



## PRODUCT MANUAL FOR MASONRY CEMENT ACCORDING TO IS 3466: 1988

*This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.*

1.	<b>Product</b>	:	IS 3466 : 1988
	<b>Title</b>	:	MASONRY CEMENT
	<b>No. of Amendments</b>	:	5
2.	<b>Sampling Guidelines:</b>		
a)	<b>Raw material</b>	:	Portland Cement Clinker – IS 16353
b)	<b>Grouping guidelines</b>	:	Not Applicable
c)	<b>Sample Size</b>	:	Masonry cement - 10 kg Conformity of Raw material per the relevant Indian Standard shall be ensured at the time of GoL
3.	<b>List of Test Equipment</b>	:	Please refer <a href="#">ANNEX – A</a>
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer <a href="#">ANNEX – B</a>
5.	<b>Possible tests in a day :</b>		
	(i) Fineness (ii) Setting time (iii) Air content (iv) Water retention		
6.	<b>Scope of the Licence :</b>		
	“Licence is granted to use Standard Mark as per IS 3466 : 1988 with the following scope:		
	Name of the product	MASONRY CEMENT	

**ANNEX B****List of Test Equipment***Major test equipment required to test as per the Indian Standard*

SI No.	Tests used in with Clause Reference	Test equipment
1	Fineness (Clause 3 Table 1)	Blaine's apparatus variable flow type
		Stop watch with start-stop mechanism
		Mercury for calibration
		Balance, Standard weights
		Standard Cement
		Manometer liquid (di-butyl phthalate or light mineral oil.)
		Mercury of reagent grade or better, Pyknometer
		Circular discs of filter paper of medium porosity (mean pore diameter 7 $\mu$ ).
		Le-Chatelier's flask
		Constant temperature water bath to maintain temperature within $\pm 0.1$ °C
		2
Pressure gauge 0-42 kg/cm <sup>2</sup> LC = 0.4 kg/cm <sup>2</sup>		
Humidity chamber with temperature & RH control 27 $\pm$ 2 °C, RH 90 to 100 %		
Standard bar 308 mm, max		
Bar moulds 25x25x282 mm		
Length comparator with dial gauge		
Mineral oil for covering moulds		
3	Soundness by Le-chatelier Method (Clause 3 Table 1)	Le-Chatelier's water bath preferably with thermostatic control raising temperature from 27 $\pm$ 2 <sup>0</sup> C to boiling in 27 $\pm$ 3 minutes
		Le-Chatelier's moulds with weights and cover glasses minimum 8 nos.
		Humidity chamber with temperature & RH control 27 $\pm$ 2 <sup>0</sup> C, RH 90 to 100 %
		Steel scale 12" (304.8 mm)

4	Setting time (Clause 3 Table 1)	Vicat apparatus
		Needle for Consistency, IST& FST testing
		Moulds
		Stop Watch
		Balance - 1000g $\pm$ 0.1g and Standard Weights 1mg to 500 gm
		Gauging trowel of weight 210 $\pm$ 10 g
5	Compressive Strength (Clause 3 Table 1)	Vibration machine with timer & cube mould fitting assembly 12000 $\pm$ 400 vibration per min.
		Compressive Strength Testing machine
		Poking Rod , Petroleum Jelly
		Proving ring with all accessories suitable for calibration of CST machine
		Tachometer
		Cube Moulds 70.6 $\times$ 70.6 mm, Poking rod
		Gauging trowel (210 $\pm$ 10 g) gauging plate, stainless steel(non-perforated)
		Standard sand grade 1, 2 and 3 (as per IS 650)
		Curing tank of appropriate size with water circulation arrangement
		Graduated glass cylinders 150 to 200 ml
		Humidity chamber with temperature & RH Control 27 $\pm$ 2° C, RH 90 to 100 %
6	Air content (Clause 3 Table 1)	Cylinder measure
		Balance
		Standard weight
		Planetary mixer
		Flow Table accessories
		Temping rod
		Le- chatelier flask

