



# Standard Specification for ~~Agencies Engaged in Construction Inspection and/or Testing~~ Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction<sup>1</sup>

This standard is issued under the fixed designation E329; 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 construction and 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 specification 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 and materials. Building officials can use Specification E329 as a tool in the qualification and establishment of competency of inspection and testing agencies in the fields covered by Specification E329.

1.4 A certificate of accreditation, including the scope of accreditation, is required to comply with this standard.

1.5 The users of an accredited agency must review the agency's scope of accreditation to ensure the agency has been accredited for its technical competence to perform the specific tests or inspections requested by the user.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

- A880 Practice for Criteria for Use in Evaluation of Testing Laboratories and Organizations for Examination and Inspection of Steel, Stainless Steel, and Related Alloys
- C1077 Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
- C1093 Practice for Accreditation of Testing Agencies for Masonry
- D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
- D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- E4 Practices for Force Verification of Testing Machines
- E543 Specification for Agencies Performing Nondestructive Testing
- E605 Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
- E736 Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- E994 Guide for Calibration and Testing Laboratory Accreditation Systems General Requirements for Operation and Recognition
- E1513 Practice for Application of Sprayed Fire-Resistive Materials (SFRMs)
- E2174 Practice for On-Site Inspection of Installed Fire Stops

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

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<sup>2</sup> 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.

## E2393 Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

### 2.2 AASHTO Standard:

R18 Standard Recommended Practice for Establishing and Implementing a Quality System for Construction Materials Testing Laboratories<sup>3</sup>

### 2.3 ANSI/ISO/IEC Standard:

17020 General Criteria for the Operation of Various Types of Bodies Performing Inspection<sup>4</sup>

17025 General Requirements for the Competence of Calibration and Testing Laboratories<sup>4</sup>

### 2.4 AWS Documents:<sup>5</sup>

B1.11 Guide for the Visual Inspection of Welds

D1.1 Structural Welding Code, Steel

D1.4 Structural Welding Code—Reinforcing

D1.5 Bridge Welding Code

### 2.5 SJI Documents:<sup>6</sup>

Recommended Code of Standard Practice for Steel Joists and Joist Girders

## 3. Terminology

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

3.1.1 *accreditation scope, n*—the document issued by the accreditation body to the agency that describes the specific tests or inspections that the agency has demonstrated a competency in performing.

3.1.1.1 *Discussion*—A certificate of accreditation alone is not sufficient to describe the technical competence of an agency unless it describes the competence of the agency in terms of specific tests or inspections.

3.1.2 *agency, n*—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.

3.1.2.1 *inspection agency, n*—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.

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

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

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

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

3.1.5 *contract*—the contractual agreement between the agency and the project sponsor.

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

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

3.1.7 *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.

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

3.1.8 *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.

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

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

3.1.9.1 *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.

3.1.9.2 *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.

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

<sup>3</sup> Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

<sup>4</sup> Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.

<sup>5</sup> Available from American Welding Society (AWS), 550 NW LeJeune Rd., Miami, FL 33126, <http://www.aws.org>.

<sup>6</sup> Available from Steel Joist Institute (SJI), 3127 Mr. Joe White Ave., Myrtle Beach, SC 29577-6760, <http://www.steeljoist.org>.

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

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

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

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

3.1.11.1 *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.

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

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

3.1.14 *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.

3.1.15 *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.

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

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

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

#### 4. Significance and Use

4.1 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.

4.2 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.

4.3 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.

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

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

4.4.2 Evaluation of the agency-submitted information, and

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

#### 5. Organization and Management

5.1 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.

5.1.1 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 6.2.1). Main facilities, sub-facilities, and permanent site facilities shall be accredited in accordance with 9.4.1 to perform the functions described in 3.1.2.1 and/or 3.1.2.2 of this specification.

5.1.2 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.

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

5.2 The agency shall:

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

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

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

5.2.4 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.

5.2.5 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.

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

5.2.7 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.

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

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

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

## 6. Personnel

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

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

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

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

6.2.1 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.

6.2.1.1 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.

6.2.2 A laboratory supervisor shall have at least three 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 qualified national, regional, or state authorities as appropriate to the work is required.

6.2.3 A field supervisor shall have at least three 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 qualified national, regional, or state authorities as appropriate to the work is required.

6.2.4 *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 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 6.2.2 or 6.2.3 .

6.2.5 It is satisfactory for a person to fill one or more of the levels of management, supervision, inspector or technician positions in accordance with 6.2.1, 6.2.2, 6.2.3, and 6.2.4 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 specification that the supervisory personnel be directly present at such locations at all times. If the qualified person in 6.2.1 performs as a supervisor, they do not have to comply with the certification requirements.

## 7. Equipment

7.1 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.

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

7.2.1 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.

7.2.1.1 The agency shall examine the effect of this defect on previous inspections or tests.

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

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

7.4.1 The name of the item of equipment,

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

7.4.3 Date received and date placed in service,

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

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

7.4.6 Details of maintenance carried out to date,

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

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

7.4.9 Current location.

## **8. Quality System, Audit and Review**

8.1 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.

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

8.1.2 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.

