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Examination Standard for Automatic Drip Valves 1/4 Inch Through 2 Inch Nominal Size

Class Number 1051

November 2023

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 automatic drip valves for use in aboveground automatic fire protection systems.

1.1.2 Testing and certification criteria may include 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 encompasses the design and performance requirements for 1/4 in. through 2 in. nominal size automatic drip valves for use in aboveground automatic fire protection systems. Typical applications are in dry pipe sprinkler systems and fire department connections. Automatic drip valves are limited to be no larger than 2 in. nominal size due to water hammer concerns.

1.2.2 In cases where metric sized automatic drip valves are to be examined for certification, test criteria comparable to the United States equivalent size shall be used.

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 automatic drip valves for the purpose of obtaining certification.

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;
- the durability and reliability of the product.

1.4.2 An examination of the manufacturing facilities and audit of quality control procedures may be conducted 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 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;
- 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 agencies product surveillance 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.

Two units of measurement (liter and bar), outside of, but recognized by SI, are commonly used in international fire protection, and are used in this standard.

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 B1.20.1, *Pipe Threads, General Purpose*

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

ISO 7-1*, Pipe Thread where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation*

1.9 Terms and Definitions

For purposes of this standard, the following terms apply:

Accepted – This term refers to installations acceptable to the authority having jurisdiction and enforcing the applicable installation rules. Factors other than the use of certified equipment may impact the decision to accept the equipment. Acceptance is not a characteristic of a product. It is installation specific. A product accepted for one installation may not be acceptable elsewhere.

Automatic Drip Valve – A valve with an inherent design characteristic that automatically closes without the need for human intervention when water flowing through it exceeds 4 to 10 gpm. When water is not flowing

in excess of 4 to 10 gpm, the valve remains open and allows water to drain through the outlet orifice. Also commonly referred to as an automatic drain valve.

End Connections – The method of connecting components of a pipe system to the valve. Typical end connections in a fire protection service are cut groove, rolled grooved, threaded, plain end, and welded end.

Leakage Rate – The rate at which water moves past an automatic drip valve when in the closed position.

Orifice – This term refers to the opening in the valve outlet where water is expelled.

Rated Working Pressure – This is the maximum pressure rating that the automatic drip valve is intended to operate at trouble free for its entire design life. This value sets the basis for the testing described in Section 4.

Set Pressure – This is the pressure at which the valve will open and relieve the upstream pressure to a drain.

Threaded End – Automatic drip valves 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, ISO 7-1)

2 GENERAL INFORMATION

2.1 Product Information

2.1.1 Automatic drip valves drain water which may leak past a closed valve into piping which must be kept dry. Automatic drip valves are generally comprised of the following common types of components: valve body, ball, and spring. Please note that product designs and part names may vary between manufacturers.

2.1.2 In order to meet the intent of this standard, automatic drip valves shall be examined on a model-by-model, type-by-type, manufacturer-by-manufacturer, and plant-by-plant basis. This is predicated on the basis that identical designs, fabricated in identical materials by different manufacturers have been seen to perform differently in testing. Sample automatic drip valves, selected in conformance to this criterion, shall satisfy all of the requirements of this standard.

2.2 Certification Application Requirements

2.2.1 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(s), anticipated marking format, brochures, sales literature, specification sheets, installation, operation and maintenance procedures; 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 Requirements for samples may vary depending on design features, results of prior or similar testing, and results of any foregoing tests.

2.3.2 The manufacturer shall submit samples representative of production.

2.3.3 It is the manufacturer's responsibility to provide any necessary test fixtures, such as those which may be required to evaluate the automatic drip valve.

2.3.4 If there are failures encountered during the examination testing, the certification agency will provide the manufacturer with information regarding what testing will need to be repeated and any additional sample requirements.

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.

3.1.2 The manufacturer's dimensional specifications and/or dimensional drawings shall fully describe the product. All critical dimensions shall be indicated with the allowed upper and lower tolerance limits clearly shown.

