



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

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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 D-4.

2.2 ASTM Standards:

- C 29/C 29M Test Method for Unit Weight and Voids in Aggregate²
- C 128 Test Method for Specific Gravity and Absorption of Fine Aggregate²
- C 138 Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete²

- D 5 Test Method for Penetration of Bituminous Materials³
- D 36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)⁴
- D 70 Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)³
- D 92 Test Method for Flash and Fire Points by Cleveland Open Cup⁵
- D 113 Test Method for Ductility of Bituminous Materials³
- D 139 Test Method for Float Test for Bituminous Materials³
- D 244 Test Methods for Emulsified Asphalts³
- D 290 Practice for Bituminous Mixing Plant Inspection³
- D 1074 Test Method for Compressive Strength of Bituminous Mixtures³
- D 1075 Test Method for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures³
- D 1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus³
- D 1560 Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus³
- D 1561 Practice for Preparation of Bituminous Mixture Test Specimens by Means of California Kneading Compactor³
- D 1754 Test Method for Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)³
- D 1856 Test Method for Recovery of Asphalt from Solution by Abson Method³
- D 2041 Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures³
- D 2170 Test Method for Kinematic Viscosity of Asphalts (Bitumens)³
- D 2171 Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer³
- D 2872 Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)³
- D 3142 Test Method for Density of Liquid Asphalts (Hydrometer Method)³
- D 3143 Test Method for Flash Point of Cutback Asphalt with Tag Open-Cup Apparatus³

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² *Annual Book of ASTM Standards*, Vol 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.03.

⁴ *Annual Book of ASTM Standards*, Vol 04.04.

⁵ *Annual Book of ASTM Standards*, Vol 05.01.

D 5506 Practice for Organizations Engaged in the Certification of Personnel Testing and Inspecting Bituminous Paving Materials³

E 329 Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction⁶

3. Terminology

3.1 Definitions:

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 bituminous 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 bituminous 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 bituminous paving materials testing agency shall include some or all of the following capabilities:

6.1.1 Testing of bituminous 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 bituminous 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 bituminous 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 bituminous 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.⁷

7.2 *Supervising Laboratory Technician*—The supervising laboratory technician shall have at least 5 years experience performing tests on bituminous materials. This person shall be able to demonstrate, either by oral or written examination, or both, the ability to perform the tests normally required in the

⁶ Annual Book of ASTM Standards, Vol 14.02.

⁷ National Institute for Certification in Engineering Technologies, 1420 King Street, Alexandria, VA 22314-2715.

manner stipulated under ASTM or other governing procedures and shall be capable of evaluating the test results in terms of specification compliance. This person shall possess an appropriate certification from a national or state organization (Note 3). A NICET Level III Certification in “Construction Materials Testing—Subfield Asphalt” would satisfy this requirement.

7.3 Supervising Field or Plant Technician or Inspector—This person shall have at least 5 years experience in inspecting the kind of work involved in the bituminous construction project. This person shall be able to demonstrate either by oral or written examination, or both, the ability to perform correctly the required duties. This person shall possess an appropriate certification from a national or state organization (Note 3). A NICET Level III Certification in “Construction Materials Testing—Subfield Asphalt” would satisfy this requirement.

7.4 Inspector or Testing Technician—This person shall have a high school diploma or equivalent and have had sufficient on-the-job training or trade school training to properly perform the test or inspection to which the person is assigned. This person must be able to demonstrate either by oral or written examination, or both, competence for the test or inspection which is being conducted and possess an appropriate certification from a national or state organization (Note 3). A NICET Level II Certification in “Construction Materials Testing—Subfield Asphalt” would satisfy this requirement. A NICET Level I, with the appropriate training and experience, might also be utilized in this position, but only with the specific approval of the user of this standard. The Inspector or Testing Technician shall work under the direct supervision of one meeting the requirements of 7.2 or 7.3 but shall not be permitted to independently evaluate test results or inspections.

7.4.1 Trainees working towards certification can be utilized to perform the inspection or test, or both, if they work under the supervision of a certified individual at the same facility, project, or plant. The trainee cannot evaluate the test or inspection results or sign acceptance reports.

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 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 (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.

