BMTPC
PACS
PERFORMANCE APPRAISAL CERTIFICATION

Lost-in-Place Formwork system – Plasmolite Wall Panels (For Partition Walls)

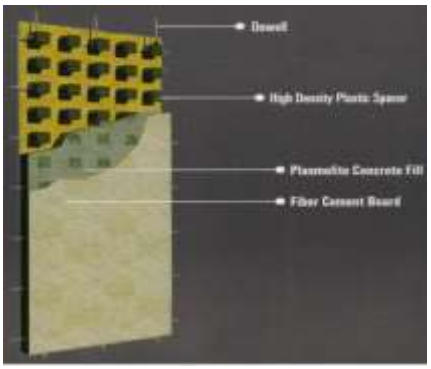
User should check the validity of the Certificate by contacting Member Secretary, PMBA at

Name and Address of Certificate Holder:
M/s FTS Buildtech Pvt. Ltd.
302, Vishakha Arcade, Opp Courtyard Hotel, Behind Mogaveeria Bhavan School,
Off Veera Desai Road, Azad Nagar, Andheri (West), Mumbai - 400058
Tel: 022-26786545

Performance Appraisal Certificate

PAC No.**1033- S/2018**
Issue No. **01**

Date of Issue:
12-03-2018



bmtpc

Building Materials & Technology Promotion Council
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PERFORMANCE APPRAISAL CERTIFICATE

FOR

Lost-in-Place Formwork system – Plasmolite Wall Panels (For Partition Walls)

ISSUED TO

M/s FTS BUILDTECH PVT. LTD., MUMBAI

STATUS OF PAC NO.: 1033-S/2018

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	12-03-2018	12-03-2020	--	--	11-03-2020	--	

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PART 1 CERTIFICATION

1.1 Certificate Holder: M/s FTS Buildtech Pvt. Ltd
302, Vishakha Arcade, Opp Courtyard
Hotel, Behind Mogaveeria Bhavan School,
Off Veera Desai Road, Azad Nagar,
Andheri (West), Mumbai -- 400058
Tel: 022-26786545, 022-26785900
E-mail: fm@fabforms.ae

1.2 Description of System

1.2.1 *Name of the System* – Lost-in-Place Formwork system – Plasmolite Wall Panel (For Partition Walls)

1.2.2 *Brief Description* – Plasmolite Panels are lost in place formwork system where two fibre cement boards (FCB) of 6 mm thickness and High Impact Molded Inserts (HIMI) (spacers) bonded between two sheets of FCB in situ and erected to produce straight to finish walls which are filled with light weight foam concrete. The system may be integrated with conventional column and beam for pre-engineered buildings. The panels may be used as partition walls for external and internal applications.
The firm imports the fibre cement board (FCB) manufactured by Hume Cemboard Industries, Malaysia for use in the technology.

An Isometric View of the Plasmolite panel is shown in Fig. 1 below.

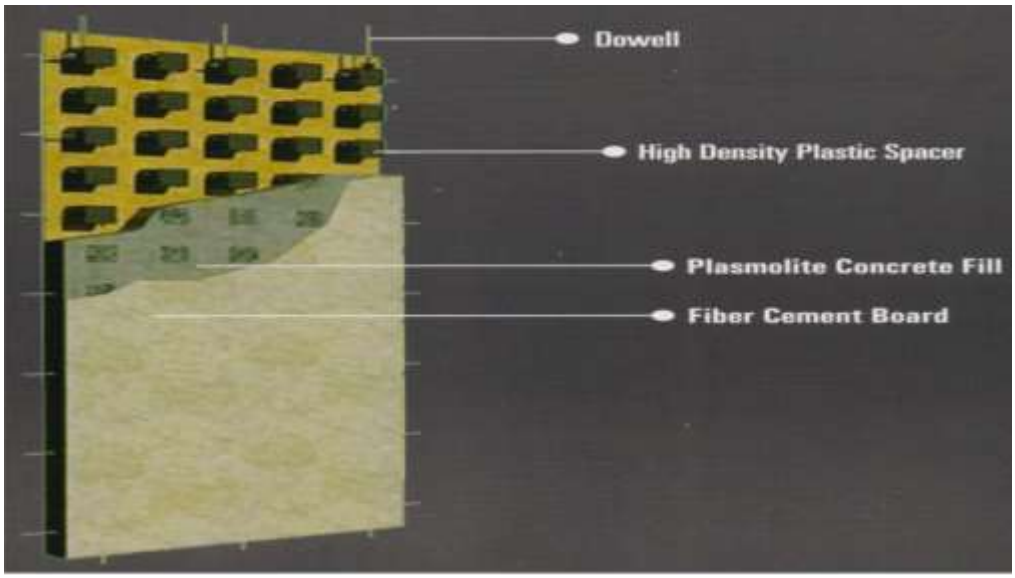


Fig. 1 Isometric View of Plasmolite Panel

1.2.3 *Size of Panels*

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

Length: 2400/3000 mm
Width: 1200 mm
Thickness: 87 mm, 112 mm, 137 mm, 162 mm & 230 mm including two fibre cement boards of 6mm thickness each.

Typical dimensional diagrams are shown in Fig. 2.

