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Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction¹

This standard is issued under the fixed designation D3740; 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 U.S. 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 To qualify for accreditation to this standard, the agency must include at least five standards relating to testing methods, inspection methods, or both, from the standards covered under the jurisdictions of Committee D18, in its certificate of accreditation.

1.5 This practice is applicable to all standards which include a reference to Practice D3740.

1.6 *The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.*

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

1.8 *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*

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

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.

1.9 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:²

[C1077 Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation](#)

[D653 Terminology Relating to Soil, Rock, and Contained Fluids](#)

[D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials](#)

[D5255 Practice for Certification of Personnel Engaged in the Testing of Soil and Rock](#)

[E329 Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection](#)

[E1187 Terminology Relating to Conformity Assessment \(Withdrawn 2006\)³](#)

[E1301 Guide for Proficiency Testing by Interlaboratory Comparisons \(Withdrawn 2012\)³](#)

2.2 Other Standards:

[AASHTO R18 Recommended Practice for Establishing and Implementing a Quality System for Construction Materials Testing Laboratories⁴](#)

[ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories](#)

3. Terminology

3.1 Definitions:

3.1.1 For definitions of common terms used in this standard, refer to Terminologies [D653](#) and [E1187](#).

3.2 Definitions of Terms Specific to This Standard:

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

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

3.2.3 *qualified national authority, n*—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 United States of America (U.S.A.). In such cases, users should make sure 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.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

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

4.4 The users of an accredited agency must review the agency's scope of accreditation to make sure the agency has been accredited for its technical competence to perform the tasks requested by the user.

5. Responsibilities and Duties

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

5.2 The agency shall make sure 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 make sure 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 agency performing field testing and inspection services of soil and rock 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 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 engineering 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.

7.2 *Supervising Laboratory Technician*—The supervising laboratory technician shall have at least 3 years experience performing tests on soil and rock.

7.2.1 This person must demonstrate, by written examination(s), the ability to perform the tests in the manner stipulated under ASTM or other governing procedures and shall be capable of evaluating the test results in terms of specification compliance. Current certification by national, regional or state authorities shall be considered as one means of evidence of fulfilling the written examination requirement (**Note 2**). The certification shall be appropriate to the work required. At a minimum, the written examination(s) shall include at least five test methods listed in ASTM Volumes 4.08 and 4.09.

7.2.2 In addition, a performance evaluation reviewing the technician's competency to perform the test method correctly shall be conducted prior to the technician performing the test independently and at least every 36 months thereafter for each test the person is authorized to perform.

7.3 *Supervising Field Technician*—This person shall have at least 3 years experience in inspecting the kind of work involved in the soil and rock construction project.

7.3.1 This person must demonstrate, by written examination(s), the ability to perform the tests and duties in the manner stipulated under ASTM or other governing procedures and shall be capable of evaluating the test results in terms of specification compliance. Current certification by national, regional or state authorities shall be considered as one means of evidence of fulfilling the written examination requirement (**Note 2**). The certification shall be appropriate to the work required. At a minimum, the written examination(s) shall include at least five of the testing or inspection methods listed in ASTM Volumes 4.08 and 4.09.

7.3.2 In addition, a performance evaluation reviewing the technician's competency to perform the test method correctly shall be conducted prior to the technician performing the test independently and at least every 36 months thereafter for each test the person is authorized to perform.

7.4 *Inspecting or Testing Technician*—This person shall have a high school diploma, or trade school training, or have had sufficient on-the-job training to properly perform the test or inspection to which the person is assigned.

7.4.1 This person must demonstrate, by written examination(s), the ability to perform the tests in the manner stipulated under ASTM or other governing procedures. Current certification by national, regional or state authorities shall be considered as one means of evidence of fulfilling the written examination requirement (**Note 2**). The certification shall be appropriate to the work necessary. At a minimum, the written examination(s) shall include at least five of the testing or inspection methods listed in ASTM Volumes 4.08 and 4.09. Technicians that perform fewer than 5 of the applicable testing or inspection methods will meet the written exam requirement provided the examination(s) includes each testing or inspection method performed.

7.4.2 In addition, a performance evaluation reviewing the technician's competency to perform the test method correctly shall be conducted prior to the technician performing the test independently and at least every 24 months thereafter for each test the person is authorized to perform.

7.4.3 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 an inspection or testing report.

NOTE 2—Refer to Practice **D5255** for other guidance on certification.

7.5 *Written Examinations*—The written examinations required for the *Supervising Laboratory Technician*, *Supervising Field Technician*, and the *Inspecting or Testing Technician* shall be of sufficient length and detail to cover the whole test or inspection method, including as applicable: the significance of the test or inspection method, sampling, specimen preparation, procedure, and reporting of results.

7.6 *Performance Evaluations*—The performance evaluations required for the *Supervising Laboratory Technician*, *Supervising Field Technician*, and the *Inspecting or Testing Technician* for reviewing the technician's competency shall include a demonstration of the test or inspection method to document the technician's ability to perform the procedure in accordance with the standard.

