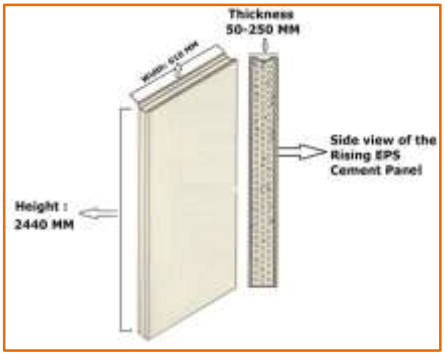
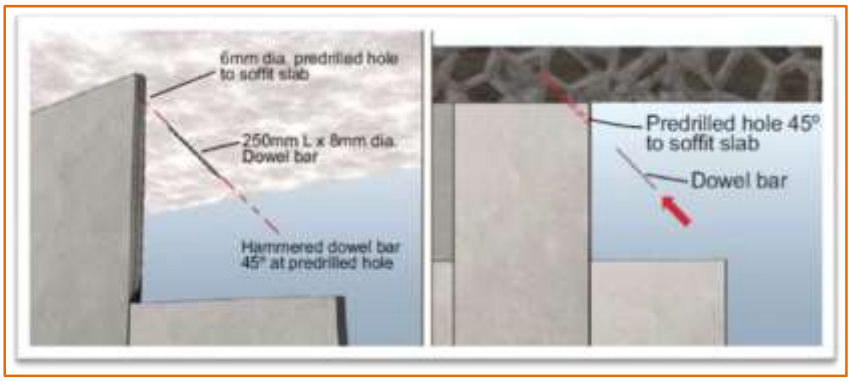
BMTPC
PACS
PERFORMANCE APPRAISAL CERTIFICATION

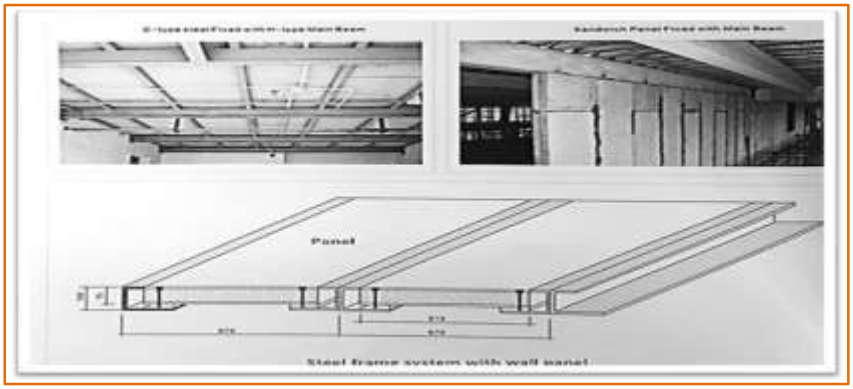
Rising EPS (Beads) Cement Panels

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:	Performance Appraisal Certificate No.
M/s Rising Japan Infra Pvt. Ltd., **I-203,Som Vihar, R K Puram** **New Delhi -- 110022** **Tel: 08826195032** **E-mail:rpg@rijapaninfra.com**	PAC No.:**1032-S/2017** Issue No. **01** Date of Issue: **04.07.2017**







bmtpc

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PERFORMANCE APPRAISAL CERTIFICATE

FOR

Rising EPS (Beads) Cement Panels

ISSUED TO

M/s Rising Japan Infra Pvt. Ltd.

STATUS OF PAC No. 1032-S/2017

S. No.	Issue No.	Date of Issue	Date of renewal	Amendment		Valid up to (Date)	Remark	Signature of authorized signatory
				No.	Date			
1.	2.	3.	4.	5.	6.	7.	8.	9.
1	01	04.07.2017	04.07.2018	--	--	03.07.2018	--	

CONTENTS

PART 1 CERTIFICATION

1.1 Certificate Holder: M/s Rising Japan Infra Pvt. Ltd
I-203, Som Vihar, R K Puram
New Delhi -- 110022
Tel: 11 – 26241874, 08826195032
E-mail: rpg@rijapaninfra.com

1.2 Description of System

1.2.1 *Name of the System – Rising EPS (Beads) Cement Panels*

1.2.2 *Brief Description* – Rising EPS (Beads) Cement Panels are lightweight composite wall, floor and roof sandwich panels made of thin fiber cement/calcium silicate board as face covered boards and the core material is EPS granule balls, adhesive, cement, sand, fly ash and other bonding materials in mortar form.
The core material in slurry state is pushed under pressure into preset molds. Once set, it shall be moved for curing and ready for use with RCC or steel support structure beams and pillars. These panels are primarily used as walling material but can also be used as floor and roof panels. These are non-load bearing panels to be used with structural support frame only.

These panels are presently manufactured by the firm in China. The firm has constructed, as reported, a 4 storey prototype residential complex at Nagpur using the panels from China. The firm proposes to install the plant in India shortly for manufacture of the panels.

1.2.3 *Size and Type of Panels*

1.2.3.1 Size: Panels are normally produced in sizes and dimensions as given below:

Length: 2440 mm (may be increased up to 3000 mm)
Width: 610 mm (may be altered as per requirement but should not be too wide since handling of the panels become difficult)
Thickness: 50-250 mm. Dimensions are shown in Fig. 1.

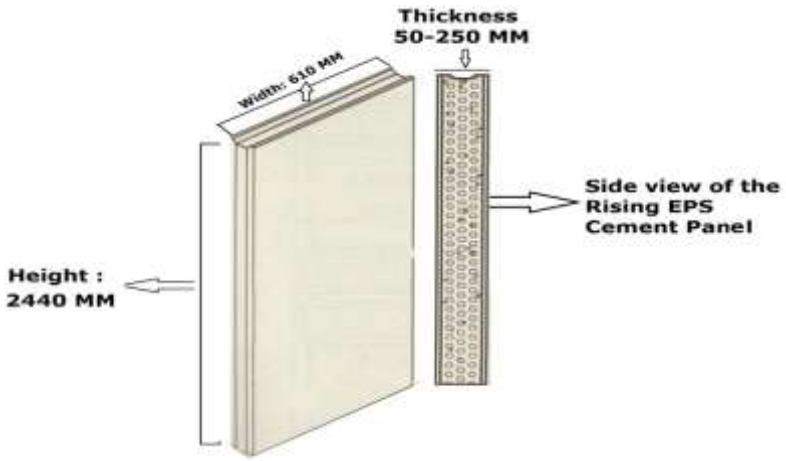
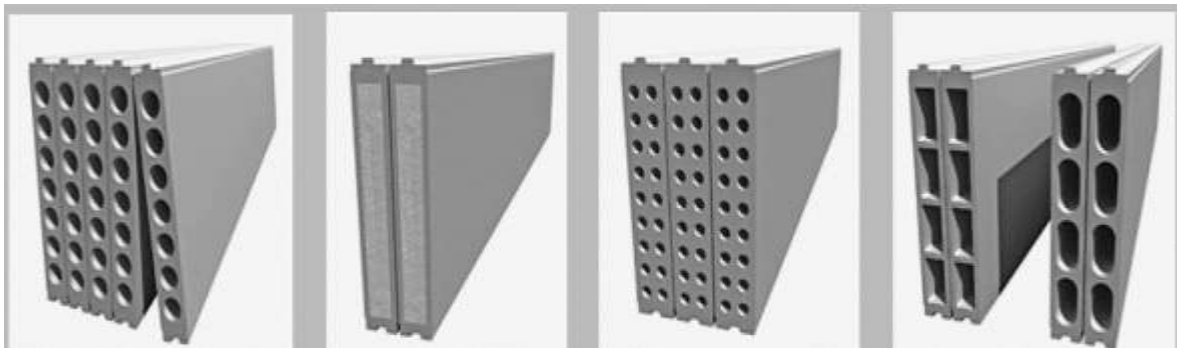


Fig. 1

1.2.3.2 *Type: P*anels are produced in 4 types as shown in Fig. 2 below:



Pole holes **Solid heart** **Rod holes** **Block hole**

Fig. 2

The above four types of panels have different applications depending on the requirements e.g. Solid heart should be used as walling material in any type of construction and Pole, Rod and Block hole may be used where different types of inserts are used like iron rods or wires for security etc.

