Test Method

Degradation Factor - Fine Aggregate

RC 370.05

1. Scope

This method is used for the determination of the degradation factor of fine aggregate or the fine portion of a mixed aggregate. It categorizes the fines produced by by selfabrasion in the presence of water. The test is suitable for materials produced from igneous or metamorphic rock but not from sedimentary rock.

2. Apparatus

(a) Shaking machine—as described in AS 1289.3.7.1.

(b) Cylinders, test-sand equivalent test cylinders, with rubber or plastics stopper, as described in AS 1289.3.7.1

(c) Plastics funnel - with a large opening to allow the sample to be readily poured into the test cylinder.

(d) Nested sieves - 200 mm diameter, 425 µ m and 75 µm sieves fitted into a large funnel.

(e) Measuring cylinders,

(i) 500 mL capacity, graduated at 100 mL intervals, with rubber or plastic stopper.

(ii) 10 mL capacity, graduated at 1 mL intervals.

(f) Sample divider (riffle splitter).

(g) Balance - at least 1 kg capacity, with a limit of performance not exceeding ± 0.5 g.

(h) Oven - thermostatically controlled to operate at a temperature of 105-110°C, preferably with mechanical ventilation.

(i) Sieves - 200 mm diameter sieves sizes: 4.75, 2.36, 1.18, 0.600 and 0.425 mm and pan.

(j) Timer—reading in seconds.

(k) Water sprayer - e.g. barber's spray.

(l) Sieve—washing sieve size 75 µm.

(m) Sieve cleaning brushes, dishes and trays.

3. Solution

Sand equivalent stock solution, as in AS 289.3.7.1.

4. Sample Preparation

(a) Obtain a representative sample of such size that it contains more than 50 g of each of the 4.75 to 2.36 mm, 2.36 to 1.18 mm, 1.18 to 0.600 mm and 0.600 to 0.425 mm fractions.

NOTE: The size of the sample required depends on the type of material and the particle size distribution and will generally range from 1 to 2kg.

(b) If necessary, bring the sample to a state of apparent dryness by placing it in the oven, any aggregations will then readily break down during the sieving process.

(c) Assemble the 200 mm diameter sieves in order: 4.75, 2.36, 1.18, 0.600 and 0.425 mm and pan. Sieve the sample to separate into fractions of size specified in (a) above.

(d) Obtain by splitting or quartering about 50 g of material from each fraction.

(e) Wash each separate fraction over the 75 µm washing sieve until the wash water remains clear.

(f) Dry the washed fractions to constant mass at 105- 100°C and cool to room temperature.

(g) Obtain a representative quantity of the material from each fraction by splitting or quartering and adjust to the mass given in Table 1. Combine the fractions to make up the test sample of 120 g.

Table 1 - Mass of material required for test sample

Fraction Size(mm)	Fraction mass(g)
4.75-2.36	30
2.36-1.18	30
1.18-0.600	30
0.600-0.425	30

5. Procedure

(a) Fill a sand equivalent test cylinder to the 100 mm graduation mark with water.

(b) Pour the test sample into the cylinder through the plastic funnel.

(c) Stopper the cylinder, secure it in the shaking machine and shake it for 20 minutes ± 10 seconds.

(d) At the conclusion of the shaking, empty the contents of the cylinder on to the nested 425 µm and 75 µm sieves fitted into a large funnel and placed over the 500 mL measuring cylinder to catch all the wash water. Using the water sprayer and clean water, wash out the sand equivalent cylinder and then the aggregate retained on the sieves until the wash water is clear but without filling the measuring cylinder to beyond the 500 mL mark. Since some wash water (about 50 mL) will be held on and between the particles retained on the sieves and will drain slowly, the spray rate must be reduced as the level in the cylinder approaches 500 mL to prevent overfilling. Fill the cylinder to the 500 mL mark.

(e) Measure out 7 mL of sand equivalent stock solution into the 10 mL measuring cylinder and then pour it into a clean sand equivalent cylinder.

(f) Stopper the 500 mL measuring cylinder. Bring all solids into suspension by inverting the cylinder end over end about ten times. Immediately fill the sand equivalent cylinder containing the stock solution to the 380 mm mark using the contents of the 500 mL measuring cylinder.

(g) Stopper the sand equivalent cylinder and mix the contents by alternately turning the cylinder upside down and right side up, allowing the bubble to traverse completely from end to end. Repeat this cycle 20 times in about 35 seconds.

(h) After mixing, place the cylinder on the bench, remove the stopper and start the timer.

(i) Allow the cylinder and its contents to stand without disturbance for a period of 20 minutes ± 10 seconds.

(j) At the end of 20 minutes, read the height of the upper surface of the flocculent column to the nearest 2 mm and record (H).

6. Calculations

Calculate the degradation factor (D_f) to the nearest whole number from:

$$D_f = \frac{380 - H}{380 + 1.75 \times H} \times 100$$

where: D_f = degradation factor of the fine fraction

H = height of flocculent column in sand equivalent cylinder, in mm.

7. Report

Report the degradation factor of the fine aggregate, or fine fraction, to the nearest five.

Test Method - Revision Summary

RC 370.05 Degradation Factor—Fine Aggregate

Date	Clause Number	Description of Revision	Authorised by
June 2013	Full document	Re-styled with minor corrections made	Manager – Construction Materials