

Approval Standard

Automatic Water
Control Valves

Class Number 1020
April 2007

Approval Standard

For

Automatic Water Control Valves

Class Number 1020

April 2007

Copyright ©2007 FM Approvals LLC. All rights reserved.

Copyright FM Approvals
Provided by IHS Markit under license with FMRC
No reproduction or networking permitted without license from IHS

Foreword

Approvals are 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 Approval Standards is to present the criteria for Approval of various types of products and services, as guidance for FM Approvals personnel, manufacturers, users and authorities having jurisdiction.

Products submitted for Approval shall demonstrate that they meet the intent of the Approval Standard, and that quality control in manufacturing and/or applications shall ensure a consistently uniform and reliable product or service. Approval Standards strive to be performance-oriented and to facilitate technological development.

For examining equipment, materials and services, Approval Standards:

- a) Must be useful to the ends of property conservation by preventing, limiting or not causing damage under the conditions stated by the Approval listing; and
- b) Must be readily identifiable.

Continuance of Approval and Listing depends on compliance with the Master Agreement, satisfactory performance in the field, on successful re-examinations of equipment, materials, and services as appropriate, and on periodic follow-up audits of the manufacturing facility or service/application.

FM Approvals LLC reserves the right in its sole judgment to change or revise its standards, criteria, methods, or procedures.

11/15/2007 10:00 AM

.....

Table of Contents

1.0	INTRODUCTION	1
1.1	Purpose.....	1
1.2	Scope.....	1
1.3	Basis for Requirements	1
1.4	Basis for Approval	2
1.5	Basis for Continued Approval.....	2
1.7	System of Units.....	3
1.8	Applicable Documents	3
1.9	Definitions.....	3
2.0	GENERAL INFORMATION	5
2.1	Product Information	5
2.2	Types.....	5
2.2.1	Clapper Type	5
2.2.2	Diaphragm Type.....	5
2.2.3	Summary	6
2.3	Approval Application Requirements.....	6
2.4	Requirements for Samples for Examination	6
3.0	GENERAL REQUIREMENTS	7
3.1	Review of Documentation	7
3.2	Physical or Structural Features.....	7
3.3	Design Requirements	7
3.4	Operation.....	8
3.5	Markings	8
3.6	Materials and Construction	8
3.7	Environment.....	9
3.8	Serviceability and Parts Removal	9
3.9	Instructions and Trim Equipment.....	9
3.10	Clearances	10
3.11	Calibration.....	10
3.12	Tolerances	11
4.0	PERFORMANCE REQUIREMENTS	11
4.1	Examination	11
4.2	Operational Tests	11
4.3	Friction Loss	12
4.4	Body Hydrostatic Strength.....	12
4.5	Clapper Strength	13
4.6	Diaphragm Strength	13
4.7	Bonding Adequacy.....	13
4.8	Water Absorption.....	14
4.9	Aging	14
4.10	Additional Tests	15
5.0	OPERATIONS REQUIREMENTS	15
5.1	Demonstrated Quality Control Program	15
5.2	Facilities and Procedures Audit (F&PA)	17
5.3	Installation Inspections	17
5.4	Manufacturer's Responsibilities	18
5.5	Manufacturing and Production Tests	18
5.5.1	Test Requirement No. 1 - Seat Leakage Test	18
5.5.2	Test Requirement No. 2 - Hydrostatic Test	18

5.5.3	Test Requirement No. 3 - Operation Test.....	18
APPENDIX A: Units of Measurement		19
APPENDIX B: FM Approvals Certification Marks.....		20
APPENDIX C: Figures		22
	Figure C-1: Clapper Type Valve Assembly.....	22
	Figure C-2: Diaphragm Type Valve Assembly	23
	Figure C-3: Sleeve Type Valve Assembly.....	24
	Figure C-4: Clearance Illustrations	25
APPENDIX D: Tolerance		26

1.0 INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states Approval criteria for Automatic Water Control Valves.
- 1.1.2 Approval criteria may include, but are not limited to: performance requirements, marking requirements, examination of manufacturing facilities, audit of quality assurance procedures, and a follow-up program.

1.2 Scope

- 1.2.1 Automatic water control valves are most commonly used to control the flow of water to various fire protection sprinkler systems. They are used in sprinkler systems such as deluge, preaction, refrigerated area, and on-off multicycle sprinkler systems. Therefore, valves used for these applications must meet the requirements of this standard, as well as, at minimum, one of the following Approval Standards:

<i>Sprinkler System</i>	<i>Approval Standard Class</i>
Deluge	1011
Precision	1012
Refrigerated Area	1013
On-Off Multicycle	1016

Although not addressed in this standard, automatic water control valves may be configured to control the flow to water spray systems, open and closed head foam water sprinkler systems and other special purpose systems. Certain designs of automatic water control valves are also utilized on the discharge of fire pumps for pressure relief, pressure reducing, and pump suction pressure regulating purposes.

- 1.2.2 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.

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 the design of automatic water control valves for the purpose of obtaining Approval. Automatic water control 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, automatic water control 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 Approval

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 An initial facilities and procedures 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 product follow-up program. (Refer to Section 5.2, Facility and Procedures Audit.)

