Resin Bonded (Plastic Waste) Tiles

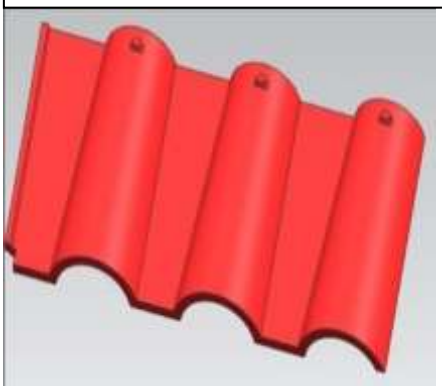
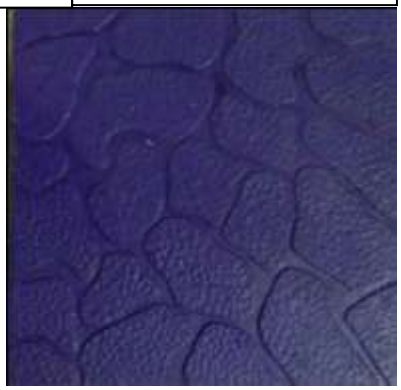
User should check the validity of the Certificate by contacting Member Secretary, BMBA at BMTPC or the Holder of this Certificate.

Name and Address of Certificate Holder:
M/s Ideal Eco Environment System
102-105, Jay Maakali Estate,
Olpad -Sayan Road, Olpad
Surat—394540, Gujarat
Tel: 09898506409
Email: idealees@gmail.com

Performance Appraisal Certificate

PAC No **1037-S/2018**
Issue No. **01**

Date of Issue:
12-03-2018



Building Materials & Technology Promotion Council
Ministry of Housing & Urban Poverty Alleviation
Government of India
Core 5A, First Floor, India Habitat Centre,
Lodhi Road, New Delhi – 110 003

Tel: +91-11-2463 8096, 2463 8097; Fax: +91-11-2464 2849
E-mail: bmtpc@del2.vsnl.net.in Web Site: http://www.bmtpc.org

PERFORMANCE APPRAISAL CERTIFICATE

FOR

Resin Bonded (Plastic Waste) Tiles

ISSUED TO

M/s IDEAL ECO ENVIRONMENT SYSTEM, SURAT

Status of PAC No.: 1037-P/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	1	12-03-2018	12-03-2020	--	--	11-03 2020	--	

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PART 1 CERTIFICATION

1.1 Certificate Holder: M/s Ideal Eco Environment System

102-105, Jay Maakali Estate,
Olpad-Sayan Road, Olpad
Surat—394540, Gujarat
Tel: 0261-2769409, 09898506409
Email: idealees@gmail.com

1.2 Description of Product

1.2.1 *Name of the Tiles* – Resin Bonded (Plastic Waste) Tiles

1.2.2 *Brief Description* – Resin Bonded Tiles are manufactured from plastic waste and white sand. The plastic waste is taken from city waste collection centre, dried, segregated, crushed, grinded, separated from metals and formed into plastic chips. Plastic chips are then mixed with sand granules for further processing for production of tiles. These tiles may be used for walls, flooring and roofing depending upon the thickness. The tiles are eco-friendly as these are made by eliminating plastic waste. These tiles are available in attractive designs and colours as per the requirement of customers.

1.2.3 *Classification of Tiles*

1.2.3.1 O*nyx* w*all tiles 10T* – These tiles of 10mm thick are of three types – Unicolor, Digicolor & 3Dcolor and shall be used for external/internal walls and flooring. (Fig. 1)

1.2.3.2 *Emerald flooring tiles 12T* -- These tiles of 12mm thick are of three types – Ivory, Black. Brick red, Terracota and also in 3D and shall be used for internal flooring. (Fig. 2)

1.2.3.3 *Emerald paver blocks 25T* – These tiles of 25mm thick are of three types – Multicolour & 3D and shall be used for external flooring. (Fig. 3)

1.2.3.4 *Scarlet roofing tiles 10T* – These tiles of 10mm thick are of three types – Heritage, Pyramid & Rajwadi and shall be used for roofing. (Figs. 4, 5 & 6)

Fig. 1 Onyx

Fig. 2 Emerald

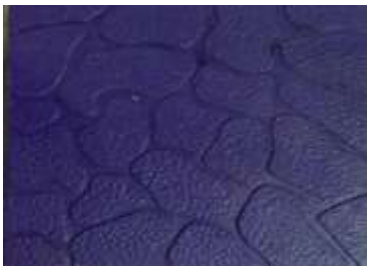
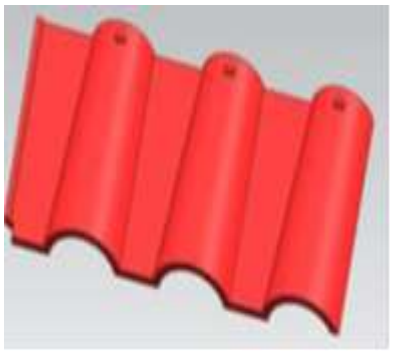
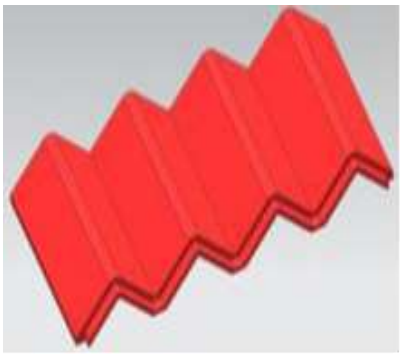


