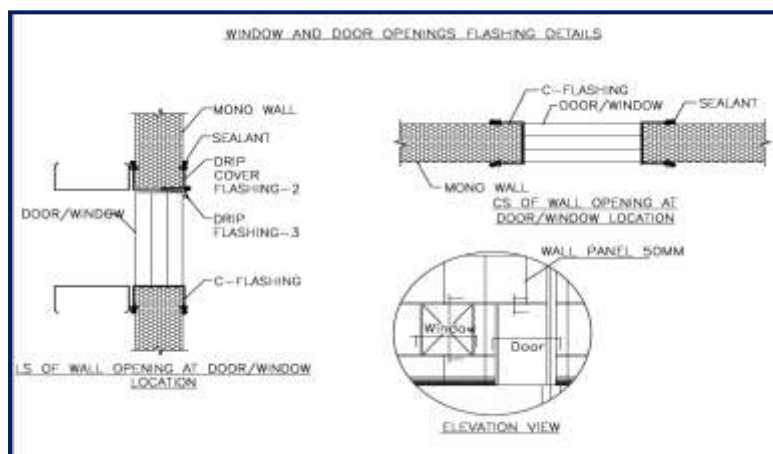


### 2.6.2.7 Wall panel fixing with slab

Wall panel of 80 mm for outer wall shall be fixed with self-drilling screw of 12-14x120x4.8mm at 300mm c/c spacing using L-Angle of 50x50x2mm above slab.

### 2.6.2.8 Wall partition panel fixing with slab top & bottom

Wall partition panel of 80 mm shall be fixed over RCC slab by PVC gitti screw of 35mm and pop rivet at 200mm c/c spacing using L- Angle of 50x50x1.2mm on both side of panel above slab.



#### 2.6.2.9 Vertical corner closer

Vertical corner shall be closed using pop rivet at 300mm c/c spacing by using L-Angle of 50x50x0.5mm.

#### 2.6.3 Ceiling Panel

##### 2.6.3.1 Fastener installation

It must be ensured that the fasteners are installed at locations indicated on the building drawings. It is easy to misjudge the location of the structural member, resulting in a fastener off the structural member or below the sealant at the end lap. The fastener shall be driven in until it is tight and the washer is firmly seated. A slight extrusion of neoprene around the washer is a good visual tightness check.

##### 2.6.3.2 Orientation of panels before lifting

For maximum weather-tightness, start laying panels from the end of the building that will be in the lee of the worst-anticipated or prevailing weather. It is much easier and safer to turn panels on the ground than up on the roof. Before lifting panels on to the roof, it must be checked that this is the correct way up and the overlapping side is towards the edge of the roof from which side installation will start. Bundle of panels shall be placed over or near firm supports, not at mid span of roof members.

##### 2.6.3.2 Fixing of Aluminium 'T'

Aluminium 'T' shall be marked on the structural members and holes shall be drilled in the structural members. Sag rod connector shall be assembled on ground for longer drop length. After that Aluminium 'T' shall be assembled on ground with all accessories and erected one by one at specified locations.

The level and alignment of 'T' line shall be checked before fixing the panels. Bottom level of the 'T' shall be adjusted for roof ceiling by adjusting nut. Coupling plates shall be erected to connect adjacent 'T' members. Same procedure shall be repeated in case of multiple lines.

##### 2.6.3.3 Ceiling panel installation

Ceiling panel must be sheeted on both sides of the 'T'

simultaneously. Proper coverage shall be checked frequently during progress. When lifting panels for laying and fastening, it must be ensured that all the panels are in the correct way up.

