

IS 8042 : 1989

Indian Standard
**WHITE PORTLAND CEMENT —
SPECIFICATION**
(Second Revision)

भारतीय मानक
सफेद पोर्टलैंड सीमेंट — विशिष्ट
(दूसरा पुनरीक्षण)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

April 1990

Price Group 3

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards on 30 October 1989, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

For architectural purposes, a pastel finish is sometimes required for finishing and decorative work in concrete. To achieve best results it is advisable to use white Portland cement with a suitable fine aggregate, and, if the surface is to be treated, also coarse aggregate. This type of cement has also the advantage that it is not liable to cause staining, since it has low content of soluble alkalis. White Portland cement is generally meant for non-structural use. White Portland cement is made from raw materials containing very little iron oxide and manganese oxide. Limited quantities of certain chemicals, which will improve whiteness of cement without affecting the physical properties, may be added during manufacture.

In this standard, the chemical requirements of white Portland cement are specified generally in line with those of 33 grade ordinary Portland cement (see IS 269 : 1989) except that maximum iron oxide content is 1.0 percent, and requirement for loss on ignition has been deleted. Further the strength requirements of white Portland cement are specified as not less than ninety percent of those of 33 grade ordinary Portland cement (see IS 269 : 1989). In addition, the requirement and method of test for degree of whiteness are also included in this standard.

This standard was first issued as an emergency standard in 1976 and subsequently revised in 1978. Since the publication of first revision of this standard, large number of amendments have been issued from time to time in order to modify various requirements based on experience gained with the use of the standard and the requirements of the users and also keeping in view the raw materials and fuel available in the country for manufacture of cement. The important amendments include modification in the tolerance requirements for the mass of cement packed in bags, deleting the requirement of percentage of alumina to that of iron oxide, permitting packaging of cement in 10 and 1 kg bags, incorporating a note allowing determination of fineness in terms of residue by dry sieving by mutual agreement and incorporating a provision for issuing a certificate indicating the total chloride content in percent by mass of cement. In view of these large number of amendments, the Sectional Committee decided to bring out the second revision of the standard incorporating all these amendments so as to make it more convenient for the users.

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

The composition of the committee responsible for the formulation of this standard is given in Annex D.

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 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

WHITE PORTLAND CEMENT — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard covers the manufacture and chemical and physical requirements of white Portland cement.

2 REFERENCES

2.1 The Indian standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 4845 : 1968 shall apply.

4 MANUFACTURE

4.1 White Portland cement shall be manufactured by intimately grinding the Portland cement clinker with appropriate proportion of natural or chemical gypsum so as to produce a cement capable of complying with this standard. No material shall be added at the time of grinding, other than gypsum or water or both, and not more than one percent of air-entraining agents or surfactants which have proved not to be harmful and do not have any negative influence on the degree of whiteness of cement.

5 CHEMICAL REQUIREMENTS

5.1 When tested in accordance with the methods given in IS 4032 : 1985, white Portland cement shall comply with the chemical requirements given in Table 1.

6 PHYSICAL REQUIREMENTS

6.1 Physical requirements of white Portland cement shall be as laid down in IS 269 : 1989 except that compressive strength of mortar prepared from white Portland cement shall not be less than 90 percent of those specified for 33 grade ordinary Portland cement.

NOTE — Those Industries which require fineness of white Portland cement in terms of residue by dry sieving, tested by the method described in IS 4031 (Part 1) : 1988, may specify the same additionally while placing order to a manufacturer by mutual agreement.

6.1.1 Notwithstanding the strength requirements specified in 6.1, the cement shall show a progressive increase in strength from the strength at 72 hours.

