



Designation: C 1077 – 02

Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation¹

This standard is issued under the fixed designation C 1077; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This practice identifies and defines the duties, responsibilities, and minimum technical requirements of testing laboratory personnel and the minimum technical requirements for laboratory equipment utilized in testing concrete and concrete aggregates for use in construction.

1.2 This practice provides criteria for the evaluation of the capability of a testing laboratory to perform designated ASTM test methods on concrete and concrete aggregates. It can be used by an accrediting agency in the accreditation of a laboratory or by other parties to determine if the laboratory is qualified to conduct the specified tests.

1.3 If the laboratory requires external technical services to conduct tests, the external agency shall be subject to separate evaluation.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- C 29/C 29M Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate²
- C 31/C 31M Practice for Making and Curing Concrete Test Specimens in the Field²
- C 39/C 39M Test Method for Compressive Strength of Cylindrical Concrete Specimens²
- C 40 Test Method for Organic Impurities in Fine Aggregates for Concrete²
- C 42/C 42M Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete²
- C 70 Test Method for Surface Moisture in Fine Aggregate²

- C 78 Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)²
- C 87 Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar²
- C 88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate²
- C 116 Test Method for Compressive Strength of Concrete Using Portions of Beams Broken in Flexure²
- C 117 Test Method for Material Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing²
- C 123 Test Method for Lightweight Particles in Aggregate²
- C 125 Terminology Relating to Concrete and Concrete Aggregates²
- C 127 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate²
- C 128 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate²
- C 131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine²
- C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates²
- C 138/C 138M Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete²
- C 142 Test Method for Clay Lumps and Friable Particles in Aggregates²
- C 143/C 143M Test Method for Slump of Hydraulic Cement Concrete²
- C 157/C 157M Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete²
- C 172 Practice for Sampling Freshly Mixed Concrete²
- C 173/C 173M Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method²
- C 174 Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores²
- C 192/C 192M Practice for Making and Curing Concrete Test Specimens in the Laboratory²
- C 215 Test Method for Fundamental Transverse, Longitudinal and Torsional Frequencies of Concrete Specimens²
- C 227 Test Method for Potential Alkali Reactivity of Cement–Aggregate Combinations (Mortar-Bar Method)²

¹ This practice is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.98 on Evaluation of Laboratories.

Current edition approved Jan. 10, 2002. Published March 2002. Originally published as C 1077 – 87. Last previous edition C 1077 – 00.

² *Annual Book of ASTM Standards*, Vol 04.02.

- C 231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method²
- C 232 Test Methods for Bleeding of Concrete²
- C 233 Test Method for Air-Entraining Admixtures for Concrete²
- C 234 Test Method for Comparing Concretes on the Basis of the Bond Developed with Reinforcing Steel²
- C 289 Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)²
- C 293 Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)²
- C 295 Guide for Petrographic Examination of Aggregates for Concrete²
- C 341 Test Method for Length Change of Drilled or Sawed Specimens of Hydraulic-Cement Mortar and Concrete²
- C 403/C 403M Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance²
- C 418 Test Method for Abrasion Resistance of Concrete by Sandblasting²
- C 441 Test Method for Effectiveness of Mineral Admixtures or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction²
- C 457 Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete²
- C 469 Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression²
- C 470/C 470M Specification for Molds for Forming Concrete Test Cylinders Vertically²
- C 495 Test Method for Compressive Strength of Lightweight Insulating Concrete²
- C 496 Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens²
- C 511 Specification for Moist Cabinets, Moist Rooms and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes³
- C 512 Test Method for Creep of Concrete in Compression²
- C 535 Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine²
- C 566 Test Method for Total Moisture Content of Aggregate by Drying²
- C 567 Test Method for Unit Weight of Structural Lightweight Concrete²
- C 586 Test Method for Potential Alkali Reactivity of Carbonate Rocks for Concrete Aggregates (Rock Cylinder Method)²
- C 597 Test Method for Pulse Velocity Through Concrete²
- C 617 Practice for Capping Cylindrical Concrete Specimens²
- C 641 Test Method for Staining Materials in Lightweight Concrete Aggregates²
- C 642 Test Method for Density, Absorption, and Voids in Hardened Concrete²
- C 666 Test Method for Resistance of Concrete to Rapid Freezing and Thawing²
- C 671 Test Method for Critical Dilation of Concrete Specimens Subjected to Freezing²
- C 672/C 672M Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals²
- C 682 Practice for Evaluation of Frost Resistance of Coarse Aggregates in Air-Entrained Concrete by Critical Dilation Procedures²
- C 684 Test Method of Making, Accelerated Curing, and Testing of Concrete Compression Test Specimens²
- C 702 Practice for Reducing Samples of Aggregate to Testing Size²
- C 779 Test Method for Abrasion Resistance of Horizontal Concrete Surfaces²
- C 801 Test Method for Determining the Mechanical Properties of Hardened Concrete Under Triaxial Loads²
- C 802 Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials²
- C 803/C 803M Test Method for Penetration Resistance of Hardened Concrete²
- C 805 Test Method for Rebound Number of Hardened Concrete²
- C 823 Practice for Examination and Sampling of Hardened Concrete in Constructions²
- C 856 Practice for Petrographic Examination of Hardened Concrete²
- C 873 Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds²
- C 876 Test Method for Half-Cell Potentials of Uncoated Reinforcing Steel in Concrete²
- C 900 Test Method for Pullout Strength of Hardened Concrete²
- C 918 Test Method for Measuring Early-Age Compressive Strength and Projecting Later-Age Strength²
- C 944 Test Method for Abrasion Resistance of Concrete or Mortar Surfaces by the Rotating-Cutter Method²
- C 1040 Test Methods for Density of Unhardened and Hardened Concrete In Place by Nuclear Methods²
- C 1064/C 1064M Test Method for Temperature of Freshly Mixed Portland Cement Concrete²
- C 1074 Practice for Estimating Concrete Strength by the Maturity Method²
- C 1084 Test Method for Portland-Cement Content of Hardened Hydraulic-Cement Concrete²
- C 1105 Test Method for Length Change of Concrete Due to Alkali-Carbonate Rock Reaction²
- C 1137 Test Method for Degradation of Fine Aggregate Due to Attrition²
- C 1138 Test Method for Abrasion Resistance of Concrete (Underwater Method)²
- C 1150 Test Method for the Break-Off Number of Concrete²
- C 1152 Test Method for Acid-Soluble Chloride in Mortar and Concrete²
- C 1170 Test Methods for Determining Consistency and Density of Roller-Compacted Concrete Using a Vibrating Table²
- C 1176 Practice for Making Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Table²

