

IS : 3466 - 1988

Indian Standard
**SPECIFICATION FOR
MASONRY CEMENT**
(Second Revision)

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Indian Standard

SPECIFICATION FOR MASONRY CEMENT

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards on 3 October 1988, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Masonry cement is obtained by intimately grinding a mixture of Portland cement clinker and gypsum with pozzolanic or inert materials, and air entraining plasticizer in suitable proportions, generally to a fineness greater than that of ordinary Portland cement. Masonry cement is chiefly intended for use in masonry mortars for brick, stone and concrete block masonry, and for rendering and plastering work. Because of its property of producing a smooth, plastic, cohesive and strong, yet workable, mortar when mixed with fine aggregates, masonry cement is considered superior to lime mortar, lime-cement mortar or cement mortar. Lime mortars are relatively weaker in strength and slower setting and they sometimes bleed under pressure. Ordinary cement mortars, although fast setting and capable of high strength development, are harsh, non-plastic and non-cohesive with the result that they cannot take up the shrinkage and temperature movements in the masonry and are liable to result in comparatively wide cracks passing right through the bricks or building blocks as compared to a number of evenly distributed hair cracks in the joints which occur when weaker mortars containing lime are used. Properly proportioned and gauged lime-cement mortars can be made to possess the desired properties of a good masonry mortar but the preparation of lime-cement mortars is time consuming and also unslaked lime and magnesia, when present in such mortars, can cause delayed expansion and consequently defects in the masonry and plaster work. In order to avoid the necessity for mixing cement and lime, and in order to minimize the risk of trouble from expansion due to the presence of small quantities of

unslaked lime, the use of masonry cement is quite popular in a number of countries abroad and its use should be encouraged in this country also. The use of masonry cement will not only improve the quality of masonry mortars but will also meet the emergent need to increase the production of cement by better utilization of available resources in the country. Masonry cement is, however, not intended for use in structural concrete, for flooring and foundation work or for reinforced and prestressed concrete works.

0.3 This standard was first issued as an emergency standard in 1966 to meet the immediate needs of the building industry and subsequently revised in 1967. In the present revision, requirements regarding air content and water retention have been lowered, retest has been allowed in case of Le-Chatelier and autoclave soundness test, and a clause on false set of cement has been incorporated in addition to some other minor modifications.

0.4 Mass of cement packed in bags and the tolerance requirements for the mass of cement packed in bags shall be in accordance with the relevant provisions of the *Standards of Weights and Measures (Packaged Commodities) Rules, 1977* and A-1.2 (see Appendix A). Any modification in these rules in respect of tolerance on mass of cement would apply automatically to this standard.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard lays down the requirements for masonry cement to be used for all general purposes where mortars for masonry are required.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Masonry Cement — Product obtained by intergrinding a mixture of Portland cement

clinker with pozzolanic materials, such as flyash and calcined clay pozzolana; or non-pozzolanic (inert) materials, such as limestone, conglomerates, dolomitic limestone, dolomite, granulated slag and waste materials like carbonated sludge, mine tailings, etc, and gypsum and an air-entraining plasticizer in suitable proportions so that the resulting product conforms to the requirements laid down in the standard.

2.2 Portland Cement Clinker — Portland cement clinker conforming to the requirements of IS : 269-1976*.

3. PHYSICAL REQUIREMENTS

3.1 Masonry cement, when tested in accordance with the methods of test specified in IS : 4031-1988†, shall conform to the physical requirements given in Table 1.

3.1.1 If cement exhibits false set, the ratio of final penetration measured after 5 minutes of completion of mixing period to the initial penetration measured exactly after 20 seconds of completion of mixing period, expressed as percent, shall be not less than 50. In the event of cement exhibiting false set, the initial and final setting time of cement when tested by the method described in IS : 4031-1988† after breaking the false set, shall conform to the requirements given in Table 1.

3.1.2 In the event of cements failing to comply with any one or both the requirements of soundness specified in Table 1, further tests in respect of each failure shall be made as described in IS : 4031-1988† from another portion of the same sample after aeration. The aeration shall be

*Specification for ordinary and low heat Portland cement (third revision).

†Methods of physical tests for hydraulic cement (first revision) (in different parts).

done by spreading out the sample to a depth of 75 mm at a relative humidity of 50 to 80 percent for a total period of 7 days. The expansion of cements so aerated shall not be more than 5 mm and 0.6 percent, when tested by Le-Chatelier method and autoclave test respectively.