Fig. 3 Emerald





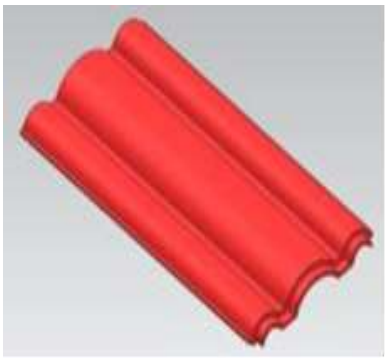


Fig. 4 Heritage Scarlet **Fig. 5 Pyramid Scarlet** **Fig. 6 Rajwadi Scarlet**

1.3 Dimensions and Tolerances

1.3.1 *Dimensions*

The standard size of these tiles shall be as follows:

S. No.	Type	Length mm	Breadth mm	Thickness mm
i)	Onyx Wall	375	375	10
ii)	Emerald Floor	375	375	12
iii)	Heritage roof	368	171	10
iv)	Paver blocks	150	150	25

1.3.1.1 Sizes other than those mentioned above may be supplied as agreed to between the supplier and the manufacturer.

1.3.2 *Tolerances*

1.3.2.1 Tolerances on length or breadth of tiles shall be ± 1mm. In addition, the difference in length of side between the longest side and the shortest side in the sample shall not exceed 1 mm.

1.3.2.2 Tolerance on thickness shall be + 15% of the minimum thickness (no tolerance on the negative side shall be permitted). In addition, the difference in thickness between the thickest and the thinnest tile in the sample shall not exceed 10% of the minimum thickness.

1.4 Basis of Assessment

1.4.1 *Scope of Assessment* – Suitability of Resin Bonded Tiles for use as wall, floor and roof tiles.

1.4.2 *Basis of Assessment* **–**

The assessment is based on the results & reports of

(i) Inspection of the factory
(ii) Inspection of the manufacturing equipment used

(iii) Tests got done in a NABL Accredited Testing Laboratory i.e. Bhumi Research Centre, Surat by the manufacturer of the tiles.

(iv) Test Report of the samples of all types of tiles collected by the Officers of BMTPC during inspection of the plant from Bhumi Research Centre, Surat.

(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.

1.4.3 *Scope of Inspection* – Scope of inspection included verification of production, performance and testing facilities at the factory including competence of technical personnel and status of quality assurance in the factory.

1.5 Uses of Resin Bonded Tiles, Limitations & Precautions

1.5.1 The Resin Bonded Tiles may be used in such places where normally light loads are taken up by the floors; such as residential buildings, office buildings, schools, colleges and hospitals and on walls, roofs and pavements.

1.5.2 *Limitations of Use*

1.5.2.1 Unless otherwise specified, the wall and floor tiles shall be supplied with initial grinding and grouting of the upper layer. The upper layer of the tiles shall be free from projections, depressions, cracks (hair cracks not included), holes, cavities and other blemishes. The edges of the wearing layer may be rounded.

1.5.2.2 The colour and texture of the wearing layer shall be uniform throughout its thickness. No appreciable difference in the appearance of the tiles, from the point of view of colour of aggregate, its type and its distribution on the surface of the wearing layer shall be present.

1.5.2.3 The roofing tiles shall be free from impurities like particles of stone, lime or other foreign materials visible to the naked eye either on the surface or on the fractured face of the tile obtained by breaking the tile.

1.5.3 *Precautions to be taken* — The following precautions shall be taken while using these tiles on the roof:

- Base of the roof slab/wall shall be smooth for proper adhesion of the tiles, else air-pockets can lead to poor and uneven insulated surface

- A minimum gradient of 1:12 shall be provided in the screed laid over the roof in order to avoid water logging which may lead to seepage and cracks on the roof

- Due to leaking water pipes / tanks etc. on the roof, rain water outlets shall not be allowed to be blocked in order to avoid water logging which may lead to seepage and cracks on the roof

- Proper grouting over brick tiles shall be laid in order to avoid damage to roof and structure due to loose tiles

- Tiles of lower density than specified by the manufacturer shall not be used as these may not be adequate to support heavy loads such as water tanks, movement of DG sets etc. on the terrace.

1.6 Conditions of Certification

1.6.1 *Technical Conditions* – Raw materials and the finished product shall conform to the requirements of the prescribed specifications.

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

1.6.3 *Brochure/ Guidelines* – The Certificate holder shall provide detail instruction of laying of the tiles and subsequent maintenance, if any

1.6.4 *Handling of User Complaints*

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

1.6.4.2 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.

1.7 Certification

1.7.1 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, Resin Bonded Tiles covered by this Certificate are fit for use as 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 Resin Bonded Tiles in accordance with the requirements specified in relevant Indian Standards. In addition it shall follow Company standards specifying requirements of various materials used in the manufacture of the product (See 2.2)

2.2 Specifications of the Tiles

2.2.1 *Technical Specifications*

2.2.1.1 *Raw materials*

i) *Sand* – Shall be as per IS 383:2016.
ii) *Plastic waste* -- Different types of thermoplastics like PP, HD, LD, HM, etc. segregated from uncategorized municipal solid waste and shall be procured from scrap dealers
iii) *Adhesive/Pigment* -- Addage RD Powder, AKULPOL-9192, Akulcel 48000 (Additives & Bonding agents) shall conform to the manufacturer specifications.

