



Designation: C 1436 – 99

## Standard Specification for Materials for Shotcrete<sup>1</sup>

This standard is issued under the fixed designation C 1436; 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 specification covers materials for use in hydraulic-cement concrete mixtures to be placed by shotcreting. It does not cover mixing, placement, curing, or protection of the concrete placed by shotcreting.

1.2 This specification covers materials for both wet-mix and dry-mix shotcreting.

1.3 The values stated in SI units are to be regarded as the standard.

1.4 The following precautionary statement pertains only to the test method portions of the specification: *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 the standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

2.1 *ASTM Standards:*

C 33 Specification for Concrete Aggregates<sup>2</sup>

C 125 Terminology Relating to Concrete and Concrete Aggregates<sup>2</sup>

C 150 Specification for Portland Cement<sup>3</sup>

C 330 Specification for Lightweight Aggregates for Structural Concrete<sup>2</sup>

C 595 Specification for Blended Hydraulic Cements<sup>3</sup>

C 1116 Specification for Fiber-Reinforced Concrete and Shotcrete<sup>2</sup>

C 1141 Specification for Admixtures for Shotcrete<sup>2</sup>

C 1157 Performance Specification for Blended Hydraulic Cement<sup>3</sup>

C 1385 Practice for Sampling Materials for Shotcrete<sup>2</sup>

### 3. Terminology

3.1 The terms used in this specification are defined in Terminology C 125 or Specification C 1141.

<sup>1</sup> This specification is under the jurisdiction of Committee C-9 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.46 on Shotcrete.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.01.

### 4. Ordering Information

4.1 In the absence of designated applicable general specifications, the purchaser shall include the following information in the purchase contract or order, if applicable:

4.1.1 The specification designation and date of issue,

4.1.2 Specification for cement and type (see 5.1.1),

4.1.3 Grading number for total combined aggregates required (see 5.1.2),

4.1.4 Specification, type, and grade(s) for admixtures required (see 5.1.4), and

4.1.5 Specification, type, length, and if appropriate the diameter (or equivalent cross-sectional dimensions) of fiber required (see 5.1.5).

### 5. Material Requirements

5.1 In the absence of designated applicable specifications covering requirements for quality of materials, the following requirements shall govern:

5.1.1 *Cement*—Cement shall be in accordance with Specification C 150, Specification C 595, or Performance Specification C 1157. If special properties are required, the purchaser shall limit the choice of cements to those suitable for the special use.

5.1.2 *Aggregates*—Aggregates shall be in accordance with Specification C 33 or Specification C 330 if lightweight shotcrete is specified by the purchaser except that the grading of the total aggregate constituent of the shotcrete shall be in accordance with the requirements prescribed in Table 1 for the grading number specified.

NOTE 1—The ranges shown in Table 1 are by necessity wide in order to accommodate nationwide conditions. For quality control of any specific operation, a producer should develop an average grading for the particular source and production facilities, and control the grading within reasonable tolerances from this average.

5.1.3 *Water*—The mixing water shall be in accordance with the requirements for water prescribed in Specification C 1116.

5.1.4 *Admixtures*—Mineral and chemical admixtures shall be in accordance with Specification C 1141.

5.1.5 *Fibers*—Fibers shall be in accordance with the requirements for fibers prescribed in Specification C 1116.

**TABLE 1 Grading Limits for Combined Aggregate for Shotcrete**

Percent by Mass Passing Individual Sieve		
Sieve Size, U.S. Standard	Grading, No. 1	Grading, No. 2
12.5 mm (½ in.)	-	100
9.5 mm (¾ in.)	100	90 - 100
4.75 mm (No. 4)	95 - 100	70 - 85
2.36 mm (No. 8)	80 - 98	50 - 70
1.18 mm (No. 16)	50 - 85	35 - 55
600 µm (No. 30)	25 - 60	20 - 35
300 µm (No. 50)	10 - 30	8 - 20
150 µm (No. 100)	2 - 10	2 - 10

## 6. Sampling

6.1 Access shall be provided to the purchaser for sampling, either at the point of manufacture or at the site of the work, as specified by the purchaser. Sampling of materials shall be in accordance with Practice C 1385.

## 7. Number of Tests and Retests

7.1 Testing, number of tests, and retests to be performed on specified materials shall be in accordance with the referenced ASTM standard.

## 8. Inspection

8.1 Inspection of the materials shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

## 9. Rejection, Certification, and Product Marking

9.1 Rejection, certifications, and product markings on specified materials shall be in accordance with the referenced ASTM specification.

## 10. Keywords

10.1 dry-mix shotcrete, materials for; ordering; shotcrete; specification; testing; wet-mix shotcrete

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