

**PS: 1630- 2014(R)**

ICS No.91.100.10

**PAKISTAN STANDARD**

---

---

**White Portland Cement**  
(1<sup>st</sup> Revision)



---

**(ALL RIGHTS RESERVED)**

**PAKISTAN STANDARDS AND QUALITY CONTROL AUTHORITY**

**STANDARDS DEVELOPMENT CENTRE**

**(STANDARDIZATION WING),**

**1<sup>ST</sup> FLOOR, ST-7-A, BLOCK-3**

**GULISTAN-E-JAUHAR**

**Karachi**

**Pakistan Standard Specification  
for  
White Portland Cement  
(1<sup>st</sup> Revision)**

0 FOREWORD:

0.1 This Standard was adopted by Pakistan Standard & Quality Control Authority after recommendations of the Technical Committee for “**CEMENT & LIME**” (BDC-05 ) on 21-04-2014. The same had been approved and endorsed by the Civil Engineering National Standards Committee on 08-05-2014.

0.2 This Standard has been prepared after taking into consideration the views and suggestions of the manufacturers, technologists, suppliers and utilizing agencies.

0.3 This Pakistan Standard No. **1630-1984** was prepared with the help of foreign specification which has been since revised/modified. Hence to keep up a par with the latest technology, it has been revised accordingly. In preparation of this Standard the Technical Committee acknowledges with thanks the assistance drawn from the standard **IS 8042:1989**.

0.4 This Standard is subject to periodical review in order to keep pace with development in industry. Any suggestions for improvement will be recorded and placed before the committee in due course.

**PAKISTAN STANDARD SPECIFICATION  
FOR  
WHITE PORTLAND CEMENT**

**1. Scope**

**1.1** This standard covers the manufacture and chemical and physical requirements of White Portland Cement.

**2. References**

**2.1** The Indian/Pakistan 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(PS...) 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 PS: 232-2008, 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 (PS...) 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 I): 1988 (PS...), 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:<br>$\frac{\text{CaO} - 0.7 \text{SO}_3}{2.8 \text{SiO}_2 + 1.2 \text{Al}_2\text{O}_3 + 0.65 \text{Fe}_2\text{O}_3}$ | 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 <sub>3</sub> ), 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 (C<sub>3</sub>A) 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 (PS...) 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 dispatch of the cement.

**8.2** The manufacturer shall furnish a certificate, within ten days of dispatch 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) (PS...)

## **9. Delivery**

**9.1** The cement shall be packed in bags [jute sacking bag conforming to IS2580: 1982 (PS...) double hessian bituminized (CRI type), multiwall paper conforming to IS 11761: 1986 (PS...), polyethylene lined (CRI type) jute, light weight jute conforming to IS 12154: 1987 (PS...), woven HDPE conforming to IS11652:1986(PS...), woven polypropylene conforming to IS 11653: 1986 (PS...), jute synthetic union conforming to IS 12174:1987 (PS...) 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 tone 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 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 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 1000 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 PAKISTAN/INDIAN STANDARDS

| IS No.  | Title   |
|---|---|
| PS:232-2008                                   | Specification for 33 grade ordinary Portland cement (2 <sup>nd</sup> Revision)    |
| IS 2580:1982                                  | Specification for jute sacking bags for packing cement (second revision)          |
| IS 4031-1988 (Parts 1 to 13)<br>/PS:4031-2014 | Methods for physical tests for hydraulic cement (first revision)                  |
| PS:232-2008                                   | Method of chemical analysis of hydraulic cement (first revision)                  |
| PS:4845-2014/<br>IS 4845: 1968                | Definitions and terminology relating to hydraulic cement                          |
| IS 4905: 1968                                 | Methods for random sampling   |
| IS 11652: 1986                                | Specification for high density polyethylene (HDPE) woven sacks for packing cement |
| IS 11653: 1986                                | Specification for polypropylene (PP) woven sacks for packing cement               |
| IS 11761: 1986                                | Specification for multi wall paper sacks for cement, valued-sewn-gussetted type   |
| IS 12154: 1987                                | Specification for light weight jute bags for packing cement                       |
| PS:12423-2014<br>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 6.2)**

**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 50Kg. 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 1200   | 80          |
| 1201 to 3200  | 125         |
| 3201 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 (50Kg) 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 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 (PS...) 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 630g, the mass of a 6-ply paper bag to hold 50 Kg of cement is approximately 400g and the mass of a polyethylene lined (CRI type) jute bag to hold 50Kg of cement is approximately 480g.

**AMENDMENT No.1**

**(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 word ‘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.”

## **AMENDMENT No.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 tolerance as given in 9.2.1.1 and packed in suitable bags as agreed to between the purchaser and the manufacturer.'

(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 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, 5, 2 or 1 Kg as the case may be.'

(clause C-1.2)- Substitute 'up to 25 tonnes' for 'of 20 to 25 tonnes.'

## **AMENDMENT No.3**

[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 word 'For Export' and the average net mass of the 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 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**

[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.'