SINGAPORE STANDARD

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(ICS 91.100.10)

SPECIFICATION FOR

Ordinary Portland cement

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Foreword

This Singapore Standard was prepared by the Technical Committee on Concrete and Cement under the direction of the Building Materials Product Standards Committee. It was first published in 1970 and revised in 1984 and 1997.

In this third revision, the standard is aligned more closely with developments in UK and ISO to keep abreast of progress in the local cement-producing industries.

This revision introduced the following changes:

(a) Different grades of compressive strength are specified and it is for ordinary Portland cement. Rapid-hardening Portland cement is no longer specified.

(b) The requirements for compressive strength are specified in terms of mortar prism, which is the new method adopted in the revised BS 12:1996.

(c) In the event that the temperature of bulk cement at delivery is of concern, there is a provision for a suitable temperature limit to be specified by agreement between the vendor and the purchaser.

(d) Compositional requirements are expressed as a percentage of the total mass of the constituents but excluding calcium sulfate and any additives. This departure from the traditional method of calculation in Singapore is fully explained in annex B.

(e) The addition of minor constituents is permitted up to a level of 5% (m/m), expressed as a percentage of the total mass of the constituents but excluding calcium sulfate and any additives, i.e. about 4.8% (m/m) expressed as a percentage of the final cement.

(f) Additives to improve the manufacture or the properties of the cement are permitted up to a level of 1.0% (m/m) without declaration by the manufacturer.

(g) The requirements are, in general, based on the results of tests on cement found in the following parts of SS 397 - Methods of testing cement :

Part 1 : 1997 Determination of strength

Part 2 : 1997 Chemical analysis of cement

Part 3 : 1997 Determination of setting time and soundness

Part 6 : 1997 Determination of fineness

Part 7 : 1997 Method of taking and preparing samples of cement

Part 21 : 1997 Determination of the chloride, carbon dioxide and alkali content of cement

(h) The requirements are specified as characteristic values and conformity is assessed by means of a statistical procedure for continuous inspection operated by the cement manufacturer (autocontrol) (see annex A). This includes the concept of ‘major defects’ which are ‘likely to reduce materially the usability of the cement for its intended purpose’. In particular, it is assumed, for the revision of this standard, that some limits are required for acceptance inspection. Clause 12 therefore gives appropriate values which in several cases are more stringent than those for major defects given in annex A.

(i) The test for setting time is essentially unchanged, but a requirement is not specified for the final setting time.

(j) Requirements are not specified for fineness, but where required, limits may be specified by agreement between the manufacturer and the purchaser.

(k) The limit for insoluble residue has been changed to an autocontrol maximum of 5.0% (m/m) (corresponding to acceptance inspection limit of 5.1% (m/m) of the final cement) where a minor additional constituent is included in the cement. For cements not containing a minor additional constituent the current limit of 1.5% (m/m) has been changed to become the autocontrol maximum (corresponding to an acceptance inspection limit of 1.6% (m/m) of the final cement).

(l) The 4.0% (m/m) limit for magnesium oxide content of the cement has been changed to a maximum of 5.0% (m/m) for the clinker.

(m) The limit for total sulphur (expressed as SO_3) has been changed to an autocontrol maximum limit for sulfate of 3.5% (m/m) (corresponding to an acceptance inspection limit of 3.6% (m/m) of the final cement).

(n) The limit for loss on ignition has been changed to an autocontrol maximum of 5.0% (m/m) (corresponding to an acceptance inspection limit of 5.1% (m/m) of the final cement) where a calcareous minor additional constituent is included in the cement. For cements not containing a calcareous minor additional constituent the current limit of 4.0% (m/m) has been changed to become the autocontrol maximum (corresponding to an acceptance inspection limit of 4.1% (m/m) of the final cement).

(o) A limit for chloride of 0.10% (m/m) has been changed to become the autocontrol maximum (corresponding to an acceptance inspection limit of 0.11% (m/m) of the final cement).

(p) Guidance on the use of cement has been retained and attention is drawn to the safety precautions recommended in Annex C when working with cement. Cement will partially hydrate when exposed to water vapour; Annex C also includes guidance on storage.

Product certification. Purchasers are recommended to specify cement manufactured and supplied to a nationally recognised third party product certification scheme.

This standard is an adoption of British Standard No. BS 12 : 1996 and was implemented with the permission of the British Standards Institution.

Acknowledgement is made for the use of information from the publications listed at the end of this standard.

NOTE

1. *Singapore Standards are subject to periodic review to keep abreast of technological changes and new technical developments. The revisions of Singapore Standards are announced through the issue of either amendment slips or revised editions.*

2. *Compliance with a Singapore Standard does not exempt users from legal obligations.*

Specification for ordinary Portland cement

1 Scope

This Singapore Standard[1] specifies requirements for the composition and the manufacture of ordinary Portland cement and for the strength, physical and chemical properties of ordinary Portland cement as 'characteristic' values. Requirements for marking, provision for information, sampling and testing for acceptance at delivery and for special Portland cements are also specified. It specifies the procedures for the manufacturer's autocontrol system to ensure conformity and for the purchaser's assessment of compliance at delivery. This standard specifies requirements for cement as commonly used in Singapore.

2 References

2.1 Normative references

This standard incorporates, by references, provisions from specific editions of other publications. These normative references are made at the appropriate points in the text and the publications are listed at the end of the standard. Subsequent amendments to, or revisions of, any of these publications apply to this standard only when incorporated in it by updating or revision.

2.2 Informative references

This standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed at the end of the standard, but reference should be made to the latest editions.

3 Definitions

For the purpose of this standard the definitions in BS 6100 : Section 6.1 apply together with the following:

3.1 Characteristic value

That value of a property corresponding to an acceptable percentage of defects, generally 10% but 5% for the lower strength limits.

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NOTE – Cement is a hydraulic binder, i.e it is a finely ground inorganic material which, when mixed with water, forms a paste which sets and hardens by means of hydration reactions and processes and which, after hardening, retains its strength and stability even under water.

1) Other types of cement standardised in Singapore are specified in SS 476 and SS 477