Designation: E2174 – 14b

Standard Practice for On-Site Inspection of Installed Firestops[1]

This standard is issued under the fixed designation E2174; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the establishing of procedures to inspect firestop products and firestop systems, including methods for field verification and inspection. This practice is referenced in the International Building Code, Chapter 17, Special Inspections.

1.2 This practice addresses all types of firestop products that become firestop systems once installed to the tested and listed system or judgment into fire resistive assemblies.

NOTE 1—Firestop System is defined in Test Method E814. Firestop products are the products used in constructing a firestop system.

1.3 This practice provides methods by which qualified inspectors verify that required firestops on a project have been installed and that their installations are in accordance with the inspection documents.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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.*

1.6 *The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C1241 Test Method for Volume Shrinkage of Latex Sealants During Cure

E176 Terminology of Fire Standards

E631 Terminology of Building Constructions

E699 Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components

E814 Test Method for Fire Tests of Penetration Firestop Systems

2.2 *Other Standards:*[3]

UL 1479-94 Fire Tests of Through-Penetration Firestops

2.3 *Other Documents:*[4]

International Building Code

3. Terminology

3.1 *Definitions*—Terms defined in Terminology E631, Terminology E176, and Practice E699 will prevail for terms not defined in this document.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *accredited testing laboratory*—a company engaged in conducting testing and possesses a valid evaluation report for testing services and is recognized by the AHJ.

3.2.2 *authority having jurisdiction (AHJ)*—the designated authority, or their duly authorized representative, charged with the administration and enforcement of the local fire code or building code, or both.

3.2.3 *authorizing authority (AA)*—the designated person, or organization, or their duly authorized representative, charged with the administration and enforcement of the provisions of this inspection document.

NOTE 2—Examples of the AA include the responsible architect, engineer, building owner, or their representative.

3.2.4 *evaluation report*—an approved document issued by the Model Code Body Evaluation Service or by the AHJ.

3.2.5 *inspection document*—any information provided to the inspector by the AA that is to be used as the basis for the inspection process. This information shall include, but is not limited to, project specifications, contract drawings, Listed Designs, judgments, manufacturer's instructions and designs, building codes, and other documentation.

[1] This practice is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.21 on Serviceability.

Current edition approved Oct. 15, 2014. Published January 2015. Originally approved in 2001. Last previous edition approved in 2014 as E2174 – 14a. DOI: 10.1520/E2174-14B.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Underwriters Laboratories (UL), 2600 N.W. Lake Rd., Camas, WA 98607-8542, http://www.ul.com.

[4] Available from International Code Council (ICC), 500 New Jersey Ave., NW, 6th Floor, Washington, DC 20001, http://www.iccsafe.org.

NOTE 3—The approved firestop submittal typically includes the firestop manufacturer's product data, a design listing of the tested firestop system or the engineering judgment design with illustrated drawings or descriptive text or both for the purpose of verifying each installation and conducting the field-inspection procedures.

3.2.6 *inspection form*—the document contained in this standard practice that is used to record information obtained during the inspection(s).

3.2.7 *inspector*—an individual meeting the qualifications set forth in this document and who performs the inspection.

3.2.8 *judgment*—an evaluation of a field condition which does not conform to an existing tested and listed system.

3.2.8.1 *Discussion*—Judgments are expected to be issued by a manufacturer or an accredited testing laboratory on the basis of an appropriate combination of engineering principles and testing.

NOTE 4—The judgment is commonly referred to as an "Engineering Judgment" in the firestopping industry. These judgments are not always issued by engineers.

NOTE 5—Some AHJs allow a judgment by the manufacturer if there is no tested and listed system for the non-typical condition, others do not. Most AHJs will allow judgments by accredited testing laboratories.

3.2.9 *listing label*—identification applied to the product that includes the name of a quality assurance agency indicating that a representative sample of the product or material has been tested and evaluated by the quality assurance agency.

3.2.10 *quality assurance agency*—a company that is engaged in conducting inspections, or certification, or listing and labeling services, or any combination, and possessing a valid evaluation report for quality assurance and is recognized by the AHJ.

4. Summary of Practice

4.1 This practice sets forth the minimum requirements to qualify an inspector to use this practice.

4.2 This practice identifies the types of firestops subject to the inspection procedures outlined in this practice.

4.3 This practice provides the minimum information required to verify compliance of installed firestops with inspection documents.

4.4 This practice provides a standard inspection form that is to be used when inspecting firestop products and firestop systems.

