

Approval Standard

Firestopping

Class Number 4990
December 2009

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Foreword

The FM Approvals certification mark is intended to verify that the products and services described will meet stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of Approval Standards is to present the criteria for FM Approval of various types of products and services, as guidance for FM Approvals personnel, manufacturers, users and authorities having jurisdiction.

Products submitted for certification by FM Approvals shall demonstrate that they meet the intent of the Approval Standard, and that quality control in manufacturing and/or applications shall ensure a consistently uniform and reliable product or service. Approval Standards strive to be performance-oriented and to facilitate technological development.

For examining equipment, materials and services, Approval Standards:

- a) must be useful to the ends of property conservation by preventing, limiting or not causing damage under the conditions stated by the Approval listing; and
- b) must be readily identifiable.

Continuance of Approval and Listing depends on compliance with the Approval Agreement, satisfactory performance in the field, on successful re-examinations of equipment, materials and services as appropriate, and on periodic follow-up audits of the manufacturing facility or service/application.

FM Approvals LLC reserves the right in its sole judgment to change or revise its standards, criteria, methods or procedures.

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1. INTRODUCTION

1.1 Purpose

- 1.1.1 An important technique in property loss control is the subdivision of a building into compartments and sub-compartments. This subdivision is usually accomplished by erecting physical barriers that will limit the damage caused by an event to the room of origin. The loss caused by the spread of fire damage can be minimized when effective compartmentation is incorporated into a building's design.
- 1.1.2 The damage caused by fire increases as it spreads to other areas of a building. Fire will easily spread to other areas of a building due to the collapse of a fire barrier. Fire can spread through openings in fire barriers which allow flames and/or hot gases to pass. Fire can also spread through a fire barrier by the transfer of sufficient heat through an opening that can ignite nearby combustibles on the non fire side of a wall.
- 1.1.3 One method of combating the spread of fire through openings in or around barriers is to properly design and install firestopping. Firestopping is intended for use in openings in or between fire resistant walls, floor/ceiling assemblies at head of walls and at construction joints between floors and walls.

1.2 Scope

- 1.2.1 This standard sets the performance requirements for firestopping under simulated laboratory conditions. They shall be examined for their ability to prevent the passage of flame and/or heat through or around openings in fire rated walls and floor/ceiling assemblies.
- 1.2.2 This standard sets the performance requirements for firestopping used to seal joints, voids, gaps or other discontinuities between or bounded by adjacent supporting elements such as walls, floors and at the head of walls against the spread of flame and their capability of accommodating anticipated building movements.
- 1.2.3 This standard sets the performance requirements for firestopping as it relates to their ability to resist an external force simulated by a hose stream after being subjected to a fire exposure.
- 1.2.4 This standard includes an optional water leakage test to determine the ability to resist water leakage through penetration fire stop systems in floor/ceiling assemblies when subjected to a standard water exposure.
- 1.2.5 This standard allows for an alternate fire exposure, method of test and acceptance criteria for use by jurisdictions where the ASTM fire resistance tests are not recognized by the Authority Having Jurisdiction. In those cases, the test assembly shall also be subjected to the hose stream test in order to qualify for Approval.
- 1.2.6 This standard is intended to evaluate only those hazards investigated and is not intended to determine suitability for the end use of the product.
- 1.2.7 This standard does not set the performance requirements for or a method of assessing the passage of smoke or air leakage through or around an assembly or the effects of movement of through penetrants.
- 1.2.7.1 FM Approvals recognizes the problems caused by the non-thermal damage resulting from the migration of smoke and/or air through a fire stop. A review of the existing test methods currently in the public domain was conducted. None were incorporated into this standard at this time as they were deemed to be inadequate for some purposes of this standard. It is the intention of FM Approvals to conduct research on this topic in the future. At that time, the standard may be revised, or a new standard developed, that will incorporate other test methods and criteria deemed necessary to adequately address the non-thermal damage caused by the movement of smoke through or being emitted by the fire stop.

- 1.2.8 This standard does not address the ability of electrical penetrations to maintain their circuit integrity or to conduct electricity in fire situations.
- 1.2.9 The results of tests conducted under the controlled conditions required by this standard shall not be used to describe or appraise performance under actual fire or natural hazard conditions as actual fire and natural hazard conditions vary widely.
- 1.2.10 This standard does not address the firestopping systems along the perimeter edge of a floor slab.
- 1.2.11 Approval criteria shall include, but are not limited to, performance requirements, marking requirements, an examination of manufacturing facility(ies), an audit of quality assurance procedures, and a follow-up program.

1.3 Basis for Requirements

- 1.3.1 The requirements of this standard are based on experience, research, testing and/or the standards of other organizations. The advice of manufacturers, users, trade associations, jurisdictions and/or loss control specialists was also considered.
- 1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of fire stops for the purpose of obtaining FM Approval. Fire stops having characteristics not anticipated by this standard may be FM Approved if performance equal, or superior, to that required by this Standard is demonstrated, or if the intent of the standard is met. Alternatively, fire stops which meet all of the requirements identified in this Standard may not be FM Approved if other conditions which adversely affect performance exist or if the intent of this standard is not met.

1.4 Basis for Approval

Approval is based upon satisfactory evaluation of the product and the manufacturer in the following major areas:

- 1.4.1 Examination and tests on production samples shall be performed to evaluate
- the suitability of the product;
 - the performance of the product as specified by the manufacturer and required by FM Approvals; and as far as practical,
 - the durability and reliability of the product.
- 1.4.2 An examination of the manufacturing facilities and audit of quality control procedures is made to evaluate the manufacturer's ability to consistently produce the product which is examined and tested and the marking procedures used to identify the product. These examinations may be repeated as part of FM Approvals' product follow-up program.