7	Water retention (Clause 3 Table 1)	Water retention test apparatus
		Balance
		Planetary mixer
		Flow Table accessories
		Temping rod
8	Staining (Clause 3 Table 1)	Flame photometer
		Buchner funnel
		Glassware
		Chemicals
8	<b>General equipments for Cement testing</b>	
a)	To control humidity & temperature in lab	1. Humidity chamber with temperature & RH control $27 \pm 2^{\circ}\text{C}$ , RH 90 to 100 % 2. Suitable arrangement to demonstrate maintenance of temperature of $27 \pm 2^{\circ}\text{C}$ & RH $65 \pm 5\%$ constantly
b)	For cement Sampling	Mixing trays –adequate size including trays of 24 partitions for keeping hourly samples
c)	To control the residue of cement	Sieves of size (300, 212, 150, 90, 75 & $45\mu$ )
d)	To measure temperature	Thermometers
e)	Lab ball mill (motorized)	To grind the clinker, slag & gypsum sample in lab ball mill for testing
f)	To weigh the material	1. Platform type balance 2. Electrical balance 3 Weight box with weights (1 mg - 500 g)
10	<b>General test equipments for chemical testing</b> <b>Clause 2 of IS 3466 : 1988</b>	
		Muffle Furnace with thermostatic control, Range 0 – $1200^{\circ}\text{C}$
		Oven with thermostatic control $0-300^{\circ}\text{C}$
		Heater and hot plate
		Distillation Assembly
		Crucible: Platinum or Porcelain / silica

	Filter paper (No- 1, 40, 41, 42)
	Desiccators with cover & Desiccant
	Water bath
	pH meter/paper
	Glassware - volumetric flask -0-250 ml, beaker 0-250 ml, measuring cylinder 0-50,100,500, 1000 ml, burette 0-25/50 ml, conical flasks- 0-250 ml, pipette 0-5,10, 25, 50 ml
	All chemicals required for complete chemical analysis of cement
	Tongs including platinum tipped tong
	Wire gauge with asbestos sheet at the middle
	Washing bottle
	Mortar mixer- 4.75 l Glass thermometer
	All required chemicals as per IS 4032 for Portland slag cement, Ordinary portland cement and Portland clinker testing.

*The above list is indicative only and may not be treated as exhaustive.*

**ANNEX C****Scheme of Inspection And Testing**

**1. LABORATORY** - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

**1.1** The manufacturer shall prepare a calibration plan for the test equipments. The following equipments shall be calibrated at a frequency shown against each and records kept.

Sl. No.	TEST EQUIPMENT	FREQUENCY OF CALIBRATION
1.	Blaine's apparatus	Daily with licensee's own Standard cement sample and monthly with standard cement samples supplied by NCCBM.
2.	Compressive strength Testing machine	Once in a month with Licensee's own Proving Ring and the Proving Ring shall be Calibrated once in two years from a NPL/NABL Accredited Calibrating body or NPL or NPL accredited Proving Ring manufacturer.
3.	Autoclave pressure gauge	Once in a month by licensee's own dead weight pressure gauge tester OR once in six months from accredited calibrating body or NPL/NABL accredited manufacturer of such gauges.
4.	Vibration machine	Once in a month by licensee's own Tachometer. The tachometer shall be calibrated once in a year from NPL/NABL accredited outside agency.
5.	Dead weight pressure gauge Tester (if available)	Once in four years from NABL accredited Tester (if available) Lab or OEM (original Equipment manufacturer) having NPL/NABL accredited calibrator.

**2. TEST RECORDS** – The manufacturer shall maintain test records in various formats, Form 1 to Form 18 for the tests carried out to establish conformity.

**3. LABELLING AND MARKING** – Labeling and marking shall be as given below:

**3.1 STANDARD MARK** - The Standard Mark, as specified by BIS, shall be printed or stenciled on each bag or drum of Masonry Cement or on the label applied to it, provided the material in each bag or package to which the mark thus applied conforms to the specification. The size of Standard Mark shall be either **160 x 120** mm or **80 x 60** mm for packing in quantity of 50 kg and above. For other packing of lower quantity, a photographic reduction is permitted.

**3.2 MARKING** - As per the requirements of IS 3466: 1988.

**3.2.1** In addition to above, following marking shall also be marked:

- a) Name of original manufacturer of cement with BIS licence number in case of repacking unit.
- b) Any other marking required under provisions of Legal Metrology Act, 2009 and Legal Metrology (Packaged Commodities) Rules, 2011 framed thereunder.

