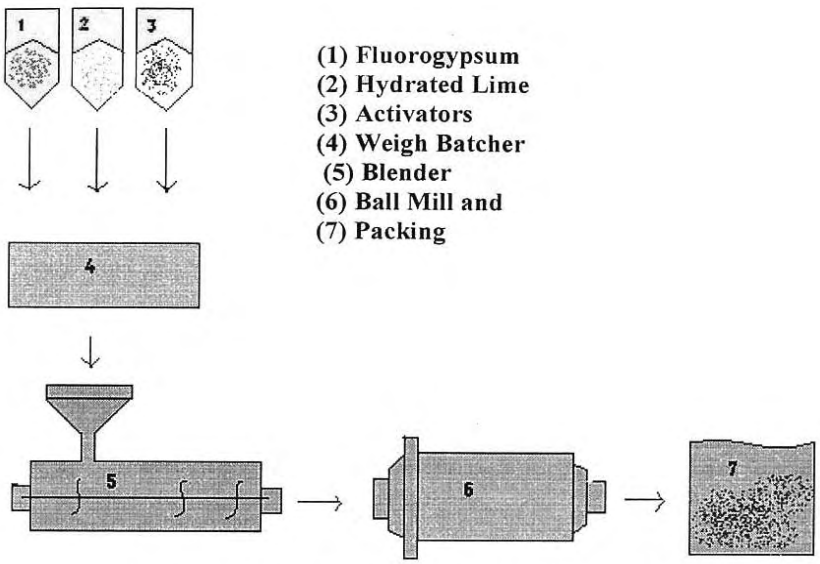
BMTPC
PACS
PERFORMANCE APPRAISAL CERTIFICATION

Fluorogypsum Based Anhydrite 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:	Performance Appraisal Certificate No.
M/s Naveen Fluorine International Ltd, 2nd Floor, Sunteck Centre, 37/40 Subash Road, Ville Parle (E), Mumbai-400057	PAC No **1012-M/2014** Issue No. **01** Date of Issue: **08.01.2014**



Process Flow Diagram for the Production of Fluorogypsum Binder

Building Materials & Technology Promotion Council
Ministry of Housing & Urban Poverty Alleviation
Government of India
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PERFORMANCE APPRAISAL CERTIFICATE

FOR

FLUOROGYPSUM BASED ANHYDRITE BINDER

ISSUED TO

M/s NAVEEN FLUORINE INTERNATIONAL LTD.

STATUS OF PAC 1012-M/2014

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	08-01-2014	08-01-2016	---	---	07-01-2016	---	

CONTENTS

PART – I CERTIFICATION

I – 1 CERTIFICATE HOLDER: M/s Naveen Fluorine International Ltd

2nd Floor, Sunteck Centre, 37/40 Subhash Road
Ville Parle (E), Mumbai--400057
PhoneNo.0261-2890325-329

I – 2 DESCRIPTION OF PRODUCT

I – 2.1 Name of the Product – Fluorogypsum Based Anhydrite Binder

I – 2.2 Brief Description –Fluorogypsum is a by-product of hydrofluoric acid and aluminium fluoride. The fluorogypsum is produced as anhydrite and it contains main impurities of free acid. Fluorogypsum after blending with hydrated lime and chemical additives and then grinding (fineness of 95% passing through IS:9 sieve) develops high chemical strength (34-37MPa) and low water absorption. The suitability of fluorogypsum binder was tested and evaluated for making masonry mortars by mixing it with sands of fineness modulus 1.28 and 1.91. The fluorogypsum binder has been found suitable by CSIR-CBRI for making masonry mortars to be used both in plastering works for undercoat and the finish coats. It may be used as an alternate to cement and Plaster of Paris.

I – 3 ASSESSMENTS

I – 3.1 Scope of Assessment – Suitability of Fluorogypsum Anhydrite Binder for use as mortar for masonry and for use in plastering works.

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 and status of quality assurance in the factory.

I – 3.3 Assessment Summary

I – 3.3.1 The assessment has been done through inspection and field observations of the product. The performance characteristics given in this Certificate are based on the Report on "Technology Transfer of Formulation of High Strength Plaster from Fluorogypsum" by CSIR-CBRI, Roorkee and independent tests done at National Test House, Mumbai and in-house testing facilities available at the factory. Assessment is also based on the verification of the raw materials during factory inspection.

