



Member of the FM Global Group

Examination Standard for Pressure Actuated Waterflow Switches

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Foreword

This standard 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 this standard is to present the criteria for examination of various types of products and services.

Examination in accordance with this standard shall demonstrate compliance and verify that quality control in manufacturing shall ensure a consistent and reliable product.

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1 INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states testing and certification requirements for pressure actuated waterflow alarm switches.
- 1.1.2 Testing and certification 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 program.

1.2 Scope

- 1.2.1 This standard applies to pressure actuated waterflow alarm switches. These devices are used with automatic water control valves in wet sprinkler systems, dry pipe systems, and special sprinkler systems. They operate an electric alarm when there is waterflow to the sprinkler system.

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 pressure actuated waterflow alarm switches for the purpose of obtaining Certification. Pressure actuated waterflow alarm switches having characteristics not anticipated by this standard may be certified if performance equal, or superior, to that required by this standard is demonstrated.

1.4 Basis for Certification

Certification 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 for certification; 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 may be 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. Subsequent surveillance may be required by the certification agency in accordance with the certification scheme to ensure ongoing compliance.

1.5 Basis for Continued Certification

The basis for continual certification may include, but is not limited to, the following based upon the certification scheme and requirements of the certification agency:

- production or availability of the product as currently certified;
- the continued use of acceptable quality assurance procedures;

- satisfactory field experience;
- compliance with the terms stipulated by the certification;
- satisfactory re-examination of production samples for continued conformity to requirements; and
- satisfactory Surveillance Audits conducted as part of the certification agency's product follow-up program.

1.6 Effective Date

The effective date of this certification standard mandates that all products tested for certification after the effective date shall satisfy the requirements of this standard.

The effective date of this Standard is eighteen (18) months after the publication date of the standard 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.

ANSI/IEEE/ASTM SI 10, *American National Standard for Metric Practice*

ANSI/NFPA 70, *National Electrical Code*

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

2 GENERAL INFORMATION

2.1 Product Information

Pressure actuated waterflow alarm switches are used with automatic water control valves in wet sprinkler systems, dry pipe systems, and special sprinkler systems. They operate an electric alarm when there is waterflow to the sprinkler system.

2.2 Certification Application Requirements

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

- A complete list of all models, types, sizes, and options for the products or services being submitted for certification consideration;
- General assembly drawings, complete set of manufacturing drawings, materials list, anticipated marking format, nameplate format, brochures, sales literature, spec. sheets, installation, operation and maintenance procedures;
- 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 a certification examination, the manufacturer shall submit samples for examination and testing based on the following:
- Sample requirements to be determined by the certification agency.
- 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 the certification agency.
- 2.3.4 It is the manufacturer's responsibility to provide any necessary test fixtures, such as those which may be required to evaluate the pressure actuated waterflow alarm switch.

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 certification examination results may further define the limits of the final certification.

3.2 Design Features

The pressure actuated switch shall:

- 3.2.1 Be able to withstand the normal conditions of vibration and atmospheres encountered in manufacturing, storage, or public assembly occupancies.
- 3.2.2 Have overall size and shape so that it can be conveniently handled and not necessitate unusual care from the fragility standpoint.
- 3.2.3 Not place any undue strain on the piping (valve trim) to which the switch is mounted.
- 3.2.4 Lend itself to conventional electrical wiring methods.
- 3.2.5 Operate reliably without excessive maintenance throughout a reasonable service life.
- 3.2.6 Have the electrical contacts and any operating members, which would otherwise be damaged or whose efficiency would be detrimentally affected enclosed in a housing which reasonably protects these parts from dirt, dust, or corrosive atmospheres.

3.3 Materials

- 3.3.1 The materials used in the construction of the switch shall be suitable for the intended application and conform in all respects to the manufacturer's specifications.
- 3.3.2 The materials of the switch shall be capable of withstanding ambient temperatures of at least 125°F (52°C) indefinitely without change in the operating characteristics.

3.4 Electrical

- 3.4.1 Electrical components — switches, wiring, etc. — shall conform with the applicable requirements of ANSI/NFPA 70.
- 3.4.2 The current carrying capacity of the electrical contacts shall be consistent with the manufacturer's ratings. Tests as considered necessary by the certification agency will be made to verify any or all such ratings.