1.3 Uses, Limitations and Critical details of Panels

1.3.1 *Uses*: These panels may be used for the applications given below:

Housing, Commercial complexes, Schools, offices, Electric sub-stations, Hotels and resorts, High rise buildings, Boundary walls, Highway railings, Bridges side support, river lining etc.

1.3.2 *Limitations on the basis of performance, safety, geo-climatic Conditions:*

These are non– load bearing panels and should be used as walling, floor and roofing with additional structural support, steel or RCC depending on the design. However, these may be used as single floor construction or stairs case slabs, kitchen/bathroom slabs etc. without support structure.
These panels are non- load bearing only if they are used without any pillar and beam support. However, they may be used as walling material with RCC or steel frame structure.

1.3.3 *Critical details*

(i) While manufacturing the panels, extra care should be taken so as to ensure that composition and mixture of EPS beads may not damage the tongue of the panel.
(ii) The panels, if used for floors/roofs, shall require screeding concrete of 35mm thick with nominal reinforcement/ GI wire mesh for shrinkage monolithic action to avoid leakage through the panel joints.

1.4 Assessment

1.4.1 *Scope of Assessment*

1.4.1.1 Scope of assessment included conformance of manufactured panels to the specified requirements for use in building construction as housing, commercial complexes, partition walls, boundary walls, highway railings, bridges side support, river lining etc.

1.4.2 *Basis of Assessment*
Assessment of the suitability of the Rising EPS panels is based on:

(i) Various tests conducted for performance characteristics of the panels of thickness 50 mm, 75 mm, 100 mm & 125 mm by Guangxi Hongfa Heavy Machinery Co. Ltd., China
(ii) Various tests conducted for Commissioning of the panels by Building Material Quality Supervision and Inspection station of Hubei Province, China
(iii) Various tests conducted on the samples of 90 mm thick panels by Madhav Institute of Technology & Science, Nagpur
(iv) Seismic Test conducted on a 6 storey building @ 7.5 fission resistance at China as per the Video submitted by the firm

(v) Assessment of quality assurance procedures implemented for Quality Assurance Scheme followed by the Certificate holder for process control as per Quality Assurance Plan attached at Annex I.

1.5 Manufacturing Machinery & Equipment

The manufacturer shall install the following major equipment of Rising Hongfa make in the plant to be set up, as reported:

Sl. No.	Name of the Machine and ID	Capacity	Capability	No.
1	2	3	4	5
1	Cement silo for bulk cement storage	100ton	Storage of Cement	1
2	Screw conveyor for cement	7.5kw	Transport Cement to mixer	1
3	Fly ash silo for fly ash storage	100 ton	Storage of fly ash	1
4	Screw conveyor for fly ash	7.5 KW	Transport of fly ash to mixer	1
5	Rotary Mixer	3.6 CMB	Materials mixing	1
6	PLC control system Mix and filling	Automatic	Control the Mixing and Filling	1
7	Water pump & water scale	1.5kw/0.4 m^3	Supply water to the mixer	1
8	Cement scale & Fly ash scale	0.4m^3	Weighing scale for fly ash & cement	1
9	EPS hopper for the mixer	1.2m^3	Accept the foam EPS from the storage bin after weighing	1
10	Foam EPS Scale	0.5m^3	Weighing the foam EPS from the storage bin	1
11	Foam EPS Air blower	3kw	Blow the foam EPS through the pipe to the foam EPS hopper	1
12	EPS Pre-expander	4.75kw	Expand the EPS raw materials to foam particle	1
13	Fluidized drying bed	3kw	Dry the foam EPS after made from the expander	1
14	Foam EPS drying blower	1.5kw	Dry the foam EPS after made from the expander in the Fluidized Drying Bed	1
15	EPS delivery blower	1.5kw	Blow the EPS to the storage bin after its made	1
16	Boiler	0.5t/h	Generate the steam for the EPS expander	1
17	Seamless steel pipe for delivering steam	Dia:30mm	Deliver the steam from the boiler to the EPS expander	1
18	Foam EPS bin	50m^3	Storage the Foam EPS after made from the expander	2

19	Air compressor	4kw	Generate air for the mixer during the mixing process	1
20	Foam EPS delivery pipe	Dia:160mm	Deliver the Foam EPS from the storage bin to the mixer	150m
21	Stationary type materials filling platform	4200x4200 x8200 mm	Platform for operating the materials mixing and filling process	1
22	Mobile filling hopper	3kw	Mixing and filling the materials from the mixer to the mold car	1
23	Ferry cars	3kw	Move the mold car under the mixing platform for materials filling; Move the mold car to the rail for curing after materials filling	2
24	Rails for ferry car	18#	For the mold car and ferry cart moving	120m
25	Winch machine	3kw	Pull the mold car after filling from the ferry cart to the curing rail; Pull the mold after de-mold from the ferry car to the rail ready for material filling.	2
26	Rails for mold car	18#	Supporting the mold cars for moving	160m
27	Recycling Slurry Pump and mixing unit	5kw	Mix the waste materials from the mixer ground cleaning and pump into the mixer for recycle used	1
28	Mobile Panel molding car	0kw	A forming machine for the wall panel	
29	Aluminum side cover		Form the shape of the panel and seal the mold car	

1.6 Production Process

1.6.1 *Salient Features of production process:*

- The panels shall be produced in batch process having batch size of 3 CBM per lot.
- Each lot shall take about 20 minutes to be ready for pouring into mold cars
- The economical size of the plant shall be about 3.00.000 Sq. meters per year on single shift basis as reported. Therefore, in this plant 1000 sq. meters of panels may be produced per day.

1.6.2 *Raw materials preparation*

- EPS granules shall be expanded into foam EPS by expanding Machine /system with suitable size and shall store the foam EPS in storage silos ready for next production stage.
- Cement, fly ash and sand shall be transported from the storage silos by the screw conveyors to the mixer according to the programmed ratio and water shall be fed into the mixer in designated proportion.
- The foamed EPS shall be transported through the blower in a programmed quantity at the same time into the mixer and mixed with the slurry.
- Additives shall also be added to the mixer at the same time.
- After about 8 minutes of mixing, the finished mixed materials shall be ready and discharged into the filling hopper.

1.6.3 *Materials filling system*

During the materials mixing process, the mold shall be set and two covers of Calcium silicate board or Cement fiber board inserted one by one in each mold. Thereafter, the ready-set mold shall be moved under the filling platform by winch machine.

1.6.4 *Material Filling*

Once the mold cars are under the filling hopper, the top platform will open and the material shall be filled into the molds under pressure.

1.6.5 *Curing*

After the filling is over, the filled mold cars shall be transported by the ferry car to the curing area for about 5 to 6 hours curing. Curing time depends on the site temperature conditions.

1.6.6 *De-molding process*

- After required period of curing, the panels in the mold shall have gained enough strength and suitable for de-molding. The de-molding process can be automatic or manual depending on the mold car chosen.
- If the mold car is automatic type, de-molding machine shall be used to pull the panels out of the mold car automatically. In one step, one panel will be pulled out from the car and stacked.

- If the mold car is manual type, the panels shall move out of the mold cars one by one and stacked.
- Once the stack is sufficient, the fork lift shall move them to the packing area for dispatch.
- After this process is completed, the mold cars shall re-set for the next production cycle.