**3.2.2** All the information including BIS Standard Mark except Manufacturers Registered Trade Mark shall be applied on each bag in **BLACK COLOUR**.

Note:

1. For each calendar year, the first week shall be counted as 7 days from 1<sup>st</sup> of January and subsequent weeks numbered serially accordingly. The bags shall be marked as W 01/MM/YY..... W 51/MM/YY..... etc.
2. Label mentioned at 3.1 and 3.2 above shall be attached to the seal of the container. The seal shall be of such a design that it shall automatically get destroyed on opening.
3. The colour of the bag and background colours should be in contrast to the colour of the Standard Mark and the details so that the markings are conspicuous.

#### **4. CONTROL UNIT –**

**4.1 For manufacturing units of Masonry Cement:** The tests, as indicated in Table 1 attached and at the levels of control specified therein, shall be carried out on the whole production of the factory which is covered by this scheme and appropriate records maintained in accordance with clause 2 above.

**4.2 For packing of Masonry Cement at bulk cement terminal:** The tests, as indicated in Table 2 attached and at the levels of control specified therein, shall be carried out on the whole packing of Masonry Cement and appropriate records maintained in accordance with clause 2 above.

**4.2.1** For bulk packing units as per clause 4.2, all cement of one consignment received shall constitute one batch.

**4.2.2** Batch mixing may be permitted for packing units, which are extended packing terminals of the same cement manufacturer (licensee) subject to packing units obtaining test certificates from the manufacturer and keeping proper records. If the cement is received from different units of the same manufacturer (different licensees) batch mixing of cement is not permitted. The Batch integrity shall be ensured at all stages of packing and the packer shall maintain appropriate controls and checks to ensure that there is no chance of mix up of different batches. Adequate care shall be taken to avoid spoilage during handling, packing and storage.

**4.2.3** If bulk packing unit is instructed by BIS for suspension of licence due to the failure of the samples, such instruction will automatically apply to the original manufacturer of the cement, as per relevant suspension of licence guidelines. An undertaking to this effect shall be obtained from the bulk packers and the original cement manufacturer.

**4.2.4** Test Certificate of each original batch of cement shall be obtained from the supplier and test results recorded. On the basis of tests and inspection, the decision regarding conformity or otherwise of the consignment/batch to a given requirement shall be taken.

**4.3 WEIGHMENT –** One filled bag from each nozzle shall be taken at random twice in each shift of operation and weight checked in case of electronic packers with recorders. In all other cases one filled bag from each nozzle shall be checked once in two hours. The records shall be maintained in Form 1. The bag shall be so chosen for weighment such that bags from each nozzle are taken for weighment. The weighing and packing machines shall be adjusted as and when necessary in such a way that net quantity of each bag shall be in accordance with the

tolerances given in Appendix A and clause 8.2 of IS 3466 : 1988. Such adjustments for each nozzle shall be recorded in Form 1 under remarks column.

**4.3.1** For packing of Masonry Cement in bulk cement terminal weightment of hourly check of mass of drums also shall be done in addition to weightment of bags mentioned in para 4.3 above. The records of weightments shall be maintained in Forms 10 and 12.

#### **4.4 RAW MATERIALS**

**4.4.1** Routine analysis of various raw materials used in the manufacture of Masonry Cement shall be made at intervals of a month or whenever there is a change in the source/mine area stratification whichever is earlier and appropriate records of the analysis and of the Physical composition of the mixtures shall be maintained in Form 2. This analysis is not applicable for Packing Units of Masonry Cement at bulk cement terminal.

**4.5 PACKING** - The Cement shall be packed in bags as specified in clause 8 of IS 3466: 1988. A test certificate either from the manufacturer or from any recognized testing laboratory shall be received along with each consignment of bags. Alternatively the samples of bags from each consignment shall be tested by the cement manufacturer either in his own laboratory or any other BIS recognized laboratory before they are used for packing cement. No testing would be necessary if the bags carry BIS Certification Mark. The bag shall be in good condition at the time of packing.

**5. LEVELS OF CONTROL** - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with clause 2 above.

**5.1. PRODUCTION DATA** - The licensee shall send to BIS a statement of quantity produced, marked and exported by him and the value thereof at the end of each quarter of the operative period as per the enclosed proforma and shall also submit these details to BIS at the end of the operative year duly authenticated by a Chartered Accountant.

