



Member of the FM Global Group

Approval Standard for Self Closing Faucets

Class Number 6031

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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.

TABLE OF CONTENTS

1 INTRODUCTION.....	4
1.1 Purpose.....	4
1.2 Scope.....	4
1.3 Basis for Requirements.....	4
1.4 Basis for Approval.....	4
1.5 Basis for Continued Approval.....	5
1.6 Effective Date.....	5
1.7 System of Units.....	5
1.8 Normative References.....	5
1.9 Definitions.....	6
2 GENERAL INFORMATION.....	7
2.1 Product Information.....	7
2.2 Approval Application Requirements.....	7
2.3 Requirements for Samples for Examination.....	7
3 GENERAL REQUIREMENTS.....	8
3.1 Review of Documentation.....	8
3.2 Physical Features.....	8
3.3 Markings.....	8
3.4 Manufacturer's Installation and Operation Instructions.....	9
3.5 Calibration.....	9
4 PERFORMANCE REQUIREMENTS.....	10
4.1 Operational.....	10
4.2 Thread Strength.....	10
4.3 Flame Arrester.....	10
4.4 Fire Exposure.....	11
4.5 Tilt Test.....	11
5 OPERATIONS REQUIREMENTS.....	12
5.1 Demonstrated Quality Control Program.....	12
5.2 Surveillance Audit.....	13
5.3 Installation Inspections.....	13
5.4 Manufacturer's Responsibilities.....	13
6 BIBLIOGRAPHY.....	14

1 INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states Approval requirements for self-closing faucets commonly used for dispensing flammable liquids from 10 gal (38 L) to 55 gal. (208 L) steel drums. The faucet is attached to the threaded connection in the drum head, the faucet/drum assembly is used in a horizontal position.
- 1.1.2 An FM Approved self-closing faucet shall successfully pass a fire exposure test of 30 minutes, a flame arrester test, thread torque test, tilt test and an operational test of 20,000 cycles.
- 1.1.3 Approval is based on satisfactory evaluation of the product and the manufacturer in two major areas:
 - Examinations and tests on production samples are performed to evaluate (1) the suitability of the product, (2) the proper operation and performance of the product as specified by the manufacturer and required by FM Approvals, and as far as practical in a laboratory, (3) the durability and reliability of the product.
 - Satisfactory field experience is the final test of FM Approval. Unsatisfactory field experience may result in withdrawal of FM Approval.
- 1.1.4 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

This standard sets performance requirements for the ability of the self-closing faucet to dispense fluids and maintain closure of a steel drum of flammable liquid during a fire exposure.

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 self-closing faucets for the purpose of obtaining Approval. Self-closing faucets 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, self-closing faucets 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 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' product 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

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 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. Conversion of U.S. customary units is in accordance with ANSI/IEEE/ASTM SI 10.

1.8 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

ANSI/IEEE/ASTM SI 10, *American National Standard for Metric Practice*
ANSI/ASME B1.20.1, *American National Standard for Pipe Threads*
ISO/IEC 17025, *General Requirements for the Competence of Testing and Calibration Laboratories*
FM Approvals Operational Test Procedure
FM Approvals Thread Strength Test Procedure
FM Approvals Flame Arrester Test Procedure
FM Approvals Fire Exposure Test Procedure
FM Approvals Tilt Test Procedure

1.9 Definitions

For purposes of this standard, the following terms apply:

Self-Closing Faucet – a device to dispense flammable liquids from metal drums.

Flame Arrester-a screen attached to the faucet to protect against ignition of vapors inside the drum

2 GENERAL INFORMATION

2.1 Product Information

Self-closing faucets are supplied fully assembled. The faucet body is to be fabricated using non-combustible materials. Other designs meeting the criteria of this standard may also be considered for Approval.

2.2 Approval Application Requirements

To apply for an Approval examination the manufacturer, or its authorized representative, should submit a request to information@fmapprovals.com.

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 being submitted for Approval consideration;
- General assembly drawings, complete set of manufacturing drawings, materials list, anticipated marking format, brochures, sales literature, spec. sheets and installation; and
- the number and location of manufacturing facilities.
- All documents shall identify the manufacturer's name, document number or other form of reference, title, date of last revision, and revision level. All documents shall be provided with English translation.

2.3 Requirements for Samples for Examination

2.3.1 Following authorization of an Approval examination, the manufacturer shall submit samples for examination and testing based on the following:

- FM Approvals Operational Test Procedure
- FM Approvals Thread Strength Test Procedure
- FM Approvals Flame Arrester Test Procedure
- FM Approvals Fire Exposure Test Procedure
- FM Approvals Tilt Test Procedure

Sample requirements will be determined by FM Approvals following review of the preliminary information.

2.3.2 Requirements for samples may vary depending on design features, results of prior or similar testing, and results of any foregoing tests.

2.3.3 The manufacturer shall submit samples representative of production. Any decision to use data generated using prototypes is at the discretion of FM Approvals.