3.2 Physical or Structural Features

3.2.1 Automatic drip valves shall:

3.2.1.1 Be designed for a minimum rated working pressure of 175 psi (1205 kPa). Automatic drip valves may be evaluated based on a higher-pressure rating at the manufacturer's request.

3.2.1.2 Automatically close without the need for human intervention when water flowing through it exceeds 4 to 10 gpm. When water is not flowing in excess of 4 to 10 gpm, the valve must remain open and allow water to drain through the outlet orifice.

3.2.1.3 Drain between 1 and 2 gpm in the closed position when subjected to 100 psi inlet water pressure.

3.2.1.4 Open before the pressure decreases to 5 psi from 100 psi.

3.2.1.5 Show readily by inspection within one minute of a change of pressure or flow that it is in its proper position and the movable parts are free.

3.2.2 Automatic drip valve outlets are usually provided with threaded end connections. Valve designs with other end connections may be evaluated on a case-by-case basis.

3.3 Materials

3.3.1 All materials used in the fabrication of the automatic drip valves discussed in this examination standard shall be suitable for the intended application. Raw materials shall be evaluated in accordance with the appropriate sections of the manufacturer's quality assurance manual plus any applicable national and/or international standards.

3.3.2 Examples of suitable materials are brass, bronze and stainless steel.

3.4 Markings

3.4.1 Each automatic drip valve shall be permanently marked with the following minimum information:

- Manufacturer's name or trademark;
- Nominal valve size;
- Model number;
- Arrow indicating flow direction;
- Rated working pressure;

- Manufacturing location source code;
- The certification agency's mark of conformity.

3.4.2 Markings shall be cast, painted, inked, or contained on a corrosion resistant nameplate that is permanently attached to the valve.

3.4.3 Any additional pertinent marking information required by the national or international standard to which the valves are manufactured shall be included using any of the marking conventions listed in Section 3.4.2.

3.4.4 Each required marking listed in Section 3.4.1 shall be legible and durable and shall be applied in any of, or any combination of, the above methods.

3.4.5 The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the certification agency's mark of conformity.

3.4.6 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.

3.5 Manufacturer's Installation and Operation Instructions

3.5.1 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

3.6 Calibration

3.6.1 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.

3.6.2 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.

3.7 Tolerances

3.7.1 Tolerances on units of measure shall be as described in Appendix A, unless otherwise specified.

4 PERFORMANCE REQUIREMENTS

4.1 Examination

4.1.1 Requirement

The automatic drip valves shall conform to the manufacturer's drawings and specifications and to the certification agency requirements.

4.1.2 Test/Verification

A sample shall be examined and compared to drawings and specifications. It shall be verified that the sample conforms to the requirements described in Section 3, General Requirements.

The Manufacturer's Installation, Operation and Maintenance Manual shall be provided and reviewed prior to conducting performance testing.

4.2 Hydrostatic Strength Test

4.2.1 Requirement

Each size and end connection style shall be able to withstand an internal hydrostatic pressure equal to two times the rated working pressure without cracking, rupture, or permanent distortion.

4.2.2 Test/Verification

Compliance shall be verified by testing a minimum of one of each size valve and end connection style submitted for examination. The valves under test shall be connected to a water supply line on one end and plugged or capped on the other. The valves under test shall then be filled with water making sure to release any trapped air and pressurized to a hydrostatic test pressure of 350 psi (2415 kPa) or two times the rated working pressure, whichever is greater. Each hydrostatic pressure test shall be maintained for a duration of five minutes.

4.3 Flow for Closure Test

4.3.1 Requirement

Automatic drip valves shall close when water flowing through it exceeds the manufacturer's specified rate at which is required to close the valve. The manufacturer's specified rate shall be between 4 to 10 gpm (15 and 40 l/m).

4.3.2 Test/Verification

Compliance shall be verified by testing a minimum of one of each size valve submitted for examination. The valves under test shall be subjected to a steadily increasing flow rate until the valve automatically closes.