2.2.1.2 *Performance Criteria*

1. *Wall/Floor/Paver Tiles* shall meet the following performance criteria:

Sl No	Performance Characteristics	Criteria	Test Method
1	Flatness of tile surface/ Warping	Shall not exceed 1 mm	IS 1237:2012
2	Perpendicularity	Shall not exceed 2 percent of the length of the edge	IS 1237 :2012
3	Straightness	Shall not exceed 1 percent of the length of the edge	IS 1237 :2012
4	Water Absorption	Shall not exceed 10%	IS 1237 :2012
5	Wet Transverse strength	Shall not be less than $3N/mm^2$	IS 1237 :2012
6.	Resistance to Wear	Shall not exceed 4mm	IS 1237:2012
7.	Density	Shall not be less than 1500 kg/m^3	IS 1237:2012
8.	Impact Resistance	Shall be min. 0.55	IS 1237:2012

2. *Roof Tiles* shall meet the following performance criteria:

S.No.	Performance Characteristics	Criteria	Test Method
1.	Flatness of tile surface /Warping	Shall not exceed 1 mm	IS 654:1992
2.	Perpendicularity	Shall not exceed 2% of length of edge	IS 654:1992
3.	Straightness	Shall not exceed 1% of length of edge	IS 654:1992
4.	Water Absorption	Shall not exceed 10%	IS 654:1992
5.	Wet Transverse strength	Shall not be less than $3N/mm^2$	IS 654:1992
6.	Abrasion/Resistance to Wear	Shall not exceed 4 mm	IS 654:1992
7.	Density	Shall not be less than $1500 kg/m^3$	IS 654:1992
8.	Permeability	No water shall ooze from the bottom	IS 654:1992
9.	Breaking load test	Shall not be less than 1100 N	IS 654:1992

2.3 M*anufacturing Machinery*

The manufacturer has got the following machines for manufacture of various type of tiles:

Sr No	Date of installation	Name of machine	Make	Capacity	Capability	Nos.
1	15/12/16	4 Pillar Hydraulic Press	India	450 ton	Pressing	2
2	15/12/16	Hydraulic Lift Jack 'jackman'	India	5 ton	Lifting	1
3	15/12/16	Aglo Machine	India	100 kg/hr	Crushing	1
4	15/12/16	Grinder Machine	India	100 kg/hr	Grinding	1
5	15/12/16	Rotary Sand Filter Machine	India	500 kg/hr	Filtering	1
6	15/12/16	Mixture Machine with Gear Box	India	500 kg/hr	Mixing	1
7	15/12/16	Shredder Machine	India	300 kg/hr	Shredding	1
8	15/12/16	Air Compressor	India	15 CFM	Air compression	1
9	15/12/16	Water Chiller with Pump	India	5tr	Refrigeration	2
10	15/12/16	Spray Machine	China	500sqft/hr	Coating	1
11	15/12/16	IR Heating Levelling Machine	China	2500C	Heating	1
12	15/12/16	Roller Conveyor	China	1000 ft/hr	Transport	3
13	15/12/16	Screw Fed Machine	China	75 kg/hr	Mixture Processing	4

14	12/7/17	UV Flatbed machine	Korea	35 sq. mt. / hr.	Printing	1

2.4 Manufacturing Process

2.4.1 The manufacturing process of Resin Bonded Tiles is carried out in the following phases:

2.4.1.1 *Phase 1 (Raw material) –- Plastic Waste Processing:*

Batch Process – A batch is defined as the amount of plastic waste that can be put in for drying (the batch definition is kept in this order as the land available for drying of unsegregated plastic waste containing moisture is limited).
Batch Size – 220kg of plastic waste input
Production per batch – 170kg dry plastic chips (50kgs loss due to moisture, sand, metals, unusable plastic etc.)

2.4.1.2 *Phase 1 (Raw material) -- Sand Processing:*

Batch Process –A batch is defined as the amount of sand processed in 1 continuous production cycle of 4 hours. The sand is then stocked and maintaining stock of approx. 2000 kg and then utilized once an appropriate amount of plastic waste is available to be fed for mixing.
Batch Size – 2000kg of white sand
Production per batch – 1600kg dry plastic chips (20% loss due to big sized granules that cannot be used)

