

**SCHEME OF TESTING AND INSPECTION
FOR CERTIFICATION OF
PORTLAND SLAG CEMENT
ACCORDING TO IS 455:1989
(Including Amendment No. 1 to 5)
(For Large Scale Cement Plant having Capacity above 600 tpd)**

1. **LABORATORY** – A laboratory shall be maintained, which shall be suitably equipped and staffed where different tests given in the specification shall be carried out in accordance with the methods given in the specification.
2. **TEST RECORDS** - All records of tests, inspection and calibration shall be kept in suitable forms approved by the Bureau.
 - 2.1 All testing apparatus/measuring instruments shall be periodically checked and calibrated and records of such checks/calibration shall be maintained.
 - 2.2 Copies of any records and other connected papers that may be required by the Bureau shall be made available at any time on request.
3. **QUALITY CONTROL** – It is recommended that, as far as possible, Statistical Quality Control (SQC) methods may be used for controlling the quality of the product during production as envisaged in this Scheme [See IS 397(Part I)::2003, IS 397(Part 2):2003 and IS 397(Part 3):2003].
 - 3.1 In addition, effort should be made to gradually introduce a Quality Management System in accordance with IS/ISO 9001.
- 4.0 **Calibration** – Periodic calibration of various testing equipments shall be carried out and records of such calibrations kept. The following equipments shall be calibrated at a frequency shown against each and records kept.

TEST EQUIPMENT

FREQUENCY OF CALIBRATION

- | | | |
|-----|--------------------------------------|--|
| i) | Blaine's apparatus | Daily with licensee's own Standard cement sample and once in a month with standard cement samples supplied by NCCBM. |
| ii) | 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 the recognized calibrating agency like NPL /NABL accredited Lab or proving ring manufacturer having NPL certified calibrator. |

6. **LEVELS OF CONTROL** - 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 and charts maintained in accordance with paragraph 2.0 above. All the production which conforms to the Indian Standards and covered by the licence shall be marked with certification mark of the Bureau.
- 6.1 Each of the sample of cement taken for test shall satisfy the requirements of the Specification.
- 6.2 **WEIGHTMENT**- One filled bag from each Nozzle shall be taken at random twice in a shift of operation and weighed in case of electronic packer with recorder. In all other cases one bag from each Nozzle shall be checked once in two hours. The records shall be maintained in Form 1. The weighing and packing machines shall be adjusted as and when necessary as indicated by the mass of these bags in such a way that net mass of each bag shall be 50 kg subject to the tolerances as given in Annex B or clause 9.2 of IS 455:89, as the case may be .Such adjustments for each nozzle shall be recorded in Form 1 under Remarks column.
- 7.0 **RAW MATERIALS** - Routine analysis of various raw materials going into the manufacture of Portland Slag 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.(See form 2).
- 7.1 Granulated slag conforming to IS 12089 shall be used for the manufacture of Portland slag cement.
- 8.0 In respect of all other clauses of the specification, the factory shall maintain appropriate controls and checks to ensure that their product conforms to the various requirements of the specification.
- 9.0 **REJECTIONS** – A separate record shall be maintained giving information relating to the rejection of the production not conforming to the requirements of the specification and the method of its disposal. Such material shall in no circumstances be stored together with that conforming to the specification.(See Form 3)
- 10.0 **PACKING** - In case cement is packed in jute sacking bags (Pl See clause 9.1 of the standard) the bags shall conform to IS 2580 and duly carry ISI Mark with regard to their conformity to IS 2580 Specification for jute sacking bags for packing cement.
- 10.1 In case cement is packed in multi-wall paper sacks conforming to IS 11761, light weight jute bags conforming to IS 12154, HDPE woven sacks conforming to IS 11652 ,jute synthetic union bags conforming to IS 12174, a test certificate indicating details of relevant tests results either from the manufacturer or from any recognized testing laboratory shall be received along with each consignment . Alternatively the samples of bags from each consignment shall be tested by the cement manufacturer either in his Own laboratory or any other recognized laboratory before they are used for packing cement. No testing would be necessary if the bags carry BIS Certification Mark.

- 11.0 **SAMPLES** – The licensee shall supply, free of charge, the samples required in accordance with the Bureau of Indian Standards (Certification) Regulations, 1988, as subsequently amended, from the factory or godowns. The Bureau shall pay for the samples taken by it from the open market.
- 12.0 **REPLACEMENT** – Whenever a complaint is received soon after the goods with Standard Marks have been purchased and used, and if there is adequate evidence that the goods have not been misused, defective goods or their components are replaced or repaired free of cost by the licensee in case the complaint is proved to be genuine and the warranty period (where applicable) has not expired. The final authority to judge the conformity of the product to the Indian Standard shall be with the Bureau.
- 13.0 In the event of any damages caused by the goods bearing the Standard Mark, or claim being filed by the consumers against BIS Standard Mark and not “conforming to” the relevant Indian Standard, entire liability arising out of such non conforming product shall be of licensee and BIS shall not in any way be responsible in such cases.
- 14.0 **STOP MARKING** – The marking of the product shall be stopped under intimation to the Bureau if, at any time, there is some difficulty in maintaining the conformity of their product to the specification, or the testing equipment goes out of order. The marking may be resumed as soon as the defects are removed under intimation to Bureau.
- 15.0 The marking of the product shall be stopped immediately if directed to do so by Bureau for any reason. The marking may then be resumed only after permission by the Bureau. The information regarding resumption of markings shall also be sent to the Bureau.
- 16.0 **PRODUCTION DATA** – The licensee shall send to BIS as per the enclosed Proforma-1 a statement of quantity produced , marked and exported by him and the trade value thereof during the half year ending 30 June and 31 December. This statement is required to be forwarded to the Bureau on or before the 31st day of July and January for the preceding half year.

