
Testing of concrete —
Part 1:
Sampling of fresh concrete

Essais du béton —

Partie 1: Échantillonnage du béton frais

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1920-1 was prepared by Technical Committee ISO/TC 71, *Concrete, reinforced concrete and pre-stressed concrete*, Subcommittee SC 1, *Test methods for concrete*.

This first edition of ISO 1920-1 cancels and replaces ISO 2736-1:1986, *Concrete tests — Test specimens — Part 1: Sampling of fresh concrete*.

ISO 1920 consists of the following parts under the general title *Testing of concrete*:

- *Part 1: Sampling of fresh concrete*
- *Part 2: Properties of fresh concrete*
- *Part 3: Making and curing test specimens*
- *Part 4: Strength of hardened concrete*
- *Part 5: Properties of hardened concrete other than strength*
- *Part 6: Sampling, preparing and testing concrete cores*
- *Part 7: Non-destructive tests on hardened concrete*

Testing of concrete —

Part 1: Sampling of fresh concrete

WARNING — When cement is mixed with water, alkali is released. When sampling, prevent skin contact with wet cement or concrete by wearing suitable protective clothing (gloves, footwear, safety glasses). If wet cement or concrete enters the eye, immediately wash it out thoroughly with clean water and seek medical treatment without delay. Wash wet concrete off the skin immediately.

1 Scope

This part of ISO 1920 specifies procedures for the sampling of fresh concrete. The samples are used for the testing of properties of fresh concrete, or for making test specimens to determine the properties of hardened concrete.

NOTE ISO 1920-1 specifies the properties of fresh concrete and ISO 1920-3 gives the procedures for making and curing test specimens.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1920-2, *Testing of concrete — Part 2: Properties of fresh concrete*

ISO 1920-3, *Testing of concrete — Part 3: Making and curing test specimens*

ISO 1920-4, *Testing of concrete — Part 4: Strength of hardened concrete*

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1 batch

quantity of concrete, mixed in one cycle of operation of a batch mixer, or the quantity of concrete conveyed ready-mixed in a vehicle, or the quantity discharged over 1 min from a continuous mixer

3.2 composite sample

quantity of concrete consisting of a number of increments, distributed through a batch or mass of concrete, which are thoroughly mixed together

3.3 spot sample

quantity of concrete taken from part of a batch or mass of concrete, consisting of one or more increments that are thoroughly mixed together

**3.4
increment**

quantity of concrete taken by the single operation of a scoop

4 Principle

4.1 Taking a composite sample

Concrete is sampled from a stream of moving concrete or from a pile in a series of increments according to 6.2. These increments are then thoroughly mixed together.

4.2 Taking a spot sample

Concrete is sampled from a stream of moving concrete or from a pile at a single point.

Spot samples are not representative of the batch and should not be used to manufacture strength specimens.

5 Apparatus

5.1 Scoop, made from non-absorbent material not readily attacked by cement paste, with a size suitable for taking increments of concrete.

5.2 Containers, one or more, made from non-absorbent material not readily attacked by cement paste, for receiving, transporting and remixing the concrete samples.

5.3 Thermometer (when required), to measure the temperature of fresh concrete to an accuracy of ± 1 °C.

5.4 Moist cloth.

6 Sampling procedure

6.1 Sampling plan

Decide whether a spot sample or a composite sample is to be taken.

NOTE This will depend upon the intended use of the sample.

Take a sample that is at least 1,5 times the quantity estimated as being required for the test.

A procedure for monitoring sampling errors is described in Annex A.

6.2 Obtaining a composite sample

Ensure that the apparatus is clean and dampen it with a moist, but not wet, cloth prior to use.

Using the scoop (5.1), take the required number of increments uniformly distributed throughout the batch.

When sampling from a stationary batch mixer or ready-mixed concrete truck, disregard the very first and the very last of the discharge. When sampling from a falling stream, the increments shall be taken in such a way as to represent the whole width and thickness of the stream. If the batch has been deposited in a heap of concrete, take the increments, wherever possible, distributed through the depth of the concrete as well as over the exposed surface. Samples shall not be taken from parts of the concrete that are obviously different from the rest of the pile, such as from areas that are oversanded or stoney.

