



# Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction<sup>1</sup>

This standard is issued under the fixed designation E 329; 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 defines the minimum requirements for inspection agency personnel or testing agency laboratory personnel, or both, and the minimum technical requirements for equipment and procedures utilized in the testing and inspection of materials used in construction.

1.2 Criteria is provided for evaluating the capability of agency to properly perform designated tests on construction materials, and establishes essential characteristics pertaining to the organization, personnel, facilities, and quality systems of the agency. This practice may be supplemented by more specific criteria and requirements for particular projects.

1.3 This specification can be used as a basis to evaluate an agency and is intended for use in qualifying and/or accrediting agencies, public or private, engaged in the testing and inspection of construction materials. These materials include concrete, steel, soil, masonry and bituminous materials.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- A 880 Practice for Criteria for Use in Evaluation of Testing Laboratories and Organizations for Examination and Inspection of Steel, Stainless Steel, and Related Alloys<sup>2</sup>
- C 1077 Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation<sup>3</sup>
- C 1093 Practice for Accreditation of Testing Agencies for Unit Masonry<sup>4</sup>
- D 3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials<sup>5</sup>
- D 3740 Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock

- as Used in Engineering Design and Construction<sup>6</sup>
- E 4 Practices for Force Verification of Testing Machines<sup>7</sup>
- E 543 Practice for Agencies Performing Nondestructive Testing<sup>8</sup>
- E 548 Guide for General Criteria Used for Evaluating Laboratory Competence<sup>9</sup>
- E 994 Guide for Calibration and Testing Laboratory Accreditation Systems General Requirements for Operation and Recognition<sup>9</sup>

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *agency*—the organization/body, or part thereof, authorized by the project sponsor or his duly authorized representative to inspect or test construction materials as required by the project specifications.

3.1.1.1 *inspection agency*—an agency or testing laboratory that makes visual observations and field measurements of construction materials. It may collect and submit samples, identified with respective portions of the construction, for laboratory evaluation. The inspection agency/body and testing agency may be one organization or separate organizations.

3.1.1.2 *testing agency*—an agency or testing laboratory that measures, examines, tests, or otherwise determines the characteristics or performance of materials and products.

3.1.2 *bituminous material and mixes, n—as used in construction*, all types of asphalts and tars for pavements.

3.1.2.1 *Discussion*—Bituminous mixes are bituminous stabilized soil, base course, binder, leveling, surface course, and mastic mixes. Bituminous mixes may contain either tar or asphalt binder material which, in some cases, may be further modified with other additive materials to produce special properties.

3.1.3 *concrete, n—as used in construction*, all portland cement concrete used in construction, particularly reinforced concrete.

3.1.4 *contract*—the contractual agreement between the

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee E36 on Conformity Assessment and is the direct responsibility of Subcommittee E36.70 on Construction and Building Testing/Inspection Agencies.

Current edition approved Aug. 10, 2002. Published September 2002. Originally published as E 329 – 67 T. Last previous edition E 329 – 01a.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 01.03.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.05.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 04.03.

<sup>6</sup> *Annual Book of ASTM Standards*, Vol 04.08.

<sup>7</sup> *Annual Book of ASTM Standards*, Vol 03.01.

<sup>8</sup> *Annual Book of ASTM Standards*, Vol 03.03.

<sup>9</sup> *Annual Book of ASTM Standards*, Vol 14.02.

agency and the project sponsor.

3.1.5 *documentation, n*—unless otherwise specified, the term documentation, and related terms such as the verb “document,” refer herein to written documentation.

3.1.5.1 *Discussion*—Documentation other than written documentation, such as video or audio recordings, shall be used, where appropriate, in addition to written documentation, if possible.

3.1.6 *engineer, n*—the term “engineer,” when used in combination with the terms “registered,” “licensed,” or “professional” are to be considered interchangeable for the purposes of clarification.

3.1.6.1 *Discussion*—Geographical areas differ in the title, but the definition and intent are the same.

3.1.7 *inspection, n*—examination of a product, product design, service, process or plant, and determination of conformity with specific or, on the basis of professional judgment, general requirements, the results of which may be used to support certification.

3.1.7.1 *Discussion*—Inspection of processes includes personnel, facilities, technology and methodology.

3.1.8 *main facility, n*—a structure with a permanent address, which provides testing and/or inspection services for multiple projects.

