NFPA 1963
Standard for Fire Hose Connections

1998 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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Fire Hose Connections

1998 Edition

This edition of NFPA 1963, *Standard for Fire Hose Connections*, was prepared by the Technical Committee on Fire Hose and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 18-21, 1998, in Cincinnati, OH. It was issued by the Standards Council on July 16, 1998, with an effective date of August 5, 1998, and supersedes all previous editions.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

This edition of NFPA 1963 was approved as an American National Standard on August 6, 1998.

Origin and Development of NFPA 1963

The development of a standard for screw threads and gaskets for fire hose connections began nearly a century ago. Specifications for hose couplings were drawn up by the NFPA as early as 1898. An NFPA committee appointed in 1905 established a national standard thread for $2^1/_2$-in. and larger hose connections. Work on smaller hose threads was started in 1916, and the standard was adopted in 1922. The standard for suction hose coupling threads was adopted in 1955. The present standard covers the 10 standard sizes of threaded connections from $^3/_4$ in. (19 mm) to 6 in. (150 mm).

Editions published in 1956, 1967, and 1968 incorporated changes adopted by the NFPA. See Appendix B for a detailed history of fire hose coupling thread standardization in the United States.

The standard was extensively revised to bring the document into conformance with NFPA's *Manual of Style* in 1974. In 1979, the committee undertook a partial revision of the standard and included metric conversion figures where applicable. At this time the number designation of this document was changed from NFPA 194 to NFPA 1963. The document was editorially revised for the 1985 edition.

The 1993 edition of NFPA 1963 was a total reorganization and expansion of the standard. The material on screw threads was consolidated into a single chapter. A new chapter was added to cover general requirements for couplings and adapters. Another new chapter was added to cover nonthreaded connections in the 4-in. and 5-in. sizes. New material was added to the chapter on gaskets to cover the gaskets used with nonthreaded connections. Sections dealing with the threads on fire department pump discharges and intakes, portable pumps, and sprinkler and standpipe systems were deleted as these requirements are covered in other NFPA standards. The title of the document was changed from *Standard for Screw Threads and Gaskets for Fire Hose Connections* to *Standard for Fire Hose Connections* to reflect the broader scope of the document.

In this edition, the requirements for locks on caps used with nonthreaded couplings have been removed, and some editorial revisions have been made to the document.

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of this document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the size and design of fire hose connections, and the performance, maintenance, and selection of all types of fire hose, couplings, nozzles, and accessory equipment.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Appendix A.

Information on referenced publications can be found in Chapter 7 and Appendix C.

Chapter 1 Administration

1-1* Scope. This standard gives the performance requirements for new fire hose couplings and adapters with nominal sizes from $^3/_4$ in. (19 mm) through 6 in. (150 mm) and the specifications for the mating surfaces.

1-2 Purpose. The purpose of this standard is to provide a uniform standard for safe couplings and adapters for the users of fire hose connections.

1-3 Definitions.

Adapter. Any device that allows fire hose couplings to be safely interconnected with couplings of different sizes, threads, or mating surfaces, or that allows fire hose couplings to be safely connected to other appliances.

Approved.* Acceptable to the authority having jurisdiction.

Authority Having Jurisdiction.* The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Blunt Start. The removal of the incomplete thread at the end of the thread. This is a feature of threaded parts that are repeatedly assembled by hand. Also known as the "Higbee cut."

Bowl Gasket. See Tail Gasket.

Coupling Assembly. A complete coupling including its gaskets and the expansion rings or collar pieces used in attaching the coupling to the hose.

Couplings. One set or pair of connection devices attached to a fire hose that allow the hose to be interconnected to additional lengths of hose or adapters and other fire-fighting appliances.

Face Gasket. The water pressure seal at the mating surfaces of nonthreaded couplings or adapters.

Hard Suction Hose. A hose used for drafting water from static supplies (lakes, rivers, wells, and so forth). It can also be used for supplying pumps on fire apparatus from hydrants if designed for that purpose. The hose contains a semirigid or rigid reinforcement designed to prevent collapse of the hose under vacuum.

Large Stream Device. Any device that discharges water at a flow rate greater than 400 gpm (1514 L/min).

NH. An American National Fire Hose Connection Screw Thread. *(See Section 3-2.)*

Nonthreaded Coupling or Adapter. A coupling or adapter in which the mating is achieved with locks or cams but without the use of screw threads.

Primary Inlet. The inlet where an appliance connects to a hose.

Screw Thread Coupling or Adapter. A coupling or adapter in which the mating is achieved with the use of threads.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Spray Nozzle. A nozzle with an adjustable pattern and with a control device that shuts off the flow.

Straight Tip Nozzle. A smooth-bore nozzle for producing a solid stream.

Tail Gasket. A gasket in the bowl of a coupling used to provide a watertight seal between the coupling and the hose in an expansion ring–type coupling.

Thread Gasket. A gasket used in a female threaded connection to provide a watertight seal between the male and female threaded connections.

1-4 General Requirements. The requirements of this standard shall apply to the following devices in the sizes defined in Section 1-1.

(a) Fire hose couplings
(b) Booster hose couplings
(c) Hard suction hose couplings
(d) Pump intake connections on fire apparatus
(e) Pump discharge connections on fire apparatus
(f) Sprinkler connections
(g) Standpipe connections
(h) Hose connections on fire hydrants
(i) Adapters
(j) Reducers
(k) Caps
(l) Plugs
(m) Connections on all other hose fittings and appliances that attach to fire pumps, hose, or hydrants

Chapter 2 General Coupling and Adapter Requirements

2-1* Workmanship. The coupling assembly or adapter shall be made and finished in a workmanship-like manner throughout. All edges shall be chamfered and free from burrs. Hose bowl or tailpiece lips shall be rounded to prevent damage to the hose.

2-2 Materials. Materials used shall be free of defects that would adversely affect the performance or maintenance of individual components or of the overall assembly.

2-3 Minimum Waterway. The design of the shank-type and nonthreaded expansion ring coupling shall be such that the coupling shall not restrict the waterway by more than $^1/_4$ in. (6.4 mm) on couplings of nominal size $2^1/_2$ in. (65 mm) or less and not more than $^1/_2$ in. (12.7 mm) on couplings of nominal size greater than $2^1/_2$ in. (65 mm). Gaskets shall not protrude into the waterway.

2-3.1 The waterway of size-increasing-style couplings shall be no smaller than the nominal size of the hose to which it is attached.

Exception: Shank-type couplings.

2-3.2 The waterway of size-reducing-style couplings shall be no smaller than the nominal size of the attachment face.

Exception: Shank-type couplings.

2-4 Gasket Groove. All sizes of internal NH threaded couplings, connections, or adapters shall have a standard gasket groove diameter as shown in Table 3-4.2, column *K. [See also Figure 3-3.2, dimension K.]*

2-5 Testing. Tests required by this standard shall be conducted by the manufacturer or by an approved testing facility designated by the manufacturer. All tests shall be conducted on standard commercially available product. Any test that requires the use of hose shall use hose with the highest service test pressure commercially available to which the coupling can be attached.

2-6 Internal Strength.

2-6.1 The coupling or adapter shall be capable of withstanding a hydrostatic pressure equal to the service test pressure without leakage, two times service test pressure with no leakage more severe than 12 drops per minute ($^1/_2$ ml per minute), and three times the service test pressure plus 100 psi (690 kPa) without separation. It shall be tested in accordance with 2-6.2 to prove compliance.

2-6.2 The coupling or adapter shall be plugged and adapted on one end to accept a pump connection from a hydrostatic test table. The other end shall be plugged or adapted to accept a petcock to remove air. The coupling or adapter shall be filled with water until all air has been exhausted and the petcock closed. Pressure shall be applied until the test pressure is reached. The test pressure shall be held for at least 15 seconds but not more than 60 seconds.

2-7 Tensile Strength.

2-7.1 Couplings shall have a tensile strength of at least 1200 lb per in. (210 N/mm) of diameter. They shall be tested in accordance with 2-7.2 to prove compliance.

2-7.2 A pair of couplings shall be attached to a section of hose. The couplings shall be connected together and the hose installed in a tension testing machine such that the tension will be on the couplings. A tensile load shall be applied at a rate of not more than 2 in. (51 mm) per minute up to 1200 lb per in. (210 N/mm) of nominal hose diameter.

After the tensile strength test, the couplings shall be subjected to a test pressure equal to the service test pressure of the hose to which they are attached. Any leakage or deformation shall constitute failure of this test.

2-8 Connect/Disconnect Capability.

2-8.1 Couplings shall be capable of being connected and disconnected at least 3000 times without leakage or failure. They shall be tested in accordance with 2-8.2 to prove compliance.

2-8.2 Tests shall be conducted on standard commercial product without lubrication. Hose couplings shall be completely connected and disconnected to each other at least 3000 times. At the completion of this portion of the test, the couplings shall be attached to hose such that tested couplings can be connected together. The tested couplings when connected together shall withstand the service test pressure of the hose without leakage or failure.

2-9 Rough Usage.

2-9.1 Couplings shall be capable of being dropped up to 6 ft (1.8 m) without deformation or damage that impairs operation. They shall be tested in accordance with 2-9.2 to prove compliance.

2-9.2 Couplings shall be installed on approximately 10-ft (3-m) lengths of fire hose. The couplings shall be coupled together, forming a loop in the hose. The coupling assembly shall then be dropped onto a concrete surface from a height of 6 ft (1.8 m) so as to land as squarely as possible on the swivel ring. This shall be repeated three times. The couplings shall operate freely and shall show no signs of deformation when inspected inside and outside. Samples showing distortion or binding of the swivel mechanism shall be judged acceptable if the mechanism can be corrected to turn freely and evenly when straightened by the use of a hammer. Samples developing cracks or broken sections either before or after attempts to straighten damaged portions shall be deemed as having failed the test. The coupling/hose assembly shall withstand the service test pressure of the hose without leakage or failure.

2-10 Coupling Retention.

2-10.1 Couplings shall remain on the hose without movement up to the rated burst pressure of the hose. They shall be tested in accordance with 2-10.2 to prove compliance.