8.2 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:

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

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

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

8.2.4 Procedures for control and maintenance of documentation,

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

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

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

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

8.2.9 Arrangements for the agency to review all new work to ensure that it has the appropriate facilities and resources before commencing such work,

8.2.10 Reference to the test procedures used,

8.2.11 Procedures for handling inspection and test items,

8.2.12 Reference to the equipment and reference measurement standards used,

8.2.13 Reference to procedures for calibration, verification and maintenance of equipment,

8.2.14 Procedures to be followed for feedback and corrective action whenever testing discrepancies are detected, or departures from documented policies and procedures occur,

8.2.15 The agency management arrangements for exceptionally permitting departures from documented policies and procedures or from standard specifications,

8.2.16 Procedures for dealing with complaints,

8.2.17 Procedures for protecting confidentiality and proprietary rights, and

8.2.18 Procedures for audit and review.

8.3 The agency shall arrange for audits or inspections of its activities at appropriate intervals to verify that its operations continue to comply with the requirements of the quality system. Such audits shall be carried out by qualified staff who are independent of the activity to be audited.

8.3.1 Where the audit findings cast doubt on the correctness or validity of the agency's inspections or test results, the agency

shall take immediate corrective action and shall immediately notify, in writing, any client whose work may have been affected.

8.4 The quality system adopted to satisfy the requirements of this standard shall be reviewed at least once a year by the management to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements.

8.5 All audit and review findings, external and internal, and any corrective actions that arise from them shall be documented. The person responsible for quality shall ensure that these actions are discharged within the agreed timescale.

8.6 In addition to periodic audits, the agency shall ensure the quality of results provided to clients by implementing checks. These checks shall be reviewed and shall include, as appropriate, but are not limited to:

8.6.1 Internal quality control schemes using, whenever possible, statistical techniques,

8.6.2 Participation in proficiency testing or peer reviews,

8.6.3 Regular use of certified reference materials or in-house quality control using secondary reference materials, or both,

8.6.4 Replicate inspections or testing using the same or different methods,

8.6.5 Re-inspection or re-testing of retained items, and

8.6.6 Correlation of results for different characteristics of an item.

NOTE 1—Compliance with the requirements specified in any of the following appropriate documents would satisfy the requirements of sections 8, 9, 10, 11, and 12 of Specification E329; Practice D3740, Specification D3666, Practice C1077, Practice C1093, Practice E543, Practice A880, AASHTO R18, or ANSI/ISO/IEC 17025 for laboratories and ANSI/ISO/IEC 17020 for inspection bodies.

## 9. Responsibilities and Duties

9.1 It shall be the responsibility of the agency to ensure that it performs only tests and inspections, or both, for which it is adequately equipped and staffed, and that its employees perform only tests and inspections, or both, for which they are adequately trained.

9.2 The following duties are those usually performed by the agency:

9.2.1 Obtain representative samples of those materials required by project specifications, and authorized by contract, to be tested and evaluated.

9.2.2 When samples are collected by the agency, the agency must ensure that there is proper protection, handling, and storing of the samples to ensure that they remain representative of the material being used at the time of sampling.

9.2.3 When the agency is responsible for collecting samples, the samples must be identified with the respective portions of the work in which the material represented was or will be used.

9.2.4 Perform all testing and inspection operations in accordance with appropriate standards as referenced in the contract.

9.2.5 Call to the attention of the project sponsor any irregularities or deficiencies in the construction materials or processes, or both, as related to construction materials, that the contract specifically states the agency is responsible for inspecting.

9.2.6 Submit promptly to the project sponsor and distribute as specified in the contract formal reports of all tests and inspections which indicate compliance or noncompliance with the specifications. The reports shall be complete and factual, citing the methods used in obtaining samples, the tests performed, the specified values for the measured characteristics, the values obtained, the parts of the structure involved, and similar pertinent data. The agency shall be prepared to substantiate its reports to the extent necessary.

9.3 Unless specifically authorized, the agency does not have the right of rejection.

9.4 The agency shall have its laboratory procedures and equipment inspected at intervals of not more than three years by a qualified national authority as evidence of its competence to perform the required tests.

9.4.1 The agency shall demonstrate evidence of meeting the requirements of Specification E329 through accreditation in the field of its operations by a recognized qualified accreditation authority. Guide E994 can be used to evaluate the credentials, qualifications, and operation of the accreditation authority.

9.5 The testing agency or inspecting agency, or both, shall supply the qualified accreditation authority with the qualification of its Personnel as listed in Section 6. At a minimum each person shall be re-evaluated internally or externally, at least every three years for each test and/or inspection the person is authorized to perform.

## 10. Inspections and Test Methods

10.1 The agency shall have documented instructions on the use and operations of all relevant equipment, on the handling and preparation of items, and for inspection, calibration, or testing, or a combination thereof, where the absence of such instructions could jeopardize the inspections or tests. All instruction, standards, manuals and reference data relevant to the work of the agency shall be maintained up-to-date and be readily available to the staff and external auditors.

10.2 The agency shall use appropriate test methods and procedures for all inspections, and tests and related activities within its responsibility (including sampling, handling, transport and storage, and preparation of items, estimation of uncertainty of measurement, and analysis of inspection data or test data, or both). They shall be consistent with the accuracy required, and with any standard specifications relevant to the inspections, or tests concerned.

10.3 Where test methods are not specified, the agency shall, whenever possible, select test methods that have been published as international or national standards, those published by reputable technical organizations or in relevant scientific texts or journals.

10.4 Where it is necessary to employ test methods that have not been established as standards, these shall be subject to agreement with the client, be fully documented and validated, and be available to the client and other recipients of the relevant reports.