

Qualification of Installers of Firestop Systems and Devices for Piping Systems

AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**



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Mechanical Engineers

A N A M E R I C A N N A T I O N A L S T A N D A R D

QUALIFICATION OF INSTALLERS OF FIRESTOP SYSTEMS AND DEVICES FOR PIPING SYSTEMS

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FOREWORD

Correctly installing firestopping and firestop devices and systems is critical to life safety in the construction industry. Therefore it is equally important to assure that those individuals who install firestopping are qualified and certified in their ability to understand, perform up to, and meet the various consensus codes and standards that are applicable to the industry. This Standard has been developed to address those needs. It offers uniform requirements that can be used and accepted throughout the construction industry to protect everyone's health and safety. It will be revised as the relevant codes and standards and safety needs demand.

Suggestions for improvement of this Standard are welcome. They should be sent to The American Society of Mechanical Engineers; Attn: Secretary, A112 Main Committee; Three Park Avenue, New York, NY 10016-5990.

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QUALIFICATION OF INSTALLERS OF FIRESTOP SYSTEMS AND DEVICES FOR PIPING SYSTEMS

1 GENERAL

1.1 Scope

This Standard establishes minimum requirements, identified by industry consensus, for the training and qualification of installers of firestop systems and devices for piping systems.

The qualifications under this Standard are restricted to those that are required by this Standard, the model building and plumbing codes requirements for firestopping developed by NFPA, ICBO, SBCCI, BOCA, ICC, and IAPMO, and consensus standards for piping system penetrations of fire-resistance-rated walls, partitions, floors, floor/ceiling assemblies, roof/ceiling assemblies, or shaft enclosures.

1.2 Limitations for Firestop System Installer

Compliance with this Standard in itself shall not qualify an individual as a certified firestop contractor in accordance with FM 4991 or a certified firestop inspector in accordance with ASTM E 2174.

1.3 Inspection of Firestop Systems

Inspection of firestop systems shall be in compliance with ASTM E 2174.

1.4 References

The following documents form a part of this Standard to the extent specified herein. Unless otherwise indicated, the latest edition shall apply.

ANSI/NFPA 101, Life Safety Code (chapter 8 for fire resistance ratings and firestop systems)

NFPA 5000, Building Construction and Safety Code (chapter 7 for types of construction; chapter 8 for fire resistance ratings and firestop systems)

Publisher: The National Fire Protection Association (NFPA), 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101

ICBO Uniform Building Code (chapters 5 and 6 for types of construction; chapter 7 for fire resistance ratings and firestop systems)

Publisher: International Conference of Building Officials (ICBO), 5360 Workman Mill Road, Whittier, CA 90601-2298

BOCA National Building Code (chapters 5 and 6 for types of construction; chapter 7 for fire resistance ratings and firestop systems)

Publisher: Building Officials and Code Administrators International (BOCA), 4051 West Flossmoor Road, Country Club Hills, IL 60478-5795

SBCCI Standard Building Code (chapters 5 and 6 for types of construction; chapter 7 for fire resistance ratings and firestop systems)

Publisher: Southern Building Code Congress International, Inc. (SBCCI), 900 Montclair Road, Birmingham, AL 35213-1206

ICC International Building Code (chapters 5 and 6 for types of construction; chapter 7 for fire resistance rating and firestop systems)

Publisher: International Code Council, Inc. (ICC), 5203 Leesburg Pike, Falls Church, VA 22041-3401

Uniform Plumbing Code (chapter 15)

Publisher: International Association of Plumbing and Mechanical Officials (IAPMO), 5001 East Philadelphia St., Ontario, CA 91761-2816

FM 4991, Approval Standard for Approval of Firestop Contractors

Publisher: Factory Mutual Research Corporation, 1151 Boston-Providence Turnpike, Norwood, MA 02062

ASTM E 119, Standard Test Methods for Fire Test of Building Construction and Materials

ASTM E 814, Standard Test Methods For Fire Test of Through-Penetration Firestops

ASTM E 2174, Standard Practice for On-site Inspection of Installed Firestops

Publisher: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428

UL 1479, Standard for Safety Fire Test of Through-penetration Firestops

Publisher: Underwriters Laboratory, Inc. (UL), 333 Pfingsten Rd., Northbrook, IL 60062

ISO/IEC 17024:2002, Personal Certification Bodies¹

Publisher: The International Organization for Standardization (ISO), 1 rue de Varembe, Case Postale 56, CH-1211, Genève 20, Switzerland/Suisse

¹ Copies may also be obtained from the American National Standards Institute, Inc. (ANSI), 25 West 43rd Street, New York, NY 10036.

