



Marble Slurry Based Binder

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:

**Shree Marble Slurry Udyog
Nikunj River Resort,
Nathdwara, Distt. Rajsmund
Udaipur - 313301, India**

Performance Appraisal
Certificate No.

PAC No. **1009-M/2011**

Issue No. **01**

Date of Issue: **01.08.2011**



bmtpc

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Ministry of Housing & Urban Poverty Alleviation
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PERFORMANCE APPRAISAL CERTIFICATE

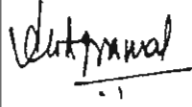
FOR

MARBLE SLURRY BASED BINDER

ISSUED TO

SHREE MARBLE SLURRY UDYOG

STATUS OF PAC 1009-M/2011

S.No	Issue No.	Date of Issue	Date of Renewal	Amendment		Valid up to (Date)	Remarks	Signature of authorized signatory
				No.	Date			
1.	2.	3.	4.	5.	6.	7.	8.	9.
1	01	01-08-2011	01-08-2012	--	--	31-07-2012		

PAC No. 1009 -M/2011

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PART I CERTIFICATION

- I.1 CERTIFICATE HOLDER:** **Shree Marble Slurry Udyog**
Nikunj River Resort
Bagol Road, Nathdwara
Distt. Rajsmund, Udaipur – 313301
PhoneNo.09828306311,08094189000
- I.2 DESCRIPTION OF PRODUCT**
- I.2.1 Name of the Product** – Marble Slurry Based Binder
- I.2.2 Brief Description** –Marble Slurry Binder is a mixer of waste marble slurry, hydrated lime and fly ash. Waste marble slurry is obtained after cutting of marbles and is available in fluid form in dumping yards. It constitutes of various chemicals in varied quantities. The marble slurry in the fluid form is left for drying. After drying, it is broken in to small pieces in the powder form. The powder plastic in nature has got water retaining properties & is capable to retain it for considerable period of time.
- I.3 ASSESSMENTS**
- I.3.1 Scope of Assessment** – Suitability of Marble Slurry Binder for use as mortar in place of cement mortar for masonry and plaster in rural and low cost housing for non-load bearing walls.
- I.3.2 Scope of Inspection** – Scope of inspection included the verification of production, performance and testing facilities at the factory including competence of technical personnel, status of quality assurance and testing in the factory.
- I.3.3 Assessment Summary**
- I.3.3.1** The assessment was done through inspection and field observations of the product. The performance characteristics given in this Certificate are based on independent tests done at Ahmedabad Engineering Research Institute, Ahmedabad. Assessment is also based on the verification of the raw materials during factory inspection.

I.3.3.2 Manufacturing & test facilities – Machineries available in the factory were found to be suitable & adequate to produce Marble slurry binder for non-load bearing walls. The applicant has a tie-up with J. K. Lakshmi Cement, Ahmedabad for laboratory testing and other technical guidance required for the product.

I.3.3.3 Inspection in actual use – Five structures constructed with Marble slurry binder were inspected at nearby places and user feedback was taken. No complaints were received from them.

I. 3.3.4 Quality Assurance Procedure – The firm follows a Quality Assurance System for production of the product.

I.3.4 Field Inspection -- The structures inspected were those constructed during the period 2004-2009. The persons contacted at the inspected locations expressed satisfaction on the performance of the product.

I.4 USES OF MARBLE SLURRY BINDER & ITS LIMITATIONS

I.4.1 Uses of the Product

I.4.1.1 The samples of Marble slurry binder tested as per the Indian standards listed in Part V of this Certificate have met the requirements of Grade MM 1.5 of Masonry Mortars as given in Table 1 of IS 2250:1981 in all the tests which characterize the product namely Fineness, Setting time – initial & final, Compressive strength – 7 days & 28 days, Water retention flow and Soundness which lead to the conclusion that the product can be used as mortar for masonry up to grade MM1.5 and plaster only with appropriate quantities of materials and water in accordance with good engineering practice.

I.4.2 Limitations of use

I.4.2.1 Marble slurry binder shall be used as mortar of Grade MM 1.5 only as stipulated in Clauses 6 & 7 of IS 2250:1981.

- I.4.2.1 Not recommended for use for load bearing walls.
- I.4.2.2 Non-load bearing walls when constructed with Marble slurry binder shall be erected up to a height of max 1 m for the first stage in a particular day. The second stage shall be taken up next day.