**6. REJECTIONS** – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.



Table 1 – Levels of Control (Grinding/Packing Unit)

(1)				(2)	(3)		
TEST DETAILS				Test equipment requirement R: required (or) S: Sub-contracting permitted	RECOMMENDED LEVELS OF CONTROL		
Clause	Requirement	Test Methods Clause Reference			Frequency		Remark
					Cement Grinding/Blending	Cement Packing	
2.1	Ordinary Portland Cement	2.1	IS 3466 IS 269	R	-	OPC shall be ISI marked and shall be accompanied with manufacturer certificate. If OPC is produced in the same factory, records as per relevant SIT shall be maintained.	
2.2	Portland Cement Clinker	2.2	IS 3466 IS 4031	R	Daily composite sample	Portland Cement Clinker shall conform to IS 16353	
Clause 3 Table 1	<b>Physical requirement</b>						
i)	Fineness	3	IS 3466 IS 4031 (Part 2)	R	1. Every alternate hourly from each mill/blender separately. 2. Daily Composite sample	Daily Composite sample	–
ii)	Setting Time	3	IS 3466 IS 4031 (Part 5)	R	One sample per shift (Composite sample)	Daily Composite sample	–
iii)	Soundness (Le-Chatelier method, Autoclave method)	3	IS 3466 IS 4031 (Part 3)	R	Daily Composite sample	Daily Composite sample	–
iv)	Compressive strength	3	IS 3466 IS 4031 (Part 6)	R	Daily Composite sample	Daily Composite sample	–

v)	Air Content	3	IS 3466 IS 4031 (Part 12)	R	Daily Composite sample	Daily Composite sample	–
vi)	Water Retention	3	IS 3466 IS 4031 ( Part 13)	R	Daily Composite sample	Daily Composite sample	–
vii)	Staining	4	IS 3466 IS 4032	R	Daily Composite sample	Daily Composite sample	Pl see Note 3

**Note-1:**

Composite sample shall be made out of hourly samples for the required period (Pl See IS 3535 Methods of sampling hydraulic cements).

If clinker is manufactured from more than one kiln, clinker sample from each kiln shall be tested as per the above table. If clinker is manufactured using different proportion of raw materials such different clinkers shall be tested considering it as separate production.

If cement is manufactured using same proportion of raw materials from more than one cement mill, sample from each mill shall be tested for fineness as per the above table. For all other parameters composite samples from all the mills shall be tested.

If cement is manufactured using different proportion of raw materials from more than one cement mill, sample from each mill shall be tested for all requirements as per the above table.

If blending of ingredients is adopted, sample at ‘Cement blending stage’ shall be drawn after blending all such ingredients.

**Note-2:** For manufacturing units where there is no packing silo and cement is packed directly from cement grinding /blending stage, the frequency of tests specified for cement grinding stage would apply for the various tests to be carried out on samples taken from cement mill spouts.

**Note-3:** By agreement between purchaser and manufacturer.

**Note-4:** Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

**Note-5:** The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.

Table 2 Level of Control (Bulk Packing Unit)

(1)				(2)	(3)		
TEST DETAILS				Test equipment requirement R: required (or) S: Sub-contracting permitted	RECOMMENDED LEVELS OF CONTROL		
Clause	Requirement	Test Methods Clause Reference			Number of samples	Frequency	Remarks
3, Table 1 (i)	Fineness	3	IS 3466 IS 4031(Part 2)	S	One	Each batch received	
3, Table 1 (ii)	Setting Time	3	IS 3466 IS 4031(Part 5)	S	One	Each batch received	
3, Table 1(iii)	Soundness	3	IS 3466 IS 4031(Part 3)	S	One	Each batch received	
3, Table 1 (iv)	Compressive strength	3	IS 3466 IS 4031(Part 6)	S	One	Each batch received	

Note-1: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

Note-2: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.

## Form No. 1

## FORMAT FOR MAINTENANCE OF TEST RECORDS WEIGHMENT CONTROL AT PACKING STAGE

Date	Shift	Time (Hourly)	No. of Bags	Net mass of bags from nozzles						Remark.

