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# International Standard



# 6274

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## Concrete — Sieve analysis of aggregates

*Béton — Analyse par tamisage des granulats*

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Descriptors : concretes, aggregates, sieves, sieve analysis, openings, dimensions.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6274 was developed by Technical Committee ISO/TC 71, *Concrete, reinforced concrete and pre-stressed concrete*, and was circulated to the member bodies in August 1978.

It has been approved by the member bodies of the following countries:

Australia	Germany, F. R.	Poland
Austria	India	Romania
Bulgaria	Israel	South Africa, Rep. of
Canada	Italy	Spain
Chile	Korea, Rep. of	Sweden
China	Mexico	Switzerland
Czechoslovakia	Netherlands	USA
Denmark	New Zealand	USSR
Egypt, Arab Rep. of	Norway	Yugoslavia

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Belgium  
France  
United Kingdom

# Concrete — Sieve analysis of aggregates

## 1 Scope and field of application

This International Standard specifies a method, using test sieves, for the determination of the particle size distribution of normal weight aggregates for concrete.

Any additional sizes shall be chosen from ISO 565.

For aperture size of 4,00 mm and above, perforated plate sieves are recommended.

## 2 References

ISO 565, *Test sieves — Woven metal wire cloth and perforated plate — Nominal size of apertures.*

ISO 2395, *Test sieves and test sieving — Vocabulary.*

ISO 2591, *Test sieving.*

ISO 3310/1, *Test sieves — Technical requirements and testing — Part 1 : Test sieves of metal wire cloth.*

ISO 3310/2, *Test sieves — Technical requirements and testing — Part 2 : Test sieves of metal perforated plate.*

ISO 4847, *Concrete — Sampling of normal weight aggregates.*<sup>1)</sup>

## 3 Sampling

The sample shall be taken and reduced in accordance with ISO 4847.

## 4 Apparatus

**4.1 Balance or scale**, accurate to 0,1 % of the total mass of the test sample.<sup>2)</sup>

**4.2 Test sieves**, with square apertures, complying with the requirements of ISO 565, ISO 2591 and ISO 3310. The sieves used shall conform to one of the series given in the table, series A being recommended.

Table — Test sieve aperture sizes

Values in millimetres

Series A	Series B	Series C
63,0	75,0	80,0
31,5	37,5	40,0
16,0	19,0	20,0
8,00	9,50	10,0
4,00	4,75	5,00
2,00	2,36	2,50
1,00	1,18	1,25
0,500	0,600	0,630
0,250	0,300	0,315
0,125	0,150	0,160
0,063	0,075	0,080

**4.3 Tightly fitting pan and lid**, for the sieves.

**4.4 Well ventilated oven**, thermostatically controlled to maintain a temperature of  $105 \pm 5$  °C.<sup>3)</sup>

## 5 Procedure

### 5.1 Preparation of test sample

The minimum dry-mass of the test sample, in kilograms, shall be 0,2 times the nominal maximum aggregate size, in millimetres. Aggregates containing substantial amounts of fine particles may be moistened before reduction to minimize segregation and loss of dust. Reduction shall be carried out by use of a sample divider or by quartering, and shall yield a test sample of mass larger than the minimum but not of an exact predetermined value. Before weighing and sieving, the

1) At present at the stage of draft.

2) For field applications, a reduced accuracy of 0,5 % of the sample mass is considered sufficient.

3) If such an oven is not available under field conditions, other suitable equipment for drying the aggregates to constant mass may be used.

test sample shall be dried to constant mass. This is normally achieved by drying it in shallow trays in the oven (4.4) for  $24 \pm 4$  h at a temperature of  $105 \pm 5$  °C.<sup>1)</sup>

After drying, the test sample shall be allowed to cool to room temperature.

## 5.2 Sieving

**5.2.1** Determine the mass of the test sample to the nearest 0,1 % (or to the nearest 0,5 % for field applications).

**5.2.2** Nest the sieves (4.2) in order of increasing aperture size from bottom to top starting with the pan (4.3) and place the test sample on the top sieve. Agitate the sieves by hand or by mechanical means for a sufficient period, established by trial or checked by measurement on the actual test sample, to meet the criterion for adequacy of sieving described in 5.2.4.

**5.2.3** On sieves with apertures smaller than 4,00 mm, the fraction retained at the end of the sieving operation shall not exceed

$$m_r = \frac{A \sqrt{d}}{300}$$

where

$m_r$  is the mass, in grams, of the fraction retained on the sieve;

$A$  is the area, in square millimetres, of the sieve;

$d$  is the nominal aperture size, in millimetres, of the sieve.

NOTE — For field applications, replace the formula by

$$m_r = \frac{A \sqrt{d}}{200}$$

If any of the fractions retained exceeds this amount, one of the two following procedures shall be used :

a) divide the fraction into portions smaller than the specified maximum and sieve these one after the other;

b) divide the portion of the sample passing the 4,00 mm sieve (4,75 mm of series B, 5,00 mm of series C) with the aid of a sample divider or by quartering, and continue the sieve analysis on the reduced sample.

**5.2.4** Continue sieving until it is ascertained that less than 0,1 % of the total sample mass will pass any individual sieve during continuous hand sieving for 1 min. Do not force any material through the sieve by hand pressure, but larger particles may be individually presented to an aperture by hand placing.

**5.2.5** Dry sieving alone is usually satisfactory for routine testing of normally graded aggregates. However, when fine particles adhere to the surface of aggregates and/or occur in

lumps, wet sieving or washing is required. For this purpose, place the dried and weighed test sample in a container and cover the test sample with water. A storage period of 24 h under water is helpful in breaking down lumps. Then agitate the sample with sufficient vigour to result in complete separation and suspension of the fine particles. Pour the wash water and the test sample over the nested sieves, and carry out sieving with the aid of a water jet until the wash water remains clear and the criterion of 5.2.4 is met. Dry the fractions retained on all sieves separately to constant mass at a temperature of  $105 \pm 5$  °C.

**5.2.6** Determine the mass of each fraction to the nearest 0,1 % of the mass of the total sample. Except in the case of wet sieving as described in 5.2.5, the sum of the masses of all individual fractions on the sieves and in the pan shall not deviate by more than 1 % from the mass of the test sample determined before sieving.

## 6 Calculation

Calculate the proportions of the individual fractions, as percentages, relative to the total mass of the sample, and calculate the total percentage of material passing each sieve. If a dividing operation as described in 5.2.3 was performed, take this into account in the calculation.

## 7 Test report

The test report shall include the information referred to in 7.1, and may include the information referred to in 7.2.

### 7.1 Mandatory data

- a) reference to this International Standard;
- b) identification of the sample;
- c) mass of sample tested;
- d) method of sieving (dry or wet, by hand or by mechanical means, etc.) and type of sieves used (frame diameter, etc.);
- e) percentage of the mass of the total sample retained on each sieve but passing the next larger sieve, and/or the cumulative percentage of the mass of the total sample passing each of the sieves, at least to the nearest 1 %;
- f) date of test.

### 7.2 Optional data

- g) name and location of the sample source;
- h) description of the material and of the sampling procedure (certificate of sampling according to ISO 4847);
- j) graphical presentation of results.

1) Other suitable methods of drying may be use for field applications.