SINGAPORE STANDARD

SS 476 : 2000

(ICS 91.100.10)

SPECIFICATION FOR

High slag blastfurnace cement

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Foreword

This Singapore Standard was prepared by the Technical Committee for Concrete and Cement under the direction of the Building Materials Product Standards Committee.

It is based on the work of Technical Committee 51, Cement and building limes, of the European Committee for Standardisation (CEN), which has prepared a European Prestandard specification for cements published as DD ENV 197-1. As an intrinsic part of this activity, CEN has published EN 196, a series of methods of testing cement. In consequence, this Singapore Standard specifies requirements in terms of the test procedures in a series under SS 397 based on BS EN 196.

The specification covers a type of blastfurnace cement which was originally intended as a low heat cement for use in structures where large masses of concrete have to be placed. In such masses of concrete, there is often a considerable rise in temperature resulting from the evolution of heat as the cement sets and hardens, and from the slow rate at which this heat is dissipated from the surface. Cracking may result owing to the building up of tensile stresses during the rise and fall of temperature within the mass. Owing to the lower heat of hydration of this type of cement the risk of shrinkage cracking can be reduced. The specification included an option for the purchaser to specify the heat of hydration, and agree on a method for its measurement with the manufacturer, if advantage is to be taken of the low heat properties of the cement.

Moreover, this cement is now being used for a variety of purposes, e.g. resistance to chemical attack (see SS CP 65 and BRE Digest 363) other than for its low heat properties; for those applications due consideration is required of the low early strength which is characteristic of this type of cement, particularly at low temperatures. The rate of strength development of this type of cement is similar to that of low heat Portland cement (see BS 1370) but lower than that of Portland blastfurnace cements (see SS 477).

The requirements for compressive strength, physical and chemical properties 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’. However, DD ENV 197-1 is considered to be inappropriate in its entirety for the manufacture of cement in Singapore and the annex therefore incorporates several footnotes identifying specific aspects. In particular, it is assumed, for this edition of this Singapore 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.The strength requirements are based on the SS 397 : Part 1 : Section One mortar prism test at 28 days.

Compositional requirements are expressed as a percentage of the total mass of the constituents but excluding calcium sulfate and any additives. This method of calculation is fully explained in Annex B.

Guidance on the use of cement has been included in Annex C and attention is drawn to the safety precautions recommended therein when, working with cement. Cement will partially hydrate when exposed to water vapour, Annex C also included guidance on storage.

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

This Singapore Standard is an adoption of British Standard No. BS 4246 : 1996 and was implemented with the permission of the British Standards Institution.

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 high slag blastfurnace cement

1 Scope

This Singapore Standard[1)] specifies requirements for the composition and manufacture and for the strength, physical and chemical properties of high slag blastfurnace cement, as characteristic values. Requirements for marking, provision for information, sampling and testing for acceptance at delivery are also specified. It gives the procedures for the manufacturer's autocontrol system to ensure conformity.

2 References

2.1 Normative references

This Singapore 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 Singapore Standard only when incorporated in it by updating or revision.

2.2 Informative references

This Singapore 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 Singapore 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.

4 Cement

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.

4.1 Cement conforming to this Singapore Standard shall, when appropriately batched and mixed with aggregate and water, be capable in producing mortar or concrete which retains workability for a sufficient time and shall after defined periods attain specified strength levels and also possess long-term volume stability.

NOTE – Hydraulic hardening of cement conforming to this Singapore Standard is primarily due to the hydration of calcium silicates[2)], but other chemical compounds may also participate in the hardening process, e.g aluminates.

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1) Other types of cement standardised in Singapore are specified in SS 26 and SS 477

2) There are also cements whose hardening is mainly due to other compounds, e.g. calcium aluminate in high alumina cement.