I – 3.3.2 **Manufacturing & test facilities** –

1. Gypsum is transported from godown to the pilot plant. The material is brought in 50 kg bags.

2. The gypsum is passed through a pulverize for getting the required particle size i.e. 90% material passing through 150 mesh.

3. The material is again collected in bags.

4. The material is further charged in a blender at the rate of 800 kgs per batch. The blending takes approx. 5 hrs. per batch. Per shift capacity of the blender is 800 kgs.

5. Sample from blender is removed and sent for testing. The material is packed in bags and sealed.

6. The spill over material is reprocessed in the blender.

7. Testing equipments and facilities listed in the DAF were available in the factory for testing of the product as per the relevant Standards.

I – 3.3.3 **Quality Assurance Procedure** – The firm follows a Quality Assurance System for production of the product.

I – 4 **USE OF THE BINDER & ITS LIMITATIONS**

I – 4.1 **Data** – The data and information provided in Part-II of this Certificate shall be used for selection of the product.

I – 4.2 **Storage, Packing & Handling at the user end using the product**

I – 4.2.1 **Storage** – The binder shall be stored in packages of 25Kg and 50 Kg at room temperature protected from excess heat, fire, water, light and air in closed packing for avoiding any kind of external contamination.

I – 4.2.2 **Handling**- There is no special care required for handling these bags. However, the instructions given by the firm shall be followed.

I – 4.3 **Uses of the product**

I – 4.3.1 The samples of Fluorogypsum Based Anhydrite Binder tested as per IS 1288:1983, IS 9 (Sieve), IS 2542:1978, IS 2547:1976, IS 3346:1980, IS 4031:1998 and BS 476(Part 4) have met the requirements of mortar and plaster in all the tests which characterize the product namely Consistency, Fineness, Setting time – initial & final, Compressive strength, Flexural strength, Thermal

Conductivity, Water absorption and Expansion in accordance with the acceptance criteria given in the test reports of CSIR-Central Building Research Institute and National Test House(WR), Mumbai which lead to the conclusion that the product can be used as mortar for masonry and plaster of walls with appropriate quantities of materials and water in accordance with good engineering practice.

I – 4.4 Limitations of use

I – 4.4.1 Load bearing walls when constructed with Fluorogypsum 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 of the prescribed specifications.

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, Fluorogypsum Anhydrite covered by this Certificate is fit for use set out in the Scope of Assessment.

PART – II CERTIFICATE HOLDER'S TECHNICAL SPECIFICATIONS

II – 1 GENERAL

II – 1.1 The PAC holder shall produce the Fluorogypsum based anhydrite binder in accordance with requirements specified in Indian & other Standards. In addition it shall follow Company standards specifying requirements of various materials used in the manufacture of the product (See V-2)

II – 2 SPECIFICATION FOR THE PRODUCT & DESIGN INFORMATION

II – 2.1 **Specification** – The specifications for raw materials & finished product shall be as given in the Appendix forming part of this Certificate.

II – 2.2 **Technical Specifications**

II – 2.2.1 **Raw Materials**

(i) Fluorogypsum -- Waste by-product of hydrofluoric acid and aluminium fluoride available in powder form of purity 90% to 95%
(ii) Hydrated lime – Available in powder form as per IS 712:1984 (Grade C)
(iii) Activators -- Available in powder form

II – 2.2.2 **Production & workmanship**

Anhydrite is made by a process of beneficiation of neutralization, adding activators and additives, grinding and packing. The reaction product gypsum is obtained by the addition of water during the making of plaster or concrete. Anhydrite plaster is water free Calcium Sulphate also called Fluorogypsum. It may be applied along with sand in the ratio of 1:1,1:2 and 1:3 as plaster over normal brick wall, RCC columns, concrete blocks etc. A neat paste of Anhydrite plaster with water over the sand plaster gives a smooth finish to the surface.

