



Designation: D3666–09a ~~Designation: D3666 – 11~~

Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials¹

This standard is issued under the fixed designation D3666; 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 specification covers the minimum requirements for field and laboratory personnel, for establishing and maintaining a quality system, and establishes minimum qualifications for agencies engaged in the testing and inspection of road and paving materials.

1.2 Criteria are provided for evaluating the capability of an agency to properly perform designated tests on road and paving materials, and for establishing guidelines pertaining to an agency's organization, personnel, facilities, and quality system. This specification may be supplemented by more specific criteria, such as that in Specification E329, and requirements for particular projects.

1.3 This specification can be used as a basis to evaluate testing or 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 road and paving materials.

1.4 Accreditation is required to comply with this standard. (See 8.1.5.)

1.5 The users of the 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.

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.*

2. Referenced Documents

2.1 The following referenced documents are those that are specifically mentioned in this specification. These referenced documents are not meant to be all inclusive, as this specification applies, as appropriate, to all test methods under the jurisdiction of Committee D04.

- 2.2 *ASTM Standards:*²
- D5 Test Method for Penetration of Bituminous Materials
 - D8 Terminology Relating to Materials for Roads and Pavements
 - D36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
 - D70 Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)
 - D92 Test Method for Flash and Fire Points by Cleveland Open Cup Tester
 - D113 Test Method for Ductility of Bituminous Materials
 - D139 Test Method for Float Test for Bituminous Materials
 - D244 Test Methods and Practices for Emulsified Asphalts
 - D1074 Test Method for Compressive Strength of Bituminous Mixtures
 - D1075 Test Method for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures
 - D1560 Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus
 - D1561 Practice for Preparation of Bituminous Mixture Test Specimens by Means of California Kneading Compactor
 - D1754 Test Method for Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)
 - D1856 Test Method for Recovery of Asphalt From Solution by Abson Method

¹ This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.95 on Quality Control, Inspection and Testing Agencies.

Current edition approved Dec. 1, 2009; 2011. Published January 2010; December 2011. Originally approved in 1978. Last previous edition approved in 2009 as D3666 – 09A. DOI: 10.1520/D3666-09A; 10.1520/D3666-11.

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.

- D2170 Test Method for Kinematic Viscosity of Asphalts (Bitumens)
- D2171 Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer
- D2872 Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)
- D3143 Test Method for Flash Point of Cutback Asphalt with Tag Open-Cup Apparatus
- D5506 Practice for Organizations Engaged in the Certification of Personnel Testing and Inspecting Bituminous Paving Materials
- D6084 Test Method for Elastic Recovery of Bituminous Materials by Ductilometer
- D6926 Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
- D6927 Test Method for Marshall Stability and Flow of Bituminous Mixtures
- E329 Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
- E1301 Guide for Proficiency Testing by Interlaboratory Comparisons

3. Terminology

3.1 Definitions:

3.1.1 ~~The Definitions~~—The approved standard definitions are listed below.

3.1.23.1.1 *quality system, n*—the organizational structure, responsibilities, procedures, activities, capabilities, and resources that together aim to ensure that laboratory services satisfy data requirements.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *agency, n*—the organization engaged to test or inspect road and paving materials as required by a specification or contract.

3.2.2 *quality system manual (QSM)*—a set of documents describing an agency's quality system.

3.2.3 *user*—the person or organization engaging the agency to provide inspections or tests; or using this specification to evaluate or accredit the agency.

3.2.4 *calibration, n*—a process that establishes the relationship (traceability) between the results of a measurement instrument, measurement system, or material measure and the corresponding values assigned to a reference standard.

3.2.4.1 *Discussion*—The purpose of calibration is to establish the traceability of a measurement on certain types of equipment, such as balances (measurement instrument) and dynamic shear rheometer (measurement system). Uncertainty estimates obtained during calibration are used to judge if an instrument is suitable for its intended purpose. There is a need to re-establish traceability or recalibrate only when instrument measurements drift out of control (as determined through verification of calibration).

3.2.5 *check, n*—a specific type of inspection and/or measurement performed on equipment and materials to indicate compliance or otherwise with stated criteria.

