



Approval Standard for Water Flow Detector Testers 1 in. Through 8 in. Nominal Size

Class Number 1043

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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 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.

Table of Contents

1.	INTRODUCTION.....	1
1.1	PURPOSE.....	1
1.2	SCOPE.....	1
1.3	BASIS FOR REQUIREMENTS.....	1
1.4	BASIS FOR APPROVAL	1
1.5	BASIS FOR CONTINUED APPROVAL.....	2
1.6	EFFECTIVE DATE	2
1.7	SYSTEM OF UNITS.....	2
1.8	APPLICABLE DOCUMENTS	2
1.9	DEFINITIONS.....	3
2.	GENERAL INFORMATION	4
2.1	PRODUCT INFORMATION.....	4
2.2	APPROVED APPLICATION REQUIREMENTS.....	4
2.3	REQUIREMENTS FOR SAMPLES FOR EXAMINATION.....	5
3.	GENERAL REQUIREMENTS.....	5
3.1	REVIEW OF DOCUMENTATION	5
3.2	PHYSICAL OR STRUCTURAL FEATURES – MECHANICAL STYLE.....	5
3.3	PHYSICAL OR STRUCTURAL FEATURES – ELECTRICAL STYLE	6
3.4	MATERIALS	6
3.5	MARKINGS	6
3.6	MANUFACTURER’S INSTALLATION AND OPERATION INSTRUCTIONS	7
3.7	CALIBRATION	7
3.8	TOLERANCES.....	7
4.	PERFORMANCE REQUIREMENTS.....	8
4.1	EXAMINATION.....	8
4.2	LEAKAGE.....	8
4.3	HYDROSTATIC INTEGRITY	8
4.4	OPERATIONAL TEST	8
4.5	ELECTRICAL TEST – VOLTAGE VARIATION	9
4.6	ELECTRICAL TEST - ENVIRONMENTAL	9
4.7	ELECTRICAL TEST – DIELECTRIC.....	9
4.8	ELECTRICAL TEST – BONDING RESISTANCE	10
4.9	ADDITIONAL TESTS	10
5.	OPERATIONS REQUIREMENTS	11
5.1	DEMONSTRATED QUALITY CONTROL PROGRAM.....	11
5.2	FACILITIES AND PROCEDURES AUDIT (F&PA)	13
5.3	MANUFACTURER’S RESPONSIBILITIES.....	13
5.4	MANUFACTURING AND PRODUCTION TESTS	13
5.4.1	TEST REQUIREMENT NO. 1 – LEAKAGE	13
5.4.2	TEST REQUIREMENT NO. 2 – BODY HYDROSTATIC	13
	APPENDIX A: UNITS OF MEASUREMENT	14
	APPENDIX B: FM APPROVALS CERTIFICATION MARKS.....	15
	APPENDIX C: SAMPLE LISTINGS	17
	APPENDIX D: TOLERANCES	18

1. INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states FM Approvals criteria for water flow detector testers for use in wet pipe sprinkler systems, for both new installations, and for retro-fit applications.
- 1.1.2 Approval criteria may include, but are not limited to, performance requirements, marking requirements, examination of manufacturing facility(ies), audit assurance procedures, and a follow-up program.

1.2 Scope

- 1.2.1 This standard encompasses the design and performance requirements for 1 inch through 8 inch nominal size water flow detector testers. In cases where metric sized products are to be examined for Approval, test criteria comparable to the equivalent or nearest nominal size shall be used.
- 1.2.2 This standard encompasses both traditional mechanical type water flow detector testers (where the water flow detectors are tested by the passage of water past the vane), and electrical style (where the water flow past the water flow detector is electrically simulated).
- 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.

1.3 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 may also be considered.
- 1.3.2 The requirements of this Standard reflect tests and practices used to examine characteristics of water flow detector testers for the purpose of obtaining FM Approval. Water flow detector testers 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. Conversely, water flow detector testers 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 (F&PA) 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 examinations are repeated periodically as part of the FM Approval 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 written 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, 2011** 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 10-02, *American National 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 or are beneficial in understanding this standard:

ANSI / American Water Works Association (AWWA) C606 (2006) – *Grooved and Shouldered Joints*
ANSI/IEEE/ASTM SI 10 (2002), *American National Standard for Use of the International System of Units (SI): The Modern Metric System*
ASME B16.5 (2009), *Pipe Flanges and Flanged Fittings: NPS 1/2 through 24 - Metric/Inch Standard*
ASME B1.20.1-1983 (R2006), *Pipe Threads, General Purpose (Inch)*
British Standards Institution, BS EN 10226-2 (2006), *Pipe threads where pressure tight joints are made on the threads - Part 2. Taper, external threads and taper internal threads - Dimensions, tolerances and designation*
FM Global Property Loss Prevention Data Sheet 2-0 (March 2010), *Installation Guidelines for Automatic Sprinklers*
FM Global Property Loss Prevention Data Sheet 3-7 (May 2010), *Fire Protection Pumps*
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/International Electrotechnical Commission (IEC) 17025 (2005), *General Requirements for the Competence of Testing and Calibration Laboratories*

National Electrical Manufacturer's Association (NEMA) MG-1-2009, *Motors and Generators*
National Sanitation Foundation (NSF)/ANSI 61 (2010), *Drinking Water System Components -- Health Effects*

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 whether to accept the product. Acceptance is not a characteristic of a product. A product accepted for one installation may not be acceptable elsewhere. (Contrast with FM Approved.)

