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Examination Standard for Angle and Straightaway Hose 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 angle and straightaway hose valves for use in aboveground standpipe systems, hose cabinets, and in fire pump discharge lines with playpipes.

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 audit program.

1.2 Scope

1.2.1 This standard encompasses the design and performance requirements for right angle and straightaway hose valves for use in aboveground standpipe systems.

1.2.2 This standard has been based on NPS (Nominal Pipe Size) 1-1/2 and 2-1/2 in (DN 40 and DN 65 mm) common sizes. Other sizes may be considered for certification on case-by-case basis.

1.2.3 Hose valves considered under this standard may be designed with horizontal, bib-nosed, oblique, or right angle body patterns.

1.2.4 This standard encompasses traditional hose valves, pressure restricting hose valves, and pressure reducing hose valves. Definitions of the valves can be found in section 1.9.
Note: Hose valves with pressure reducing features are not intended to replace the pressure reducing valve that sets the water supply pressure for combined systems that supply water to the sprinkler system and the standpipe system.

1.2.5 The minimum rated working pressure for hose valves evaluated using this standard is 175 psi (1205 kPa).

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 hose valves for the purpose of obtaining certification. Hose valves having characteristics not anticipated by this standard may be certified if performance equal, or superior, to that required by this standard is demonstrated.

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 made 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 audits may be required by the certification agency in accordance with the certification scheme to ensure ongoing compliance.

1.5 Basis for Continued Certification

1.5.1 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;
- satisfactory field experience;
- 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 surveillance audit 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/IEEE/ASTM SI 10, American National Standard for Metric Practice
ASME B36.10M, *Welded and Seamless Wrought Steel Pipe*
ASTM D 471-12a, *Standard Test Method for Rubber Property – Effect of Liquids*
ASTM D 572, *Standard Test Method for Rubber – Deterioration by Heat and Oxygen*
BS 336, *Specification for Fire Hose Couplings and Ancillary Equipment*
NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*

1.9 Terms and 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 (Authority Having Jurisdiction). Acceptance is based upon an overall evaluation of the installation. Factors other than the use of certified equipment impact upon the decision to accept the product. Acceptance is not a characteristic of a product; it is installation specific. A product accepted for one installation may thus not be acceptable elsewhere.

Authority having Jurisdiction

This term refers to an organization, office or individual responsible for enforcing the requirements of a code or standard or for approving equipment, materials, an installation or a procedure.

Bib-Nose Body Pattern

This term refers to a body shape that results in the valve stem being roughly 90 degrees from the valve inlet, and the valve outlet being roughly 135 degrees from the valve stem.

Combined Standpipe System

This term refers to the piping arrangement where a common main feeds both the fire sprinkler system and the hose connections.

End Connections

The term refers to the types of joints used to connect components of a pipe system. Typical end connections in hose pipe systems are: threaded (pipe threads), threaded (hose threads), flanged, instantaneous connections (those meeting the requirements of BS 336), and Storz connections.

Horizontal Body Pattern

This term refers to a body pattern shape that results in the inlet and outlet connections sharing the same axis. The waterway flow path typically resembles that of a globe valve in that the fluid enters the valves and then enters the seat ring from underneath, passes up and around the sealing assembly, and then falls back toward the valve outlet.

Hose Station

This term refers to the combination of a hose rack or reel, hose nozzle, fire hose, and hose valve with threaded connection.

Landing Valve

This term is commonly used to describe a hose valve used at each floor of a multi-story structure.

Oblique Body Pattern

This term refers to a body pattern shape that results in the valve stem being in line with the valve inlet, and the valve outlet being at an angle of roughly 45 degrees in relation to the valve stem.

Pressure Reducing Hose Valve

This term refers to a hose valve designed for the purpose of reducing the outlet water pressure. The valve design replaces the traditional bonnet and stem assembly with a single stage regulator. The field adjustable regulator feature will limit the outlet pressure of the hose valve by balancing the water supply pressure against the force generated by an internal component (i.e. spring). If the inlet pressure is above the set pressure rating the pressure reduction feature engages and the valve will limit outlet pressure to the maximum set pressure. The valve must still operate if the inlet pressure is below the set pressure.

Pressure Restricting Hose Valve

This term refers to a hose valve that has been designed with an adjustable stop that limits travel of the rising stem of the hose valve when the valve is opened. The purpose of the adjustable stop is to increase the friction loss through the valve by restricting the opening distance between the sealing ring and the seat ring within the valve. The restricting valve is designed to restrict the outlet water pressure and has a pin that can be removed by firefighters to override the restricting device and fully open the valve. Pressure restriction is only observed under flowing conditions.