2.4.1.3 *Phase 2 – Raw Material to Finished Goods*

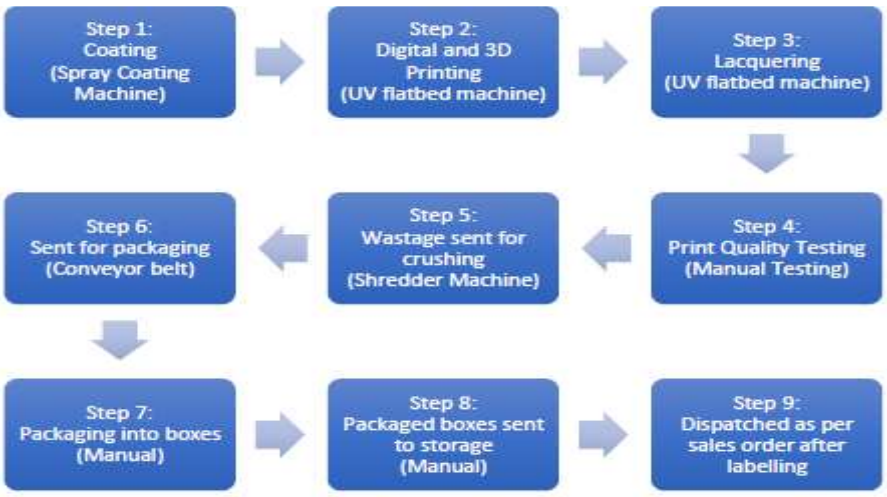
Batch Process - A batch is defined as the amount of mixture that can be processed into mixing machine and melting for optimum quality of output.
Batch Size – 60kg of mixture and5 kg mixed material put every 5 minutes in screw fed machine for 30 second of pressing and holding time
Production per batch – Almost 5 kg of lumps prepared (the production per batch is dependent on the type of product).

2.4.1.4 *Production per 60 kg mixture excluding wastage*

No.	Type of Tile	Size	Thickness	Production
1.	Onyx Wall Tiles	375mm x 375mm	10mm	29 pieces
2.	Emerald Flooring Tiles	375mm x 375mm	12mm	24 pieces
3.	Emerald Paver Blocks	150mm x 150mm	25mm	75 pieces
4.	Scarlet Roofing Tiles	368mm x 171mm	10mm	46 pieces

2.4.1.5 *Phase 3: Finished tiles ready for sale*

Batch Process – A batch is defined as the number of tiles required for a particular sales order.
Batch Size – Variable
Production per batch – As per requirement of sales order.



Manufacturing Process Flow Chart is shown in Annex II.

2.5 Installation Process

The process for installation of the tiles is as follows:

2.5.1 *Onyx* W*all Tiles*

2.5.1.1 *Installing a batten to keep first row straight*

- Batten shall be installed to help keep the tile rows straight. Batten shall be a piece of 25mm x 100mm lumber that is used as a long straight-edge, placing the first row of tiles right against the batten.
- The top edge of the wood shall be aligned so that it follows exactly along the mid-level line that is marked and screwed into the studs.
- Once the tiles have been placed, the batten shall be unscrewed and removed.
- It must be ensured that everything is in line and level before installing the tiles on the batten. This shall also be checked all the way across, since there may be dips in the wood that is used for the batten. (Fig. 7)

2.5.1.2 *Mixing the cement mortar*

- A thin set cement mortar shall be mixed to lay the tiles. Put the powder in a bucket and water shall be added slowly and mixed until the consistency of the mortar becomes like peanut butter.
- It should also be allowed to "slake" after it is mixed and to rest for 10-15 minutes and then stirred again. (Fig. 8)

Fig. 7

Fig. 8

2.5.1.3 *Spreading the cement mortar*

- A tiling trowel to apply the mortar in a 600 m x 900mm area. The notched trowel shall be held at a shallow angle against the wall, so that the notches on one of its long sides dig grooves into the mortar.

- Long, sweeping motions shall be used to apply the mortar irrespective of the direction of grooves but the lines should all be roughly parallel.
- The trowel size shall depend on the size and type of tile being used.
- A tile shall be tested to make sure the mortar is mixed and spread correctly. Cement mortar shall be placed on small spot and then tile placed.
- The tile shall be pulled up and look at the pattern that is created on the back. If clear lines are seen, then the cement mortar is too dry and if goopy mounds are seen, then the mortar is too wet. (Fig. 9)

2.5.1.4 *Placing tiles on the wall*

- When the cement mortar is ready, start placing tiles. The mortar
  shall be twisted into place, sticking to the small area that has been prepared. The spacers shall be placed between each tile as the work proceeds. These are usually cross shaped and placed at the corners but if the tiles are uneven, spacers have to improvised, such as by placing only one arm between tiles and letting the rest of the spacer stick out.
- If the mortar rises up between the tiles as it is placed, the bed is too thick and a smaller trowel is needed.
- The tiles shall be checked for line and level as the work proceeds. A laser level can be used. (Fig. 10)

Fig. 9

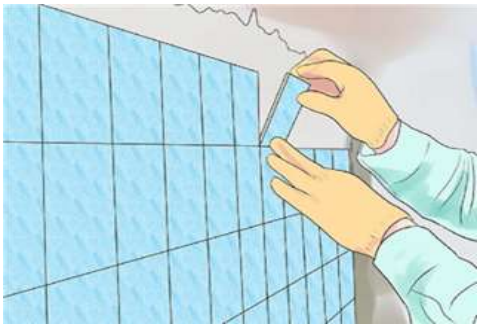


Fig. 10

2.5.1.5 *Choosing and mixing grout*

- A grout is appropriate for the project, depending on how large the gaps are between the tiles shall be chosen. Once the grout is chosen, it shall be mixed according to the packaging directions, being sure to also mix any additives that are required. The water in a bowl or bucket shall be put and powder added until the consistency is like toothpaste. The quantity of grout that can be used in

about 20 minutes shall be mixed, since mixing more may risk the product drying out.