I.5 **CONDITIONS OF CERTIFICATION**

I.5.1 **Technical Conditions** –Raw materials and the finished product shall conform to the requirements given in Clause II—2.2.

I.5.2 **Quality Assurance** – The Certificate Holder shall implement & maintain a quality assurance system in accordance with Scheme of Quality Assurance (SQA) given in Annexure attached with this Certificate.

I.5.3 **Handling of User Complaints**

I.5.3.1 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.

I.5.3.2 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.

I.6 **CERTIFICATION**

I.6.1 On the basis of assessment given in Part III 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 I & II of this Certificate, Marble slurry binder covered by this Certificate conforms to grade MM 1.5.

PART II CERTIFICATE HOLDER'S TECHNICAL SPECIFICATIONS

II.1 GENERAL

II.1.1 The PAC holder shall produce Marble slurry binder in accordance with the specifications given below.

II.2 SPECIFICATIONS OF THE PRODUCT

II.2.1 Specifications – The specifications for raw materials & finished product shall be as per performance criteria given in Clauses 2.2.1 & 2.2.2.

II.2.2 Technical Specifications

II.2.2.1 Raw Materials

- (i) Waste marble slurry -- An indestructible waste procured in pure form from dumping yards
- (ii) Hydrated lime (Class C) – shall conform to IS 712:1973
- (iii) Fly Ash (Grade I/II) – shall conform to IS 3812(Part 1):2003

II. 2.2.2 Performance Criteria of Marble Slurry Binder – Marble slurry binder shall meet the following performance criteria when tested in accordance with IS 4031:1988 (Parts 3, 5, 7, 13 & 15):

S.No.	Performance Characteristics	Test Method	Acceptable Criteria
1.	Fineness	IS 4031: 1988 Part 15	Shall retain 15% on 150 micron sieve
2.	Setting Time (a) Initial, <i>Min</i> (b) Final, <i>Max</i>	Part 5	Shall be 8 hrs Shall be 48 hrs
3.	Compressive Strength (a) 7 days, <i>Min</i>	Part 7	Shall be 0.60 N/mm ²

	(b) 28 days, <i>Min</i>		Shall be 1.50 N/mm ²
4.	Soundness (a)Le-Chatlier expansion, <i>Max</i> (b)Auto-Clave Expansion, <i>Max</i>	Part 3	10 mm 1.0 %
5.	Water Retention Flow, <i>Min</i>	Part 13	35% of original flow

II.2.3 Storage, Handling & Packing

II.2.3.1 Storage – After packing the bags of 35 Kg weight, they shall be stored at site on dry surface so as avoid the product from being spoiled.

II.2.3.2 Handling- There is no special care required for handling these bags. However, the instructions given by the firm shall be followed.

II.2.3.3 Packing – Each bag shall be packed in suitable packing material to ensure safe delivery to the consumers. NOT TO BE USED FOR LOAD-BEARING WALLS shall be clearly marked on the bags in red colour.

II.3 SELECTION

II.3.1 The user is responsible for the proper use of the product at site. PAC holder shall provide required guidance for usage/mixing of the product at site. It shall also provide instructions on the bag.

II.3.2 Good practice for using the product at site – Marble slurry binder shall be used at site in accordance with standard procedures for masonry, plaster and curing. PAC holder shall provide proper guidance for optimum use of the product.

II.4 CRITICAL DETAILS FOR USING THE PRODUCT

II.4.1 Placing – Mortar using marble slurry binder shall be transported & placed as per the cement mortar using conventional methods.

II.4.2 Finishing – Brick/stone masonry shall be finished using normal tools/ methods.

II.4.3 Curing – With the use of this binder/mortar, standard procedure shall be used for curing as per the guidelines/instructions.

II.5 MAINTENANCE REQUIREMENTS -- Maintenance requirements of the structures for using this product shall be the same as per the conventional cement mortar.

II.6 SKILLS/TRAINING NEEDED FOR USING THE PRODUCT – No special skills other than normal skills of a mason as required for cement mortar shall be sufficient for this material also. However, the PAC holder shall provide on request necessary guidance to the users at site, if required.

II.7 GUARENTEES/WARRENTIES PROVIDED BY THE PAC HOLDER- Full replacement shall be made by the manufacturer if any legitimate complaints are received from the consumers.