3.5 Operation

- 3.5.1 The switch shall operate when subjected to water pressures between 4 and 8 psig (0.28 and 0.55 Bar) and restore at some positive pressure.
- 3.5.2 The design and arrangement of the various components shall be such that the performance of the switch will not only be satisfactory under normal conditions, but will also have sufficient safety factor to allow for other conditions which may be encountered in the field.

3.6 Adjustment

- 3.6.1 The switch shall be designed so that its adjustment feature, if provided, cannot be readily tampered with.
- 3.6.2 While a non-adjustable switch has some safety advantage over an adjustable switch, practical considerations generally necessitate a means of adjusting the actuating point.
- 3.6.3 The adjustment feature shall not be visible from the exterior of the switch, and cover removal shall be necessary to reach the adjustment mechanism.
- 3.6.4 No adjusting shall be provided which increases the necessary actuating pressure above 20 psig (1.4 Bar).
- 3.6.5 Other characteristics affecting adjustment will be the subject of a special investigation.

3.7 Markings

- 3.7.1 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, rating, capacity, etc., as appropriate.

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

- 3.7.2 The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the certification agency's mark of conformity.
- 3.7.3 The certification agency's mark of conformity shall be displayed visibly and permanently on the product and/or packaging as appropriate and in accordance with the requirements of the certification agency. The manufacturer shall exercise control of this mark as specified by the certification agency and the certification scheme.
- 3.7.4 All markings shall be legible and durable.

3.8 Manufacturer's Installation and Operation Instructions

- 3.8.1 The manufacturer shall
- prepare instructions for the installation, maintenance, and operation of the product;
 - provide facilities for repair of the product and supply replacement parts, if applicable; and
 - provide services to ensure proper installation, inspection, or maintenance for products of such nature that it would not be reasonable to expect the average user to be able to provide such installation, inspection, or maintenance.

3.9 Calibration

- 3.9.1 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. The certificate shall indicate that the calibration was performed

against working standards whose calibration is certified and traceable to an acceptable reference standard 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 should be available.

- 3.9.2 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

4.1 Operational

- 4.1.1 The switch will be tested as received to determine that it is capable of operating between 4 and 8 psig (0.28 and 0.55 Bar). If there is an adjustment, the switch will be tested at the minimum and maximum settings to determine the switch operating characteristics.

4.2 Strength of Working Parts

- 4.2.1 A sample switch will be subjected to a pressure of 300 psig (20.7 Bar) for 5 minutes. There shall be no damage to the assembly or distortion of the operating range as a result of this test.

4.3 Durability

- 4.3.1 A sample switch will be subjected to an endurance test of not less than 20,000 complete cycles of operation under normal pressure conditions. No failure shall occur.
- 4.3.2 After the endurance test, the switch will again be tested for operating characteristics. There shall be no change as a result of this test.

4.4 Hydrostatic

- 4.4.1 A sample switch will be subjected to a hydrostatic pressure of 500 psig (34.5 Bar) for 5 minutes. There shall be no rupture of case or body.

4.5 Suitability

- 4.5.1 If warranted because of design, the switch will be subjected to atmospheres of 95% relative humidity at 70°F for a period of 72 hours. No change in operating characteristics shall result because of this test and those parts on which moisture accumulates shall not corrode

5 OPERATIONS REQUIREMENTS

5.1 Demonstrated Quality Control Program

5.1.1 A quality assurance program is required to assure that subsequent pressure operated waterflow switches produced by the manufacturer shall present the same quality and reliability as the specific pressure operated waterflow switches examined. Design quality, conformance to design, and performance are the areas of primary concern.

- Design quality is determined during the examination and tests, and may be documented in the certification report.
- Continued conformance to this standard is verified by the certifier's surveillance program.
- 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 certification report, may be required to be reported to, and authorized by, the certification agency prior to implementation for production.
- Records of all revisions to all certified products shall be maintained.

5.2 Surveillance Audit

- 5.2.1 An audit of the manufacturing facility may be part of the the certification agency's surveillance requirements 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 insure a uniform product consistent with that which was tested and certified.
- 5.2.2 Certified products or services shall be produced or provided at or from the location(s) disclosed as part of the certification examination . Manufacture of products bearing a certification mark is not permitted at any other location without prior disclosure to the certification agency.

5.3 Manufacturer's Responsibilities

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