2-10.2 The couplings shall be attached to a 3-ft (1-m) length of hose. The hose and coupling as an assembly shall be pressurized to the service pressure of the hose for 1 minute, and then the pressure shall be released. The position of the coupling with relation to the hose shall be marked. The pressure in the hose/coupling assembly shall then be raised at a rate of 300 psi to 1000 psi (2068 kPa to 6895 kPa) per minute until the rated burst pressure of the hose is reached. The pressure shall be held for a minimum of 15 seconds but not longer than 60 seconds. The hose shall show no signs of movement from the coupling.

2-11 Vacuum Tightness.

2-11.1 When couplings are used on hard suction hose, they shall be capable of holding a vacuum of 22 in. Hg (74.2 kPa) for 5 minutes. They shall be tested in accordance with 2-11.2 to prove compliance.

2-11.2 The coupling shall be attached to a suitable section of hard suction hose. A blank cap shall be attached to the coupling on one end, and a vacuum pump shall be attached to the other end. A vacuum of 22 in. Hg (74.2 kPa) shall be developed within the assembly, and the assembly shall hold the vacuum for 5 minutes without any loss of vacuum.

2-12 Corrosion Resistance.

2-12.1 Couplings having parts other than high-strength yellow brass No. 8A as defined in ASTM B 30, *Standard Specification for Copper-Brass Alloys in Ingot Form*, or ASTM B 584, *Standard Specification for Copper Alloy Sand Castings for General Applications,* shall be capable of being coupled and uncoupled using accepted standard practices and shall not show any evidence of galvanic corrosion between dissimilar metals after testing in accordance with 2-12.2.

2-12.2 Coupling assemblies including expansion rings and gaskets shall be supported vertically in a fog chamber and exposed to salt spray (fog) as specified by ASTM B 117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*, for a period of 120 hours.

2-13 Nonmetallic Materials. Any nonmetallic material used in couplings except for the gaskets shall be certified by the manufacturer of the nonmetallic material as fit for the service intended.

2-14 High-Temperature Performance.

2-14.1 Temperatures up to 275°F (135°C) shall not affect the ease with which a coupling assembly is coupled or uncoupled. Couplings shall be tested in accordance with 2-14.2 to prove compliance.

2-14.2 Dry couplings with gaskets installed shall be conditioned in an oven at 275°F (135°C) for 4 hours. Immediately upon removal it shall be possible to connect and disconnect the couplings within the original torque range.

2-15 Low-Temperature Performance.

2-15.1 Temperatures down to –25°F ± 2°F (–32°C ± 1°C) shall not affect the performance of the coupling assembly. Couplings shall be tested in accordance with 2-15.2 to prove compliance.

2-15.2 With the gasket(s) installed, a coupling assembly shall be subjected to an environment of 0°F ± 1°F (–18°C ± 1°C) for a period of 24 hours and subsequently to an environment of –25°F ± 2°F (–32°C ± 1°C) for a period of 2 hours. Following this exposure, the coupling shall be dropped from a height of 10 ft (3 m) onto its longitudinal axis. It shall then be possible to couple and uncouple the coupling assembly by the application of a torque no greater than required before the test.

2-16 Gasket Performance. The gasket material used with any coupling or adapter shall meet the test requirements of 2-16.1 through 2-16.3.

2-16.1 Low Temperature Test. Gaskets shall be subjected to an environment of 0°F ± 1°F (–18°C ±1°C) for a period of 24 hours and subsequently to an environment of –25°F ± 2°F (–32°C ± 1°C) for a period of 2 hours. Immediately upon removal from the test chamber, the gasket shall not crack when squeezed from any two opposite points into a figure 8 configuration.

2-16.2 Accelerated Aging Test. Samples of the gasket material shall be prepared in accordance with the procedures described in ASTM D 3183, *Standard Practice for Rubber — Preparation of Pieces for Test Purposes from Products*. The samples of the gaskets shall then be subjected to oven aging at 212°F ± 3°F (100°C ± 2°C) for 70 hours in accordance with ASTM D 573, *Standard Test Method for Rubber Deterioration in an Air Oven*. The samples shall then be tested for tensile strength and ultimate elongation, and the tensile strength shall be not less than 80 percent, and the ultimate elongation shall be not less than 50 percent of the corresponding properties of samples that have not been so treated.

2-16.3 Compression Set Test. A sample of gasket material shall be compressed as defined in ASTM D 395, *Standard Test Methods for Rubber Property — Compression Set* (Method B), and subjected to heat treatment at 158°F ± 1°F (70°C ± 1°C) for a period of 24 hours. The compression set of the sample of gasket material so tested shall not exceed 15 percent of the original thickness.

Chapter 3 Screw Threads for Couplings and Adapters

3-1 Basic Form of Thread.

3-1.1 Basic thread form as specified in Figure 3-3.1 shall have an included angle of 60 degrees and truncated top and bottom.

3-1.2 The basic angle of the thread between the sides of the thread measured in an axial plane shall be 60 degrees. The line bisecting this 60-degree angle shall be perpendicular to the axis of the screw thread.

3-1.3 The flat at the root and crest of the basic thread as specified in Figure 3-3.1 shall be $^1/_8$ times the pitch or 0.125 times the pitch (p).

3-1.4 The height of the basic thread shall be

$$h = 0.649519 \times p$$

or

$$h = \frac{0.649519}{n}$$

where:

p = pitch in inches
or

$$p = \frac{1}{n}$$

n = number of threads per inch
h = basic thread height in inches

3-1.5 Blunt Start.

3-1.5.1 The outer ends of all external and internal threads shall be terminated by the blunt start or Higbee cut, as shown in Figure 3-3.2, on full thread to avoid crossing and mutilation of thread.

3-1.5.2 The minimum length of the blunt start shall be not less than the radius formed by a cutter with a radius not less than the height of the thread.

3-1.5.3 The maximum length of the blunt start shall be not greater than 10 degrees of arc.

3-2* Thread Series Designation. Fire hose connection threads that meet the requirements of this chapter shall be identified as "American National Fire Hose Connection Screw Threads" (abbreviated throughout the standard with the thread symbol NH). They shall be designated by specifying in sequence the nominal size of the connection, the number of threads per inch, and the thread symbol "NH" as shown in the following example:

0.75-8 NH	3.5-6 NH
1-8 NH	4-4 NH
1.5-9 NH	4.5-4 NH
2.5-7.5 NH	5-4 NH
3-6 NH	6-4 NH

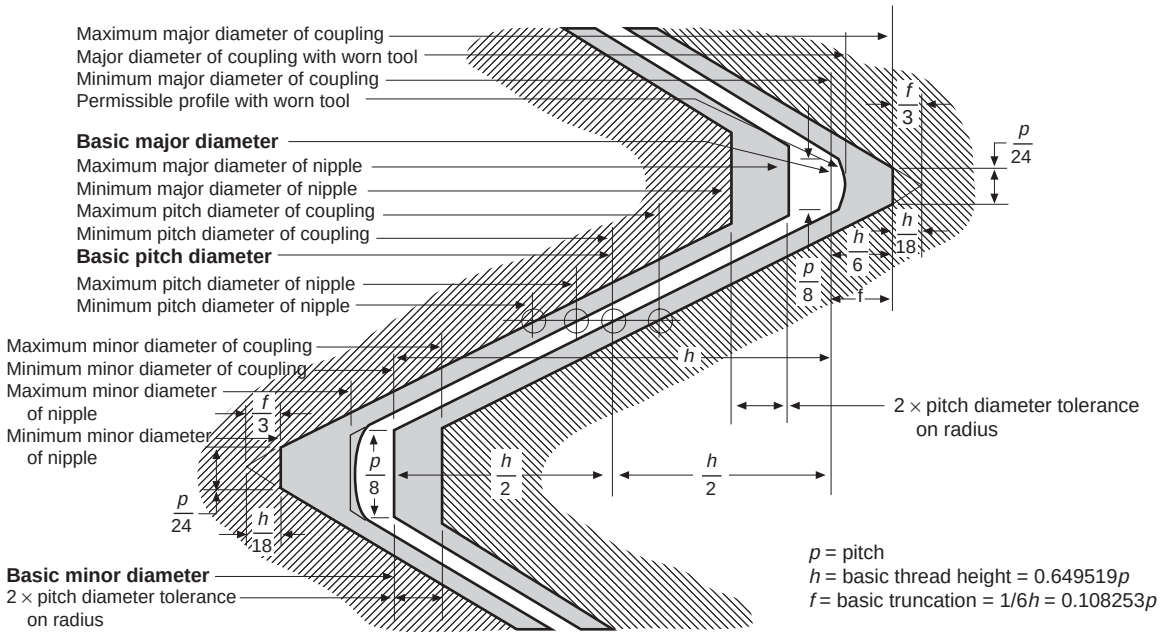


Figure 3-3.1 Form of thread of American National Fire Hose Connection Screw Thread (NH). The left portion shows the external thread (nipple), and the right portion shows the internal thread (coupling). ***(See Table 3-4.1 for dimensions.)***

3-3 Dimensions of American National Fire Hose Connection Screw Threads (NH).

3-3.1 The basic major diameter, basic pitch diameter, and basic minor diameter and tolerances shall be as specified in Figure 3-3.1.

3-3.2 Nominal dimensions shall be as specified in Figure 3-3.2.

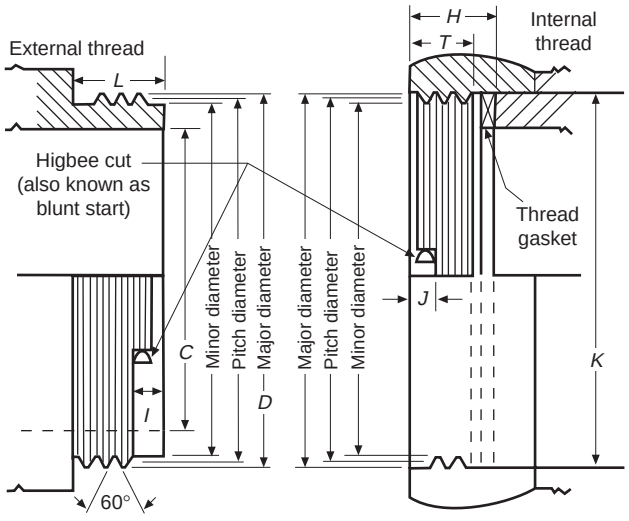
3-4 Thread Dimensions.

