Transport Roads & Maritime Services

Test method T270

Material finer than 2 μm in aggregates

OCTOBER 2012

Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D.Dash	May 1999
		Date on Test Method Revised to Agree with Date on Revision Summary	D.Dash	Feb 2001
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	October 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T270 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T270

Material finer than 2 *μm in aggregates*

1. Scope

This test method sets out the procedure for the determination of the material finer than 2um in fine, coarse and mixed aggregates. The test is carried out on the washwater obtained from test method T203, and is not applicable if the percentage of material finer than 75 um is less than 1% for a coarse aggregate, or less than 4% for a fine aggregate. The method conforms with the method described in Australian Standard 1141.

2. Apparatus

(a) A balance accurate and readable to 0.0001 g within the operating range

(b) Bath, constant temperature, set to 25 ± 1° C. The bath must be vibration-free, and well illuminated

(c) Beaker, PTFE, of approximately 250 mL capacity

(d) Desiccator, 200-250 mm diameter, containing anhydrous silica gel

(e) Glassware

- (i) Petri dishes and covers
- (ii) Plate, of sufficient area to allow preparation of test portion
- (iii) Tube, sedimentation, 50 mm diameter and 340 mm long, graduated to 500 mL
- (iv) Weighing bottle, capacity 100 mL

(f) Oven, drying, operating temperature 100°C to 110°C. The atmosphere in the oven must be dust-free.

(g) Pipette, sampling (for assembly of the apparatus see Fig. 1)

(h) Stirrer, mechanical

(i) Stopwatch

(j) Sundry equipment: dish or saucepan, PTFE coated; spatula with 150 mm blade.

3. Reagents

(a) Distilled water

(b) Freshly made solution of 3.3 g sodium hexametaphosphate and 0.7 g sodium carbonate per 100 mL

4. Test Portion

The test portion shall be all of the wash water as derived from Test Method T203 - Material Finer than 75 um in Aggregates (by washing).

CALIBRATION AND USE OF PIPETTE (SEE FIG. 1)

Immerse the nozzle in distilled water with tap B closed and tap E open. Draw in water at 25°C until the level reaches bulb D then close tap E. Allow surplus in D to run to waste through F. Discharge water in pipette and tap E into a tared weighing bottle and determine the mass of the amount os water (M1) to the nearest 0.0001 g.

5. Procedure

(a) Transfer the test portion to a PTFE coated dish and evaporate to a thick slurry. Transfer this slurry to a tared PTFE beaker and dry to a constant mass at 105+-5°C. Determine mass of material (M2).

(b) (b) Cone and quarter the dried material on a glass plate to give a sub-portion of approximately 10 g. Dry the sub-portion to constant mass (M2) in a petri dish.

(c) Transfer the sample to a 400 mL beaker. Pipette 20 mL of dispersing onto the material and make up to approximately 150 mL with distilled water. Stir until obvious lumps are broken. Allow to stand overnight. Transfer all the dispersion to the sedimentation tube and make up to approximately 450 mL. At the same time pipette 20 mL dispersing into a second tube and make up to 450 mL.

(d) Place the tubes in the constant temperature bath to reach equilibrium. A period of not less than one hour is required. Make up to 500 mL with water at 25°C.

(e) Using the stirrer, briskly agitate the lower third of the tube for approximately one minute. For the next minute carefully agitate the entire tube. Withdraw the stirrer slowly to allow excess liquid to drip back into sample and avoid turbulence. The time of removal is noted as the starting time, and the sampling time is counted from this.

(f) The sampling time is dependent on the density of the material in suspension. Where this density is not known, assume it to be 2.30 g/mL. This may be considered an average density for clay in which the range extends from 2.00 g/mL for montmorillonite and halloysite to 2.63 g/mL for kaolin. Sampling times for a range of material densities from 2.00 g/mL to 3.00 g/mL are listed in Table 1. A tolerance of +- two minutes may be allowed on all sampling times.

TABLE 1
SAMPLING TIMES

Density of clay fraction g/mL	Time of starting sampling after shaking h - m
2.00	5 - 42
2.05	5 - 25
2.10	5 - 10
2.15	4 - 57
2.20	4 - 45
2.25	4 - 33
2.30	4 - 23
2.35	4 - 13
2.40	4 - 4
2.45	3 - 55
2.50	3 - 48
2.55	3 - 41
2.60	3 - 33
2.65	3 - 27
2.70	3 - 23
2.75	3 - 15
2.80	3 - 10
2.85	3 - 5
2.90	3 - 0
2.95	2 - 55
3.00	2 - 50

(g) 15 seconds before sampling time lower the pipette, with tap E closed, into the tube containing the sample until the tip just touches the surface of the liquid. Note the reading on the measuring gauge. Lower the pipette slowly to a depth of 50 mm - this operation should take approximately 20 seconds. Open top E and draw liquid up into the pipette until the pipette and bore of tap E are filled. Close tap E. The operation must take only 10 seconds from the time of opening tap E until it is closed again.