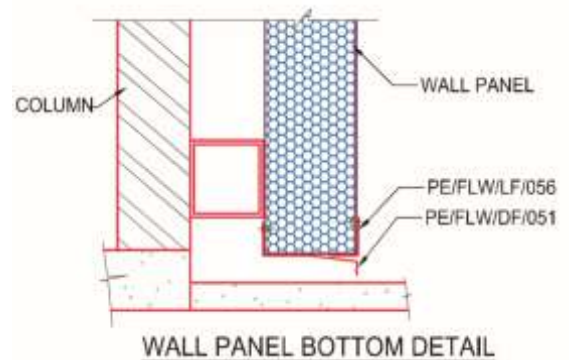
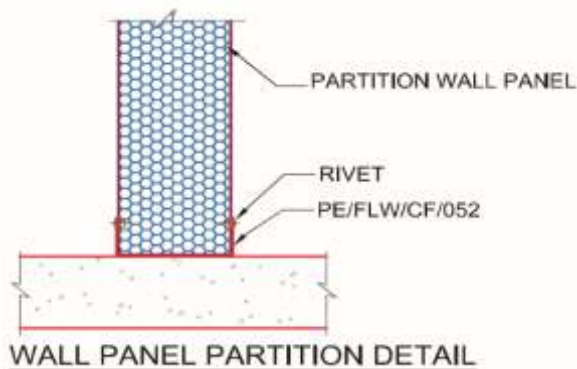
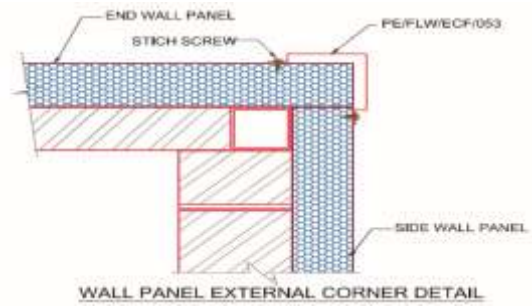
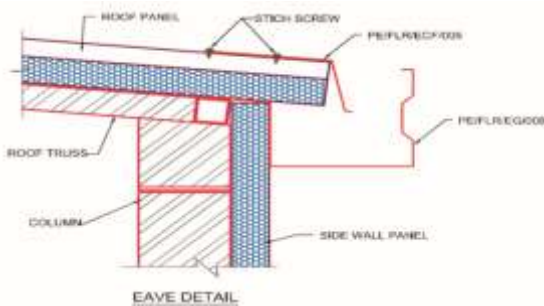
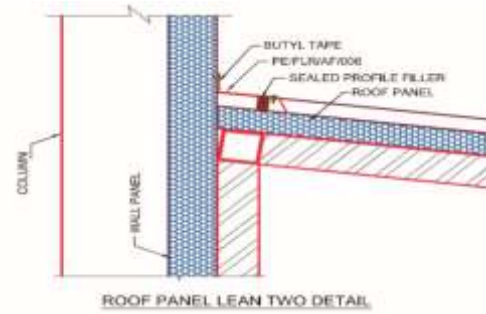
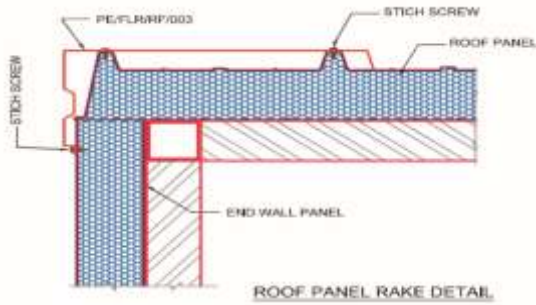
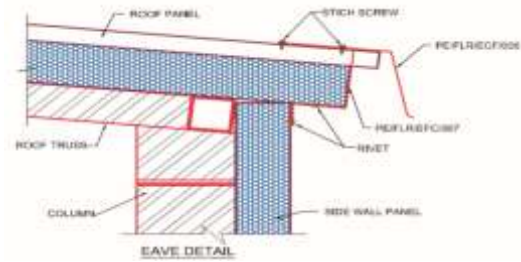
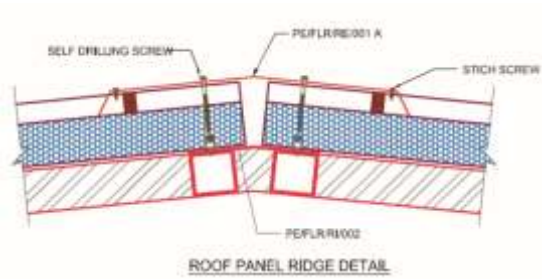
For panel installation steps given below shall be followed:

- Layout on the floor shall be marked as per the drawings.
- U Track/ base angle shall be installed in water level.
- Step cutting at wall panels shall be made to make provision for ceiling panel resting.
- Then wall panels shall be installed starting from one end wall and one side wall.
- Plumb and alignment of each panel shall be checked for starting the ceiling panels.
- Inner and outer flashings shall then be installed to give temporary hold at wall panels.
- Partition/other side wall panel shall also be installed with inner and outer flashings.
- Ceiling panels shall then be lifted to the location after checking the orientation as per the drawings before lifting.
- Strip flashing shall be installed on top of the ceiling panel after checking the alignment.

The chamber shall then be completed by following the above steps. Silicon sealant shall be filled at inner and outer face of all the panels. All flashings and accessories shall be installed as shown in the drawings. After that chemical filling shall be done as per the specifications.

#### 2.6.3.4 Sealing the side laps

Apply the side lap sealant to the weather side edge of the lower edge of the crest. The sealant should only be applied to clean, dry surfaces. Press firmly along the length of the panel to ensure proper adhesion. Install the adjoining panel positioning the overlapping/side-lapping rib with care. Drill, at the centre of the clearance holes in the end-lapping panel, required size pilot holes for the lap fasteners. Stitch the lap with the self-fastening fasteners supplied with the screw line. Sealant shall not be placed inside of the screw line.



## 2.7 Skilled / Training Needed for Installation

The panels shall be installed under the direct supervision of trained personnel of the manufacturer or by manufacturer's authorized personnel only.

## **2.8 Guarantees/Warranties Provided by the PAC Holder**

PAC holder shall furnish various performance warranties as required for project specifications.

The items covered by these warranties include weather tightness, corrosion and finish performance. Weather tightness warranties are subjected to the use of manufacturer's authorized contractors under its technical Engineer's supervision and periodic inspection.

The manufacturer shall ensure that all specifications and shop drawings are reviewed prior to warranty issuance.

In addition, warranties are limited to materials supplied by the manufacturer.

## **2.9 Services Provided by the PAC Holder to the Customer**

The PAC holder shall take full care of after sales services such as leakages, repairing etc.