Manufacturing process flow chart is shown in Annex II.

1.7 Conditions of Certifications

1.7.1 *Technical Conditions*

1. Raw materials and the finished panels shall conform to the requirements of the prescribed specifications.
2. The Certificate holder shall inform BMTPC as and when the plant is set up in India. Rising Japan shall provide full details of manufacture and erection of the panels to the agency who may be engaged for production and construction.
3. The Certificate is being issued for a period of one year and will be reviewed when the plant is set up in India and after visit to the site and satisfactory test results of the panels from NABL Accredited labs/ Institutes as per Indian conditions and Standards.

1.7.2 *Quality Assurance*

The Certificate Holder shall implement & maintain a quality assurance system in accordance with Quality Assurance Plan (QAP) given in Annex I attached with this Certificate.

1.7.3 *Handling of User Complaints*

1.7.3.1 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.

1.7.3.2 The Certificate holder shall implement the procedure included in the SQA. As part of PACS Certification, he 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 Parts 1 & 2 of this Certificate, the panels covered by this Certificate are fit for use set out in the Scope of Assessment.

PART 2 CERTIFICATE HOLDER'S TECHNICAL SPECIFICATIONS

2.1 General

2.1.1 The PAC holder shall manufacture the panels in accordance with the requirements specified in the relevant Standards. In addition it shall follow the specific requirements of various materials used in the manufacture of these sections (see Part 5).

2.2 Specifications

2.2.1 *Raw Materials*

(i) OPC 43/53 grade cement shall conform to IS 8112:2013/ 12269:2013.
(ii) Fly ash shall conform to IS 3812 (Part 2):2003.
(iii) EPS beads shall conform to IS 4671:1984 and shall have density not less than 15 kg/m^3.
(iv) Fibre cement board shall conform to Is 14862:2000.
(v) Calcium silicate board shall conform to EN 14306:2009
(v) Fine (sand) & coarse aggregate shall conform to IS 383:2016.
(vi) Water shall conform to IS 456:2000.
(vii) Addage RD Powder, AKULPOL-9192, Akulcel 48000 (Additives & Bonding agents) shall conform to the manufacturer M/s. Sakshi Chem Science Pvt. Ltd. Mumbai specifications.

2.2.2 *Performance Criteria*
Rising EPS panels shall meet the following performance criteria when tested in accordance with the relevant Standards:

Sl.No.	Performance Characteristics	Criteria	Test Method
1.	Flammability of EPS	≥ 600kgs/M^3	IS ASTM D 7309:2013
2.	Axial compression	≥ 3.5MPa	IS 2095 (Part1):1996
3.	Resistance to continuous heating	≥ 70°C	ASTM F 1939:2015
4.	Flexural Strength	≥ 1N/mm^2	IS 516:1969
5.	Acoustic Performance	≥ 35dB	IS 9901:1981
6.	Thermal conductivity	≥ 0.1W/M^2 k	IS 3346:1980
7.	Thermal Resistance	≥ 0.40M^2 k/W	IS 3346:1980

8.	Water penetration	There should be no damage or leakage	EN1609:2013
9.	Fire rating of the panels	Should be Grade 1/3 Hrs	BS 476 (Part 20 & 22)
10.	Resistance to structural damage from a large light body	There should be no collapse or dislocation	BS 5234 (Part 2):1992, Annex E
11.	Anti-bending damage load	≥ 1.5 times of its weight	BS 5234(Part 2):1992
12.	Non-combustibility	Should be 'A' level	GB 8624:2012
13.	Water tightness behind panels after 24 Hrs at 250mm water head	No droplets should be observed	ASTM C1185:2016
14.	Drying Shrinkage value	≤ 0.1%	IS 2185 (Part 1):2003
15.	Single point hanging strength	≥ 1000N	BS 5234 (Part 2):1992

2.3 Design Parameters

- The Rising EPS Cement panels are produced using cement, EPS and fly ash / sand along with bonding agents to form walling material. The system may be used as an alternate solution to a building designed using conventional brickwork masonry wall.
- M/s Rising Japan Infra Pvt. Ltd. shall provide design data in the form of tables for different live loads and different spans and ready Design table for good practices and as ready reckoner for users.
- 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.
- M/s Rising Japan Infra Pvt. Ltd. through the use of chartered Engineers will help the builders / developers in proper design and installation of Rising EPS Cement Panels in the building for each project.
- The Rising Japan Infra engineer shall also work with the engineer of the developer / builders and shall provide the necessary loading information for the design of the foundation.
- The panels shall be designed to provide the required performance against the loads to be taken into account in accordance with IS 800:2007 and IS 801:1975 and the data

given for various panels. It shall provide besides other requirements the required bearing resistance for earthquake and wind forces as per IS 875 (Part 3):1987 and IS 1893 (Part 1):2002, both individually and in combination, wherever applicable.

- The design assumptions, detailed calculations, references to necessary and detailed design drawings shall be jointly made and the structural design calculations should clearly demonstrate structural integrity and stability including connection details. Design calculations should have proper sketches annotated in English.
- Foundation shall be specifically designed in accordance with provision given in IS 1904:1986 and taking into consideration the properties and weight of Rising EPS Cement Panels.
- In addition, any other requirement regarding safety against earthquake need to be ensured by the designer as per prevailing codal requirements.

2.4 Installation of EPS Cement Panel Applications & Jointing Procedure

2.4.1 *With RCC frame structure*: If RCC frame structure is used in the construction, then the panels should be directly fixed on the walls, pillars, beams and floor with the help of cement glue and later iron locking rods should be inserted into the panels and the pillars, beams and floors at 45° so that they are firmly locked with each other and become one single unit.

The manufacturer shall inform the specialized chemical "cement glue", if available in India/manufactured by reputed chemical/ water proofing companies to the customers.

2.4.2 *With Steel frame structure*: If steel structure frame is used in the construction, then U type channels should be used to hold the panels with the structure. In this case additional clips should be welded with the frame pillars and beams to hold the U cannel firmly with the pillars/beans and floor. Then only the panels should be inserted into the U channels. There after PU glue should be applied to hold the panels firmly. The thickness of the panels shall determine the size of U channel.

After installation of the panels in both the above systems, all gaps should be checked and filled with additives, PU and cement mixers and later thin putty should be applied to give uniform smooth surface ready for paint.

2.4.3 *Installation of Panels*

2.4.3.1 Receipt and inspection of Panels:
Once the panels are received, it should be checked if the edges are safe and also there are no cracks or damages on the surface of the panels which can happen during transportation and handing.

2.4.3.2 Laying of panels as per drawings:
Once panels received are as per the drawings, then it should be separated and laid down as per the drawings for easy installation and to avoid extra handling.