II – 2.3 **Performance Criteria of Fluorogypsum Anhydrite Binder –** Fluorogypsum binder shall meet the following performance criteria:

S.No.	Performance Characteristics	Test Method	Requirements as per relevant Standards
1.	Consistency	**IS 4031:1988** Part-4	31%
2.	Setting Time, min a) Initial b) Final	Part-5	 20 minutes 360 minutes

3.	Water absorption %, 24 hrs	Part-13	Not more than 10%
4.	Fineness	Part 15	Not more than 20% retained on IS sieve 9
5.	Compressive Strength, MPa a) 3 days b) 7 days c) 28 days	**IS 2542 1978** (Part 1, Sec5):	 17.0 MPa min. 25.0 MPa min.
6.	Expansion	**IS 2547:1976**	Max. 0.5 at 96 hrs
7.	Non-combustibility test	**BS 476(Part-4)**	Pass

II – 2.4 **Packing** – Each bag shall be packed in suitable packing material to ensure safe delivery to the consumers.

II – 3 **SELECTION & INSTALLATION**

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** – Fluorogypsum 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 FLUOROGYPSUM BINDER**

II – 4.1 **Placing –** Mortar using fluorogypsum binder shall be transported & placed as 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 – 4.4 **Marking** – The following information shall be legibly marked on each package:

4.4.1 Name of manufacturer

4.4.2 Brand

4.4.3 Description

4.4.4 Net and gross weight of package

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

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

II--7 **GUARANTEES/WARRANTIES 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 TO THE CUSTOMER**

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) Report on "Technology Transfer of Formulation of High Strength Plaster from Fluorogypsum" by CSIR-CBRI and tests got done in an independent laboratory i.e. National Test House by the manufacture of the product

III – 2 **APPLICATION PROCEDURES**

III – 2.1
1. Take 1 kg of gypsum and 2 kg sand in a pan.
2. Mix the materials in dry condition with spade.
3. Add 600 ml of water and mix again.
4. Sprinkle water on brick wall before applying plaster for proper wetting of bricks.
5. Brick wall used for plaster shall be cured for min 7 days for proper binding.

6. Mark the guide strip of min 15 mm as per verticality of wall at every 1 meter interval.
7. Use kerni for applying mortar on the wall and finish the surface with trowel.
8. Apply 2 to 3 mm thick paste on plaster with trowel and finish the surface.

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 representative of the Council. 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 Annexure. 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.

III – 4 LABORATORY TESTS DONE FOR ASSESSMENT

III – 4.1 Testing of samples

III – 4.1.1 **In the factory** – The tests listed in the report i.e. pH value, Fineness, Setting time & consistency etc. were witnessed at the laboratory of the factory and results were found to be within the prescribed limits.

III – 4.1.2 **In independent laboratory** – The performance tests for fluorogypsum binder specified in IS 2542 (Part-1):1978 'Methods of test for gypsum plaster, concrete and products Part1- Plaster & concrete', IS 3466: 1980 "Method of Determination of Thermal Conductivity" and IS 4031: 1988 pertaining to "Methods of physical tests for hydraulic cement" and listed below have been carried out by CSRI--Central Building Research Institute under the report titled "Technology Transfer of Formulation of High Strength Plaster from Fluorogypsum" as per the performance characteristics and specifications given by the manufacturer. A few tests namely Chemical analysis, Compressive strength, Setting time and Compact bulk density have also been got done from the National Test House (WR), Mumbai. The samples conform to the tests as per performance requirements and specifications given by the manufacturer.

Tests performed on the Product

I. Tests performed in CSIR—Central Building Research Institute, Roorkee

1. Chemical Composition of Fluorogypsum as per IS 1288:1982

S. No.	Constituents (%)	Fluorogypsum
1	F	1.32
2	SiO_2 + insoluble in HCL	1.80
3	$Al_2O_3 + Fe_2O_3$	0.65
4	CaO, percent by mass, Min 32	41.5
5	MgO	Tr.
6	SO_3, percent by mass, Min 48	56.52
7	Loss on ignition, percent by mass, Max 2.0	0.61
8	pH	2.83
9	Density, g/cc	1.80