3.2.5.1 *Discussion*—Checks are performed on items of equipment that do not make measurements, such as specimen molds and ovens. Stated criteria can be dimensional tolerances.

3.2.6 *quality system manual (QSM), n*—a set of documents describing an agency's quality system.

3.2.7 *standardization, n*—a process that determines whether adjustments are needed to a specific piece of equipment, such as pycnometers and flow meters, when its performance is compared with that of a generally accepted standard.

3.2.8 *traceability, n*—the property of a result of a measurement whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties.

3.2.8.1 *Discussion*—There is a need for traceable measurements. Measurements, not the instrument, can be traceable. Measurement traceability is established through calibration. Measurement traceability is maintained through check of calibration (a regular check of instrument output using a control standard).

3.2.9 *uncertainty, n*—a parameter associated with the result of a measurement that defines the range of the values that could be attributed to the measured quantity.

3.2.9.1 *Discussion*—The uncertainty of a measurement is required in order to establish its traceability. The uncertainty estimates obtained during calibration are used to judge if an instrument is suitable for its intended purpose.

3.2.10 *user, n*—the person or organization engaging the agency to provide inspections or tests; or using this specification to evaluate or accredit the agency.

3.2.11 *verification, n*—a process that establishes whether the results of a previously calibrated measurement instrument, measurement system, or material measure are stable.

3.2.11.1 *Discussion*—Verification is used to maintain the traceability of a measurement and to determine when to recalibrate. Control charts are often used to plot verification results and determine if instrument measurements have drifted out of control.

3.3 Other Definitions:

3.3.1 Refer to Terminology D8.

4. Significance and Use

4.1 This specification provides the basic minimum criteria for use in evaluating the qualifications of testing or inspection agencies, or both, for road and paving materials. 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.

4.2 The intent of this specification 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 specification can 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. Documents unique to the user shall be furnished to the agency.

6. General Capabilities

6.1 *Laboratory Testing*—The laboratory testing services of a road and paving materials testing agency shall include some or all of the following capabilities:

6.1.1 Testing of road and paving materials and mixtures in the laboratory,

6.1.2 Testing of aggregate for compliance with specification requirements,

6.1.3 Preparation and evaluation of mix design in accordance with the proper method common to the geographical area in which it offers services or in accordance with the appropriate ASTM or AASHTO standard procedure,

6.1.4 Determination of percent binder and gradation of plant aggregates in plant mix, and

6.1.5 Determination and verification of mix properties for comparison with the mix design.

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

6.2.1 Investigation of aggregate at the source for compliance with specification requirements,

6.2.2 Inspection of proportioning and mixing at the plant or project site in accordance with user's requirements.

6.2.3 Inspection of handling, laying, and rolling operations of the mixture at the site,

6.2.4 Determination of thickness of compacted mixture, and

6.2.5 Determination of density and the percent compaction of a bituminous pavement after construction.

NOTE 1—Since the requirements for construction control can vary widely from project to project depending upon the nature of the mixture, location, and intended use of the bituminous mixture in the project, the capability of the agency for testing and inspection should be that necessary to accomplish construction control of the user's specific project or special requirements.

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 scientific or engineering managerial responsibility. This person should be a licensed engineer and a full-time employee of the agency and shall have a minimum of 5 years experience in inspecting and testing of road and paving materials and construction; however, in place of being a licensed engineer, a person with equivalent science-oriented education and experience in having satisfactorily directed testing or inspection services, or both, of road and paving materials is acceptable. This person shall possess all applicable professional licenses or certificates required by public law or requirements of the authority in one or more fields which the person directs. A NICET Level IV Certification in Construction Materials Testing—Subfield Asphalt would be considered an example of an acceptable certification of the experience of this individual.

NOTE 2—The National Institute for Certification in Engineering Technologies (NICET) is a nationally recognized certification organization.³

7.2 *Field/Plant Inspector or Testing Technician Supervisor*:

7.2.1 This person shall have a minimum of 3 years of relevant and progressively more responsible experience in testing and/or inspection of road and paving materials and hot mix asphalt construction as appropriate to their job classification.