4.5 This practice provides a standard report format that is to be used when reporting the inspection results.

5. Significance and Use

5.1 This practice is intended to provide a standard set of guidelines that are to be followed when conducting and reporting on inspections of installed firestop systems.

5.2 This practice is intended to provide a means to verify compliance of the installed firestop systems to the inspection documents.

5.3 This practice is not intended to provide a basis for selecting installers or products or both.

5.4 This practice is not intended to establish any performance criteria of the inspected firestop systems.

6. Inspector

6.1 *Qualifications*—An inspector shall be acceptable to the AHJ and shall meet at least one of the following requirements:

6.1.1 Meet the criteria contained in Practice E699 for agencies involved in quality assurance; or

6.1.2 Have a minimum of two years experience in construction field inspections and have education, credentials, and experience acceptable to the AA; or

6.1.3 Be a quality assurance agency accredited by the AHJ.

6.2 *Conflicts of Interest:*

6.2.1 The inspector shall be completely independent of, and divested from, the installer, contractor, manufacturer, or supplier of any material being inspected.

6.2.2 The inspector shall not be a competitor of the installer, contractor, manufacturer, or supplier of any material being inspected.

6.3 The inspector shall submit notarized statements to the AA assuring compliance with 6.2.

6.4 The inspector shall make a written submission to the AA requesting acceptance. If accepted, the AA shall present the inspector with written confirmation of acceptance.

7. Inspection Documents

7.1 The inspection documents shall be reviewed by and acceptable to the AA and AHJ.

7.2 The AA shall be responsible for ensuring that the inspection documents do not contain conflicting information.

7.3 The AA shall provide the inspector with a complete set of inspection documents at least ten working days prior to the inspection. The inspector shall review all inspection documents prior to conducting any inspection. When the inspector believes that the inspection documents contain conflicting information or documentation that the inspector believes is insufficient to perform the inspection, the inspector shall submit written notification of the potential conflict and obtain written clarification from the AA before conducting any inspection.

7.4 As part of the inspection documents, Listed Designs shall be provided for every firestop, as a reference against which to compare the installation. As an alternative for every case where a Listed Design does not exist for a particular application, a judgment issued by the firestop product manufacturer or an accredited testing laboratory, and acceptable to the AHJ, shall be provided as a reference against which to compare and inspect the installation.

8. Materials

8.1 The inspector shall verify that the materials and systems used for firestopping have been tested in accordance with Test Method E814 or UL 1479-94, and are listed and labeled for the use intended.

NOTE 6—Listed and labeled refers to materials, devices or assemblies that have been tested by an accredited testing laboratory after which the test results and description of the materials, devices or assemblies are

published by an accredited quality assurance agency and the materials, devices or assemblies bear a Listing Label.

8.2 All materials shall bear a Listing Label as defined in 3.2.9. Manufacturer's container labels shall include the manufacturer's name, product name and product description. Other components of the firestop shall also be identifiable by labeling or other method approved by the AHJ.

8.3 All materials shall be exactly as identified on the inspection documents.

8.4 All materials used in firestop systems shall have been tested or evaluated as part of the system in accordance with Test Method E814 or UL 1479-94 as required by the building code or fire code, or both.

9. Inspection Schedule

9.1 The inspector and installer shall mutually agree upon a schedule for the notification of the following:

9.1.1 Inspection of firestop materials,

9.1.2 Start of installation, and

9.1.3 Anticipated completion of inspection.

9.2 The inspection schedule shall not interfere with the installation process.

9.3 The installer shall notify the inspector within one working day when any item agreed to on the schedule must be changed due to unforeseen circumstances, such as material delays, project change orders, or other installation conflicts.

10. Inspection

10.1 The inspector shall be permitted to enter the premises to review the applicable inspection documents, to observe the installation in progress, to inspect completed work and to perform overall functions relative to their duty as inspector.

10.2 The inspector shall use the inspection documents in 7.3 to identify and locate fire rated assemblies on the project that are subject to the installation of firestops.

10.3 The installer shall notify the inspector of the arrival of the materials (described in 8.1 – 8.4 inclusive) as agreed to in 9.1.

10.4 Prior to installation, the inspector shall verify that all materials received for the installation of the firestop meet the requirements of 8.1 – 8.4 inclusive and record this information on the inspection form.

10.5 Prior to installation, the inspector shall verify any construction detail on the inspection documents that will not be visible after the firestop installation and record this information on the inspection form.