## **2.10 Manuals**

Installation Manual, Quality Control Manual and a Manual for Health & Safety shall be provided for each project incorporating the Continuous Sandwich (PUF) Panels.

## **2.11 Responsibility**

- Specific design using Continuous Sandwich (PUF) Panels is the responsibility of the designer with the instructions, supervision and guidance of the PAC holder.
- Quality of installation of the system on site is the responsibility of the trade persons engaged by the agency
- Quality of maintenance of the building is the responsibility of the building owner.
- Providing necessary facilities and space for movement of cranes and vehicles is the responsibility of the building developer.

## **PART 3 BASIS OF ASSESSMENT AND BRIEF DESCRIPTION OF ASSESSMENT PROCEDURE**

### **3.1 Assessment**

**3.1.1** The technical assessment was done as per provisions of the Standards listed in Part 5 of this Certificate.

### **3.2 Site Inspection (Manufacturing Plant Visit)**

The manufacturing unit was inspected by the Officers of the Council and members of TAC via video conferencing in prevailing scenario of Covid -19. The firm has got necessary manufacturing and test facilities to produce the components as per the required design and specifications. It has Quality Assurance system in the factory to produce the components conforming to the specified requirements. The manpower were found to be conversant with manufacturing process & testing procedures required for the quality control of the system.

### **3.3 Tests referred for Assessment;**

**3.3.1** The various tests as carried out;

- i. Report of various tests carried out on 50 mm thick PUF panel as per standard norms by Dow Chemical International Pvt. Ltd., Mumbai
- ii. Brief Evaluation Report of Ignitability Evaluation carried out on 228 mm\*228 mm\*25 mm thick PUF panel as per BS 476-Part 5 by CBRI, Roorkee in 2009.
- iii. Brief Evaluation Report of Surface Spread of Flame carried out on 25 mm thick PUF panel as per BS 476-Part 7 by CBRI, Roorkee in 2009.
- iv. Performance mock up testing of Polyurethane Panels Closed Joint System carried out on 60 mm thick PUF panel as per ASTM & AAMA standards by Façade India Testing Inc. in 2015.
- v. Approval of Puff Panels of Metecno (India) Pvt. Ltd. by Power Grid Corporation of India Limited

**3.3.2** The summary of test reports are as per the details below;

- a. Physical and Mechanical Properties Report for PUF Panel Foam sample

Date of Sample Received:	14/09/2020
Standard Specification :	IS 11239 & ASTM
Laboratory :	Atharva Laboratories Pvt. Ltd., Noida

S. No.	Parameters	Test Method	Requirements	Unit	Results
1.	Overall Density	IS 11239 Part-2: 2019	40+2	kg/m <sup>3</sup>	40.5
2.	Compressive strength at 10% Deformation	IS 11239 Part-11: 1985 RA:2019	115 (Min.)	KPa	124.2
3.	Dimensional Stability (at 100°C for 24hrs) i) Length ii) Width iii) Thickness	IS 11239 Part-3:2009 RA:2019	$\pm 2$ (Max.) $\pm 2$ (Max.) $\pm 2$ (Max.)	%	0 0 0.3
4.	Water vapour transmission rate	IS11239 Part-4:2014 RA:2019	5.5 (Max.)	ng/pas m	2.8
5.	Horizontal burning test	IS 11239 Part-12: 1988 RA:2019	125 (Max.)	mm	58
6.	Closed Cell Content	IS 11239 Part-5: 2019	85 (Min.)	%	91.8
7.	Thermal conductivity (at 10°C)	ASTM C518:2017	N.A.	-	N.A.
8.	Thermal conductivity (at 50°C)	ASTM C518:2017	0.03 (Max.)	W/mK	0.026
9.	Water Absorption by volume	IS 11239 Part-9:1988 RA:2019	2 (Max.)	%	0.4

b. Physical & Mechanical Properties report by Dow Chemical International Pvt. Ltd., Navi Mumbai for Polyurethane sandwich panel foam samples (50mm thickness) tested during November, 2018 has also been submitted, which is conforming to the specification requirements.

c. Physical and Mechanical Properties for PUF Sandwich Panels Foam sample

Date of Sample Received : 12/10/2009  
 Standard Specification : IS 11239 & ASTM E 1530  
 Laboratory : Central Institute of Plastics Engineering & Technology (CIPET)

S. No.	Parameters	Test Method	Requirements	Unit	Results
1.	Density	IS 11239 (Part 2)	40+2	kg/m <sup>3</sup>	38.2
2.	Compressive strength at 10% Deformation	IS 11239 (Part 11)	115 (Min.)	KPa	156.0
3.	Dimensional stability	IS 11239 (Part 3)	$\pm 2$ (Max.)	%	1.40
4.	Water vapour transmission rate	IS 11239 (Part 4)	5.5 (Max.)	ng/pas m max.	3.9
5.	Horizontal burning test	IS 11239 (Part 12)	125 (Max.)	mm	45
6.	Flexural strength	IS 11239 (Part 10)		KPa	710
7.	Thermal conductivity (at 50°C)	ASTM E 1530	0.03 (Max.)	W/mK	0.24



d. Air & Water Tightness Test

Material Description : Polyurethane Panels Closed  
 Joint System (Monowall Panel with a core of PUR foam)  
 Panel Thickness : 60mm  
 Date of Sample Received : 23/03/2015  
 Standard Specification : As per ASTM & AAMA Standards  
 Laboratory : Facade India Testing Inc