1.5 Basis for Continued Approval

1.5.1 Continued Approval is based upon:

- Production or availability of the product as currently FM Approved;
- The continued use of acceptable quality assurance procedures;
- Compliance with the terms stipulated in the Master Agreement;
- Satisfactory re-examination of production samples for continued conformity to requirements;
- Satisfactory Facilities and Procedures Audits (F&PAs) conducted as part of FM Approvals' product follow-up program; and
- Satisfactory field experience.

1.5.2 Satisfactory field experience is the final test of Approval. Unsatisfactory field experience because of FM Approved equipment malfunction may necessitate withdrawal of Approval.

1.5.3 Also, as a condition of retaining Approval, manufacturers may not change an FM Approved 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 that date shall satisfy the requirements of the 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 **February 29, 2008** 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 10-2002, *"American National Standard for Use of the International System of Units (SI): The Modern Metric System."* The units of measurement for pressure discussed in this standard are gage pressures unless otherwise noted in the text.

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 Water Works Association (AWWA) C606-06,
AWWA Standard for Grooved and Shouldered Joints
American Society of Mechanical Engineers (ASME) B16.5 - 2003, *Pipe Flanges and Flanged Fittings: NPS 1/2 through 24*
ASTM D 471 - 2006, *Standard Test Method for Rubber Property - Effect of Liquids*
ASTM D 572 - 2004, *Standard Test Method for Rubber - Deterioration by Heat and Oxygen*
FM Global Property Loss Prevention Data Sheets
IEEE/ASTM SI 10 - 2002, *American National Standard for Use of the International System of Units (SI): The Modern Metric System*
International Standards Organization (ISO)/International Electrotechnical Commission (IEC) 17025 - 2005,
General Requirements for the Competence of Testing and Calibration Laboratories
National Fire Protection Association (NFPA) 13 - 2007, *Standard for the Installation of Sprinkler Systems*
NFPA 15 - 2001, *Standard for Water Spray Fixed Systems for Fire Protection*
NFPA 16 - 2007, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*

1.9 Definitions

For purposes of this standard, the following terms apply:

Accepted

This term refers to installations acceptable to the authority enforcing the applicable installation rules. When this 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. A product accepted for one installation may not be acceptable elsewhere. (Contrast with FM Approved.)

Deluge System

A deluge system is a sprinkler system employing open sprinklers installed in the piping system. The system is connected to a water supply through an automatic water control valve that is opened by the operation of a detection system installed in the same areas as the sprinklers. When this valve opens, water flows into the piping system and discharges from all sprinklers attached thereto.

Deluge sprinkler systems have open sprinklers and are used where it is desirable to discharge water through all of the system's sprinklers simultaneously. Prior to discharge there is no water in the sprinkler piping. The water supply is held back by a automatic water control valve which is operated manually or automatically by the actuation of a fire detection system. The fire detection system is required to be one of the following types: wet pilot sprinkler line, dry pilot sprinkler line, hydraulic rate-of-rise, pneumatic rate-of-rise or electric.

FM Approvals Certification Marks

The FM Approvals Certification Marks are detailed in Appendix B. Their use is mandatory on all units of FM Approved Deluge and Preaction Valves and Control Panels. These registered marks cannot be used except as authorized by FM Approvals via the granting of Approval to specific systems and components.

FM Approved

This term refers to products FM Approved by FM Approvals. Such products are listed in the Approval Guide, issued annually, or its supplements. All products so listed have been successfully examined by FM Approvals, and their manufacturers have signed and returned a Master Agreement to FM Approvals. These forms obligate the manufacturer to allow re-examination of the product and the audit of its facilities and procedures at FM Approval's discretion. It further prohibits the manufacturer from deviating from the as-FM Approved configuration of the product without prior review by and agreement of FM Approvals.

Preaction System

A sprinkler system employing automatic sprinklers attached to a piping system containing air that may or may not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers. Actuation of the detection system opens an automatic water control valve that permits water to flow into the sprinkler piping system and to be discharged from any sprinklers that open.

Preaction systems are equipped with automatic sprinklers and are used where it is important to prevent the accidental discharge of water. These systems may also be used where an alarm is desired in advance of sprinkler operation or where it is desired to minimize the water delivery delay inherent in a standard dry-pipe system.

Rated Working Pressure

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

Refrigerated Area System

A hybrid preaction system that requires both a sprinkler and a heat-actuated device to operate before the water control valve opens and admits water into the sprinkler piping. It is intended for use in freezers with extremely low temperatures.

A refrigerated area sprinkler system affords fire protection in refrigerated rooms or buildings and includes special safeguards against accidental filling with water and subsequent freezing of the system. A fire detection system must actuate and one or more automatic sprinklers in the piping must operate before water will enter the sprinkler system. An alarm sounds if the detection system only is actuated while pneumatic pressure is maintained in the sprinkler piping. An alarm also sounds if the pneumatic pressure in the sprinkler piping is not properly maintained. In either case, water does not enter the system piping.

On-Off Multicycle Sprinkler Systems

Multicycle sprinkler systems are FM Approved automatic sprinklers and hydraulic controls capable of repeated on-off cycles appropriate to control the possible redevelopment of fire in the protected area. The cycling occurs as the result of fire detector operation which, acting as an electrical interlock, causes the main automatic water control valve to open and close. Fire detector actuation precedes sprinkler operation so water is discharged as from a conventional water system. Should the fire rekindle after its initial control, water again flows from the opened sprinklers. Manual control valve operation, in the event of detector impairment, is a required system capability. Sprinkler replacement after a fire does not cause impairment of protection.