1.5 Recommended Guidelines for Firestop Contractors

Nonmandatory Appendix A provides recommended guidelines for firestop contractors.

2 GENERAL KNOWLEDGE

2.1 Laws, Codes, Rules, Listing Agencies, and Regulations

The qualified firestop systems installer shall be able to identify and demonstrate knowledge of the applicable laws, codes, rules, listing agencies, and regulations from the federal, state, and local levels related to the scope of this Standard.

2.2 Basic Concepts

The qualified firestop systems installer shall be able to identify and describe the basic concepts pertaining to

- (a) fire dynamics
- (b) firestopping
- (c) piping systems
- (d) compartmentation and protection of structural elements

2.3 Notifications

The qualified firestop systems installer shall be able to identify and describe the actions that take place prior to and after installing and testing a firestop system, including

- (a) notification to proper authorities (authority having jurisdiction)
- (b) notification to job inspector
- (c) notification to premise owners
- (d) notification to the architect/engineer of record

3 PRODUCT PERFORMANCE KNOWLEDGE

3.1 Major Components

The qualified firestop systems installer shall be able to identify the major components of firestop material and systems as defined by the listing directories of appropriate third party certification organizations.

3.2 Application

The qualified firestop systems installer shall be able to identify and describe the proper application of firestop systems with respect to

- (a) model building codes requirements
- (b) design on approved plans and specifications
- (c) fire resistance ratings of assemblies being penetrated
- (d) types of materials
- (e) types of fire-resistive construction
- (f) listing agency directories

(g) product listing/labeling specifications and installation criteria

(h) contractor labeling/markings

3.3 Performance Characteristics

The qualified firestop systems installer shall be able to identify and describe the performance characteristics of firestop systems and devices as outlined in para. 9.

4 PRODUCT INSTALLATION KNOWLEDGE

4.1 Installation Requirements

The qualified firestop systems installer shall be able to identify and describe the proper installation requirements for the firestop systems pertaining to

- (a) firestop manufacturer installation instructions
- (b) local jurisdictional requirements
- (c) system listing conditions
- (d) site environment conditions
- (e) proper material handling and use
- (f) installer-performed field testing
- (g) piping installation requirements

4.2 Improper Installations

The qualified firestop systems installer shall be able to identify and describe potential hazards resulting from the improper installations of firestop systems (refer to para. 9).

5 SYSTEM AND SYSTEM COMPONENT ACCEPTANCE TESTING KNOWLEDGE

5.1 Field Inspection and Test Procedures

The qualified firestop systems installer shall be able to describe the field inspection and test procedures associated with the following:

- (a) firestop system type
- (b) insulation type, thickness, and compression
- (c) type and size of penetration opening
- (d) orientation of penetrating item
- (e) annular space determination
- (f) approved drawings and specifications
- (g) firestop system and assembly rating

5.2 Precautions and Hazards

The qualified firestop systems installer shall be able to describe the precautions and hazards during installation and field tests relating to

- (a) confined spaces safety
- (b) site notification protocol
- (c) electricity and safety
- (d) tool usage

6 DOCUMENTING AND RECORDING

The qualified firestop systems installer shall be able to identify and report the physical locations for the following items on the “as-built” drawings:

- (a) firestop system type
- (b) insulation type, thickness, and compression
- (c) type and size of penetration opening
- (d) orientation of penetrating item
- (e) annular space and dimension
- (f) other items as required by the local jurisdiction
- (g) firestop system and assembly rating
- (h) types of penetrating items

7 VOCABULARY AND TERMS

The qualified firestop systems installer shall be able to demonstrate a basic working knowledge of the pertinent terms and vocabulary associated with firestopping systems covered by this Standard.

