



UL 405

STANDARD FOR SAFETY

Fire Department Connection Devices

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UL Standard for Safety for Fire Department Connection Devices, UL 405

Sixth Edition, Dated August 23, 2013

Summary of Topics

This revision of ANSI/UL 405 dated July 29, 2020 includes the following changes in requirements:

Screens for Nonthreaded Fire Department Connections; [8.5](#), [8.6](#), Sections [15A](#), and [15B](#)

Hinge Pin Securement; [9.3](#)

Hose Thread Requirements; [8.2](#)

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new and/or revised requirements are substantially in accordance with Proposal(s) on this subject dated May 22, 2020.

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Standard for Fire Department Connection Devices

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Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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INTRODUCTION

1 Scope

1.1 These requirements apply to fire department connection devices and roof manifolds intended for use in buildings having standpipe and hose, water spray, or sprinkler systems to enable a fire department to connect hose lines directly to the system to supplement existing water supplies.

1.2 Requirements for the installation and use of fire department connection devices and roof manifolds for fire protection service are included in the following Standards of the National Fire Protection Association:

- a) NFPA 13, Installation of Sprinkler Systems;
- b) NFPA 14, Standpipe, Private Hydrants, and Hose Systems;
- c) NFPA 15, Water Spray Fixed Systems for Fire Protection; and
- d) NFPA 24, Installation of Private Fire Service Mains and Their Appurtenances.

2 Components

2.1 Except as indicated in [2.2](#), a component of a product covered by this standard shall comply with the requirements for that component.

2.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

5 Glossary

5.1 For the purpose of this standard the following definitions apply:

5.2 FIRE DEPARTMENT CONNECTION – A device generally having a single threaded or grooved outlet and swivel or non-threaded inlet connection(s). A fire department connection may be provided with a single inlet or multiple inlets. The outlet of these devices is intended to be attached to a standpipe, sprinkler or other water distribution system and the inlets are intended to be attached to a fire hose.

5.3 FLUSH TYPE FIRE DEPARTMENT CONNECTION – A type of fire department connection that is designed to have the hose connection feature flush with a wall and the body concealed.

5.4 ROOF MANIFOLD – A device having a single threaded or grooved inlet and multiple outlets with threaded connections. The inlet of these devices is intended to be attached to a standpipe, sprinkler or other water distribution system and the outlets are intended to be attached to hose connections.

5.5 SWIVEL ADAPTOR – A device having a single threaded outlet and a single swivel hose coupling that is intended to be attached to a fire department connection.

6 General

6.1 A fire department connection, roof manifold and swivel adaptor shall have a rated working pressure of 175 psig (1.21 MPa) or higher.

CONSTRUCTION

7 Body

7.1 The body of a fire department connection or roof manifold shall be constructed of a material having corrosion resistance equivalent to or exceeding that of cast iron.

7.2 The mating surfaces for the swivel connection shall be made of a material having corrosion resistance equivalent to or exceeding that of brass, bronze or series 300 stainless steel.

7.3 Parts shall be smooth, free from porosity, scale, lumps, cracks, blisters, sand holes, or other defects which make them unfit for the use for which they are intended. A casting shall not be plugged or filled; however, impregnation may be employed to remove porosity.

8 Fire Department Connection Inlets

8.1 Inlets shall be horizontal or shall be inclined downward. The arrangement of multiple inlets shall be such that a hose can be conveniently attached to or removed from any one inlet while the other inlet(s) is in service.

8.2 Each inlet shall be provided with a female swivel hose coupling at least 1-1/2 inches (38.1 mm) nominal diameter having hose threads that conform to those used by the fire department in accordance with the Standard for Hose Coupling Screw Threads – Inch, ANSI/ASME B1.20.7 unless specifically ordered to fit existing fire hose equipment requiring different threads.

Exception No. 1: Nominal diameter inlets in the 4 and 5 inch (100 and 125 mm) size having nonthreaded connections constructed in accordance with NFPA 1963, the Standard for Fire Hose Connections, are able to be used.

Exception No. 2: The inlets of a flush type fire department connection having pipe threads are not required to be shipped with a female swivel hose coupling.

8.3 Each inlet having a swivel hose coupling or nonthreaded connection shall be provided with a hose cap to protect the hose threads and prevent the entrance of foreign material. The cap shall be removable (without the use of a special tool). Breaking of the cap securement device is acceptable.

8.4 The swivel of hose connection shall be constructed of a material having corrosion resistance equivalent to or exceeding that of brass or bronze. The ball bearings of a swivel hose connection shall be constructed of a material having corrosion resistance equivalent to or exceeding that of brass, bronze or Series 300 stainless steel.

8.5 Nonthreaded fire department connections in the 4 and 5 inch (100 and 125 mm) size shall be permitted to be provided with a screen to reduce the potential for objects or debris obstructing the piping downstream of the connection.

