



Designation: C457/C457M – 16

Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete¹

This standard is issued under the fixed designation C457/C457M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method describes procedures for microscopical determinations of the air content of hardened concrete and of the specific surface, void frequency, spacing factor, and paste-air ratio of the air-void system in hardened concrete. Three procedures are described:

- 1.1.1 *Procedure A*—Linear-traverse method.
- 1.1.2 *Procedure B*—Modified point-count method.
- 1.1.3 *Procedure C*—Contrast enhanced method.

1.2 This test method is based on prescribed procedures that are applied to sawed and lapped sections of specimens of concrete from the field or laboratory.

1.3 It is intended to outline the principles of this test method and to establish standards for its adequate performance but not to describe in detail all the possible variations that might be used to accomplish the objectives of this test method.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 *This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements see [Note 9](#) and [Note 12](#).

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards*:²

- [C42/C42M](#) Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- [C125](#) Terminology Relating to Concrete and Concrete Aggregates
- [C138/C138M](#) Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- [C173/C173M](#) Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- [C231/C231M](#) Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- [C666/C666M](#) Test Method for Resistance of Concrete to Rapid Freezing and Thawing
- [C670](#) Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- [C672/C672M](#) Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals
- [C823/C823M](#) Practice for Examination and Sampling of Hardened Concrete in Constructions
- [C856](#) Practice for Petrographic Examination of Hardened Concrete
- [D92](#) Test Method for Flash and Fire Points by Cleveland Open Cup Tester

2.2 *American Concrete Institute Standards*:³

- [201.2R](#) Guide to Durable Concrete
- [211.1](#) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

3. Terminology

3.1 For definitions of terms used in this test method, refer to Terminology [C125](#).

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *average chord length* ($\bar{l}$), n —the average length of the chords formed by the transection of the voids by the line of

¹ This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.65 on Petrography.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, <http://www.aci-int.org>.

*A Summary of Changes section appears at the end of this standard