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Designation: D 3740 – 03

Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction[1]

This standard is issued under the fixed designation D 3740; 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 establishes minimum qualifications for agencies engaged in the testing and inspection of soil and rock. Minimum requirements for field and laboratory personnel are defined. The practice also covers the establishment and maintenance of a quality system.

1.2 Criteria are provided for evaluating the capability of an agency to properly perform designated tests on soil and rock, and for establishing essential characteristics pertaining to an agency's organization, personnel, facilities, and quality system. This practice may be supplemented by more specific criteria and requirements for particular projects.

1.3 This practice can be used as a basis to evaluate testing and inspection agencies, or both, and is intended for use for the qualifying or accrediting, or both, of testing or inspection agencies, public or private, engaged in the testing and inspection of soil and rock as used in engineering design and construction.

1.4 This practice is applicable to all standards promulgated by Committee D18 whether or not mentioned in the Referenced Document Section.

1.5 This practice is not intended to apply to agencies engaged in chemical testing of soil, rock, and contained fluid. The minimum requirement for those agencies can be found in Specification D 5522.

1.6 *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.*

1.7 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

C 1077 Practice for Laboratories Testing Concrete and Concrete Aggregate for Use in Construction and Criteria for Laboratory Evaluation

D 422 Test Method for Particle-Size Analysis of Soils

D 558 Test Methods for Moisture-Density Relations of Soil-Cement Mixtures

D 559 Test Methods for Wetting and Drying Compacted Soil-Cement Mixtures

D 560 Test Methods for Freezing and Thawing Compacted Soil-Cement Mixtures

D 653 Terminology Relating to Soil, Rock and Contained Fluids

D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,4000 ft-lbf/ft^3 (600 kN-m/m^3))

D 854 Test Method for Specific Gravity of Soil Solids by Water Pycnometer

D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

D 1883 Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils

D 2166 Test Method for Unconfined Compressive Strength of Cohesive Soil

D 2419 Test Method for Sand Equivalent Value of Soils and Fine Aggregate

[1] This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.99 on Quality Control.

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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.