8 CERTIFICATION OF FIRESTOP SYSTEMS INSTALLERS

8.1 Overview

Certification to this Standard shall be through an ISO/IEC 17024 ANSI-accredited third party certifier. Certification shall include the successful completion of a minimum 32-hr training course (outlined in para. 9) that includes a written and a practical examination covering all facets of this Standard.

8.2 Practical Experience

The certified firestop installer shall have a minimum of four (4) years of documented practical experience, recognized by the ISO/IEC 17024 ANSI-accredited third party certifier, in the installation of piping systems.

8.3 Recertification

Certification shall be renewed a minimum of every five (5) years. The qualified firestop systems installer shall have at least eight (8) hr of continuing education prior to recertification

9 32-HOUR FIRESTOP SYSTEMS INSTALLER TRAINING OUTLINE

The 32-hr training requirement (para. 8) shall include instruction, as a minimum, in the following topics:

- (a) Session One (8 hr)
 - (1) history and background of fires (MGM, etc.)
 - (2) fire dynamics
 - (a) sources of combustion
 - (b) ignition sources
 - (c) smoke migration and stack effect/air movement

- (d) fire development and spread in multistory buildings
- (e) fire development and spread in single story buildings
- (f) “fire triangle”
- (g) basic theory of combustion
- (h) methods of heat transfer
- (i) “flashover”
- (3) principles of fire protection
 - (a) detection
 - (b) containment and suppression
 - (c) building codes and firestop protection
 - (d) building design considerations
 - (e) understanding containment and compartmentalization
 - (f) the role of fire-resistance-rated construction
- (4) hot gas, combustible gases, and toxicity
 - (a) thermal layering
 - (b) chemical asphyxiates
 - (c) toxic gases
 - (d) combustible gases
- (5) test methods for firestop systems and fire-resistance-rated construction
 - (a) ASTM E814/UL 1479
 - (b) ASTM E119/NFPA 251/UL 263
- (6) rating of fire-resistance-rated barriers
 - (a) hourly ratings
 - (b) flame penetration ratings (F rating)
 - (c) temperature transmission ratings (T rating)
 - (d) air (smoke) leakage rating (L rating)
 - (e) through penetration
 - (f) membrane penetration
- (7) identification of fire-resistance-rated barriers
 - (a) floor/ceiling assembly
 - (b) roof/ceiling assembly
 - (c) smoke barrier
 - (d) fire wall
 - (e) fire barriers
 - (f) fire partitions
 - (g) smoke partitions
- (8) Material barriers
 - (a) concrete barriers
 - (b) gypsum barriers
 - (c) combination barriers
 - (d) wood
 - (e) masonry
- (9) Piping systems
 - (a) piping materials
 - (b) joining and support
- (10) Design consideration
 - (a) smoke-tight penetrations
 - (b) types of construction: combustible and non-combustible
 - (c) fire blocking and draft stopping
- (b) Session Two (8 hr)

- (1) common terminology used in firestopping
 - (a) F rating
 - (b) T rating
 - (c) L rating
 - (d) annular space
 - (e) endothermic
 - (f) intumescent
 - (g) mechanical firestops/devices
 - (h) hourly rating
 - (i) fire test
 - (j) rated system
 - (k) through penetration
 - (l) membrane penetration
- (2) Performance characteristics for firestop systems for piping penetrations
 - (a) intumescent
 - (b) endothermic
 - (c) mechanical
- (3) Common penetration items
 - (a) DWV piping (nonpressure — vented to atmosphere)
 - (b) pressure piping (pressure — closed to atmosphere)
 - (c) combustible piping
 - (d) noncombustible piping
- (4) Review of firestop manufacturer's specifications
 - (a) caulks and walk systems
 - (b) prefabricated collars
 - (c) caulk and sleeve systems
 - (d) mechanical systems
 - (e) alternative systems
 - (f) piping insulation materials
 - (g) plastic pipe devices
 - (h) cast in place
 - (i) wrap strip system
 - (j) pillows

