भारतीय मानक ब्यूरो
(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)
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व्यापक परिचालन मसौदा

हमारा संदर्भ : सीईडी 02:1/टी-12 **22 जुलाई 2024**

तकनीकी समिति : सीमेंट और कंक्रीट अनुभागीय समिति , सीईडी 02
प्राप्तकर्ता :

1. **सिविल अभियांत्रिकी विभाग परिषद, सीईडीसी के सभी सदस्य**
2. **सीमेंट और कंक्रीट अनुभागीय समिति , सीईडी 02**
3. **सीईडी 02 की उपसमितियों और अन्य कार्यदल के सभी सदस्य**
4. **रुचि रखने वाले अन्य निकाय।**

महोदय/महोदया,

निम्नलिखित मानक का मसौदा संलग्न है:

प्रलेख संख्या	शीर्षक
सीईडी 02(26196)WC	**संरचना उपयोग के लिये उच्च ऐलुमिना सीमेंट — विशिष्टि का भारतीय मानक मसौदा** (IS 6452 का दूसरा पुनरीक्षण) (आई सी एस संख्या : 91.100.30)

कृपया इस मसौदे का अवलोकन करें और अपनी सम्मतियाँ यह बताते हुए भेजे कि यह मसौदा प्रकाशित हो तो इन पर अमल करने में आपको व्यवसाय अथवा कारोबार में क्या कठिनाइयां आ सकती हैं।

सम्मतियाँ भेजने की अंतिम तिथि: 20 सितम्बर 2024

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को ई-मेल द्वारा ced2@bis.gov.in पर या उपरलिखित पते पर, संलग्न फोर्मेट में भेजें। सम्मतियाँ बीआईएस ई-गवर्नेंस पोर्टल, www.manakonline.in के माध्यम से ऑनलाइन भी भेजी जा सकती हैं।

यदि कोई सम्मति प्राप्त नहीं होती है अथवा सम्मति में केवल भाषा संबंधी त्रुटि हुई तो उपरोक्त प्रालेख को यथावत अंतिम रूप दे दिया जाएगा। यदि सम्मति तकनीकी प्रकृति की हुई तो विषय समिति के अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रालेख को अंतिम रूप दे दिया जाएगा।

यह प्रालेख भारतीय मानक ब्यूरो की वेबसाइट www.bis.gov.in पर भी उपलब्ध हैं।

धन्यवाद।

भवदीय
ह-/
द्वैपायन भद्र
वैज्ञानिक ई एवं प्रमुख
सिविल अभियांत्रिकी विभाग

संलग्न: उपरलिखित

भारतीय मानक ब्यूरो
(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)
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WIDE CIRCULATION DRAFT

Our Reference: CED 02:1/T-12 **22 July 2024**

TECHNICAL COMMITTEE: CEMENT AND CONCRETE SECTIONAL COMMITTEE, CED 02

ADDRESSED TO:

1. All Members of Civil Engineering Division Council, CEDC
2. All Members of Cement and Concrete Sectional Committee, CED 02 and its Subcommittees
3. All Members of Subcommittees, Panels and Working Groups under CED 02
4. All others interested.

Dear Sir/Madam,

Please find enclosed the following draft:

Doc No.	Title
CED 02(26196)WC	**Draft Indian Standard High Alumina Cement for Structural Use — Specification** (*Second Revision of IS 6452*) ICS 91.100.30

Kindly examine the attached draft and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for comments: 20 September 2024

Comments if any, may please be made in the enclosed format and emailed at ced2@bis.gov.in or sent at the above address. Additionally, comments may be sent online through the BIS e-governance portal, www.manakonline.in.

In case no comments are received or comments received are of editorial nature, kindly permit us to presume your approval for the above document as finalized. However, in case comments, technical in nature are received, then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.gov.in.

Thanking you,

Yours faithfully,
Sd/-
Dwaipayan Bhadra
Scientist 'E' & Head
Civil Engineering Department

Encl: As above

FORMAT FOR SENDING COMMENTS ON THE DOCUMENT

[Please use A4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/ table/figure, etc, be stated on a fresh row. Information/comments should include reasons for comments, technical references and suggestions for modified wordings of the clause. Comments through e-mail to **ced2@bis.gov.in** shall be appreciated.]

