

**SINGAPORE STANDARD**

**SS 31 : 1998**

(ICS 91.100.30)

**SPECIFICATION FOR**

**Aggregates from natural  
sources for concrete**

(Incorporating Erratum No. 1, October 1998)

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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. This edition is a revision SS 31 : 1984 – ‘Specification for coarse and fine aggregates from natural sources for concrete’.

The Technical Committee, in revising SS 31 : 1984, has taken into consideration the views of concrete suppliers, consumers, testing authorities and concrete technologists, and has related the standard to the practice followed in the local context.

This revised standard is based on BS 882 : 1992 - ‘Aggregates from natural sources for concrete’ and is reproduced by permission of BSI, 389 Chiswick High Road, London W4 4AL, England.

In preparing this standard, reference was also made to AS 2758.1 : 1985 - ‘Aggregates and rock for engineering purposes - Part 1 : Concrete aggregates’.

Acknowledgement is made for the use of information from the above overseas publications.

In this revision, ‘fine aggregate’ is replaced by ‘sand’ which now refers to natural uncrushed, partially crushed and crushed rock material. ‘Fines’ replaces ‘clay, silt and fine dust’ and refers to any solid material passing a 75  $\mu$ m sieve.

New grading requirements are introduced for coarse aggregates containing 2 mm to 10 mm fractions with the inclusion of limits for material passing a 14 mm sieve. This ensures a reasonable fraction of the aggregate will be retained between the 20 mm and 14 mm sieves and eliminates the anomaly that some nominal 14 mm aggregates previously complied with the 20 mm grading requirements.

Changes in test methods since the 1984 edition are reflected. The difference in results for mechanical properties dependent on the moisture condition of the aggregate is eliminated by linking limits to tests on oven-dry materials.

Another example reflects the change in the test for fines content to the washing and sieving method and limits have been correspondingly increased. Attention is also drawn to the importance of performance characteristics where doubt exists in place of fixing particular limits for fines contents.

The annexes give further consideration to provision of information by the supplier and advice on user concerns. Annex A is expanded to include provision of information on request from tests in accordance with SS 73 for acid soluble sulphate contents and drying shrinkage. Additionally in several cases the time period is reduced from which test results are to be provided. Annex B identifies the potential damaging effect of materials such as mundic mine waste in Cornwall and Devon, UK. Finally, Annex C includes tighter guideline limits on chloride content in the total combined aggregate whilst stressing the need to calculate the chloride content of the concrete mix from the total of the measured values for each of the constituents.

The field settling test has been retained as a simple means of routine testing for fines content when a correlation between the result of this test (by volume) and the quantity by mass has been established for a given source of supply. Guidance on measurement of fines content in the field settling test is given in Annex D.

### **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.*

## 0 Introduction

When specifying aggregates in compliance with this standard, there may be a need to specify or approve certain additional quality requirements or narrower grading limits within one of those in table 4 for sands, to suit special applications, for example, the production of concrete having an especially fine finish or suitable for very severe conditions of exposure. Certain machine-formed concrete or precast products may also require aggregate gradings outside those given in tables 3, 4 and 5. In these cases appropriate grading should be agreed between the purchaser and the supplier. When narrower grading limits are required, sands should be obtained from sources which demonstrate from test data no more variability than a grading width (see Annex A). Guidance is given in Annex B on special factors to be considered in the selection of aggregates for which limits cannot be specified and determined by testing the aggregate itself in accordance with an accepted method of test. Guidance on chloride content is given in Annex C.

In general it will not be necessary to test each aggregate for all of the requirements specified in this standard. Consideration of the nature of the aggregate and its source will normally indicate which characteristics will need periodic examination, particularly in respect of those properties for which different requirements are given for specific uses. The suitability of an aggregate for the required use can be assessed initially by reference to data provided by the supplier in accordance with Annex A.

Some variation in the measured quality of material from any source can be expected due to sampling and testing in addition to the variability of the material itself. Data provided in accordance with Annex A may not be strictly applicable to the material in a single sample or consignment.

## 1 Scope

This Singapore Standard specifies the quality and grading requirements for aggregates obtained by processing natural materials for use in concrete. (For lightweight aggregates, see BS 3797.)

NOTE – The titles of the publications referred to in this standard are listed at the end of the standard.

## 2 Definitions

For the purposes of this Singapore Standard the following definitions apply.

### 2.1 Aggregate

A granular material obtained by processing natural materials.

### 2.2 Coarse aggregate

Aggregate mainly retained on a 5.0 mm SS 74 test sieve and containing no more finer material than is permitted for the various sizes in this specification.

NOTE – Coarse aggregate may be described as gravel (uncrushed, crushed or partially crushed) as defined in 2.2.1, or as crushed rock as defined in 2.2.2, or as blended coarse aggregate as defined in 2.2.3.

#### 2.2.1 Gravel

- (a) uncrushed gravel

Coarse aggregate resulting from the natural disintegration of rock.