- Sanded grout shall be used for gaps larger than 3 mm.
- Un-sanded grout shall be used for gaps smaller than 3 mm.

- The additives shall make the grout more water resistant and changing the color to match the tiles. (Fig. 11)

2.5.1.6 *Spreading the grout using a grout float*

- The grout shall be spreaded (using a grout float) in 900mm x 900mm area or whatever size can be grouted in about 20 minutes. The float shall be held at 45° and grout pushed into the gaps using diagonal swipes.
- The grout shall not be pushed around parallel to the lines, since this can gouge the grout back out of the gaps. (Fig. 12)

Fig. 11

Fig. 12

2.5.1.7 *Clean the grout*

- After allowing the grout to cure for 20 minutes, the tiles shall be wiped with a clean, damp sponge to remove any excess grout from the tiled surface. A small area shall be wiped first, the sponge cleaned out and then some more wiped. This shall be continued for each small area as it is completed but wait until two to four small areas are done. (Fig. 13)

2.5.1.8 *Allow it to cure*

- The grout shall be allowed to cure for three hours or whatever amount of time is recommended as per the manufacturer's guidelines. It must be ensured that the area remains dry and it gets adequate ventilation.
  - Some additives may cause the grout to cure more slowly.
  - Any remaining residue shall be cleaned after the grout has cured. (Fig. 14)

2.5.1.9 *Seal the grout*

- Once all tile have been installed, grout sealer shall be applied. This will help keep moth from growing in the gaps and will need to be reapplied usually every year (preferably every six months). Though every sealer is different, usually it is a wax which must be applied in a circular motion with a rag.
- A brush-on or spray-on tile sealer may be used.
- Do not put these sealers on non-glazed, unfinished tile. It will absorb into and possibly stain the tile. (Fig. 15)

Fig. 13

Fig. 14

Fig. 15

2.5.2 *Emerald Floor Tiles*

2.5.2.1 *Finding Center of the Room*

- Firstly, the room shall be measured and the center marked.
- Then the room shall be measured in the other direction, and the center marked.
- A chalk line shall be snapped across both center points; the intersection of the two lines is the center of the room.
-

2.5.2.2 *Laying out the Tiles*

- The tiles shall be laid in a dry run, starting at the center and following both chalk lines.
- Spacers shall be placed between the tiles to ensure proper distances between them.
- The starting point shall be repositioned, if necessary.
- After the placement, the center tile shall be traced.

2.5.2.3 *Installing the Center Tile*

- The center tile shall be placed using any type of adhesive or cement.
- The notched edge of the trowel shall be held at about 45° to the floor and the adhesive applied to the floor.
- The tile shall be pressed in place while twisting it back and forth to secure it into position.

- The tile shall be pulled back up and make sure the adhesive is in contact with all of the bottom of the tile.
- If adhesive is not in contact with all of the bottom of the tile. It should be made thicker when applying it with the notched trowel.
- The center tile shall be reinstalled. (Fig. 16)

Fig. 16

Fig. 17

2.5.2.4 *Installing the remaining Tiles*

- The center tile shall be used as a reference point and the remaining tiles shall be installed along straight lines.
- A few tiles installed at a time, spreading adhesive for two or three tiles. If adhesive oozes up between tiles when the tile is pressed into place, too much adhesive is being used.
- Spacers shall be placed between the tiles to establish the grout lines. If necessary, any tile shall be cut to size for the end rows next to the walls of the room. (Fig. 17)

2.5.2.5 *Allowing the adhesive to cure*

- After installing the tile, it shall be allowed to cure overnight or for the amount of time recommended by the adhesive manufacturer.

2.5.2.6 *Mixing the Grout*

- The grout shall be mixed to a consistency similar to peanut butter. Grout comes in a wide variety of colors, and it may be tinted to match the decor.
- Some grout shall be scooped onto the tiles using a rubber grout float to work it into the joints.
- The grout shall be spread with the float at an angle to the grout lines to force it as far as possible into the joints. (Fig. 18)

Fig. 18

Fig. 19

2.5.2.7 *Cleaning of the Tiles*

- After working the grout into the joints, the residue shall be wiped off with a damp sponge so as to be careful to not pull any grout out of the grout lines between tiles. The sponge shall be rinsed frequently for better results.
- The grout shall be allowed to cure to a light haze and buff the tiles with a soft damp cloth. The manufacturer's instructions shall be followed on how to cure the grout.
- This may take several days to keep the grout damp using a spray bottle. After the grout has cured, sealant shall be applied to the grout lines. If the tile is installed in a bathroom, caulk along the tub line to prevent moisture from seeping underneath the tiles. (Fig.19)

2.5.3 *Scarlet Roof Tiles*

2.5.3.1 *Installing battens* (if necessary)

- If the roof has a steep slope, battens may be required to hold the tiles in place. Battens are thin strips of material (usually wood, but sometimes metal or plastic and of size 25 mm x 50 mm) that run horizontally along the length of the roof. Many tile varieties possess a lip or hook that hangs on available battens. In addition, clips are available to attach the tiles onto the batten.
- Two tiles shall be used to determine the spacing required for the battens. A minimum of a 75 mm overlap is required for the tiles that do not interlock (interlocking tiles shall take care of the measurement), and a smaller amount of overhang should be left over the eaves.
- After the distance has been determined between the first two battens, the distance shall be measured and battens set using that spacing all the way up, making sure to double check measurements as work proceeds. (Fig. 20)