Test	As per Standard	Test Pressure	Permissible Limit	Measured Value	Inference
Pretest-Air Infiltration	ASTM E283	300 Pa	16.58m <sup>3</sup> /hr	1.5 m <sup>3</sup> /hr	Pass
Pretest-Static Water Penetration	ASTM E331	720 Pa	No leakage is permitted.	No leakage observed	Pass
Air Infiltration	ASTM E283	300 Pa	16.58 m <sup>3</sup> /hr	1.5m <sup>3</sup> /hr	Pass
Static Water Penetration	ASTM E331	1200 Pa	No leakage is permitted.	No Leakage observed	Pass
Dynamic Water Penetration	AAMA 501.1	1200 Pa (159 km/h wind velocity)	Total 15ml.	No Leakage observed	Pass

e. Brief Evaluation Report of Surface Spread of Flame carried out on PUF Panel as per BS 476-Part 7 by CSIR, Roorkee in 2009, indicates the flame spread as Class-1 (Nil for 1.5 minutes fire duration & 10 minutes fire duration). The test sample/specimen were of PUF Insulated Sandwich Panel of sizes 900 mm x 270 mm x 25 mm size.

f. Brief Evaluation Report of Ignitability Evaluation carried out on PUF panel as per BS 476-Part 5 by CSIR, Roorkee in 2009, indicates the Classification as P (Not easily Ignitable). The test sample/specimen were of PUF Insulated Sandwich Panel of sizes 228 mm x 228 mm x 25 mm size respective.

**3.4.** Execution of Projects: The executed projects along with photographs are at **Annexure-D**.

## **PART 4 STANDARD CONDITIONS**

This certificate holder shall satisfy the following conditions:

- 4.1** The certificate holder shall continue to have the product reviewed by BMBA.
- 4.2** The product shall be continued to be manufactured according to and in compliance with the manufacturing specifications and quality assurance measures which applied at the time of issue or revalidation of this certificate. The Scheme of Quality Assurance separately approved shall be followed.
- 4.3** The quality of the product shall be maintained by the certificate holder.
- 4.4** The product user should install, use and maintain the product in accordance with the provisions in this Certificate.
- 4.5** This certificate does not cover uses of the product outside the scope of this appraisal.
- 4.6** The product is appraised against performance provisions contained in the standards listed in Part-V. Provisions of any subsequent revisions or provisions introduced after the date of the certificate do not apply
- 4.7** Where reference is made in this Certificate to any Act of Parliament of India, Rules and Regulations made there under, statutes, specifications, codes of practice, standards etc. of the Bureau of Indian Standards or any other national standards body and the International Organization for Standardization (ISO), manufacturer's company standards, instruction/manual etc., it shall be construed as reference to such publications in the form in which they were in force on the date of grant of this Certificate (and indicated in Part V to this Certificate)
- 4.8** The certificate holder agrees to inform BMBA of their distributors / licensees whenever appointed by him and agrees to provide to BMBA a six monthly updated list thereof.
- 4.9** The certificate holder agrees to provide to BMBA feedback on the complaints received, the redressal provided, and the time taken to provide redressal on complaint to complaint basis as soon as redressal is provided. BMBA agrees to provide the certificate holder the user feedback received by it, if any.

- 4.10** If at any time during the validity period, PACH is unable to fulfill the conditions in his PAC, he should on his own initiative suspend using the PAC and notify Chairman, TAC the date from which he has suspended its use, the reason for suspension and the period by which he will be able to resume. He shall not resume without the prior permission of BMBA. He shall also inform, simultaneously, his agents, licensees, distributors, institutional, government, public sector buyers, other buyers and all those whom he has informed about his holding the PAC. He shall also inform all those who buy his product(s) during the period of suspension. He shall provide to BMBA at the earliest the list of who have been so informed by him.
- 4.11** In granting this Certificate, BMBA takes no position as to:
- a. The presence or absence of patent or similar rights relating to the product;
  - b. The legal right of the Certificate holder to market, install or maintain the product,
  - c. The nature of individual installations of the product, including methods of workmanship.
- 4.12** BMTPC and the Board of Agreement of BMTPC (BMBA) take no position relating to the holder of the Performance Appraisal Certificate (PACH) and the users of the Performance Appraisal Certificate (PAC) respecting the patent rights / copy rights asserted relating to the product / system / design / method of installation etc. covered by this PAC. Considerations relating to patent / copy rights are beyond the scope of the Performance Appraisal Certification Scheme (PACS) under which this PAC has been issued. PACH and users of this PAC are expressly advised that determination of the Claim / validity of any such patent rights / copy rights and the risk of infringement of such rights are entirely the responsibility of PACH on the one hand and that of the users on the other.
- 4.13** It should be noted that any recommendations relating to the safe use of the product which are contained or referred to in this Certificate are the minimum standards required to be met with when the product is installed, used and maintained. They do not purport in any way to restate or cover all the requirements of related Acts such as the Factory Act, or of any other statutory or Common Law duties of care, or of any duty of care which exist at the date of this Certificate or in the future, nor is conformity with the provisions of this Certificate to be taken as satisfying the requirements of related Acts.
- 4.14** In granting this Certificate, BMTPC and BMBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the use of this product.

