

Approval Standard

for

Fire Resistant Barriers for use with CPVC Pipe and Fittings in Light Hazard Occupancies

Class Number 1636

November 2003

Foreword

FM Approvals are 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 FM 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 Approval 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. FM Approval Standards strive to be performance-oriented and to facilitate technological development.

For examining equipment, materials and services, FM 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 judgement 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 FM Approvals criteria for fire resistant barriers for use with chlorinated polyvinyl chloride (CPVC) pipe and fittings in light hazard occupancies for automatic wet sprinkler fire protection systems.
- 1.1.2 FM Approvals 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 encompasses the design and performance requirements for fire resistant barriers for use with CPVC pipe and fittings in light hazard occupancies for automatic wet sprinkler fire protection systems. The intent is to determine if specific CPVC compounds/fire resistant barrier combinations are capable of maintaining sprinkler system integrity and performance during a fire.
- 1.2.2 The evaluation of fire resistant barriers is based on the premise that the barrier would fail, prior to the failure of the attachment fastener. Therefore, the attachment fastener is not considered to be within the scope of this Approval Standard.
- 1.2.3 Fire resistant barriers are designed to be used in conjunction with CPVC sprinkler pipe and fittings in light hazard occupancies in $\frac{3}{4}$ in. through 3 in. nominal pipe size.
- 1.2.4 FM Approvals standards are intended to verify that the product described will meet stated conditions of performance, safety, and quality useful to the ends of property conservation.

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 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 resistant barriers for the purpose of obtaining FM Approval. Fire resistant barriers having characteristics not anticipated by this standard may be 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 resistant barriers that meet all of the requirements identified in this standard may not be Approved if other conditions that adversely affect performance exist or if the intent of this standard is not met.

1.4 Basis for FM Approval

FM 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 shall be made to evaluate the manufacturer's ability to produce the product which was examined and tested, and the marking procedures used to identify the product. These examinations are 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 Approved;
- the continued use of acceptable quality assurance procedures;
- satisfactory field experience;
- compliance with the terms stipulated in the Master/Approval Agreement;
- 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 Approved under a previous edition shall comply with the new version by the effective date or forfeit Approval.

The effective date of this standard is **December 1, 2003** for compliance with all requirements.

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 10-97, "Standard for Use of the International System of Units (SI): The Modern Metric System." Two units of measurement (liter and bar), outside of, but recognized by SI, are commonly used in international fire protection and are used in this standard.

1.8 Applicable Documents

The latest versions of the following standards, test methods, and practices are referenced in this standard:

ANSI/IEEE/ASTM SI 10-97, *Standard for Use of the International System of Units (SI): The Modern Metric System.*

ASTM A308-99, *Standard Specification for Steel Sheet, Terne (Lead-Tin Alloy) Coated by the Hot-Dip Process*

ASTM A463/A463M-01a, *Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process*

ASTM A653/A653M-01a, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*

ASTM A792/A792M-01a, *Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process*

ASTM A875/A875M-01a, *Standard Specification for Steel Sheet, Zinc-5% Aluminum Alloy-Coated by the Hot-Dip Process*

ASTM A924/A924M-99, *Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process*

ASTM A929/A929M-01, *Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe*

ASTM D1784-99, *Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds*

ASTM D3915-99, *Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Pressure Applications*

ASTM D4216-00, *Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) and Related PVC and Chlorinated Poly (Vinyl Chloride) (CPVC) Building Products Compounds*

ASTM D4396-99, *Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Nonpressure Applications*

ASTM D5260-97, *Standard Classification for Chemical Resistance of Poly (Vinyl Chloride) (PVC) Homopolymer and Copolymer Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds*

ASTM F1970-01, *Standard Specification for Special Engineered Fittings, Appurtenances or Valves for use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems*