8.6 The screen referenced in [8.5](#) shall be constructed of a material having corrosion resistance equivalent to or exceeding that of aluminum, brass or bronze or Series 300 stainless steel and mechanically or otherwise securely fastened into position. A screen that is press (friction) fit into position shall require a supplemental means of securement.

9 Clapper

9.1 A fire department connection having multiple inlets shall be provided with one or more clappers or check devices to prevent the discharge of water from any inlet when water is being supplied to any of the other inlets.

9.2 Clappers or other check devices, and accessories such as springs, shall be constructed of a material having corrosion resistance equivalent to or exceeding that of brass or bronze or Series 300 stainless steel.

9.3 If used, clappers shall be mounted such that a 2-1/2 inch (63.5 mm) diameter sphere can be passed through any inlet. The hinge pins shall be of brass, bronze or other equivalent corrosion resistant material, not less than 1/4 inch (6.4 mm) in diameter, and supported at each end for a distance at least equal to the diameter of the pins. The hinge pins shall be securely fastened in position such as by riveting the ends or by other equivalent means which does not permit water leakage. Hinge pins secured with threads shall be provided with a supplemental means of securement such as the use of a thread locking compound, permanent adhesive, or mechanical staking.

10 Clearances

10.1 The clearance between the clapper rim and the body in all positions of travel shall be at least 1/4 inch (6.4 mm) with gray, cast, or malleable iron bodies, and 1/8 inch (3.2 mm) with brass, bronze and Series 300 stainless steel bodies. The clearance between the clapper hub or hinge and the body or seat ring shall be at least 1/8 inch (3.2 mm). The length of the clapper hub or hinge shall be 1/32 inch (0.8 mm) less than the distance between the bearings. The hole through the clapper hub shall be at least 1/32 inch (0.8 mm) greater in diameter than the diameter of the hinge pin.

11 Seat Rings

11.1 The seat or seat rings shall be constructed of a material having corrosion resistance equivalent to or exceeding that of brass or bronze and shall be smoothly machined. Raised seats shall be at least 1/4 inch (6.4 mm) wide and raised at least 1/8 inch (3.2 mm). Machined surfaces of seats which are not raised shall extend at least 1/8 inch (3.2 mm) beyond the clapper rim. If the seat rings are not a part of the body casting, they shall be screwed or pressed into place.

12 Outlets and Inlets

12.1 The maximum number of fire department connection inlets or roof manifold outlets shall be in accordance with [Table 12.1](#).

Table 12.1
Maximum Number of Fire Department Connection Inlets or Roof Manifold Outlets

Nominal Size of Fire Department Connection Outlet or Roof Manifold Inlet, in (mm)	Nominal Size of Fire Department Connection Inlet or Roof Manifold Outlet, in (mm)	Maximum Number Fire Department Connection Inlets or Roof Manifold Outlets
3 (75)	2 1/2 (65)	1
	3 (75)	1
4 (100)	2 1/2 (65)	3
	3 (75)	2
	4 (100) ¹	1
5 (125)	2 1/2 (65)	3
	3 (75)	2
	4 (100) ¹	1
6 (150)	5 (125) ¹	1
	2 1/2 (65)	4
	3 (75)	4

Note 1 – Non-threaded connection

12.2 The outlet of a fire department connection and the inlet of a roof manifold shall be provided with National Pipe Threads (NPT) conforming to the Standard for Pipe Threads, General Purpose (Inch), ANSI/ASME B1.20.1 or the Standard for Dryseal Pipe Threads (Inch), ANSI B1.20.3 or grooved ends complying with the Standard for Grooved and Shouldered Joints, ANSI/AWWA C600.

Exception: Fire department connections or roof manifolds intended for use in installations where fittings incorporate pipe threads other than NPT type threads shall be permitted to be provided with pipe threads complying with a national pipe thread standard compatible with those fittings.

PERFORMANCE

13 General

13.1 Representative samples of each fire department connection shall be subjected to the tests described in Sections [14](#) – [17](#).

14 Leakage Test

14.1 A fire department connection, roof manifold, or swivel adaptor shall be capable of withstanding without leakage through the body or at joints an internal hydrostatic pressure of two times the rated working pressure, applied for a period of 1 minute. The seat of a fire department connection shall be capable of withstanding without leakage or leakage in excess of slight weeping. Slight weeping of water at the seat is acceptable but, if such leaking is evident, the test is to be conducted three times, releasing pressure after each test, opening and reclosing the clapper, and then pressurizing the connection.

14.2 The leakage at any inlet shall not exceed 20 fluid ounces per hour (9.86 mL/min) for each nominal inch (mm x 0.039) of inlet diameter pipe size.

14.3 A representative sample of the fire department connection, roof manifold, or swivel adaptor is to be filled with water and vented of air. For the body leakage test, the clapper is to be blocked open or pressurized through the fire department connection inlet so that the clapper is not sealed against the seat. For the seat leakage test, the test sample is to be pressurized through the fire department connection outlet so that the pressure is applied in a direction to close the clapper against the seat. The pressure is to be gradually increased at a rate not exceeding 300 psig (2.07 MPa) per minute until the required test pressure is achieved and held for 1 minute. Visual observations are to be made for leakage through the body or at the seat. If leakage past the seat is observed, the leakage rate is to be determined in accordance with [14.2](#).

