



Designation: **C1181 – 00 (Reapproved 2012) C1181/C1181M – 17**

## Standard Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts<sup>1</sup>

This standard is issued under the fixed designation **C1181/C1181M**; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope ~~Scope~~\*

1.1 These test methods cover a quantitative, comparative test for compressive creep of chemical-resistant grouting materials under a sustained load at a test temperature. Constant load is maintained using a bolt and spring washers. Measurements are made at laboratory temperature after exposure periods at the selected test temperature.

1.2 Test Method A outlines the molding techniques for an unbonded test specimen. Test Method B covers the molding techniques for a bonded test specimen.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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.

1.4 *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, health, and ~~health~~ environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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:*<sup>2</sup>

**C904 Terminology Relating to Chemical-Resistant Nonmetallic Materials** <sup>17</sup>

### 3. Terminology

3.1 *Definitions*—For definitions of terms used in these test methods, see Terminology **C904**.

### 4. Significance and Use

4.1 These test methods provide a means of measuring the total compressive deflection of chemical-resistant, machinery-grout materials under a sustained load at the test temperature. Test stress and temperature can be selected to simulate anticipated use conditions. For the purposes of these tests, creep is considered to be the compressive deflection in ~~inches per inch, cm per cm~~ [inches per inch], which occurs after the initial loading of the specimen at laboratory temperature. *The results do not necessarily correlate for different specimen thicknesses.* No correlation has been established to actual-use conditions.

### 5. Apparatus

5.1 *Steel Loading Plates*—Steel plates, as described, are used for loading the grout during the test. They may, also, be part of the mold used to cast the grout specimen.

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee **C09** on Concrete and Concrete Aggregates and are the direct responsibility of Subcommittee **C09.41** on Hydraulic Cement Grouts.

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<sup>2</sup> 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.

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

5.1.1 Two steel plates are required for each test specimen. The plates shall be 411 to 13 cm [4¼ to 5 in. (11 to 13 cm)] square by 1 in. (25 mm) in. square by 25 mm [1 in.] thick. A 1¼-in. (30-mm) diameter hole shall be drilled in the center of the plates. The edges of the plates and holes shall be deburred.

5.1.2 One of the steel plates shall have four ¼-in. (6-mm) measuring holes (one in each corner) with the center 13 mm [½ in. (13 mm)] in from each edge.

5.2 *Bolt Assembly*— A 1-in. (25-mm) diameter by 7.5 in. (19 cm) long, high-strength steel bolt, and nut, flat washers, and spring washers are used to maintain the test load.

5.3 *Belleville Spring Washers*—Four washers are required for each test. These shall be high carbon steel with dimensions of 2.9 cm [1 1/8 by 2 1/4 in. (5.7 by 6.0 cm)] outside diameter by 0.159-in. (4.0-mm) thickness, with 0.039-in. (1.0-mm) dish. These washers will have an approximate spring rate of 153 000 lb/in. (27 300 kg/cm) and a rated load of 5793 lb (2630 kg) when flattened.

5.4 *Grout Mold*, suitable to cast the 4-in. (10-cm) diameter by 2.5 cm [2 ± 0.1 in. (5 cm)] thick grout specimen with a 2.9-cm [1 1/8-in.] diameter center hole as shown in Fig. 1. The faces must be parallel to within 0.030 in. (0.75 mm) over the 4-in. (10 cm) diameter specimen contact area (see 5.3). The mold may utilize the steel loading plates.

5.4.1 For the bonded method, the plates are used as mold end plates.

5.5 *Compression Machine or Apparatus*, capable of applying the test load to within ±2.0 %.

5.6 *Depth Micrometer*, readable to 0.0001 in. (2.5 μ) with adjustable shaft length capable of reading approximately 3-in. (7.6-cm) depth.

5.7 *Indicating Caliper*, readable to 0.001 in. (25 μ).

5.8 *Constant Temperature Oven*, capable of maintaining the desired temperature ±4°F (±2°C).

5.9 *Suitable Support Stand*, capable of supporting the test assembly when placed under compressive load.

## 6. Specimen Preparation

6.1 *Temperature*— Condition all grout components and molds at 73 ± 4°F (23 ± 2°C), for at least 24 h prior to use.

6.2 *Test Method A, Unbonded*—To prevent bonding, treat all surfaces of the mold with a suitable release agent, which will contact the material during casting.

6.3 *Test Method B, Bonded:*

6.3.1 Prior to assembly, clean to remove foreign matter such as rust, dirt, or scale from the grout contact surfaces of the two base plates.

6.3.2 To prevent bonding, treat all other surfaces of the mold which will contact the material during casting.

6.4 Mix the grout according to manufacturer's recommendations and pour, or otherwise place, through the fill hole in the mold. The grout may be consolidated with a rounded-end rod.

## 7. Conditioning

7.1 The specimen shall remain in the mold at least 16 h at 73 ± 4°F (23 ± 2°C).

7.2 Following the initial conditioning period, disassemble the mold (including the end plates if using Test Method A). Maintain the specimens at 73 ± 4°F (23 ± 2°C) for a total of seven days, including the time in the mold.

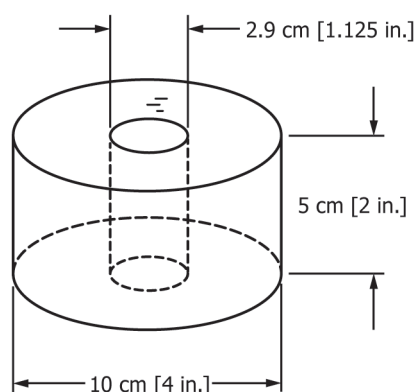


FIG. 1 Test Specimen