- ASTM F437-99, *Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*
- ASTM F438-01, *Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40*
- ASTM F439-01, *Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*
- ASTM F441/F441M-99, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80*
- ASTM F442/F442M-99, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)*
- ASTM F493-97, *Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings*
- BSR/ASTM D1784-200x, *Specification for Rigid Poly Vinyl Chloride PVC Compounds and Chlorinated Poly Vinyl Chloride CPVC Compounds*
- BSR/ASTM D3915-200x, *Specification for Rigid Poly Vinyl Chloride PVC and Chlorinated Poly Vinyl Chloride CPVC Compounds for Plastic Pipe and Fittings used in Pressure Applications*
- BSR/ASTM F438-200x, *Specification for Socket-type Chlorinated Poly Vinyl Chloride CPVC Plastic Pipe Fittings, Schedule 40*
- BSR/ASTM F439-200x, *Specification for Chlorinated Poly Vinyl Chloride CPVC Plastic Pipe Fittings, Schedule 80*
- BSR/ASTM F493-199x, *Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings*
- FM Global Property Loss Prevention Data Sheets
- International Maritime Organization (IMO), Maritime Safety Committee (MCS)/Circ. 848, *Revised Guidelines for the Approval of Equivalent Fixed Gas Fire-Extinguishing Systems, as Referred to in SOLAS 74, for Machinery Spaces and Cargo Pump-Rooms*
- International Standards Organization (ISO), Draft International Standard, ISO/TC21/SC5/WG8, *Gaseous Fire Extinguishing Systems, Part 1: General Requirements*

1.9 Definitions

For purposes of this standard, the following terms apply:

Accepted

This term refers to installations acceptable to the authority enforcing the applicable installation rules. When the authority is FM Global, such locations are termed “FM Global Accepted.” Acceptance is based upon an overall evaluation of the installation. Factors other than the use of Approved equipment impact upon the decision to accept, or not to accept. Acceptance is not a characteristic of a product. It is installation specific. A product accepted for one installation may not be acceptable elsewhere. (Contrast with FM Approved.)

Approved

This term refers to products Approved by FM Approvals. Such products are listed in the *Approval Guide*, a publication of FM Approvals, issued annually, or one of the supplements. All products so listed have been successfully examined by FM Approvals, and their manufacturers have signed and returned an Approval Agreement to FM Approvals. This form obligates the manufacturer to allow re-examination of the product and audit of facilities and procedures at FM Approvals discretion. It further requires the manufacturer not to deviate from the as-Approved configuration of the product without review by and agreement of FM Approvals. Approval is product specific.

Attachment Fastener

The fastener used to connect the fire resistant barriers to the building.

Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings

Pipe and fittings made of chlorinated poly (vinyl chloride) plastic in which the chlorinated poly (vinyl chloride) is in the greatest amount by weight.

FM Approval Mark

The FM Approval Mark is detailed in Appendix B. Its use is mandatory on all components of Approved fire resistant barriers. These registered marks cannot be used except as authorized by FM Approvals via the granting of Approval to a specific product.

Fire Resistant Barrier

A barrier used to shield chlorinated poly (vinyl chloride) pipe and fittings from direct contact with an open flame.

IMO Cribs

Fire test cribs designed to the International Maritimes Organization (IMO) standards. An IMO crib consists of six 18 in. (455 mm) lengths of trade size nominal 2 in. by 2 in. (50 mm x 50 mm) kiln dried spruce or fir lumber having a moisture content between 9 and 13 percent. The members are placed in four alternate layers at right angles to one another. The members are to be evenly spaced forming a square structure. The heat release rate of each IMO crib is approximately 300 kW, See Appendix D.

Ignition Source

Apparatus consisting of a 6 in. (152 mm) diameter steel cylinder, filled with 30 ml (0.008 gallons) of heptane. The ignition source apparatus also provides support for the IMO cribs at a height of 12 in. (305 mm) above floor level. See Appendix E.

Sprinkler Pipe

Nominal one inch SDR 13.5 CPVC sprinkler pipe which includes the sprinkler used in each test. This pipe includes a minimum of one bonded joint. This pipe is supplied by a pressure pump used to supply the required flow rate through the sprinkler after actuation of the sprinkler. This pipe is outfitted with a pressure transducer and is capped on the other end.

Thermocouple Attached Pipe

Nominal one inch SDR13.5 CPVC sprinkler pipe to which three thermocouples are attached in accordance with Appendix F. The thermocouple attached pipe is water filled and maintained at a static pressure of 50 psi (345 kPa) throughout the tests.