4. STAINING

4.1 This requirement shall apply only when a purchaser specifically states that cement shall be non-staining to limestone. Non-staining cement shall contain not more than 0.03 percent of water soluble alkali when determined in accordance with the method given in IS : 4032-1985*.

NOTE — The amount and nature of the staining material in limestones seems to vary with the stone. The alkali in any cement may, therefore, induce markedly different staining on different stones, even though it may have come apparently from the same source. The amount of water soluble alkali permitted by the specification should not cause stain unless stone high in staining material is used, or unless insufficient means have been used to prevent infiltration of water into the masonry.

5. STORAGE

5.1 The cement shall be stored in such a manner as to permit easy access for proper inspection and identification, and in a suitable weather-tight building to protect the cement from dampness and to minimize warehouse deterioration.

6. MANUFACTURER'S CERTIFICATE

6.1 The manufacturer shall satisfy himself that the cement conforms to the requirements of this standard, and if requested, shall furnish a certificate to this effect to the purchaser or his representative.

*Method of chemical analysis of hydraulic cement (first revision).

TABLE 1 PHYSICAL REQUIREMENTS
(Clauses 3.1, 3.1.1 and 3.1.2)

| Sr. No. | CHARACTERISTIC | REQUIREMENT |
|---------|--|-----------------------------|
| i) | Fineness: Residue on 45-micron IS Sieve, <i>Max</i> , percent (by wet sieving) | 15 |
| ii) | Setting Time (by Vicat Apparatus): | |
| | a) Initial, <i>Min</i> | 90 min |
| | b) Final, <i>Max</i> | 24 h |
| iii) | Soundness: | |
| | a) Le-Chatelier expansion, <i>Max</i> | 10 mm |
| | b) Autoclave expansion, <i>Max</i> | 1 percent |
| iv) | Compressive Strength: Average compressive strength of not less than 3 mortar cubes of 50 mm size, composed of 1 part masonry cement and 3 parts standard sand* by volume, <i>Min</i> | |
| | 7 days | 2.5 MPa |
| | 28 days | 5 MPa |
| v) | Air Content: Air content of mortar composed of 1 part masonry cement and 3 parts standard sand* by volume, <i>Min</i> | 6 percent |
| vi) | Water Retention: Flow after suction of mortar composed of 1 part masonry cement and 3 parts standard sand* by volume, <i>Min</i> | 60 percent of original flow |

*Standard sand shall conform to IS : 650-1966 'Specification for standard sand for testing of cement (first revision)'.

7. BASIS OF PURCHASE

7.1 The purchaser shall specify whether non-staining masonry cement as specified in 4 is desired. When this is not specified, the requirements for ordinary masonry cement shall govern.

8. DELIVERY

8.1 The cement shall be packed in bags [jute sacking bag conforming to IS : 2580-1982*, double hessian bituminized (CRI type), multiply paper conforming to IS : 11761-1986†, polyethylene lined (CRI type) jute, light weight jute conforming to IS : 12154-1987‡, woven HDPE conforming to IS : 11652-1986§, woven polypropylene conforming to IS : 11653-1986||, jute synthetic union conforming to IS : 12174-1987¶ or any other approved composite bags] bearing the manufacturer's name or his registered trademark, if any. The words 'masonry cement' and the number of bags (net mass) to the tonne or the nominal average net mass (see 8.2) of the cement shall be legibly and indelibly marked on each bag. Bags shall be in good condition at the time of inspection.

NOTE — The bags shall conform to relevant Indian Standards except dimensions.

8.1.1 Similar information shall be provided in the delivery advices accompanying the shipment of packed or bulk cement (see 8.3).

8.1.2 The bags or packages may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

8.1.3 In order to distinguish the masonry cement from the ordinary Portland cement, a distinctive bright coloured mark along with the words 'Masonry Cement' shall be marked outside the bag.

*Specification for jute sacking bag for packing cement (second revision).

†Specification for multiwall paper sacks for cement, valved-sewn-Gusseted type.

‡Specification for light weight jute bag for packing cement.

§Specification for high density polyethylene (HDPE) woven sacks for packing cement.

||Specification for polypropylene (PP) woven sacks for packing cement.

¶Specification for jute synthetic union bags for packing cement.

8.2 The average net mass of cement per bag shall be 50 kg (see Appendix A).

8.2.1 The average net mass of cement per bag may also be 25 kg subject to tolerances as given in 8.2.1.1 and packed in suitable bags as agreed to between the purchaser and the manufacturer.