3 GENERAL REQUIREMENTS

3.1 Review of Documentation

- 3.1.1 During the initial investigation and prior to physical testing, the manufacturer's specifications and details shall be reviewed to assess the ease and practicality of installation and use. The Approval investigation shall define the limits of the Approval.

3.2 Physical Features

- 3.2.1 The self-closing faucet is a solid or two-piece construction non-combustible body assembled together to maintain its integrity during testing and operation.
- 3.2.2 The self-closing faucet shall be constructed of materials free of defects that would impair safety and serviceability over a temperature range of -40° F (-40° C) to 130° F (54° C). In addition, all materials shall be compatible with the liquids recommended for use with the faucet.
- 3.2.3 The faucet shall be self-closing under all conditions. It may be arranged to lock in a closed position, but shall not lock in an open position.
- 3.2.4 The faucet shall be equipped with a flame arrester held firmly in place at the inlet to the valve body. The flame arrester shall provide an open area of at least 35% greater than the cross sectional area of the valve body flow-away. A flame arrester is impractical in cases involving viscous liquid; i.e., having a value of 2000 seconds, Saybolt Universal (SSU). In cases where the self-closing faucet is to be used for viscous liquids with a closed cup flash point greater than 100°F (38°C), a flame arrester shall not be required and the faucet shall be clearly labeled or supplied with a manufacturer's instruction sheet with this restriction. This type of faucet shall not be used to dispense viscous liquids with closed cup flash points less than or equal to 100°F (38°C).

3.3 Markings

- 3.3.1 Marking on the product or, if not possible due to size, on its packaging or label accompanying the product, shall include the following information:
- name and address of the manufacturer or marking traceable to the manufacturer;
 - date of manufacture or code traceable to date of manufacture or lot identification;
 - model number, size, etc., as appropriate.
 - compatible liquids

When hazard warnings are needed, the markings should be universally recognizable.

- 3.3.2 The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the product as FM Approved. The manufacturer shall not place this model or type identification on any other product unless covered by a separate agreement.
- 3.3.3 The Approval Mark shall be displayed visibly and permanently on the product and/or packaging as appropriate. The manufacturer shall not use this Mark on any other product unless such product is covered by a separate report.
- 3.3.4 All markings shall be legible and durable.

3.4 Manufacturer's Installation and Operation Instructions

The manufacturer shall provide the user with instructions for the installation, maintenance, and operation of the product.

3.5 Calibration

- 3.5.1 Each piece of equipment used to verify the test parameters shall be calibrated within an interval determined on the basis of stability, purpose, and usage. A copy of the calibration certificate for each piece of test equipment is required for FM Approvals records. The certificate shall indicate that the calibration was performed against working standards whose calibration is certified as traceable to the National Institute of Standards and Technology (NIST) or traceable to other acceptable reference standards and certified by an ISO/IEC 17025 accredited calibration laboratory. The test equipment shall be clearly identified by label or sticker showing the last date of the calibration and the next due date. A copy of the service provider's accreditation certificate as an ISO/IEC 17025 accredited calibration laboratory is required for FM Approvals' records.
- 3.5.2 The calibration of new equipment is also required. Documentation indicating either the date of purchase or date of shipment, equipment description, model and serial number is required for identification. The new test equipment shall be clearly identified by label or sticker showing the date of initial calibration and the next due date.
- 3.5.3 When the inspection equipment and/or environment is not suitable for labels or stickers, other methods such as etching of control numbers on the measuring device are allowed, provided documentation is maintained on the calibration status of thus equipment.

4 PERFORMANCE REQUIREMENTS

Representative samples of the manufacturer's product line must be submitted with manufacturing drawings and material specifications for tests and examination.

4.1 Operational

- 4.1.1 At the rated pressure (approx. 1 psi [6.9 kPa]) of the self-closing faucet, the valve seat shall provide a tight closure against leakage under the normal force of the self-closing mechanism through 20,000 opening and closing cycles. In addition, the valve seat shall be of a material that will not swell, deteriorate or be otherwise affected so that leakage occurs from the action of any liquids recommended for use with the faucet.
- 4.1.2 A sample faucet, installed in a test apparatus to simulate the full head pressure of a horizontally placed drum, shall be operated 20,000 times.
- 4.1.3 Samples shall be tested in accordance with FM Approvals Operational Test Procedure.

4.2 Thread Strength

- 4.2.1 The faucet shall have ¾ in. or 2 in. NPT external threads to mate with a standard drum bung fitting. Pipe threads shall be in accordance with the American National Standard for Pipe Threads, ANSI/ASME B1.20.1.
- 4.2.2 The faucet shall be threaded into the drum fitting as described in the manufacturer's instructions.
- 4.2.3 Samples shall be tested in accordance with FM Approvals Thread Strength Test Procedure.