3.1.8.1 *sub-facility, n*—a structure with a permanent address, that is physically separate from, but considered an extension of the main facility, which generally provides testing and/or inspection services for multiple projects.

3.1.8.2 *site facility, n*—a structure, or a mobile, fully-equipped, self-contained unit, capable of conducting specific tests and/or inspections, established in a dedicated area on-site for the duration of a specific project.

3.1.8.3 *temporary, adj*—as used to describe testing and/or inspection facilities, expected to function for a maximum of three years.

3.1.8.4 *permanent, adj*—as used to describe testing and/or inspection facilities, expected to function for a period exceeding three years.

3.1.9 *masonry, n*—as used in construction, masonry units, brick, mortar and grout used in construction.

3.1.9.1 *Discussion*—The masonry construction may be load bearing or non-load bearing.

3.1.10 *nondestructive testing, n*—procedures for testing products as used in construction.

3.1.10.1 *Discussion*—Nondestructive testing includes all test methods that do not impair the serviceability of the material, part, or assembly under test. Nondestructive tests are specific. They usually reveal only the specific kinds of defects and conditions for whose detection they were designed. Consequently, they must be selected in accordance with the specific materials, the specific conditions to be detected, and the specific job to be done.

3.1.11 *owner, n*—the owner’s officer, the engineer, or the architect responsible for the work, or his duly recognized or authorized representative.

3.1.12 *project sponsor, n*—the organization that retains the agency, and normally, the owner of record when the project is complete.

3.1.13 *qualified accreditation authority, n*—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.

3.1.14 *soil, n*—as used in construction, subgrade, subbase, base, select fill and other similar types of granular and non-granular soils used in construction regardless of whether it is considered as a structural element in the project or general fill not supporting structural elements.

3.1.15 *steel, n*—as used in construction, structural steel plates and shapes used wholly or in part for structures including reinforcing steel used in concrete.

3.1.15.1 *Discussion*—It is not intended to include steels used in conjunction with mechanical, electrical, heating or air-conditioning equipment except for the supporting structures.

3.1.16 *technician, n*—an employee of the inspection and testing agency assigned to perform the actual operations of inspection or testing.

#### **4. Reference Material**

4.1 Appropriate references, relevant to the construction being inspected, including project plans and specifications, shall be readily available to the technicians or inspectors at all times. The following are particularly essential:

4.1.1 Applicable parts of *Annual Book of ASTM Standards*,

4.1.2 *Applicable Parts of AISC Manual of Steel Construction*,

4.1.3 *Applicable Parts of ASME Boiler and Pressure Vessel Code*,

4.1.4 Applicable building codes,

4.1.5 AWS D1.1 Structural Welding Code, Steel,

4.1.6 AWS B1.11 Guide for the Visual Inspection of Welds,

4.1.7 AWS D1.5 Bridge Welding Code,

4.1.8 AWS D1.4 Structural Welding Code—Reinforcing, and

4.1.9 Steel Joist Institute (SJI) Recommended Code of Standard Practice for Steel Joists and Joist Girders.

#### **5. Significance and Use**

5.1 The testing and inspection of construction materials is an important element in obtaining quality construction. A testing and inspection agency must be selected with care after a comprehensive evaluation of its competency to perform the work properly.

5.2 This standard provides basic minimum criteria for use in evaluating the qualifications of technically oriented testing or inspection agencies, or both. The criteria may be supplemented by more specific criteria and requirements for particular classes of testing or types of inspection agencies. An individual user can also use it to judge the competency of an agency. The existence of a formal accrediting authority such as a federal, state, or independent agency is not necessary for the use of this practice, but the practice can be used as a basis for accreditation, if desired.

5.3 The intent of this standard is to provide a consensus system standardized basis for requirements for a technically oriented testing or inspection agency, with respect to the agency’s capability to objectively and competently provide the

specific services needed by the user without prejudice.

5.4 Typically, evaluating an agency involves the following three essential sequential phases:

5.4.1 Submittal of basic information in accordance with the criteria of this practice to the evaluator by an agency desiring to be qualified to this standard,

5.4.2 Evaluation of the agency-submitted information, and

5.4.3 On-site verification of the agency-submitted information by the user or a qualified national authority.

## **6. Organization and Management**

6.1 The agency shall be legally identifiable. It shall be organized and shall operate in such a way that its facilities meet the requirements of this standard.

