



Approval Standard for Cast Iron Pipe, Fittings and Couplings

Class Number 1615

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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 This standard states Approval criteria for cast iron pipe for use in underground fire protection mains. This standard also addresses fittings and couplings for joining cast iron pipe and fittings. The fittings and couplings shall be FM Approved only for use below ground. This standard is not meant to encompass cast iron soil pipe.
- 1.1.2 Displacements due to seismic events (earthquake) are beyond the scope of this standard.
- 1.1.3 Approval criteria may include, but is not limited to, performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a follow-up audit program.

1.2 Scope

- 1.2.1 This standard encompasses the design and performance requirements for:

- Cast iron water pipe, from 3 through 36 inch (80 to 915 mm) nominal sizes for underground use;
- Cast iron fittings and couplings for underground use

Note: This standard is intended only for cast iron pipe and its associated fittings and couplings. Products intended for use with ductile iron pipe (even if they are made from cast iron) should be examined in accordance with Approval Standard 1610, *Ductile Iron Pipe and Fittings. Flexible Fittings and Couplings*

- 1.2.2 FM Approvals will consider cast iron pipe and fittings which are designed in accordance to national or international standards.
- 1.2.3 Approval 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.
- 1.2.4 All Approval testing is to be conducted on production samples.

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 cast iron pipe, fittings and couplings for the purpose of obtaining Approval. These requirements are intended primarily as guides, and strict conformity is not always mandatory. Pipe, fittings and couplings 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, fittings and couplings 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 initial Facilities and Procedures Audit shall be conducted to evaluate the manufacturer's ability to consistently produce the product that was examined and tested as part of the Approval examination. The audit shall review the facility and in-place quality control procedures used in the manufacture of the product. Typically, areas of review are incoming inspection, work in progress, production testing, final quality control, marking, calibration of equipment, shipping procedures, and document and drawing control. These examinations are repeated as part of FM Approvals' product follow-up program. (Refer to Section 5.2, Facility and Procedures Audit.)

1.5 Basis for Continued Approval

1.5.1 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 Master 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.

1.5.2 Also, as a condition of retaining Approval, manufacturers may not change an FM Approved product or service without prior authorization by FM Approvals. (Refer to Section 5.1.3 for further details regarding changes.)

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 forfeit Approval.

The effective date of this Standard is **December 31, 2010** 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 Institute of Electrical and Electronics Engineers (IEEE)/American Society for Testing and Materials (ASTM) SI 10-2002, *American National Standard for Use of the International System of Units (SI): The Modern Metric System*. One unit of measurement (bar), outside of, but recognized by SI, is commonly used in international fire protection and is used in this standard.

1.8 Applicable Documents

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

American Water Works Association (AWWA) C111/A21.11-2006 *Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings*
Bureau of Indian Standards (IS) 1536:2001, *Centrifugally cast (spun) iron pressure pipes for water, gas and sewage*
FM Global Property Loss Prevention Data Sheets
IEEE/ASTM SI 10-2002, *American National Standard for Use of the International System of Units (SI): The Modern Metric System*
International Organization for Standardization (ISO) 17025-2005, *General Requirements for the Competence of Testing and Calibration Laboratories*
National Fire Protection Association (NFPA) 13-2007, *Standard for the Installation of Sprinkler Systems*

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 FM 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.)

Bell and Spigot Pipe

A general pipe design where one end of a length of pipe is straight (spigot) and the other larger end is bell shaped and contains a gasket seal. The spigot end of one pipe is designed to fit into the bell end of another pipe and to fit under the gasket seal. Generally, this joint uses an elastomeric gasket to obtain a seal. Older version of bell and spigot pipe used a poured seal made up of jute and lead. These joints are rarely used as of this writing.

Flanged End Fitting

A device, such as a tee or elbow, which has an integral rim on each end that is drilled in a symmetric hole pattern and which is connected to a mating device by means of a gasket, bolts and hex nuts. Critical flange dimensions are as tabulated in a nationally or internationally recognized standard.

FM Approvals Certification Marks

The FM Approvals Certification Marks are detailed in Appendix B. Their use is mandatory on all FM Approved products. These registered marks cannot be used except as authorized by FM Approvals via the granting of Approval to a specific product.

FM Approved

This term refers to products FM Approved by FM Approvals. Such products are listed in the Approval Guide, an on-line resource of FM Approvals. All products so listed have been successfully examined by FM Approvals, and their manufacturers have signed and returned a Master 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 FM Approved configuration of the product without review by and agreement of FM Approvals. Approval is product and site specific.

Push-On Joint

A joint which results from the method of joining pipe by forcing the spigot end of a pipe into the bell of another pipe suitably equipped with a "push-on" elastomeric gasket. The spigot end of one length of pipe passes into the bell end of the receiving pipe, which contains the gasket seal. When the spigot end is pushed to the bottom of the socket a seal is obtained. This joint is considered a non-restrained joint.

Restrained Joint

A joint design used to counteract unbalanced forces in a piping system which includes the joint gasket. In some designs, the rubber gasket contains toothed metal strips, in a cam shape, inserted along the perimeter of the gasket. The gasket is initially inserted into the bell end of the joint. The spigot end of the pipe is inserted into the bell and through the gasket to the bottom of the socket. The cam rotates and the metal teeth engage the grooved section of the spigot so that the joint is adequately secured as the pipe is pressurized. Other designs which incorporate other methods of restraint and sealing are also acceptable. This joint is considered a self-restrained joint.

Thrust Block

A large block of concrete used to transfer reaction forces from water flow in piping systems to adjacent soil. The forces would otherwise cause an unrestrained joint to open and leak. Thrust blocks are especially useful at changes of direction in buried piping systems. Thrust blocks should not prohibit access to the pipe joints.

2. GENERAL INFORMATION

2.1 Product Information

- 2.1.1 Cast iron pipe and fittings encompassed by this standard are used in underground fire protection systems. This standard addresses rigid and flexible fittings and couplings for joining pipe and fittings. The fittings and couplings may be rated for use below ground. Installation shall be in accordance with FM Global Property Loss Prevention Data Sheets and the manufacturer's installation instructions.
- 2.1.2 In order to meet the intent of this standard, pipe, coupling and fitting components must be examined on a type-by-type, manufacturer-by-manufacturer, and plant-by-plant basis. This is predicated on the basis that identical products, produced with identical materials by different manufacturers, or even by different plants of the same manufacturer, have been seen to perform differently in testing. Sample pipe, coupling and fitting components, selected in conformance to this criterion, shall satisfy all of the requirements of this standard.

2.2 Approval Application Requirements

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

Hydraulics Group Manager
FM Approvals Hydraulics Laboratory
743A Reynolds Road
West Glocester, RI 02814 U.S.A.