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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.

ε[1] NOTE—Editorially changes were made throughout in November 2007.

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 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.*

1.6 *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 653 Terminology Relating to Soil, Rock and Contained Fluids

~~D3666Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials~~

~~D4403Practice for Extensometers Used in Rock~~

~~D4543Practice for Preparing Rock Core Specimens and Determining Dimensional and Shape Tolerances~~

~~D4612Practice for Calculating Thermal Diffusivity of Rocks~~

D 3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D 5255 Practice for Certification of Personnel Engaged in the Testing of Soil and Rock

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

[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.
Current edition approved ~~Feb.~~Nov. 1, 2004. Published ~~March~~November 2004. Originally approved in 1978. Last previous edition approved in ~~2003~~2004 as D 3740 – 0~~3~~4.

[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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2.2 *Other Standards:*

AASHTO R18 Recommended Practice for Establishing and Implementing a Quality System for Construction Materials Testing Laboratories[3]

ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories[4]

3. Terminology

3.1 *Definitions:*

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

3.1.2 Soil and Rock — as used in this standard, any test method, practice, specification or guide developed by D18 and listed in volumes 04.08 and 04.09.

3.2 *Definitions of Terms Specific to This Standard*:

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.

4.4 To qualify for accreditation to this standard, the agency must include at least five standards relating to testing and/or inspection methods, from the standards covered under the jurisdictions of Committee D18, in its certificate of accreditation.

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

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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:

[3] AMRL, National Institute of Standards Technology, Bldg. 226, Rm A365, Gaithersburg, MD 20899.

[3] 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] NVLAP, National Institute of Standards Technology, Bldg. 411, Rm A162, Gaithersburg, MD 20899.

[4] Available from International Organization for Standardization (ISO), 1 rue de Varembé, Case postale 56, CH-1211, Geneva 20, Switzerland, http://www.iso.ch.

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[5] (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 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.

7.5 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 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

[5] American Association for Laboratory Accreditation, Quince Orchard, Gaithersburg, MD 20878.
[5] National Institute for Certification in Engineering Technologies, 1420 King St., Alexandria, VA 22314-2794.

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 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 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~~Note 12),

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.

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 (Note 6). The agency shall, within 30 days of the receipt of the evaluation report, submit to the qualified national authority a written report documenting how any deficiencies were corrected.~~

~~NOTE6—Laboratory inspection services are provided by the AASHTO Materials Reference Laboratory (AMRL). Laboratory inspection is broadened into accreditation programs by such independent authorities as the National Institute of Standards and Technology—National Voluntary Laboratory Accreditation Program (NVLAP), American Association for Laboratory Accreditation (A2LA), and AASHTO Accreditation Program (AAP).~~ —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

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	Verify Load Indications	12
Mechanical Compactor	Calibrate	12
CA Kneading Compactor	Calibrate	24
Ovens	Verify Temperature Setting(s)	4
Vacuum System	Ck. Pressure	24
Molds	Ck. Critical Dimensions	12
Manual Hammer	Ck. Wt. & Critical Dimensions	12
Sieves	Ck. Physical Condition	6
Liquid Limit Device	Ck. Wear & Critical Dimensions	12
Grooving Tool	Ck. Critical Dimensions	12
Hydrometers	Ck. Critical Dimensions	24
Straightedge	Ck. planeness of edge	6
Weighted Foot Assembly	Ck. weight	12
CBR Annular and Slotted Weights	Ck. weight	12
CBR Penetration Piston	Ck. diameter	12
Standard Metal Specimen	Ck. outside diameter	12
Metal Follower	Ck. diameter	12
Gen. Purpose Balances, Scales, Weights	Verify	12
Compression or Loading Device	Verify Load Indications	12
Ovens	Verify Temperature Settings	4
Sieves	Check Physical Condition	6
~~Dial Gages, LVDTs, Micrometres~~	~~Verify Indications~~	~~6~~
Dial Gages, LVDTs, Micrometers	Verify Indications	6
Presure Gages and Transducers	Calibrate	6
Load Cells	Calibrate	12
Flow Meters	Calibrate	12
Thermal Meters and Transducers	Calibrate	12
Sonic Transducers	Verify	6

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