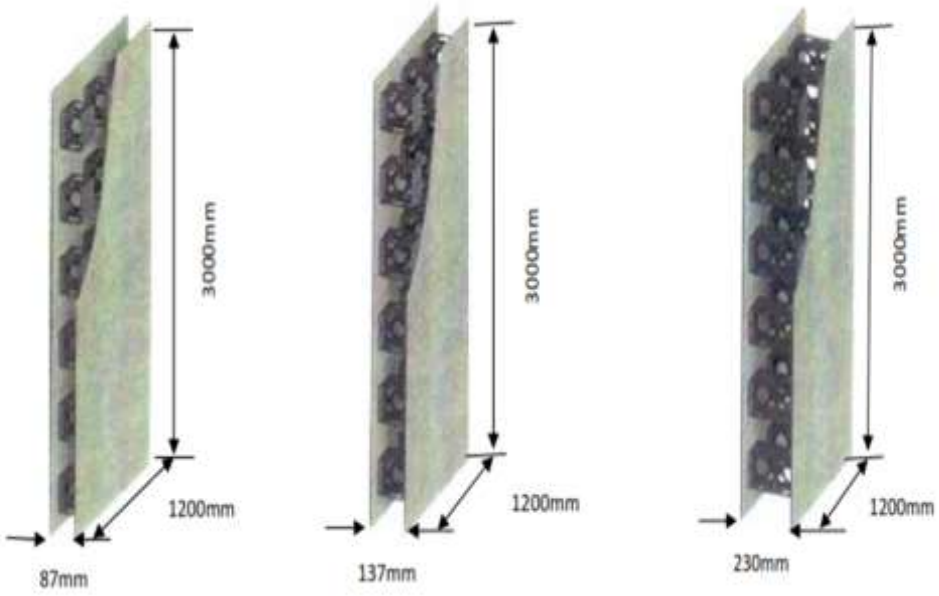


Fig. 2 Dimensional Diagrams

1.3 Uses, Limitations/Precautions for Wall Panels

1.3.1 *Uses*:
Plasmolite Panels may be used as partition walls for external and internal applications for residential and commercial buildings, schools, hospitals, factories and malls etc.

1.3.2 L*imitations/precautions to be taken for using Plasmolite wall panels on the basis of performance, safety, geo-climatic Conditions:*

- The nail should not be hammered directly on the wall by using hammer.
- The hole shall be first drilled by using drill machine and then the plastic sleeves or rawl plugs be inserted for fixing the

screws for hanging on the walls. Screws shall be such which give at least 25 kg holding capacity.

- Chisel shall not be used to chase directly on the wall for embedment of additional services. Instead 100 mm grinder machine shall be used to cut out exact portion of wall and then rendering of the wall be done with mortar and putty.
- If wall tiles are to be changed, wall shall not be hacked for fixing new tiles for bonding. Instead, cementious tile adhesive shall be used which will act as bonding agent between the wall and tile instead of mortar.

1.4 Basis of Assessment

1.4.1 *Scope of Assessment*

1.4.1.1 Scope of assessment included conformance of manufactured non-load bearing walls to the specified requirements for external and internal applications for and commercial buildings, schools, hospitals, factories and malls etc.

1.4.2 *Basis of Assessment*

Assessment of the suitability of the Lost-in-Place Formwork System — Plasmolite Wall is based on:

(i) Tests conducted for performance characteristics of the Wall panels by Civil-Aid Technoclinic Pvt. Ltd., Bangalore

(ii) Tests conducted for characterization of the panels by IIT Bombay.

(iii) Quality Assurance of Fibre Cement Board, Plastic Spacers, Glue, Putty and foaming agent used in the manufacture of wall panels shall be as per the relevant IS/specifications of the manufacturers.

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

1.5 Production Machinery & Equipment

The manufacturer uses the following major equipment in the plant for production and installation of Wall panels, as reported:

Sl.No.	Name of the Machine	Make	Capacity	No.
1	2	3	4	5

1.	Recessing Machine	--	--	--
2.	Mixer	Crompton Greaves	5 cu. M. /day	1
3.	Foam Generator	Crompton Greaves	1 HP	1
4.	Pump Set	Indian	7 cu. M. /day	1
5.	Shearing Machine	--		
6.	Injection Molding Machine	K2 Machinery	120 Tons	1

1.6 Construction and Installation of Plasmolite Panel

1.6.1 *Fibre Cement Edge Recessing*

- After cutting fibre cement sheet to the desired dimensions, the edge of the sheet shall be recessed using recessing machine. (Figs. 3 & 4)

