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.**

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*:

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

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

TABLE 2 Test Equipment Calibration and Verification Requirements for Testing Rock

Equipment—Test Method	Requirement	Interval (Months)
Gen. Purpose Balances, Scales, Weights—D 4612, D 4644, D 5220, D 5240, D 5312, D 5313	Verify	12
Compression or Loading Device—D 2664, D 2936, D 2938, D 3148, D 3967, D 4341, D 4405, D 4406, D 5407	Verify Load Indications	12
Ovens—D 4612, D 4644, D 5220, D 5240, D 5312, D 5313	Verify Temperature Settings	4
Sieves—D 4644	Check Physical Condition	6
Dial Gages, LVDTs, Micrometres—D 2664, D 3148, D 4341, D 4394, D 4395, D 4403, D 4405, D 4406, D 4435, D 4436, D 4506, D 4535, D 4543, D 4553, D 4554, D 4555, D 4729, D 4971, D 5335	Verify Indications	6
Presure Gages and Transducers—D 4394, D 4395, D 4525, D 4406, D 4506, D 4553, D 4554, D 4630, D 4631, D 4645, D 4729, D 4971, D 5407	Calibrate	6
Load Cells—D 4394, D 4395, D 4435, D 4436, D 4553, D 4555	Calibrate	12
Flow Meters—D 4630, D 4631, D 4525	Calibrate	12
Thermal Meters and Transducers—D 4341, D 4405, D 4406, D 4535, D 4611, D 4612, D 5334, D 5335	Calibrate	12
Sonic Transducers—D 2845	Verify	6

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.

NOTE 6—Laboratory inspection services are provided by the AASHTO Materials Reference Laboratory (AMRL).[3] 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),[4] American Association for Laboratory Accreditation (A2LA),[5] and AASHTO Accreditation Program (AAP).[6]

8.1.7 *Proficiency Sample Testing*—The agency shall participate in a formal proficiency sample program(s) as described in Guide E 1301. An inhouse program or a program operated by an independent third party is acceptable (Note 7). The scope of participation shall be sufficient to validate quality system operation.

NOTE 7—The AASHTO Materials Reference Laboratory (AMRL) operates a soil proficiency sample program.

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.

8.1.10 *Test Methods and Procedures*—The agency shall maintain copies of standard and nonstandard procedures for testing performed which is covered by the scope of this standard and shall ensure that the procedures are the most current and are readily accessible to employees performing the work.

8.1.11 *Test Records*—The agency shall maintain test records which contain sufficient information to permit verification of any test reports. Records pertaining to testing shall include original observations, calculations, derived data and an identification of personnel involved in sampling and testing. The agency shall prepare test reports which clearly, accurately and unambiguously present, but are not limited to, the information specified in Table 3 (Note 8). The procedure for amending reports shall require that the previously existing report be clearly referenced when an amendment is made. The references shall establish a clear audit trail from the latest issuance or deletion to the original report and its supporting data.

NOTE 8—The requirements in Table 3 apply to the record that is used to present the laboratory's test results in their final form. In some cases, a test report or test data sheet is the final form of the data.

8.1.12 *Records Retention*—Records pertaining to testing, equipment calibration and verification, test reports, internal

TABLE 3 Test Report Requirements

A Name and address of the testing laboratory
B Identification of the report and the date issued
C Name and address of the client
D Identification of the project
E Description and identification of the test sample
F Date of receipt of the test sample
G Date(s) test was performed
H Identification of the standard test method(s) used and a notation of deviations from the standard
I Test results and other pertinent data required by the standard test method
J Identification of any test results obtained from tests performed by a subcontractor
K The name of the person(s) accepting technical responsibility for the test report
L Any additional sample and field identification/location information

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

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

[5] American Association for Laboratory Accreditation, Quince Orchard, Gaithersburg, MD 20878.

[6] American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capital St. NW, Suite 249, Washington DC 20001

quality system reviews, proficiency sample testing, test technician training and evaluation, and personnel shall be retained by the laboratory in a secure location for a minimum of 3 years.

NOTE 9—There are many circumstances when a longer retention may be advantageous to the agency. Records concerning the calibration and verification of equipment are an example. Retention schedules of this type usually require such records to be held throughout the useful life of the equipment.

9. Quality Manual (Requirements)

9.1 The agency shall establish and maintain a quality manual meeting the following requirements:

NOTE 10—The quality system requirements of AASHTO R18, ISO/IEC 17025, Specification E 329, Practice C 1077, or Specification D 3666, satisfy the requirements of this standard.