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

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D 2435 Test Method for One-Dimensional Consolidation Properties of Soils
D 2664 Test Method for Triaxial Compressive Strength of Undrained Rock Core Specimens Without Pore Pressure Measurements
D 2844 Test Method for Resistance *R*-Value and Expansion Pressure of Compacted Soils
D 2845 Test Method for Laboratory Determination of Pulse Velocities and Ultrasonic Elastic Constants of Rock
D 2850 Test Method for Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression
D 2936 Test Method for Direct Tensile Strength of Intact Rock Core Specimens
D 2938 Test Method for Unconfined Compressive Strength of Intact Rock Core Specimens
D 3080 Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
D 3148 Test Method for Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression
D 3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
D 3967 Test Method for Splitting Tensile Strength of Intact Rock Core Specimens
D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D 4341 Test Method for Creep of Cylindrical Hard Rock Core Specimens in Uniaxial Compression
D 4394 Test Method for Determining the In Situ Modulus of Deformation of Rock Mass Using the Rigid Plate Loading Method
D 4395 Test Method for Determining the In Situ Modulus of Deformation of Rock Mass Using the Flexible Plate Loading Method
D 4403 Practice for Extensometers Used in Rock
D 4405 Test Method for Creep of Cylindrical Soft Rock Core Specimens in Uniaxial Compressions
D 4406 Test Method for Creep of Cylindrical Rock Core Specimens in Triaxial Compression
D 4435 Test Method for Rock Bolt Anchor Pull Test
D 4436 Test Method for Rock Bolt Long-Term Load Retention Test
D 4506 Test Method for Determining the In Situ Modulus of Deformation of Rock Mass Using a Radical Jacking Test
D 4525 Test Method for Permeability of Rocks by Flowing Air
D 4535 Test Methods for Measurement of Thermal Expansion of Rock Using a Dilatometer
D 4543 Practice for Preparing Rock Core Specimens and Determining Dimensional and Shape Tolerances
D 4553 Test Method for Determining In Situ Creep Characteristics of Rock
D 4554 Test Method for In Situ Determination of Direct Shear Strength of Rock Discontinuities
D 4555 Test Method for Determining Deformability and Strength of Weak Rock by an In Situ Uniaxial Compressive Test
D 4611 Test Method for Specific Heat of Rock and Soil
D 4612 Practice for Calculating Thermal Diffusivity of Rocks
D 4630 Test Method for Determining Transmissivity and Storage Coefficient of Low Permeability Rocks by In Situ Measurements Using the Constant Head Injection Test
D 4631 Test Method for Determining Transmissivity and Storativity of Low Permeability Rocks by In Situ Measurements Using the Pressure Pulse Technique
D 4644 Test Method for Slake Durability of Shales and Similar Weak Rocks
D 4645 Test Method for Determination of the In Situ Stress in Rock Using the Hydraulic Fracturing Method
D 4729 Test Method for In Situ Stress and Modulus of Deformation Using the Flatjack Method
D 4971 Test Method for Determining the In Situ Modulus of Deformation of Rock Using the Diametrically Loaded 76-mm (3-in.) Borehole Jack
D 5220 Test Method for Water Content of Soil and Rock In-Place By the Neutron Depth Probe Method
D 5240 Test Method for Testing Rock Slabs to Evaluate Soundness of Riprap By Use of Sodium Sulfate or Magnesium Sulfate
D 5255 Practice for Certification of Personnel Engaged in the Testing of Soil and Rock
D 5312 Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions
D 5313 Test Method for Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions
D 5334 Test Method for Determination of Thermal Conductivity of Soil and Soft Rock by Thermal Needle Probe Procedure
D 5335 Test Method for Linear Coefficient of Thermal Expansion of Rock Using Bonded Electric Resistance Strain Gages
D 5407 Test Method for Elastic Moduli of Undrained Intact Rock Core Specimens in Triaxial Compression Without Pore Pressure Measurement
D 5522 Specification for Minimum Requirements for Laboratories Engaged in Chemical Analysis of Soil, Rock, and Contained Fluid
E 329 Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
E 1187 Terminology Relating to Conformity Assessment
E 1301 Guide for Proficiency Testing by Interlaboratory Comparisons

2.2 *Other Standards:*

AASHTO R18 Recommended Practice for Establishing and Implementing a Quality System for Construction Materials Testing Laboratories
ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this practice see Terminologies D 653 and E 1187.

3.2 *Definitions of Terms Specific to This Standard*:

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3.2.1 *agency*—an organization, or part of an organization, engaged in activities of technically oriented testing or inspection, or both.

3.2.2 *quality manual*—a document stating the quality policy, quality system and quality practices of an organization.

3.2.3 *qualified national authority*—an organization recognized throughout the country, with the capability to assess and monitor the professional and technical activities of an inspection or testing agency, or both.

4. Significance and Use

4.1 This practice provides the basic minimum criteria for use in evaluating the qualifications of a testing or inspection agency, or both, for soil and rock. The criteria may be supplemented by more specific criteria and requirements. An individual user can also use it to judge the qualification of an agency. The existence of a formal accrediting body such as a federal, state, or independent agency is not necessary for the use of this standard.

NOTE 1—Users of this practice should be aware that certain of these requirements may not be achievable and/or applicable to work performed outside of the U.S.A. In such cases, users should ensure that all necessary modifications are made to these requirements such as to render them appropriate to each specific set of circumstances.

4.2 The intent of this practice is to provide a consensus basis for evaluating a testing or inspection agency, or both, with respect to that agency's capability to objectively and competently provide the specific services needed by the user.

4.3 This practice may be used as a basis for accreditation.

5. Responsibilities and Duties

5.1 The agency shall ensure that only inspections or tests for which it is adequately equipped and staffed are performed.

5.2 The agency shall ensure that personnel perform only inspections and tests for which they are adequately trained, qualified and certified in accordance with applicable specifications.