Fig. 3 Recessing Machine

Fig. 4 Sheer Recessing

1.6.2 *Panel Lamination*

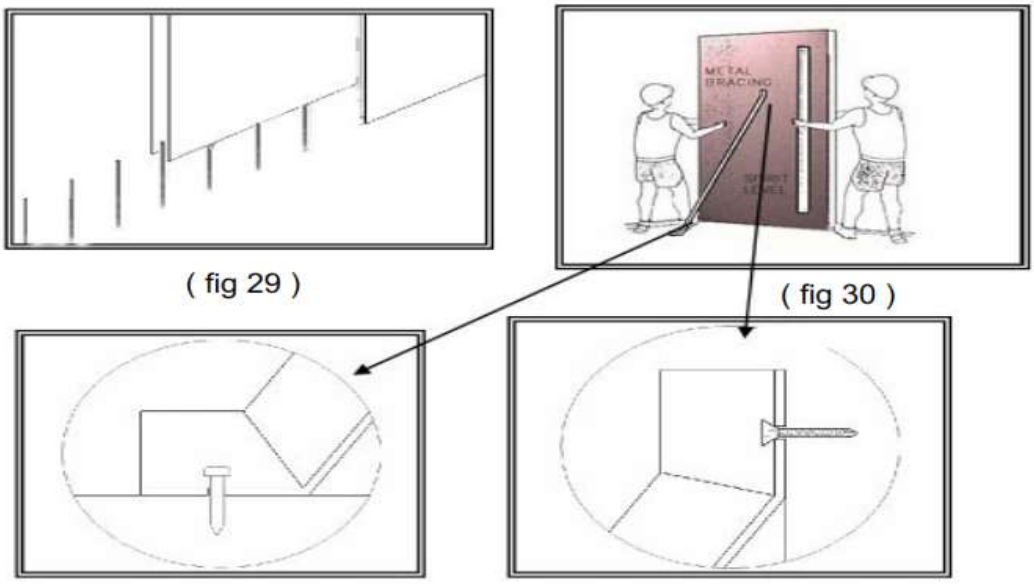
- Using the panel jig, one fibre cement sheet 6mm thick shall be placed on top of jig with the smooth face touching the jig flat form.
- Desired number of HIMI spacers shall be placed on top of fibre cement sheet and PU adhesive applied on the stud flanges (32 pieces for full panel 1200mm x 2400mm). HIMI spacers shall be aligned using pattern board.
- Another 6mm thick fibre cement sheet shall be placed on top of the studs to close the first panel.
- The same process as above shall be repeated until jig is filled with panels.
- Flat plywood covers shall be laid to compress the panel for two hours. (Figs. 5, 6, 7, 8, 9, & 10)

Figs. 5, 6, 7, 8, 9 & 10

1.6.3 *Panel Installation*

- Flatness of the plinth shall be verified at major corners. If elevation variance is less than 25mm, it should be started from the highest corner elevation. Shims for other panels shall be provided to maintain same wall elevation. If variance is greater than 30mm, elevation of the plinth shall be corrected or bottom portion of some panels be cut to attain level walls.
- Glue @ 250gm min. is the standard consumption. Reusable bottom angles shall be laid as per alignment of walls where panels are to be installed.
- The first panel shall be placed along the bottom angles directly above the proposed location.
- The panel shall be lifted slightly and then placed along the bottom angles. The panel shall be plumbed at edge and face sides and provide shims, if needed.
- Standard diagonal bracing angle 35x35x2000x3mm shall be provided for alignment stability which should be fixed with 25mm concrete nail on the slab and by FCB screw at side of the wall. Then the alignments shall be rechecked, diagonal bracing adjusted to achieve correct plumbness. (Figs. 11 & 12)

- The panel shall be screwed both sides at bottom at 250mm center to center, while glue is still tacky. If glue is not available, spacing shall be kept at 200mm center to center.
- Second panel at other side of the corner shall be installed. Same procedure shall be followed as for the first panel and then go to item no. 2.
- Corner connection details shall be followed as shown in Fig. 13 & 14.
- Joiner stud shall be positioned half into the panel end already installed. Glue shall be provided prior to inserting. The same shall be screwed with FCB screw at 250mm center to center, while glue is still tacky. If glue is not available, spacing shall be kept at 200mm center to center.
- Next panel shall be installed following the instructions given from item no. 2 onwards.
- Adjacent next panels shall be continued as per sequence.



Figs. 11, 12, 13 & 14

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 wall panels shall conform to the requirements of the prescribed specifications.

2. FTS Buildtech 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 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 Scheme of Quality Assurance (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 shall conform to relevant grade of Indian Standard.
(ii) Fly ash shall conform to IS 3812 (Part 2):2003.
(iii) Fibre cement board shall be 100% asbestos free and of Type A, Category 3 min. as stipulated in IS 14862:2000.
(iv) Recycled plastic spacers made of High Impact Molded Inserts shall conform to the specifications of the manufacturer M/s Comfort Plast, Mumbai
(v) PU Adhesive Glue shall conform to the specifications of the manufacturer.
(vi) Foaming Agent shall conform to the specifications of the manufacturer.
(vii) Putty shall conform to IS 419:1967.

2.3 Design Parameters

- Plasmolite Wall Panels shall be produced using fibre cement board, spacers, glue, cement and fly ash along with foaming and bonding agents to form walling material.
- All concreting work shall be done in accordance with light weight concrete mix design or as per the requirement of the manufacturer with regard to workmanship and materials.
- M/s FTS Buildtech shall provide design data for good practices and as ready reckoner for users.

Typical design sketches for non-load bearing walls are shown in Figs. 15 & 16.