End Connections

The term "End Connections" refers to the method of connecting components of a pipe system to one another. Typical end connections in a fire protection service are cut groove, rolled groove, cast groove, threaded, flanged, plain end, and welded end.

Flanged End

This term refers to piping components having mating flanged ends per the dimensional values shown in ASME B16.5, *Pipe Flanges and Flanged Fittings: NPS 1/2 through 24 - Metric/Inch Standard*. Flanges meeting other national or international standards may be evaluated on a case-by-case basis.

FM Approvals Certification Marks

The FM Approvals Certification Marks are detailed in Appendix B. Their use is mandatory on all units of FM Approved water flow detector testers. 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 online resource of FM Approvals, see Appendix C. All products so listed have been successfully examined by FM Approvals, and their manufacturers have signed and returned a Master Agreement to FM Approvals. The Master Agreement obligates the manufacturer to allow re-examination of the product and audit of facilities and procedures at FM Approval's discretion. It further requires the manufacture not to deviate from the as-FM Approved configurations of the product without review by and agreement of FM Approvals. Approval is product specific.

Grooved End

This term refers to a style of end connection that is characterized by having a groove located near the free end of the piping component allowing joining to other grooved end products via the use of grooved end couplings. Dimensions for these connections may vary slightly due to the method used to impart the groove to the product (i.e. cut groove where the groove is machined, roll groove where the groove is mechanically formed using a grooving machine, or cast groove where the groove is simply cast on the part during casting process) but in all cases tend to follow the dimensions of ANSI / American Water Works Association (AWWA) C606 – *Grooved and Shouldered Joints*.

Mechanical Tee

A mechanical tee is a fitting that provides a connection to a pipe line in the place of a tee. The pipe is pre-drilled per the manufacturer's instructed hole size, and the "saddle" is placed over the hole so that the mechanical tee gasket encircles the hole. The fitting has a second piece that loops around the pipe and allows for the "saddle" to be drawn tight against the pipe surface. Approval of these fittings is limited to fittings having a minimum of one pipe size reduction as the branch outlet. Equal size outlets are not permitted. Typical end connections for these fittings are threaded and grooved end.

Rated Working Pressure

This is the maximum sustained pressure at or below which the water flow detector tester shall operate trouble free. This also sets the basis for the testing described in Section 4, Performance Requirements. The minimum pressure rating considered for FM Approval is 175 psi (1205 kPa).

Threaded End

Water flow detector testers 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 (e.g., ASME B1.20.1, EN 10226-2, ISO 7-1).

Water Flow Detector

This term refers to a device that incorporates a switch that is activated when prolonged water flow interacts with a paddle that is inserted into the pipeline. The device is fastened to the pipe by means of a U-Bolt wrapping around the pipe outside diameter and through a saddle housing. The saddle housing also has a gasket that prevents the water supply pressure from escaping, and atmospheric pressure from entering the sprinkler piping.

2. GENERAL INFORMATION

2.1 Product Information

2.1.1 Water flow detector testers permit the testing of in-line water flow detectors used in sprinkler piping without the need for the discharge of the water that is used for the test. They are used on wet pipe sprinkler systems in new installations and may also be designed for retro-fit applications.

2.1.2 In order to meet the intent of this standard, water flow detector testers shall be examined on a model-by-model, type-by-type, manufacturer-by-manufacture, and plant-by-plant basis. This is predicated on the basis that identical designs, fabricated using identical materials by different manufacturers, or, even by different plants of the same manufacturer, have sometimes been shown to perform differently in testing. Sample valves, selected in conformance to this criterion, shall satisfy all of the requirements of this standard.

2.2 Approved Application Requirements

2.2.1 To apply for an Approval examination, the manufacturer, or an authorized representative, shall submit a request to:

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

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

- A complete list of all models, types, sizes, and options for the products or services being submitted for Approval consideration,
- General assembly drawings, one complete set of manufacturing drawing, material list(s), anticipated marking format, brochures, sales literature, specification sheets, installation, operation and maintenance procedures, wiring diagrams, and
- Number and location of manufacturing facilities making the products submitted for Approval.