Table 1 Chemical Requirements for White Portland Cement

(Clause 5.1)

Sl No.	Characteristic	Requirement
(1)	(2)	(3)
i)	Ratio of percentages of lime to percentage of silica, alumina and iron oxide, when calculated by the formula: $\frac{\text{CaO} - 0.7 \text{ SO}_3}{2.8 \text{ SiO}_2 + 1.2 \text{ Al}_2\text{O}_3 + 0.65 \text{ Fe}_2\text{O}_3}$	Not greater than 1.02 and not less than 0.66
ii)	Iron oxide, percent by mass	Not more than 1.0 percent
iii)	Insoluble residue, percent by mass	Not more than 2.0 percent
iv)	Magnesia, percent by mass	Not more than 6 percent
v)	Total sulphur content calculated as sulphuric anhydride (SO ₃), percent by mass	Not more than 2.75 and 3.0 when tricalcium aluminate (see Note), percent by mass is 7 or less and greater than 7 respectively.

NOTE — The tricalcium aluminate content (C₃A) is calculated by the formula:

$$C_3A = 2.65 (Al_2O_3) - 1.69 (Fe_2O_3),$$

where each symbol in brackets refers to the percentage (by mass of total cement) of the oxide, excluding any contained in the insoluble residue referred to at Sl No. (iii).

6.2 Degree of Whiteness

The reflectance of neat cement ring, prepared and tested in accordance with Annex B shall not be less than 70 percent.

7 STORAGE, SAMPLING, TESTS AND REJECTION

7.1 Storage, sampling, tests and rejection of white Portland cement shall be as laid down in IS 269 : 1989 for 33 grade ordinary Portland cement.

8 MANUFACTURER'S CERTIFICATE

8.1 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 within 10 days of despatch of the cement.

8.2 The manufacturer shall furnish a certificate, within ten days of despatch of cement, indicating the total chloride content in percent by mass of cement.

NOTE — The limit of total chloride content in cement for use in plain and other reinforced concrete structures is being reviewed. Till that time, the limit may be mutually agreed to between the purchaser and the manufacturer. (Method of test for determination of chloride content in cement is given in IS 12423 : 1988)

9 DELIVERY

9.1 The cement shall be packed in bags [jute sacking bag conforming to IS 2580 : 1982, double hessian bituminized (CRI type), multiwall 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 trade-mark, if any. The words 'White

Portland Cement' and the number of bags to a tonne or the nominal average net mass of the cement (see 9.2) shall be marked legibly and indelibly on each bag. Bags shall be in good condition at the time of inspection.

9.2 The average net mass of cement per bag shall be 50 kg (see Annex C).

9.2.1 The average net mass of cement per bag may also be 10 or 1 kg subject to tolerances as given in 9.2.1.1 and packed in suitable bags as agreed to between the purchaser and the manufacturer.

9.2.1.1 The number of bags in a sample taken for weighing 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 10 or 1 kg as the case may be.

9.3 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.

ANNEX A

(Clause 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
IS 269 : 1989	Specification for 33 grade ordinary Portland cement (fourth revision)	IS 11652 : 1986	Specification for high density polyethylene (HDPE) woven sacks for packing cement
IS 2580 : 1982	Specification for jute sacking bags for packing cement (second revision)	IS 11653 : 1986	Specification for polypropylene (PP) woven sacks for packing cement
IS 4031 (Parts 1 to 13) : 1988	Methods for physical tests for hydraulic cement (first revision)	IS 11761 : 1986	Specification for multi wall paper sacks for cement, valued-sewn-gusseted type
IS 4032 : 1985	Method of chemical analysis of hydraulic cement (first revision)	IS 12154 : 1987	Specification for light weight jute bags for packing cement
IS 4845 : 1968	Definitions and terminology relating to hydraulic cement	IS 12174 : 1987	Specification for jute synthetic union bag for packing cement
IS 4905 : 1968	Methods for random sampling	IS 12423 : 1988	Method for colorimetric analysis of hydraulic cement

ANNEX B

(Clause 6.2)

TEST FOR DEGREE OF WHITENESS OF WHITE PORTLAND CEMENT

B-1 PREPARATION OF SAMPLE

B-1.1 Heap some quantity of dry neat cement into a mould of the shape of a ring of 30 mm diameter and 3 mm height (or any other mould or the mould supplied with the reflectivity measuring equipment) placed on a clean glass plate and gently press it down with another clean glass plate so that the density of the cement compact is close to that of the standard magnesium oxide blocks mentioned under B-2. Lift the ring gently with the compacted cement inside and prepare two such specimens for measuring the degree of whiteness.