II.8 SERVICES PROVIDED BY THE PAC HOLDER

II. 8.1 The PAC holder shall provide pre-sale advisory regarding the product. Customer/user may obtain from the PAC holder details of the advice that may be provided to him.

II.8.2 Users/Customers should ascertain from the PAC holder the type of service, the PAC holder is prepared to provide.

PART III BASIS OF ASSESSMENT AND BRIEF DESCRIPTION OF ASSESSMENT PROCEDURE

III.1 BASIS OF ASSESSMENT

III.1.1 The technical basis for assessment is as per the standards listed in Part V

III.1.2 The assessment is based on the results & reports of

- (i) Inspection of the factory
- (ii) Inspection of the manufacturing equipment used
- (iii) Assessment of quality assurance procedures implemented in the factory
- (iv) Tests got done in an independent laboratory by the manufacturer on random samples of the product taken by the IO during inspection
- (v) Inspection of the structures constructed using the product

III.2 MANUFACTURING PROCESS

III.2.1 Waste marble slurry from dumping yard is transported by tractor to factory and left for drying for some time. Then it is converted into powder form manually. This powder marble slurry along with hydrated lime & fly ash are put in to the mixer manually in fixed quantities of 35Kg, 10Kg & 20 Kg respectively. The mixer is then run for 2-3 minutes till a homogeneous mix is formed. The mix is then put manually in the grinder for inter-grinding as per required production till it is grinded to a fineness of 150 micron. The grinded material is filled in bags and packed to the required quantity. Then these are weighed to 35Kg, packed by machine and stored in the godown for further dispatch to the market.

III.2.2 Inspection is done at appropriate stages of manufacturing process. The packed bags are stored properly to ensure that no damage occurs during transportation. As part of quality assurance regular in-process inspections are carried out by the trained personnel of the PAC holder.

III.3 FACTORY INSPECTIONS

III.3.1 The factory was inspected by the technical representatives of the Council. During inspection the entire manufacturing process along with the equipment was inspected. The in-process inspection and the inspection of the finished product were in accordance with the SQA approved as a part of the requirements for grant of this PAC. It is the responsibility of the PAC holder to maintain and calibrate equipment for manufacturing and testing periodically to produce slurry binder in accordance with the specified parameters.

III.4 TESTS DONE FOR ASSESSMENT

III.4.1 **Testing of Samples in Independent Laboratory** -- The performance tests for Marble slurry binder specified in IS 3466:1988, IS 4031:1988 and IS 4098:1983 have been done in a Govt. approved laboratory namely Ahmedabad Engineering Research Institute as per the performance characteristics and specifications given by the manufacturer on random samples of the product taken by the IO. The samples conform to the tests listed below as per performance requirements and specifications given by the manufacturer:

Test done in an independent laboratory on the product

S. No.	Parameters	Test Method/ Acceptable Criteria	Result obtained
1.	Fineness---Percentage retain on 150 micron sieve, <i>Max</i>	IS 4031:1988 Part 15 15 %	1.5 %
2.	Setting time (i) Initial, <i>Min.</i> (ii) Final, <i>Max.</i>	Part 5 8 hrs 48 hrs	11 hrs 15 min 32 hrs
3.	Compressive strength (i) 7 days, <i>Min.</i> (ii) 28 days, <i>Min.</i>	Part 7 0.60 N/mm ² 1.50 N/mm ²	1.15 N/mm ² 1.81 N/mm ²
4.	Soundness	Part 3	

	(i) Le-Chatlier expansion, <i>Max.</i>	10 mm	3.68 mm
	(ii) Auto-Clave expansion, <i>Max</i>	1.0 %	0.45 %
5.	Water retention flow, <i>Min</i>	Part 13 35% of original flow	58 % of flow

III.5 INSPECTION OF STRUCTURES - Five structures constructed with the mortar made of Marble slurry binder during the period 2004-2009 were inspected. The users had no complaints. Details of the structures constructed using the product is as follows:-

S.No.	Occupancy	Location of structure	When constructed	Remarks
1.	Temple Board, Nathdwara	Goverdhan Parikarma Boundary wall	2006	Satisfactory
2.	Forest Deptt. Rajsmund	Boundary walls, Nathdwara	2007 & 2008	Satisfactory
3.	Sh. Shivdan Singh.	House & boundary wall, Nathdwara	2004-2005 & 2007-2008	Satisfactory
4.	Sh. Murli Dhar Bhatia	Boundary wall, house & factory, Nathdwara	2007, 2008 & 2009	Satisfactory
5.	Sh. S.L. Surana (inventor)	Complete house, Nathdwara	2009	Satisfactory