7.2.2 This person shall have applicable technician level or inspector level, or higher, certifications/qualifications (see Note 3) through a program approved by a State DOT, or have a NICET Level II certification in Construction Materials Testing—Asphalt, or Transportation Technologist—Highway Materials.

7.3 *Field/Plant Inspector or Testing Technician*:

7.3.1 This person shall have applicable technician level or inspector level certifications/qualifications (see Note 3) through a program approved by a State DOT, or, have a NICET Level I certification in Construction Materials Testing—Asphalt, or Transportation Technologist—Highway Materials.

7.3.2 Trainees working toward certification can be used to perform the inspection or test, or both, if they work under the supervision of a certified/qualified individual as described in Sections 7.2.2 or 7.3.1, at the same facility, project, or plant. The trainee cannot evaluate the test or inspection results or sign acceptance reports. The trainee must achieve certification within 2 years from the start of work as a trainee.

³ National Institute for Certification in Engineering Technologies, 1420 King Street, Alexandria, VA 22314-2715, <http://www.nicet.org>.

7.4 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, and 7.3 provided that person qualifies for the highest level. It is also recognized that frequently a few laboratory control tests 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.

NOTE 3—The organization certifying should meet the requirements of Practice D5506.

8. Quality System Criteria

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

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

8.1.2 *Quality System 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 system manual. This individual(s) shall have direct access to top management (see Note 4).

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

NOTE 5—Inspection and testing procedures may reference published standards.

8.1.3 *Equipment Calibration and Checks*—The agency shall calibrate, standardize, or check 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.

8.1.3.1 *Calibration and Standardization*—Applicable measurement equipment shall be calibrated or standardized at the intervals specified in the agency’s QSM. The calibration and standardization intervals specified in the QSM shall be no greater than those indicated in Table 1 and Table 2. However, when a maximum calibration or standardization interval for a specific piece of measurement equipment is specified in a standard, the interval specified by the laboratory in the QSM shall not exceed this interval unless the equipment is calibrated or standardized before each use. Measurement equipment that has been removed from service and newly acquired equipment without a calibration or standardization certificate shall be calibrated before being placed in service.

8.1.3.2 *Checks*—Applicable equipment shall be checked at the intervals specified in the agency’s QSM. The check intervals specified in the QSM shall be no greater than those indicated in Table 1 and Table 2. However, when a maximum check interval for a specific piece of equipment is specified in a standard, the interval specified by the laboratory shall not exceed this interval unless the equipment is checked before each use. Any item of equipment which has been shown by checking or otherwise to be defective shall be taken out of service and clearly identified. Equipment that has been removed from service and newly acquired equipment and materials without manufacturer’s certification shall be checked before being placed into service.

TABLE 1 Bituminous Materials Test Equipment

Equipment—Test Method	Requirement	Interval (Month)
Saybolt Viscometers—D244	Standardize	36
Timing Devices—D5, D2170, D2174	Calibrate	6
Timing Devices—D5, D2170, D2171	Calibrate	12
Penetrometer Needle—D5	Check Condition and Critical Dimensions	6
Penetrometer Needle—D5	Check Condition and Critical Dimensions	12
Penetrometer—D5	Standardize	12
Ductility Machine—D113, D6084	Check Speed of Travel	12
TFO and RTFO Oven Shelf—D1754, D2872	Check Rotation Speed	12
Brass Rings and Assembly—D36	Check Critical Dimensions	12
Pycnometers—D70	Check Physical Condition	12
Pycnometers—D70	Standardize	12
Collars and Floats—D139	Check Critical Dimensions	12
Flowmeters—D1856, D2872	Standardize	12
Flash Cups—D92, D3143	Check Critical Dimensions	12
Compression Testing Machine—D1074, D1075, D6927, D1560	Standardize	12
CA Kneading Compactor—D1561	Standardize	24
Followers, Calibration Cylinders—D1560, D1561	Check Critical Dimensions	12
Compaction Hammers, Breaking Heads—D6926	Check Critical Dimensions, Check Mass of Hammer	12
Plungers—D1074	Check Critical Dimensions	12
Asphalt Ignition Furnace, Internal balances	Standardize	12