1.5 Basis for Continued Approval

Continued Approval is based upon:

- production or availability of the product as currently FM Approved;
- the continued use of acceptable quality assurance procedures;
- satisfactory field experience;
- compliance with the terms stipulated in the Approval report;
- satisfactory re-examination of production samples for continued conformity to requirements; and
- satisfactory Facilities and Procedures Audits (F&PAs) conducted as part of FM Approvals' product follow-up program.

Also, as a condition of retaining Approval, manufacturers may not change a product or service without prior authorization by FM Approvals.

1.6 Effective Date

The effective date of an Approval standard mandates that all products tested for Approval after the effective date shall satisfy the requirements of that standard. Products FM Approved under a previous edition shall comply with the new version by the effective date or else forfeit Approval.

The effective date of this Standard is July 1, 2010.

1.7 System Of Units

Units of measurement used in this Standard are United States (U.S.) customary units. These are followed by their arithmetic equivalents in International System (SI) units, enclosed in parentheses. The first value stated shall be regarded as the requirement. The converted equivalent value may be approximate. Appendix A lists the selected units and conversions to SI units for measures appearing in this standard. Conversion of U.S. customary units is in accordance with the American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)/American Society for Testing Materials (ASTM) SI 10-02 "Standard for Use of the International System of Units (SI): The Modern Metric System."

1.8 Applicable Documents

The following standards, test methods, and practices are referenced in this standard:

American Society for Testing and Materials (ASTM)

ASTM E119, Standard Test Methods for Fire Tests for Building Construction and Materials

ASTM E814, Standard Test Method for Fire Tests of Through Penetration Fire Stops

ASTM E1529, Standard Test Methods for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies

ASTM E 1966, Standard Test Method for Fire Resistive Joint Systems

ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops

ASTM E 2226, Practice for Application of Hose Stream

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

European Standards

EN 1363-1, Fire Resistance Tests – Part 1: General Requirements

EN 1363-2, Fire Resistance Tests – Part 2: Alternative and Additional Procedures

EN 1366-3, Fire Resistance Tests for Service Installations – Part 3: Penetration Seals

EN 1366-4, Fire Resistance Tests for Service Installations – Part 4: Linear Joint Seals

FM Approvals/ FM Global

Approval Standard 4991, Approval of Firestop Contractors (May 2001)

FM Approvals Through Penetration Water Leakage Test Procedure

Firestop Contractors International Association (FCIA)

FCIA Manual of Practice

Underwriters Laboratories of Canada

CAN/ULC -S115-05, Standard Test Method for Fire Tests of Firestop Systems

1.9 Definitions

For purposes of this standard, the following terms apply:

Authority Having Jurisdiction (AHJ) – the organization, office, official, government entity or individual responsible for approving or accepting firestopping components.

Fire Stop – fire resistant materials, systems and assemblies installed around and/or directly to through penetrating items, construction joints and at head of walls.

Joint System – an assembly or device that provides a fire separating function along continuous linear openings, including changes in direction, between adjacent fire separating elements.

Membrane Penetration System – an assembly or device that maintains the fire resistance rating when an opening is made through only one (1) side of a wall or floor.

Through Penetration – a specific construction consisting of an hourly rated wall or floor assembly, a penetrating item passing through the rated wall or floor system and the materials designed to prevent the spread of fire through the opening(s).

2. GENERAL INFORMATION

2.1 Product Information

- 2.1.1 The term fire stop is a general term for a passive fire protection system of various materials and components that are used to seal openings and joints in fire resistive wall and/or floor assemblies. The primary types of firestopping are through penetrations and joint systems.
- 2.1.2 The term through penetration is used to denote an opening in a fire rated wall or floor through which passes a mechanical, electrical, piping, structural, communication or other device. Examples of through penetrations would be fire protection piping, electrical conduits, cable trays, communication cables and other mechanical devices passing through openings in a wall.
- 2.1.3 A fire resistive joint system is used to denote the linear joint created by adjacent rated walls and or floor/ceiling assemblies. The most common joint systems are designated as wall to wall, floor to floor, floor to wall and head of wall.
- 2.1.4 Fire stops can also be used for dual purposes by also acting as a means of preventing water leakage through a floor. This type of protection is useful during the construction phase of a building when it has not yet been totally enclosed to the elements. Under such circumstances rainwater often gets into the building and causes damage to lower floors where finish work is being done by passing through openings in floors that are designed to allow the passage of piping systems. It can also be useful during a fire when a sprinkler system has been activated. In cases where the openings in floors are not made water proof, sprinkler runoff often finds it way through openings in the floor which causes water damage to lower floors that are not being exposed to fire.

2.2 Approval Application Requirements

To apply for an Approval examination the manufacturer, or its authorized representative, should submit a request to

Materials, Director
FM Approvals
1151 Boston-Providence Turnpike
PO Box 9102
Norwood, MA 02062
U.S.A.

The manufacturer shall provide the following preliminary information with any request for Approval consideration:

- A complete list of all models, types, sizes, product names and options for the products or services being submitted for Approval consideration;
- general assembly drawings, complete set of manufacturing drawings, materials list, formulation(s), sales literature and installation procedures;
- the number and location of manufacturing facilities and;
- all documents shall identify the manufacturer's name, document number or other form of reference, title, date of last revision, and revision level. All documents shall be provided in English or with English translation.