Rated Working Pressure

The rated working pressure for a product described in this standard is the maximum pressure at which the hose valve can be expected to operate in normal service. The minimum rated working pressure for hose valves considered for certification is 175 psi (1205 kPa). The rated working pressure of an assembly is that of its lowest pressure rated component.

Right Angle Body Pattern

This term refers to a body pattern shape that results in the stem being in line with the valve inlet connection, and the outlet connection being at an angle of roughly 90 degrees from the inlet connection.

Schedule 40 Steel Pipe

This term refers to a combination of outside diameter and pipe wall thicknesses that are commonly used within industry for hose pipe systems. For clarity, the dimensional values may be referenced in ASME B36.10, Welded and Seamless Wrought Steel Pipe.

Snoot

This term refers to a threaded adapter that allows the connection of fire hose to standpipe connections. Common connections utilize different combinations male of female tapered pipe threads x male or female hose threads.

Standpipe

This term refers to the piping within a building that provides water supply to the hose connections, hose stations, as well as sprinkler systems (on combined systems). Further explanation on standpipe systems can be found in NFPA 14.

Storz Connection

This term refers to a joint comprised of mating identical ends with interlocking hooks and flanges originally designed by August Guido Storz. The joint is made with the insertion of the hooks into the receiving hole on the mating flange, and then turning a quarter turn until the joint locks in place.

2. GENERAL INFORMATION

2.1 Product Information

2.1.1 Traditional hose valves discussed in this standard are assemblies of the following common types of components: body, bonnet, stem, seat assembly, seat ring, seat clamping ring, seat ring clamping nut, stem seal, hand wheel, and hand wheel nut. Please note that product designs and part names may vary between manufacturers.

2.1.2 Pressure restricting hose valves differ from the traditional hose valve by the addition of pressure restriction feature on the stem and are a combination of the following components: setting indicator, pin and collar. While designs and component names differ between manufacturers, this valve assembly achieves pressure restriction by limiting the travel of the seat assembly.

2.1.3 Pressure reducing hose valves differ from the traditional hose valve by replacing the bonnet and stem assembly with the pressure reducing feature components. While the designs vary, the pressure reducing feature allows for a maximum outlet pressure to be set in the flowing condition. The valve must still operate if the inlet pressure is below the set pressure.

2.1.4 In order to meet the intent of this standard, hose 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 hose valves, selected in conformance to this criterion, shall satisfy all of the requirements of this standard.

2.2 Certification Application Requirements

2.2.1 The manufacturer shall provide the following preliminary information with any request for certification consideration:

- A complete list of all models, types, sizes, end connections, pressure ratings, factory pressure setting and options for the products being submitted for Certificate consideration,
- General assembly drawings, one complete set of manufacturing drawings, materials list(s), anticipated marking format, brochures, sales literature, specification sheets, installation, operation and maintenance procedures, and
- Number and location(s) of manufacturing facilities making the products submitted for certification.
- 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. Any decision to use data generated utilizing prototypes is at the discretion of the certification agency.

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 hose valve.

2.3.5 In addition to the sample requirements, manufacturers submitting samples of pressure restricting, or pressure

reducing, hose valves shall also supply instructions how to properly make field adjustments to the valve and maintenance manuals.

2.3.6 If there are failures encountered during the examination testing, the certification agency will provide the manufacturer with information regarding what testing will need to be repeated and any additional sample requirements.

3. GENERAL REQUIREMENTS

3.1 Review of Documentation

3.1.1 During the initial investigation and prior to physical testing, the manufacturer's specifications and details shall be reviewed to assess the ease and practicality of installation and use. The certification examination results may further define the limits of the final certification.

3.1.2 The manufacturer's dimensional specifications and/or dimensional drawings shall fully describe the product. All critical dimensions shall be indicated with the allowed upper and lower tolerance limits clearly shown.

3.2 Physical or Structural Features

3.2.1 Hose valves shall be designed for a minimum rated working pressure of 175 psi (1205 kPa) for use in standpipe systems. Hose valves may be evaluated based on a higher pressure rating at the manufacturer's request.

3.2.2 NPS 1-1/2 in (DN 40) hose valves shall be designed to allow a flow of 100 gpm (380 L/min) across its range of water supply pressure. NPS 2-1/2 in (DN 65) hose valves shall be designed to allow a flow of 250 gpm (945 L/min) across its range of water supply pressure.