6.1.1 Main facilities, sub-facilities, and permanent site facilities shall maintain staff, equipment, procedures, and documentation as required in this standard. The manager for the main facility may also be responsible for a sub-facility or permanent site facility (see 7.2.1). Main facilities, sub-facilities, and permanent site facilities shall be accredited in accordance with 10.4.1 to perform the functions described in 3.1.1.1 and/or 3.1.1.2 of this specification.

6.1.2 Temporary site facilities offering a defined scope of services for a specific project, which are demonstrably under the main facility's or sub-facility's technical direction and quality program, do not require separate accreditation. Agencies that use temporary site facilities for their projects shall describe the operation of these facilities in their quality manual.

6.1.3 An endorsement for the operation of temporary site facilities shall also be listed on the agency's accreditation certificate.

6.2 The agency shall:

6.2.1 Have managerial staff with the authority and resources needed to discharge their duties.

6.2.2 Have arrangements to ensure that its personnel are free from any commercial, financial, and other pressures that might adversely affect the quality of their work.

6.2.3 Be organized in such a way that confidence in its independence of judgment and integrity is maintained at all times.

6.2.4 Specify and document the responsibility, authority, qualifications, and interrelation of all personnel who manage, perform, or verify work affecting the quality of inspections or tests, or both.

6.2.5 Provide supervision by persons qualified to perform the inspections and tests and to implement relevant procedures. They should also be qualified to evaluate the objective of the inspections or tests and the results. The ratio of supervisory to non-supervisory personnel shall be such as to ensure adequate supervision.

6.2.6 Have a technical manager (however named) who has overall responsibility for the technical operations.

6.2.7 Have a quality manager (however named) who has the responsibility for the quality system and its implementation. The quality manager shall have direct access to the highest level of management at which decisions are made on agency policy or resources, and to the technical manager. In some agencies, the quality manager may also be the technical

manager or deputy technical manager.

6.2.8 Nominate deputies in case of absence of the technical or quality manager.

6.2.9 Where relevant, have documented policy and procedures to ensure the protection of clients' confidential information and proprietary rights.

6.2.10 Where appropriate, as determined by the agency's quality manual, participate in interlaboratory comparisons and proficiency testing programs.

## **7. Personnel**

7.1 The agency shall have sufficient personnel having the necessary education, training, technical knowledge, certification as appropriate, and experience for their assigned functions.

7.1.1 The agency shall ensure that the training of its personnel is kept up-to-date.

7.1.2 Records of relevant certification, qualifications, training, skills, and experience of the technical personnel shall be maintained by the agency.

7.2 The following personnel requirements must be satisfied by the agency when services are being provided for construction:

7.2.1 The testing and inspection services of the agency, that provides the quality control or quality assurance program, or both, as related to construction practices or materials, or both, shall be under the direction of a person charged with engineering managerial responsibility. The person shall be a licensed professional/registered engineer and a full-time employee of that agency. The person shall have at least five years engineering experience in testing and inspection of construction materials. The organization may consist of one or more separate facilities providing inspection or testing services or both. A licensed professional/registered engineer may have engineering managerial responsibility for one or more facilities within the organization.

7.2.1.1 When a producer's or manufacturer's laboratory only serves as a quality control laboratory and does not produce tests for acceptance, payment, or the official record, the requirement for a registered professional engineer is waived. However, the laboratory function of the organization shall be supervised by a quality control manager. The quality control manager shall have at least five years experience in testing of that particular construction material, and be a full time employee of the organization. The quality control manager will have the authority to make changes in production to ensure that quality material is produced. He may serve as the quality control manager for several materials production facilities. The quality control manager shall have the certifications appropriate to the testing of the materials supervised.

7.2.2 A laboratory supervisor shall have at least five years experience performing tests on relevant construction materials. This person shall be able to demonstrate either by oral or written examination, or both, their ability to perform the tests normally required in the manner stipulated under ASTM or other governing test procedures and shall be capable of evaluating the test results in terms of specification compliance. Certification by ACI (American Concrete Institute) Laboratory Testing Technician, Grade II or NICET (National Institute for Certification of Engineering Technicians) Level III or higher,

or certification by other qualified national, regional or state authorities as appropriate to the work, is required.

7.2.3 A field supervisor shall have at least five years inspection experience in the type of work being supervised. This person shall be able to demonstrate, either by oral or written examination, or both, their ability to perform correctly the required duties and shall be capable of evaluating the inspection or test results in terms of specification compliance. Certification by ACI (Concrete Construction Inspector or Concrete Transportation Construction Inspector), BOCA/ICBO Reinforced Concrete Special Inspector, NICET (Level III or higher), ASNT (Level II or III), AWS (CWI), or certification by other qualified national, regional or state authorities as appropriate to the work, is required.