The increments shall be taken from at least three places.

Deposit the increments into the container(s) (5.2).

Record the date and time of sampling.

6.3 Obtaining a spot sample

Ensure that the apparatus is clean and dampen it with a moist, but not wet, cloth prior to use.

Using the scoop (5.1), take the increment(s) from the required part of a batch or mass of concrete.

Deposit the increment(s) into the container (5.2).

Record the date and time of sampling.

6.4 Transporting, handling and care of samples

At all stages of sampling, transport and handling, protect the fresh concrete samples against contamination, increase or loss of moisture, excessive vibration, and against extreme variations of temperature.

The properties of fresh concrete change with time after mixing, depending upon the environmental conditions. This should be taken into account in deciding when tests are carried out or specimens made.

When taking the concrete from the container(s), ensure that no more than a light covering of slurry is left adhering to the container(s).

6.5 Measuring the temperature of the sample

When required, measure the temperature of the concrete in the container(s) at the time of sampling.

7 Sampling report

Each sample shall be accompanied by a report from the person responsible for taking the sample. An example of a test report is given in Annex B. The report shall include

- a) clear identification of the sample,
- b) type of sample (composite or spot),
- c) identification of the works,
- d) identification of the element(s) in the works which the sample represents,
- e) date and time of sampling,
- f) identification of the batch sampled,
- g) ambient temperature and weather conditions,
- h) name and signature of person responsible for sampling,
- i) temperature of the concrete sample before discharging the concrete (when required),
- j) any deviations from the standard method of sampling, and
- k) a declaration by the person technically responsible that the sample was obtained in accordance with this International Standard, except as noted in j) above.

Annex A (informative)

Monitoring sampling error

A.1 General

This procedure may be used to assess the consistency of the sampling procedure being used by an individual ("repeatability").

Sampling error may be assessed during regular sampling from the difference in compressive strength between duplicate samples with allowance for the contribution from testing error.

A.2 Procedure

From each of 20 batches of concrete of the same strength class or mix, a standard sample and a duplicate sample shall be obtained using the procedure described in Clause 6. Each increment taken for the standard sample shall be followed immediately by an increment for the duplicate sample and the two samples shall be collected in separate containers. Both the samples shall be prepared in accordance with 6.2 and pairs of test specimens shall be made from each composite sample in accordance with ISO 1920-3. All the test specimens shall be tested for compressive strength at 28 days in accordance with ISO 1920-4.

A.3 Calculation and reporting sampling error

For each pair of compressive strength results from the 20 standard samples, the mean, M_s , and the differences, D_s , shall be calculated.

Similarly for each pair of compressive strength results from the 20 duplicate samples, the mean, M_d , and the differences, D_d , shall be calculated. Record each calculation of the mean to the nearest 0,25 MPa. Calculations shall be based on the following formulae.

- a) Testing variation, V_t

$$V_t = \frac{\sum D_s^2 + \sum D_d^2}{80}$$

- b) Testing plus sampling variance, V_{ts}

$$V_{ts} = \frac{\sum (M_s - M_d)^2}{40}$$

- c) Mean strength, M

$$M = \frac{\sum M_s + \sum M_d}{40}$$

- d) Sampling error (in percent), E_s

$$E_s = \frac{100 \sqrt{(V_{ts} - 0,5V_t)}}{M}$$

e) Testing error (in percent), E_t

$$E_t = \frac{100\sqrt{V_t}}{M}$$

Report the sampling error and testing error to the nearest 0,1 %.

A.4 Assessment

If the estimate of the sampling error is greater than 3 %, then the sampling procedure shall be reviewed. If the estimate of the testing error is above 3 %, then the testing procedure shall be reviewed. If both estimates are not more than 3 % , the sampling procedure may be assumed to be satisfactory.

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