3.2.3 The waterway at the seat ring should be equal to or greater than the waterway formed by the nominal inner diameter of like-sized Schedule 40 steel pipe as shown in Table 3.2.3 below.

Table 3.2.3 – Internal Pipe Diameters

Nominal Pipe Size		Internal Pipe Diameters	
NPS, in	**DN, mm**	**in**	**mm**
1-1/2	40	1.610	40.9
2-1/2	65	2.470	62.7

3.2.4 The lift of the disc holder (face of the seat ring to the face of the disc when valve is wide open) should be at least equal to the values in Table 3.2.4 below.

Table 3.2.4 – *Lift of Disc*

Nominal Valve Size		Lift of Disc	
NPS, in	**DN, mm**	**in**	**mm**
1-1/2	40	1.00	25.4
2-1/2	65	1.75	44.5

3.2.5 For traditional angle and straightaway hose valve designs that fail to satisfy Section 3.2.3 or 3.2.4 above, the valve will be subjected to a friction loss test as described in Section 4.6 in order to verify compliance with this standard.

3.2.7 Manual operation of the valve shall be accomplished by rotating the hand wheel counterclockwise to open the valve. The hand wheel shall be marked with the word "OPEN" and a directional arrow pointing appropriately.

3.2.8 Pressure restricting hose valves shall be designed to be field adjustable so that the user can set the valve assembly to the desired flow restriction, and then return the valve to the closed position. The pressure restriction feature shall be accompanied by externally visible graduations on an adjacent component so that field adjustment may be made using the operational range performance information in the manufacturer's literature.

3.2.9 Pressure restricting valves shall be designed so the pressure restriction feature may be overridden, allowing the valve to open completely.

3.2.10 Pressure reducing valves shall be designed so that field adjustment shall be possible with the valve installed in the hose pipe system. The field adjustment shall be possible using the manufacturer's adjustment procedure, and standard tools as outlined in the manufacturer's maintenance manual. Pressure reducing valves that have been

pre-set at the manufacturer's facility shall be marked with the current setting so that the installer will be able to make the adjustments appropriate for the intended installation, using the operational range performance information in the manufacturer's maintenance manual.

3.2.11 Hose valves considered under this standard may be designed with a variety of end connections. Generally, the valve inlets are either flanged, threaded, or grooved. Hose valve outlets are usually threaded or provided with an instantaneous connection. Valve designs with other end connections may be evaluated on a case-by-case basis.

3.3 Materials

3.3.1 All materials used in the fabrication of the hose valves discussed in this examination standard shall be suitable for the intended application. Raw materials shall be evaluated in accordance with the appropriate sections of the manufacturer's quality assurance manual plus any applicable national and/or international standards.

3.3.2 Examples of suitable materials are brass, bronze, stainless steel, etc.

3.4 Markings

3.4.1 Each hose valve shall be permanently marked with the following minimum information:

- Manufacturer's name or trademark;
- Nominal valve size;
- Model number;
- Arrow indicating flow direction;
- Rated working pressure;
- Manufacturing source code where necessary;
- Certification agency's mark of conformity.

3.4.2 Markings shall be cast, painted, inked, or contained on a corrosion resistant nameplate that is permanently attached to the valve.

3.4.3 Any additional pertinent marking information required by the national or international standard to which the valves are manufactured shall be included using any of the marking conventions listed in Section 3.4.2.

3.4.4 Each required marking listed in Section 3.4.1 shall be legible and durable and shall be applied in any of, or any combination of, the above methods.

3.4.5 The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the certification agency's mark of conformity.

3.4.6 The certification agency's mark of conformity shall be displayed visibly and permanently on the product and/or packaging as appropriate and in accordance with the requirements of the certification agency. The manufacturer shall exercise control of this mark as specified by the certification agency and the certification scheme.

3.4.7 Hose valves are often used to make transitions between end connections used in steel piping systems and those used in hose systems. For valve designs that have different styles of end connections for the inlet and the outlet, each end shall be suitably marked in order to aide in the installation. In some designs, the end connections for the valve are also used to transition sizes between the inlet and outlet. In this case, the valve shall be marked with the inlet size, outlet size, and the nominal valve size (which would relate to the waterway bore).