8.2.1.1 The number of bags in a sample taken for weighment showing a minus error greater than 2 percent of the specified net mass shall be not more than 5 percent of the bags in the sample. Also the minus error in none of such bags in the sample shall exceed 4 percent of the specified net mass of cement in the bag. However, the average net mass of cement in a sample shall be equal to or more than 25 kg.

8.3 Supplies of cement in bulk may be made by arrangement between the purchaser and the supplier (manufacturer or stockist).

NOTE — A single bag or container containing 1 000 kg or more net mass of cement shall be considered as bulk supply of cement. Supplies of cement may also be made in intermediate containers, for example, drums of 200 kg, by agreement between the purchaser and the manufacturer.

9. SAMPLING

9.1 Samples for Testing and by Whom to be Taken — A sample or samples for testing may be taken by the purchaser or his representative, or by any person appointed to superintend the work for the purpose of which the cement is required or by the latter's representative. The samples shall be taken within three weeks of delivery and the tests shall be made within four weeks of delivery.

9.1.1 When it is not possible to test the samples within four weeks of delivery, the samples shall be packed and stored in air-tight containers till such time as they are tested.

9.2 In addition to the requirements of 9.1, the methods and procedure of sampling shall be in accordance with IS : 3535-1986*.

9.3 Facilities for Sampling and Identifying — The manufacturer or supplier shall afford every facility, and shall provide all labour and materials for taking and packing the samples for testing the cement and for subsequent identification of the cement sampled.

10. TESTS

10.1 The sample or samples of cement for tests shall be taken as described in 9 and shall be tested in the manner described in the relevant clauses.

*Method of sampling hydraulic cements (first revision).

10.2 Temperature of Testing — The temperature range within which physical tests may be carried out should, as far as possible, be $27 \pm 2^\circ\text{C}$.

10.3 Non-compliance with Tests — Any cement which does not comply with any of the tests specified above, or which has not been stored in the manner provided under 5 may be rejected as not complying with this standard.

10.4 Independent Testing

10.4.1 If the purchaser or his representative

requires independent tests, the samples shall be taken before or immediately after delivery at the option of the purchaser or his representative, and the tests shall be carried out in accordance with this standard on the written instruction of the purchaser or his representative.

10.4.2 After a representative sample has been drawn, tests on the sample shall be carried out as expeditiously as possible.

APPENDIX A

(*Clauses 0.4 and 8.2*)

TOLERANCE REQUIREMENTS FOR THE MASS OF CEMENT PACKED IN BAGS

A-1. The average net mass of cement packed in bags at the plant in a sample shall be equal to or more than 50 kg. The number of bags in a sample shall be as given below:

| <i>Batch Size</i> | <i>Sample Size</i> |
|-------------------|--------------------|
| 100 to 150 | 20 |
| 151 to 280 | 32 |
| 281 to 500 | 50 |
| 501 to 1 200 | 80 |
| 1 201 to 3 200 | 125 |
| 3 201 and over | 200 |

The bags in a sample shall be selected at random (*see IS : 4905-1968**).

A-1.1 The number of bags in a sample showing a minus error greater than 2 percent of the specified net mass (50 kg) shall be not more than 5 percent of the bags in the sample and the minus error in none of such bags in the sample shall exceed 4 percent of the specified net mass of the bag.

NOTE — The matter given in A-1 and A-1.1 are extracts based on the *Standards of Weights and Measures (Packaged Commodities)*, Rules, 1977 to which reference shall be made for full details. Any modification made in these Rules and other related Acts and Rules would apply automatically.

A-1.2 In case of a wagon/truck load of 20 to 25 tonnes, the overall tolerance on net mass of cement shall be 0 to + 0.5 percent.

*Methods for random sampling.

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AMENDMENT NO.1 NOVEMBER 1991
TO
IS 3466 : 1988 SPECIFICATION FOR MASONRY
CEMENT

(Second Revision)

(Page 4, clause A -1.2) — Substitute 'up to 25 tonnes' for 'of 20 to 25 tonnes'.

(CED 2)

Reprography Unit, BIS, New Delhi, India

**AMENDMENT NO. 2 JULY 2000
TO
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(Second Revision)

Substitute 'net mass' for 'nominal average net mass' and 'average net mass' wherever these appear in the standard.

(Page 3, clause 8.3) — Insert the following new clause after 8.3:

“8.4 The words ‘Not for structural concrete, flooring and foundation’ shall be marked on each bag or package.”

(CED 2)