2.5.3.2 *Installing the tiles*

- Start with one side first and then move along the length of the roof.
- If battens have not been installed, the tiles may be nailed directly into the sheathing.
- If battens have been installed first, the tiles shall be nailed into the battens. Clips can also be used to anchor the tiles to the battens.
- If tiles that tightly interlock are used, it may not be necessary to nail all the tiles to the sheathing or battens. (Fig. 21)

2.5.3.3 Cutting *tiles to fit tight spots*

- If obstacles such as chimney etc. are encountered, tiles shall be cut to fit tightly around these areas. Additionally, tiles at the end of each row shall have to be cut.

2.5.3.4 *Installing the ridge tiles*

- After the broad surfaces of the roof are completed, the tops shall be capped with special ridge tiles. These are rounded and depending upon design can either be laid out end-to-end or in an overlapping style.

Fig. 20

Fig. 21

Refer manufacturer's Installation Guidelines for details of Installation Procedure.

2.6 Inspection, Selection & Installation

2.6.1 Inspection shall be done at appropriate stages of manufacturing process. The packed tiles shall be stored properly to ensure that no damage occur during transportation. As part of quality assurance, regular in-process inspections shall be carried out by the trained personnel of the PAC holder.

2.6.2 The user is responsible for the proper use of the tiles at site. PAC holder shall provide required guidance and instructions for usage of the product at site.

2.6.3 *Good practice for installing the tiles at site* – Resin Bonded Tiles shall be installed at site in accordance with the applicable specifications, instructions and guidelines of the manufacturer. The user shall also follow the Brochure of the product supplied by the manufacturer.

2.7 Marking, Handling and Packing of the Tiles

2.7.1 *Marking* -- The following information shall be legibly marked on each package:

a) Name of manufacturer
b) Brand
c) Description –Classification and type
d) Net and gross weight of package

2.7.2 *Handling* -- The instructions given by the manufacturer for handling of these tiles shall be followed.

2.7.3 *Packing* – The tiles shall be packed in polybag by the supplier. Label giving the packing details shall be made available on the polybag.

2.8 Sampling and Criterion for Conformity

2.8.1 *Sampling* – The consignment of the wall, flooring and roofing tiles shall be divided into a number of lots in accordance with Clause 2.8.2. Each lot shall be inspected separately for ascertaining its conformity to the requirements.

2.8.2 *Lot -- A*ll the tiles in a consignment which are of the same type, class, shape and size and have been manufactured from identical raw materials, under identical conditions of manufacture shall be grouped together to form a single lot.

2.8.3 The sample tiles for inspection and testing shall be chosen from a lot at random. For guidance in procedure of random selection, IS 4905:2015 may be referred.

2.8.4 *Number of Samples and Criterion for Conformity*

2.8.4.1 For each characteristic, the number of sample tiles to be selected from a lot and criterion for determining the conformity of the lot on the basis of the test results on those samples, shall be in accordance with the 1.3.1 and Acceptable Quality Limit (AQL) 6.5% in Table 3 of IS 2500 (Part1):2000.

2.8.4.2 If the samples drawn for testing one characteristic can be utilized for any other characteristic, without introducing any prejudice in the test results of the latter, it would not be necessary to take fresh samples for the latter characteristics.

2.8.4.3 From the test results for water absorption, the average (x) and range (R) shall be calculated. The value of the expressing (x + 0.5 R) shall be less than or equal to the corresponding limit specified.

2.8.4.4 All the individual values of breaking load shall be above the corresponding minimum value specified. The average of the six test results shall be above the corresponding minimum limit specified.

2.8.4.5 In the case of permeability test all the tiles tested for permeability shall satisfy the requirements of the test.

2.9 **Skills/Training needed or Installation –** No special skills other than normal skills of a mason as required for fixing of tiles shall be required for tiles. However, the PAC holder shall provide on request necessary guidance to the users at site, if required

2.10 **Guarantees/ Warranties provided by the PAC Holder**- The manufacturer shall furnish a Guarantee for a period of 10 years excluding any damage caused during transit and installation from the date of supply, provided these tiles are installed strictly in accordance with the applicable specifications, instructions and guidelines of the manufacturer. Only manufacturing related defects will be warrantied for replacement.

2.11 **Services Provided by the PAC Holder to the Customer**

2.11.1 The PAC holder shall provide pre-sale advisory regarding the tiles. Customer/user may obtain from the PAC holder details of the advice that may be provided to him.

2.8.2 Users/Customers should ascertain from the PAC holder the type of service, the PAC holder is prepared to provide.

Part 3 BASIS OF ASSESSMENT AND BRIEF DESCRIPTION OF ASSESSMENT PROCEDURE

3.1 **Assessment**

3.1.1 *Factory Inspection*

The factory was inspected by the Technical representatives of the Council and TAC member. During inspection the entire manufacturing process along with the equipment was inspected. The manufacturing process was found to conform to the process description given in the Annex II. The in-process inspection and the inspection of the finished product were in accordance with

the Scheme of Quality Assurance (SQA) approved as a part of the requirements for grant of this PAC.