3.5 Manufacturer's Installation and Operation Instructions

3.5.1 An Installation, Operation, and Maintenance (IOM) Manual for each product considered for certification shall be furnished by the manufacturer. The IOM manual for pressure restricting and/or pressure reducing hose valves shall include the operation range information for the different settings. This information may be supplied in

tabular or graphical format. Field setting instructions shall be provided with each pressure restricting and pressure reducing valve.

3.6 Calibration

3.6.1 Each piece of equipment used to verify the test parameters shall be calibrated within an interval determined on the basis of stability, purpose, and usage. A copy of the calibration certificate for each piece of test equipment is required. The certificate shall indicate that the calibration was performed against working standards whose calibration is certified and traceable to an acceptable reference standard and certified by an ISO/IEC 17025 accredited calibration laboratory. The test equipment shall be clearly identified by label or sticker showing the last date of the calibration and the next due date. A copy of the service provider's accreditation certificate as an ISO/IEC 17025 accredited calibration laboratory should be available.

3.6.2 When the inspection equipment and/or environment is not suitable for labels or stickers, other methods such as etching of control numbers on the measuring device are allowed, provided documentation is maintained on the calibration status of this equipment.

3.7 Tolerances

3.7.1 Tolerances on units of measure shall be as described in Appendix A, unless otherwise specified in this standard.

4. PERFORMANCE REQUIREMENTS

4.1 Examination

4.1.1 Requirement

The hose valves shall conform to the manufacturer's drawings and specifications and to the certification agency requirements.

4.1.2 Test/Verification

A sample shall be examined and compared to drawings and specifications. It shall be verified that the sample conforms to the requirements described in Section 3, General Requirements.

The Manufacturer's Installation, Operation and Maintenance Manual shall be provided and reviewed prior to conducting performance testing.

4.2 Seat Leakage Test

4.2.1 Requirement

The Standard hose valves, Pressure Restricting hose valves and Pressure Reducing hose valves considered for Certification shall provide leak-free sealing when subjected to water supply pressures of 50 psi (345 kPa) above the rated working pressure.

4.2.2 Test/Verification - *Standard Hose Valve and Pressure Restricting Hose Valve*

Representative samples of every valve under consideration shall be subjected to a seat leakage test. With the valve in the manually closed position, the valve inlet will be filled with water, making sure to remove any trapped internal air. With the outlet open to atmosphere, the inlet side of the valve shall be subjected to a hydrostatic pressure of 50 psi (345 kPa) above the rated working pressure and maintained for a duration of 5 minutes. There shall be no observed leakage as a result of this test.

4.2.3 Test/Verification – *Pressure Reducing Hose Valves Only*

The valve shall be manually closed at the start of this test. A maximum seating torque specified in Table 4.2.3 below may be then applied to further close the valve. With the outlet open to atmosphere, the inlet side of the pressure reducing valve shall be subjected to a hydrostatic pressure of 50 psi (345 kPa) above the rated working pressure. The applied hydrostatic test pressure shall be maintained for 2 hours. There shall be no observed leakage as a result of this test.

Table 4.2.3 – *Maximum Seating Torque*

Nominal Valve Size		**Torque Values**	
NPS	**DN**	**Lb-ft**	**N-m**
1-1/2	40	45	61
2-1/2	65	55	75

4.3 Stem Seal Leakage Test

4.3.1 Requirements

The standard hose valves and pressure restricting hose valves considered for certification shall be provided with a stem seal that shall provide leak-free sealing at water supply pressures up to the rated working pressure.

The pressure reducing hose valves considered for certification shall provide leak-free sealing when subjected to

water supply pressures of 50 psi (345 kPa) above the rated working pressure.

4.3.2 Tests/Verification - *Standard Hose Valve and Pressure Restricting Hose Valve*

Representative samples of every valve under consideration shall be subjected to a stem seal leakage test. For this test, the valve outlet shall be closed off, the valve brought to the partially open position, and the valve inlet filled with water making sure to remove any trapped internal air. The internal pressure will be raised to the rated working pressure of the valve and maintained for a duration of five minutes. During the test, the valve hand wheel will be rotated in both directions several times. There shall be no observed leakage as a result of this test.

The tested valve shall then have the internal pressure relieved and be drained completely. It shall then be placed in an air-circulating oven for a period of 72 hours, at 120 °F (50 °C), at the conclusion of the 72 hours the stem seal leakage test above shall be repeated. There shall be no observed leakage as a result of this test.