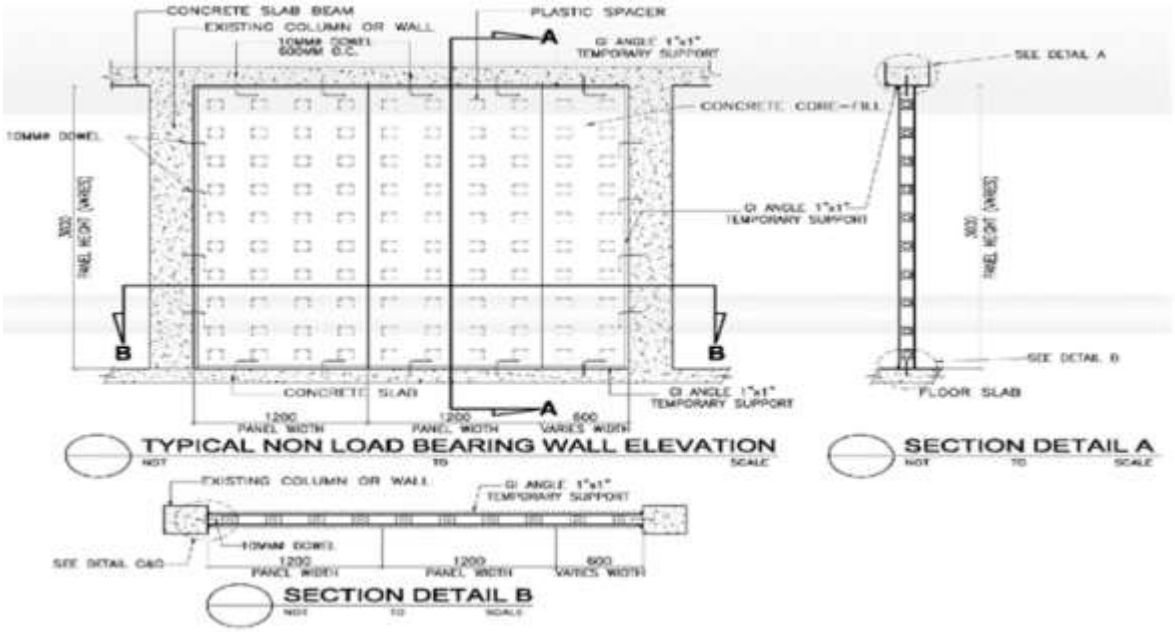


Fig. 15

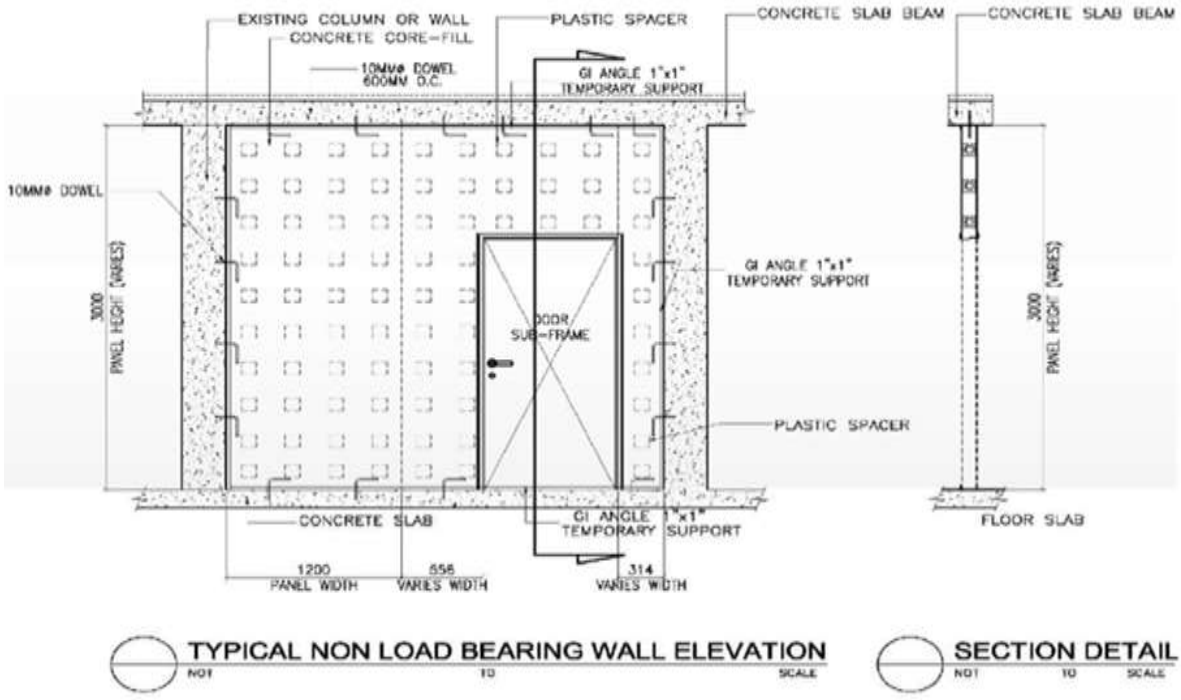


Fig. 16

2.4 Installation of Plasmolite Wall & Jointing Procedure

2.4.1 *Dowelling.*

- Holes of dia 75 mm to 125 mm shall be drilled as same as dia of the bar
- Dowels shall be grouted by using epoxy resins in the above drilled holes
- Centre to centre spacing between dowels shall be 300 mm as per design
- Dowels shall be installed on beams, columns and slab. (Fig. 17)

Fig. 17 Dowelling

Fig. 18 Panel Fabrication

2.4.2 *Fabrication*

- Plastic pallets and jigs shall be arranged perpendicular to each other.
- Fibre sheet shall be laid in alignment with respect to pallet and jig setup.
- Marking of spacer with use of specific stencil positions shall be done on the sheet.
- Glue @ 250gm min. per panel of standard size shall be applied on various positions where spacers are to be bonded
- Spacers shall be placed where glue is applied and kept in linear manner for 4 to 5 hours.
- Glue shall be applied on upper faces of spacers and upper sheet is laid perfectly in line with lower sheet.
- Ten number of panels shall be fabricated on each side of jig and stacked on pallets.
- These panels then shall be cut as per the specified dimensions and sizes such as rectangular, square, curves etc. (Fig. 18)

