



Designation: D 3666 – 03

## Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials<sup>1</sup>

This standard is issued under the fixed designation D 3666; 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 ( $\epsilon$ ) 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 E 329, 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 *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 Specification D 3666. These referenced documents are not meant to be all inclusive, as Specification D 3666 applies, as appropriate, to all test methods under the jurisdiction of Committee D04.

#### 2.2 ASTM Standards:

C 128 Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregate<sup>2</sup>

D 5 Test Method for Penetration of Bituminous Materials<sup>3</sup>

D 36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)<sup>4</sup>

D 70 Test Method for Specific Gravity and Density of Semi-Solid Bituminous Materials (Pycnometer Method)<sup>3</sup>

D 92 Test Method for Flash and Fire Points by Cleveland Open Cup Tester<sup>5</sup>

D 113 Test Method for Ductility of Bituminous Materials<sup>3</sup>

D 139 Test Method for Float Test for Bituminous Materials<sup>3</sup>

D 244 Test Methods for Emulsified Asphalts<sup>3</sup>

D 290 Practice for Bituminous Mixing Plant Inspection<sup>6</sup>

D 1074 Test Method for Compressive Strength of Bituminous Mixtures<sup>3</sup>

D 1075 Test Method for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures<sup>3</sup>

D 1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus<sup>7</sup>

D 1560 Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus<sup>3</sup>

D 1561 Practice for Preparation of Bituminous Mixture Test Specimens by Means of California Kneading Compactor<sup>3</sup>

D 1754 Test Method for Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)<sup>3</sup>

D 1856 Test Method for Recovery of Asphalt from Solution by Abson Method<sup>3</sup>

D 2041 Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures<sup>3</sup>

D 2170 Test Method for Kinematic Viscosity of Asphalts (Bitumens)<sup>3</sup>

D 2171 Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer<sup>3</sup>

D 2872 Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)<sup>3</sup>

D 3142 Test Method for Density of Liquid Asphalts (Hydrometer Method)<sup>3</sup>

D 3143 Test Method for Flash Point of Cutback Asphalt with Tag Open-Cup Apparatus<sup>3</sup>

<sup>1</sup> 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.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.03.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.04.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 05.01.

<sup>6</sup> Discontinued; see 2000 *Annual Book of ASTM Standards*, Vol 04.03.

<sup>7</sup> Discontinued; see 1998 *Annual Book of ASTM Standards*, Vol 04.03.

- D 4402 Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer<sup>4</sup>
- D 5506 Practice for Organizations Engaged in the Certification of Personnel Testing and Inspecting Bituminous Paving Materials<sup>3</sup>
- D 6307 Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method<sup>3</sup>
- D 6521 Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)<sup>3</sup>
- D 6648 Test Method for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)<sup>3</sup>
- E 329 Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction<sup>8</sup>

### 3. Terminology

3.1 *Definitions*—The approved standard definitions are listed below. In addition, for information purposes only, Appendix X1 includes definitions for the terms *verification*, *calibration*, *traceability*, and *uncertainty*.

3.1.1 *quality system*—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*—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.

### 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 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. 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 Practice D 290 or 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 registered 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 registered 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

<sup>8</sup> Annual Book of ASTM Standards, Vol 04.02.

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.<sup>9</sup>

**7.2 Supervising Field or Laboratory Technician or Inspection:**

7.2.1 This person shall have a minimum of 5 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 III 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 II 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.

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 D 5506.

**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 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 QSM. The intervals specified in the QSM shall be no greater than those indicated in Table 1 (Note 6). 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.

**TABLE 1 Bituminous Materials Test Equipment**

Equipment—Test Method	Requirement	Interval (Month)
Saybolt Viscometers—D 244	Calibrate	36
Mechanical Shakers	Verify sieving thoroughness	12
General Purpose Balances, Scales and Weights	Calibrate	12
Temperature Measuring Devices—D 5, D 70, D 113, D 2041, D 2170, D 2171, D 3142, D 4402, D 6648, D 2872, D 6521	Calibrate	6
Analytical Balances and Weights	Calibrate	24
Compression Testing Machine—D 1074, D 1075, D 1559, D 1560	Calibrate	12
CA Kneading Compactor—D 1561	Calibrate	24
Timers—D 2170, D 2171	Calibrate	6
Ovens	Verify temperature settings	4
Penetrometer and Accessories—D 5	Calibrate dial and timer accuracy and verify needle condition	6
Ductility Machine—D 113	Verify molds and speed of travel	12
TFO and RTFO Oven—D 1754, D 2872	Verify shelf/carriage rotation speed	12
Sieves	Verify physical condition	6
Molds, Followers, Calibration Cylinders—D 1560, D 1561	Verify critical dimensions	12
Molds, Manual Compaction Hammers, Breaking Heads—D 1559	Verify critical dimensions and mass of hammer	12
Molds and Plungers—D 1074	Verify critical dimensions	12
Brass Rings and Assembly—D 36	Verify critical dimensions	12
Pycnometers—D 70	Calibrate	12
Collars and Floats—D 139	Verify critical dimensions	12
Flowmeters—D 1856, D 2872	Calibrate	12
Molds and Tampers—C 128	Verify critical dimensions	24
Flash Cups—D 92, D 3143	Verify critical dimensions	12
Rotary transducers—D 4402	Verify with a reference fluid	6
Pressure Gages—D 6521	calibrate	6
Stainless steel beams—D 6648	Verify dimensions	12
Standard masses—D 6648	Verify masses	12
Internal balances—D 6307	Calibrate	12

<sup>9</sup> National Institute for Certification in Engineering Technologies, 1420 King Street, Alexandria, VA 22314-2715.