Doc. No.: CED 02(26196)WC

BIS Letter Ref:

Title: Draft Indian Standard High Alumina Cement for Structural Use — Specification (*Second Revision of IS 6452*) ICS No. 91.100.30

Last date of comments: 20 September 2024

Name of the Commentator/ Organization: _____

Sl No.	Clause/ Para/ Table/ Figure No. commented	Type of Comment (General/ Technical/ Editorial)	Comments/ Modified Wordings	Justification of Proposed Change

NOTE- *Kindly insert more rows as necessary for each clause/table, etc*

BUREAU OF INDIAN STANDARDS

DRAFT STANDARD FOR COMMENTS ONLY

(Not to be reproduced without the permission of BIS or used as an Indian Standard)

Draft Indian Standard

High Alumina Cement for Structural Use — Specification

(Second Revision of IS 6452)

Cement and Concrete Sectional Committee, CED 02	**Last Date for Comments: 20 September 2024**

FOREWORD

(*Formal clauses of the standard to be added later*)

High alumina cement (HAC) is a special cement containing essentially hydraulic calcium aluminates as the major ingredient. The presence of the mono calcium aluminate ($CaO\ Al_2O_3$) constituent in HAC imparts certain unique properties, such as high early strength and refractoriness.

High alumina cement is mainly a refractory cement but in some cold regions this cement may find use as a structural material taking advantage of high heat of hydration and high early strength development. The hydration of mono calcium aluminates imparts high early strength and hence this cement will have special utility in work involving emergency repair or construction. However, conversion of the hydration product of the calcium aluminates from dicalcium aluminate hydrate to aluminate hydroxide and tricalcium aluminate hydrate and water will result in increased porosity and gradual reduction in strength. This conversion is more rapid in presence of moisture and at atmosphere temperatures over 18°C to 20°C. In tropical climates the loss in strength can be as much as 50 percent to 80 percent.

There has been considerable controversy on the long term effect of storage of high alumina cement concrete in water at temperatures around 18°C, also the data on retrogression is conflicting. In view of this, the use of this cement should be restricted to areas of continuously low temperature where highest summer temperatures do not exceed 18°C.

In view of the above and other properties of high alumina cement, there are certain restrictions given below about the use of this cement in concrete which should be strictly followed:

a) In view of the restrogression in strength and reduced durability, high alumina cement shall not be used in locations where the ambient temperatures are likely to exceed 18°C even for short periods. It shall not be used in mass concrete in view of the high heat of hydration inducing conversion of the hydrated compounds;
b) Accelerators like calcium chloride shall not be used with this cement;

c) Steam curing or elevated temperature of curing shall be avoided; and
d) High alumina cement shall not be mixed with any other type of cement.

This standard was first published in 1972 and subsequently revised in 1989. Since the last revision of this standard, various amendments had been issued from time to time in order to modify various requirements based on the experience gained with the use of this specification, the requirements of the users and also other standards referred to in the specification which had been revised. These amendments have been incorporated in this revision so as to make it more convenient for the users. Further, requirement of testing the cement samples at the earliest but not later than 3 months since the receipt of samples for testing, requirement of marking the 'Best before date' of cement and provision for rejection of cement samples have been included.

Quantity of cement packed in bags and the tolerance requirement for the quantity of cement packed in bags shall be in accordance with the relevant provisions of the *Standards of Weight and Measures (Packaged Commodities) rule,* 2011 and **B-1** (*see* Annex B). Any modification in these rules in respect of tolerance on mass of cement would apply automatically to this standard.

This standard contains **9.3, 9.4, 9.4.3** and **9.5** which call for agreement between purchaser and supplier.

This standard contributes to the United Nations Sustainable Development Goal 9: 'Industry, innovation and infrastructure', particularly its target to develop quality, reliable, sustainable and resilient infrastructure and also promote inclusive and sustainable industrialization.

The composition of the Committee responsible for the formulation of this standard is given in Annex C.

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 he rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (Second Revision)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

BUREAU OF INDIAN STANDARDS

DRAFT STANDARD FOR COMMENTS ONLY

Draft Indian Standard

High Alumina Cement for Structural Use — Specification

(Second Revision of IS 6452)

1 SCOPE

This standard covers the manufacture of High Alumina Cement (HAC) and the specific requirements for its use as a structural building material in the colder regions of our country (continuously 18°C and below). Its use as a refractory cement is not covered.