NOTE 6—When a maximum calibration or verification interval for a specific piece of test equipment is specified in a standard, the maximum

TABLE 1 Bituminous Materials Test Equipment

Equipment—Test Method	Requirement	Interval (Month)
Saybolt Viscometers—D 244	Calibrate	36
Mechanical Shakers	Check sieving thoroughness	12
General Purpose Balances, Scales and Weights	Verify	12
Test Thermometers—D 5, D 70, D 113, D 2041, D 2170, D 2171, D 3142	Calibrate	6
Analytical Balances and Weights	Verify	24
Compression Testing Machine—D 1074, D 1075, D 1559, D 1560	Verify load indications	12
CA Kneading Compactor—D 1561	Calibrate	24
Timers—D 2170, D 2171	Check accuracy	6
Ovens	Verify temperature settings	4
Penetrometer and Accessories—D 5	Check dial and timer accuracy and needle condition	6
Ductility Machine—D 113	Check molds and speed of travel	12
TFO and RTFO Oven—D 1754, D 2872	Shelf/Carriage check rotation speed and temperature	12
Sieves	Check physical condition	6
Molds, Followers, Calibration Cylinders—D 1560, D 1561	Check critical dimensions	12
Molds, Manual Compaction Hammers, Breaking Heads—D 1559	Check critical dimensions and mass of hammer	12
Molds and Plungers—D 1074	Check critical dimensions	12
Brass Rings and Assembly—D 36	Check critical dimensions	12
Pycnometers—D 70	Check critical dimensions and physical condition	12
Collars and Floats—D 139	Check critical dimensions	12
Flowmeters—D 1856, D2872	Calibrate	12
Molds and Tampers—C 128	Check critical dimensions	24
Flash Cups—D 92, D 3143	Check critical dimensions	12

interval specified by this document is intended to be the same as the maximum interval specified by the standard.

8.1.4 Inspection of Facilities—The agency shall have its laboratory procedures and equipment inspected at intervals of approximately 2 years by an evaluation authority as evidence of its competence to perform required tests. The agency shall within 30 days of the receipt of the evaluation authority written report document on how the deficiencies were corrected.

NOTE 7—The AASHTO Materials Reference Laboratory (AMRL) of the National Institute of Standards and Technology is a qualified national authority.

8.1.5 Agency Accreditation—The agency shall possess a certificate of accreditation listing D 3666 from a national authority as evidence that it meets the requirements of this standard.

NOTE 8—Accreditation programs offered by AASHTO (AASHTO Accreditation Program—AAP), the American Association for Laboratory Accreditation (A2LA) and the National Voluntary Laboratory Accreditation Program (NVLAP) are examples of programs offered by national authorities.

8.1.6 Proficiency Sample Testing—The agency shall participate in applicable AMRL proficiency sample programs.

NOTE 9—The AASHTO Materials Reference Laboratory (AMRL) located at the National Institute of Standards and Technology in Gaithersburg, Maryland, distributes proficiency samples for bituminous materials testing.

8.1.7 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 the information specified in Table 2. 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 10—The requirements in Table 2 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.

8.1.8 Records Retention—Records pertaining to testing, equipment calibration and verification, test reports, internal 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 1 year.

NOTE 11—Although a 1 year retention schedule is adequate in some instances, 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.

8.1.9 Equipment Calibration and Verification Records—The agency shall maintain calibration and verification records for all equipment specified in the QSM. Such records shall include:

8.1.9.1 Detailed results of the calibration and verification work performed (dimensions, mass, force, frequency, temperature, time, etc.),

8.1.9.2 Description of the equipment calibrated or verified including model and serial number or other acceptable identification (See 9.1.3.1),

8.1.9.3 Date the work was done,

8.1.9.4 Identification of the individual performing the work,

8.1.9.5 Identification of the calibration or verification procedure used,

8.1.9.6 The previous calibration or verification date and the next due date, and

8.1.9.7 Identification of any in-house calibration or verification device used.

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

8.1.11 **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.

8.1.12 **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.

9. Quality System Manual (QSM) Requirements

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

9.1.1 **Organization and Organizational Policies:**

9.1.1.1 The QSM 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 QSM 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 QSM shall contain an organization chart showing relevant internal organizational components.

9.1.2 **Staff:**

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

9.1.2.2 The QSM 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

TABLE 2 Test Report Requirements (see Note 10)

(1) Name and address of the testing laboratory
(2) Identification of the report and the date issued
(3) Name and address of the client or identification of the project
(4) Description and identification of the test sample
(5) Date of receipt of the test sample
(6) Date(s) of test performance
(7) Identification of the standard test method used and a notation of any known deviations from the test method
(8) Test results and other pertinent data required by the standard test method
(9) A name of the person(s) accepting technical responsibility for the test report