

SINGAPORE STANDARD

SS 289 : Part 1 : 2000

(ICS 91.100.30)

SPECIFICATION FOR

Concrete

Part 1 : Guide to specifying concrete

Published by
SPRING Singapore
2 Bukit Merah Central
Singapore 159835
SPRING Singapore Website: www.spring.gov.sg
Standards Website: www.standards.org.sg



SINGAPORE STANDARD

SS 289 : Part 1 : 2000

(ICS 91.100.30)

SPECIFICATION FOR

Concrete

Part 1 : Guide to specifying concrete

All rights reserved. Unless otherwise specified, no part of this Singapore Standard may be reproduced or utilised in any form or by any means, electronic or mechanical, including photocopying and microfilming, without permission in writing from the SPRING Singapore at the address below:

Programme Director
Standardisation Department
SPRING Singapore
2 Bukit Merah Central
Singapore 159835
Telephone: 62786666 Telefax: 62786667
Email: stn@spring.gov.sg

ISBN 9971-67-795-4

Contents

	Page
Foreword _____	4

SPECIFICATION

0	Introduction _____	6
1	Scope _____	6
2	References _____	6
3	Definitions _____	7
4	Constituent materials of concrete _____	10
5	Durability of concrete _____	13
6	Other properties of hardened concrete _____	18
7	Properties of fresh concrete _____	23
8	Basis for specifying concrete _____	25
9	Sampling for conformity testing _____	28
10	Action to be taken in the event of non-conformity of the concrete with its specification _____	28

TABLES

1	Cements _____	8
2	Aggregates for general use _____	11
3	Admixtures _____	12
4	Limits of chloride content of concrete _____	14
5	Classification of exposure conditions _____	16
6	Guidance on mix design limits for durability of concrete made with normal weight aggregates of 20 mm nominal maximum size _____	16
7a	Sulfate and acid resistance - Recommendations for concrete exposed to sulfate attack _____	19
7b	Sulfate and acid resistance - Cement groups for use in Table 7a _____	20
7c	Sulfate and acid resistance - Modifications to Table 7a for other types of exposure and types of construction _____	21
7d	Sulfate and acid resistance - Modifications to Table 7a and Table 7c for concrete exposed to attack from acids in natural ground _____	21
8	Adjustments to minimum cement contents for aggregates other than 20 mm nominal maximum size _____	22
9	Compressive strength grades _____	22
10	Flexural strength grades _____	22
11	Workabilities suitable for different uses of in-situ concrete _____	24
12	Summary of different types of mix _____	26
13	Equivalent grades for cement content and free water/cement ratio _____	27
14	Recommended minimum rates of sampling _____	28

Foreword

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

This part, which is a new edition is a revision of SS 289 : 1986, together with three other parts, forms a comprehensive standard for the specification of concrete to which codes of practice and contractual documents can refer.

This part takes account of the recent consensus reached by experts on provisions to resist damaging ASR in the UK. These recommendations are published in the BRE Digest 330:1999.

It refers to BRE Digest 363 which has superseded BRE Digest 250, for guidance on sulfate and acid resistance of concrete in natural ground. Consideration is given in this standard to the type of construction in addition to the concentration of sulfate. Account is also taken of the factors affecting sulfate attack such as pH level and soil permeability.

As this standard involves selection by specifier from a number of options and, in certain circumstances, agreement on requirements between the purchaser and producer, any requirement for conformity to SS 289 or any claim of compliance with it has to be qualified by reference to the selection and to any such agreements.

This standard covers the methods for specifying and producing concrete as a construction material up to the point of delivery into the construction. The standard is in four parts:

Part 1: Guide to specifying concrete

Part 2: Methods for specifying concrete mixes

Part 3: Specification for the procedures to be used in producing and transporting concrete

Part 4: Specification for the procedures to be used in sampling, testing and assessing compliance of concrete

Part 1 provides guidance to the specifier and purchaser of concrete on the selection of requirements for materials and concrete mixes. Part 2 provides a choice of methods by which the purchaser can convey the selected requirements to the producer. Part 3 specifies for the producer the procedures to be used in producing and transporting the concrete. Part 4 specifies the procedures to be used by the purchaser in sampling, testing and assessing concrete for conformity.

This standard provides methods for specifying concrete mixed on site or in a precast concrete factory and for the purchase and supply of ready-mixed concrete. It takes account of the distinct and different responsibilities of the purchaser and the producer. There are a number of instances in which the purchaser has to select from the various options given in this standard in order to specify the concrete required. The purchaser is responsible for passing on to the producer the requirements of the specifying body, e.g. the engineer's or architect's specification, together with any additional requirements. Throughout this standard the terms 'specify' and 'specification' are used in relation to both sets of requirements. There may be occasions where it is advantageous for economic or technical reasons to propose changes to the specification. In such cases the producer and purchaser should agree on the proposed amendments for approval and sanction by the specifying body.

Precautions need to be taken when working with cement and wet concrete and attention is drawn to these in SS 289 : Parts 3 and 4.

This standard covers concrete produced by normal methods, but it does not apply to precast concrete products where other specifications contain the specification of the concrete. Many of the requirements of the standard, e.g. the use of materials and the control of production, apply equally to precast concrete and to in situ concrete. However, some of its requirements concerning the responsibilities of the purchaser and producer may not apply in the case of precast concrete.

It is necessary for the purchaser to take into account the requirements of specialized codes of practice and any influences of the construction process. Provisions are made in this standard for the inclusion of any special requirements.

A Singapore Standard does not purport to include all the necessary provisions of a contract. Users of Singapore Standard are responsible for their correct application.

This Singapore Standard is an adoption of British Standard No. BS 5328:Part 1: 1997 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 concrete – Part 1 : Guide to specifying concrete

0 Introduction

This part of SS 289 gives advice on the selection of the quality of concrete suitable for many general purposes not covered by Singapore Standard Specifications or Codes of Practice.

This part of SS 289 is primarily a guide for the specifier in choosing the appropriate materials and mix. It gives the range of constituent materials that can be used. It describes the properties of fresh and hardened concrete, with considerable emphasis on durability. Distinction is made between structural and non-structural concrete and between unreinforced, reinforced and prestressed concrete. Also included is guidance on sampling for strength conformity testing and action to be taken in the event of non-conformity.

Account is taken of standard specifications relating to ground granulated blastfurnace slag or pulverized-fuel ash used in composite cements or in equivalent combinations.

Purchasers ordering in accordance with this standard are advised to specify quality assurance requirements for materials or for concrete in their purchasing contracts to assure themselves that products specified in accordance with SS 289 consistently achieve the required level of quality. Purchasers of ready-mixed concrete are advised to specify certification meeting the requirements of the Singapore Accreditation Council for Certification Bodies. They are similarly advised to specify that, where they are available, constituent materials should be obtained from the suppliers operating quality systems in accordance with relevant SS ISO 9000 series of standards.

1 Scope

This part of SS 289 gives guidance on the selection of materials for concrete and on the mixes to be specified to produce concrete having the required properties in the fresh and hardened state. It also gives guidance on sampling for strength conformity testing and action to be taken in the event of non-conformity.

2 References

2.1 Normative references

This part of SS 289 incorporates, by dated or undated references, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed at the end of the standard. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this part of SS 289 only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies together with any amendments.

2.2 Informative references

This part of SS 289 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard should be made to the latest editions.