4.3.3 Tests/Verification - *Pressure Reducing Hose Valves Only*

Representative samples of every pressure reducing valve under consideration shall be subjected to a stem seal leakage test. The outlet of the valve shall be closed off, and the valve shall be brought to the partially open position, and the valve inlet will be filled with water making sure that all internal air is removed. Once filled, valve shall be subjected to a hydrostatic pressure of 50 psi (345 kPa) above the rated working pressure and maintained for a duration of 2 hours. During this test, the valve hand wheel shall be rotated several times in both directions. There shall be no leakage as a result of this test.

4.4 Hydrostatic Strength Test

4.4.1 Requirement

Each size and end connection style shall be able to withstand an internal hydrostatic pressure equal to four times the rated working pressure without cracking, rupture, or permanent distortion.

4.4.2 Test/Verification

Compliance shall be verified by testing a minimum of one of each size valve and end connection style submitted for certification. The valves under test shall be subjected to a hydrostatic test pressure of 700 psi (4830 kPa) minimum, or four times the rated working pressure, whichever is greater. Each hydrostatic pressure test shall be maintained for a duration of five minutes.

4.5 Valve Stem Strength Test

4.5.1 Requirement

The hose valves considered for certification shall be able to resist the effects of over-tightening. Each valve size shall be subjected to the torque values outlined in the respective tables below. The torque shall be applied to the valve stem in the clockwise direction to further close the valve. There shall be no signs of sticking or binding, component failure, or permanent deformation as a result of this test.

4.5.2 Tests/Verification - *Standard Hose Valve and Pressure Restricting Hose Valve*

Representative samples of every valve under consideration shall be subjected to a valve stem strength test. The valve shall be manually closed, and then subjected to an increasing torque applied to the valve hand wheel or directly to the valve stem until the applicable value in Table 4.5.2 is reached. After application, the valve assembly shall be able to demonstrate full range of motion of the seat assembly. The valve shall also be visually examined for signs of component failure or permanent deformation.

Table 4.5.2 – *Stem Torque Values Standard Hose Valves and Pressure Restricting Hose Valves*

Nominal Valve Size		Torque Values	
NPS	**DN**	**Lb-ft**	**N-m**
1-1/2	40	50	68
2-1/2	65	75	102

4.5.3 Tests/Verification - *Pressure Reducing Hose Valves Only*

Representative samples of every pressure reducing valve under consideration shall be subjected to valve stem strength testing. At the start of the test, the valve shall be manually closed, and then subjected to the applicable torque values, shown in Table 4.5.3, applied to the valve stem in the clockwise direction. Once the specified torque value has been applied, the valve shall demonstrate full range of motion and the valve stem shall be examined for signs of permanent distortion or failure which would be regarded as not meeting this requirement.

Table 4.5.3 – *Stem Torque Values Pressure Reducing Hose Valves*

Nominal Valve Size		Torque Values	
NPS	**DN**	**Lb-ft**	**N-m**
1-1/2	40	60	81
2-1/2	65	125	170

4.6 Friction Loss Test

4.6.1 Requirement

The valve shall be designed so that the obstruction in the waterway is minimal. For valves found to be non-compliant with Sections 3.2.3 and/or 3.2.4, friction loss testing is necessary. The valve will be tested in the full open position, and the friction loss through the valve will be measured at a flow rate that produces a fluid velocity of 20 ft/sec (6.1 m/sec) in Schedule 40 steel pipe of the same nominal diameter as the valve. The measured friction loss shall be less than 10 psi (69 kPa).

4.6.2 Test/Verification– Traditional Hose Valves Only

Representative samples of traditional hose valves shall be installed in a horizontal flow line and subjected to friction loss testing. The valve under test shall be manually brought to the full open position, and then subjected to the applicable flow rates specified in Table 4.6.2 below. Measurements of upstream and downstream pressure shall be recorded. The valve shall be then replaced with a section of steel pipe of the same nominal pipe size, and the test shall be re-run. The difference between the readings shall be regarded as the friction loss across the valve.

Table 4.6.2 – *Friction Loss Flows*

Nominal Valve Size		Flow Rate	
NPS	**DN**	**gpm**	**L/min**
1-1/2	40	125	475
2-1/2	65	300	1135

4.7 Water Absorption Test

4.7.1 Requirement

For resilient seated hose valves, water absorption of the rubber facings shall not exceed 1.5 percent of the original thickness or weight (mass).