10.6 The inspector shall not supervise or in any manner direct any aspect of the installation process. This includes, but is not limited to, the following:

10.6.1 Handling and storage of materials,

10.6.2 The mixing of materials,

10.6.3 The cutting or fastening of materials, and

10.6.4 The preparation of substrates.

10.7 When work is started or completed per the schedule in Section 9, the installer shall notify the inspector. Inspection of completed work shall take place within two working days from notification by the installer.

10.8 The inspector shall verify and document that the firestop systems required in the inspection documents have been installed.

10.9 The inspector shall verify that every firestop system inspected as required by 10.12.2 is in accordance with one of the documents specified in 7.4.

10.10 The inspector shall verify that every firestop system inspected as required by 10.12.2 is in accordance with the manufacturers instructions.

10.11 The inspector shall verify compliance of the firestop system by observing the installation process and by taking and recording measurements of the substrates and materials being installed or by destructive examination of completed installations.

10.12 Inspection frequency shall depend on the method of inspection and the scope of the project. The method of inspection shall be one of the following:

10.12.1 The inspector shall be on site during installation and randomly witness a minimum of 10 % of each type of firestop system being installed, or

10.12.2 The inspector shall conduct a post installation inspection, which shall require destructive type verification of the firestop system and repair of the firestop system. A minimum of 2 %, but not less than one, of each type of firestop system shall be inspected per floor or for each area of a floor when a floor is larger than 10 000 ft^2 (946.7 m^2). An area consists of 10 000 ft^2 or less.

NOTE 7—The AA may determine the types of firestop systems and subsequently the number of each type that is to be inspected, in addition to the minimum required by this standard. The determination of a "type" will typically be a function of a unique combination of parameters, including penetrant type (for example, metal pipe, plastic pipe, cabling), firestop material or device (for example, intumescent caulk, collar, sealant), and penetrated substrate (for example, gypsum wall, concrete floor, composite floor deck).

10.13 Any type of firestop system noted in 10.12.2 that does not comply with the inspection documents will require repair or replacement and re-inspection of that firestop system plus one full additional inspection, of the number specified in 10.12.2, of that type firestop system. If non-compliance occurs on 10 % or more of the quantity of firestop products or firestop systems within 10.12.1 or 10.12.2, then inspection of those particular type firestop systems shall cease. The installer shall inspect their own work, repair or replace those like firestops within the area prior to re-commencement of inspections by the inspector.

10.14 All observed deficiencies shall be documented and marked on the inspection forms. In addition, the inspector shall physically identify the location where a required firestop system has been omitted or where the inspection results indicate that the installed firestop system does not comply with the inspection documents.

10.15 The inspector shall advise the contractor of any deficiencies noted within one working day.

10.16 Repair of firestops damaged during inspection shall be conducted according to the manufacturers recommended procedures and methods. The repaired firestop product that was damaged shall comply with the inspection documents.

10.17 When repairs have been made to firestop systems with documented deficiencies, the installer shall notify the inspector. Follow up inspections of firestop systems with repaired deficiencies shall take place within two working days from notification by the installer. The repaired firestop system that contained deficiencies shall comply with the inspection documents.

10.18 Inspection forms, as defined in 3.2.6, shall be submitted to the AA and installer within one working day after an area is inspected.

11. Inspection Forms

11.1 Inspection forms, as defined in 3.2.6, shall be submitted to the AA and installer within one working day after an area is inspected.

NOTE 8—The delivery of inspection reports in a timely manner helps to ensure that project construction schedules are not delayed and that the installer has an adequate opportunity to repair all deficiencies prior to the work of other trades (for example, installation of gypsum wallboard, ceilings, ductwork, and so forth) impairing or obstructing proper installation.

11.2 An inspection form shall be written, and clearly describe the results of the inspection and any deficiencies.

11.3 Example of inspection form is shown in Fig. 1.

INSPECTION FORM Reference No. _____	
Inspection Date: _____	Inspector: _____
Installer: _____	AA: _____
AHJ: _____	Project: _____
Firestop Type per Inspection Documents: _____	
Quantity of Firestop Type on Project: _____	Quantity Inspected Today: _____
Total Quantity Inspected to Date: _____	
Inspected Firestops	
Location & Inspection Document Reference	Deficiency
Repaired Firestops	
Location & Inspection Form Reference	Compliant "Yes" If "No" State Deficiency

FIG. 1 Inspection Form

11.4 Inspection forms shall be sequentially numbered, starting with *1*, and only contain information about one type of firestop system. Use a new inspection form for each type of firestop system. Use as many inspection forms as needed. Attach drawings and additional pages if needed.