4.3 Flame Arrester

- 4.3.1 The faucet shall be equipped with a flame arrester held firmly in place at the inlet to the valve body. The flame arrester shall provide an open area of at least 35% greater than the cross sectional area of the valve body flow-away.
- 4.3.2 A flame arrester is impractical in cases involving viscous liquid; i.e., having a value of 2000 seconds, Saybolt Universal (SSU). In cases where the self-closing faucet is to be used for viscous liquids with a closed cup flash point greater than 100°F (38°C), a flame arrester shall not be required and the faucet shall be clearly labeled or supplied with a manufacturer's instruction sheet with this restriction. This type of faucet shall not be used to dispense viscous liquids with closed cup flash points less than or equal to 100°F (38°C).
- 4.3.3 With the faucet installed in the test apparatus and held open, a combustible hydrocarbon gas-air mixture (natural gas) shall be passed through the faucet, ignited and controlled to burn on the surface of the arrester.
- 4.3.4 Samples shall be tested in accordance with FM Approvals Flame Arrester Test Procedure.

4.4 Fire Exposure

- 4.4.1 The faucet shall be installed in the test apparatus and subjected for 30 minutes to a simulated spill, fire exposure test.
- 4.4.2 No leakage shall occur during the test and no damage shall be affected that would permit leakage after the test.
- 4.4.3 Samples shall be tested in accordance with FM Approvals Fire Exposure Test Procedure.

4.5 Tilt Test

- 4.5.1 The faucet shall be installed into a 55 gallon (208 L) steel drum filled with water and tilted to drop the drum with the faucet towards a concrete floor.
- 4.5.2 The faucet shall not sustain damage to cause leakage.
- 4.5.3 Faucet sample shall be tested in accordance with FM Approvals Tilt Test Procedure.

5 OPERATIONS REQUIREMENTS

5.1 Demonstrated Quality Control Program

5.1.1 A quality assurance program is required to assure that subsequent self-closing faucets produced by the manufacturer shall present the same quality and reliability as the specific self-closing faucet(s) examined. Design quality, conformance to design, and performance are the areas of primary concern.

- Design quality is determined during the examination and tests and is documented in the Approval Report.
- Continued conformance to this standard is verified by the Surveillance Audit.
- Quality of performance is determined by field performance and by periodic re-examination and testing.

5.1.2 The manufacturer shall demonstrate a quality assurance program which specifies controls for at least the following areas:

- existence of corporate quality assurance guidelines;
- incoming quality assurance, including testing;
- in-process quality assurance, including testing;
- final inspection and tests;
- equipment calibration;
- drawing and change control;
- packaging and shipping; and
- handling and disposition of non-conforming materials.

5.1.3 Documentation/Manual

There should be an authoritative collection of procedures/policies. It should provide an accurate description of the quality management system while serving as a permanent reference for implementation and maintenance of that system. The system should require that sufficient records are maintained to demonstrate achievement of the required quality and verify operation of the quality system.

5.1.4 Records

To assure adequate traceability of materials and products, the manufacturer shall maintain a record of all quality assurance tests performed, for a minimum period of two years from the date of manufacture.

5.1.5 Drawing and Change Control

- The manufacturer shall establish a system of product configuration control that shall allow no unauthorized changes to the product. Changes to critical documents, identified in the Approval Report, must be reported to, and authorized by, FM Approvals prior to implementation for production.
- The manufacturer shall assign an appropriate person or group to be responsible for, and require that, proposed changes to FM Approved or Listed products be reported to FM Approvals before implementation. The manufacturer shall notify FM Approvals of changes in the product or of persons responsible for keeping FM Approvals advised by means of FM Approvals' Revision

Request, FM Approved Product/Specification-Tested Revision Report or Address/Main Contact Change Report.

- Records of all revisions to all FM Approved products shall be maintained.

5.2 Surveillance Audit

5.2.1 An audit of the manufacturing facility is part of the Approval investigation to verify implementation of the quality assurance program. Its purpose is to determine that the manufacturer's equipment, procedures, and quality program are maintained to ensure a uniform product consistent with that which was tested and FM Approved.

5.2.2 These audits shall be conducted at a defined frequency based upon the classification by FM Approvals or its representatives.

5.2.3 FM Approved products or services shall be produced or provided at or from the location(s) audited by FM Approvals and as specified in the Approval Report. Manufacture of products bearing the Approval Mark is not permitted at any other location without prior written authorization by FM Approvals.

5.3 Installation Inspections

Field inspections may be conducted to review an installation. The inspections are conducted to assess ease of application, and conformance to written specifications. When more than one application technique is used, one or all may be inspected at the discretion of FM Approvals.

5.4 Manufacturer's Responsibilities

The manufacturer shall notify FM Approvals of changes in product construction, components, raw materials, physical characteristics, coatings, component formulation or quality assurance procedures prior to implementation.

6 BIBLIOGRAPHY

ISO/IEC 17025, *General Requirements for the Competence of Testing and Calibration Laboratories*.