



**PRODUCT MANUAL FOR  
OIL-WELL CEMENT  
ACCORDING TO IS 8229: 1986**

*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 8229 : 1986
	<b>Title</b>	:	OIL-WELL CEMENT
	<b>No. of Amendments</b>	:	6
2	<b>Sampling Guidelines:</b>		
a)	<b>Raw material</b>	:	Not applicable
b)	<b>Grouping guidelines</b>	:	Sample of each Class of Oil-well Cement (A/ B/ C/ D/ E/ F/ G/ H/ J/) shall be tested to cover that Class of Cement in the Scope of Licence.
c)	<b>Sample Size</b>	:	- 8 kg for physical test - 1 kg for chemical test (Not applicable for Class J)
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) Insoluble Residue (ii) Loss on Ignition (iii) Magnesium Oxide (iv) Fineness (v) Free water content of slurry (vi) Thickening time		
6.	<b>Scope of the Licence :</b>		
	“Licence is granted to use Standard Mark on Oil-Well Cement as per IS 8229 : 1986”		
	Class of Cement		

ANNEX - AList of Test Equipment*Major test equipment required to test as per the Indian Standard*

Sl No.	Tests used in with Clause Reference	Test equipment
1	Fineness Clause 5.1 Table 2	Blaine's apparatus variable flow type
		Stop watch
		Mercury
		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
2	Soundness by Autoclave Clause 5.1 Table 2	Auto clamp machine with thermostatic control, L-Shape thermometer LC 1 °C
		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	Free water content of slurry Clause 5.1 Table 2	Atmospheric pressure consistometer
		Interval counter
		Paratone calibration oil
		Grease or light oil
		Water bath
		Slurry container assembly as per A-2.3.3 of IS 8229 : 1986
		Graduated cylinder
		Steel pate
Rubber pad		

5	Compressive Strength Clause 5.1 Table 2	Seive 850 micron
		Specimen moulds
		Base and cover plates
		Water curing bath (either non-pressure type or pressure vessel as per Clause A-3.1.4 of IS 8229)
		Cooling bath
		Temperature indicator i.e thermometer or pyrometer
		Puddling rod
		Grease
6	Thickening time Clause 5.1 Table 2	Thickening time tester unit
		Stop watch
7	<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 temp. 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)
9	<b>General test equipments for chemical testing Clause 6 , Table 1 of IS 8229 : 1986</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 Oil well cement testing.

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

**ANNEX - B****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.
6	Atmospheric Pressure Consistomer	The apparatus shall be calibrated with Paratone calibration oil, the viscosity temperature relationship of which is known over a range of 5 to 100 Bc. The apparatus shall be recalibrated at least once a year, also whenever wear of any metallic part in contact with cement slurry becomes noticeable or when such part is replaced. (Paratone shall be discarded after the use because of possible contamination during calibration).
7	Thickening time tester unit	Calibration of the potentiometer mechanism of the pressurized consistometer shall be done as prescribed for atmospheric pressure consistometer as above. The thermocouples shall be calibrated at frequent intervals to ensure the accuracy of temperature measurements

**2. TEST RECORDS** – The manufacturer shall maintain test records in various formats, Form 1 to Form 16 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 Oil-Well 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 8229: 1986.

**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 Oil-Well 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 Oil-Well 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 Oil-Well 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 Annex B and clause 9.2 of IS 8229 : 1986. Such adjustments for each nozzle shall be recorded in Form 1 under remarks column.

**4.3.1** For packing of Oil-well Cement in bulk cement terminal weighment of hourly check of mass of drums also shall be done in addition to weighment of bags mentioned in para 4.3 above. The records of weighments shall be maintained in Forms 8 and 10.

#### **4.4 RAW MATERIALS**

**4.4.1** Routine analysis of various raw materials used in the manufacture of Oil-well 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 Oil-well Cement at bulk cement terminal.

