

METHOD OF TEST FOR MICROSCOPICAL DETERMINATION OF AIR VOID SYSTEM PARAMETERS IN HARDENED CONCRETE, FOR REFEREE TESTING

1. SCOPE

1.1 This method covers the apparatus and procedure to determine the air-void system parameters in hardened concrete for referee testing purposes.

2. RELEVANT DOCUMENTS

2.1 ASTM C 457-08 "Standard Test Method for Microscopical Determination of Parameters of the Air-void System in Hardened Concrete"

3. PROCEDURES

3.1 Procedure B-Modified Point-Count Method of ASTM C 457-08 shall be followed, except as noted below.

4. EXCEPTIONS

4.1 APPARATUS

4.1.1 Stereoscopic Microscope: The magnification of the microscope shall be between 100x and 125x.

4.2 PROCEDURE

4.2.1 The referee laboratory shall examine the referee specimen for quality of polishing and the size of available area to determine if the specimen is adequate for testing. The laboratory shall re-polish the specimen if it is deemed necessary in the laboratory's opinion.

4.2.2 Minimum Area of Finished Surface for Microscopical Measurement: The total area to be tested shall be twice the size specified in Table 1 of ASTM C457-08 for the same Nominal or Observed Maximum Size of Aggregate in the Concrete. Table A provides examples for the minimum area requirements for the two Nominal Maximum Sizes of aggregate used in MTO contracts.

For specimens prepared by cutting cores lengthwise, if the total available area is larger than that specified above, test either the entire available area or an area of the specified size adjacent to the surface of the concrete structure or concrete component.

Where cores 100 mm diameter and 125 mm long are specified by the contract, the total available area shall be tested.

4.2.3 Minimum Length of Traverse and Minimum Number of Points: The length of traverse and the number of points shall be twice those specified in Table 3 of ASTM C457-08. Table A provides examples for the minimum length of traverse and the minimum number of points for two Nominal Maximum Sizes of aggregates used in MTO contracts.

4.2.4 Calculation: Use the following equation to calculate the spacing factor.

If p/A is less than or equal to 4.342

$$\bar{L} = \frac{S_p \cdot I}{4N}$$

If p/A is greater than 4.342

$$\bar{L} = \frac{3I \cdot S_a}{4N} \left[1.4 \left(1 + \frac{S_p}{S_a} \right)^{1/3} - 1 \right]$$

Note 1: These equations are based on the equations in ASTM C457. These equations use the data recorded on the counters directly to avoid rounding the numbers in subsequent steps.

4.3 SHIPPING OF SAMPLES

As soon as the testing is completed, the air void system specimens shall be shipped to the Concrete Section at the following address:

Ontario Ministry of Transportation
Room 15, Building C,
1201 Wilson Avenue,
Downsview, ON M3M 1J8

Attention: Head, Concrete Section

5. REPORTING OF RESULTS

The air content shall be reported to the nearest 0.1%, and the spacing factor shall be reported the nearest 0.001 mm. Rounding off of test data shall be done according to LS-100.

The report shall include:

- 5.1 Total area tested;
- 5.2 Total traverse length;
- 5.3 Total number of stops;
- 5.4 Air content;
- 5.5 Void frequency;
- 5.6 Paste content;
- 5.7 Paste-air ratio;
- 5.8 Average chord length;
- 5.9 Specific surface;
- 5.10 Spacing factor;
- 5.11 Name of operator;
- 5.12 Name and signature of laboratory staff who reviewed the test report;
- 5.13 Date of testing; and
- 5.14 Contract number.

Table A

Examples Of Required Minimum Area To Be Traversed, Minimum Length Of Traverse And Minimum Number Of Points			
Nominal Or Observed Maximum Size Of Aggregate In the Concrete (mm)	Minimum Area To Be Traversed (cm ²)	Minimum Length Of Traverse (mm)	Minimum Number Of Points
19	142	4572	2700
13.2	130	4064	2400