



# **Examination Standard for Pressure Maintenance Devices**

**Class Number 1032**

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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 maintenance devices (air/nitrogen) used in dry pipe and preaction type automatic sprinkler fire protection systems to automatically maintain, within pre-set limits, the air/nitrogen pressure within these 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 pressure maintenance devices (air/nitrogen) for use in dry pipe and preaction fire protection systems.

## 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 may also be considered.
- 1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of pressure maintenance devices (air/nitrogen) for use in dry pipe and preaction fire protection systems 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/IEEE/ASTM SI 10, *American National Standard for Metric Practice*

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

## 1.9 Terms and Definitions

For purposes of this standard, the following terms apply:

### ***Accelerator***

An accelerator is installed as part of the valve trim on a dry-pipe valve installed on the riser of a dry-pipe sprinkler system. It is used to reduce the time it takes a dry-pipe valve to open. It operates (trips) by sensing a significant and steady drop in system pressure (caused by the actuation of one or more sprinklers) which redirects system pressure to the intermediate chamber of the dry pipe valve reducing the pressure differential across the clapper of the dry-pipe valve allowing it open. Accelerators may be mechanical type or electric/electronic type.

### ***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. Acceptance is not a characteristic of a product. It is installation specific. A product accepted for one installation may not be acceptable elsewhere.

### ***Automatic Sprinkler System***

An integrated network of above-ground piping to which automatic sprinklers are attached. As a minimum, each sprinkler system is provided with at least one system control valve, system pressure gauge, system drain valve and a means of initiating alarm notification in the event of water movement through the system's piping network. A sprinkler system is considered to provide adequate protection when it is connected to a reliable automatic water supply that can provide the flow, pressure and duration requirements for all occupancy hazards protected by the sprinkler system.

### ***Automatic Drain Valve***

An automatic drain valve, also referred to as a ball drip check or velocity check valve, is used to ensure the intermediate chamber of a differential dry-pipe valve remains unpressurized while the valve is in the ready or set position. When the dry pipe valve trips the automatic drain valve trips allowing pressure to rise within the intermediate chamber.

### ***Dry Pipe Automatic Sprinkler System***

An automatic sprinkler system that is located downstream of a dry-pipe valve. It is filled with a pressurized gaseous medium (typically air or an inert gas such as nitrogen) for the purpose of maintaining the dry-pipe valve in the closed position. Upon sprinkler actuation, the pressure within the sprinkler system begins to drop until the pressure becomes too low to keep the dry-pipe valve closed. At this time the dry-pipe valve opens (trips) allowing water to fill the sprinkler system and discharge through any automatic sprinkler that has been actuated. A dry-pipe sprinkler system is typically used in areas where the presence of water within the sprinkler is not suitable. These systems are used when the ambient temperature of the protected area can drop below 40°F (4°C) or rise above 200°F (95°C).

### ***Dry-Pipe Valve***

An automatic water control valve, typically installed on the riser of a sprinkler system, which is specifically designed to use a pressurized gaseous medium (typically air or an inert gas such as nitrogen) to hold back water on the upstream side of the valve. The valve remains closed until the gas pressure on the downstream side of the valve drops, such as by automatic sprinkler operation, to a value too low to hold back the pressure of the water, thus opening the valve and allowing water to flow into and fill up the dry-pipe sprinkler system. Similar to an alarm check valve, it is designed to be equipped with a means of alarm notification in the event water flows through it, but it is also equipped with a means of measuring the gas pressure within the sprinkler system. There are two types of dry-pipe valves available, a differential type valve and a mechanical type valve which are further described below.

### ***Differential Type Dry-Pipe Valve***

A dry pipe valve that is held in the closed position by a clapper that is characterized by a larger system (air/nitrogen) surface area than the surface area of the clapper in contact with water on the supply side of the valve. Normally these valves are designed with a pressure differential of between 5.0 and 6.5. As a result, in a valve with a differential of 5.0, a 20 psi (1.4 bar) system air/nitrogen pressure would be necessary to equalize a water supply pressure of 100 psi (6.9 bar). An additional 20 psi (1.4 bar) of system air/nitrogen pressure is typically supplied to ensure the valve will remain closed and avoid false trips. These valves employ an intermediate chamber which is normally vented to atmosphere so that the differential is maintained ensuring the valve remains closed. To hasten operation of the differential type dry-pipe valve an accelerator may be installed in the valve trim which, when activated, would redirect system air/nitrogen pressure into the intermediate chamber. This redirected pressure destroys the pressure differential of the valve, allowing it to trip sending water into the system piping.

### ***Mechanical Type Dry-Pipe Valve***

A dry pipe valve that is held in the closed position by a mechanical latch or piston. The operation of this type of valve is independent of water pressure and relies on an external device, a dry pilot actuator, provided as part of the valve trim. The dry pilot actuator functions similar to the differential valve described above. When the dry pilot actuator trips it vents the priming chamber of the mechanical type