5.3 The agency shall ensure that all equipment is properly maintained in good operating condition and is calibrated as applicable.

5.4 The agency shall perform all testing and inspection in accordance with appropriate standards and quality control criteria.

6. General Capabilities

6.1 *Laboratory Testing*—The agency performing laboratory testing of soil and rock shall have suitable test equipment and laboratory facilities for storing and testing samples and preparing samples for test.

6.2 *Field Testing and Inspection*—The field services of a soil and rock testing and inspection agency shall include some or all of the following capabilities:

6.2.1 testing of in situ materials,

6.2.2 testing of materials being processed,

6.2.3 checking on adequacy of production equipment or construction equipment used for reworking or processing soil and rock,

6.2.4 observation and inspection of soil or rock placement, and

6.2.5 in-place testing of constructed components.

6.3 *Sampling*—the services of an agency responsible for sampling soil and rock shall include some or all of the following capabilities:

6.3.1 sampling of in situ materials,

6.3.2 sampling of materials which are to be reworked, processed, and reused,

6.3.3 sampling of materials being processed, and

6.3.4 sampling of constructed components.

7. Personnel Qualifications

7.1 *Management and Supervision*—The testing and inspection services of the agency shall be under the direction of a person charged with the engineering managerial or scientific managerial responsibility. The person shall be a licensed registered engineer or other licensed registered professional and a full-time employee of the agency and shall have a minimum of 5 years engineering or scientific experience, as appropriate, in the inspection and testing of soil and rock; or a person with equivalent science-oriented education and experience in having satisfactorily supervised or directed testing or inspection services, or both, of soil and rock is acceptable. A NICET (Note 2) Level IV Certification in Construction Materials Testing—Soils, Geotechnical Engineering Technology or Transportation Engineering—Subfield Highway Materials shall be considered as one means of evidence of the experience of this individual.

NOTE 2—The National Institute for Certification in Engineering Technologies (NICET) is a nationally recognized certification organization. Refer to Practice D 5255 for other guidelines on certification.

7.2 *Supervising Laboratory Technician*— The supervising laboratory technician shall have at least 5 years experience performing tests on soil and rock. This person must demonstrate, by performance evaluation and written/oral examination, the ability to perform the tests normally required in the manner stipulated under ASTM or other governing procedures and shall be capable of evaluating the test results in terms of specification compliance. A current valid NICET Level III Certification (Note 1) in Construction Materials Testing—Subfield Soils or Geotechnical Engineering Technology or Transportation Engineering—Subfield Highway Materials shall be considered as one means of evidence of competency. At a minimum, each person shall be re-evaluated at least every three years for each test the person is authorized to perform.

7.3 *Supervising Field Technician*—This person shall have at least 5 years experience in inspecting the kind of work involved in the soil and rock construction project. This person must demonstrate, by performance evaluation and written/oral examination, the ability to correctly perform the required duties. A current valid NICET Level III Certification (Note 2) in Construction Materials Testing— Subfield Soils or Geotechnical Engineering Technology or Transportation Engineering—Subfield Highway Materials shall be considered as one means of evidence of competency. At a minimum, each person shall be re-evaluated at least every three years for each test the person is authorized to perform.

7.4 *Inspecting or Testing Technician*— This person shall have a high school diploma or equivalent or trade school

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training and have had sufficient on-the-job training to properly perform the test or inspection to which the person is assigned.

This person must demonstrate, by written and performance examinations, competency for the test or inspection which the person will be assigned.

A current NICET Level I certification in a related field (Geotechnical/Construction Materials Testing- Soils or similar); or a current ACI certification as a "Aggregate Testing Technician-Field or Lab"; or equivalent; satisfy the above requirement.

A trainee may perform this work while advancing toward certification under the direct physical supervision of a person meeting the requirements above. The trainee cannot independently evaluate test results or sign as responsible for the report.

NOTE 3—ACI International is a nationally recognized certification organization.