- (5) Code requirements
 - (a) building code issues
 - (b) plumbing code issues
 - (c) expansion and contraction
 - (d) changing and support
 - (e) installation standards
 - (f) local amendments
 - (g) authority having jurisdiction
- (6) Field conditions
 - (a) engineering judgments
 - (b) change orders
- (c) Session Three (12 hr)
 - (1) Good installation practices — hands-on training
 - (a) caulk and walk systems
 - (b) plastic pipe devices
 - (c) wrap strip systems
 - (d) pillows
 - (e) surface preparation/corrosion protection
 - (f) caulk and containment collar systems
 - (g) alternative methods
 - (h) shaft enclosure method
 - (i) mechanical firestops
 - (j) manufacturer's installation instructions
 - (k) required plan check for firestopping
 - (l) listing/labeling
 - (m) contractor labeling/marking
- (d) Session Four (4 hr)
 - (1) Good inspection practices
 - (a) review of plans and specifications
 - (b) matching manufacturer's specifications to independent lab's rating and rating required by plans and specs
 - (c) destructive testing and nondestructive testing
 - (d) overall final review and test
 - (e) laboratory directories
 - (f) manufacturer's guidelines

NONMANDATORY APPENDIX A

RECOMMENDED GUIDELINES FOR FIRESTOP CONTRACTORS¹

A1 CONTRACTOR QUALIFICATION

A1.1 General

It is of the utmost importance to improve the performance and installation of firestop systems and their components by examining and qualifying contractors involved in the installation of such systems and components.

While firestop contractors may specialize in one or more areas, e.g., firestop joint systems, floor perimeter/slab edge/exterior wall cavity systems and through-penetration systems, there should be only a single approved category: firestop contractor. Therefore, the qualified firestop contractor should be knowledgeable in and meet the test requirements for all areas of firestopping and firestopping systems.

A1.3 Prior Requirements

(a) Verification that the contractor has been in the firestop installation business for at least two (2) years and is licensed by the state or local authority where applicable.

(b) Verification that the contractor possesses a current qualification as an installer per the requirements of ASME A112.20.2.

(c) Verification that the contractor has in his employ at least one qualified installer who meets the requirements of ASME A112.20.2.

(d) Verification that the contractor keeps a documented and archived record keeping system for all installations.

(e) Verification that the contractor has a demonstrated quality control program.

A2 DEMONSTRATED QUALITY CONTROL PROGRAM

A2.1 Quality Assurance Program

It is vital that the qualified firestop contractor has a quality assurance program that specifies controls for at least the following areas:

- (a) corporate guidelines for quality assurance
- (b) appropriate measures for designing the system or assembly and transferring the design requirements to installation personnel

- (c) appropriate measures to ensure proper installation
- (d) appropriate measures to ensure proper labeling or marking (if required)
- (e) appropriate measures for inspecting completed assemblies

A2.2 Program Documentation

Contractors should have written policies and procedures in place as part of their quality assurance program, including a record keeping program for each type of system or assembly installed.

A2.3 Record Keeping

The contractor should assure adequate traceability of components and application and should maintain a record of all firestopping installations for a minimum of seven (7) years from the date of installation.

A3 AUDITS

An initial audit should be conducted by the third-party certifier on the contractor's home office and a job site.

A4 TRAINING

An additional 16 hr of training beyond the requirements of ASME A112.20.2 is recommended on the following topics:

- (a) FCIA Manual of Practice
- (b) Factory Mutual Research Approval requirements
- (c) specifications, estimating, and bidding
- (d) fire-resistance-rated system selection
- (e) equivalent fire-rated assembly selection
- (f) nonconformances
- (g) field constructed mockups
- (h) single source responsibility
- (i) delivery, storage, and handling
- (j) project conditions
- (k) sequencing and scheduling
- (l) environmental regulations
- (m) close-out documents

¹ Refer to FM 4991 as referenced in para. 1.4 for additional information.

A5 CERTIFICATION

Certification of qualified firestop contractors is highly recommended and should be through a recognized

ANSI-accredited third party certifier. Certification should include the successful completion of a minimum 16-hr training course as outlined in para. A4 or equivalent, including a written and a practical examination.

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