## Form No. 2

## RAW MATERIAL TESTING

Date of receipt of material	Date of testing	Name of Material	Source of supply and consignment No.	Details of analysis for specified requirements

## Form 3

## PRODUCTION DATA

(POST GRINDING DETAILS OF PRODUCTION ACCEPTED AND REJECTED FOR STANDARD MARK)

Shift	Quantity	Passed for Standard mark	Rejected	Remark

## Form No. 4

## CLINKER CHEMICAL COMPOSITION (DAILY COMPOSITE SAMPLE)

Date of manufacture	Total loss on ignition	Insoluble residue	Alkali content as Na <sub>2</sub> O	C <sub>3</sub> S	C <sub>3</sub> A	C <sub>3</sub> S+ C <sub>2</sub> S	SO <sub>3</sub>	MgO	Chloride	Free lime	LSF	Alumina factor	Sample Pass/Fail	Remarks

## Form No. 5

## CLINKER GROUND WITH GYPSUM (DAILY COMPOSITE SAMPLE)

Date of grinding	Fineness	Soundness		Setting time		Compressive strength			Sample Pass/Fail	Remark
		Le-Chatelier	Autoclave	Initial	Final	3 days	7 days	28 days		

## Form 6

## MASONRY CEMENT (GRINDING/ BLENDING) (Daily/Weekly Composite sample)

Date of grinding	Fineness	Soundness (Le-chatelier & Autoclave)	Setting Time Initial & Final	Compressive strength	Air content	Water retention	Staining	Sample Pass/Fail	Action taken if sample fails

## Form No 7

## MASONRY CEMENT GRINDING (For Alternate Hourly Sample)

Date of grinding	Time	Fineness	Setting Time Initial & Final	Sample Pass/Fail	Mode of disposal or action taken if sample fails

## Form No 8

## MASONRY CEMENT PACKING STAGE (Daily/Weekly Composite Sample)

Date of Packing	Fineness	Soundness (Le-chatelier & Autoclave)	Setting Time Initial & Final	Compressive strength	Air content	Water retention	Staining	Sample Pass/Fail	Action taken if sample fails

## Form No 9

## CALIBRATION

Sl. No	Date of calibration	Result of Calibration (Test records indicating details of standard values and observed values for each equipment to be kept in proforma for which various columns be devised; as required)	Name of equipment Action taken if equipment found defective	Sl.No. (If any) & Remarks

Note: The above records are to be kept separately for each equipment.

**RECORDS TO BE MAINTAINED AS PER TABLE-2 OF SIT (BY BULK PACKING UNIT)**

Form No. 10

FORMAT FOR MAINTENANCE OF TEST RECORDS WEIGHMENT CONTROL AT PACKING STAGE  
HOURLY CHECK OF MASS OF DRUMS

Date	Time (Hourly)	Condition of Drums	Net quantity of cement	Record of calibration of weighing scale and Date of calibration.

Form No. 11

FORMAT FOR MAINTENANCE OF RECORDS FOR THE CONDITIONS OF THE EMPTY DRUMS/BULKERS  
FOR PACKING CEMENT

Date	No. of empty drums/Bulkers checked	No. of empty drums/Bulkers rejected	Reasons/Remarks	Sign of firms inspector

Form No. 12

FORMAT FOR MAINTENANCE OF TEST RECORDS WEIGHMENT CONTROL AT PACKING STAGE  
HOURLY CHECK OF MASS OF BAGS

Date	Shift	Time(Hourly)	No of Bags	Net quantity of Bags from Nozzles	Records of calibration/date of calibration of nozzles

Form No. 13

RECEIPT OF CEMENTS

Date of receipt	Batch No.	Supply received from	Test Certificate No

Form No. 14  
CEMENT DISPATCH DATA FROM PACKING

Date	Quantity	Passed for Standard Mark	Rejected (if any)	Reasons for not marking/Method of disposal

Form No 15 & 16  
TEST DONE AT FACTORY (At receipt stage and at bulk packing terminal)

Date	Batch No.	Fineness	Setting Time	Soundness	Compressive strength	Remarks

Form No 17 & 18  
MASONRY CEMENT (PHYSICAL TEST REPORT) (At receipt stage and at bulk packing terminal)

Date	Batch No.	Test Report	Soundness		Compressive Strength		Remarks
			LC	AC	7 days	28 days	