2.4.3 *Installation*

- Bottom angle shall be placed horizontally
- Already fabricated panels shall be positioned and screwed into place
- It is essential that panels be first installed starting from face of supporting column
- The panels are now installed and temporarily screwed into position to complete run of wall. (Figs. 19, 20 & 21)
- Support the temporarily angle installed on other side of panel to hold it in position for concreting
- A support angle of 2m length shall be used for the purpose
- One end shall be screwed to hollow panel on spacer while other end be nailed to slab at approx. 30° to 40°
- The purpose of keeping at this angle is to withstand pressure while pouring and to maintain verticality. (Fig. 22)

Fig. 19

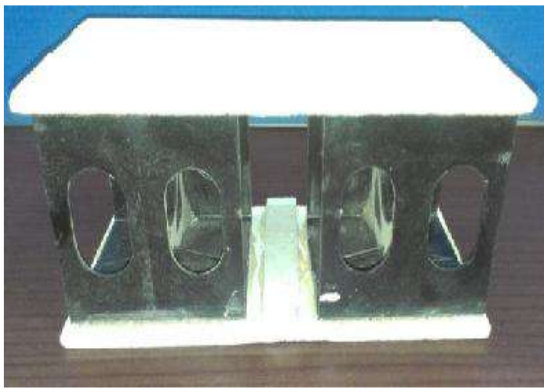
Fig. 20

Fig. 21

Fig. 22

2.4.4 *Joint Splicing*

- Joints between two panels shall be fixed by using FCB strips 50 mm wide inside the panel with help of glue, screws and tacking pins. (Figs. 23, 24 & 25)



Tongue and Groove Systems

Fig. 23 **Fig. 24**

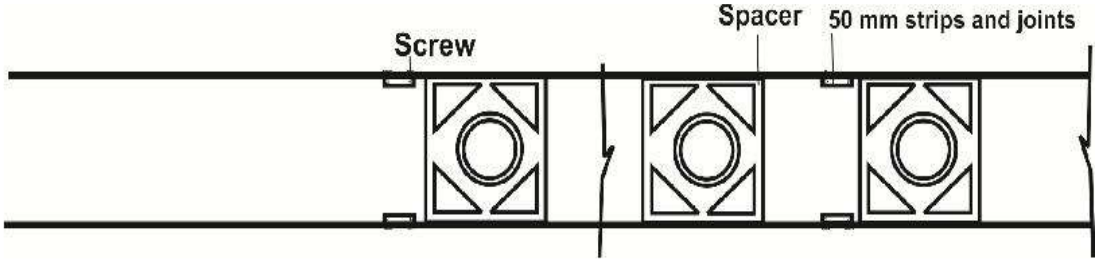


Fig.25

2.4.5 E*mbedment of Services*

- After installation of panel, electrical and plumbing pipes shall be inserted into the panel as per the drawings.

2.4.6 *Pouring*

2.4.6.1 *Pouring set up*

- MS channel purlins shall be used for holding several panels Together
- While pouring, 3 to 4 panels shall be used to maintain alignment. (Fig. 26)

Fig. 26 Pouring set up

Fig. 27 Manual Pouring

2.4.6.2 *Concrete mix*

- Plasmolite foam generator and mixer shall be used for this purpose. An elaborated mix of cement, sand/fly ash and water shall be prepared, quantities of which vary depending upon required density and strength (inner material) foam concrete by the client.

2.4.6.3 *Manual pouring*

- In this method, wet mix shall be emptied in parts into buckets so that it may be manually lifted and poured into hollow wall panel via hoppers or directly from top.
- 50 mm holes shall be drilled in the entire wall approx. 500 mm apart.
- Hoppers shall be installed and buckets filled with light weight concrete be poured in panels through these.
- This shall be continued till concrete starts overflowing from adjacent holes.
- Walls shall be allowed to set for 3 to 4 hrs and then pouring is continued in the upper portion in a similar manner or by pouring directly from top depending on site conditions. (Fig. 27)

2.4.6.4 *By machine or pumping*

- Concrete shall be poured in the panel by pumping which may be identified by overflowing of concrete from drilled holes.
- The holes shall then be patched using waste FCB sheet pieces with glue and screws.
- The mix shall be allowed to set for 3 to 4 hrs.

