Transport Roads & Maritime Services

NSW GOVERNMENT

Test method T378

Void content of no fines concrete

OCTOBER 2012

Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
Ed 1/ Rev 0	All	New Method	D Hazell	Jul 2010
Ed 2/Rev 0	3(e). 4(a), (b)	New format. Saw required for trimming. Height range broadened.	D Hazell	Oct 2011
Ed 3/ 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 T378 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T378

Void content of no fines concrete

1. Scope

This test method sets out the procedure to determine the void content of no fines concrete (NFC) using either moulded specimens or cores.

2. General

(a) Carry out this test before T377 Water Permeability of No Fines Concrete (Falling Head Laboratory Permeameter) when required to carry out both tests and ensure that the specimen meets the requirements for T377

NOTE: These specimens may also be used for other material property tests.

(b) This test is carried out on a core taken on site or a specimen moulded in the laboratory. The specimen has a diameter of 150 ±5 mm and height in the range 1.00 to 2.05 times the actual diameter of the specimen

(c) The following documents are referred to in this Test Method:

(i) T376 Moulding of No Fines Concrete Specimens

(ii) T377 Water Permeability of No Fines Concrete (Falling Head Laboratory Permeameter)

(iii) AS 1012.12.2 Methods of testing concrete - Determination of mass per unit volume of hardened concrete – Water displacement method

(iv) AS 1012.14 Methods of testing concrete - Method for securing and testing cores from hardened concrete for compressive strength

3. Apparatus

(a) Controlled temperature environment in the range 25° to 50°C

(b) A balance of suitable capacity with a limit of performance of not greater than ± 5 grams

(c) Vernier callipers readable to 0.1 mm

(d) 300 mm steel ruler

(e) A masonry or diamond saw for accurately trimming specimens

4. Sampling and Preparation

(a) The test is carried out on either a core or laboratory specimen:

(i) Secure a nominal 150 mm diameter core in accordance with AS 1012.14. Inspect the core and reject any core that has cracking or defect that cannot be removed by trimming

OR

(ii) Prepare and mould laboratory specimens according T376

(b) Trim approximately 20 mm from each end of the specimen to remove irregularities or solidified slurry. Ensure the following requirements are achieved after trimming:

(i) A final height in the range 1.00 to 2.05 times the actual diameter of the specimen

(ii) Parallel ends that are no more than 5 mm out of square from the vertical axis

(iii) The edges of the specimen are not fretted

5. Procedure

(a) Dry the specimen to constant mass as follows:

NOTE: Pat the specimen to remove of surface moisture.

(i) Determine the mass of the specimen (M_1) to the nearest 1 g

(ii) Place the specimen in a controlled environment in the range of 25° to 50°C

(iii) After at least 1 h at the required temperature, remove the specimen and determine the new mass (M_2) to the nearest 1 g

(iv) Calculate the relative loss in mass as $\frac{M_1 - M_2}{M_1} \times 100\%$

(v) Repeat Step 5(a) until the relative loss in mass between subsequent drying periods is < 0.1%.

NOTE: Specimens can be placed in front of a fan or in an oven set at less than 40°C.

(b) The dry mass of the specimen (M_D) equals the constant mass (M_2) determined in Step Step 5(a)

(c) Using Vernier callipers, determine the average height (h_m) and diameter (D_m) of the specimen to the nearest 0.1 mm using 3 measurements of each dimension

(d) Determine the density by water displacement in accordance with AS 1012.12.2 of the sample (ϱW) to the nearest 0.01 t/m3

6. Calculations

(a) Calculate the cross-sectional area of the specimen (A) using the formula:

$$A = \left(\frac{\pi D_m^2}{4}\right) \times 10^{-6}$$

Where:

A = Cross-sectional area of the specimen (m²)

D_m = Average diameter of specimen (mm)

(b) Calculate the Dry Density of the specimen (ρ_D) to the nearest 0.01 t/m³ using the formula:

$$\rho_D = \left(\frac{M_D}{A \times h_m}\right) \times 10^{-3}$$

Where:

ρ_D = Dry density of specimen (t/m³)

M_D = Mass of dry specimen (g)

A = Cross-sectional area of the specimen (m²)

h_m = Average height of specimen (mm)

(c) Calculate the air void content (AV) using the formula:

$$AV = \left(1 - \frac{\rho_D}{\rho_W}\right) \times 100\%$$

Where:

AV = Air voids content (%)

ρ_D = Dry density of specimen (t/m³)

ρ_W = Density of specimen by water displacement (t/m³)

7. Reporting

Include the following data and results in the report:

(a) Source of the specimen (i.e. core or moulded specimen):

  (i) Where the specimen is a core, the location as chainage and lateral offset

  (ii) Where the specimen is prepared in a laboratory, the mix, compaction details and curing period in days

(b) Age of the specimen in days

(c) Diameter (D_m) and height (h_m) of specimen to the nearest 1 mm

(d) Dry density (ρ_D) and water displaced density (ρ_W) of the specimen to the nearest 0.01 t/m^3

(e) Void Content (AV) to the nearest 1%

(f) Reference to this test method