3-4.1 The basic dimensions for the threads shall be as specified in Table 3-4.1.

3-4.2 The nominal dimensions for the threads shall be as specified in Table 3-4.2.

3-4.3 The limiting dimensions for external threads (nipples) shall be as specified in Table 3-4.3

3-4.4 The limiting dimensions for internal threads (couplings) shall be as specified in Table 3-4.4.



C = Inside diameter of connection waterway (nominal size of connection)
D = Approximate outside diameter of external thread (ODM)
H = Depth of internal connection
I = Length of the pilot from the face of the external connection to the start of the second thread (Higbee cut)
J = Distance from the face of the internal connection to the start of the second thread (Higbee cut)
K = Diameter of the gasket seat
L = Length of external thread
T = Length of internal thread

Figure 3-3.2 Nominal dimensions of connections. ***(See Table 3-4.2 for dimensions.)***

Table 3-4.1 Basic Dimensions of NH Threads (*See Figure 3-3.1.*)

Nominal Size of Connection	Threads[1] per Inch (tpi)	Thread[1] Designation (NH)	Pitch (*p*)	Basic Thread Height (*h*)	External Thread Dimensions (Nipple)				Minimum Internal Thread Dimensions		
					Allowance	Maximum Major Diameter, *D*–Col. 6	Maximum Pitch Diameter, Col. 7–*h*	Maximum Minor Diameter, Col. 7–2*h*	Minimum Minor Diameter, *D*–2*h*	Basic Pitch Diameter, *D*–*h*	Basic Major Diameter, *D*
1	2	3	4	5	6	7	8	9	10	11	12
3/4	8	0.75-8 NH	0.12500	0.08119	0.0120	1.3750	1.2938	1.2126	1.2246	1.3058	1.3870
1	8	1-8 NH	0.12500	0.08119	0.0120	1.3750	1.2938	1.2126	1.2246	1.3058	1.3870
1 1/2	9	1.5-9 NH	0.11111	0.07217	0.0120	1.9900	1.9178	1.8457	1.8577	1.9298	2.0020
2 1/2	7.5	2.5-7.5 NH	0.13333	0.08660	0.0150	3.0686	2.9820	2.8954	2.9104	2.9970	3.0836
3	6	3-6 NH	0.16667	0.10825	0.0150	3.6239	3.5156	3.4073	3.4223	3.5306	3.6389
3 1/2	6	3.5-6 NH	0.16667	0.10825	0.0200	4.2439	4.1356	4.0273	4.0473	4.1556	4.2639
4	4	4-4 NH	0.25000	0.16238	0.0250	5.0109	4.8485	4.6861	4.7111	4.8735	5.0359
4 1/2	4	4.5-4 NH	0.25000	0.16238	0.0250	5.7609	5.5985	5.4361	5.4611	5.6235	5.7859
5	4	5-4 NH	0.25000	0.16238	0.0250	6.2600	6.0976	5.9352	5.9602	6.1226	6.2850
6	4	6-4 NH	0.25000	0.16238	0.0250	7.0250	6.8626	6.7002	6.7252	6.8876	7.0500

[1]All other values are given in inches.

Table 3-4.2 Nominal Dimensions of NH Threads *(See Figure 3-3.2.)*

Nominal Size of Connection Waterway, *C*	Threads[1] per Inch (tpi), N	Thread[1] Designation (NH)	Approximate Outside Diameter of External Thread, *D*[2]	Length of External Thread (Min), L	Length of Pilot to Start of Second Thread (External), I	Depth of Internal Connector, H	Diameter of Gasket Seat in Coupling, *K*	Length of Internal Thread, T	Length of Pilot to Start of Second Thread (Internal), J
3/4	8	0.75-8 NH	1 3/8	5/8	5/32	19/32	1 7/16	13/32	5/32
1	8	1-8 NH	1 3/8	5/8	5/32	19/32	1 7/16	13/32	5/32
1 1/2	9	1.5-9 NH	2	5/8	5/32	19/32	2 1/16	13/32	5/32
2 1/2	7 1/2	2.5-7.5 NH	3 1/16	1	1/4	15/16	3 3/16	11/16	3/16
3	6	3-6 NH	3 5/8	1 1/8	5/16	1 1/16	3 3/4	3/4	1/4
3 1/2	6	3.5-6 NH	4 1/4	1 1/8	5/16	1 1/16	4 3/8	3/4	1/4
4	4	4-4 NH	5	1 1/4	7/16	1 3/16	5 1/8	7/8	3/8
4 1/2	4	4.5-4 NH	5 3/4	1 1/4	7/16	1 3/16	5 7/8	7/8	3/8
5	4	5-4 NH	6 1/4	1 3/8	7/16	1 5/16	6 3/8	1	3/8
6	4	6-4 NH	7 1/32	1 3/8	7/16	1 5/16	7 1/8	1	3/8

Note: Approximate dimensions are for field identification purposes only. Exact basic manufacturing dimensions and tolerances are given in subsequent tables
[1] All other values are given in inches.

Table 3-4.3 Limits of Size and Tolerances of NH External Threads (Nipples)

Nominal Size of Connection	Threads[1] per Inch (tpi)	Thread[1] Designation (NH)	Pitch (p)	Basic Thread Height (h)	External Thread (Nipple)						
					Major Diameter			Pitch Diameter			Minor[2] Diameter
					Maximum	Minimum	Tolerance	Maximum	Minimum	Tolerance	Maximum
1	2	3	4	5	6	7	8	9	10	11	12
$^3/_4$	8	0.75-8 NH	0.12500	0.08119	1.3750	1.3528	0.0222	1.2938	1.2827	0.0111	1.2126
1	8	1-8 NH	0.12500	0.08119	1.3750	1.3528	0.0222	1.2938	1.2827	0.0111	1.2126
$1^1/_2$	9	1.5-9 NH	0.11111	0.07217	1.9900	1.9678	0.0222	1.9178	1.9067	0.0111	1.8457
$2^1/_2$	7.5	2.5-7.5 NH	0.13333	0.08660	3.0686	3.0366	0.0320	2.9820	2.9660	0.0160	2.8954
3	6	3-6 NH	0.16667	0.10825	3.6239	3.5879	0.0360	3.5156	3.4976	0.0180	3.4073
$3^1/_2$	6	3.5-6 NH	0.16667	0.10825	4.2439	4.2079	0.0360	4.1356	4.1176	0.0180	4.0273
4	4	4-4 NH	0.25000	0.16238	5.0109	4.9609	0.0500	4.8485	4.8235	0.0250	4.6861
$4^1/_2$	4	4.5-4 NH	0.25000	0.16238	5.7609	5.7109	0.0500	5.5985	5.5735	0.0250	5.4361
5	4	5-4 NH	0.25000	0.16238	6.2600	6.2100	0.0500	6.0976	6.0726	0.0250	5.9352
6	4	6-4 NH	0.25000	0.16238	7.0250	6.9750	0.0500	6.8626	6.8376	0.0250	6.7002

[1]All other values are given in inches.
[2]Dimensions given for the maximum minor diameter of the nipple are figured to the intersection of the worn tool arc with a centerline through crest and root. The minimum minor diameter of the nipple shall be that corresponding to a flat at the minor diameter of the minimum nipple equal to $p/24$ and may be determined by subtracting $11h/9$ (or $0.7939p$) from the minimum pitch diameter of the nipple.

Table 3-4.4 Thread Limits of Size and Tolerances of NH Internal Threads (Couplings)

Nominal Size of Connection	Threads[1] per Inch (tpi)	Thread[1] Designation (NH)	Pitch (p)	Basic Thread Height (h)	Internal Thread (Coupling)						
					Minor Diameter			Pitch Diameter			Major[2] Diameter
					Minimum	Maximum	Tolerance	Minimum	Maximum	Tolerance	Minimum
1	2	3	4	5	6	7	8	9	10	11	12
$^3/_4$	8	0.75-8 NH	0.12500	0.08119	1.2246	1.2468	0.0222	1.3058	1.3169	0.0111	1.3870
1	8	1-8 NH	0.12500	0.08119	1.2246	1.2468	0.0222	1.3058	1.3169	0.0111	1.3870
$1^1/_2$	9	1.5-9 NH	0.11111	0.07217	1.8577	1.8799	0.0222	1.9298	1.9409	0.0111	2.0020
$2^1/_2$	7.5	2.5-7.5 NH	0.13333	0.08660	2.9104	2.9424	0.0320	2.9970	3.0130	0.0160	3.0836
3	6	3-6 NH	0.16667	0.10825	3.4223	3.4583	0.0360	3.5306	3.5486	0.0180	3.6389
$3^1/_2$	6	3.5-6 NH	0.16667	0.10825	4.0473	4.0833	0.0360	4.1556	4.1736	0.0180	4.2639
4	4	4-4 NH	0.25000	0.16238	4.7111	4.7611	0.0500	4.8735	4.8985	0.0250	5.0359
$4^1/_2$	4	4.5-4 NH	0.25000	0.16238	5.4611	5.5111	0.0500	5.6235	5.6485	0.0250	5.7859
5	4	5-4 NH	0.25000	0.16238	5.9602	6.0102	0.0500	6.1226	6.1476	0.0250	6.2850
6	4	6-4 NH	0.25000	0.16238	6.7252	6.7752	0.0500	6.8876	6.9126	0.0250	7.0500

[1]All other values are given in inches.
[2]Dimensions for the minimum major diameter of the coupling correspond to the basic flat $p/8$, and the profile at the major diameter produced by a worn tool must not fall below the basic outline. The maximum major diameter of the coupling shall be that corresponding to a flat at the major diameter of the maximum coupling equal to $p/24$ and can be determined by adding $11h/9$ (or $0.7939p$) to the maximum pitch diameter of the coupling.

3-5 Tolerance.