- Pouring shall be continued in the upper portion in a similar manner or by pouring directly from top depending on floor to floor height and site conditions. (Fig. 28)

Fig. 28 Plasmolite set for pouring

Fig. 29 Gap Filling

2.4.7 *Joint Treatment*

- After walls are completely filled and mix dried, joint treatment shall be done using fibre mesh tape and putty.
- One coat of putty shall be applied to close the joint, then second coat shall be applied in order to flush recessed part.
- Mesh tape shall be sandwiched between first & second coats to have a hold over the wall. (Fig. 29 & 30)

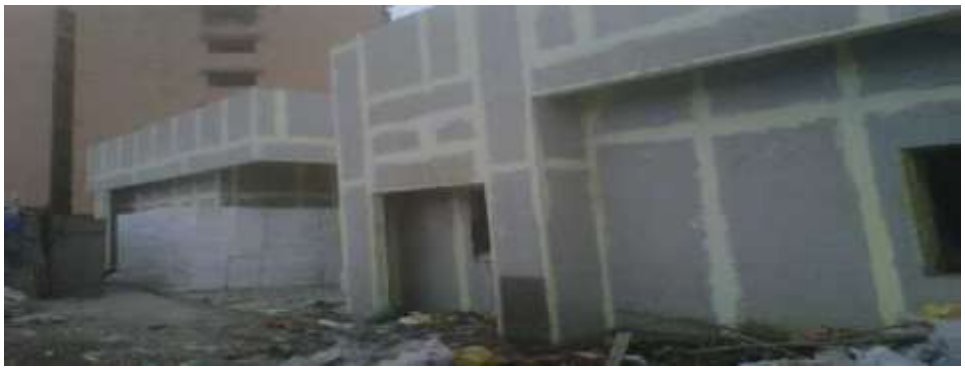


Fig. 30 Yellow Putty with Fibre Mesh Tape

Wall is now ready to accept primer & paint.

Panel accessories required for manufacture and installation is given in Annex 3.

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 and Quality Manuals and necessary diagrams, drawings, detailing to the customers and/or their structural designer.

2.7 Skilled/Training Needed for Installation

Skilled labourers like carpenter, masons shall be trained on the system and other unskilled labourers shall be trained in max. 30 days' time by the PAC holder. Training shall be conducted on or off site depending upon the numbers.

2.8 Guarantees/Warranties Provided by the PAC Holder

The FTS Buildtech warrants to the Client and the Architect/client that all materials and equipment furnished under this Contract shall be fit for their intended purpose, unless otherwise specified. All work shall be of good quality, free from faults and defects and in conformance with the Contract Documents. All work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Architect/Client, FTS Buildtech shall furnish satisfactory evidence as to the kind and quality of materials and equipment.
Warranties shall become effective on a date established by the FTS and Architect/Client in accordance with the Contract Documents.
The FTS Buildtech shall warrant for a period of twelve (12) months that the buildings(s) shall be watertight and leak proof at every point and in every area, except where leaks can be attributed to damage to the building(s) by external forces beyond FTS's control.

2.9 Responsibility

- Specific design using Plasmolite Wall Panels is the responsibility of the designer with the instructions, supervision and approval of FTS Buildtech.
- Quality of maintenance of the building is the responsibility of the building owner.
- Providing necessary facilities and space for movement of machines 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.

3.1.2 *Inspection of the Panels and Visit to Site*

TAC members and IOs inspected the manufacturing process of the panels and the spacers in detail. The process was found to be satisfactory and with minimum training of manpower.

3.2 Tests Performed on Panels

3.2.1 Tests performed on Plasmolite Panels by Civil-Aid Technoclinic Pvt. Ltd., Bangalore in October, 2013:

S.No.	Test conducted	Test Method	Test Result
1.	Dry Density	---	957 kg/m^3
2.	Compressive Strength	ASTM C 873	3.78 N/mm^2
3.	Water Absorption	IS 2185 (Part 1): 2003	11.5 %
4.	Nail Holding capacity	IS 2380 (Part 14): 1977	763 N (screw slipped from test specimen)
5.	Fire Resistance	ASTM E 119	At the end of test of 8 hr duration, a crack was observed on bottom surface of the panel and top surface was intact.

3.2.2 Tests performed on samples of spacers i.e. High Impact Moulded Inserts (HIMI) of size 125mm collected by the IOs for carrying out the following tests by Central Institute of Plastics Engineering and Technology (CIPET), Ahmedabad is given below:

S.No.	Tests	Test Method	Unit	Result Obtained
1.	Density	ASTM D792	gm/cc	1.08
2.	Melt Flow Index	ASTM D1238	gm/10min	15.0
3.	Tensile Strength	ASTM D638	Kg/cm^2	261
4.	Flexural Modulus	ASTM D790	Kg/cm^2	9781
5.	Notch Izod Impact	ASTM D256	J/m	23.66

3.2.3 Tests performed on samples of Fibre Cement Board collected by the IOs for carrying out the following tests by Deptt. of Earth Sciences, Indian Institute of Technology Bombay:

S.No.	Tests	Test Method	Result Obtained
1.	Apparent Density	IS 14862:2000	1.42 gm/cc
2.	Bending Strength	IS 14862:2000	9.32MPa
3.	Water Permeability	IS 14862:2000	0.16%
4.	Warm Water	IS 14862:2000	0.18
5.	Scale -- Dry	IS 14862:2000	No deposit of water after 24 hours
6.	Heat -- Rain	IS 14862:2000	

3.2.4 Tests performed on samples of Plasmolite Wall Panels of thickness 112mm collected by the IOs for carrying out the following tests by Deptt. of Earth Sciences, Indian Institute of Technology Bombay:

S.No.	Tests	Test Method	Result Obtained
1.	Dry Density	IS 15622:2006	1450 kg/m^3
2.	Compressive Strength	IS 15622:2006	4.89 MPa
3.	Water Absorption	IS 15622:2006	6.24%
4.	Thermal Conductivity	IS 15622:2006	0.267 W/mK
5.	Impact Resistance	IS 15622:2006	2.62 MPa
6.	Scratch Resistance	IS 15622:2006	No scratch up to 100N load
7.	Pull Out test	IS 15622:2006	2413 N
8.	Sound Insulation	IS 15622:2006	26 dB for 6hr
9.	Nail Holding capacity	IS 15622:2006	2000 N
10.	Fire Resistance	IS 3809:1979	110 minutes