2.4.3.3 Marking and sizing the panels:
Once panels are placed at the proper place, marking should be down as per drawing and proper sizing should be cut of the required panels as per the drawings. (See Figs. 3 & 4)

Fig. 3 Marking of the panels as per drawings

Fig. 4 Cutting of panels as per drawings

2.4.3.4 Actual installation as wall:

The panels are lifted and placed as per the drawings. For installation of the panels, following points should be considered:

1.1 Joining of panels with each other:

- The panels shall be placed at the marked space and adjusted together. Dust should be cleaned on the tongue and groove of

the panel to be installed. Cement mortar shall be applied and glue filled in the gaps on the panel joining parts and force them together to form one panel. Levels of both panels shall be checked. (See Figs. 5 & 6)

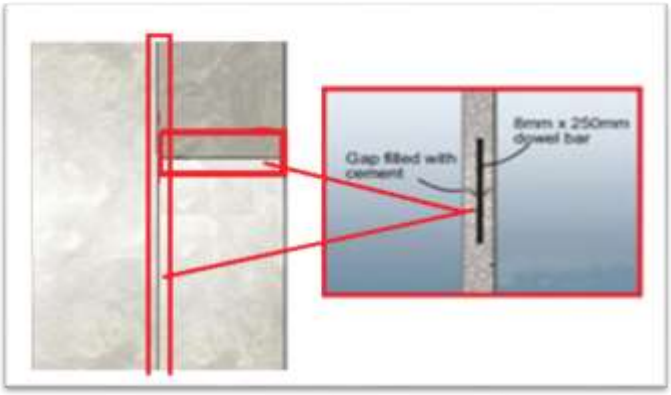


Fig. 5 Placing panels together

Fig. 6 Applying cement and glue

- The panels shall be fixed with steel bar between each other or between the panels and the floor to lock them together. (See Fig. 7)

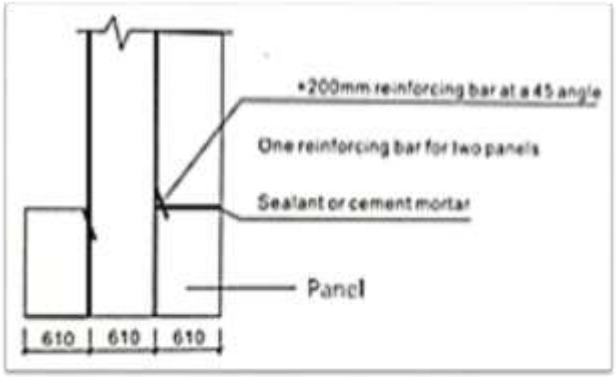


Fig. 7 Part elevation of wall panels

1.2 Typical Joint between two panels side by side:

- The panels shall be fixed with dowel bars and the bars inserted in one panel at 45° and hammer it down to lock both the panels. (See Figs. 8, 9 & 10)

Fig. 8 Steel bars

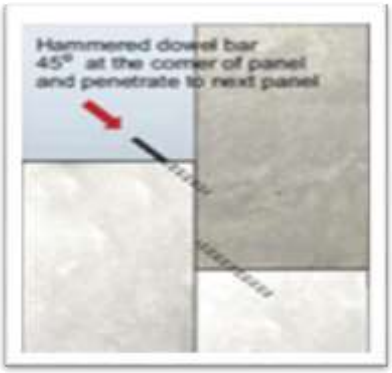


Fig. 9

Fig. 10

1.3 Typical joint with floor:

- The panels shall be placed on floor, cement and glue applied between panels and floor and L type steel bars inserted through the panels edge at 45° in the floor. The panel will then be locked to the floor. (See Figs. 11 & 12)

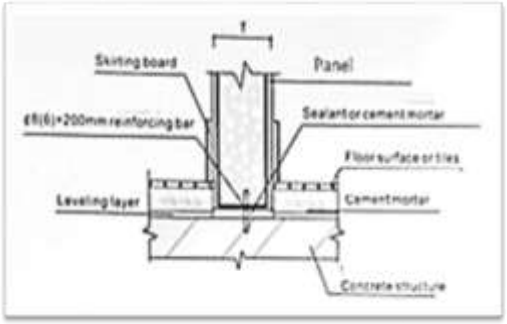


Fig. 11

Fig. 12

1.4 Typical L and T joint with panels:

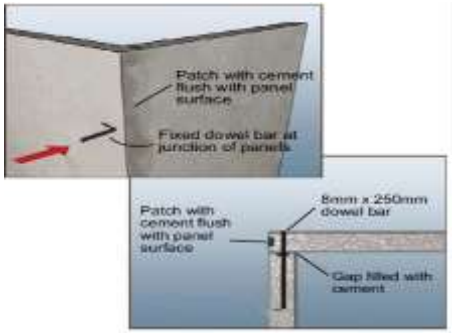


Fig. 13

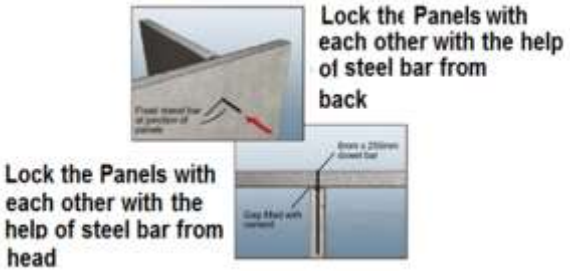


Fig. 14

1.5 Joining of upper and lower panels together:

- The panels shall be placed one over the other vertical/ horizontal after applying cement and glue. The steel rod shall

be inserted from the sides of the panels into each other to join them together and locked. (See Figs. 15 & 16)

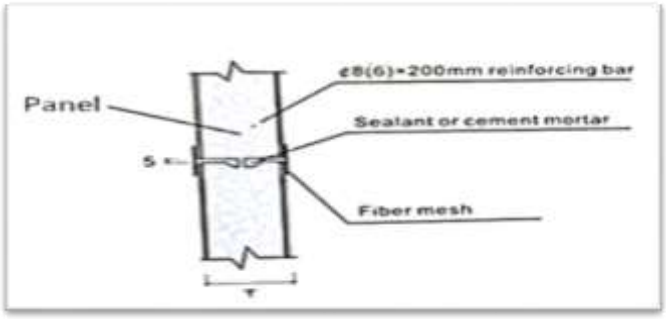


Fig. 15

Fig. 16

- A wall of these panels shall be inter-connected with steel bars inserted at 45° and fixed with cement and glue in between panels. (See Fig. 17)

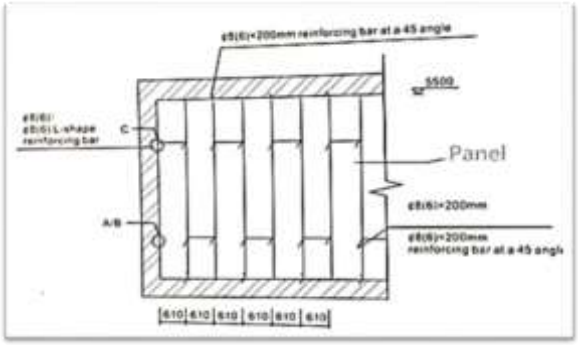


Fig. 17

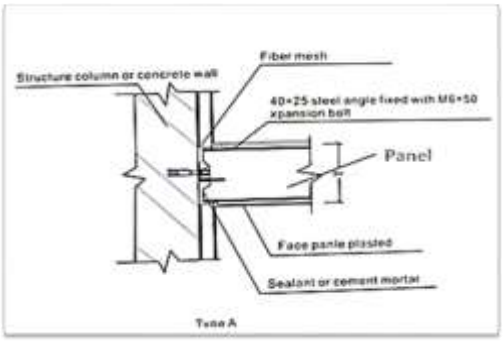


Fig. 18

2.1 Connecting panels with RCC pillar/RCC Walls/RCC beams:

- For connecting these panels with RCC pillars, the panels shall be placed with the pillar after applying cement and glue on the side of the panels and pushed to make the perfect position.

