

# Australian Standard<sup>®</sup>

AS 1141.33:2015

## Methods for sampling and testing aggregates

### Method 33: Clay and fine silt (settling method)

#### 1 SCOPE

This Standard describes a settling test which may be used in the field or laboratory as a guide to the amount of fine silt, clay and similar materials in fine aggregates. The test is not recommended for fine aggregates known to have more than 10% passing the 75  $\mu\text{m}$  sieve aperture as it is unlikely that the clay and fine silt will separate from sand-sized particles in the settling column. The test may not be suitable for fine aggregates containing some active clays as these clays may not separate from the sand during the settlement period. This test is not suitable for testing manufactured sands.

#### 2 PRINCIPLE

The test method causes a sample that is a mixture of sand, silt and clay-sized particles to be agitated in a column of a salt solution. The particles settle in the liquid and the silt and clay particles that require a longer time to settle out of the suspension, usually form a distinct layer above the sand-sized particles. The sodium ions in the salt solution assist in settling the clay particles by causing partial flocculation. The test result is the volume of clay and silt particles in relation to the volume of the sand particles.

In samples where there is a high volumetric proportion of clay and silt, or where the clay particles are active (i.e. have a high cationic exchange capacity) clay and silt particles may remain visible, trapped within the sand particles at the end of the test. In these instances, this standard test is not appropriate for the material in question, although the method provides some suggestions for dealing with this situation.

The test provides a volumetric measure of the clay and silt particles present in the sample. There is no consistent relationship between this test result and the result of the mass passing the 75  $\mu\text{m}$  test (either AS 1141.11.1 or AS 1141.12). In general, the magnitude of the result of this test will be greater than the result of the passing 75  $\mu\text{m}$ . It is probable that the greater the difference between the two tests, the more active the clay in the sample.

#### 3 NORMATIVE REFERENCES

The following are the normative documents referenced in this Standard:

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS

1141	Methods for sampling and testing aggregates
1141.1	Part 1: Definitions
1141.2	Method 2: Basic testing equipment
1141.3.1	Method 3.1: Sampling—Aggregates

#### 4 DEFINITIONS

For the purposes of this Standard, the definitions of AS 1141.1 apply.



## 5 APPARATUS

The following apparatus, complying with the requirements below and those of AS 1141.2 are required:

- (a) *Balance*—having a limit of performance of  $\pm 0.5$  g.
- (b) *Cylinder*—of glass or transparent plastic, graduated to 250 mL in 2 mL increments. The cylinder shall be stoppered to prevent loss of sample and test fluid when the cylinder is shaken and inverted during testing.

## 6 REAGENT

The reagent shall be common salt or table salt.

## 7 TEST PORTION

The test portion shall be representative of a sample obtained in accordance with AS 1141.3.1. The portion obtained shall be sufficient to yield about 100 mL of fine aggregate from the sample. This test portion shall be used without drying or any other treatment.

## 8 PROCEDURE

The procedure shall be as follows:

- (a) Prepare a nominal 1% solution of common salt in water by adding 10 g of common or table salt to 1 L of water.
- (b) Place about 50 mL of the salt solution in the 250 mL measuring cylinder. Pour aggregate into the cylinder until its measured volume in the cylinder is approximately 100 mL. If the volume of the aggregate and liquid is less than 150 mL, make the volume up to 150 mL by the addition of more salt solution and stopper the cylinder.
- (c) Shake the mixture vigorously for approximately 30 s until adherent particles have been dispersed. Place the measuring cylinder on a level surface, and gently tap it until the surface of the aggregate is level.
- (d) Allow the measuring cylinder and contents to stand for  $180 \pm 10$ ,  $-0$  minutes. At the end of that time carefully examine the sand layer to determine if clay and silt particles are clearly visible, trapped between the sand particles. If the separation of the clay and silt from the sand has not occurred, report the result as 'Indeterminate'.

NOTE: For quality control purposes at individual sites, it may be possible to obtain a result by reducing the quantity of sample in Item (b) above to 50 mL instead of 100 mL, but filling the cylinder with the liquid to 150 mL. This may result in better separation of the silt and clay. However, as the relationship between results so obtained and results from this Standard are unknown, any results obtained should be reported as 'Non-standard'.

- (e) If a clear separation of the silt and clay from the sand is obtained, record the volume of the sand (*S*) and the volume of the settled clay and fine silt (*F*), in millimetres (see Figure 1).