7.2.4 *Inspector or Technician*—This person shall have sufficient education and 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 competence for the test or inspection which is being conducted either by oral or written examination, or both. Certification by ACI (American Concrete Institute), BOCA/ICBO Reinforced Concrete Special Inspector, AWS (American Welding Society), ASNT (American Society for Nondestructive Testing), NICET (National Institute for Certification of Engineering Technicians), ICC (International Code Council), ICBO (International Council of Building Officials), BOCA (Building Officials Code Administration), as appropriate for the work being performed, or certification by other qualified national authorities as appropriate to the work; shall be considered as one means of documenting competency. The Inspector or Technician shall work under the direct supervision of personnel meeting the requirements of 7.2.2 or 7.2.3 (see Appendix X1).

7.2.5 It is satisfactory for a person to fill one or more of the levels of management, supervision, inspector or technician positions in accordance with 7.2.1, 7.2.2, 7.2.3, and 7.2.4 provided the person qualifies for the highest level worked. It is also recognized that frequently some tests and inspections are conducted at small field or peripheral locations; it is not the intent of this practice that the supervisory personnel be directly present at such locations at all times. If the qualified person in 7.2.1 performs as a supervisor, they do not have to comply with the certification requirements.

## 8. Equipment

8.1 The agency shall furnish all items of equipment, including reference materials, required for the correct performance of inspections and tests. In those cases where the agency needs to use equipment outside its permanent control, it shall ensure that the relevant requirements of this standard are met.

8.2 All equipment shall be properly maintained. Maintenance procedures shall be documented and shall include a schedule for future maintenance.

8.2.1 Any equipment that has been subjected to overloading or mishandling, or that gives suspect results, or has been shown by verification or otherwise to be defective, shall be taken out of service, clearly identified, and wherever possible, stored at a specified place until it has been repaired and shown by calibration, verification, or test to perform satisfactorily.

8.2.1.1 The agency shall examine the effect of this defect on

previous inspections or tests.

8.3 Each item of equipment including reference materials shall, when appropriate, be labeled, marked or otherwise identified to indicate its calibration status.

8.4 Records shall be maintained for each item of equipment and all reference materials significant to the inspections or tests performed. The records shall include:

8.4.1 The name of the item of equipment,

8.4.2 The manufacturer's name, type identification, and serial number or other unique identification,

8.4.3 Date received and date placed in service,

8.4.4 Condition when received (for example, new, used, reconditioned, and so forth),

8.4.5 Copy of the manufacturer's instructions, where available, condition when received (for example, new, used, reconditioned, and so forth),

8.4.6 Details of maintenance carried out to date,

8.4.7 Dates and results of calibrations or verifications, or both, and date of next calibration or verification, or both,

8.4.8 History of any damage, malfunction, or repair, and

8.4.9 Current location.

## 9. Quality System, Audit and Review

9.1 The agency shall establish and maintain a quality system appropriate to the type, range, and volume of inspections and testing activities it undertakes. The elements of this system shall be documented. The quality documentation shall be available for use by the agency's personnel.

9.1.1 The agency shall define and document its policies and objectives for, and its commitment to good practice and quality of, inspection or testing services.

9.1.2 The agency management shall ensure that these policies and objectives are documented in a quality manual and communicated to, and understood and implemented by all personnel concerned. The quality manual shall be maintained current under the responsibility of the quality manager.

9.2 The quality manual, and related quality documentation, shall state the agency's policies and operational procedures established in order to meet the requirements of this standard. The quality manual and related quality documentation shall also contain:

9.2.1 A quality policy statement, including objectives and commitments, by top management,

9.2.2 The organization and management structure of the agency, its place in any parent organization and relevant organizational charts,

9.2.3 The relations between management, technical operations, support services and the quality system,

9.2.4 Procedures for control and maintenance of documentation,

9.2.5 Job descriptions of key staff and reference to the job descriptions of other staff,

9.2.6 Identification of the agency's approved signatories (where this concept is appropriate),

9.2.7 The agency's procedures for achieving traceability of measurements,

9.2.8 The agency's scope of inspections or tests, or both,

9.2.9 Arrangements for the agency to review all new work to ensure that it has the appropriate facilities and resources