3-5.1 The pitch diameter tolerances for a mating external (nipple) and internal (coupling) thread shall be the same. Pitch diameter tolerances shall include lead and half-angle deviations. Values for deviations in lead and half-angle consuming one-half of the pitch diameter tolerance shall be as specified in Table 3-5.1.

3-5.2 The tolerance relationships for the external (nipple) threads shall be as follows:

Major diameter tolerance =
2 × pitch diameter tolerance

Minor diameter tolerance =
pitch diameter tolerance + $2h/9$.

3-5.3 The minimum minor diameter of the external thread (nipple) shall be such as to result in a flat equal to $^1/_3$ of the $p/8$ basic flat ($p/24$) at the root when the pitch diameter of the nipple is at its minimum value. The maximum minor diameter is basic but shall be permitted to be such as results from the use of a worn or rounded threading tool. The maximum minor diameter shall be as specified in Figure 3-3.1 and is the diameter on which the minor diameter tolerance formula shown in 3-5.2 shall be based.

3-5.4 The tolerance relationships for the internal (coupling) threads shall be as follows:

Minor diameter tolerance =
2 × pitch diameter tolerance

The minimum minor diameter of a coupling is such as to result in a basic flat, $p/8$, at the crest when the pitch diameter of the coupling is at its minimum value.

Major diameter tolerance =
pitch diameter tolerance + $2h/g$.

3-6 Gauges and Gauging NH Threads.

3-6.1 The limits of size for the gauges to be used in the gauging of fire hose connections shall be as specified in Tables 3-6.1(a), (b), and (c).

3-6.2 For these gauges, the allowable variation in lead between any two threads not farther apart than the length of engagement shall be ±0.0004 in. The allowable variation in half-angle of thread shall be ±5 minutes.

3-6.3* Except as otherwise specified herein, the gauges and gauging practices shall conform to ANSI/ASME B 1.2, *Gages and Gaging for Unified Inch Screw Threads*.

3-6.4* Adjustable thread ring gauges shall be set by means of threaded setting plug gauges, the dimensions of which are given in Table 3-6.1(a). Means of setting ring gauges shall be as specified in ANSI/ASME B1.2, *Gages and Gaging for Unified Inch Screw Threads.*

Table 3-5.1 Deviations in Lead and Half-Angle Consuming One-Half of Pitch Diameter Tolerances for NH Threads

Nominal Size of Connection	Thread per[1] Inch (tpi)	Thread[1] Designation (NH)	Pitch Diameter[2] Tolerance	Lead Deviation[3] Consuming One-Half of Pitch Diameter Tolerance	Half-Angle Deviation[1] Consuming One-Half of Pitch Diameter Tolerance	
					degree	minute
$^3/_4$	8	0.75-8 NH	0.0111	0.0032	1	42
1	8	1-8 NH	0.0111	0.0032	1	42
$1^1/_2$	9	1.5-9 NH	0.0111	0.0032	1	54
$2^1/_2$	7.5	2.5-7.5 NH	0.0160	0.0046	2	17
3	6	3-6 NH	0.0180	0.0052	2	4
$3^1/_2$	6	3.5-6 NH	0.0180	0.0052	2	4
4	4	4-4 NH	0.0250	0.0072	1	55
$4^1/_2$	4	4.5-4 NH	0.0250	0.0072	1	55
5	4	5-4 NH	0.0250	0.0072	1	55
6	4	6-4 NH	0.0250	0.0072	1	55

[1]All other values are in inches.
[2]The tolerances specified for pitch diameter include all deviations of pitch diameter, lead, and angle. The full tolerance cannot, therefore, be used on pitch diameter unless the lead and angle of the thread are perfect. The last two columns give, for information, the deviations in lead and in angle, each of which can be compensated for by half the pitch-diameter tolerance given in Column 4. If lead and angle deviations both exist to the amount tabulated, the pitch diameter of a nipple, for example, must be reduced by the full tolerance or it will not enter the GO gauge.
[3]Between any two threads not farther apart than the length of engagement.

Table 3-6.1(a) Setting Thread Plug Limits of Size for NH Thread Ring Gauges[1]

Nominal Size of Connection	Threads[2] per Inch (tpi)	Thread[2] Designation (NH)		X Truncated Setting Plugs						X Basic-Crest Setting[3] Plugs	
				Plug for GO Thread Gauge			Plug for LO (NOT GO) Thread Gauge			Major Diameter	
				Major Diameter		Pitch Diameter	Major Diameter		Pitch Diameter	Plug for GO Thread Gauge	Plug for LO (NOT GO) Thread Gauge
				Truncated	Full		Truncated	Full			
Gauge Tolerance				−	+	−	−	+	+	+	+
1	2	3	4	5	6	7	8	9	10	11	12
$^3/_4$	8	0.75-8 NH	Max	1.3579	1.3757	1.2938	1.3368	1.3757	1.2831	1.3757	1.3757
			Min	1.3572	1.3750	1.2934	1.3361	1.3750	1.2827	1.3750	1.3750
1	8	1-8 NH	Max	1.3579	1.3757	1.2938	1.3368	1.3757	1.2831	1.3757	1.3757
			Min	1.3572	1.3750	1.2934	1.3361	1.3750	1.2827	1.3750	1.3750
$1^1/_2$	9	1.5-9 NH	Max	1.9742	1.9907	1.9178	1.9548	1.9907	1.9071	1.9907	1.9907
			Min	1.9735	1.9900	1.9174	1.9541	1.9900	1.9067	1.9900	1.9900
$2^1/_2$	7.5	2.5-7.5 NH	Max	3.0507	3.0693	2.9820	3.0237	3.0693	2.9665	3.0693	3.0693
			Min	3.0500	3.0686	2.9815	3.0230	3.0686	2.9660	3.0686	3.0686
3	6	3-6 NH	Max	3.6029	3.6247	3.5156	3.5698	3.6247	3.4981	3.6247	3.6247
			Min	3.6021	3.6239	3.5151	3.5690	3.6239	3.4976	3.6239	3.6239
$3^1/_2$	6	3.5-6 NH	Max	4.2229	4.2452	4.1356	4.1898	4.2452	4.1182	4.2452	4.2452
			Min	4.2216	4.2439	4.1350	4.1885	4.2439	4.1176	4.2439	4.2439
4	4	4-4 NH	Max	4.9828	5.0124	4.8485	4.9318	5.0124	4.8241	5.0124	5.0124
			Min	4.9813	5.0109	4.8479	4.9303	5.0109	4.8235	5.0109	5.0109
$4^1/_2$	4	4.5-4 NH	Max	5.7328	5.7624	5.5985	5.6818	5.7624	5.5741	5.7624	5.7624
			Min	5.7313	5.7609	5.5979	5.6803	5.7609	5.5735	5.7609	5.7609
5	4	5-4 NH	Max	6.2319	6.2615	6.0976	6.1809	6.2615	6.0732	6.2615	6.2615
			Min	6.2304	6.2600	6.0970	6.1794	6.2600	6.0726	6.2600	6.2600
6	4	6-4 NH	Max	6.9969	7.0265	6.8626	6.9459	7.0265	6.8382	7.0265	7.0265
			Min	6.9954	7.0250	6.8620	6.9444	7.0250	6.8376	7.0250	7.0250

[1]Gauge limit values in this table have been obtained in accordance with ANSI/ASME B1.2, *Gages and Gaging for Unified Inch Screw Threads*.
[2]All other values are given in inches.
[3]Pitch diameter limits for basic-crest GO setting plugs are the same as those shown in column 7. Pitch diameter limits for basic-crest LO (NOT GO) setting plugs are the same as those shown in column 10.

Table 3-6.1(b) Gauge Limits of Size for Ring Gauges for NH External (Nipple) Threads[1]

Nominal Size of Connection	Threads[2] per Inch (tpi)	Thread[2] Designation (NH)		X Thread Ring Gauges				Z Plain Ring Gauges	
				GO		LO (NOT GO)		Major Diameter	
				Pitch Diameter	Minor Diameter	Pitch Diameter	Minor Diameter	GO	NOT GO
Gauge Tolerance				–	–	+	+	–	–
1	2	3	4	5	6	7	8	9	10
$^3/_4$	8	0.75-8 NH	Max	1.2938	1.2246	1.2831	1.2563	1.37500	1.35292
			Min	1.2934	1.2239	1.2827	1.2556	1.37488	1.35280
1	8	1-8 NH	Max	1.2938	1.2246	1.2831	1.2563	1.37500	1.35292
			Min	1.2934	1.2239	1.2827	1.2556	1.37488	1.35280
$1^1/_2$	9	1.5-9 NH	Max	1.9178	1.8577	1.9071	1.8833	1.99000	1.96796
			Min	1.9174	1.8570	1.9067	1.8826	1.98984	1.96780
$2^1/_2$	7.5	2.5-7.5 NH	Max	2.9820	2.9104	2.9665	2.9378	3.06860	3.03680
			Min	2.9815	2.9097	2.9660	2.9371	3.06840	3.03660
3	6	3-6 NH	Max	3.5156	3.4223	3.4981	3.4623	3.62390	3.58810
			Min	3.5151	3.4215	3.4976	3.4615	3.62370	3.58790
$3^1/_2$	6	3.5-6 NH	Max	4.1356	4.0473	4.1182	4.0828	4.24390	4.20810
			Min	4.1350	4.0460	4.1176	4.0815	4.24370	4.20790
4	4	4-4 NH	Max	4.8485	4.7111	4.8241	4.7709	5.01090	4.96115
			Min	4.8479	4.7096	4.8235	4.7694	5.01065	4.96090
$4^1/_2$	4	4.5-4 NH	Max	5.5985	5.4611	5.5741	5.5209	5.76090	5.71115
			Min	5.5979	5.4596	5.5735	5.5194	5.76065	5.71090
5	4	5-4 NH	Max	6.0976	5.9602	6.0732	6.0200	6.26000	6.21025
			Min	6.0970	5.9587	6.0726	6.0185	6.25975	6.21000
6	4	6-4 NH	Max	6.8626	6.7252	6.8382	6.7850	7.02500	6.97532
			Min	6.8620	6.7237	6.8376	6.7835	7.02468	6.97500

[1]Gauge limit values in this table have been obtained in accordance with ANSI/ASME B1.2, *Gages and Gaging for Unified Inch Screw Threads,* except for the values shown in column 6. The maximum values shown in column 6 are values for the minimum minor diameter of the internal thread.
[2]All other values are given in inches.