4.7.2 Test/Verification

A sample of the seal assembly rubber facing shall be measured for initial thickness and weight. The sample shall then be maintained in water at a temperature of 212°F (100°C) for 6 hours. The comparative ability of rubber to

withstand the effect of water shall be evaluated in accordance with ASTM D 471, "Standard Test Method for Rubber Property – Effect of Liquids". At the conclusion of the exposure period, the sample shall be measured again for thickness and weight (mass). The comparison against initial measurements shall not vary by 1.5 percent for either thickness or weight (mass).

4.8 Aging Test

4.8.1 Requirement

For resilient seated valves, there shall be no observed evidence of cracking of the rubber facings as a result of being subjected to an aging test.

4.8.2 Test/Verification

A minimum of three samples of rubber sealing facings, each approximately 1 x 3 in (25 x 75 mm) by 1/8 in (3 mm) thick shall be subjected to an accelerated aging test in accordance with ASTM D 572, "Standard Test Method for Rubber – Deterioration by Heat and Oxygen". The test duration shall be 96 hours. After exposure, the sample shall be bent 180 degrees and visually examined for signs of cracking.

4.9 Seat Assembly Strength Test

4.9.1 Requirement

Pressure reducing hose valves considered for certification shall be subjected to a seat assembly strength test. For this test, the valve shall be pressurized in the direction reverse of normal flow indicated on the valve at twice the rated working pressure. Afterwards, the valve shall be rotated through its full range of travel of the seat assembly. There shall be no signs of sticking or binding, component failure, or permanent distortion as a result of this test.

4.9.2 Tests/Verification - *Pressure Reducing Hose Valves Only*

For this test, the valve shall be brought to the closed position, and the valve outlet filled with water making sure to remove any trapped internal air. Once filled, the outlet of the valve will be connected to a pressure pump and the internal pressure will be raised to twice the rated working pressure of the valve and maintained for a duration of five minutes. At the completion of five minutes at the test pressure, the pressure shall be removed and the valve shall be rotated through its full range of travel of the seat assembly. There shall be no signs of sticking or binding, component failure, or permanent distortion as a result of this test

4.10 Durability Test

4.10.1 Requirement

Pressure reducing valves shall be fully operable and without any functional impairment after a 90-minute exposure to both high flow / low pressure drop and low flow / high pressure drop conditions within manufacturer's specifications.

4.10.2 Test/Verification– *Pressure Reducing Hose Valves Only*

A sample pressure reducing hose valve shall be installed and set at the specified minimum outlet pressure with inlet pressure and flow conditions that meet manufacturer's specifications. The flow shall be increased to the specified maximum allowable flow with the inlet pressure maintained at a level resulting in the specified minimum allowable pressure drop across the valve. This high flow / low pressure drop condition shall be maintained for 90 minutes. After 90 minutes, the flow shall be decreased to the specified minimum allowable flow with the inlet pressure increased near the rated working pressure of the valve. This low flow / high pressure drop condition shall be maintained for 90 minutes.

At the conclusion of the two 90-minute tests described above, the flow and inlet pressure conditions of the sample

valve shall be returned to the initial set conditions. The outlet pressure shall be consistent with that measured prior to exposure to both the high flow / low pressure drop and low flow / high pressure drop conditions.

4.11 Cycle Test

4.11.1 Requirement

Pressure reducing hose valves shall be capable of 1000 cycles from open to close under representative pressures and flows without functional impairment or excessive wear, damage, or failure of any valve component.

4.11.2 Test/Verification- *Pressure Reducing Hose Valves Only*

A sample pressure reducing hose valve shall be initially set to an outlet pressure within the specified outlet pressure range at a flow rate within the specified allowable flow range. Once set, the flow rate shall be increased to the maximum allowable flow and the inlet pressure maintained between the specified minimum and maximum allowable inlet pressure.

While maintaining the maximum allowable flow as described above, the pressure reducing valve shall then be cycled 1000 times from open to closed at a rate that allows the valve to maintain a consistent outlet pressure when open.

When equipped, cycling shall be conducted by operating the manual close feature. For pressure reducing valves without a manual close feature, a butterfly valve shall be installed downstream of the sample valve at a distance of at least 10 times the nominal valve diameter. The butterfly valve shall then be cycled from open to close. The pressure reducing valve without a manual close feature does not need to achieve full close during cycling.

After cycling, the valve shall remain in the open position and the outlet pressure shall be consistent with that measured prior to cycling.

