



Member of the FM Global Group

Examination Standard for Fire Department Connections

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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 fire department connections which are used to provide a means to pump water into a sprinkler system, or standpipe, from a public hydrant or other water supply.
- 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 fire department connections.

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 fire department connections 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. Normative References

The following standards, test methods, and practices are referenced in this standard:

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

NFPA 1963, *Standard for Fire Hose Connections*

1.8. 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. Acceptance is based upon an overall evaluation of the installation. Factors other than the use of certified equipment impact upon the decision to accept, or not to accept. Acceptance is not a characteristic of a product. It is installation specific. A product accepted for one installation may not be acceptable elsewhere.

End Connections – The means by which components of a sprinkler system are connected to the sprinkler fitting or piping. Typical end connections are grooved and threaded.

Rated Working Pressure – This is the maximum sustained pressure at or below which the fire department connections shall operate trouble free. This also sets the basis for the testing described in Section 4, Performance Requirements. The minimum pressure rating considered for certification is 175 psi (1205 kPa).

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). Standpipes are classified as either "Automatic" or "Manual", where the difference is whether or not the standpipe is connected to a water supply. If connected to a water supply on continuous basis, and all that is required to get water at the hose valve is to open the hose valve, then the system is regarded as "Automatic". For standpipe systems that receive primary water supply from the fire department connection at the exterior wall of the building, this is regarded as "Manual". Secondary Classifications for standpipes are "Dry" or "Wet" which is a reference to the normal condition within the actual standpipe. Standpipe systems are further classified as vertical when supplying water to hose connections floor to floor, and horizontal when supplying water to hose connections on the same floor.

2 GENERAL INFORMATION

2.1. Product Information

- 2.1.1. Fire department connections provide a means to pump water into a sprinkler system, or standpipe, from a public hydrant or other water supply.
- 2.1.2. In order to meet the intent of this standard, fire department connections 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 in identical materials by different manufacturers or, even by different plants of the same manufacturer, have been seen to perform differently in testing. Sample fire department connections, 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 fire department connections.

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.

3.2. Physical or Structural Features

- 3.2.1. The fire department connections shall be designed for a minimum rated working pressure of 175 psi (1205 kPa).
- 3.2.2. Fire department connections shall have a single 4 inch (100 mm) or two 2-1/2 inch (63 mm) female hose inlets with swivels and a 4 inch IPS minimum outlet. Each inlet shall be provided with a suitable washer and conform to NFPA Standard 1963, "Standard for Fire Hose Connections". The hose inlets may be attached to the body or may be part of an adapter; the swivels shall have spanner lugs.
- 3.2.3. The body shall be straight, or have a 45 or 90 degree angle.
- 3.2.4. The inlets shall be arranged so that the hose can be conveniently attached to or removed from one inlet while the other is in service.
- 3.2.5. Waterways shall be at least 2-1/2 inch I.D. from inlet to outlet. A 2-1/2 inch diameter sphere will be placed into each inlet. The sphere must pass freely through the body.
- 3.2.6. Either a single or dual clapper arrangement may be certified.
- 3.2.7. The clearances between the periphery of the clapper and the inside of iron-bodies shall be at least 1/4 inch in every position of the clapper from closed to full open.
- 3.2.8. The seat ring shall be raised 1/8 inch minimum above the body to allow for proper seating of the clapper.
- 3.2.9. A hose plug which can be readily removed or broken shall be provided on each inlet to protect the hose threads and to prevent the entrance of foreign material.

3.3. Materials

All materials used in these fire department connections shall be suitable for the intended application. Parts exposed to water shall be constructed of corrosion resistant materials. Materials shall be compatible with other sprinkler system components. When unusual materials are used, special tests may be necessary to verify their suitability. All components shall withstand the normal abuse of shipping, handling, and installation.

3.4. Markings

- 3.4.1. Marking on the product or, if not possible due to size, on its packaging or label accompanying the product, shall include the following information:
- name and address of the manufacturer or marking traceable to the manufacturer;
 - date of manufacture or code traceable to date of manufacture or lot identification;

- model number, size, rating, capacity,

When hazard warnings are needed, the markings should be universally recognizable.

- 3.4.2.** The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the certification agency's mark of conformity.
- 3.4.3.** The type of system it supplies on top of the body such as "AUTO. SPKR.", "OPEN SPKR.", or "STAND-PIPE"
- 3.4.4.** 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.
- 3.4.5.** Any additional pertinent marking information required by a national or international standard to which the product is manufactured shall be permanently marked on the outside surface of each assembly.
- 3.4.6.** Each fire department connection shall be supplied with a corrosion resistant wall plate. The plate shall be marked in cast raised letters with the words "FIRE DEPT. CONNECTION" and the type of system which is supplied in the following manner:

AUTOMATIC SPRINKLERS
FIRE DEPT. CONNECTION
Or
STANDPIPE
FIRE DEPT. CONNECTION
Or
OPEN SPRINKLERS
FIRE DEPT. CONNECTION

- 3.4.7.** Each required marking listed in Section 3.4.1 shall be legible and durable and applied in any of, or any combination of casting, die stamping, forging, roller embossing or electro-etching.