8. Quality System Criteria

8.1 The agency shall establish and implement a quality system which meets the following criteria:

8.1.1 *Quality Manual*—The agency shall establish and maintain a quality manual that conforms to the requirements in Section 9, Quality Manual (Requirements). Each document in the quality manual shall indicate its preparation date. If a document is revised, the date of revision shall be indicated on the document. The quality manual shall be available for use by laboratory staff.

8.1.2 *Quality Management*—The agency shall designate a person(s) having responsibility for determining if quality system implementation activities are being conducted by agency staff in the manner specified in the agency's quality manual. This individual(s) shall have direct access to top management (Note 4).

NOTE 4—This individual(s) may have other responsibilities (for example, laboratory manager).

8.1.3 *Laboratory Procedure Manual*—The agency shall establish and maintain a procedures manual, outlining the customary method or inspection procedures for each test or service performed by the laboratory. Copies of current ASTM, AASHTO, or other national standards used need not to be included in the manual. However, for each procedure, the manual shall include specific references to such standards along with any exceptions to them and/or any special instructions (such as requirement for forms, calculation programs, checking and/or review, etc.). The referenced standards shall be readily available for use by personnel performing the test or service.

8.1.4 *Equipment Calibration and Verification*—The agency shall calibrate or verify all significant testing equipment associated with tests covered by the scope of this standard which the agency performs. As a minimum, the equipment listed in Table 1 and Table 2 shall be included if it is associated with tests performed by the agency. Applicable equipment shall be calibrated or verified at the intervals specified in the agency's quality manual. The intervals specified in the quality manual shall be no greater than those indicated in Table 1 and Table 2 (Note 5). Newly acquired equipment without manufacturers certification and equipment that has not been calibrated or verified because it has been removed from service shall be calibrated or verified before being placed in service. The agency shall have detailed written procedures for all in-house calibration and verification activities not addressed in standards. These procedures shall indicate the equipment required to perform the calibration or verification.

NOTE 5—When a maximum calibration or verification interval for a specific piece of test equipment is specified in a standard, the maximum interval specified by this document is intended to be the same as the maximum interval specified by the standard.

8.1.5 *Equipment Calibration and Verification Records*—The agency shall maintain calibration and verification records for all equipment specified in the quality manual. Such records shall include:

8.1.5.1 detailed results of the work performed (dimensions, mass, force, frequency, temperature, time, and the like),

8.1.5.2 description of the equipment calibrated or verified including model and serial number or other acceptable identification (Note 13),

8.1.5.3 date the work was done,

TABLE 1 Test Equipment Calibration and Verification Requirements

Equipment—Test Method	Requirement	Interval (Month)
Mechanical Shakers	Ck. Sieving Thoroughness	12
Gen. Purpose Balances, Scales & Weights	Verify	12
Compression or Loading Device—D 1883, D 2166, D 2435, D 2850, D 3080	Verify Load Indications	12
Mechanical Compactor—D 698, D 1557	Calibrate	12
CA Kneading Compactor—D 2844	Calibrate	24
Ovens	Verify Temperature Setting(s)	4
Vacuum System—D 854	Ck. Pressure	24
Molds—D 698, D 558, D 559, D 560, D 1557, D 1883, D 2844	Ck. Critical Dimensions	12
Manual Hammer—D 698, D 1557	Ck. Wt. & Critical Dimensions	12
Sieves	Ck. Physical Condition	6
Liquid Limit Device—D 4318	Ck. Wear & Critical Dimensions	12
Grooving Tool—D 4318	Ck. Critical Dimensions	12
Hydrometers—D 422	Ck. Critical Dimensions	24
Straightedge—D 698, D 558, D 559, D 560, D 1557	Ck. planeness of edge	6
Weighted Foot Assembly—D 2419	Ck. weight	12
CBR Annular and Slotted Weights—D 1883	Ck. weight	12
CBR Penetration Piston—D 1883	Ck. diameter	12
Standard Metal Specimen—D 2844	Ck. outside diameter	12
Metal Follower—D 2844	Ck. diameter	12

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