9.1.1 *Organization and Organizational Policies*:

9.1.1.1 The quality manual shall contain the legal name and address of the agency and that of the main office or company, if different, and any other information needed to identify the organization.

9.1.1.2 The quality manual shall contain the ownership and management structure of the agency. Names, affiliations and positions of principal officers and directors shall be listed.

9.1.1.3 The quality manual shall contain an organization chart showing relevant internal organizational components.

9.1.1.4 The quality manual shall contain a list showing applicable dates of the qualifications, accreditations and recognition of the agency by others.

9.1.2 *Staff*:

9.1.2.1 The quality manual shall contain an outline or chart showing operational personnel positions and their lines of authority and responsibility.

9.1.2.2 The quality manual shall contain position descriptions for each technical operational position shown on the agency's organization chart in testing areas covered by the scope of this standard. These position descriptions shall identify the position and include a description of the duties associated with the position, required skills, education and experience, and supervision exercised and received. A reference to where the required position descriptions may be found is acceptable if they are not included in the quality manual.

9.1.2.3 The quality manual shall contain a brief biographical sketch, noting the education, work experience, licensure, certifications, and current position of supervisory technical staff involved in testing areas covered by the scope of this standard. Alternatively, the quality manual may contain a reference to the location of the biographical sketches.

9.1.2.4 The quality manual shall contain a document which describes the method(s) used to ensure that all agency technical staff are trained and qualified to perform tests covered by the scope of this standard. In addition to the description of training methods the document shall indicate what position(s) or employee(s) is responsible for the agency training program and maintenance of training records.

NOTE 11—There may be several different methods employed for differing conditions of staff experience and background including (1) on-the-job apprentice training (one on one) for new employees with little or no experience in laboratory or inspection work; (2) formal in-house training sessions for certification, rating, or competency evaluation; and (3) training by external organizations. An individual with prior experience performing a specific test need only have competency confirmed by the agency.

9.1.2.5 The quality manual shall contain a document describing the method(s) used to evaluate staff competency to ensure that each test covered by the scope of this standard is performed in accordance with standard procedures. This description shall include the frequency of evaluations for each technician and indicate what position(s) or employee(s) is responsible for evaluating staff competency and maintaining records. These procedures shall ensure that each technician performing the test method is evaluated.

NOTE 12—Proficiency sample testing may be useful in evaluating staff competency, however, it should be used in conjunction with observation of actual testing performed.

9.1.2.6 The quality manual shall contain a form(s) for recording training and competency evaluation activities summarized under 9.1.2.4 and 9.1.2.5 including the name of the trainee, name of the evaluator, test method evaluated, the dates and results.

9.1.3 *Facilities and Equipment*:

9.1.3.1 *Inventory*—The quality manual shall contain an inventory of major sampling, testing, calibration and verification equipment associated with the test methods covered by the scope of this standard. A reference to where the inventory is located is acceptable if it is not included in the quality manual. The inventory shall include, for each piece of major equipment, the name, manufacturer, model and serial number (Note 13).

NOTE 13—Major equipment includes equipment such as shakers, physical or chemical testing machines, balances, baths, ovens, microscopes, and computing equipment dedicated to testing. Equipment such as chairs, desks and file cabinets may be excluded. Major equipment does not usually include expendable items such as miscellaneous glassware, sieves, molds and viscometers.

NOTE 14—An identification number assigned by the agency or other unique identifying information may be substituted for the model and serial number if this is the practice normally followed by the agency.

9.1.3.2 *Equipment Calibration and Verification*:

(1) The quality manual shall contain a list(s) giving a general description of equipment for performing tests covered by the scope of this standard that require calibration or verification. For each item listed, the list shall include the interval of calibration or verification, a reference to the calibration or verification procedure used (Note 15), and the location of calibration and verification records (Note 16).

NOTE 15—When standard calibration procedures are used, the standard shall be referenced. When the procedure used has been prepared by the agency, the in-house designation shall be referenced. It shall be indicated if the work is performed by an outside agency.

NOTE 16—In addition to being in the quality manual, this information may also be included in the calibration and verification records on each piece of equipment.

(*2*) The quality manual shall contain a document that describes the agency's method for ensuring that the calibration and verification procedures are performed for all required equipment at the specified intervals. This document shall include the name of individual(s) responsible for ensuring that

calibration and verification activities are carried out, and procedures for handling equipment that is new, removed from service, out of calibration or defective.