Table 1.....

IS 455:1989, Portland Slag Cement
TABLE 1, LEVELS OF CONTROL
(Para 6 of the Scheme of Testing and Inspection)

Test Details				Levels of Control			Remarks
CL	Requirements	Clause	Reference	Clinker (Form 4 & 5)	Cement Grinding/ Blending (Form 6 & 7)	Packed Cement (Form 6)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
5.	Chemical composition, full analysis		IS4032	Daily composite sample	Daily composite sample	Weekly composite sample	
8.2	Chloride content	-	IS 12423	-	-	Weekly composite sample	This test shall also be carried out whenever there is any change in source of any raw material
5	Sulphur trioxide	-	IS4032	-	Daily composite sample	-	-
	Magnesium oxide	-	- do -	-	- do -	-	-
	Insoluble residue	-	-do-	-	- do -	-	-
	Loss on ignition	-	- do -	-	- do-	-	-
	Sulphide Sulphur	-	- do -	-	-do-	-	Consignment wise Test certificate for the Slag shall be obtained from the supplier. In case Sulphide Sulphur content is observed more than 1.0% sample to be tested on daily basis and original weekly frequency to be restored only when this value is observed less than 1.0% continuously for seven days.
6.1	Fineness	-	IS 4031 (Part 2)	Laboratory Ball Mill Testing is required to be done when there is change in the Source of Raw Material or change in Design	1. Every alternate hourly from each mill/blender separately 2. Daily composite sample	Daily composite sample	-

IS 455:1989, Portland Slag Cement
TABLE 1, LEVELS OF CONTROL
(Para 6 of the Scheme of Testing and Inspection)

Test Details				Levels of Control			
Cl.	Requirements	Cl.	Reference	Clinker (Form 4 & 5)	Cement Grinding/ Blending (Form 6 & 7)	Packed Cement (Form 6)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
6.2.1	Soundness	-	Le-Chatelier method IS4031(Part 3)	Laboratory Ball Mill Testing is required to be done when there is change in the Source of Raw Material or change in Design	Daily composite sample	Daily composite sample	
6.2.1	Soundness	-	Autoclave Method IS 4031(Part 3)	- do -	- do -	- do -	-
6.3	Setting time	-	IS 4031(Part 5)	- do -	One sample per Shift(composite sample)	Daily composite sample	Daily composite sample
6.4	Compressive Strength	-	IS 4031(Part 6)	- do -	Daily composite sample	-	- do -
6.5*	Transverse test	-	IS 4031(Part 8)	- do -	Weekly composite sample	Weekly composite sample	

* When asked for the agreement between purchaser and manufacturer. Transverse strength value to be agreed between purchaser and supplier at the time of placing an order.

- Note – (1) Composite sample shall be made out of hourly samples for the required period PI See IS 3535:1986 Methods of sampling hydraulic cements)
- (2) Granulated slag conforming to IS 12089 shall be used for the manufacture of Portland slag cement.

Form No.5

**CLINKER GROUND WITH GYPSUM
(DAILY COMPOSITE SAMPLE)
(COLUMN 5 OF TABLE 1)**

Laboratory Ball Mill Testing is required to be done when there is change in the Source of Raw Material or change in Design

Date of grinding	Fineness	Soundness (Le-chatelier/Autoclave method)	Setting Time Initial (IST)	Setting Time Final (FST)	Comprehensive Strength 3 7 28 ..days..	Transverse Strength (Optional)	Sample/pass/fail	Remarks

Form No.6

**CEMENT GRINDING / BLENDING (DAILY/WEEKLY COMPOSITE SAMPLES)
(COLUMN 6 OF TABLE 1)**

Date of grinding	LOI	IR	SO ₃	MgO	CaO	Al ₂ O ₃	Fe ₂ O ₃	SiO ₂	LSF	Alumina	Fineness	Soundness Auto	Setting time IST/FST	Compressive strength 3 7 28days	Transverse (Optional)	Sample pass/fail	Remarks

Form No.7

**CEMENT GRINDING / BLENDING (FOR ALTERNATE HOURLY SAMPLES)
(Column 6 of Table 1)**

Date of grinding	Time	Fineness	Setting Time		Sample Pass/Fail
			Initial Setting Time (IST)	Final Setting Time (FST)	

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Form No.8
PACKING STAGE (CEMENT)
(DAILY/WEEKLY AVERAGE SAMPLE (COLUMN 7 OF TABLE 1))

Date of packing	LOI	IR	SO ₃	MgO	CaO	Al ₂ O ₃	Fe ₂ O ₃	SiO ₂	LSF	Chloride content	Alumina Factor	Fines	Soundness Lechatelier/Autoclave	Setting Time I ST/FS T	Compressive strength 3 7 28 ..days..	Transverse Optional	Sample pass/fail	Remarks
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Form No.9

Sl. No	Date of calibration	Calibration Record	Name of equipment	Sl.No. (If any)
		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)	Action taken if equipment found defective	Remarks

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