Table 3-6.1(c) Gauge Limits of Size for Plug Gauges for NH Internal (Coupling) Threads[1]

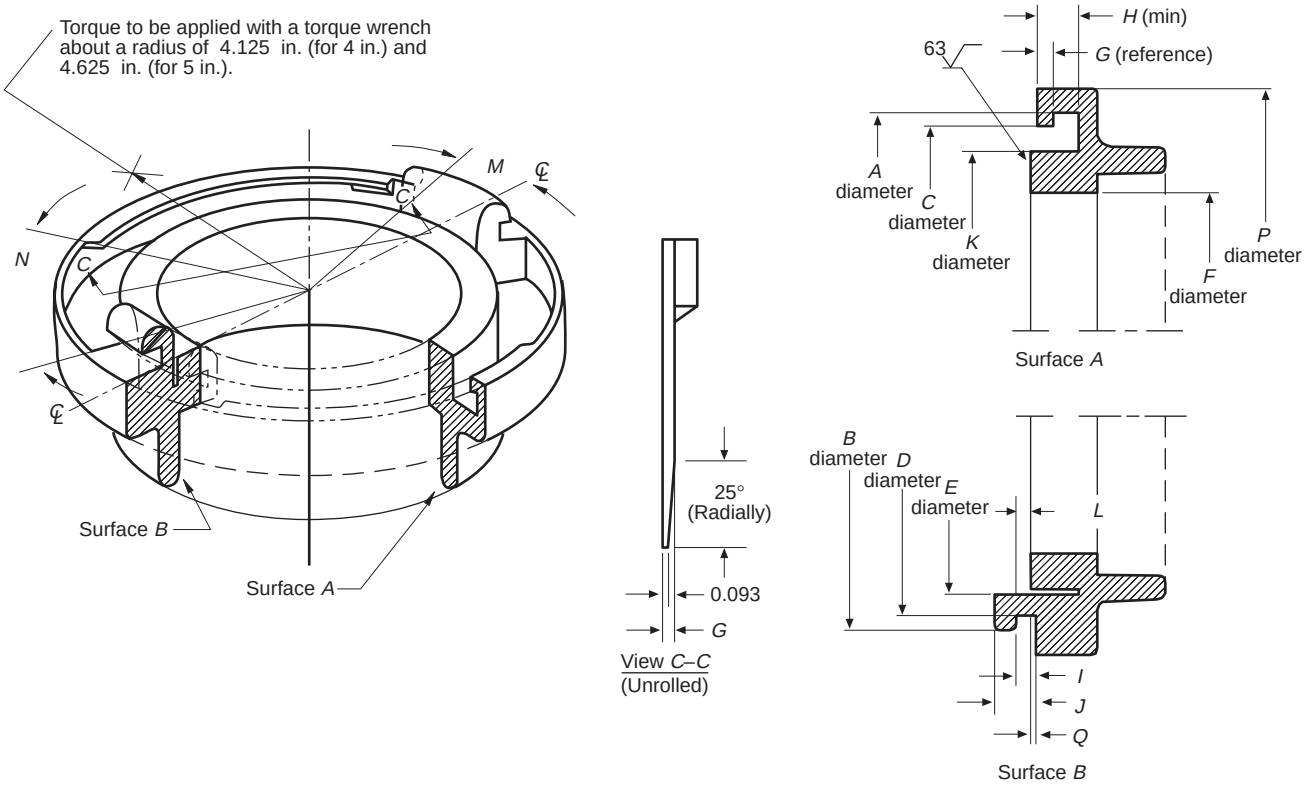
Nominal Size of Connection	Threads[2] per Inch (tpi)	Thread[2] Designation (NH)		X Thread Plug Gauges				Z Plain Plug Gauges	
				GO		HI (NOT GO)		Minor Diameter	
				Major Diameter	Pitch Diameter	Major Diameter	Pitch Diameter	GO	NOT GO
Gauge Tolerance				+	+	−	−	+	
1	2	3	4	5	6	7	8	9	10
3/4	8	0.75-8 NH	Max	1.3877	1.3062	1.3710	1.3169	1.22472	1.24680
			Min	1.3870	1.3058	1.3703	1.3165	1.22460	1.24668
1	8	1-8 NH	Max	1.3877	1.3062	1.3710	1.3169	1.22472	1.24680
			Min	1.3870	1.3058	1.3703	1.3165	1.22460	1.24668
1 1/2	9	1.5-9 NH	Max	2.0027	1.9302	1.9890	1.9409	1.85786	1.87990
			Min	2.0020	1.9298	1.9883	1.9405	1.85770	1.87974
2 1/2	7.5	2.5-7.5 NH	Max	3.0843	2.9975	3.0707	3.0130	2.91060	2.94240
			Min	3.0836	2.9970	3.0700	3.0125	2.91040	2.94220
3	6	3-6 NH	Max	3.6397	3.5311	3.6208	3.5486	3.42250	3.45830
			Min	3.6389	3.5306	3.6200	3.5481	3.42230	3.45810
3 1/2	6	3.5-6 NH	Max	4.2652	4.1562	4.2458	4.1736	4.04750	4.08330
			Min	4.2639	4.1556	4.2445	4.1730	4.04730	4.08310
4	4	4-4 NH	Max	5.0374	4.8741	5.0068	4.8985	4.71135	4.76110
			Min	5.0359	4.8735	5.0053	4.8979	4.71110	4.76085
4 1/2	4	4.5-4 NH	Max	5.7874	5.6241	5.7568	5.6485	5.46135	5.51110
			Min	5.7859	5.6235	5.7553	5.6479	5.46110	5.51085
5	4	5-4 NH	Max	6.2865	6.1232	6.2559	6.1476	5.96045	6.01020
			Min	6.2850	6.1226	6.2544	6.1470	5.96020	6.00995
6	4	6-4 NH	Max	7.0515	6.8882	7.0209	6.9126	6.72552	6.77520
			Min	7.0500	6.8876	7.0194	6.9120	6.72520	6.77488

[1]Gauge limit values in this table have been obtained in accordance with ANSI/ASME B1.2, *Gages and Gaging for Unified Inch Screw Threads.*
[2]All other values are given in inches.

Chapter 4 Nonthreaded Connections

4-1* General. This chapter covers nonthreaded connections only in the 4-in. (100-mm) and 5-in. (125-mm) sizes. The requirements of Chapters 1 and 2 shall apply in addition to the requirements defined in this chapter.

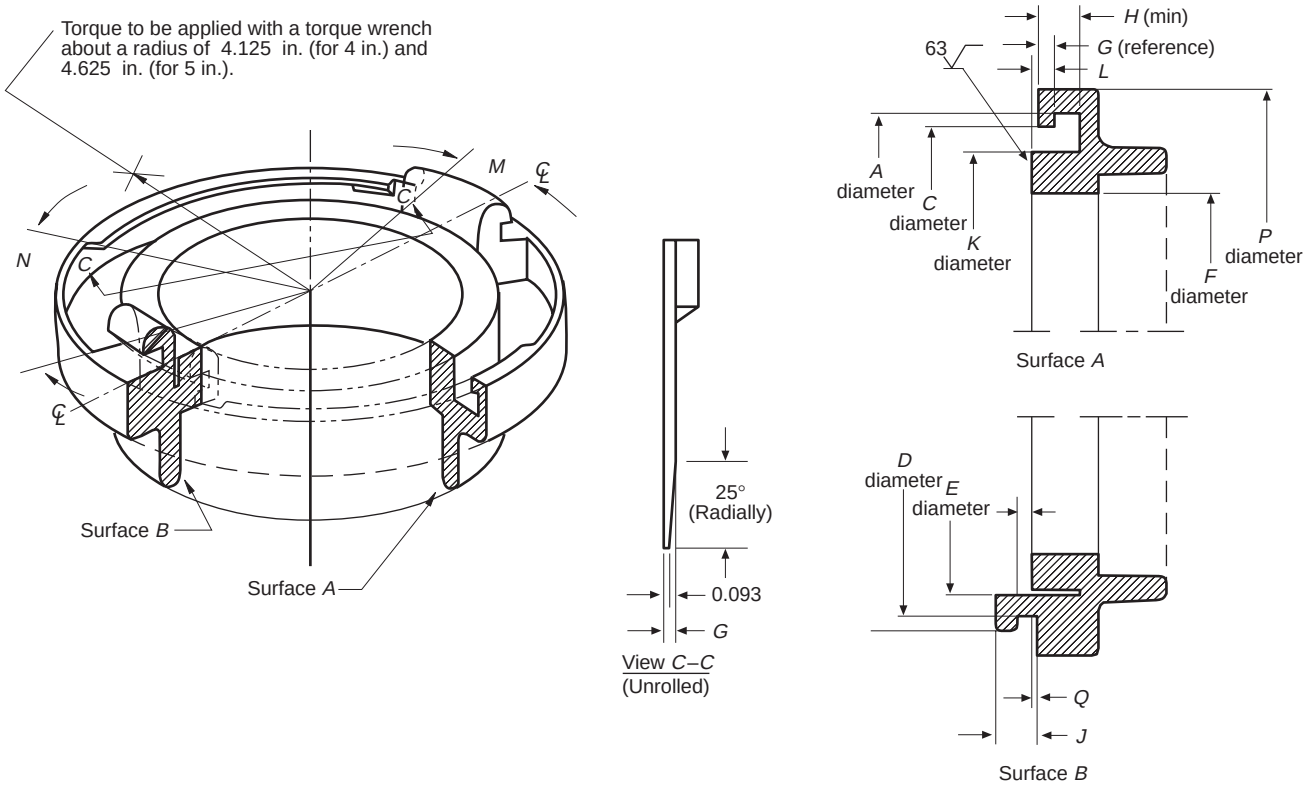
4-2* Gauges. The dimensional characteristics and tolerances for the metal-face gauges to be used in the gauging of nonthreaded connections shall be as specified in Figure 4-2(a) for a Type A test gauge and Figure 4-2(b) for a Type B test gauge. In addition, the 4-in. (100-mm) metal-face gauge shall meet the dimensional characteristics of Figure 4-2(c), and the 5-in. (125-mm) metal-face gauge shall beet the dimensional characteristics of Figure 4-2(d).



