



Member of the FM Global Group

Approval Standard for Pipe and Duct Insulation

Class Number 4924

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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 shall ensure a consistently uniform and reliable product. Approval Standards strive to be performance-oriented. They are intended 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.

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 This standard states Approval requirements for materials which may be used as insulation on the exterior of noncombustible pipes or ducts. If such a material is sufficiently combustible, it may cause a spreading fire along the route of the pipe or duct which it insulates. Mechanical piping systems such as those in heating, ventilating, air conditioning, or refrigeration sometimes need to be insulated for maximum operational efficiency. This standard sets the performance requirements to accurately assess the ability of a material to resist this fire.
- 1.1.2 Approval criteria may include, but are not limited to, performance requirements, marking requirements, examination of manufacturing facility (ies), audit of quality assurance procedures, and a follow-up program.

1.2 Scope

- 1.2.1 This standard sets the fire performance requirements for pipe and duct insulation including pre-insulated pipe and evaluates the potential for a horizontal spreading fire in parallel runs of insulated pipes or ducts within a pipe chase or plenum. To qualify for FM Approval as a product of low fire hazard, not requiring automatic sprinkler protection of itself, the insulation material must perform satisfactorily in all tests as outlined in this standard. This standard is not intended to address Approval of pre-insulated ducts, or Fume and Smoke Exhaust Ducts that have been Approved in accordance with Approval Standard 4922.
 - 1.2.1.1 Pipe and duct insulation that meet the fire performance requirements of paragraph 1.2.1 above, and are categorized for use in pharmaceutical manufacturing and storage area, food preparation and storage areas and similar occupancies or other occupancies that are highly susceptible to smoke damage shall also meet the requirements as outlined in paragraph 4.5 (Duct Insulation) or paragraph 4.6 (Pipe Insulation) of this standard. Pipe and duct insulation in this category produce somewhat higher levels of smoke (when compared to those materials which are evaluated for cleanrooms) but produce less smoke than materials evaluated for fire performance only.
 - 1.2.1.2 Pipe and duct insulation that meet the fire performance requirements of paragraph 1.2.1 above, and are intended for use in cleanroom occupancies shall also meet the requirements of FM 4910-Cleanroom Materials Flammability Test Protocol. This test protocol evaluates the materials' fire propagation behavior and potential for smoke contamination using two indices: Fire Propagation Index (FPI) and Smoke Development Index (SDI).
- 1.2.2 This standard is intended to evaluate only those hazards investigated, and is not intended to determine suitability for end use of a product.
- 1.2.3 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 conditions. Actual fire conditions may vary widely.

1.3 Basis for Requirements

- 1.3.1 The requirements of this standard are based on experience, research and testing, and/or the standards of other national and international 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 pipe and duct insulation for the purpose of becoming FM Approved. These requirements are intended primarily as guides, strict conformity is not always mandatory. Pipe and duct insulation 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, pipe and duct insulation 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 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' Facilities and Procedures Audit 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 Surveillance Audits 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

1.6.1 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 shall apply to the entire Approval Standard, or, where so indicated, only to specific paragraphs of the standard.

1.6.2 The effective date for this standard is January 1, 2014.

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 BSR/IEEE/ASTM SI 10, *Standard for Use of the International System of Units (SI): The Modern Metric System*.

1.8 Applicable Documents

The following standards, test methods, practices, books and technical papers were either used to develop this standard or are referenced in this standard:

ASTM E2058, Standard Test Methods for Measurement of Synthetic Polymer Material Flammability Using a Fire Propagation Apparatus (FPA).

ASTM D1622, Standard Test Method for Apparent Density of Rigid Cellular Plastics.

ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials

BSR/IEEE/ASTM SI 10, *Standard for Use of the International System of Units (SI): The Modern Metric System*.

Ditch, Benjamin. "Development of a Fire Performance Test for Pipe and Duct Insulation, Approval Standard Class Number 4924", FM Global Technical Report, Project ID 0003033423, May 2011.

International Standards Organization (ISO) 9705, International Standard, "Fire Tests-Full Scale Room Test for Surface Products".

International Standards Organization (ISO/IEC) 17025:2005, General Requirements for the Competence of Testing and Calibration Laboratories, International Standards Organization, Geneva, Switzerland, 2005 Edition.

FM Approvals Test Procedure Class Number 4924: FM Approvals Pipe Chase Test.

FM Approvals 4910-Cleanroom Materials Flammability Test Protocol.

FM Approvals 4922-Approval Standard for Fume Exhaust Ducts or Fume and Smoke Exhaust Ducts.

Tewarson, A. "Generation of Heat and Chemical Compounds in Fires," The SFPE Handbook of Fire Protections Engineering, 3rd Edition, Section 3 Chapter 4, pp. 3-82 to 3-161, 2002.