15 Strength of Body Test

15.1 A fire department connection, roof manifold, or swivel adaptor shall withstand without rupture a hydrostatic pressure of four times the rated working pressure applied for a period of 5 minutes.

15.2 During this test, the clapper is to be blocked open, or other arrangements made, to impress the test pressure on all parts of the body.

15.3 A representative sample of the fire department connection, roof manifold, or swivel adaptor is to be filled with water and vented of air. The pressure is to be gradually increased at a rate not exceeding 300 psig (2.07 MPa) per minute until the required test pressure is achieved and held for 5 minutes.

15A Screen Strength Test

15A.1 A screen installed in a nonthreaded connection as indicated in [8.5](#) shall withstand, without dislodgement or partial separation from the fire department connection body, 125 psig (862 kPa) applied to the inlet of the screen for a period of 1 minute. Permanent bending or distortion of the screen during this test shall be permitted.

15A.2 During this test, the screen perforations are to be blocked with a flexible, reinforced rubber or similar material so that the test pressure is applied to all portions of the screen.

15A.3 The inlet of a representative sample of the fire department connection with the screen is to be filled with water and vented of air. The pressure is to be gradually increased at a rate not exceeding 300 psig (2.07 MPa) per minute until the required test pressure is achieved and held for 1 minute. After the test, the sample is to be visually examined for screen dislodgement or partial separation from the fire department connection body.

15B Screen Friction Loss Test

15B.1 A screen installed in a nonthreaded connection as indicated in [8.5](#) shall not have a pressure loss due to hydraulic friction that exceeds 5 psi (35 kPa) while flowing 1000 gpm (3,785 L/min).

15B.2 A representative sample of the nonthreaded fire department connection with the integral screen shall be installed in a test piping system. This test line is to be equipped with a calibrated flow meter or equivalent means to measure water flow. A differential pressure gauge is to be connected to piezometer fittings located upstream and downstream from the test sample to measure the pressure loss between the two piezometer fittings. The pressure loss between the piezometer fittings while flowing 1000 gpm (3,785 L/min) is to be determined.

15B.3 The fire department connection test sample with the integral screen is then to be replaced with the same fire department connection without a screen. The pressure loss between the piezometer fittings is to be determined for the same flow rate or rates. The friction loss for the screen is then to be determined by subtracting the losses measured with the piping and fire department connection without the screen from the losses measured with the piping and fire department connection with the screen.

16 Elastomeric Parts (Except Gaskets) Test

16.1 An elastomeric part used to provide a seal shall have the following properties when tested as specified in the Standard for Gaskets and Seals, UL 157:

- a) For silicone rubber (having poly-organo-siloxane as its constituent characteristic), a minimum tensile strength of 500 psi (3.4 MPa) and a minimum ultimate elongation of 100 percent.
- b) For natural rubber and synthetic rubber other than silicone rubber, a minimum tensile strength of 1500 psi (10.3 MPa) and minimum ultimate elongation of 150 percent; or a minimum tensile strength of 2200 psi (15.2 MPa) and a minimum ultimate elongation of 100 percent.
- c) Those properties relating to maximum tensile set; minimum tensile strength and elongation after oven aging; and hardness after oven aging, all as specified in the Standard for Gaskets and Seals, UL 157. The maximum service temperature used to determine the oven time and temperature for oven aging is considered to be 60°C.

16.2 The Standard for Gaskets and Seals, UL 157 provides for the testing of either finished elastomeric parts or sheet or slab material. Sheet or slab material is to be tested when the elastomeric parts are O-rings having diameters of less than 1 inch (25.4 mm). The material tested is to be the same as that used in the product, regardless of whether finished elastomeric parts or sheet or slab material is tested.

17 Stress Cracking Test for Brass Parts

17.1 After being subjected to the conditions described in [17.2](#) – [17.3](#), a brass part containing more than 15 percent zinc shall show no evidence of cracking when examined using 25X magnification

Exception: Cracking is allowed when it does not impact the ability of the product to comply with the requirements of this Standard.

17.2 At least one sample, or a representative section of a sample, without plating or coatings are to be degreased and then continuously exposed for ten days to a moist ammonia-air mixture maintained in a glass chamber having a glass cover. Samples or sections of samples having a nominal inlet or outlet diameter exceeding 4 inches are not required to be tested.

17.3 Each test sample is to be subjected to the physical stresses normally imposed on or within a part as the result of assembly with other components. Such stresses are to be applied to the sample prior to and maintained during the test. Samples with female threads, intended to be used for use in the field, are to have the threads engaged and tightened to the torque specified in [Table 17.1](#). Teflon tape or pipe compounds are not to be used on the threads.