Test Method T239

Fractured faces of coarse aggregate

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About this release

Title:	Fractured faces of coarse aggregate
Test method number:	T239
Author:	Materials Technology
Authorised by:	Director Ground Engineering

Summary of changes

Issue number	Clause number	Revision description	Authorised by	Publication date
Issue 4.0	All 2 All 5(a/c/d/f) 6 (c) 6 (d) 8	Reformatted RMS template References previously in clause 2(c) has been moved to new References section at the end of the method. Replaced reference to AS 1152 with ISO 3310 series throughout method Change of accuracy of mass value recorded to 0.1g Added descriptor for variable M2 Added missing "=" sign to calculation Added clause 8 - References	Director Ground Engineering	December 2022
Ed 3/ Rev 0		Reformatted RMS template	J Friedrich	October 2012
Ed 2/ Rev 1		Corrected 14 mm or greater	J Friedrich	October 2011
Ed 2/ Rev 0		New issue. Subscripts changed, groups changed.	J Friedrich	May 2011
Ed 1/ Rev 1		Date on Test Method revised to agree with date on revision summary.	D. Dash	February 2001
Ed 1/ Rev 0		Reformatted and Revision Summary added.	D. Dash	May 1999

Note: The functions of the former State Government agency Roads and Maritime Services (RMS or Roads and Maritime) are now administered by Transport for NSW.

Contents

1 Scope **5**
2. General **5**
3 Equipment **5**
4 Sampling and preparation **5**
5 Procedure **6**
6 Calculations **6**
7 Reporting **8**
8 References **8**

List of tables

Table 1. Definition 5
Table 2. Sieve required for aggregate nominal size 6

List of equations

Equation 6(1). Percentage by mass of aggregate passing (P) 6
Equation 6(2). Percentage by mass of aggregate retained with no fractured faces (F_0) 7
Equation 6(3). Percentage by mass of aggregate retained with one or more fractured faces (F_1) 7
Equation 6(4). Percentage by mass of aggregate retained with two or more fractured faces (F_2) 7

Test Method T239

Fractured faces of coarse aggregate

1 Scope

This test method sets out the procedure to determine the percentage by mass of aggregate containing no fractured faces, at least one fractured face, and two or more fractured faces.

2. General

(a) This test is applicable to aggregate used for pavements.

(b) The following term and definition is used in this test method.

Table 1. Definition

Term	Definition
Fractured face	The relatively planar surface of an aggregate particle which appears broken (as by crushing action) and not rounded, and the area of which is significant enough to affect the physical characteristics of the particle.

3 Equipment

(a) Sample divider (e.g. riffle box) or suitable quartering equipment.

(b) Balance of not less than 1 kg capacity readable to 0.1 g and with a limit of performance of ± 1 g.

(c) Sieve of required size that conforms to ISO 3310-1 or ISO 3310-2 (refer to Table 2).

(d) Suitable dishes.

4 Sampling and preparation

(a) Sample the aggregate according to TfNSW test method T100.

(b) Quarter or riffle the sample to obtain sufficient sub-sample for 200 to 300 coarse aggregate particles.

(c) Dry the sub-sample to constant mass in an oven at a temperature within the range of 105 °C to 110 °C. When complete, cover sub-sample and allow cooling.

5 Procedure

(a) Determine the mass of the sub-sample (M) to the nearest 0.1 g.

(b) Sieve the sub-sample through the ISO sieve required for the nominal size aggregate according to Table 2.

Table 2. Sieve required for aggregate nominal size

Aggregate nominal size	ISO sieve
14 mm or greater	6.70 mm
10 mm	4.75 mm
7 and 5 mm	1.18 mm

(c) Determine the mass of the portion passing the required sieve (M_P) to the nearest 0.1 g.

(d) Determine the mass of the portion retained on the required sieve (M_R) to the nearest 0.1 g.

(e) From the portion retained on the sieve, visually examine each aggregate particle and separate into the following 3 groups (one group in each dish) based on the number of fractured faces:

(i) Group 0 – aggregate particles with no fractured faces.

(ii) Group 1 – aggregate particles with one fractured face.

(iii) Group 2 – aggregate particles with two or more fractured faces.

(f) Separately determine the mass of aggregate in each of the 3 groups (M_0, M_1 and M_2 respectively) to the nearest 0.1 g.

6 Calculations

(a) Determine the percentage by mass of aggregate passing (P) the required sieve to the nearest 1% as follows:

$$P = \frac{M_P}{M} \times 100\% \qquad \ldots 6(1)$$

Where:

P = Proportion of aggregate passing the required sieve (%)

M_P = Mass of aggregate passing the coarse sieve (g)

M = Total mass of aggregate sample (g)

Equation 6(1). Percentage by mass of aggregate passing (P)

(b) Determine the percentage by mass of aggregate retained with no fractured faces (F_0) to the nearest 1% as follows:

$$F_0 = \frac{M_0}{M_R} \times 100\% \qquad \ldots 6(2)$$

Where:

F_0 = Percentage of aggregate with no fractured faces (%)

M_0 = Mass of aggregate with no fractured faces (g)

M_R = Mass of aggregate retained on the sieve (g)

Equation 6(2). Percentage by mass of aggregate retained with no fractured faces (F_0)

(c) Determine the percentage by mass of aggregate retained with one or more fractured faces (F_1) to the nearest 1% as follows:

$$F_1 = \frac{(M_1 + M_2)}{M_R} \times 100\% \qquad \ldots 6(3)$$

Where:

F_1 = Percentage of aggregate with one or more fractured faces (%)

M_1 = Mass of aggregate with one or more fractured faces (g)

M_2 = Mass of aggregate with two or more fractured faces (g)

M_R = Mass of aggregate retained on the sieve (g)

Equation 6(3). Percentage by mass of aggregate retained with one or more fractured faces (F_1)

(d) Determine the percentage by mass of aggregate retained with two or more fractured faces (F_2) to the nearest 1% as follows:

$$F_2 = \frac{M_2}{M_R} \times 100\% \qquad \ldots 6(4)$$

Where:

F_2 = Percentage of aggregate with two or more fractured faces (%)

M_2 = Mass of aggregate with two or more fractured faces (g)

M_R = Mass of aggregate retained on the sieve (g)

Equation 6(4). Percentage by mass of aggregate retained with two or more fractured faces (F_2)

7 Reporting

Include the following results in the report:

(a) Type and nominal size of aggregate.

(b) Sieve size used.

(c) Percentage of aggregate passing the sieve (*P*) to the nearest 1%.

(d) Percentage of aggregate with the following number of fractured face to the nearest 1%:

  (i) No fractured faces (F_0).

  (ii) At least one fractured face (F_1).

  (iii) Two or more fractured faces (F_2).

(e) Reference to this test method.

8 References

The following documents are referred to in this Test method:

- ISO 3310-1:2016 *Test sieves – Technical requirements and testing, Part 1: Test sieves of metal wire cloth*
- ISO 3310-2:2013 *Test sieves – Technical requirements and testing, Part 2: Test sieves of perforated metal plates*
- T100 (2020) *Sampling road construction materials (soil, gravel, sand, aggregate, rock and recycled products)*

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Contact Us:

If you have any questions or would like more information on this document please contact Transport for NSW:

roads-maritime.transport.nsw.gov.au

standards@transport.nsw.gov.au

13 22 13

Customer feedback
Locked Bag 928,
North Sydney NSW 2059

131 450

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