



Transport
Roads & Maritime
Services

Test method T217

Accelerated expansion test

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 T217 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T217

Accelerated expansion test

1. Scope

This test method sets out a procedure for detecting the presence of expandable clays in rock particles by subjecting the rock particles to immersion in ethylene glycol for period up to 15 days. Ethylene glycol enters the lattice structure of expandable clays such as montmorillonite causing swelling with consequent fracturing of rock particles which contain this form of clay mineral.

Montmorillonite normally has a basal spacing of about 10 angstroms. Water molecules will expand this to about 14 angstroms whereas ethylene glycol will expand it to about 17 angstroms. Consequently ethylene glycol is more effective than water in splitting rock particles containing expandable clays.

This method is suitable for preliminary investigation of material deposits but does not provide quantitative data suitable for a basis for acceptance or rejection. However results of this test will indicate the need for more detailed investigation should expandable clays be present in quantity.

2. Apparatus

- (a) Plastic bowls with a capacity of about 3 litres.
- (b) 37.5 mm, 26.5 mm, 19.0 mm, 9.50 mm, 6.70 mm, and 4.75 mm AS sieves,
- (c) Wire baskets of 2.36 mm mesh or finer to fit in plastic bowls, and of sufficient capacity to contain 100 pieces of the aggregate sample being tested
- (d) A thermostatically-controlled oven with good air circulation, capable of maintaining a temperature within the range of 105°C to 110°C
- (e) Ethylene glycol, commercial grade

3. Test Portion

- (a) Determine the grading of sample by sieve analysis as described in Test Method T201 using 37.5 mm, 26.5 mm, 19.0 mm, 13.2 mm, 9.50 mm, 6.70 mm and 4.75 mm AS sieves.
- (b) From each of the following fractions which constitute 5 percent or more of the sample, obtain 100 particles of aggregate. Each group of 100 particles is tested as a separate test portion.

Fractions:

37.5 mm to 26.5 mm
26.5 mm to 19.0 mm
19.0 mm to 13.2 mm
13.2 mm to 9.50 mm
9.50 mm to 6.70 mm
6.70 mm to 4.75 mm

4. Procedure

- (a) Transfer each test portion to a basket and place the basket in a plastic bowl. Add sufficient ethylene glycol to the plastic bowl to cover the aggregate particles to a depth of at least 25 mm over the top of the particles. Allow the bowl and contents to stand at room temperature.
- (b) Examine each test portion at the completion of each 24-hour period of immersion for visual indications of deterioration. Terminate the immersion when significant deterioration is evident or after 15 days, whichever is sooner. Record the period of immersion
- (c) Thoroughly wash each test portion in the baskets and then dry in an oven overnight at a temperature within the range of 105°C to 110°C.
- (d) Screen each test portion on the sieve on which it was originally retained and count the number of the particles retained.

5. Calculations

- (a) Compute the percentage loss (by number) for each test portion after test as follows:

$$B = (100 - A)$$

Where

- A = Mass of BaSO₄(g)
 B = Correction for blank, in grams
 C = Mass of test portion used (g)

- (b) Calculate the total loss as the sum of the weighted average for each test portion as follows:

Fraction		Percentage of Original Sample (C)	Percentage Loss (B)	Weighted Average $\frac{B \times C}{100}$
Passing	Retained			
37.5mm	26.5mm			
26.5mm	19.0mm			
19.0mm	13.2mm			
13.2mm	9.50mm			
9.50mm	6.70mm			
6.70mm	4.75mm			
		100%	Total	

6. Reporting

Report the sulphur content in metallurgical slag, crushed rock or other pavement materials to the nearest 0.02%.

7. Techniques

- (a) Rock spalls may be tested by breaking material to pass a 75mm AS sieve and providing a test portion of 5000 g mass. Visual assessment is used to indicate the effects of immersion in ethylene glycol.
- (b) The quantitative assessment set out in this method is approximate only as a number has been substituted for mass in determining loss. While ethylene glycol is water soluble it is difficult to ensure complete removal from porous particles, hence mass cannot be used to determine loss.