



Member of the FM Global Group

Examination Standard for Anti-Water Hammer Check Valves

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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 anti-water hammer check valves for 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 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 certification, 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 examination standard are supplied with flanged, grooved, threaded or wafer style end connections. Other types of anti-water hammer check valves may be certified 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. The requirements of this standard reflect tests and practices used to examine characteristics of anti-water hammer check 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; and
 - 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 agency's product surveillance program.

1.6. Effective Date

The effective date of this examination 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/ASME B1.20.1, *Pipe Threads, General Purpose (inch)*

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

ASTM D471-12a, *Standard Test Method for Rubber Property - Effect of Liquids*

ASTM D572-4, *Standard Test Method for Rubber - Deterioration by Heat and Oxygen*

1.9. Terms and Definitions

For purposes of this standard, the following terms apply:

Accepted – Installations acceptable to the authority enforcing the applicable installation rules. Acceptance is based upon an overall evaluation of the installation. Acceptance is not a characteristic of a product. It is installation specific. A product accepted for one installation may not be acceptable elsewhere.

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.

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 certified 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. 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, piping and electrical schematics, nameplate format, brochures, sales literature, spec. sheets, installation, operation and maintenance procedures, etc... ; 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 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.
- 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 anti-water hammer check valves.