3.5. Manufacturer's Installation and Operation Instructions

- 3.5.1.** The manufacturer shall:

- prepare instructions for the installation, maintenance, and operation of the product;
- provide facilities for repair of the product and supply replacement parts, if applicable; and
- provide services to ensure proper installation, inspection, or maintenance for the product where it is not reasonable to expect the average user to be able to provide the installation, inspection, or maintenance.

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

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

4 PERFORMANCE REQUIREMENTS

4.1. Examination

4.1.1. Requirement

The fire department connections shall conform to the manufacturer's drawings and specifications and to the certification agency's requirements.

4.1.2. Test/Verification

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

4.2. Hydrostatic Strength Test

4.2.1. Requirement

The fire department connection body shall withstand hydrostatic strength testing without sustaining cracking or permanent deformation.

4.2.2. Test/Verification

The fire department connection body shall be able to withstand a hydrostatic pressure of 700 psi (4830 kPa) or four times the rated working pressure, whichever is greater, for five minutes.

4.3. Clapper Leakage Test

4.3.1. Requirement

The clapper(s) shall prevent excessive leakage when subjected to a water pressure at 125% of the rated working pressure.

4.3.2. Test/ Verification

The clapper(s) will be subjected to 125% of the rated working pressure for 5 minutes. Total water leakage shall not exceed one (1) pint.

4.4. Clapper Strength Test

4.4.1. Requirement

The clapper(s) shall not crack or deform when subjected to twice the rated working pressure.

4.4.2. Test/ Verification

Clapper(s) shall have adequate strength to resist a water pressure of two times the rated working pressure for five minutes. There shall be no failure or permanent distortion of the clapper(s) as a result of this test.

5 MANUFACTURER'S 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 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:

- existence of 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; and
- handling and disposition of non-conforming materials.

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 allow no 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 agency's 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.

5.3. 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. Manufacturer's Responsibilities

The manufacturer shall notify the certification agency of changes in product construction, design, components, raw materials, physical characteristics, coatings, component formulation or quality assurance procedures prior to implementation of such changes.

5.5. 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 fire department connections. The fire department connection shall be subjected to twice the rated working pressure for a minimum of 1 minute. There should be no evidence of body leakage or deformation.

5.5.2. Test Requirement No. 1 – *Clapper Leakage Test*

The manufacturer shall perform Clapper leakage testing on 100 percent of production fire department connections. Clapper Leakage testing shall be run at a test pressure equal to the rated working pressure for a minimum duration of 1 minute.

6 BIBLIOGRAPHY

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

ANSI / ASME B1.20.3, *Dryseal Pipe Threads (Inch)*

ANSI / ASME B1.20.7, *Hose Coupling Screw Threads*

AWWA C606, Grooved and Shoulder Joints

FM Property Loss Prevention Data Sheet 2-0 , *Installation Guidelines for Automatic Sprinklers*

ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories.

NFPA 13, Standard for the Installation of Sprinkler Systems

NFPA 14, Standard for the Installation of Standpipe and Hose Systems

NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection

NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-based Fire Protection Systems

NFPA 1962, Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances

APPENDIX A:

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APPENDIX B: TOLERANCE

Unless otherwise stated, the following tolerances shall apply:

Mass	± 2 percent of value
Length	± 2 percent of value
Pressure	± 2 psi (14 kPa)
Temperature	$\pm 4^{\circ}\text{F}$ (2°C)
Time	+ 5/-0 seconds
	+0.1/-0 minutes

APPENDIX C: SAMPLE LISTING

C-1 FIRE SERVICE CONNECTIONS

A fire service pumper connection, located outside buildings, permits the fire service to pump water into a sprinkler system from a nearby public hydrant or reservoir. Water supplied at high pressure will aid automatic sprinklers to control a fire. The connection may also be used to supply building standpipes.

Certified connections are made of bronze and consist of two inlet couplings threaded for standard fire hose and siamesed into an outlet pipe connection. A check valve is provided in each inlet so that either connection may be used separately. The connections are available in straight, 45° or 90° patterns. Unless otherwise noted in the listing, these connections have 175 psi (1205 kPa) rated working pressure.

Models A, B, C, D

<i>Model No.</i>	<i>Component Description</i>	<i>Nominal Size, Inlets x Outlet, in.</i>	<i>Rated Working Pressure, psi (kPa)</i>
A	Straightaway Single Clapper	2 1/2 x 2 1/2 x 4	175 (1205)
B	Straightaway Double Clapper	2 1/2 x 2 1/2 x 4	175 (1205)
C	45 degree angle Body Double Clapper	2 1/2 x 2 1/2 x 4	175 (1205)
D	90 degree angle Body Double Clapper	2 1/2 x 2 1/2 x 4	175 (1205)