



Member of the FM Global Group

Examination Standard for Expansion Chambers

Class Number 1364

September 2024

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.

TABLE OF CONTENTS

1 INTRODUCTION	1
1.1. Purpose	1
1.2. Scope	1
1.3. Basis for Requirements	1
1.4. Basis for Certification	1
1.5. Basis for Continued Certification	2
1.6. Effective Date	2
1.7. System of Units	2
1.8. Normative References	2
1.9. Definitions	3
2 GENERAL INFORMATION	4
2.1. Product Information	4
2.2. Certification Application Requirements	4
2.3. Requirements for Samples for Examination	4
3 GENERAL REQUIREMENTS	5
3.1. Review of Documentation	5
3.2. Physical or Structural Features	5
3.3. Materials	5
3.4. Markings	5
3.5. Manufacturer's Installation and Operation Instructions	6
3.6. Calibration	6
4 PERFORMANCE REQUIREMENTS	7
4.1. Examination	7
4.2. Hydrostatic Strength Test	7
4.3. Bladder Strength Test	7
4.4. Pressure Cycling Test	7
4.5. Operational Test	8
4.6. Material Compatibility	8
4.7. Temperature Tests	9
5 MANUFACTURER'S REQUIREMENTS	10
5.1. Demonstrated Quality Control Program	10
5.2. Surveillance Audit Program	11
5.3. Installation Inspections	11
5.4. Product Modifications	11
5.5. Manufacturing and Production Tests	11
6 BIBLIOGRAPHY	11
APPENDIX A:	12
APPENDIX B:	13
APPENDIX C: Operational Test Setup Diagram	14
APPENDIX D: Sample Listings	15
APPENDIX E: Tolerance	17

1 INTRODUCTION

1.1. Purpose

- 1.1.1. This standard states testing and certification requirements for expansion chambers for use in wet pipe sprinkler systems that utilize water or antifreeze solutions.
- 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 applies to any component intended for use in sprinkler system piping to reduce pressure changes from temperature cycling in sprinkler systems, or to account for thermal expansion or pressure changes in anti-freeze systems. These expansion chambers are referred to as thermal expansion chambers.
- 1.2.2. The standard applies to any component (with the exception of anti-waterhammer check valves) intended for use in sprinkler system piping to reduce pressure surges from fire pump start-ups. These expansion chambers are sometimes referred to as surge suppressors or surge arrestors.

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 expansion chambers 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 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.

Two units (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 B16.5, *Pipe Flanges & Flanged Fittings*

ANSI/AWWA C-606, *Grooved and Shouldered Joints*

ASME B1.20.1, *Pipe Threads, General Purpose, (Inch)*

ASME Boiler & Pressure Vessel Code, Section VIII Division 1 – *Rules for Construction of Pressure Vessels*

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

NFPA 13, *Standard for the Installation of Sprinkler Systems*

U.S. Department of Transportation (DOT) Title 49, Code of Federal Regulations (CFR), *Hazardous Materials Regulations of the Department of Transportation*

1.9. Definitions

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

Bladder – This term is used to describe the rubber chamber located inside an expansion chamber that is pre-charged with gas to act as a shock absorber to liquid expanding or surging within a closed loop sprinkler system.

Expansion Chamber – This is a generic term used throughout this standard to describe either thermal expansion chambers or surge suppressors. See below detailed definitions of Thermal Expansion Chambers and Surge Suppressors.

End Connections – refers to the method of connecting components of a fire protection system. Typical end connections in fire protection service are flanged, grooved, threaded and welded end.

Pre-Charge Pressure – This term is used to describe the initial gas charge of the bladder before the fluid system pressure is introduced. The pre-charge pressure supplied by the manufacturer and contained in the expansion chamber bladder of a newly constructed expansion chamber is referred to as the “factory” pre-charge pressure.

Rated Working Pressure – This is the maximum sustained pressure at or below which the device shall operate trouble free for its entire design life. This value sets the basis for the testing described in Section 4.

Surge Suppressor – Surge suppressors (also referred to as surge arresters or dampers), similar in construction to thermal expansion chambers, are used to moderate the potentially destructive effects of pressure surges or water hammer due to pump starting and stopping and valve opening and closing. They are employed when an anti-waterhammer check valve, alone, proves inadequate to control the problem, but should always be used in conjunction with such a valve.

Thermal Expansion Chamber – Thermal expansion chambers are used in automatic sprinkler systems to control the effects of thermal expansion on system pressure that can occur due to fluid temperature changes. These hydropneumatic pressure vessels provide additional space in the system to accommodate the expanded volume of solution when temperature increases. They contain a pre-charged bladder (containing nitrogen or dry air, typically) that is compressed as the system pressure increases creating the space for the increased volume of fluid.