2. Particle size distribution of Fluorogypsum passing through 90 micron (IS 9 sieve)

S. No.	IS Sieve No.	% wt. retained over sieve
1	480	0
2	240	0.05
3	120	1.90
4	60	5.25
5	30	7.00
6	15	15.20
7	-15	70.60

3. Physical Properties of High Strength Fluorogypsum Binder

S.No.	Performance Characteristics	Test Method	Results
1.	Consistency, %	**IS 4031:1988** Part-4	32
2.	Setting Time, min Initial Final	Part-5	 38 80
3.	Water absorption %, 24 hrs	Part-13	4.50
4.	Fineness	Part 15	13.30
5.	Compressive Strength,	**IS 2542: 1978**	

	MPa a) 3 Days b) 7 Days c) 28 Days	(Part 1,Sec5)	 28.0 32.5 36.0
6.	Flexural Strength, MPa, 28D	(Part 1, Sec 4)	6.0
7.	Bulk density, kg/m^3 a) 3 Days b) 7 Days c) 28 Days	(Part 1,Sec12)	 1830 1910 1980
8.	Thermal Conductivity	**IS 3346:1980**	0.19
9.	Expansion, %	**IS 2547:1976**	0.28
10.	Non-combustibility test	**BS 476(Part4)**	Pass

4. Water Absorption and Porosity of High Strength Fluorogypsum Binder

S. No.	Chemical Activators (By weight %)	Water Absorption (%)			Porosity		
		2h	8h	24h	2h	8h	24h
1.	Ca $(OH)_2$, (3.0%): $CaCl_2$ (0.5%): NA_2SO_4 (1.0%)	4.76	4.85	4.90	9.42	9.60	9.70

5. Properties of Mortars

S. No.	Proportion of mortars FG Binder : Sand		Compressive strength (MPa) 3d	7d	28d	Bulk density gm/cm^3 3d	7d	28d
1.	**(F.M. 1.91)**							
	1	1	9.3	16.5	20.3	1.92	1.93	1.98
2.	1	2	6.4	9.5	12.5	1.95	1.97	1.99
3.	1	3	3.8	5.2	7.9	1.96	1.98	1.99
4.	1	4	1.2	2.4	4.8	1.97	2.01	2.02
	(F.M. 1.28)							
5.	1	1	8.2	12.5	15.5	1.86	1.86	1.91
6.	1	2	4.5	6.5	8.7	1.87	1.91	1.95
7.	1	3	2.1	3.5	4.2	1.93	1.95	1.98
8.	1	4	0.9	1.9	2.8	1.93	1.96	1.99
	IS 3466:1988 Limits		**--**	**2.5 min.**	**5.0 min.**			

The above data shows that mix proportions 1:1, 1:2 and 1:3 fluorogypsum binder-sand (fineness modulus 1,91) and 1:1and 1:2 (fineness modulus 1.28) mortars comply with the strength requirements laid down in IS 3466:1988.

6. Suitability of Fluorogypsum Binder in Plastering

The fluorogypsum binder was found suitable for use in plastering works. The mortars of mix proportions 1:1, 1:2 and 1:3 by volume were prepared at mason consistency to plaster the burnt brick wall. Mortar mixes 1:1, 1:2 and 1:3 binder-sand (fineness modulus 1.91) and 1:1 and 1:2 binder-sand (fineness modulus 1.28) in 12mm thickness were applied over the internal brick wall. The finish coat of 3 mm of neat binder was applied over 9 mm of base coat plaster (1:1 and 1:2 binder-sand base coat). Before applying binder-sand plaster, the brick wall was well watered so that water from mortar may not be evaporated before the mortar was set. The plastered patches were examined for their various characteristics after 24 hours. It was found that plaster patches developed adequate strength and hardness after 24 hours of application and further continued. Similarly, fluorogypsum binder-sand (F M 1.28) mortar can be used in place of cement-sand mortar for plaster work.

II. Tests done in National Test House (WR), Mumbai

S. No.	Test	Test Method	Resuls
1.	Chemical Analysis a) Sodium (Na) by AAS b) Calcium (Ca) c) Chloride (Cl)	IS 1288:1982	 1.59% 27.88% 0.14%
2.	Compressive Strength (Curing at 90% RH) a) 7 Days (avg of 3 cubes) b) 28 Days (avg of 3 cubes)	IS 4031:1988	 8.3 MPa 18.1 MPa
3.	Setting Time a) Initial b) Final	IS 4031:1988	hr min 0 30 1 30
4.	Compact Bulk density	IS 4031:1988	0.917 gm/cc

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 there of.