2 REFERENCES

The standards given in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A

3 MANUFACTURE

The cement shall be manufactured from aluminous and calcareous materials either by fusion or by sintering, and grinding the resulting clinker so as to produce a cement complying with this specification. No materials, other than water, shall be added during grinding of the cement.

4 PROPERTIES

4.1 The total alumina content (Al_2O_3) determined in accordance with the method specified in IS 4032 shall not be less than 32 percent by mass.

4.2 Fineness

Fineness of cement expressed in terms of specific surface determined by Blaine's air permeability method described in IS 4031 (Part 2) shall be not less than 225 m^2/kg.

4.3 Soundness

When tested by the 'Le-Chatelier' method described in IS 4031 (Part 3), (except that the quantity of mixing water shall be 22 percent of cement by mass) the cement shall not have an expansion of more than 5 mm.

4.4 Setting Time

The setting time of cement, when tested by the Vicat apparatus method described in IS 4031 (Part 5) (except that the quantity of mixing water shall be 22 percent of cement by mass) shall conform to the following requirements:

a) Initial setting time not less than 30 min, and

b) Final setting time not more than 10 h.

4.5 Compressive Strength

The average compressive strength of at least three mortar cubes (area of face 50 cm^2) composed of one part of cement, three parts of standard sand (conforming to IS 650) by mass and 10.5 to 11 percent (of combined mass of cement plus sand) water, and prepared, stored and tested at temperature 18°C ± 2°C in the manner described in IS 4031 (Part 6) shall be as follows:

a) At 24 h ± 30 min not less than 30 MPa, and
b) At 72 h ± 1 h shall show an increase on the compressive strength at 24 h and shall be not less than 35 MPa.

5 SAMPLING

5.1 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 all the tests shall be made within four weeks of delivery.

5.2 Notwithstanding the requirements of **5.1**, the methods and procedures of sampling shall be in accordance with IS 3535.

5.3 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.

6 TESTS

6.1 The sample or samples of cement for test shall be taken as described in **5.1** and shall be tested in the manner described in **4**.

6.2 The temperature at which physical tests may be carried out shall be 18°C ± 2°C.

6.3 Independent Testing

6.3.1 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 instructions of the purchaser or his representative.

6.3.2 *Cost of Testing*

The manufacturer shall supply, free of charge, the cement required for testing. Unless otherwise specified m the enquiry and order, the cost of the tests shall be borne as follow:

a) By the manufacturer in the event of the results showing that the cement does not comply with this standard, and
b) By the purchaser in the event of the results showing that the cement complies with this standard.

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

7 STORAGE

The cement shall be stored in such a manner as to permit easy access for proper inspection and identification, and in a suitable weathertight building to protect the cement from dampness and to minimize warehouse deterioration (*see also* IS 4082).

8 MANUFACTURER'S CERTIFICATE

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, within ten days of testing of the cement (except for 25 days compressive strength test results, which shall be furnished after completion of the test).

9 PACKING

9.1 The cement shall be packed in any of the following bags:

a) Multi-wall paper sacks conforming to IS 11761,
b) HDPE/PP woven sacks conforming to IS 11652,
c) Jute synthetic union bags conforming to IS 12174, or
d) Any other approved composite bag.

Bags shall be in good condition at the time of inspection.

9.2 The net quantity of cement per bag shall be 50 kg subject to provisions and tolerance given in Annex B.

9.3 The net quantity of cement per bag may also be 25 kg subject to tolerances as given in **9.3.1** and packed in suitable bags as agreed to between the purchaser and the manufacturer.

9.3.1 The number of bags in a sample taken for weighment showing a minus error greater than 2 percent of the specified net quantity 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 quantity of cement in the bag. However, the net quantity of cement in a sample shall be equal to or more than 25 kg.

9.4 When cement is intended for export and if the purchaser so requires, packing of cement may be done in bags or in drums with net quantity of cement per bag or drum as agreed to between the purchaser and the manufacturer.

9.4.1 For this purpose the permission of the certifying authority shall be obtained in advance for each export order.

9.4.2 The words 'FOR EXPORT' and the net quantity of cement per bag/drum shall be clearly marked in indelible ink on each bag/drum.

9.4.3 The packing material shall be as agreed to between the manufacturer and the purchaser.

9.4.4 The tolerance requirements for the quantity of cement packed in bags/drum shall be as given in **9.3.1** except the net quantity which shall be equal to or more than the quantity in **9.4**.