NOTE: When using a measuring cylinder, reading the heights in millilitres is sufficient as the cross-sectional area of the cylinder is the same at any height and therefore the ratio of the layer volumes is equivalent to the ratio of the layer heights.

## 9 CALCULATION

The ratio ( $C$ ) of the volume of clay and fine silt layer to the volume of the underlying sand layer shall be calculated and expressed as a percentage, using the following formula:

$$C = \frac{F}{S} \times 100$$

where

$C$  = ratio by volume of clay and fine silt to sand, expressed as a percentage

$F$  = volume of settled clay and fine silt above the sand, in millilitres

$S$  = volume of the sand after settling, in millilitres

## 10 REPORT

The following shall be reported:

- (a) The ratio expressed as a percentage by volume of clay and fine silt ( $C$ ) to the nearest whole number or the result expressed as 'indeterminate' if the clay and silt does not separate completely from the sand.
- (b) Reference to this Standard, i.e. AS 1141.33.

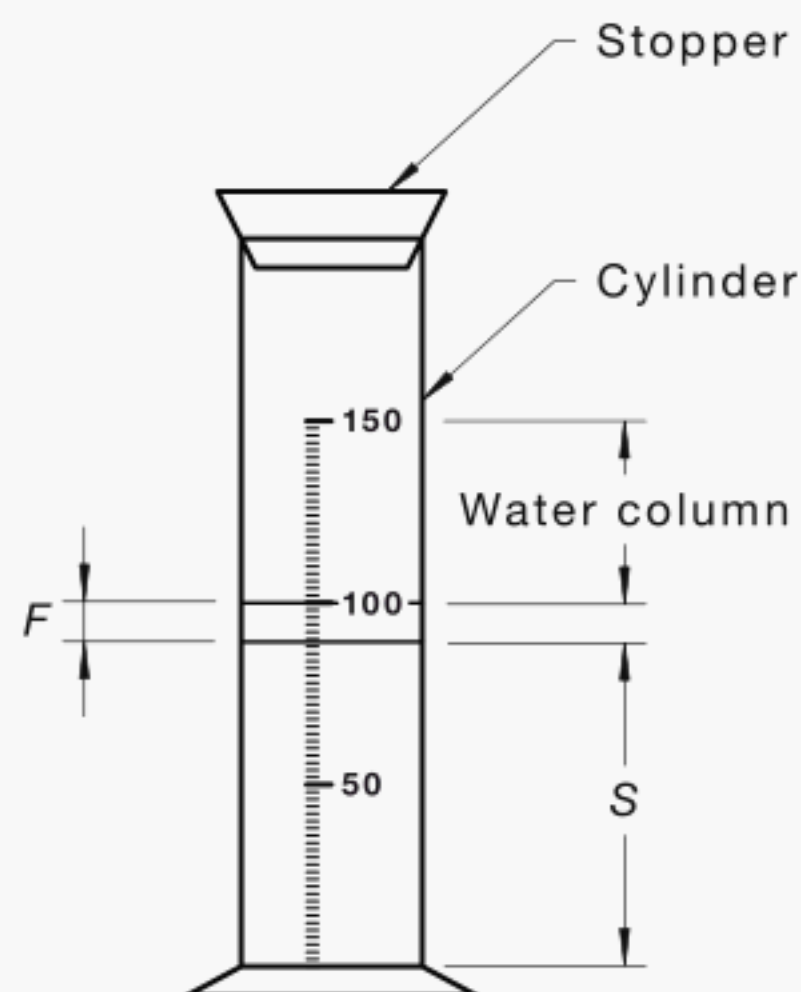


FIGURE 1 MEASUREMENTS

## BIBLIOGRAPHY

## AS

- 1141 Methods for sampling and testing aggregates
- 1141.11.1 Method 11.1: Particle size distribution—Sieving method
- 1141.12 Method 12: Materials finer than 75 µm in aggregates (by washing)

## NOTES

NOTES

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This Australian Standard® was prepared by Committee CE-012, Aggregates and Rock for Engineering Purposes. It was approved on behalf of the Council of Standards Australia on 7 April 2015 and published on 11 May 2015.

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Originated as part of AS 77—1957.  
Previous edition AS 1141.33—1997.  
Second edition AS 1141.33:2015.

*This Standard was issued in draft form for comment as DR AS 1141.33:2014.*

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Published by Standards Australia Limited  
GPO Box 476, Sydney, NSW 2001, Australia



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