11.5 When deficiencies or repairs are made to a firestop system, the inspection form number shall be cited on the inspection form in 11.4 for cross reference.

12. Report

12.1 At the end of the installation and inspection process, the inspector shall submit a final report.

12.2 The final report shall contain a cover page with the following:

12.2.1 The project name, location, and reference number;

12.2.2 The name and address of the inspector;

12.2.3 The name and address of the installer, as well as the prime contractor if different;

12.2.4 The name and address of the AA; and

12.2.5 The name and address of the AHJ.

12.3 The final report shall also contain a summary page with the following:

12.3.1 Types and quantity of each firestop system on the project according to the inspection documents.

12.3.2 Which verification method from 10.12 was used to ascertain compliance with the inspection documents.

12.3.3 The quantity of each firestop system inspected on the project and a notarized written statement by the inspector that the number of firestop systems inspected comply with 10.12.

12.3.4 The summary page shall also contain percentages of deficiencies for each type of firestop system referenced in the inspection documents.

12.3.5 A total number of deficiencies shall be expressed as a percentage of the total number of firestop systems inspected.

12.4 The final report shall also contain copies of all information submitted by the inspector to the AA.

12.5 The final report shall also contain copies of all inspection forms submitted during the inspection process. They shall be arranged chronologically.

13. Keywords

13.1 firestop; inspection; inspector

APPENDIX

(Nonmandatory Information)

X1. DISCUSSION OF ITEMS IN THIS PRACTICE

X1.1 Inspector

X1.1.1 The inspector is responsible for the verification and inspection of all the firestop systems on the inspection documents.

X1.1.2 Therefore, it is possible that in addition to meeting the requirements set forth in this practice that the inspector is also one of the following:

X1.1.2.1 A code official,

X1.1.2.2 An architect,

X1.1.2.3 An engineer,

X1.1.2.4 A representative of a quality assurance agency or an accredited testing laboratory, or

X1.1.2.5 A licensed professional in the construction industry.

X1.2 The procedures discussed in this practice should be established at a mandatory pre-construction meeting attended by representatives of the owner, general contractor, the subcontractors responsible for creating penetrations or openings, the firestop installer and the inspector.

X1.3 In order to facilitate cooperation between all parties during the installation of firestop products and inspection of the firestop systems, the AA should make the following documents available: project specifications, drawings, penetration schedule and the approved firestop product and firestop system submittals. Project drawings should include, but not be limited to, architectural, structural, mechanical, plumbing, electrical and fire protection. These drawings and the penetration schedule should be sufficient for identifying and locating all fire resistance rated assemblies on the project, as well as the penetrating items, and openings relative to the construction trades involved (mechanical, plumbing, masonry, etc.).

X1.4 A current design listing of a firestop system generated by an approved quality assurance agency should be deemed to be adequate information for reference in contracts, specifications, drawings, submittals, and reports. Published firestop system design listings are used if available. Judgments from manufacturers or accredited testing laboratories are then submitted for acceptance by the AHJ.

NOTE X1.1—Examples of listing and testing agencies that produce design listings are Factory Mutual, Omega Point Laboratories, Underwriters Laboratories, Underwriters Laboratories of Canada and Warnock Hersey/Intertek Testing Services.

X1.5 Prior to the establishment of the inspection documents, the firestop installer makes a submittal through the proper construction document established communication channels, which is submitted, possibly by others, to the AA. The name of the firestop product manufacturer, a description of the products and systems that will be installed, and the manufacturer's installation instructions should be part of this submission.

X1.6 The inspector uses the following as a guide during inspections:

X1.6.1 The inspector brings any tools needed to examine the firestop products or firestop system for compliance. These tools include, but are not limited to, the following:

X1.6.1.1 A razor knife to cut into the firestop,

X1.6.1.2 A tape measure to verify dimensions,

X1.6.1.3 A thickness gauge to verify sealant thickness, and

X1.6.1.4 An outside caliper to measure penetrating item diameters.

X1.6.2 The following are types of penetrating items that may be encountered by the installer and inspector:

X1.6.2.1 Plastic pipe,

X1.6.2.2 Cables,

X1.6.2.3 Metal pipe,

X1.6.2.4 Cable trays,

X1.6.2.5 Ducts, and

X1.6.2.6 Multiple items.

X1.6.3 The thickness and construction of the fire rated assembly into which the firestop is installed is also critical.