- 4.15** The certificate holder indemnifies BMBA, its officers and officials involved in this assessment against any consequences of actions taken in good faith including contents of this certificate. The responsibility fully rests with the certificate holder and user of the product.
- 4.16** The responsibility for conformity to conditions specified in this PAC lies with the manufacturer who is granted this PAC. The Board (BMBA) will only consider requests for modification or withdrawal of the PAC.
- 4.17** The PAC holder shall not use this certificate for legal defense in cases against him or for legal claims he may make from others.



Place: New Delhi

Date of issue 10.2.21

Chairman TAC & for and on behalf of  
Member Secretary, BMBA

**Dr. Shallesh Kr. Agrawal**  
Chairman, TAC  
& Member Secretary, BMBA  
Building Materials and Technology Promotion Council  
Ministry of Housing and Urban Affairs, Govt. of India  
Core 5A, 1st Floor, India Habitat Centre  
Lodhi Road, New Delhi-110003

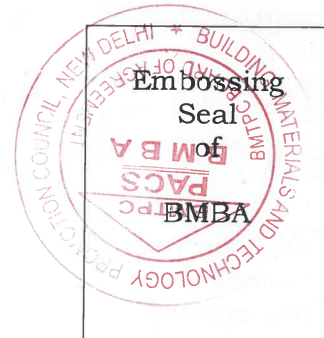
## PART 5 LIST OF STANDARDS & CODES USED IN ASSESSMENT

- 5.1 These Standards are referred for carrying out particular tests only and do not specify the requirement for the whole product as such.
- 5.1.1 **IS 277:2018** – Specifications for galvanized steel sheets (Plain & corrugated).
- 5.1.2 **IS 801:1975 (Reaffirmed 2010)** – Code of practice for use of cold formed light gauge steel structural members in general building construction.
- 5.1.3 **IS 875 (Parts 1 to 3):1987/2015** – Code of Practice for design loads (other than earthquake) for buildings & structures.
- 5.1.4 **IS 3346: 1980 (Reaffirmed 2017)** – Method of determination of thermal conductivity of thermal insulation materials.
- 5.1.5 **IS 11239 (Part 1, 3, 4, 11 & 12)** - Method of tests for rigid cellular thermal insulations.
- 5.1.6 **IS 12436:1988** – Specifications for Performed Rigid Polyurethane foam for thermal insulation.
- 5.1.7 **IS 14246:2013**--Specifications for continuously pre-painted galvanized steel sheets and coils.
- 5.1.8 **BS 476 (Parts 5, 6 & 7)** -- Fire Tests on Building Materials & Structures
- 5.2 Company Standards of the PAC holder** – The branded design & specifications of the raw materials and finished product are as submitted by the manufacturer. The PAC holder has to make available the company standards to the consumers according to which testing have been done.

## CERTIFICATION

In the opinion of Building Materials & Technology Promotion Council's Board of Agreement (BMBA), **Factory Assembled Insulated Sandwich Panels using PUF** bearing the mark manufactured by M/s Metecno (India) Pvt. Ltd., Chennai is satisfactory if used as set out above in the text of the Certificate. This Certificate PAC No.: 1058-P/2021 is awarded to **M/s Metecno (India) Pvt. Ltd., Chennai.**

The period of validity of this Certificate is as shown on Page 1 of this PAC. This Certificate consists of a cover page and pages 1 to 37.



On behalf of BMTPC Board of Agreement, Chairman, Technical Assessment Committee (TAC) of BMBA & Member Secretary, BMTPC Board of Agreement (BMBA) Under Ministry of Housing and Urban Affairs, Government of India

Place: New Delhi, India

Date: ..... 10.2.21

## PART 6 ABBREVIATIONS

### Abbreviations

BMBA	Board of Agreement of BMTPC
BMTPC	Building Materials and Technology Promotion Council
CPWD	Central Public Works Department
ED	Executive Director of BMTPC
IO	Inspecting Officer
MS	Member Secretary of BBA
PAC	Performance Appraisal Certificate
PACH	PAC Holder
PACS	Performance Appraisal Certification Scheme
SQA	Scheme of Quality Assurance
TAC	Technical Assessment Committee (of BMBA)

## **Performance Appraisal Certification Scheme –A Brief**

Building Materials & Technology Promotion Council (BMTPC) was set up by the Government of India as a body under the Ministry of Housing & Urban Poverty Alleviation to serve as an apex body to provide inter-disciplinary platform to promote development and use of innovative building materials and technologies laying special emphasis on sustainable growth, environmental friendliness and protection, use of industrial, agricultural, mining and mineral wastes, cost saving, energy saving etc. without diminishing needs of safety, durability and comfort to the occupants of buildings using newly developed materials and technologies.

During the years government, public and private sector organizations independently or under the aegis of BMTPC have developed several new materials and technologies. With liberalization of the economy several such materials and technologies are being imported.