IV-9 The certificate holder agrees to provide to BMBA feed back 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 feed back 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 8.1.14

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

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: 1984 – Specifications for building limes

Part- V.1.2 IS 1288:1982 – Methods of test for mineral gypsum

Part- V.1.3 IS 2542 (Part1):1978 -- Methods of test for gypsum plaster and concrete

Part- V.1.4 IS 2547 (Part 1):1976 – Specifications for gypsum building plaster

Part- V.1.5 IS 3346:1980 – Method of determination of thermal conductivity of thermal insulation materials

Part-V.1.6 IS 3466: 1988 – Specifications for masonry cement

Part-V.1.7 IS 4031:1988 – Methods of physical tests for hydraulic cement

Part-V.1.8 IS 3808:1979 – Method of test for non-combustibility of building materials

Part-V.1.9 IS 3809:1979 – Fire resistance test of structures

Part-V.1.10 IS 12654:1989 – Method of test for low grade gypsum

Part-V.1.11 BS 476 (Part 4) – Fire tests on building materials & structures – method of test for non-combustibility

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), **Fluorogypsum Based Anhydrite Binder** bearing the mark manufactured by M/s Navin Fluorine International Ltd., Mumbai is satisfactory if used as set out above in the text of the Certificate. This Certificate **PAC No. 1012-M/2014** is awarded to M/s **Navin Fluorine International Ltd., Mumbai**

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 23.

Embossing Seal of BMBA

BUILDING MATERIALS AND TECHNOLOGY PROMOTION COUNCIL NEW DELHI
BMTPC
PACS
B M B A
BMTPC BOARD OF AGREEMENT

On behalf of BMTPC Board of Agreement

New Delhi, India

Place of

Date 9.1.14

Chairman, Technical Assessment Committee (T AC)

BMBA & Member Secretary, BMTPC Board of Agreement (BMBA) Under Ministry of Housing and Urban Poverty Alleviation, Government of India

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

ANNEXURE

BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

QUALITY ASSURANCE PLAN FOR FLUOROGYPSUM BASED ANHYDRITE BINDER

S.No.	Parameters to be inspected	Requirement Specified	Test Method	Frequency of Testing
I.	**Raw Materials**			
1	Fluorogypsum	90% to 95% purity	MTC	For every lot
2	Hydrated lime	Commercial Grade C	IS 712:1984	-do-
3	Activators	Commercial Grade	MTC	--do--
II.	**Fluorogypsum Anhydrite Binder**			
1	Fineness	Not more than 20% retained on IS 9 sieve	IS 4031 (Part15): 1988	Once in a lot
2	Consistency (%)	Vicat Plunger penetration to 5-7 mm from bottom of Vicat mould	IS 4031 (Part 4): 1988	--do--
3	Setting time (i)Initial (ii)Final	 Min. 20 min Max. 360 min	IS 4031 (Part 5): 1988	--do-
4	Soundness (Le-Chatelier & Auto-Clave)	Max. 10mm & 0.8%	IS 4031 (Part 3): 1988	-do-
5	Water Retention Flow	35% of original flow	IS 4031 (Part13): 1988	-do--
6	Compressive Strength	Min 17.0 MPa	IS 2542 (Part 1-Sec 5):1978	-do-
7	Bulk Density (kg/m3)	As specified	IS 2542 (Part 1-Sec 12):1978	--do--
8	Flexural Test	As specified	IS 2542 (Part 1-Sec 4):1978	--do--
9	Non-combustibility test	Pass	BS 476 (Part 4)	--do--

APPENDIX

Specifications of Fluorogypsum Based Anhydrite Binder

1. Raw Materials

(i) Fluorogypsum -- Waste by-product of hydrofluoric acid and aluminium fluoride available in powder form of purity 90% to 95%
(ii) Hydrated lime – Available in powder form as per IS 712:1984 (Grade C)
(iii) Activators -- Available in powder form

2. Brief Description

Fluorogypsum is a by-product of hydrofluoric acid and aluminium fluoride. The fluorogypsum is produced as anhydrite and it contains main impurities of free acid. Fluorogypsum after blending with hydrated lime and chemical additives and then grinding (fineness of 95% passing through IS:9 sieve) develops high chemical strength (34-37MPa) and low water absorption. The suitability of fluorogypsum binder was tested and evaluated for making masonry mortars by mixing it with sands of fineness modulus 1.28 and 1.91. The fluorogypsum binder has been found suitable by CSIR-CBRI for making masonry mortars of high strength and can be used both in plastering works for undercoat and the finish coats. It can be used as an alternate to cement and Plaster of Paris.