3.2 Performance Tests

3.2.1 *Testing of samples* -- The performance tests of samples of Resin Bonded Tiles for its use over walls, floor and roof specified in IS 3464:1986, IS 12583:1988, IS 13317:1992 and IS 13630:2006 were got tested from M/s Bhumi Research Centre, Surat. The samples conform to the tests as per the performance characteristics and specifications given by the manufacturer.

3.2.1.1 *Roof Tiles*

S. No.	Tests	Results	Test Method
1.	Length	361mm (avg.)	IS 13630 (Part 1):1993
2.	Width	171mm (avg.)	IS 13630 (Part 1):1993
3.	Thickness	10.0 mm(avg.)	IS 13630 (Part 1):1993
4.	Deviation in straightness of sides	Nil %	IS 13630 (Part 1):1993
5.	Deviation in perpendicularity of Tiles	Nil %	IS 13630 (Part 1):1993
6.	Water absorption	0.26%	IS 3464:1986,
7.	Breaking Load	1550N	IS 12583:1988
8.	Wet Transverse strength	23.25N/mm^2	IS 12583:1988
9.	Impact Resistance	Tearing not observed	IS 3464:1986,
10.	Resistance to wear	0.69mm	IS 3464:1986,
11.	Temperature Susceptibility(70+2°C)	No deterioration observed	IS 3464:1986,
12.	Acid Test	OK	IS 13630 (Part 8):1993

3.2.1.2 *Paver Blocks*

S. No.	Tests	Results	Test Method
1.	Length	150mm (avg.)	IS 13630 (Part 1):1993
2.	Width	150mm (avg.)	IS 13630 (Part 1):1993

3.	Thickness	25.0mm (avg.)	IS 13630 (Part 1):1993
4.	Deviation in straightness of sides	Nil %	IS 13630 (Part 1):1993
5.	Deviation in perpendicularity of Tiles	Nil %	IS 13630 (Part 1):1993
6.	Deviation in Flatness of Tiles	Nil %	IS 13630 (Part 1):1993
7.	Deviation in Warpage of Tiles at 100°C for 24 hours	Nil %	IS 13630 (Part 1):1993
8.	Water absorption	0.26%	IS 3464:1986,
9.	Breaking Load	6553.3N	IS 12583:1988
10.	Wet Transverse strength	13.63N/mm^2	IS 12583:1988
11.	Impact Resistance	Tearing not observed	IS 3464:1986,
12.	Resistance to wear	0.68mm (avg.)	IS 3464:1986,
13.	Temperature Susceptibility(70+2°C)	No deterioration observed	IS 3464:1986,
14.	Acid Test	OK	IS 13630 (Part 8):1993

3.2.1.3 *Wall Tiles*

S. No.	**Tests**	**Results**	**Test Method**
1.	Length	375mm (avg.)	IS 13630 (Part 1):1993
2.	Width	375mm(avg.)	IS 13630 (Part 1):1993
3.	Thickness	10.0mm(avg.)	IS 13630 (Part 1):1993
4.	Deviation in straightness of sides	0.008 %	IS 13630 (Part 1):1993
5.	Deviation in perpendicularity of Tiles	0.003%	IS 13630 (Part 1):1993
6.	Deviation in Flatness of Tiles	Nil %	IS 13630 (Part 1):1993

7.	Deviation in Warpage of Tiles at 100°C for 24 hours	0.968 %	IS 13630 (Part 1):1993
8.	Water absorption	0.24%	IS 3464:1986,
9.	Breaking Load	460N	IS 12583:1988
10.	Wet Transverse strength	5.52N/mm^2	IS 12583:1988
11.	Impact Resistance	Tearing not observed	IS 3464:1986,
12.	Resistance to wear	0.70 (avg.)	IS 3464:1986,
13.	Temperature Susceptibility(70+2°C)	No deterioration observed	IS 3464:1986,
14.	Acid Test	OK	IS 13630 (Part 8):1993

3.2.1.4 *Floor Tiles*

S. No.	Tests	Results	Test Method
1.	Length	375mm (avg.)	IS 13630 (Part 1):1993
2.	Width	375mm(avg.)	IS 13630 (Part 1):1993
3.	Thickness	12.0mm(avg.)	IS 13630 (Part 1):1993
4.	Deviation in straightness of sides	0.003 %	IS 13630 (Part 1):1993
5.	Deviation in perpendicularity of Tiles	0.005%	IS 13630 (Part 1):1993
6.	Deviation in Flatness of Tiles	Nil %	IS 13630 (Part 1):1993
7.	Deviation in Warpage of Tiles at 100°C for 24 hours	0.975 %	IS 13630 (Part 1):1993
8.	Water absorption	0.28%	IS 3464:1986,
9.	Breaking Load	1030N	IS 12583:1988
10.	Wet Transverse strength	8.58mm^2	IS 12583:1988
11.	Impact Resistance	Tearing not	IS 3464:1986,

		observed	
12.	Resistance to wear	0.78 (avg.)	IS 3464:1986,
13.	Temperature Susceptibility(70+2°C)	No deterioration observed	IS 3464:1986,
14.	Acid Test	OK	IS 13630 (Part 8):1993