9.5 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 quantity of cement shall be considered as bulk supply of cement. Supply of cement may also be made in intermediate containers, for example, drums of 200 kg, by agreement between the purchaser and the manufacturer.

10 MARKING

10.1 Each bag or drum of cement shall be legibly and indelibly marked with the following:

a) Manufacturer's name and his registered trade-mark, if any;
b) The words 'HIGH ALUMINA CEMENT';
c) Net quantity, in kg;
d) The words 'USE NO HOOKS' on the bags;
e) Batch/control unit number in terms of week, month and year of packing;
f) Best before date (that is, 3 months from date of packing);
g) The need for testing of cement more than 3 months old to check conformity before its use; and
h) Address of the manufacturer.

10.2 Similar information shall be provided in the delivery advices accompanying the shipment of packed or bulk cement and on cement drums (*see* **9.5**).

10.3 BIS Certification Marking

10.3.1 The cement may also be marked with the Standard Mark.

10.3.2 The use of the Standard Mark is governed by the provisions of *the Bureau of Indian Standards Act,* 2016 and the Rules and Regulations made thereunder. The details of conditions under which a license for the use of the Standard Mark may be granted to manufacturers or purchasers may be obtained from the Bureau of Indian Standards.

11 REJECTION

11.1 Cement may be rejected, if it does not comply with any of the requirements of this specification.

11.2 Cement remaining in bulk storage at the factory, prior to shipment, for more than six months, or cement in bags, in local storage such as in the hands of a vendor for more than 3 months after completion of tests, shall be retested before use and shall be rejected, if it fails to conform to any of the requirements of this specification.

ANNEX A
(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
IS 650 : 1991	Standard sand for testing cement — Specification (*second revision*)
IS 3535 : 1986	Methods of sampling hydraulic cement (*first revision*)
IS 4031	Methods of physical tests for hydraulic cement:
Part 1:1996	Determination of fineness by dry sieving (*second revision)*
Part 2 : 1999	Determination of fineness by blaine air permeability method (*second revision)*
Part 3 : 1988	Determination of soundness (*first revision*)
Part 4 : 1988	Determination of consistency of standard cement paste (*first revision*)
Part 5 : 1988	Determination of initial and final setting times (*first revision*)
Part 6 : 1988	Determination of compressive strength of hydraulic cement other than masonry cement (*first revision*)
Part 7 : 1988	Determination of compressive strength of masonry cement (*first revision*)
Part 8 : 1988	Determination of transverse and compressive strength of plastic mortar using prism (*first revision*)
Part 9 : 1988	Determination of heat of hydration (*first revision*)
Part 10 : 1988	Determination of drying shrinkage (*first revision*)
Part 11 : 1988	Determination of density (*first revision*)
Part 12 : 1988	Determination of air content of hydraulic cement mortar (*first revision*)
Part 13 : 1988	Measurement of water retentivity of masonry cement (*first revision*)
IS 4032:1985	Method of chemical analysis of hydraulic cement (first revision)
IS 4905 : 2015	Random sampling and randomization procedures (*first revision*)
IS 11652 : 2017	Textiles — High density polyethylene (HDPE)/polypropylene (PP) woven sacks for packaging of 50 kg cement — Specification (*third revision*)
IS 11761 : 1997	Multi-wall paper sacks for cement — Specification (*first revision*)

IS 12174 : 1987	Specification for jute synthetic union bags for packing cement

ANNEX B
(*Foreword and Clause* **9.2**)

TOLERANCE REQUIREMENTS FOR THE QUANTITY OF CEMENT PACKED IN BAGS

B-1 The net quantity 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:

Batch Size	*Sample Size*
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 to over	200

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

B-1.1 The number of bags in a sample showing a minus error greater than 2 percent of the specified net quantity (50 Kg) 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 quantity of cement in the bag.

NOTE — The matter given in **B-1** and **B-1.1** are extracts based on *the Standards of Weights and Measures (Packaged Commodities) Rules*, 2011 to which reference shall be made for full details. Any modification made in these Rules and other related Acts and Rules would apply automatically.

B-1.2 In case of wagon/truck load up to 25 tonnes, the overall tolerance on net quantity of cement shall be 0 to +0.5 percent.

ANNEX C

(*Foreword)*

(Committee composition will be added after finalization)

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