4.12 Operational Range Test

4.12.1 Requirement

Pressure restricting and pressure reducing hose valves shall be subjected to operational range testing in order to determine their dynamic performance. For this test, the valve will be set according to the manufacturer's specifications and subjected to the maximum and minimum allowable flow and pressures. The manufacturer's field adjustment procedure shall be used in order to make adjustments between settings.

4.12.2 Test/Verification – Pressure Restricting Hose Valves Only

A sample pressure restricting valve of each size shall be tested at the minimum and maximum set outlet pressure and several set pressures in between. At each set pressure, the valve shall be set at initial conditions that meet manufacturer's specifications then subjected to the minimum and maximum allowable flow and several flows in between. At all data points throughout the operation test, the inlet pressure shall be maintained between the minimum and maximum allowable per manufacturer's specifications.

The operation test data shall be compared to manufacturer's anticipated hydraulic performance data to evaluate accuracy and consistency between data sets.

4.12.3 Test/Verification - Pressure Reducing Hose Valves Only

A sample pressure reducing valve of each size shall be tested at the minimum, maximum, and several set pressures in between. At each set pressure, the valve shall be set at initial conditions that meet manufacturer's specifications then subjected to the minimum, maximum, and several flows in between. At all data points throughout the

operation test, the inlet pressure shall be maintained between the minimum and maximum allowable per manufacturer's specifications.

The operation test data shall be compared to manufacturer's anticipated hydraulic performance data to evaluate accuracy and consistency between data sets.

At the maximum set outlet pressure, a zero-flow test shall be performed on a representative size valve with the pressure relief valve installed downstream and set per manufacturer's specifications. The flow shall be reduced to zero by closing a valve downstream of the pressure reducing valve under test. The pressure reducing valve shall close within 15 minutes.

5. OPERATIONS REQUIREMENTS

5.1 Demonstrated Quality Control Program

5.1.1 A quality assurance program is required to assure that subsequent products produced by the manufacturer shall present the same quality and reliability as the specific products examined. Design quality, conformance to design, and performance are the areas of primary concern.

- Design quality is determined during the certification examination and tests, and may be documented in the certification report.
- Continued conformance to this standard is verified by the certifier's surveillance program.
- Quality of performance is determined by field performance and by periodic re-examination and testing.

5.1.2 The manufacturer shall demonstrate a quality assurance program which specifies controls for at least the following areas:

- Corporate quality assurance guidelines;
- Incoming quality assurance, including testing;
- In-process quality assurance, including testing;
- Final inspection and tests;
- Equipment calibration;
- Drawing and change control;
- Packaging and shipping;
- Handling and disposition of non-conforming materials;
- In order to assure adequate traceability of materials and products, the manufacturer shall maintain records of all quality control tests performed, and their results, for a minimum period of two years from the date of manufacture.

5.1.3 Documentation/Manual

There should be an authoritative collection of procedures/policies. It should provide an accurate description of the quality management system while serving as a permanent reference for implementation and maintenance of that system. The system should require that sufficient records are maintained to demonstrate achievement of the required quality and verify operation of the quality system.

5.1.4 Records

To assure adequate traceability of materials and products, the manufacturer shall maintain a record of all quality assurance tests performed, for a minimum period of two years from the date of manufacture.

5.1.5 Drawing and Change Control

The manufacturer shall establish a system of product configuration control that shall not allow unauthorized changes to the product. Changes to critical documents, identified in the certification report, may be required to be reported to, and authorized by the certification agency prior to implementation for production.

Records of all revisions to all certified products shall be maintained.

5.2 Surveillance Audit Program

5.2.1 An audit of the manufacturing facility may be part of the certification agencies surveillance requirements to verify implementation of the quality assurance program. Its purpose is to determine that the manufacturer's equipment, procedures, and quality program are maintained to ensure a uniform product consistent with that which was tested

and certified.

5.2.2 Certified products or services shall be produced or provided at, or provided from, location(s) disclosed as part of the certification examination. Manufacture of products bearing a certification mark is not permitted at any other location prior to disclosure to the certification agency

5.2.4 In the event that all or part of the quality inspection is subcontracted, the manufacturer shall provide the certification agency with documentation outlining the nature of the inspection, frequency, test details, and pass / fail criteria that was provided to the subcontracted company, and documentation that they have received and implemented these procedures.

5.3 Installation Inspections

Field inspections may be conducted to review an installation. The inspections are conducted to assess ease of application, and conformance to written specifications. When more than one application technique is used, one or all may be inspected at the discretion of the certification agency.