B-2 TESTING

B-2.1 Compare the reflectivity of the compact cement surface with standard magnesium oxide blocks of certified reflectivity on absolute scale with the help of a suitable apparatus, for example, a reflectometer or reflectance spectrophotometer.

B-3 REPORTING OF RESULTS

B-3.1 Average reflectance of two specimens shall be reported; the two values should not differ by more than two units.

ANNEX C

(Clause 9.2)

TOLERANCE REQUIREMENTS FOR THE MASS OF CEMENT PACKED IN BAGS

C-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).

C-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. 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.

NOTE — The matter given in C-1 and C-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.

C-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.

NOTE — The mass of a jute sacking bag conforming to IS 2580 : 1982 to hold 50 kg of cement is 531 g, the mass of a double hessian bituminized (CRI type) bag to hold 50 kg of cement is 630 g, the mass of a 6-ply paper bag to hold 50 kg of cement is approximately 400 g and the mass of a polyethylene lined (CRI type) jute bag to hold 50 kg of cement is approximately 480 g.

ANNEX D

COMPOSITION OF THE TECHNICAL COMMITTEE CEMENT AND CONCRETE SECTIONAL COMMITTEE, CED 2

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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**AMENDMENT NO. 1 JANUARY 1991
TO
IS 8042:1989 SPECIFICATION FOR
WHITE PORTLAND CEMENT**

(Second Revision)

(Page 2, clause 9.2.1.1) - Insert the following new clauses after 9.2.1.1:

"9.2.2 When cement is intended for export and if the purchaser so requires, packing of cement may be done in bags other than those given in 9.2 and 9.2.1 with an average net mass of cement per bag as agreed to between the purchaser and the manufacturer.

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

9.2.2.2 The words 'FOR EXPORT' and the average net mass of cement per bag shall be clearly marked in indelible ink on each bag.

9.2.2.3 The packing material shall be as agreed to between the supplier and the purchaser.

9.2.2.4 The tolerance requirements for the mass of cement packed in bags shall be as given in 9.2.1 except the average net mass which shall be equal to or more than the quantity in 9.2.2."

(CED 2)

AMENDMENT NO. 2 NOVEMBER 1991
TO
IS 8042 : 1989 WHITE PORTLAND CEMENT —
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(Second Revision)

(Page 2, clause 9.2.1) — Substitute the following for the existing clause :

‘9.2.1 The average net mass of cement per bag may also be 10, 5, 2 or 1 kg subject to tolerances as given in 9.2.1.1 and packed in suitable bags as agreed to between the purchaser and the manufacturer.’

(Page 2, clause 9.2.1.1) — Substitute the following for the existing clause :

‘9.2.1.1 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 10, 5, 2 or 1 kg as the case may be.’

(Page 3, clause C-1.2) — Substitute ‘up to 25 tonnes’ for ‘of 20 to 25 tonnes’.

**AMENDMENT NO. 3 NOVEMBER 1993
TO
IS 8042 : 1989 WHITE PORTLAND CEMENT —
SPECIFICATION**

(Second Revision)

[Page 2, clause 9.2.1.1 (see also Amendments No. 1 and 2)] —
Substitute the following for the existing matter:

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

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

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

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

9.2.2.4 The tolerance requirements for the mass of cement packed in bags/drum shall be as given in 9.2.1.1 except the average net mass which shall be equal to or more than the quantity in 9.2.2.'

AMENDMENT NO. 4 APRIL 1994
TO
IS 8042 : 1989 WHITE PORTLAND CEMENT —
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(Second Revision)

[*Page 2, clause 9.2.2.1 (see also Amendment No. 3)*] — Substitute the following for the existing matter:

‘9.2.2.1 For this purpose, the manufacturer shall keep the certifying authority informed in advance for each export order.’

(CED 2)

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AMENDMENT NO. 5 APRIL 2000
TO
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(*Second Revision*)

Substitute 'net mass' *for* 'average net mass' wherever it appears in the standard.

(CED 2)

Reprography Unit, BIS, New Delhi, India