³ Annual Book of ASTM Standards, Vol 04.01.

- C 1202 Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration²
- C 1218 Test Method for Water-Soluble Chloride in Mortar and Concrete²
- C 1231 Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders²
- C 1383 Test Method for Measuring the P-Wave Speed and the Thickness of Concrete Plates Using the Impact-Echo Method²
- C 1399 Test Method for Obtaining Average Residual-Strength of Fiber-Reinforced Concrete²
- C 1404/C 1404M Test Method for Bond Strength of Adhesive Systems Used with Concrete as Measured by Direct Tension²
- D 75 Practice for Sampling Aggregates⁴
- D 2419 Test Method for Sand Equivalent Value of Soils and Fine Aggregate⁴
- E 4 Practices for Force Verification of Testing Machines⁵
- E 11 Specification for Wire-Cloth and Sieves for Testing Purposes⁶
- 2.2 *ACI Standards:*
 - ACI 214-77 Recommended Practice for Evaluation of Strength Test Results of Concrete⁷
 - SP-19 (116R) Cement and Concrete Terminology⁷

3. Terminology

3.1 Definitions:

3.1.1 *evaluation authority*—an independent entity, apart from the organization being evaluated, that can provide an unbiased evaluation of that organization. The entity must have the capability to assess the professional and technical activities of concrete and concrete aggregate testing laboratories.

3.1.1.1 *Discussion*—Laboratory inspection services are provided by the Cement and Concrete Reference Laboratory (CCRL).⁸ Laboratory inspection is broadened into accreditation programs by such independent authorities as the National Voluntary Laboratory Accreditation Program (NVLAP),⁹ American Association for Laboratory Accreditation (AALA),¹⁰ Construction Materials Engineering Council (CMEC),¹¹ AASHTO Accreditation Program (AAP)¹² and other recognized agencies as may be established.

3.1.2 *external technical services*—those services required by a testing laboratory that are provided by another organization.

⁴ *Annual Book of ASTM Standards*, Vol 04.03.

⁵ *Annual Book of ASTM Standards*, Vol 03.01.

⁶ *Annual Book of ASTM Standards*, Vol 14.02.

⁷ Available from American Concrete Institute, P.O. Box 9094, Farmington Hills, MI 48333.

⁸ CCRL, National Institute of Standards and Technology, Bldg. 226, Rm. A365, Gaithersburg, MD 20899.

⁹ NVLAP, National Institute of Standards and Technology, Bldg. 820, Rm. 282, Gaithersburg, MD 20899.

¹⁰ American Association for Laboratory Accreditation, Quince Orchard, Gaithersburg, MD 20878.

¹¹ Construction Materials Engineering Council, 649 Vassar St., Orlando, FL 32804.

¹² American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capital St. NW, Suite 225, Washington, DC 20001.

3.1.3 *field technician*—an employee of the laboratory who is assigned to perform sampling and testing functions outside the laboratory.

3.1.4 *laboratory technician*—an employee of the laboratory who is assigned to perform the actual testing operations primarily conducted in the laboratory.

3.1.5 *quality systems*—those internal procedures and practices that a laboratory utilizes to ensure continued compliance with applicable testing standards for concrete and concrete aggregates.

3.1.6 *testing laboratory*—an organization that measures, examines, performs tests, or otherwise determines the characteristics or performance of materials or products. This may include organizations that offer commercial testing services, an in-house quality control function, an academic institution, or any other organization providing the required testing services.

3.1.7 Additional definitions can be found in Terminology C 125, Practices E 4, and ACI SP-19.

4. Significance and Use

4.1 The testing and inspection of concrete and concrete aggregates are important elements in obtaining quality construction. A testing laboratory specializing in these services must be selected with care.

4.2 A testing laboratory shall be deemed qualified to perform and report the results of its tests if the laboratory meets the requirements of this practice. The testing laboratory services shall be provided under the technical direction of a registered professional engineer.

4.3 This practice establishes essential characteristics pertaining to the organization, personnel, facilities, and quality systems of the laboratory. This practice may be supplemented by more specific criteria and requirements for particular projects.

5. Organization

5.1 The following information shall be readily available for review:

5.1.1 Description of the organization, including:

5.1.1.1 Complete legal name and address of the main office and each laboratory location,

5.1.1.2 Names and positions of the principal officers and the responsible, registered professional engineer in charge, and

5.1.1.3 Description of the organization management structure.

5.1.2 Listing of the relevant technical services offered, and

5.1.3 All external technical services normally utilized.

5.2 The laboratory shall designate an individual with access to management who has the responsibility of seeing that procedures required in this document are being carried out.

6. Human Resources

6.1 Information shall be made available to substantiate personnel qualifications as follows:

6.1.1 All relevant testing services are provided under the full-time technical direction of a registered professional engineer with at least 5 years experience in construction materials testing.