(h) Withdraw the pipette. Run out any liquid which has been drawn into bulb D via tube F. Wash bulb D by addition of water to bulb A. Open tap E and run the aliquot in the pipette into a tared petri dish. Flush out the pipette with water from bulb A.

(i) Repeat this operation for the second tube which is a bland. Dry the aliquots to constant mass (M4) for material, (M5) for blank.

6. Calculations

(a) Volume of pipette = V1 = $\frac{M_1}{0.9970}$

(b) % material finer than 2 μm = $(M_4 - M_5) \times \frac{500}{V_1} \times \frac{M_2}{M_3} \times \frac{100}{A}$

Where V1 = volume of pipette.
M1 = mass of water in pipette.
M2 = mass of material finer than 75 um.
M3 = mass of material in sub-portion.
M4 = mass of material finer than 2 um in aliquot.
M5 = mass of solids in blank.
A = mass of test portion used in Test Method T203.

7. Reporting

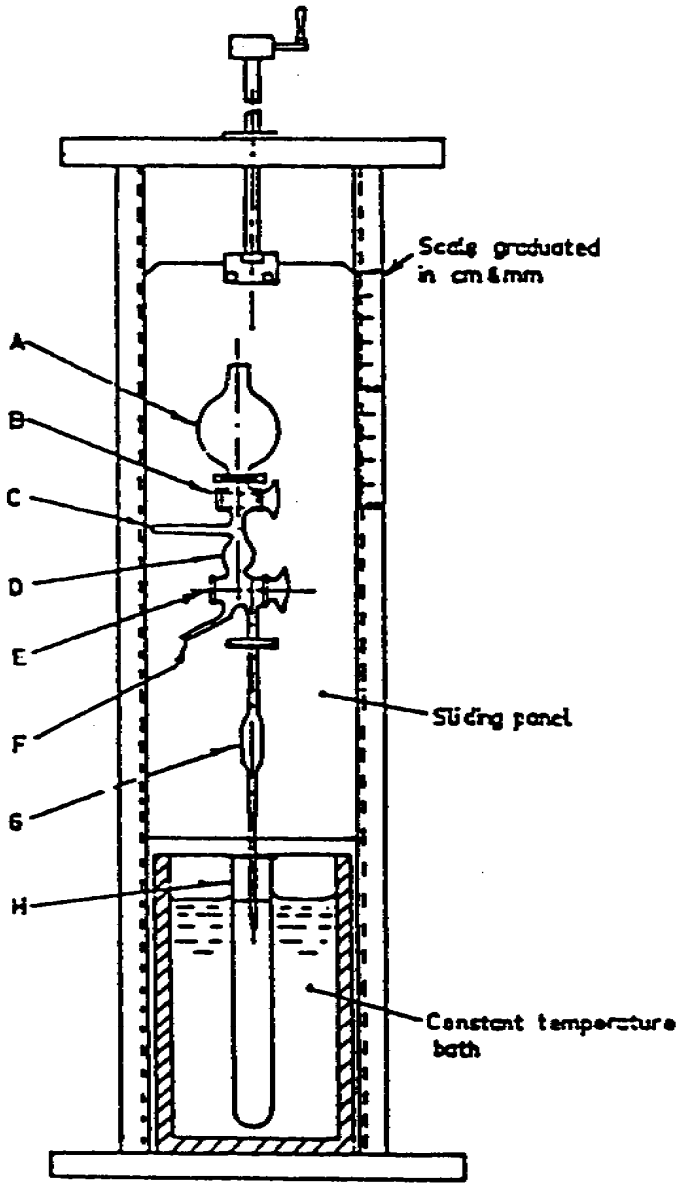
Report the percentage of material finer than 2 μm to the nearest 0.1%.

8. Techniques

(a) PTFE beakers may be placed directly in the oven, but they are liable to distort if placed directly on a hot plate at temperatures exceeding 120oC. In such cases they should be placed on gauze to avoid direct contact with the hot plate.

(b) Cleanliness is essential for reproducible results. The pipette should be soaked for 24 hours in chromic acid at regular intervals.

(c) Care must be taken during coning and quartering to ensure that fines are not lost. This operation should not be carried out in a draught or with excessive disturbance of the material.



A and B—125 ml bulb funnel with stopcock
C—Safety bulb suction inlet tube
D—Safety bulb
F—Outlet tube
G—Sampling pipette
H—Sedimentation tube
D, F and G are joined to three-way stopcock E.

Fig. 1. ASSEMBLY OF APPARATUS FOR DETERMINATION OF MATERIAL FINER THAN 2 μm

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