3. Production & workmanship

Anhydrite is made by a process of beneficiation of neutralization, adding activators and additives, grinding and packing. The reaction product gypsum is obtained by the addition of water during the making of plaster or concrete. Different from Plaster of Paris, the gypsum made by mixing Calcium Sulphate with water achieves high strength and good technical properties. Anhydrite plaster is water free Calcium Sulphate also called Fluorogypsum. It can be applied along with sand in the ratio of 1:1,1:2 and 1:3 as plaster over normal brick wall, RCC columns, concrete blocks etc. A neat paste of Anhydrite plaster with water over the sand plaster gives a smooth finish to the surface.

4. Manufacturing & test facilities –

1. Gypsum is transported from godown to the pilot plant. The material is brought in 50 kg bags.

2. The gypsum is passed through a pulverize for getting the required particle size i.e. 90% material passing through 90 micron sieve.

3. The material is again collected in bags.

4. The material is further charged in a blender at the rate of 800 kgs per batch. The blending takes approx. 5 hrs. per batch. Per shift capacity of the blender is 800 kgs.

5. Sample from blender is removed and sent for testing. The material is packed in bags and sealed.

6. The spill over material is reprocessed in the blender.

5. Application Procedure

1. Take 1 kg of gypsum and 2 kg sand in a pan.
2. Mix the materials in dry condition with spade.
3. Add 600 ml of water and mix again.
4. Sprinkle water on brick wall before applying plaster for proper wetting of bricks.
5. Brick wall used for plaster shall be cured for min 7 days for proper binding.
6. Mark the guide strip of min 15 mm as per verticality of wall at every 1 meter interval.
7. Use kerni for applying mortar on the wall and finish the surface with trowel.
8. Apply 2 to 3 mm thick paste on plaster with trowel and finish the surface

6. Suitability of Fluorogypsum Binder as Mortar and in Plastering

The fluorogypsum binder is found suitable for use in mortar and plastering works. The mortars of mix proportions 1:1, 1:2 and 1:3 by volume shall be prepared at mason consistency to plaster the burnt brick wall. Mortar mixes 1:1, 1:2 and 1:3 binder-sand (fineness modulus 1.91) and 1:1 and 1:2 binder-sand (fineness modulus 1.28) in 12mm thickness shall be applied over the internal brick wall. The finish coat of 3 mm of neat binder shall be applied over 9 mm of base coat plaster (1:1 and 1:2 binder-sand base coat). Before applying binder-sand plaster, the brick wall shall be well watered so that water from mortar may not be evaporated before the mortar was set. The plastered patches shall be examined for their various characteristics after 24 hours. Fluorogypsum binder-sand (F M 1.28) mortar can be used in place of cement-sand mortar for plaster work.

7. Performance Criteria of Fluorogypsum Anhydrite Binder – Fluorogypsum binder shall meet the following performance criteria:

S.No.	Performance Characteristics	Test Method	Requirements as per relevant Standards
1.	Consistency	**IS 4031:1988** Part-4	31%
2.	Setting Time, min (a) Initial (b) Final	Part-5	 20 minutes 360 minutes
3.	Water absorption %, 24 hrs	Part-13	Not more than 10%
4.	Fineness	Part 15	Not more than 20% retained on IS sieve 9
5.	Compressive Strength, MPa (a) 3 days (b) 7 days (c) 28 days	**IS 2542 1978** (Part 1, Sec5):	 17.0 MPa min. 25.0 MPa min.
6.	Expansion	**IS 2547:1976**	Max. 0.5 at 96 hrs
7.	Non-combustibility test	**BS 476(Part-4)**	Pass