SOUTH AFRICAN NATIONAL STANDARD

Concrete tests

Part 3: Making and curing of test specimens
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<td>2006</td>
<td>Amended to change the designation of SABS standards to SANS standards, with no technical changes.</td>
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**Foreword**

This South African standard was approved by National Committee SABS SC 59A, *Construction standards – Cement, lime and concrete*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This edition is technically identical to the first revision (SABS SM 861-3:1994).

SANS 5861 consists of the following parts, under the general title, *Concrete tests*:

*Part 1: Mixing fresh concrete in the laboratory.*

*Part 2: Sampling of freshly mixed concrete.*

*Part 3: Making and curing of test specimens.*

Reaffirmed and reprinted in March 2012. This standard will be reviewed every five years and be reaffirmed, amended, revised or withdrawn.
Concrete tests

Part 3: Making and curing of test specimens

1 Scope

This part of SANS 5861 applies to the making and curing of test specimens in the form of cubes, cylinders or rectangular prisms with a square cross-section from freshly mixed concrete supplied in measured and measurable quantities.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of SANS 5861. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this part of SANS 5861 are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

SANS 5860, Concrete tests – Dimensions, tolerances and uses of cast test specimens.
SANS 5861-1, Concrete tests – Part 1: Mixing fresh concrete in the laboratory.
SANS 5861-2, Concrete tests – Part 2: Sampling of freshly mixed concrete.
SANS 5862-1, Concrete tests – Consistence of freshly mixed concrete – Part 1: Slump test.

3 Apparatus

3.1 Moulds, that are capable of providing test specimens of which the dimensions and tolerances comply with the requirements of SANS 5860. The moulds should so be constructed as to facilitate the removal (without damage) of the moulded specimens. The moulds should be made of a non-absorbent material (preferably steel or cast iron) that is not readily attacked by cement.

NOTE The nominal size of the moulds should be at least four times the nominal maximum size of the aggregate.

3.1.1 Each mould should have a base plate, with a plane surface and of such dimensions as to support the mould (during filling) without leakage. The base plate should be rigidly attached to the mould by springs, bolts or screws.

3.1.2 The parts of the mould (when assembled) should be positively and rigidly held together, and effective methods of ensuring this, both during filling and on subsequent handling of the filled mould, should be provided.
3.1.3 When assembling the mould for use, ensure that the joints between the sections of the mould, the bottom contact surfaces between the mould and the base plate, and the internal faces of the assembled mould are thinly coated with grease or oil to prevent leakage of water through the joints and to prevent the adhesion of the concrete to the moulds.

3.2 Means of compacting the concrete in the mould, which shall be one of the following:

a) a tamping rod, for hand compaction, that is made of steel, is of nominal diameter 16 mm and of length 600 mm ± 2 mm, and that has at least one hemispherical end; or

b) a suitable vibrating table or a suitable electric or pneumatic hammer.

3.3 Steel float, for finishing off the surface of the concrete in the filled mould.

4 Preparation of test specimens

4.1 Moulding

4.1.1 General

Using the composite sample collected on site or from concrete mixed in the laboratory (see SANS 5861-1 and SANS 5861-2, as relevant), prepare at least three specimens for each test age by filling (in layers of depth approximately 50 mm) each of three moulds in such a way as to provide full compaction of the concrete without segregation or excessive laitance. Compact each layer with the tamping rod (see 4.1.2) or by vibration (see 4.1.3). Once the top layer has been compacted, use the steel float to strike off the surface of the concrete level with the top of the mould.

NOTE Some types of concrete, e.g. no-fines concrete, concrete that has a slump of less than 5 mm (see SANS 5862-1), self-levelling concrete, etc., need other means of compaction than described in this method. In such cases, adjust the method of compaction to ensure that the concrete is fully compacted and free from segregation.

4.1.2 Compaction by tamping

Using the hemispherical end of the tamping rod, tamp the concrete, distributing strokes uniformly over the cross-section of the mould to ensure full compaction. The number of strokes required per layer will vary according to the type of concrete, but in normal cases the concrete is subjected to one stroke for every 500 mm² of the layer. Ensure that the tamping rod does not penetrate the previous layer by more than ± 10 mm and does not forcibly strike the bottom of the mould when the first layer is being compacted.

4.1.3 Compaction by vibration

When using a vibrating table or an electric or a pneumatic hammer, ensure that the mould is clamped to the table or held firmly against the hammer.

NOTES

1 Vibration should be applied for the minimum duration necessary to achieve full compaction of the concrete. The required duration of vibration depends on the workability of the concrete and the effectiveness of the vibrator. Vibration should cease when large air bubbles are no longer released and the surface of the concrete is relatively smooth and has a glazed appearance.

2 Unless the compaction method is stated in the relevant standard, guidelines for the selection of the method of compaction are based on the slump, as follows:
a) concrete with a slump that exceeds 75 mm: compact by tamping;
b) concrete with a slump of between 25 mm and 75 mm: compact by either tamping or vibration; and
c) concrete with a slump of less than 25 mm: compact by vibration.

4.1.4 Mark each mould or mark each specimen to facilitate identification before removing it from the mould (see 4.2.1.2).

4.2 Curing

4.2.1 Laboratory-made specimens

4.2.1.1 Cover the specimens (as marked in their moulds) with an impervious sheet and then store them in a place that is free from vibration and in an atmosphere that has a relative humidity of at least 90 % and a temperature of 22 °C to 25 °C, 20 h to 24 h after the time of the addition of water to the dry ingredients.

4.2.1.2 So mark each specimen that it can be identified. Demould the specimens and, unless they are tested immediately, submerge them, until just prior to testing, in potable water that is maintained at a temperature of 22 °C to 25 °C. Ensure that specimens do not become dry at any time before testing.

4.2.2 Specimens made on site

4.2.2.1 Cover the test specimens (as marked in their moulds) with an impervious sheet, followed by wet matting, sacks, or similar material, and then store them in a place that is free from vibration, excessive draughts, direct sunlight and low temperatures for 20 h to 24 h after casting of the cubes (see Note 1 below). Then so mark each specimen that it can be identified.

4.2.2.2 If the specimens have to be kept on site for a prolonged period, mark them as in 4.2.2.1, then demould the specimens and immerse them in potable water that is preferably maintained at 22 °C to 25 °C, until they are transferred to the test facility (see Note 2 below).

4.2.2.3 Ensure that loss of moisture is prevented during transportation, and that, once the specimens have been demoulded, they are well protected against damage.

NOTES

1 If the concrete has been designed for either retarded or accelerated strength development and the predemoulding time lapse of 20 h to 24 h is not suitable, this time may be shortened or extended for a suitable period. Such deviations from the standard procedure must be reported.

2 During curing on site and in transit, it is important to keep the specimens at an even temperature, preferably above 10 °C, since lower temperatures can have an adverse effect on the strength development of the concrete.

3 It is important to ensure that specimens, especially conventional concrete cubes that are less than 72 h old, are protected from abrasion or shock in transit.

4.2.2.4 On their arrival at the test facility, store the specimens in water (see 4.2.1.2) until they are tested.