Following are three types of connections depending on the situation:
Steel rods/screw or bolt shall be inserted in the pillar and the panels locked with the help of the above. Thus the panel will be fixed and becomes part of wall connected with pillars. (See Figs. 18, 19 & 20)

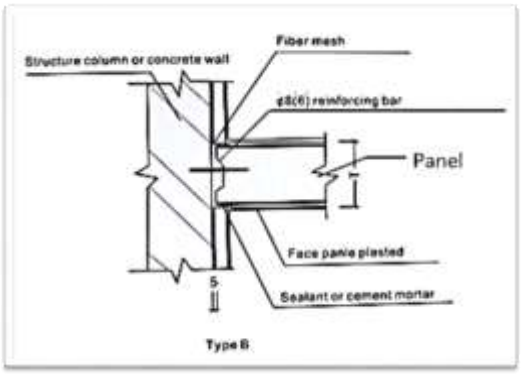


Fig. 19

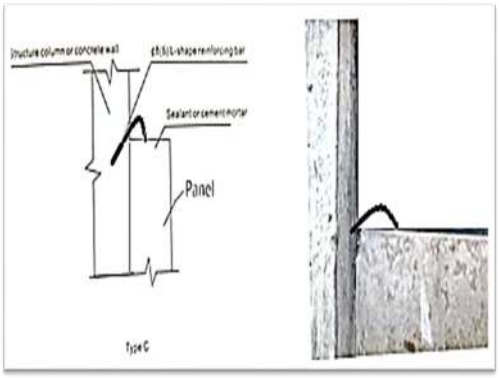


Fig. 20

2.2 Wall head fixing:

- Dowel bar of 250mm length and 8mm dia shall be fixed into pre-drilled hole of the panels and lock the panel to the overhead beams or RCC roof slab. (See Figs. 21, & 22)
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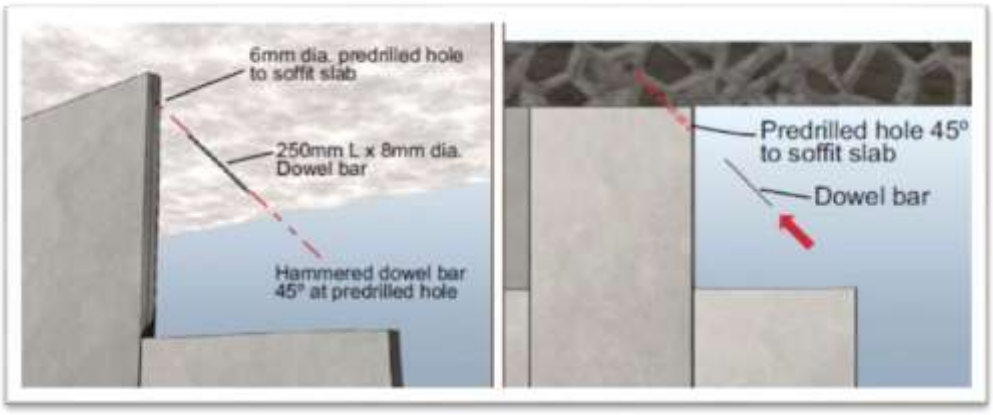

Fig. 21 **Fig. 22**

2.3 Fixing panels to the Steel frame (Pillars & Beams)

- Connection of wall panel to RHS column

  Steel L-angle/C Channel/Z channel shall be welded to the side of RHS column and the panel inserted inside the angle/channel and locked. The thickness of the panels shall determine the size of angle/channel. (See Figs. 23, 24 & 25)

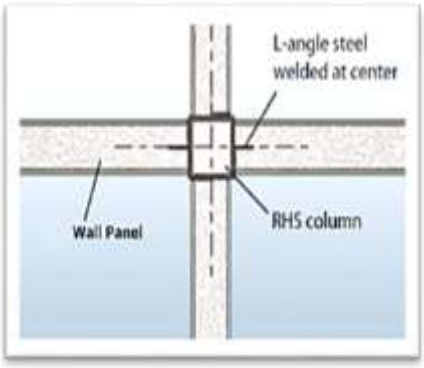

Fig. 23

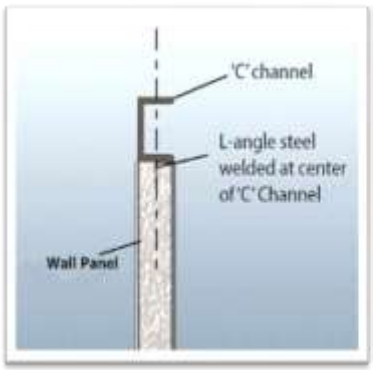

Fig. 24

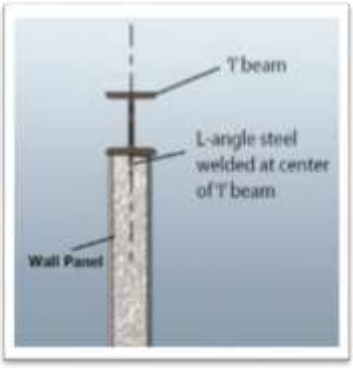

Fig. 25

3.1 Cutting of space for doors and windows

- The space on the drawing where doors and windows are required to be placed shall be marked and then while making walls keep that space. There is another way also where the space is cut later on once the walls are set fully.

3.2 Door Opening

- The panels shall be placed horizontally to keep space for doors. (See Figs. 26 & 27)

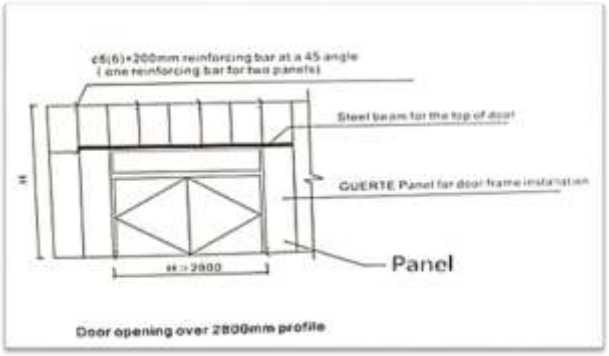

Fig. 26

Fig. 27

3.3 Window Opening

- The panels shall be placed horizontally to keep space for windows. (See Figs. 28 & 29)

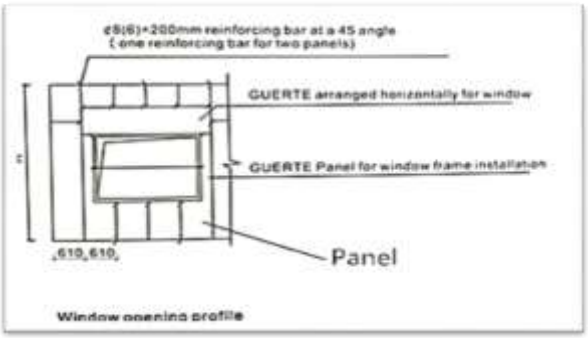

Fig. 28

Fig. 29

3.4 Cutting space for doors and windows after the panels are fixed.

- The position of steel inserts shall be marked to protect the wall from any movement while cutting of panels. All the steel bars shall be inserted at 45° angle to lock the panels with each other to stop further movement. (See Fig. 30)