5.4 Manufacturing and Production Tests

5.5.1 *Test Requirement No. 1 - Hydrostatic Test*

The manufacturer shall perform hydrostatic pressure testing on 100 percent of production valves that have the certification mark. Production valves shall be subjected to twice the rated working pressure of the valve while in the partially open position for a minimum duration of 1 minute.

5.5.2 *Test Requirement No. 2 – Seat Leakage Test*

The manufacturer shall perform seat leakage tests on 100 percent of production valves that have the certification marking. Production seat leakage testing shall be run at a minimum test pressure equal to the rated working pressure for a minimum duration of 1 minute.

5.5.3 *Test Requirement No. 3 – Pressure Reducing Valve Setting*

The manufacturer shall perform valve setting tests on 100 percent of production valves that have the certification mark. Production setting tests may result in either setting to a common factory setting used to compare performance against production norms, or to customer's specification. In either case, the valve shall be marked with the setting at the completion of the test.

6. BIBLIOGRAPHY

ANSI/AWWA C606, *Standard for Grooved and Shouldered Joints*
ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*
ASME B1.20.7, *Hose Coupling Screw Threads (Inch)*
ASME B16.5, *Pipe Flanges and Flanged Fittings NPS ½ Through 24, Metric / Inch Standard*
ASME B16.24, *Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 400, 600, 900, 1500, and 2500*
ASTM A53/A53M, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*
BS 10, *Specification for Flanges and Bolting for Pipes, Valves and Fittings*
BS EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads, Part 1: Dimensions, tolerances, and designations*
BS EN 10226-1, *Pipe threads where pressure-tight joints are made on the threads, Part 1: Taper external threads and parallel internal threads – Dimensions, tolerances, and designation*
EN 10226-2, *Pipe threads where pressure-tight joints are made on the threads, Part 2: Taper external threads and taper internal threads – Dimensions, tolerances, and designation*

EN 1092-1, *Flanges and Their Joints – Circular Flanges for Pipes, Valves, Fittings and Accessories, PN Designated - Part 1: Steel Flanges*
ISO/IEC 17025, *General Requirements for the Competence of Testing and Calibration Laboratories*
NFPA 1963, *Standard for Fire Hose Connections*

APPENDIX A: Tolerances

Unless otherwise stated, the following tolerances shall apply:

Flow	± 2 percent of value
Length	± 2 percent of value
Volume	± 5 percent of value
Volume Per Unit Area	± 5 percent of value
Pressure	± 5 psi (35 kPa)
Temperature	± 4°F (2°C)
Time	+ 5/–0 seconds
	+0.1/–0 minutes

Unless stated otherwise, all tests shall be carried out at a room (ambient) temperature of 68 ± 9°F (20 ± 5°C).

APPENDIX B – Sample Listings

Angle and Straightaway Hose Valves

Company EMT Manufacturing Co.

Model No	Description	Valve Size		End Connection	Rated Working Pressure	
		in	(mm)		psi	(kPa)
A	Standard Angle Hose Valve	1 1/2	(38)	Female NPT x Male NH	300	(2065)
B	Standard Angle Hose Valve	2 1/2	(64)	Female NPT x Male NH	300	(2065)
C	Pressure Restricting Hose Valve	1 1/2	(38)	Female NPT x Female NPT	175	(1205)
D	Pressure Restricting Hose Valve	2 1/2	(64)	Female NPT x Female NPT	175	(1205)

Pressure Reducing Hose Valves

NPS 1-1/2 (DN 40) hose valves may be used on fire hose connections from sprinkler systems; NPS 2-1/2 in (DN 65) valves are used on hose standpipes and fire pump headers. Unless otherwise specified, maximum rated working pressure is equal to 175 psi (1205 kPa). Valves in this category incorporate a pressure reducing feature into traditional hose valve body configurations. The valves in this category are to be used to feed water to fire hoses only, and are not to be used in other applications found in fire protection sprinkler systems where pressure reduction may be needed.

Company JBD Manufacturing Co.

Model No	Valve Size		End Connection	Rated Working Pressure		Outlet Pressure Range	
	in	(mm)		psi	(kPa)	psi	(kPa)
E	2 1/2 x 1 1/2	(64 x 38)	Female NPT X Female NPT	175	(1205)	30-100	(205-690)
F	2 1/2 x 1 1/2	(76 x 38)	Flanged x NHT threaded	175	(1205)	30-100	(205-690)