3.3 Execution of Projects

The manufacturer, as reported, has executed the projects as per the details given below (as reported):

S. No.	Name & location of the Project	Quantity (sqm) approx.	Period of Completion
1.	Supply, Fabrication & Installation of wall panels at Goa for construction of a high rise building for M/s JVS Infrastructure & Environment, Goa	5097 sq. m.	January, 2011

2.	Supply, Fabrication & Installation of wall panels at Pune for construction of a IT Park for M/s Tata Consultancy Ltd., Pune	25000 sq. m.	April, 2012
3.	Supply, Fabrication & Installation of wall panels at Dahej, Gujarat for M/s Indo Baijin Chem Pvt. Ltd., Bharuch, Gujarat	1460 sq. m.	October, 2012
4.	Supply, Fabrication & Installation of panels at TCS Sahyadri Park, Hinjawadi, Pune for M/s Shapoorji Pallonji, Pune	137 mm thick 12000 sq. m.	February, 2013
5.	Supply, Fabrication & Installation of panels at Future Towers, Amanora Park Town, Pune for Amanora, Pune	87 mm thick = 14925 sq. m 162 mm thick = 3080 sq. m	September, 2013
6.	Design, Supply & Installation of panels at residential building at Vikhroli, Mumbai for Shubam Dynamic, Mumbai	112 mm thick = 3300 sq. m	September, 2013

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.

Place: New Delhi
Date of issue_____

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

Dr. Shailesh K. Agrawal
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

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 419:1967 – Specifications for putty
5.1.2 IS 456:2000 – Code of practice for reinforced cement concrete
5.1.3 IS 516:1969– Standard test method for flexural strength of concrete specimens
5.1.4 IS 2185 (Part 1):2005 – Specifications for concrete masonry units— hollow and solid concrete blocks
5.1.5 IS 2380 (Part 14):1977 – Methods of test for wood particle board and other ligne cellulosic materials – screw & nail withdrawal test.
5.1.6 IS 3809:1979 – Fire Resistance Test for Structures
5.1.7 IS 3812 (Part 2):2013 – Specifications for fly ash for use as pulverized mixture in cement concrete
5.1.8 IS 8112:2013 -- Specifications for 43 grade ordinary Portland cement
5.1.9 IS 14862:2000 -- Specifications for Fibre Cement Flat Sheets
5.1.10 IS 15622:2006 – Specifications for Pressed Cement Tiles
5.1.11 ASTM C779 – Standard test method for abrasion resistance of horizontal concrete surfaces
5.1.12 ASTM C873 – Standard test method for compression strength of concrete cylinders
5.1.13 ASTM C900 – Standard test method for pullout strength of hardened concrete
5.1.14 ASTM 322:09 – Standard test method for thermal conductivity
5.1.15 ASTM E119 – Standard test method for fire tests of building construction and materials
5.1.16 ASTM E2179 – Standard test method for lab measurement of effectiveness of floor coverings

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.

5.3 References
1. Tests Performed on samples of Fibre Cement Board and Panels by Indian Institute of Technology Bombay, Mumbai
2. Tests Performed on Panels by Civil-Aid Technoclinic Pvt. Ltd., Bangalore
3. Test Performed on samples of spacers i.e. High Impact Moulded Inserts (HIMI) of size 125mm collected by the IO for carrying out the tests by Central Institute of Plastics Engineering and Technology (CIPET), Ahmedabad

CERTIFICATION

In the opinion of Building Materials & Technology Promotion Council's Board of Agreement (BMBA), **Lost-in-Place Formwork system -- Plasmolite Wall Panels (For Partition Walls)** bearing the mark manufactured by M/s FTS Buildtech Pvt. Ltd. is satisfactory if used as set out above in the text of the Certificate. This Certificate **PAC No.: 1033-S/2018** is awarded to **M/s FTS Buildtech Pvt. Ltd., Mumbai**

The period of validity of this Certificate is for a period of two years i.e. from 12-03-2018 to 11-03-2020 as shown on Page 1 of this PAC.
This Certificate consists of a cover page and pages 1 to 28.

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

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:

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)