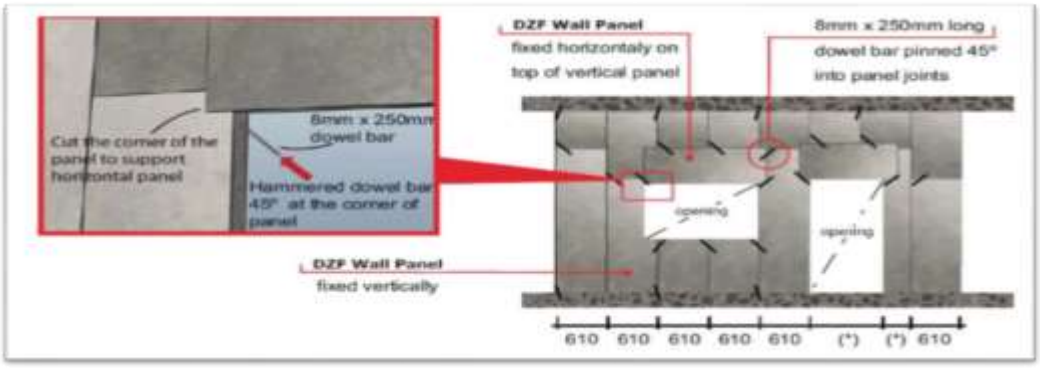

Fig. 30

3.5 Frame Fixing (See Figs. 31, 32, & 33)

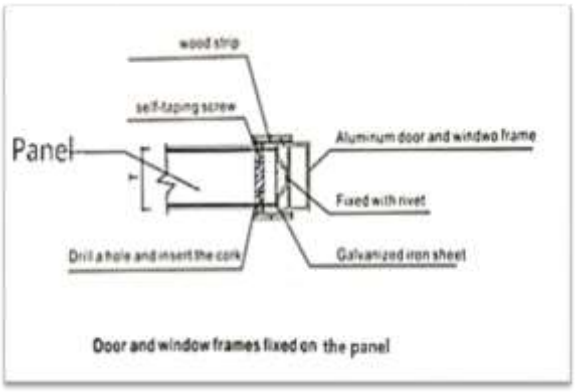

Fig. 31

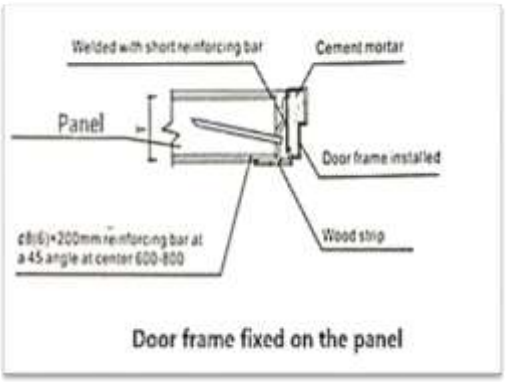

Fig. 32

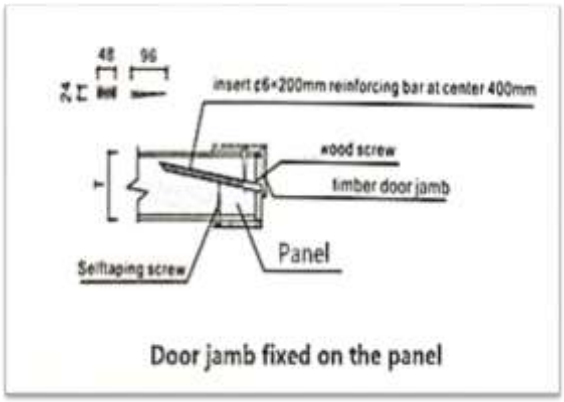

Fig. 33

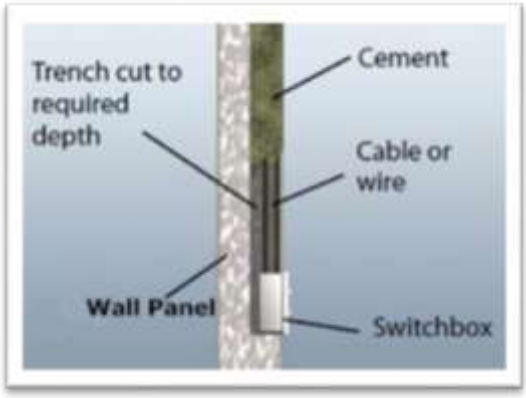

Fig. 34

4. Laying of electrical conduits

- The wire shall be embedded from the ceiling into the trench. (See Figs. 34 & 35)

Fig. 35

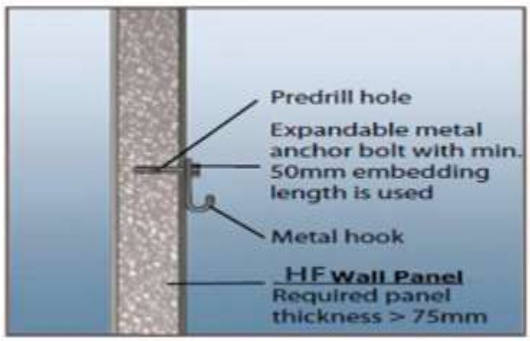

Fig. 36

5. Hanging Force (See Fig. 36)

- Expandable metal bolt shall be used and hooked on the wall panel.
- Tile adhesive shall be used for fixing heavy granite tiles.

6. Fixing the Panels as floor (See Fig. 37)

- Steel frame shall be fixed if this is to be a raised platform otherwise the panels can be used directly as floor after making the ground level properly.
- Floor tiles can be fixed on these panel, if required.

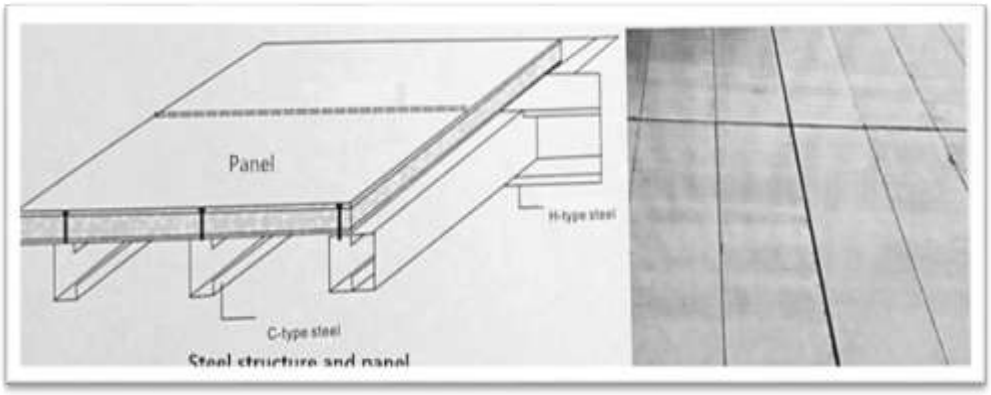

Fig. 37 (Screeding concrete not shown in these drawing)

7. Fixing the Panels as roof (See Figs. 38 & 39)

- These panels can be used in the roofing as long as it is non-load bearing application.
- Steel frame shall be fixed as base for fixing the panels as roof.

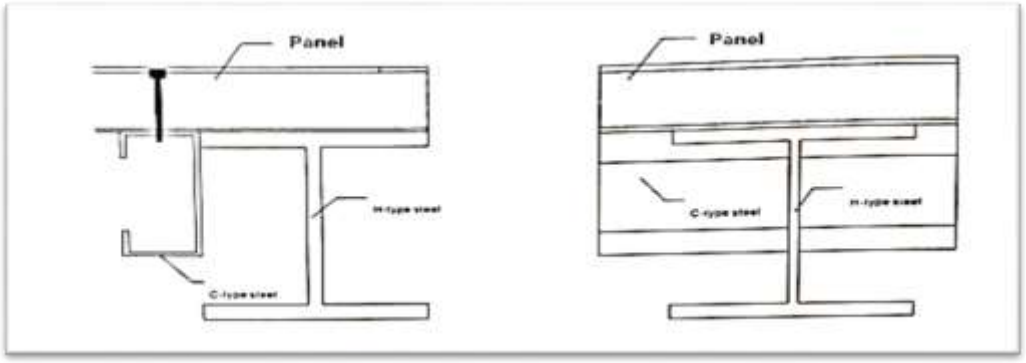

Fig. 38 (Screeding concrete not shown in these drawing)