Size	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*P*	*Q*
4 in.	5.500	5.472	5.197	5.118	4.528	3.500	0.190	0.576	0.236	0.532	4.500	0.2130	15°	35°	6.142	0.0230
5 in.	6.957	6.929	6.575	6.496	5.826	4.500	0.220	0.653	0.295	0.622	5.750	0.2575	16°	36°	7.717	0.0375

Note 1: All linear measurements in inches. Tolerances: .XXXX = ±.002 in.
Note 2: All dimensions are to be the same for similar configurations on the gauge.

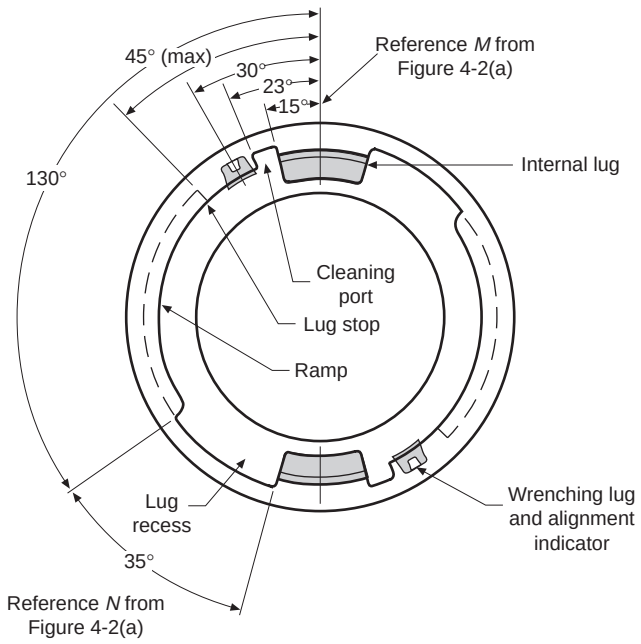
Figure 4-2(a) Dimensions for Type A test gauge (no ramp angle).



Size	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*P*	*Q*
4 in.	5.500	5.472	5.197	5.118	4.528	3.500	0.190	0.576	0.236	0.532	4.500	0.2130	15°	35°	6.142	0.0230
5 in.	6.957	6.929	6.575	6.496	5.826	4.500	0.220	0.653	0.295	0.622	5.750	0.2575	16°	36°	7.717	0.0375

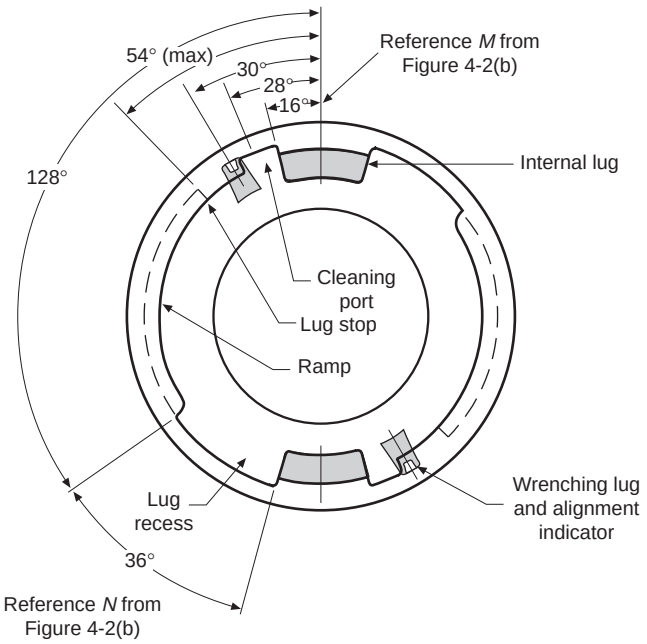
Note 1: All linear measurements in inches. Tolerances: .XXXX = ±.005 in.; .XXX = ±.002 in.
Note 2: All dimensions are to be the same for similar configurations on the gauge.

Figure 4-2(b) Dimensions for Type B test gauge (with lugs removed).



Note: All dimensions are to be the same for similar configurations on the gauge.

Figure 4-2(c) End view of 4-in. (100-mm) metal-face gauge and nonthreaded 4-in (100-mm) connections.



Note: All dimensions are to be the same for similar configurations on the gauge.

Figure 4-2(d) End view of 5-in. (125-mm) metal-face gauge and nonthreaded 5-in (125-mm) connections.

4-3 Locks.

4-3.1* Nonthreaded connections shall be provided with locks within the confines of the nonthreaded connection to ensure against unintentional disconnection.

Exception: Caps for use with nonthreaded connections.

4-3.2 The locks shall be located so that the nonthreaded connection will connect to the Type A metal-face test gauge and lock.

4-3.3 The locks shall be designed so as to lock automatically when connecting two nonthreaded connections without additional action needed to engage the locks. The lock shall not be capable of being secured (mechanically) in the open (unlocked) position.

4-3.4 The locks shall be field repairable.

4-3.5 The locks shall be designed so as to be disengaged by hand in a separate action other than that needed to disconnect the nonthreaded connection. The locks shall be capable of being unlocked by a fire fighter wearing gloves meeting the requirements of NFPA 1971, *Standard on Protective Ensemble for Structural Fire Fighting*. A device such as a wrench incorporating both actions in one motion shall be permitted to be used.

4-3.6 The lock mechanism shall not shear when a force of 300 lb × ft (407 N × m) is applied at the nut on the test wrench.

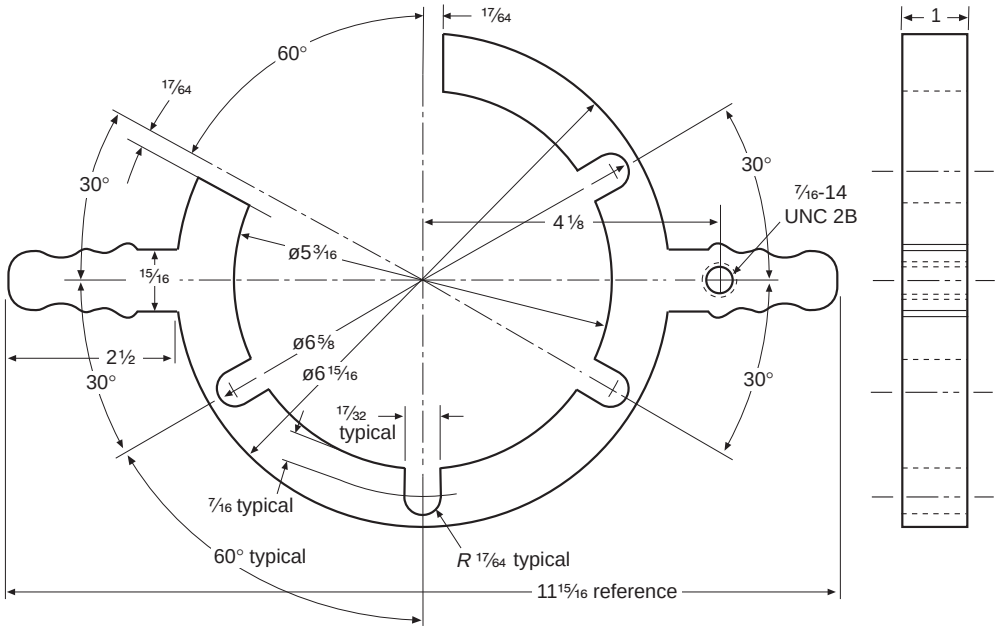
4-4 Indicators. Permanent indicators, obvious to sight and touch, shall be located at two points 180 degrees apart as shown on Figures 4-2(c) and 4-2(d) to indicate the fully engaged position of the connections.

4-5 Force to Connect and Disconnect Requirements.

4-5.1* All nonthreaded pressure connections shall be capable of connection and disconnection to both the Type A and the Type B metal-face test gauges at a force of between 6.0 lb × in. (0.68 N × m) and 30 lb × in. (3.4 N × m) when measured as described in 4-5.3 and under the conditions described in 4-5.4. The force to connect and disconnect nonthreaded pressure connections to each other shall not exceed 40 lb × in. (4.5 N × m) when measured as described in 4-5.3 and under the conditions described in 4-5.4.

4-5.2 All nonthreaded suction connections shall be capable of connection and disconnection to both the Type A and the Type B metal-face test gauges at a force of between 168 lb × in. (19.0 N × m) and 312 lb × in. (35.3 N × 4-5.3 and under the conditions described in 4-5.4. The force to connect and disconnect nonthreaded suction connections to each other shall not exceed 360 lb × in. (40.7 N × m) when measured as described in 4-5.3 and under the conditions described in 4-5.4.