**4.5. PACKING** - The Cement shall be packed in bags as specified in clause 9 of IS 8229: 1986. 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 levels of control in column 3 of Table 1, shall be carried out on 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			Number of sample	Frequency		Remark
						Cement Grinding/Blending	Cement Packing	
<b>4.1 Table 1</b>	<b>Chemical Requirement</b>							
i)	Magnesium oxide	4.1	IS 4032	R	One	Daily Composite sample	Weekly composite sample	-
ii)	Supher trioxide	4.1	IS 4032	R	One	Daily Composite sample	Weekly composite sample	-
iii)	Loss on ignition	4.1	IS 4032	R	One	Daily Composite sample	Weekly composite sample	-
iv)	Insoluble residue	4.1	IS 4032	R	One	Daily Composite sample	Weekly composite sample	-
v)	Tricalcium aluminate	4.1	IS 4032	R	One	Daily Composite sample	Weekly composite sample	-
vi)	Tricalcium silicate	4.1	IS 4032	R	One	Daily Composite sample	Weekly composite sample	-
vii)	Tetracalcium aluminoferrite plus twice the Tricalcium aluminate	4.1	IS 4032	R	One	Daily Composite sample	Weekly composite sample	-
viii)	Total Alkali Content	4.1	IS 4032	R	One	-	Weekly composite sample	-



5.1 Table 2	Physical Requirement							
i)	Water percent by mass	5.1	-	-	-	-	-	As recommended by manufacturer
ii)	Fineness	5.1	IS 8229	R	One	1. Every alternate hourly from each mill separately. 2. Daily Composite sample	Daily Composite sample	-
iii)	Soundness by Autoclave method	5.1	IS 8229	R	One	Daily Composite sample	Daily Composite sample	-
iv)	Free water content of slurry	5.1 A-2	IS 8229	R	One	Daily Composite sample	Daily Composite sample	-
v)	Compressive strength	5.1 A-3	IS 8229	R	One	Daily Composite sample	Daily Composite sample	-
vi)	Thickening time	5.1 A-4	IS 8229	R	One	1. Every hour one sample 2. Daily Composite sample	Daily Composite sample	-

## NOTES –

- Composite sample shall be made out of hourly samples for the required period (Pl see IS 3535 Methods of sampling hydraulic cements).  
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.
- For manufacturing units where there is no packing silo and cement is packed directly from cement grinding, 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 along with weekly chloride content test.
- Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.
- 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	
4.1 , Table 1	Insoluble Residue	4.1	IS 4032	R	One	Each batch	To be tested in laboratory at bulk terminal packing unit.
4.1 , Table 1	Loss on Ignition	4.1	IS 4032	R	One	Each batch	
5.1, Table 2	Fineness	5.1	IS 8229	S	One	Each batch	-
5.1, Table 2	Soundness by Autoclave method	5.1	IS 8229	S	One	Each batch	
5.1, Table 2	Free water content of slurry	5.1 A-2	IS 8229	S	One	Each batch	
5.1, Table 2	Compressive strength	5.1 A-3	IS 8229	S	One	Each batch	
5.1, Table 2	Thickening time	5.1 A-4	IS 8229	S	One	Each batch	

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 4

## OIL-WELL CEMENT (GRINDING/ BLENDING) (Daily/Weekly Composite sample)

Date of grinding	MgO	SO <sub>3</sub>	LOI	IR	C <sub>3</sub> A	C <sub>3</sub> S	C <sub>4</sub> AF + 2 C <sub>3</sub> A	Total alkali content	Water percent by mass	Fineness	Soundness by Autoclave)	Free water content of slurry	Compressive strength	Thickening time	Sample Pass/Fail	Action taken if sample fails

## Form No 5

## OIL-WELL CEMENT GRINDING (For Alternate Hourly Sample)

Date of grinding	Time	Fineness	Thickening time	Sample Pass/Fail	Mode of disposal or action taken if sample fails

## Form No 6

## OIL-WELL CEMENT PACKING STAGE (Daily/Weekly Composite Sample)

Date of Packing	MgO	SO <sub>3</sub>	LOI	IR	C <sub>3</sub> A	C <sub>3</sub> S	C <sub>4</sub> AF + 2 C <sub>3</sub> A	Total alkali content	Water percent by mass	Fineness	Soundness by Autoclave)	Free water content of slurry	Compressive strength	Thickening time	Sample Pass/Fail	Action taken if sample fails

## Form No 7

## 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. 8

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. 9

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. 10

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. 11

RECEIPT OF CEMENTS

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

Form No. 12

CEMENT DISPATCH DATA FROM PACKING

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

Form No 13 & 14

TEST DONE AT FACTORY (At receipt stage and at bulk packing terminal)

Date	Batch No.	LOI	IR	Fineness	Thickening time	Remarks

Form No 15 & 16

ORDINARY PORTLAND CEMENT (PHYSICAL TEST REPORT) (At receipt stage and at bulk packing terminal)

Date	Batch No.	Test Report	Soundness by AC	Compressive Strength	Free water content of slurry	Remarks