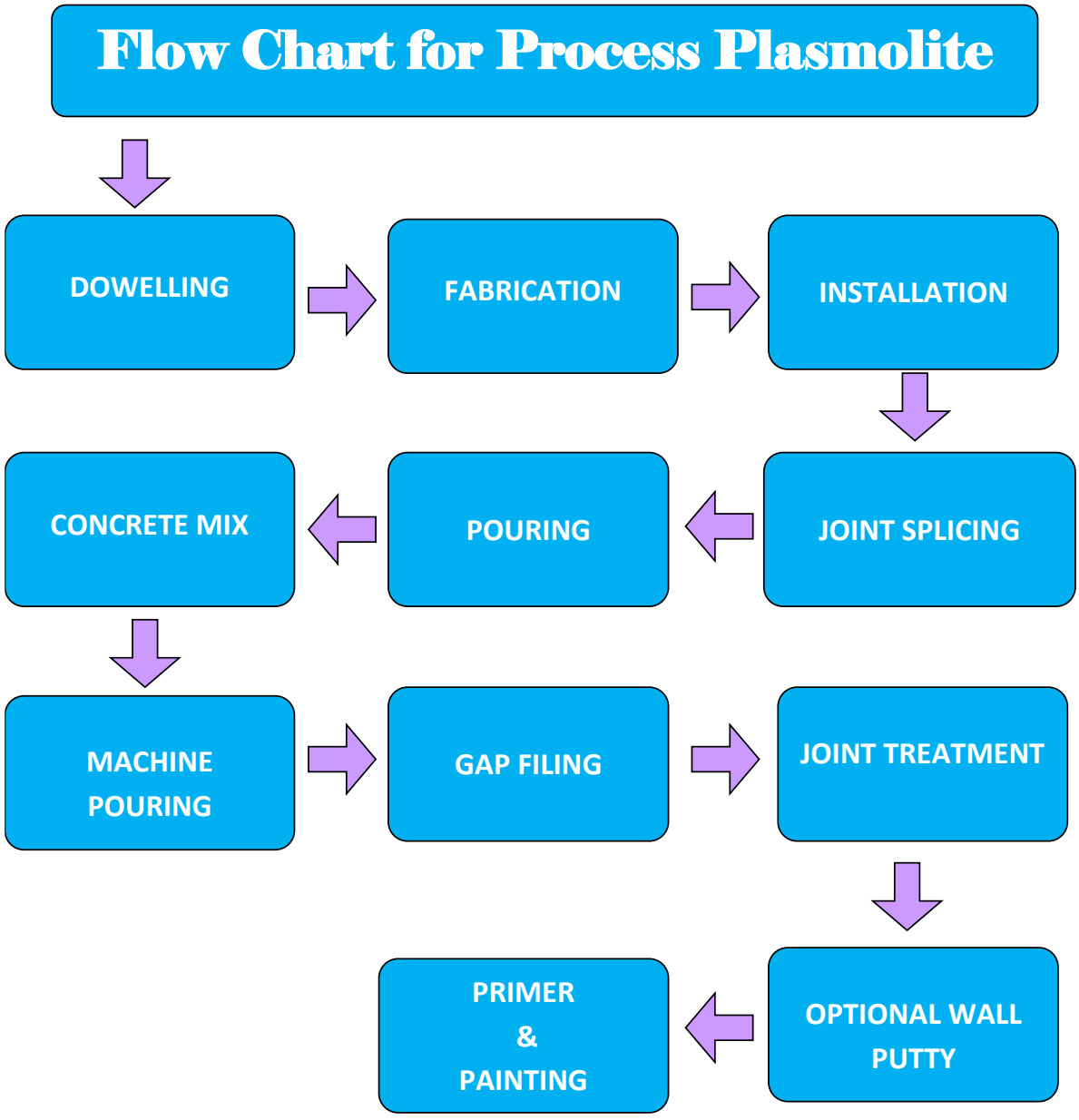
QUALITY ASSURANCE PLAN FOR LOST-IN-PLACE FORMWORK SYSTEM – PLASMOLITE WALL PANELS

S. No.	Parameters to be inspected	Requirement Specified	Test Method	Frequency of Testing
	I. Raw Materials			
1.	O P Cement 43 Grade	As per IS 8112: 2013	Manufacturer's test report	Every batch/lot
2.	Fly ash Grade 1	As per IS 3812(Part 1):2003	As per IS 1727: 1967	Every batch/lot
3.	Fibre cement board	Manufacturer's specifications	Manufacturer's test report	Every batch/lot
4.	Recycled plastic spacers	Manufacturer's test report	Manufacturer's test report	Every batch/lot
5.	Foaming and bonding agents	Manufacturer's test report	Manufacturer's test report	Every batch/lot
6.	PU Adhesive Glue	Manufacturer's test report	Manufacturer's test report	Every batch/lot
7.	Putty	As per IS 419:1967	Manufacturer's test report	Every batch/lot
	II. Finished Panels			
1.	Dry Density	600 to 800 kg/m^3	--	One time or as per requirement
2.	Compressive Strength	70.35 kg/cm^2	ASTM C 873	One time or as per requirement
3.	Water Absorption	14. 06%	IS 2185 (Part 1):2003	One time or as per requirement
4.	Thermal Conductivity	0.25 W/mK	ASTM D 322:009	One time or as per requirement
5.	Impact Resistance	1 mm depth of wear	IS 516:1959	One time or as per requirement
6.	Scratch Resistance	0.9 mm/kg	ASTM C 779	One time or as per requirement
7.	Sound Insulation	7.2 (% reduction)	ASTM E 2179	One time or as per requirement
8.	Nail Holding capacity	4.6 kg/cm^2 (single nail)	IS 2380 (Part 14):1977	One time or as per requirement
9.	Fire Resistance	4 hours	ASTM E 119	One time or as per requirement

ANNEX II

(Clause 1.6.3)

PROCESS FLOW CHART OF LOST-IN-PLACE FORMWORK SYSTEM -- PLASMOLITE WALL PANELS



ANNEX III

(Clause 2.4.7)

PANEL ACCESSORIES

HIMI Spacer :

(fig 2)

SCREW :

(fig 4)

GLUE :

(fig 5)

Template :

Panel Installation Accessories :