X1.7 Examples of Firestop Systems (See Fig. X1.1)

X1.7.1 Item 1 is the fire-resistive assembly. The thickness and construction may be critical to performance.

X1.7.2 Item 2 is the materials placed into an annular space. The thickness of the sealant may be critical, as well as the thickness and density of the backing material. The shape of the annular space is typically rectangular or circular.

X1.7.3 Item 3 is the penetrating item. The material and diameter may be critical components.

X1.8 Product Shrinkage

X1.8.1 When conducting destructive inspection of cured latex, elastomeric or other firestop sealants, it should be recognized that liquid-applied sealants, and particularly all water-based sealants, will exhibit some degree of shrinkage. The degree of shrinkage will vary from product to product, and from manufacturer to manufacturer, even for seemingly similar products.

X1.8.2 The degree of shrinkage for a given product may even vary for the same product when cured in dramatically different environments, such as very cold, very hot, very humid or very dry environments, or combinations thereof. Some products will shrink more than others.

X1.8.3 The geometry of the resulting seal will also impact the observed degree of shrinkage, since surface tension effects will tend to produce a greater sealant thickness at points of adhesion (also known as the “bond line”), and a minimum thickness halfway between the points of adhesion. The observation of a thicker sealant thickness at the point of the bond line can also be due to the installer smoothing the material into the bond line with pressure.

X1.8.4 When performing a destructive examination, only the dry thickness will be measurable. The correctness of the installation is being evaluated against the inspection documents (for example, listed systems, Judgments), which provide the wet firestop sealant thicknesses required at installation.

X1.8.5 If an attempt is made to determine whether or not the firestop sealant was installed correctly based on a fully-cured sealant measurement against the listed system or judgment, proper consideration should be given to shrinkage of the sealant during curing. To compare measurements of dry to wet firestop sealant thicknesses, the effect of shrinkage must be accounted for in the comparison.

X1.8.6 Product shrinkage information can usually be obtained from the firestop sealant manufacturer in resources such as the manufacturer’s product data sheets or listing laboratory classification card. Manufacturers published firestop product shrinkage may be evaluated in accordance with Test Method C1241.

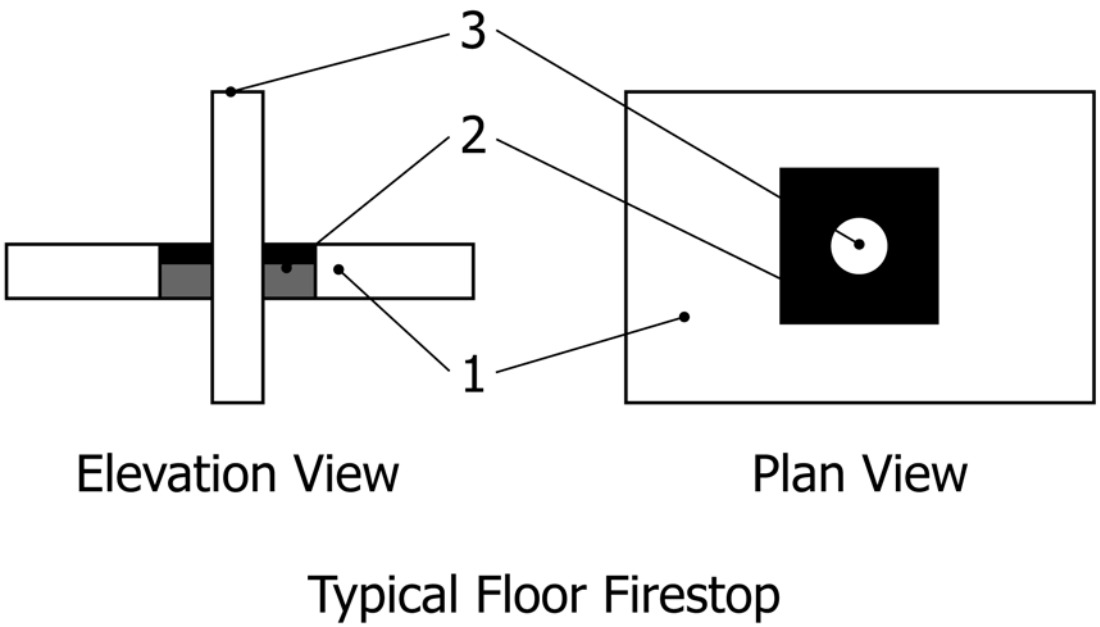

FIG. X1.1 Typical Floor Firestop