

---

**Standard Method of Test for**

**Characterization of the Air-Void  
System of Freshly Mixed Concrete  
by the Sequential Pressure Method**

---

**AASHTO Designation: TP 118-17 (2018)<sup>1</sup>**

**Technical Subcommittee: 3b, Fresh Concrete**

**Release: Group 1 (April)**



**American Association of State Highway and Transportation Officials  
444 North Capitol Street N.W., Suite 249  
Washington, D.C. 20001**

[This is a preview. Click here to purchase the full publication.](#)

# Characterization of the Air-Void System of Freshly Mixed Concrete by the Sequential Pressure Method

AASHTO Designation: TP 118-17 (2018)<sup>1</sup>



Technical Subcommittee: 3b, Fresh Concrete

Release: Group 1 (April)

---

## 1. SCOPE

- 1.1. This method covers determination of the air content and system air metric (SAM) number of freshly mixed concrete from observation of the change in volume of concrete with a sequential change in test pressure.
- 1.2. This method is intended for use with concretes and mortars made with aggregates for which the aggregate correction factor can be satisfactorily determined by the technique described in Section 7. It is not applicable to concretes made with light-weight aggregates, air-cooled blast-furnace slag, or other aggregates with high porosity. This test method is also not applicable to nonplastic fresh concrete such as is commonly used in the manufacture of pipe and concrete masonry units.
- 1.3. The text of this standard references notes and footnotes that provide explanatory information. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements for this standard.
- 1.4. The values stated in inch-pound units are to be regarded as the standard.
- 1.5. *This standard does not purport to address all of the safety concerns, if any, 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.*  
**Warning**—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.

---

## 2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
  - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
  - R 39, Making and Curing Concrete Test Specimens in the Laboratory
  - R 60, Sampling Freshly Mixed Concrete
  - R 61, Establishing Requirements for Equipment Calibrations, Standardizations, and Checks
  - T 23, Making and Curing Concrete Test Specimens in the Field

- T 119M/T 119, Slump of Hydraulic Cement Concrete
- T 121M/T 121, Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- T 152, Air Content of Freshly Mixed Concrete by the Pressure Method
- T 196M/T 196, Air Content of Freshly Mixed Concrete by the Volumetric Method

2.2. *ASTM Standards:*

- C192/C192M, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
- C457/C457M, Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete
- C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- D5720, Standard Practice for Static Calibration of Electronic Transducer-Based Pressure Measurement Systems for Geotechnical Purposes (withdrawn 2018)
- E177, Standard Practice for Use of the Terms Precision and Bias in ASTM Test Methods<sup>2</sup>

2.3. *American Concrete Institute:*

- ACI 201.2R, Guide to Durable Concrete

2.4. *Other Reference:*

- Powers, T. C., Void Spacing as a Basis for Producing Air-Entrained Concrete. *ACI Journal*, Part 2, *Proc.*, Vol. 50, 1954.

---

### 3. SIGNIFICANCE AND USE

- 3.1. This test method covers the determination of the air content and the system air metric (SAM) number of freshly mixed concrete. The test determines the air content of freshly mixed concrete exclusive of any air that exists inside voids within aggregate particles. For this reason, it is applicable only to concrete made for which the aggregate correction factor can be determined. (See Sections 7.1 and 10.1.)
- 3.2. This test method and T 152, T 121M/T 121, and T 196M/T 196 provide sequential pressure, static pressure, gravimetric, and volumetric procedures, respectively, for determining the air content of freshly mixed concrete. The sequential pressure procedure of this test method gives substantially the same air content as the other test methods for concrete made with dense aggregates. The sequential pressure procedure of this test method also gives the SAM number, which can be used to estimate the freeze-thaw durability of the paste in a hardened concrete mixture.
- 3.3. The air content of the same hardened concrete mixture may be either higher or lower than determined by this test method. This depends on the methods and amount of consolidation effort applied to the concrete from which the hardened concrete specimen is taken; uniformity and stability of the air voids in the fresh and hardened concrete; accuracy of the microscopic examination to measure the hardened air content, if used; time of comparison; environmental exposure; stage in the delivery, placement, and consolidation processes at which the air content is determined, that is, before or after the concrete goes through a pump; and other factors.
- 3.4. In cases where the air content did not vary between the fresh and hardened concrete, this test method has shown to predict freeze-thaw durability as well as the spacing factor as measured by ASTM C457/C457M.