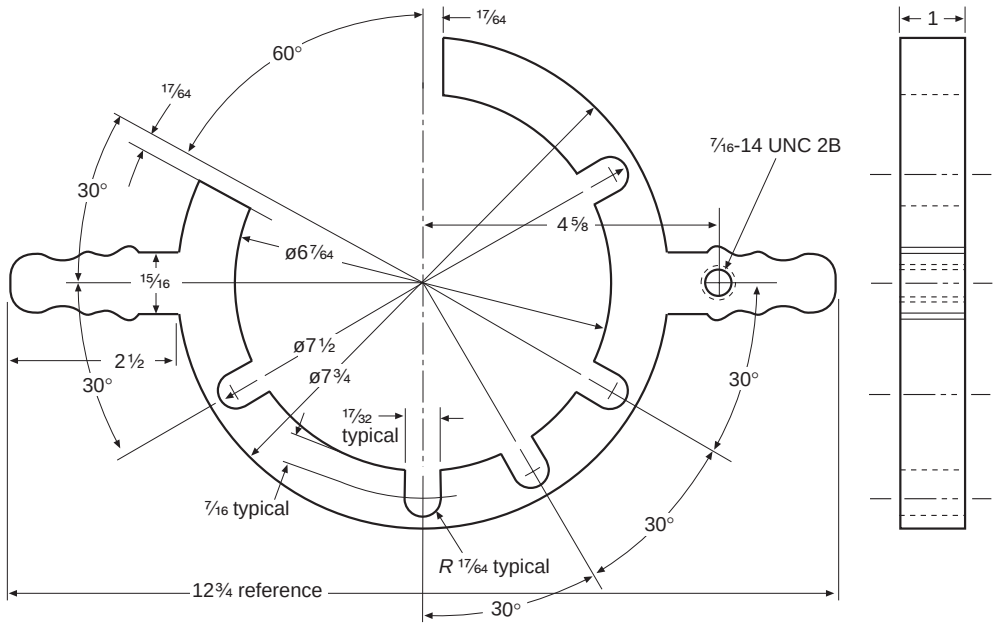
4-5.3* The force to connect and disconnect shall be tested as follows. One of the metal-face test gauges, or one-half of a pressure or suction connector, depending on the force to be checked, shall be secured in a vise or similar device. The connector to be tested shall be free to turn without constraint or assistance. For 4-in. (100-mm) connectors, a test wrench with dimensions as shown in Figure 4-5.3(a) shall be attached over the external lugs of the connector being tested. For 5-in. (125-mm) connectors, a test wrench with dimensions as shown in Figure 4-5.3(b) shall be attached over the external lugs of the connector to be tested. A standard torque wrench measuring inch pounds shall be connected to the test wrench. The torque wrench shall be moved in the direction necessary to connect or disconnect the connector being tested. The lock shall be held open only when the connector is being disconnected. The torque wrench shall be in direct line with the center of the connector when the torque reading is being taken.



Note 1: Use 7/16-14 UNC 2A × 1-in. long hex head cap screw to connect torque wrench socket to.
Note 2: Unless otherwise specified, tolerance shall be decimals: X.XXX ±0.005; fractions: ±1/64.

Drawing units = inches
Angles = ±1/2 degree
125 micro-inch finish on all machine surfaces.
Do not scale drawing.

Figure 4-5.3(a) Test wrench for force to connect test of 4-in. (100-mm) connectors.



Note 1: Use 7/16-14 UNC 2A × 1-in. long hex head cap screw to connect torque wrench socket to.
Note 2: Unless otherwise specified, tolerance shall be decimals: X.XXX ±0.005; fractions: ±1/64.

Drawing units = inches
Angles = ±1/2 degree
125 micro-inch finish on all machine surfaces.
Do not scale drawing.

Figure 4-5.3(b) Test wrench for force to connect test of 5-in. (125-mm) connectors.

4-5.4 The force to connect and disconnect test shall be done at 70°F (21°C) ambient temperature. The gaskets shall be clean but not lubricated.

4-6 Caps. All nonthreaded caps shall have suction gaskets installed.

4-7 Adapters. All nonthreaded adapters shall have pressure gaskets installed.

4-8 Metal-Face Hydrant Connections. All nonthreaded, metal-face hydrant connections shall be made to the dimensions as specified in Figure 4-8. In addition, 4-in. (100-mm) metal-face hydrant connections shall meet the dimensional characteristics of Figure 4-2(c), and the 5-in. (125-mm) metal-face connections shall meet the dimensional characteristics of Figure 4-2(d).

Chapter 5 Gaskets

5-1 Threaded Coupling Gasket.

5-1.1 Each internal connection shall be provided with a resilient thread gasket that does not leak under normal use when fitted accurately in the seat specified in this standard.

5-1.2 Each thread gasket shall meet the dimensions specified in Table 5-1.2.

5-1.3 The durometer of the thread gasket shall be 70 ± 5 Shore A.

5-2 Nonthreaded Coupling Gaskets.

5-2.1 Each nonthreaded connection shall be fitted with a resilient face gasket that does not leak under normal use.

5-2.2 The durometer of the gasket shall be 70 ± 5 Shore A.

5-2.3 The face gasket shall be either a suction gasket or a pressure gasket, depending on the application in which the coupling is to be used.

5-2.3.1 Pressure gaskets shall be designed to withstand the pressure requirements of Sections 2-6 and 2-10 without leakage. They shall be black in color.

5-2.3.2 Suction gaskets shall be designed to allow couplings equipped with the gasket to meet the requirements of Section 2-11. They shall be gray in color.

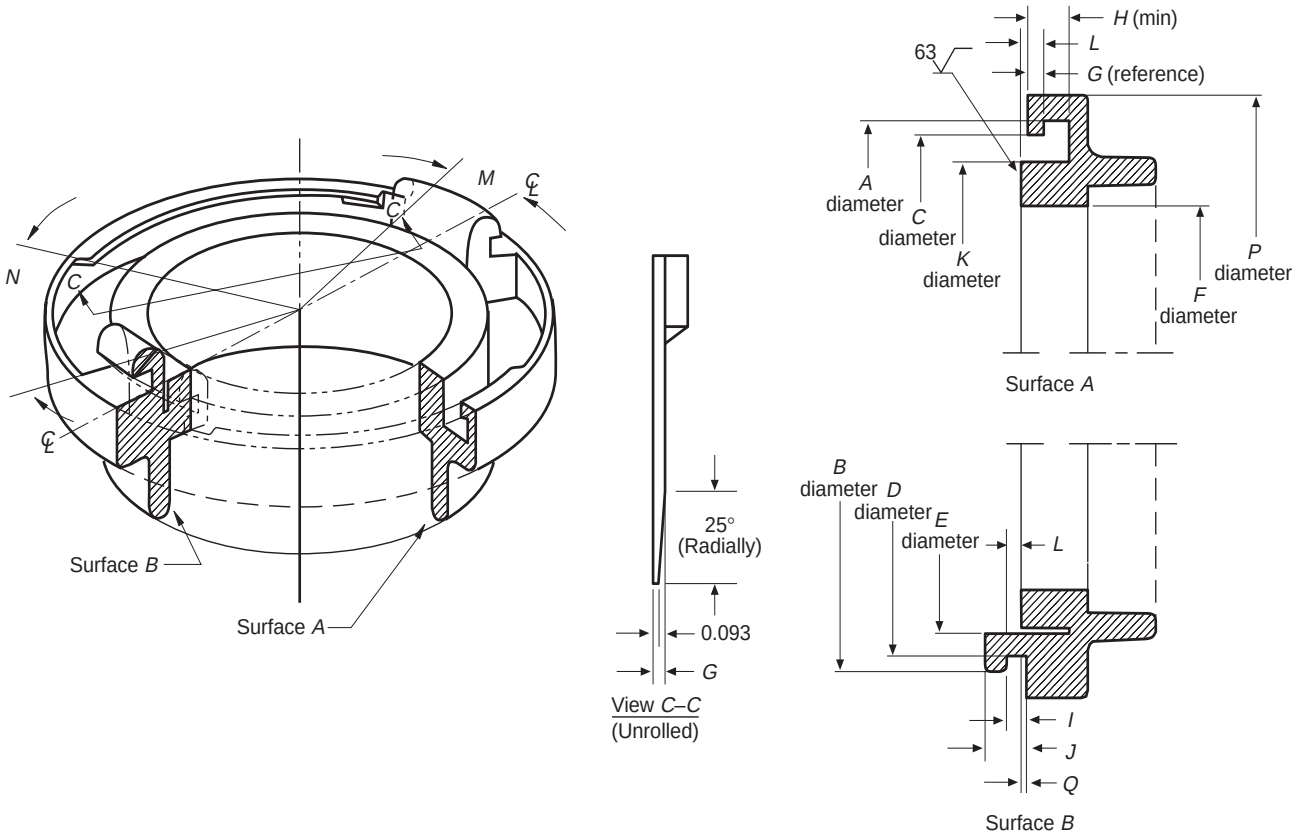
5-3* Tail Gasket. Each coupling that is installed on a fire hose with an expansion ring shall be equipped with a resilient gasket of durometer 60 ± 5 Shore A in the hose bowl that keeps the ends of the fabric of the fire hose dry. The nominal dimensions of these gaskets shall be as follows:

(a) Minimum inside diameter as specified in Table 5-1.2
(b) Outside diameter to accurately fit the recess provided
(c) Thickness $^{3}/_{16}$ in. (4.8 mm) minimum

Table 5-1.2 Dimensions of Thread Gaskets for Standard Internal Threaded Connections

Nominal Size of Connection	Inside Diameter	Outside Diameter	Thickness
$^{3}/_{4}$	$^{13}/_{16}$ (20.6)	1 $^{7}/_{16}$ (36.5)	$^{1}/_{8}$ (3.18)
1	1 $^{1}/_{16}$ (27)	1 $^{7}/_{16}$ (36.5)	$^{1}/_{8}$ (3.18)
1 $^{1}/_{2}$	1 $^{9}/_{16}$ (40)	2 $^{1}/_{16}$ (52)	$^{1}/_{8}$ (3.18)
2 $^{1}/_{2}$	2 $^{9}/_{16}$ (65)	3 $^{3}/_{16}$ (81)	$^{3}/_{16}$ (4.8)
3	3 $^{1}/_{16}$ (78)	3 $^{3}/_{4}$ (95)	$^{1}/_{4}$ (6.4)
3 $^{1}/_{2}$	3 $^{9}/_{16}$ (91)	4 $^{3}/_{8}$ (111)	$^{1}/_{4}$ (6.4)
4	4 $^{1}/_{16}$ (103)	5 $^{1}/_{8}$ (130)	$^{1}/_{4}$ (6.4)
4 $^{1}/_{2}$	4 $^{9}/_{16}$ (117)	5 $^{7}/_{8}$ (149)	$^{1}/_{4}$ (6.4)
5	5 $^{1}/_{16}$ (129)	6 $^{3}/_{8}$ (162)	$^{1}/_{4}$ (6.4)
6	6 $^{1}/_{16}$ (154)	7 $^{1}/_{8}$ (181)	$^{1}/_{4}$ (6.4)

Note: All dimensions are given in inches (mm).