3.3 Supply of Resin Bonded Tiles

Details of the tiles supplied by the manufacturer are given below (as reported):-

S.No.	Customer and Location	Type & Quantity of Tiles	Period of supply
1.	Parth Enterprise, Sidhhivinayak Complex, Palanpur Jakat Naka, Adajan, Surat	Paver Blocks of size 150 x 150 x 25 mm – 630 tiles = 90 sq. m	2017
2.	Ritul D. Mendapara Maakali Industrial Estate, Olpad Road, Olpad, Surat.	Paver Blocks 150 x 150 x 25 mm – 800 tiles = 110 sq. m	2017
3.	Anjali Row House, Atodra-Karamala Road, Atodra. Olpad, Surat.	Paver Blocks 150 x 150 x 25mm – Unicolor – 1184 tiles = 180 sq. m	2017
4.	Rajesh Bhai, Ragini Society, Ankleshwar (Mah)	Paver Blocks 150 x 150 x 25 mm –7200 blocks = 162 sq. m	October, 2017
5.	M/s Mohanraj Construction, No. 1, Opplamaniar Koil Street, Karaikal (Kerala)	Wall Tiles 375 x 375 x 25 mm – 24 tiles = 3.375 sq. m	October, 2017
6.	M/s Mahakali Construction, No. 1, Opplamaniar Koil Street, Karaikal (Kerala)	Wall Tiles 375 x 375 x 25 mm – 20 tiles = 2.812 sq. m	October, 2017

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.

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

Place: New Delhi Chairman, TAC & for and on behalf of

Date of issue_____ Member Secretary, BMBA

PART 5 LIST OF STANDARDS AND CODES USED IN ASSESSMENT

Part 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.

Part 5.1.1 IS 383:2016 – Specification for Coarse and Fine Aggregates from Natural Sources for Concrete

Part 5.1.2 IS 654:1992 – Clay Roofing Tiles, Mangalore Pattern – Specifications

Part 5.1.3 IS 1237:2012 – Cement Concrete Flooring Tiles – Specifications

Part 5.1.4 IS 2500 (Part 1):2000 – Sampling inspection procedures – Attribute sampling plans indexed by Acceptable Quality Limit (AQL) for lot by lot inspection

Part 5.1.5 IS 3464:1986 – Method of Tests for Plastic Flooring and Wall Tiles

Par 5.1.6 IS 4905:2015 – Methods for random sampling and randomization procedures

Part 5.1.7 IS 8112:2016 – Specifications for 43 grade ordinary Portland cement

Part 5.1.8 IS 12583:1988 – Code of practice for corrugated bitumen sheets

Part 5.1.9 IS 13630 (Parts 1, 2, 5, 6, 8, 9, 11 & 13): 2006 -- Ceramic Tiles — Methods of Test, Sampling and Basis for acceptance.

Part 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.

Part 5.3 References

1. Refer manufacturer's Installation Guidelines for details of Installation Procedure.
2. Tests got done in a NABL Accredited Testing Laboratory i.e. Bhumi Research Centre, Surat by the manufacturer of the tiles.

CERTIFICATION

In the opinion of Building Materials & Technology Promotion Council's Board of Agreement (BMBA), **Resin Bonded (Plastic Waste) Tiles** bearing the mark manufactured by M/s Ideal Eco Environment System is satisfactory if used as set out above in the text of the Certificate. This Certificate **PAC No.: 1037-P/2018** is awarded to **M/s Ideal Eco Environment System, Surat (Gujarat)**

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 31.

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:

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 1.7.2)

QUALITY ASSURANCE PLAN FOR RESIN BONDED TILES

S.No.	Parameters to be inspected	Requirement Specified	Test Method	Frequency of Testing
	I. Raw Materials			
1.	Sand	Shall not exceed 2 mm, no moisture & clay	Manual by sampling	Each lot
2.	Plastic waste	Shall have zero biomedical waste or dead animals and no thermoset plastic, bad smell or hazardous chemicals	Manual by sampling	Each lot
3.	Pigment	Shall conform to the manufacturer specifications	Shall conform to the manufacturer specifications	Each lot
	II. Resin Bonded Tiles			
1.	Flatness of tile surface/Warping	Shall not exceed 1 mm	IS 654:1992	Each lot
2.	Perpendicularity	Shall not exceed 2 % of length of edge	IS 654:1992	Each lot
3.	Straightness	Shall not exceed 1 % of length of edge	IS 654:1992	Each lot
4.	Water Absorption	Shall not exceed 10 %	IS 654:1992	Once in six months
5.	Wet Transverse strength	Shall not be less than $3N/mm^2$	IS 654:1992	Once in six months
6.	Abrasion/Resistance to Wear	Shall not exceed 4 mm	IS 654:1992	Once in six months
7.	Density	Shall not be less than 1500 kg/m^3	IS 654:1992	Once in six months
8.	Permeability	No water shall ooze from the bottom	IS 654:1992	Once in a year
9.	Breaking load test	Shall not be less than 1.0 kN	IS 654:1992	Once in a year
10.	Fire Resistance	Shall not be less than 60 N/mm^2 (dry) and 40 N/mm^2 (wet)	IS 6250:1981	Once in a year

ANNEX II

(Clause 2.4.1.5)

PRODUCTION PROCESS FLOW CHART