However, benefits of such developments have not been realized in full measure as understandably the ultimate users are reluctant to put them to full use for want of information and data to enable them to make informed choice.

In order to help the user in this regard and derive the envisaged social and economic benefits the Ministry of Housing & Urban Poverty Alleviation has instituted a scheme called Performance Appraisal Certification Scheme (PACS) under which a Performance Appraisal Certificate (PAC) is issued covering new materials and technologies. PAC provides after due investigation, tests and assessments, amongst other things information to the user to make informed choice.

To make the PACS transparent and authentic it is administered through a Technical Assessment Committee (T AC) and the BMTPC Board of Agreement (BMBA) in which scientific, technological, academic, professional organizations and industry interests are represented.

The Government of India has vested the authority for the operation of the Scheme with BMTPC through Gazette Notification No. 1-16011/5/99 H-II in the Gazette of India No. 49 dated 4th December, 1999.

Builders and construction agencies in the Government, public and private sectors can help serve the economic, development and environmental causes for which the people and Government stand committed by giving preference to materials and technologies which have earned Performance Appraisal Certificates.

Further information on PACS can be obtained from the website: [www.bmtpc.org](http://www.bmtpc.org)



**ANNEX A**

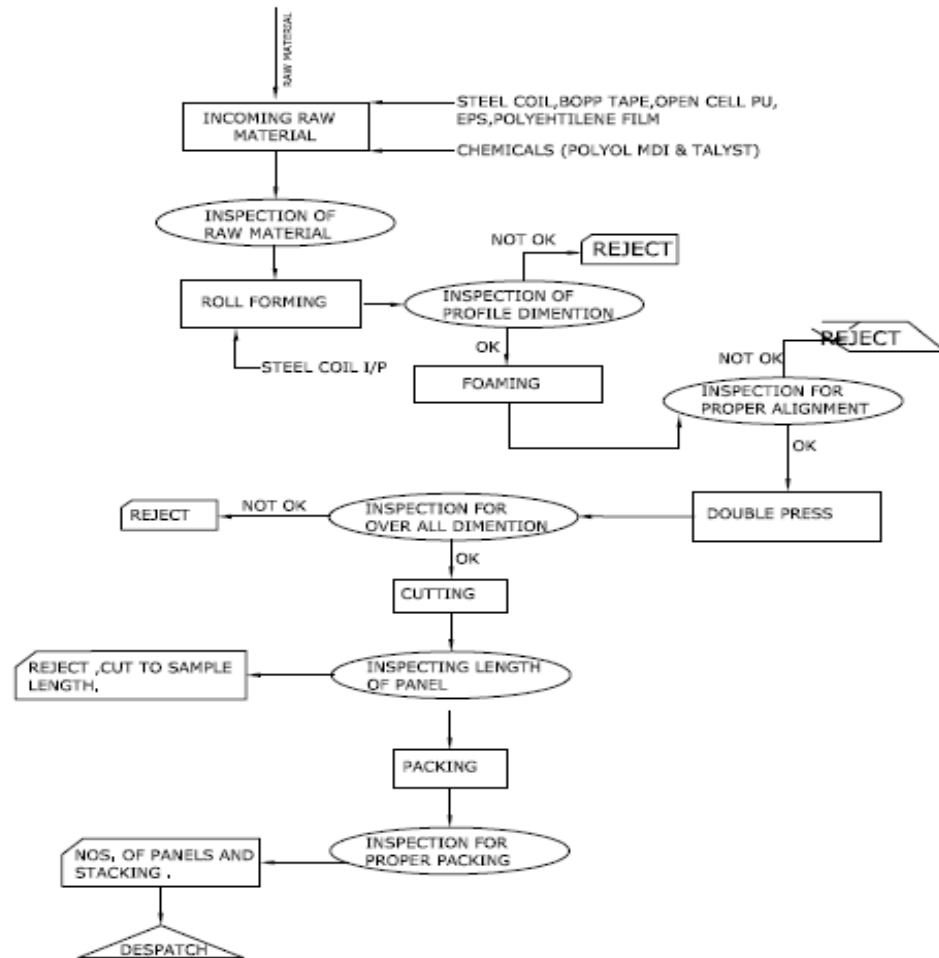
*QUALITY ASSURANCE PLAN FOR CONTINUOUS SANDWICH (PUF) PANELS*

