

Approval Standard

Anti-Water Hammer Check Valves

Class Number 1230
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Member of the FM Global Group

Approval Standard for Anti-Water Hammer Check Valves

Class Number 1230

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1. INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states Approval criteria for anti-water hammer check valves for fire protection systems.
- 1.1.2 Approval criteria 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.
- 1.1.3 Approval standards are intended to verify that the product described shall meet stated conditions of performance, safety, and quality useful to the ends of property conservation.

1.2 Scope

- 1.2.1 This standard encompasses the design and performance requirements for 2, 2-1/2, 3, 3-1/2, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, and 24 inch nominal size anti-water hammer check valves. The intended application of these devices is to permit the flow of water in one direction only, preventing flow in the opposite direction, as well as to moderate the potentially destructive effects of pressure surges or water hammer due to pump starting and stopping and valve opening and closing. Sizes refer to the nominal diameter of the pipeline to which the valve will be connected. In cases where metric sized anti-water hammer check valves are to be examined for FM Approval, test criteria comparable to the equivalent or nearest nominal inch size shall be used.
- 1.2.2 This standard defines the requirements for anti-water hammer check valves with single or multiple waterways. Anti-water hammer check valves covered in this Approval standard are supplied with flanged, grooved, threaded or wafer style end connections. Other types of anti-water hammer check valves may be FM Approved if they meet the requirements and intent of this standard. Anti-water hammer check valves of unusual design may be subjected to special tests to determine their suitability.
- 1.2.3 This standard encompasses the design and performance requirements for anti-water hammer check valves for their intended installation in the discharge line of a fire pump where conditions may be expected to cause pressure surges or water hammer.

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 anti-water hammer check valves for the purpose of obtaining Approval. Anti-water hammer check valves 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, anti-water check valves 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 FM Approval

FM 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 examinations are repeated periodically as part of the FM Approvals' Surveillance Audit program. (Refer to Section 5.2, Surveillance Audit 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 Master Agreement;
- Satisfactory re-examination of production samples for continued conformity to requirements; and
- Satisfactory Surveillance Audits conducted as part of the FM Approvals' product follow-up program.

Also, as a condition of retaining Approval, manufacturers may not change a 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 **12 Months from Issue Date** 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 Institute of Electrical and Electronics Engineers (IEEE)/American Society for Testing and Materials (ASTM) SI 10-2010, *American National Standard for Metric Practice*.

1.8 Applicable Documents

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

American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME) B1.20.1-1983 (R2006), *Pipe Threads, General Purpose (inch)*.
ANSI/ASME B16.5 - 2013, *Pipe Flanges and Flanged Fittings NPS ½ through NPS 24 metric/inch Standard*
ANSI /American Water Works Association (AWWA) C606-11 (2011), *Grooved and Shouldered Type Joints*
IEEE/ASTM SI 10 - 2010, *American National Standard for Metric Practice*
ASTM D471-12a – (2012), *Standard Test Method for Rubber Property - Effect of Liquids*
ASTM D572-4 – (2010), *Standard Test Method for Rubber - Deterioration by Heat and Oxygen*
AWWA M11 - 2004, *Steel Water Pipe: A Guide for Design and Installation*
FM Global Property Loss Prevention Data Sheets

1.9 Definitions

For purposes of this standard, the following terms apply:

Accepted

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 to accept, or not to accept. Acceptance is not a characteristic of a product. It is installation specific. A product accepted for one installation may not be acceptable elsewhere. (Contrast this definition with ***FM Approved***.)

Anti-Water Hammer Check Valve

For the purposes of this standard, a valve designed for fire protection application that suppresses water hammer as well as function as a check valve. Design of these valves typically incorporates features which enable the valve to close quickly. These features normally include short overall disc or clapper travel and springs to assist in valve closure.

Corrosion Resistant

Having resistance to corrosion equal to or exceeding that of a bronze alloy having a minimum copper content of 80 percent, or constructed of 300 or 400 Series stainless steel.

End Connections

Types of joints used to connect components of a fire protection system. Typical end connections for fire protection service include flanged, grooved, threaded and welding end.

Flanged End Valve

A valves having mating flanged ends in accordance with the dimensional values shown in ANSI/ASME B16.5. Flanges meeting other national or international standards shall 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 FM Approved anti –water hammer check valves. These registered marks cannot be used except as authorized by FM Approvals via the granting of Approval to a specific product.

FM Approved

Products FM Approved by FM Approvals. Such products are listed in the Approval Guide, an online 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. The Master Agreement obligates the manufacturer to allow re-examination of the product and surveillance audits at FM Approval's discretion. It further prohibits the manufacturer from deviating from the as-FM Approved configuration of the product without review by and agreement of FM Approvals. Approval is product specific.

Grooved End Valve

A valve characterized by having grooved ends on the inlet and outlet ends of the valve body such that the valve may be installed in the sprinkler system piping using FM Approved grooved end couplings. For the purpose of this standard, grooves shall comply with the dimensional values shown in AWWA C606. Grooves meeting dimensions of other standards will be reviewed on a case-by-case basis.

Hand Hole Cover

A removable cover, which when removed, allows replacement of internal parts without having to remove the valve from the pipeline.

Rated Working Pressure

The maximum sustained pressure at or below which the valve is expected to operate trouble free. This also sets the basis for the testing described in Section 4, Performance Requirements.

Swing Check Valve

A valve with an inherent design characteristic that permits flow of water in one direction and prevents flow in the opposite direction under cyclic pressure conditions.

Threaded End Valve

A valve characterized by having threads machined into the valve body and end plate allowing for installation into a threaded pipe system. For the purposes of this standard, threaded end refers to ANSI/ASME B1.20.1 for tapered pipe threads. Other thread forms may be acceptable on a case-by-case basis.

Wafer Style Valve

A valve type where the valve is placed between two pipe flanges and held in place by the flange bolting. In this style of valve, the flange bolts surround the valve but do not connect directly to it.

2. GENERAL INFORMATION

2.1 Product Information

- 2.1.1 Anti-water hammer check valves typically consist of an assembly of the following components: body, spring, disc/clapper, seat ring, seal facing, lifting lug and hinge pin.
- 2.1.2 In order to meet the intent of this standard, anti-water hammer check valves must 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 using identical materials by different manufacturers or, even by different plants of the same manufacturer, have been seen to perform differently in testing. Sample valves, selected in conformance to this criterion, shall satisfy all of the requirements of this standard.

2.2 Approval Application Requirements

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

Fire Protection Group Manager
FM Approvals Fire Protection Building
743A Reynolds Road
West Glocester, RI 02814 USA