



Approval Standard for Fire Service Meters

Class Number 1044

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Foreword

The FM Approvals certification mark is intended to verify that the products and services described will meet FM Approvals' 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 surveillance 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 criteria for fire service meters for use in automatic fire protection systems. Meters addressed in this standard are used in aboveground installations as well as pits and vaults which maybe below grade.
- 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 surveillance audit program.

1.2 Scope

- 1.2.1 This standard encompasses the design and performance requirements for fire service meters intended for use where full registration metering devices on public water connections are required.
- 1.2.2 Other types and sizes, including metric sizes, of fire service meters may be FM Approved if they meet the requirements and intent of this standard. Fire service meters of unusual design may be subjected to special tests to determine their suitability.

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 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. The requirements of this standard reflect tests and practices used to examine characteristics of fire service meters for the purpose of obtaining Approval. Fire service meter 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 service meters 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 A first 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 project. The audit shall review the facility and in-place quality control procedures used in the manufacturing 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 audits are repeated periodically for as long as the product remains FM Approved, as part of FM Approvals' Surveillance Audit program. (Refer to Section 5.2, Surveillance Audit Program.)

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 Surveillance Audits conducted as part of FM Approval's product surveillance audit 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 **August 30, 2013** 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 Institute of Electrical and Electronics Engineers (IEEE)/ASTM International (ASTM) IEEE/ASTM SI 10-2010, *American National Standard for Metric Practice*. Two units of measurement (Bar and Liter), outside of, but recognized by SI, are commonly used in international fire protection and are used in this standard.

1.8 Applicable Documents

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

American Society of Mechanical Engineers (ASME) B1.20.1 - 1983 (R2006), *Pipe Threads, General Purpose, (Inch)*
American Water Works Association (AWWA) C703 - 2011, *Cold-Water Meters -- Fire Service Type*
British Standards Institution European Specifications (BS EN) 10242 - 1995, *Threaded Pipe Fittings in Malleable Cast Iron*
FM Approval Standard 1045, Waterflow Detector Check Valves, August 2005
FM Approval Standard 1140, Quick Opening Valves 1/4 inch through 2 inch Nominal Size, October 1998
FM Approval Standard 5551, Strainers for use with Water Spray Systems, January 1980
FM Global Property Loss Prevention Data Sheets
IEEE/ASTM SI 10-2010, *American National Standard for Metric Practice*
International Organization for Standardization (ISO) 7-1 - 2007, *Pipe Threads Where Pressure-Tight Joints are made on the Threads- Part 1: Dimensions, Tolerances and Designation*
ISO 17025 - 2005, *General Requirements for the Competence of Testing and Calibration Laboratories*

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 may be considered when determining whether to accept the product. 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.)

Accuracy

The extent to which a given measurement agrees with the actual value for that measurement.

Electromagnetic (Mag Meters) Flowmeters

A volumetric flow meter with no moving parts, based on Faraday’s Law of electromagnetic induction, which states that the voltage induced across any conductor as it moves at right angles through a magnetic field is proportional to the velocity of that conductor.

End Connections

The term “End Connections” refers to the method of connecting components of a fire protection system. Typical end connections in a fire protection service are grooved, threaded, plain end, flanged and welded end.

Flange Fittings

The term flanged fittings has been taken to refer to any style of pipe fitting covered in the scope of this Approval Standard with integral flanged end connections.

FM Approvals Certification Marks

The FM Approvals Certification Marks are detailed in Appendix B. Their use is mandatory on all units of 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 agreement obligates the manufacturer to allow re-examination of the product and surveillance audit of facilities and procedures at FM Approvals discretion. It further requires the manufacturer not to deviate from the as-FM Approved configuration of the product without review by and agreement of FM Approvals. Approval is product specific.

Grooved Coupling, Flexible

A grooved coupling is an assembly that is used to join two similar sized grooved ends together. The flexible grooved coupling is characterized by its ability to allow for angular or rotational differences between the components being joined after assembly. These products may provide greater system reliability in situations involving excessive vibration, difficult alignment, or seismic activity. They may also provide greater system flexibility than historic use of rigid systems of flanged pipe and fittings.

Grooved Coupling, Rigid

A rigid grooved coupling is an assembly that is used to join two different sized grooved ends together. The rigid grooved coupling is characterized by its prevention of rotation of the joined ends, and reduced tolerances for angular variations after assembly.

Plain End Fittings

Pipe couplings designed to work with pipe ends that have been cut perpendicular to its axis and incorporating no grooves or threads. The fitting is typically fastened to the pipe by mechanical means, such as a fastener.

Rangeability

The ratio of the maximum flow to the minimum flow of the meter.

Rated Working Pressure

This is the maximum sustained pressure at or below which the device shall operate trouble free for its entire design life. This value sets the basis for the testing described in Section 4.

Safe Maximum Operating Capacity

A specified maximum flow at which the meter is required to function safely.

Threaded End

Pipe couplings or fittings which have been furnished with its ends threaded with internal or external pipe threads conforming to national or international standards for pipe threads for the nation of intended use (i.e. ANSI B1.20.1, ISO 7-1).

Turbine-Type Flowmeters

A flow meter with turbine blades in the waterway. Water flowing around the blades results in the turbine rotating. The rotational speed of the turbine blades is proportional to the fluid velocity.

Type 1 Devices- Proportional Fire – Service Meter with Check Valve

A meter of the proportional type for measuring high flow rates, a bypass meter for measuring low flow rates and a check valve for diverting low flow rates through the bypass meter.

Type 2 Devices - Compound Fire – Service Meter Assembly and Strainer with Check Valve

A turbine type meter for measuring high flow rates, a bypass meter for measuring low flow rates, a strainer and a check valve for diverting low flow rates through the bypass meter.

Type 3 Devices - Turbine Fire – Service Meter and Strainer without Check Valve

A turbine type meter and strainer without a check valve and by-pass.

Type 4 Devices

Ultrasonic Transit-Time Flowmeters and Electromagnetic (Mag Meters) Flowmeters, (see definitions)

Ultrasonic Transit-Time Flowmeters

A volumetric flow meter with no moving parts, which measures the difference of the transit time of ultrasonic pulses. Ultrasonic transit-time meters requires particulates, bubbles or turbulence in the flow.

Welded End

Steel pipe furnished with ends characterized by having the ends cut perpendicular to its axis and finished with a pronounced bevel on each end to allow for butt welding.