Quality Assurance Plan For Continuous Sandwich Panels					
S.no	Component/Operation	Type of check	Acceptance Norm/Test method	Frequency of testing	Remarks
<b>1.0. Raw Material</b>					
1.1	Prepainted Sheet (PPGL/PPGI)	Visual checks	Shall be free from any surface defects	For every batch/lot	
1.2	Mechanical, chemical & coating properties of GI sheet	Review of Mill TC	IS 14246/ASTM A 755	For every batch/lot	Once in six month . Random Sample tested in External Lab
1.3	PU chemical	Reactivity	MIPL specification sheet	For every batch	
1.4	PUF	Density	40±2 kg/m <sup>3</sup> IS 11239 Part-2)	For every batch	
<b>2.0 In process</b>					
2.1	Profile	Thickness & Visual checks	IS 14246/ASTM A 755	For every batch/lot	
2.2	Foaming	PU Reactivity	MIPL Process control Plan	For every batch	
2.3	Cutting	Dimensional & Physical checks	EN 14509	Random sampling	
<b>3.0 Finished Product</b>					
3.1	PUF	Overall Density	38-42 Kg/m <sup>3</sup> /IS 11239 part 2	For every batch	Internal Lab
3.2	PUF	Compression strength	min 115 Kpa/IS 11239 Part 11	For every batch	Internal Lab
3.3	PUF	Hot dimensional stability	(+/-2%)/IS 11239 part 3	For every batch	Internal Lab
3.4	PUF	Water vapour transmission rate	max 5.5ng/pasm/IS 11239 part 4	Once in a year	External Lab
3.5	PUF	Horizontal burning test	<125mm/IS 11239 part 12	Once in a year	External Lab
3.6	PUF	Closed cell content	min 85%/IS 11239 part 5	Once in a year	External Lab
3.7	PUF	Thermal conductivity	0.023-0.03w/m K/ASTM C 518	Once in a year	External Lab
3.8	PUF	Water absorption by volume	Less than 2%/IS 11239 part-9	Once in a year	External Lab

**ANNEX B**

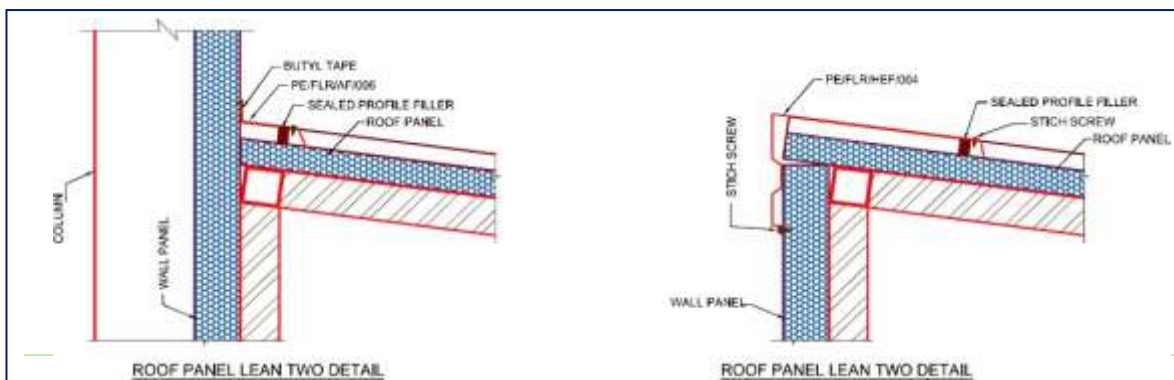
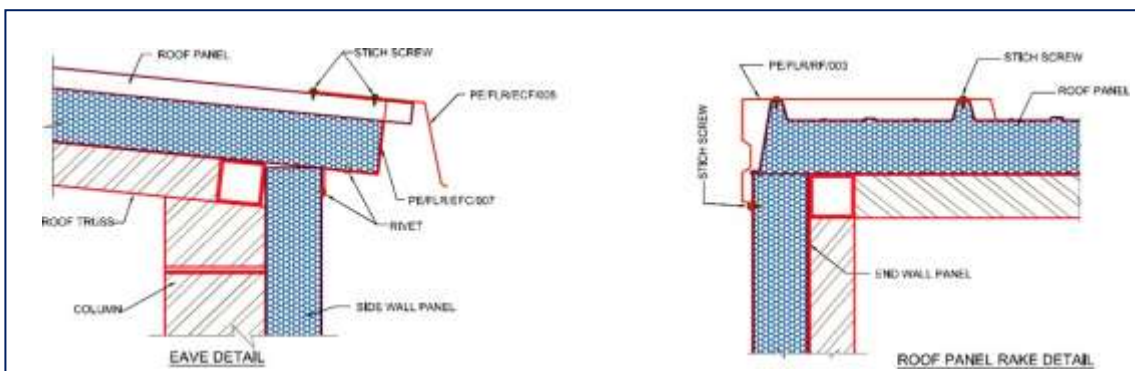
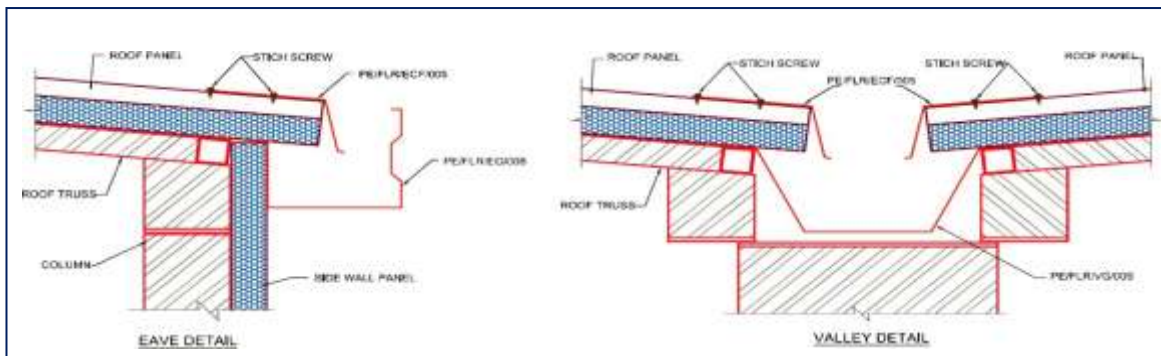
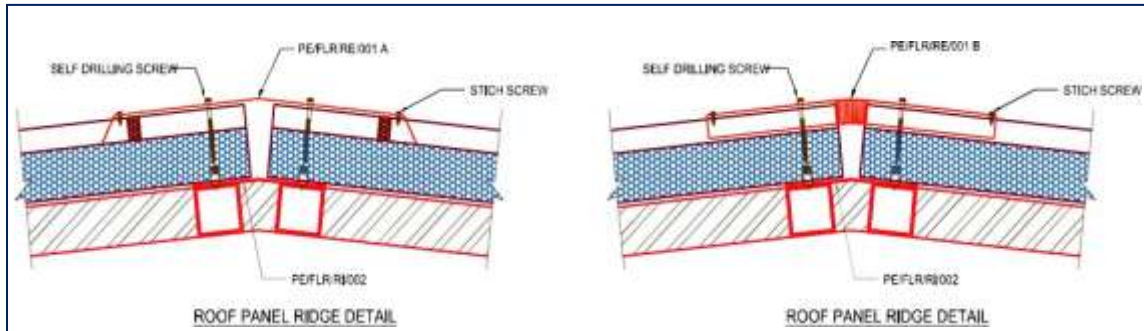
*MANUFACTURING PROCESS FLOW CHART*