(*3*) The quality manual shall contain in-house equipment calibration and verification procedures, when they cannot be referenced in applicable standards, or have a reference to their location.

(*4*) The quality manual shall contain certificates or other documents that establish the traceability of in-house equipment or reference standards used for calibration and verification, or have a reference to their location in the agency.

9.1.4 *Test Records and Reports*:

9.1.4.1 The quality manual shall contain a document that describes methods used by the agency to produce test records and to prepare, check and amend test reports.

9.1.4.2 The quality manual shall contain typical test report forms which illustrate the manner in which tests results and supporting information (see 8.1.11) are documented.

NOTE 17—A printout showing a typical test record is acceptable if the laboratory uses electronic media for report storage.

9.1.5 *Sample Management*—The quality manual shall contain a document describing procedure(s) for sample identification, storage, retention, and disposal of samples.

NOTE 18—In this context, the term storage refers to what is done before testing. The term retention refers to what is done after testing.

9.1.6 *Diagnostic and Corrective Action*:

9.1.6.1 The quality manual shall contain a document(s) describing participation in proficiency sample and on-site inspection programs, methods used to identify poor results and procedures followed when poor results occur or deficiencies occur.

9.1.6.2 The quality manual shall contain a document outlining the method(s) used in responding to external technical complaints.

9.1.7 *Internal Quality System Review*— The quality manual shall contain a document describing the scope of internal quality system reviews, establishing the frequency of these reviews, identifying individuals responsible for the review, describing the distribution of reports to management and identifying the location of resulting records.

9.1.8 *Subcontracting*—The quality manual shall contain a document describing the policies that the agency follows relative to subcontracting, if it engages in such activities. A reference to where the policies may be found is acceptable if they are not included in the quality manual. These policies shall include procedures followed by the agency in selecting competent subcontractors who meet the requirements of this practice and reporting the results of testing performed by subcontractors. If the agency does not engage in such activities, the quality manual shall contain a statement to that effect.

10. Records and Reporting Requirements

10.1 The agency shall maintain a system of records that permits verification of any issued report. A record of each report and related records shall be retained for at least three years and shall include the name of the person performing the test(s).

10.2 The agency shall maintain the following records:

10.2.1 Detailed results (for example, worksheets) of all required equipment calibration and verification,

10.2.2 Results of internal audits,

10.2.3 The results of any on-the-job training performed including name of person, date of training, by whom and type of training,

10.2.4 The results of any activities performed to ensure continued competence in performing standard test methods, including name of person, date of competency check, by whom, what type of activity,

10.2.5 The results of audits and inspections of the agency and certifications of agency personnel with applicable dates,

10.2.6 Records of verification of competency of any external organizations used, and

10.2.7 Records or resumes that document the qualifications, work experience, and training history of each person.

10.3 Each report, as a minimum, shall include:

10.3.1 The name and address of the agency,

10.3.2 The date the report was issued and the date the test or inspection was performed,

10.3.3 The name of the client,

10.3.4 Identification of the report, the project, and the name and title of the person technically responsible for the report, and the standard test method(s) used,

10.3.5 Specific identification and description of the test specimen or item inspected that includes field identification and detailed location information, for example, applicable horizontal and vertical coordinates of the sample source,

10.3.6 The date the test sample or item inspected was received by the agency, if applicable,

10.3.7 The standard test method(s) used with a notation of all known deviations from the referenced methods or requirements of the method(s), or both, not performed by the agency,

10.3.8 Identification of test results or other data, or both, obtained from subcontractor(s), and,

10.3.9 The results and other pertinent data required by the test or inspection method(s) used.

10.4 Agency test reports shall accurately and clearly present the specified test results and all pertinent data.

10.5 Corrections or additions to reports shall clearly reference the report being amended.

11. Keywords

11.1 construction materials testing; quality assurance; quality control; quality manual; quality system

SUMMARY OF CHANGES

In accordance with Committee D18 policy, this section identifies the location of changes to this standard since the last edition (D3740–01) that may impact the use of this standard.

(1) 1.4 was added to the Scope section to make it clear this standard is applicable to all D18 standards.
(2) 7.4 was revised to simplify, to add ACI certifications, and to lower the experience requirement.
(3) Note 10 was added to Section 9.1 to identify quality systems that will meet the requirements of this standard.
(4) Reference to Note 10 was deleted from Section 9.1.3.1. It was not correct.
(5) Old Section 10 was deleted as redundant. Old Section 11 was renumbered as new Section 10.