4.4 Leakage Test

4.4.1 Requirement

Automatic drip valves shall have a leakage rate between 1 – 2 gpm (4 and 8 l/m) when subjected to a water pressure of 100 psi (690kPa) while in the closed position.

4.4.2 Test/Verification

Compliance shall be verified by testing a minimum of one of each size valve submitted for examination. The valves under test shall be subjected to a water pressure of 100 psi (690kPa) while in the closed position. Each leakage test shall be conducted for a minimum duration of five minutes.

4.5 Reliability to Open Test

4.5.1 Requirement

Automatic drip valves shall open when the shut-off pressure is reduced from 100 psi (690kPa) to 5 psi (35 kPa). The automatic drip valves set opening pressure shall be at minimum 5 psi (35kPa).

4.5.2 Test/Verification

Compliance shall be verified by testing a minimum of one of each size valve submitted for examination. The valves under test shall be subjected to a water pressure of 100 psi (690kPa) while in the closed position. The water pressure subjected to the valve shall be steadily reduced until the valve automatically opens. This process shall be repeated a minimum of three times on each valve under test.

4.6 Durability Test

4.6.1 Requirement

Automatic drip valves shall be capable of 500 cycles from open to close under representative pressures and flows without functional impairment or excessive wear, damage, or failure of any valve component.

4.6.2 Test/Verification

Compliance shall be verified by testing a minimum of one of each size valve submitted for examination. The valves under test shall be connected to a chamber consisting of a 1 in. NPS pipe, 12 inches (300mm) long. Water at 90 to 120 psi (620 to 825 kPa) shall be suddenly introduced to the chamber. As soon as the automatic drip valve closes, the water shall be shut off and the automatic drip valve shall steadily drip water until it automatically opens at the manufacturer's specified opening pressure and drains all remaining water in the chamber. This cycle shall be repeated 500 times.

5 OPERATIONS REQUIREMENTS

5.1 Demonstrated Quality Control Program

5.1.1 A quality assurance program is required to assure that subsequent products produced by the manufacturer shall present the same quality and reliability as the specific products 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 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 ensure 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 provided from, location(s) disclosed as part of the certification examination. Manufacture of products bearing a certification mark is not permitted at any other location prior to disclosure to the certification agency.

5.3 Manufacturer's Responsibilities

5.3.1 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.

5.4 Manufacturing and Production Tests

5.4.1 Test Requirement No. 1 – *Hydrostatic Test*

The manufacturer shall perform hydrostatic pressure testing on 100 percent of production valves that have the certification mark. The production valves under test shall be connected to a water supply line on one end and plugged or capped on the other. The production valves under test shall then be filled with water making sure to release any trapped air and subjected to the rated working pressure of the valve for a minimum duration of 1 minute.

6 BIBLIOGRAPHY

ANSI B1.20.1, *Pipe Threads, General Purpose*

ASTM SI10 – *American National Standard for Use of the International System of Units (SI): The Modern Metric System*

ISO 17025 – *General Requirements for the Competence of Testing and Calibration Laboratories*

ISO 7/1, Pipe Thread where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation

APPENDIX A: Tolerances

Unless otherwise stated, the following tolerances shall apply:

Flow	± 2 percent of value
Length:	± 2 percent of value
Volume:	± 5 percent of value
Volume Per Unit Area:	± 5 percent of value
Pressure:	± 5 psi (35 kPa)
Temperature:	± 4°F (2°C)
Time:	+ 5/- 0 seconds + 0.1/- 0 minutes

Unless stated otherwise, all tests shall be carried out at a room (ambient) temperature of 68°F ± 9°F (20°C ± 5°C).

APPENDIX B: Sample Listing

Automatic Drip Valves

Model No	Valve Size		End Connection	Rated Working Pressure	
	in	(mm)		psi	(kPa)
A	1/2	(15)	NPT	175	(1205)