PART IV STANDARD CONDITIONS

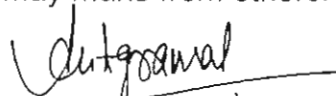
This certificate holder shall satisfy the following conditions:

- IV.1** The certificate holder shall continue to have the product reviewed by BMBA.
- IV.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.
- IV.3** The quality of the product shall be maintained by the certificate holder.
- IV.4** The product user should install, use and maintain the product in accordance with the provisions in this Certificate.
- IV.5** This certificate does not cover uses of the product outside the scope of this appraisal.
- IV.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.
- IV.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)
- IV.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.
- IV.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.
- IV.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.

- IV.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.
- IV.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.
- IV.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.
- IV.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.
- IV.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
- IV.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.
- IV.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 _____



Chairman TAC &

Member Secretary, BMBA

for and on behalf of

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, 1st Floor, India Habitat Centre, Lodhi Road,
New Delhi-110003

PART V LIST OF STANDARDS AND CODES USED IN ASSESSMENT

Part V.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 V.1.1 IS 712: 1973 – Specifications for building limes

Part V.1.2 IS 2250:1981 – Code of Practice for Preparation & Use of Masonry Mortars

Part V.1.3 IS 3466 (Part 1): 1988 – Specifications for masonry cement—for use as pozzolana in cement, cement mortar & concrete

Part V.1.4 IS 3812: 2003 – Specifications for pulverized fly ash

Part V.1.5 IS 4031:1988 – Methods of physical tests for hydraulic cement

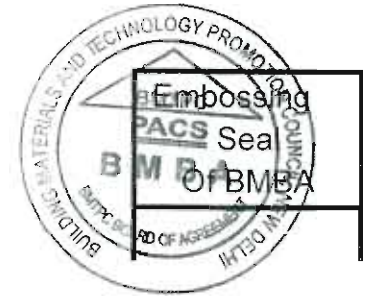
Part V.1.6 IS 4098:1983 – Specifications for Lime-pozzolana mixture

Part V.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), **Marble Slurry Based Binder** bearing the mark Manufactured by Shree Marble Slurry Udyog is satisfactory if used as set out above in the text of the Certificate. This Certificate **PAC No. 1009-M/2011** is awarded to **Shree Marble Slurry Udyog**.

The period of validity of this Certificate is as shown on Page 1 of this PAC. This Certificate consists of a cover page and pages 1 to 18.



On behalf of BMTPC Board of Agreement

New Delhi, India

Place

Date

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

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, 1st Floor, India Habitat Centre, Lodhi Road,
New Delhi-110 003

PART VI 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

BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCILQUALITY ASSURANCE PLAN FOR MARBLE SLURRY BASED BINDER

S.No.	Parameters to be inspected	Requirement Specified	Test Method	Frequency of Testing
I. Raw Materials				
1	Fly ash	Shall conform to Grade I/II of IS 3812 (Part1) : 2003	Conform to IS 3812 (Part 1): 2003	For every lot
2	Hydrated lime	Shall conform to Class C of IS 712:1973	Conform to IS 712:1973	-do-
II. Low Cost Binder				
1	Fineness, <i>Max</i>	15% retain on 150 micron sieve	Conform to IS 4031 (Part 15): 1988	Once in a lot
2	Setting time (i)Initial, <i>Min</i> (ii)Final, <i>Max</i>	8 Hrs 48 hrs	Conform to IS 4031 (Part 5): 1988	--do-
3	Compressive Strength (i)7 days, <i>Min</i> (ii)28 days, <i>Min</i>	0.60 N/mm ² 1.50 N/mm ²	Conform to IS 4031 (Part 7): 1988	-do-
4	Soundness (i)Le-Chatlier Expansion, <i>Max</i> (ii)Auto- Clave expansion, <i>Max</i>	10 mm 1.0 %	Conform to IS 4031 (Part 3): 1988	-do-
5	Water Retention Flow, <i>Min</i>	35% of original flow	Conform to IS 4031 (Part 13): 1988	-do-