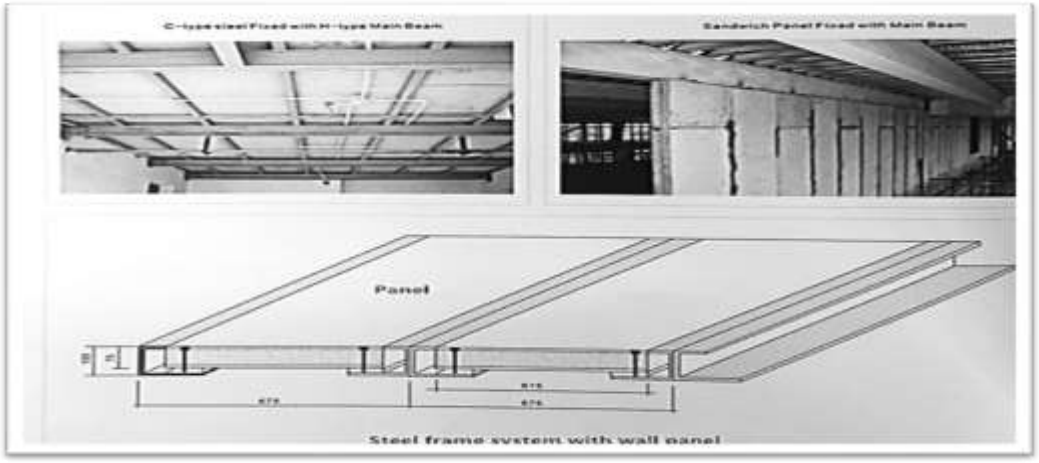

Fig. 39 (Screeding concrete not shown in these drawing)

For details of installation and jointing procedure, reference may be made to the manufacturer's Construction & Installation Manual.

2.5 Inspections & Testing

Inspections & testing shall be done at appropriate stages of manufacturing process of all the elements. 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.

2.6 Manuals

PAC holder shall provide Construction & Installation Manual showing necessary diagrams, drawings, detailing to the customers and / or their structural designer.

2.7 Skilled/Training Needed for Installation

No special training is needed for the installation of these panels except a two days familiarization course to make sure the workers understand how to fix the joints properly and to get use to handling the panels and cutting and sawing as per drawings.

2.8 Guarantees/Warranties Provided by the PAC Holder

PAC holder shall guarantee satisfactory performance of these panels supplied to the customer for a period of 12 months from the date of commissioning or 18 months from the date of receipt of material at site whichever is earlier and shall be responsible for any failure of the material to conform to the standard of performance, proficiency, production and for any defects that may develop and shall remedy such defects at its cost.

2.9 Responsibility

- Specific design using Rising EPS Cement Panels is the responsibility of the designer with the instructions, supervision and guidance of the PAC holder.
- Quality of installation/construction of the system on site is the responsibility of the trade persons engaged by the building owner under the guidance of the manufacturer.
- Quality of maintenance of the building is the responsibility of the building owner under the guidance of the manufacturer.

PART 3 BASIS OF ASSESSMENT AND BRIEF DESCRIPTION OF ASSESSMENT PROCEDURE

3.1 Basis of Assessment

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

3.1.2 *Factory Inspection*
The Certificate holder shall inform BMTPC as and when the plant is set up in India. Rising Japan Infra shall provide full details of design, manufacture and erection of the panels to the agency who may be engaged for production and construction.

3.1.3 *Site Inspection*

- The residential project of 4 storeyed building constructed with the Rising EPS Cement Panels manufactured in China by Rising Japan Infra, has been seen by one of the TAC members.
- The Panels, manufactured in China by the said firm, have been installed at the third floor of G+6 residential Complex being constructed by NBCC at Kidwai Nagar, New Delhi and the same seen by two TAC members and Technical representative of BMTPC.

3.2 Tests Performed

3.2.1 *By Foreign Institutes* – The following tests have been performed on the panels by the Institutes in China as per the specifications given by the manufacturer:

3.2.1.1 *Commission test* b*y Building Material Quality Supervision & Inspection Station of Hubei Province, China in September 2016*

S.No.	Test conducted	National Standard	Test Result	Remarks
1.	Appearance quality i) Face panel break off ii) Panel crack 50-100mm x 1.5-1.0mm iii) Air hole 5-30mm iv) Disfigurement 10 x 25mm, 30 x 35mm	 No ≤ 2 per piece ≤ 3 per piece ≤ 2 per piece	 No 1 No 1	 Qualified
2.	Size tolerance i) Length	 ± 5mm	 2-4mm	Qualified

	ii) Width iii) Thickness iv) Surface levelness v) Diagonal tolerance vi) Lateral bending	± 2mm ± 1.5mm ≤ 2mm ≤ 6mm ≤ 1mm per 1000(2.27)	-1 to 1mm -1 to 1mm ≤ 1mm ≤ 3mm ≤ 1.5mm	
3.	Anti-impact capacity	No cross crack after 5 times impact of 30 kg	No	Qualified
4.	Anti-bending -- damage load	≥ 1.5 times	3 times	Qualified
5.	Compressive strength	≥ 3.5 MPa	5.0 MPa	Qualified
6.	Softening coefficient	≥ 0.80	0.84	Qualified
7.	Surface density	≤ 90 kg/m^2	58 kg/m^2	Qualified
8.	Moisture rate	≤ 12%	10.5%	Qualified
9.	Drying shrinkage value	≤ 0.6mm/m	0.5mm/m	Qualified
10.	Single point hanging strength	≥ 1000N	1300N	Qualified
11.	Freeze-resistance performance	No crack or change on the surface	No	Qualified
12.	Combustibility	A level (Refer to GB8624:1997)	A level	Qualified
13.	Fire proof limit	≥ 1 hour	4 hour	Qualified
14.	Radioactivity i) Inner radiation Index ii) Outer radiation Index	 ≤ 1.0 ≤ 1.0	 0.1 0.4	Qualified

3.2.1.2 *Performance test* b*y Guangxi Hongfa Heavy machinery Co. Ltd. China* in January, 2017

S.No.	Test conducted	Test Method	Test Result
1.	Weight i) 50mm thick ii) 75mm thick iii) 100mm thick iv) 125mm thick		Nominal at ambient 44 kg/m^2 64 kg/m^2 77 kg/m^2 99 kg/m^2
2.	Thermal conductivity	BS 874 (Part 2):1986	0.221 W/OK
3.	Flexural strength i)Longitudinal ii) Transverse		 4.27 MPa 4118 N
4.	Moisture movement		0.06%
5.	Moisture content		9%
6.	Resistance to continuous heating		80°C
7.	Surface alkalinity		PH 7-10
8.	Non-combustibility	BS 476 (Part 4):1987	Grade A

9.	Fire rated partition	BS 476 (Part 20/22): 1987	Euro Class A1 2 hour FRP
10.	Water tightness – test 24 hours at 250mm water head	ASTM C 1185:2016	No droplets observed behind the panel
11.	Partition stiffness	BS 5234 (Part 2):1992, Annex A	Pass
12.	Resistance to structural damage i) by multiple impacts from a large soft body ii) hard body impact --heavy duty grade	BS 5234 (Part 2):1992, Annex E	No collapse or dislocation
13.	Surface damage by hard body impact -- heavy duty grade	BS 5234 (Part 2):1992, Annex B	Pass
14.	Effects of door slamming -- heavy duty grade	BS 5234 (Part 2):1992, Annex B	Pass
15.	Resistance to crowd pressure -- heavy duty grade	BS 5234 (Part 2):1992, Annex G	No collapse or damage
16.	Heavy weight anchorage eccentric downward	BS 5234 (Part 2):1992, Annex K	No damage or detachment of anchor
17.	Anchorage load		45 Kg
18.	Acoustic performance i) 50mm thick ii) 75mm thick iii) 100mm thick iv) 125mm thick v) 150mm thick		 37dB 40dB 42dB 44dB 46dB

3.2.2 *Testing of samples of the panels by Madhav Institute of Technology & Science, Gwalior (MP)*