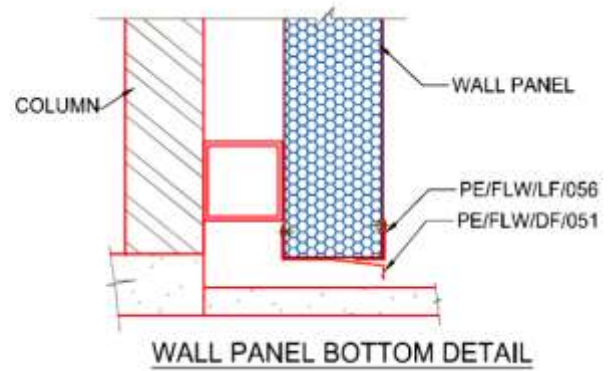
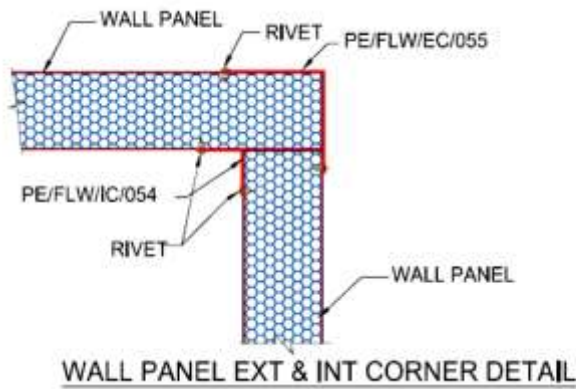
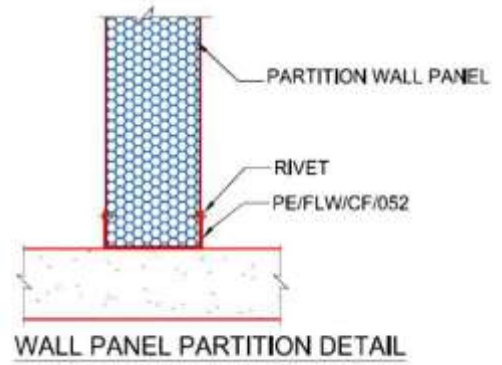
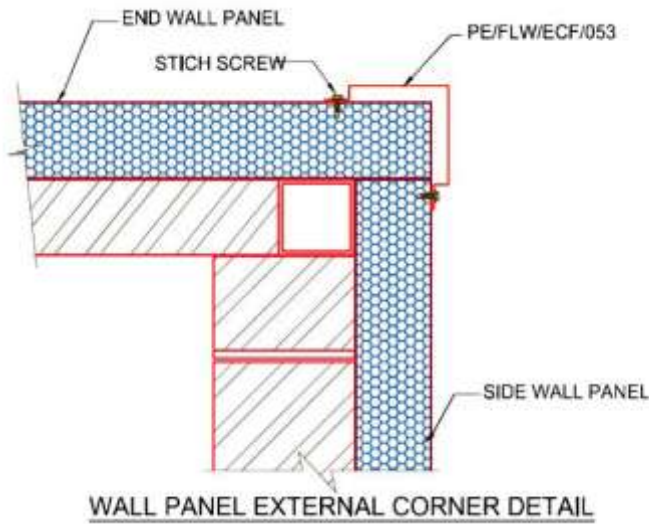
PROCESS FLOW FOR PUF INSULATED PANEL



**ANNEX C**

**TYPICAL FLASHING DETAILS**





**ANNEX D**

**PHOTOGRAPHS OF COMPLETED PROJECTS**



Client: Cyber Park (Kochi)

*Superwall*



Client: Hanyang, Oragadam.

*Monowall*