7.7 It is satisfactory for a person to fill one or more of the levels of management, supervision, inspector, or technician positions in accordance with 7.1, 7.2, 7.3, and 7.4 provided that person qualifies for the highest level. It is also recognized that frequently

a few laboratory control tests or inspections are conducted at small field or peripheral locations. It is not the intent of this practice that the supervisory personnel be directly present at such locations at all times.

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 3).

NOTE 3—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 or any special instructions (such as requirement for forms, calculation programs, checking, review, or combinations thereof, etc.) (or both). 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 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 (Note 4). 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 4—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.

8.1.4.1 **Table 1** provides a list of maximum intervals for the frequency of calibration, standardization, verification, and check for use when a standard test method does not provide one. Where a standard test method specifies an interval that is different than the interval found in Table 1, the interval in the standard test method shall take precedence for that method.

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 109),
- 8.1.5.3 date the work was done,
- 8.1.5.4 identification of the individual performing the work,
- 8.1.5.5 identification of the calibration or verification procedure used,
- 8.1.5.6 the previous calibration or verification date and the next due date, and
- 8.1.5.7 identification of any in-house calibration or verification device used.

TABLE 1 Test Equipment Calibration and Verification Requirements

Equipment—Test Method	Requirement	Interval (Month)
Mechanical Shakers	Check Sieving Thoroughness	12
Gen. Purpose Balances, Scales & Weights	Verify Measurements	12
Gen. Purpose Balances, Scales & Weights	Standardize	12
Compression or Loading Device	Verify Measurements	12
Compression or Loading Device	Standardize	12
Mechanical Compactor	Calibrate Compactive Effort	12
Mechanical Compactor	Standardize Compaction Effort	12
CA Kneading Compactor	Calibrate Compactive Effort and Dwell	24
CA Kneading Compactor	Standardize Compaction Effort and Dwell	24
Ovens	Verify Temperature Setting(s)	12
Ovens	Verify Temperature	12
Vacuum System	Check Pressure	24
Vacuum System, Pressure Gauges, and Pressure Transducers	Standardize	24
Molds	Check Critical Dimensions	12
Manual Hammer	Check Wt. & Critical Dimensions	12
Sieves	Check Physical Condition	12
Liquid Limit Device	Check Wear & Critical Dimensions	12
Grooving Tool	Check Critical Dimensions	12
Hydrometers	Check Critical Dimensions	24
Straightedge	Check planeness of edge	12
Straightedge	Check Planeness of Edge	12
Weighted Foot Assembly	Check weight	12
Weighted Foot Assembly	Check Mass	12
GBR Annular and Slotted Weights	Check weight	12
GBR Annular and Slotted Weights	Check Mass	12
GBR Penetration Piston	Check diameter	12
GBR Penetration Piston	Check Diameter	12
Standard Metal Specimen	Check outside diameter	12
Standard Metal Specimen	Check Outside Diameter	12
Metal Follower	Check diameter	12
Metal Follower	Check Diameter	12
Dial Gages, LVDTs, Micrometers	Verify Indications	12
Dial Gauges, LVDTs, Micrometers, Extensometers, Strain Gauges,	Verify Indications	12
Compressometers, Strain Readout Indicators		
Pressure Gages and Transducers	Calibrate Measurements	12
Load Cells	Calibrate Measurements	12
Load Cells	Standardize	12
Flow Meters	Calibrate Measurements	12
Flow Meters	Standardize	12
Thermal Meters and Transducers	Calibrate Measurements	12
Thermal Meters and Transducers	Standardize	12
Sonic Transducers	Verify Measurements	12
Bearing Plates	Check Plainness, Flatness, and Parallelism	12
Surface Plates, V-Blocks, Gauge Stands	Check Bearing Surface Planeness	12
Feeler Gauges	Check Blade Thickness	24
Slake Durability Device	Check Critical Dimensions, Drum Rotation Rate	12
Thermal Needle Probe	Standardize (Voltage-Ohm-Meter)	12
Rebound Hammer	Check Critical Dimensions	12
Bearing Platens	Check Bearing Surface Planeness	12
Borehole Deformation Gauge	Verify Displacement	12

8.1.6 *Inspection of Facilities*—The agency shall have its facilities inspected at intervals of not more than 3 years by a qualified national authority. The agency shall, within 30 days of the receipt of the evaluation report, submit to the qualified national authority complete a written report documenting how any deficiencies were corrected, action plans or corrective action reports, or both for deficiencies found during the assessment. This information shall be submitted to the requesting accreditation body, agency, owner at a deadline specified by that entity.

8.1.7 *Proficiency Sample Testing*—The agency shall participate in a formal proficiency sample program(s) as described in Guide E1301. An inhouse program or a program operated by an independent third party is acceptable. The scope of participation shall be sufficient to validate quality system operation.

8.1.8 *External Audit Records*—The agency shall maintain records of any external audits and documentation describing how the deficiencies were corrected.

8.1.9 *Proficiency Sample Records*—The agency shall retain results of participation in proficiency sample programs including data sheets, summary reports, and documentation describing steps taken to determine the cause of poor results and corrective actions taken.