S.No.	Test conducted	Test Method	Test Result	Remarks
1.	Flammability of EPS	ASTM D 7309:2013	780 kg/m^3	Qualified
2.	Axial compression	EN 520:2004 + A1:2009	4.27 MPa	Qualified
3.	Resistance to continuous heating	ASTM F 1939:2015	80°C	Qualified
4.	Flexural strength	ASTM C 293:2016	1.53 MPa	Qualified
5.	Acoustic performance	IS 9901:1981	40 dB	Qualified
6.	Thermal conductivity	IS 3346:1980	0.22 W/mK	Qualified
7.	Thermal resistance	IS 3346:1980	0.42 mk/W	Qualified
8.	Water penetration	EN 1609:2013	No dampness or leakage	Pass

9.	Fire resistance	BS 476 (Part 20/22)	Grade 1/3 Hr	Pass
10.	Resistance to structural damage from a large light body	BS 5234 (Part 2): 1992, Annex E	No collapse or dislocation	Pass
11.	Anti-bending damage load	BS 5234 (Part 2): 1992	3 times of its weight	Qualified
12.	Non-combustibility	GB8624:2012	A level	Qualified
13.	Water tightness – test 24 hours at 250mm water head	ASTM C 1185:2016	No droplets observed behind the panels	Qualified
14.	Drying shrinkage value	IS 2185 (Part1): 2003	0.083 %	Pass
15.	Single point hanging strength	BS 5234 (Part 2): 1992	1300 N	Pass

3.3 Supply of the Panels

The manufacturer, as reported, has supplied the panels in China as per the details given below:

S. No.	**Name & location of the Client**	**Quantity supplied (sqm) approx.**	**Period of supply**
1.	Nanning Lv Gang International, China	202,000	2014-2016
2.	Nanning Metro, China	95,000	2014-2016
3.	Bebu Gulf Service Park, China	160,000	2014-2016
4.	Chongzuo International. Building Material Co.	280,000	2014-2016
5.	Jinji Technology Co. Ltd., China	175,000	2014-2016
6.	Bai se Construction Co., China	225,000	2014-2016
7.	Wu yue Lai Material Group China	120,000	2014-2016
8.	BestWay Building Group, China	185,000	2014-2016
9.	Jugyang Ya International Park, China	220,000	2014-2016

PART 4 STANDARD CONDITIONS

The 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.

For and on behalf of
Chairman PAC &
Member Secretary, BMBA

Dr. Shailesh Kr. Agarwal
Chairman, TAC
& Member Secretary, BMBA
Building Materials and Technology Promotion Council
(An Autonomous Body of Ministry of Housing & Urban Poverty Alleviation, Govt. of India)
Core 5A, India Habitat Centre, Lodhi Road,
New Delhi-110 003

Place: New Delhi
Date of issue 04.07.17

PART 5 LIST OF STANDARDS AND CODES USED IN ASSESSMENT

5.1 Standards - These Standards are referred for carrying out a particular test only and do not specify the requirement for the whole product as such.

5.1.1 IS 383:2016 – Specifications for coarse and fine aggregates from natural resources
5.1.2 IS 456:2000 – Code of practice for reinforced cement concrete
5.1.3 IS 2185 (Part 1):2003 – Specifications for concrete masonry units – hollow and solid
5.1.4 IS 3346:1980 – Method of determination of thermal conductivity of thermal insulation materials
5.1.5 IS 3809:1979 – Fire resistance test for structures
5.1.6 IS 3812 (Part 2):2003 – Specifications for flyash for use as pulverized mixture in cement concrete
5.1.7 IS 8112:2013 -- Specifications for 43 grade ordinary Portland cement
5.1.8 IS 9901:1981 –Measurement of sound insulation in buildings and building elements
5.1.9 IS 12269:2013 – Specifications for 53 grade ordinary Portland cement
5.1.10 IS 14862:2000 -- Specifications for silica- asbestos cement flat cement sheets
5.1.11 IS 516:1969– Standard test method for flexural strength of concrete specimens
5.1.12 ASTM C 1185(08):2016 – Standard test method for sampling and testing non-asbestos fibre cement flat sheets
5.1.13 IS 4671:1984 -- Specifications for expanded polystyrene for thermal insulation purposes
5.1.14 ASTM F 1939:2015 -- Standard test method for radiant heat resistance of combination of materials
5.1.15 BS 476 (Part 20-22): 1987 – Method of determination of fire resistance of building materials and structures
5.1.16 BS 5234 (Part 2):1992 – Specifications for performance requirements for strength and robustness of partitions including method of tests
5.1.17 IS 2095 (Part 1):1996 – Specifications of gypsum plasto boards
5.1.18 EN 1609:2013 -- Specifications for thermal insulating products for buildings
5.1.19 GB 8624:2012 – Classification of burning behavior of building materials

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), **Rising EPS (Beads) Cement Panels** bearing the mark manufactured by M/s Rising Japan Infra Pvt. Ltd. is satisfactory if used as set out above in the text of the Certificate. This Certificate **PAC No. 1032-S/2017** is awarded to **M/s Rising Japan Infra Pvt. Ltd., New Delhi.**

The period of validity of this Certificate is for a period of one year i.e. from 04-07-2017 to 03-07-2018.

This Certificate consists of a cover page and pages 1 to 34.

Dr. Shailesh Kr. Agarwal
Chairman, TAC
& Member Secretary, BMBA
Building Materials and Technology Promotion Council
Ministry of Housing & Urban Poverty Alleviation, (Govt. of India)
Core 5A, Ist Floor, India Habitat Centre,Lodhi Road,
New Delhi-110 003

Embossing Seal of BMBA

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 Poverty Alleviation, Government of India.

Place: New Delhi
Date: 04.07.17

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 (TAC) 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

ANNEX I

(Clause 1.4.2)

QUALITY ASSURANCE PLAN FOR RISING EPS CEMENT PANELS

S. No.	Parameters to be inspected	Requirement Specified	Test Method	Frequency of Testing
	I. Raw Materials			
1.	O P Cement 43/53 Grade	As per IS 8112: 2013/12269:2013	Manufacturer's test report	Every batch/lot
2.	Coarse & fine aggregate	As per IS 383:2016	As per IS 383: 2016	Every batch/lot
3.	Fly ash Grade 1	As per IS 3812(Part 1):2003	As per IS 1727: 1967	Every batch/lot
4.	Expanded Polystyrene (ESP)	As per IS 4671: 1984	Manufacturer's test report	Every batch/lot
5.	Fibre cement board	As per IS 14862: 2000	As per IS 14862: 2000	Every batch/lot
6.	Calcium Silicate Board	EN 14306: 2009 +A1:2013	Manufacturer's test report	Every batch/lot
7.	Additives and bonding agents	Manufacturer's test report	Manufacturer's test report	Every batch/lot
	II. Finished Panels			
1.	Flammability of EPS	ASTM 7309-07	As per manufacturer	Every year
2.	Axial compression	EN 520:2004 + A1:2009	As per manufacturer	Every year
3.	Flexural strength	ASTM 293	As per manufacturer	Every year
4.	Acoustic performance	IS 9901:1981	As per manufacturer	Every year
5.	Water penetration	EN 1609:2013	As per manufacturer	Every year
6.	Resistance to structural damage from a large light body	BS 5234 (Part 2): 1992, Annex E	As per manufacturer	Every year
7.	Water tightness – test 24 hours at 250mm water head	ASTM C 1185:2016	Flow meter	Every year
8.	Drying shrinkage value	IS 2185 (Part1): 2003	As per manufacturer	Every year
9.	Single point hanging strength	BS 5234 (Part 2): 1992	As per manufacturer	Every year
10.	Sound insulation test	--	Lab test	Every year
11.	Rebound hammer test	--	Schimdt hammer	Every year

ANNEX II

(Clause 1.6.6)

PROCESS FLOW CHART OF RISING EPS CEMENT PANELS