Size	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*P*	*Q*
4 in.	5.500	5.472	5.197	5.118	4.528	3.500	0.190	0.576	0.236	0.532	4.500	0.2130	15°	35°	6.142	0.0230
5 in.	6.957	6.929	6.575	6.496	5.826	4.500	0.220	0.653	0.295	0.622	5.750	0.2575	16°	36°	7.717	0.0375

Note 1: All linear dimensions in inches. Tolerances: .XXXX = ±.002 in.; .XXX = ±.005 in.
Note 2: Attachment to hydrant — as specified by purchaser.
Note 3: All dimensions are to be the same for similar configurations on the hydrant connection.

Figure 4-8 Metal-face hydrant connection showing required dimensions.

Chapter 6 Use of NH Threads and Nonthreaded Connections

6-1* Hose Coupling Threads.

6-1.1* $^3/_4$-in. and 1-in. (19-mm and 25-mm) Hose. All $^3/_4$-in. and 1-in. (19-mm and 25-mm) hose shall be provided with couplings having the 0.75-8 NH standard thread and 1-8 NH standard thread, respectively.

6-1.2 $1^1/_2$-in. through 2-in. (38-mm through 52-mm) Fire Hose. All $1^1/_2$-in. through 2-in. (38-mm through 52-mm) fire hose shall be provided with couplings having the 1.5-9 NH standard thread.

6-1.3 $2^1/_2$-in. (65-mm) Fire Hose. All $2^1/_2$-in. (65-mm) fire hose shall be provided with couplings having the 2.5-7.5 NH standard thread.

6-1.4 3-in. (75-mm) Fire Hose. All 3-in. (75-mm) fire hose shall be provided with couplings having the 2.5-7.5 NH standard thread for interchangeability with $2^1/_2$-in. (65-mm) fire hose.

6-1.4.1 Where interchangeability with $2^1/_2$-in. (65-mm) fire hose is not a factor, the couplings shall be permitted to have the 3-6 NH standard thread.

6-1.5 $3^1/_2$-in. (90-mm) Fire Hose. All $3^1/_2$-in. (90-mm) fire hose shall be provided with couplings having the 3.5-6 NH standard thread.

6-1.5.1 Where interchangeability with 3-in. (75-mm) fire hose or other connections is required, the couplings shall be permitted to have the 3-6 NH standard thread.

6-1.6 4-in. (100-mm) Fire Hose. All 4-in. (100-mm) fire hose shall be provided with couplings having the 4-4 NH standard thread.

6-1.6.1 Where interchangeability with $3^1/_2$-in. (90-mm) fire hose or other connections is required, the couplings shall be permitted to have the 3.5-6 NH standard thread.

6-1.6.2 Where the authority having jurisdiction permits, 4-in. (100-mm) nonthreaded couplings shall be permitted to be used.

6-1.7 $4^1/_2$-in. (114-mm) Fire Hose. All $4^1/_2$-in. (114-mm) fire hose shall be provided with couplings having the 4.5-4 NH standard thread.

6-1.7.1 Where interchangeability with 4-in. (100-mm) fire hose or other connections is required, the couplings shall be permitted to have the 4-4 NH standard thread.

6-1.8 5-in. (125-mm) Fire Hose. All 5-in. (125-mm) fire hose shall be provided with couplings having the 5-4 NH standard thread.

6-1.8.1 Where interchangeability with $4^1/_2$-in. (114-mm) fire hose or other connections is required, the couplings shall be permitted to have the 4.5-4 NH standard thread.

6-1.8.2 Where the authority having jurisdiction permits, 5-in. (125-mm) nonthreaded couplings shall be permitted to be used.

6-1.9 6-in. (150-mm) Fire Hose. All 6-in. (150-mm) fire hose shall be provided with couplings having the 6-4 NH standard thread.

6-1.9.1 Where interchangeability with 5-in. (125-mm) fire hose or other connections is required, the couplings shall be permitted to have the 5-4 NH standard thread.

6-1.10* Hard Suction Hose. Hard suction hose shall be provided with couplings having the NH standard thread compatible with the nominal size of the hard suction hose.

6-2* Connections for Fire Service Nozzles for Handlines.

6-2.1 Playpipes for connecting shutoff nozzles to $2^1/_2$-in. (65-mm) fire hose shall have the 2.5-7.5 NH standard thread at the base or primary inlet and the 1.5-9 NH standard thread at the discharge end, as shown in Figure 6-2.1.

6-2.2 Nozzle shutoff valves for either $2^1/_2$-in. (65-mm) nozzles or $1^1/_2$-in. (38-mm) nozzles shall have the 1.5-9 NH standard thread for both the inlet and discharge sides of the valve, as shown in Figure 6-2.1 for $1^1/_2$-in. (38-mm) and Figure 6-2.2 for $2^1/_2$-in (65-mm).

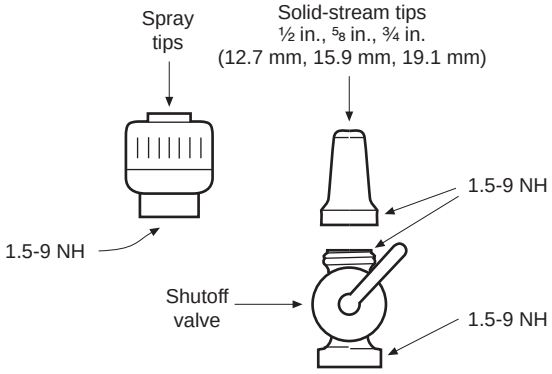


Figure 6-2.1 Nozzle assembly for $1^1/_2$-in. (38-mm) hose.

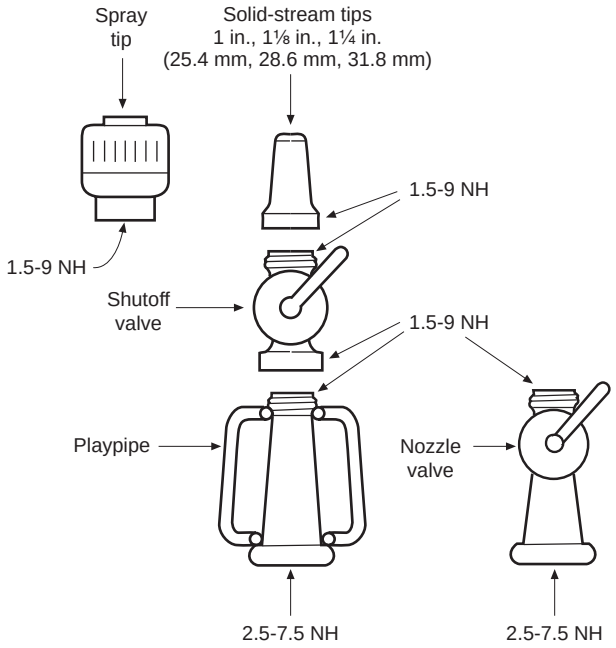


Figure 6-2.2 Nozzle assembly for $2^1/_2$-in. (65-mm) hose.

6-2.2.1 Where the valve is an integral nondetachable part of a $2^1/_2$-in. (65-mm) playpipe, the 1.5-9 NH standard thread shall be provided only on the discharge side of the valve.

6-2.3 All nozzles used on booster hose shall have the 1-8 NH standard thread.

6-2.4 All nozzle tips for use on $2^1/_2$-in. (65-mm) and $1^1/_2$-in. (38-mm) nozzles shall have the 1.5-9 NH standard thread.

6-2.5* All spray nozzles with a shutoff valve for use on $1^1/_2$-in. (38-mm) and $2^1/_2$-in. (65-mm) hose where flows at rated pressure do not exceed 400 gpm (1600 L/min) shall have at least 1.5-9 NH standard thread at the internal connection.

6-3 Connections for Large Stream Devices.

6-3.1* Primary Inlet. At least one inlet connection on each fire department large stream device equipped with multiple primary inlets (other than devices piped permanently to a pump) shall be fitted with at least one female swivel connection, which shall have 2.5-7.5 NH standard thread as shown in Figures 6-3.2.1 and 6-3.2.2. An adapter shall be permitted to be provided to meet this intent.

6-3.2* Subsequent Connections.

6-3.2.1 Discharge ends of large stream devices designed to discharge from 400 to 1250 gpm (1600 to 5000 L/min) shall have the 2.5-7.5 NH standard thread for attaching nozzle tips or spray nozzles. If stacked tips are used, one of these tips shall have the 1.5-9 NH standard thread as shown in Figure 6-3.2.1.

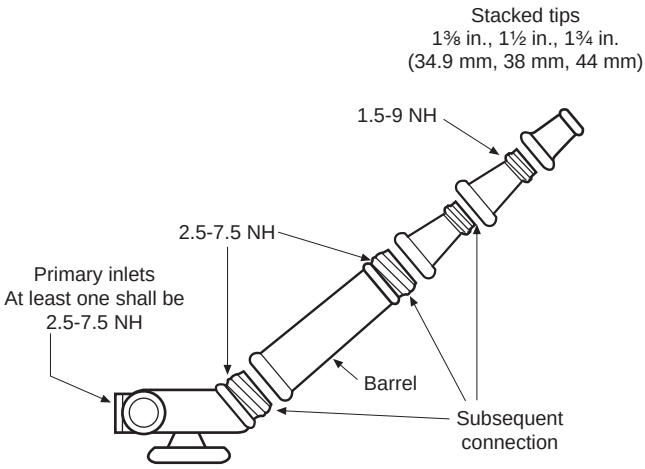


Figure 6-3.2.1 Large stream device rated under 1250 gpm (5000 L/min).

6-3.2.2 Discharge ends of large stream devices designed to discharge in excess of 1250 gpm (5000 L/min) but less than 3000 gpm (12,000 L/min) shall have the 3.5-6 NH standard thread for attaching nozzle tips or spray nozzles. However, all such large-capacity appliances shall be provided with a reducer fitting, 3.5-6 NH female × 2.5-7.5 NH male. A stacked tip meeting the requirements of 6-3.2.5 and having the male 2.5-7.5 NH standard thread as an integral component shall be accepted as meeting this requirement as shown in Figure 6-3.2.2.

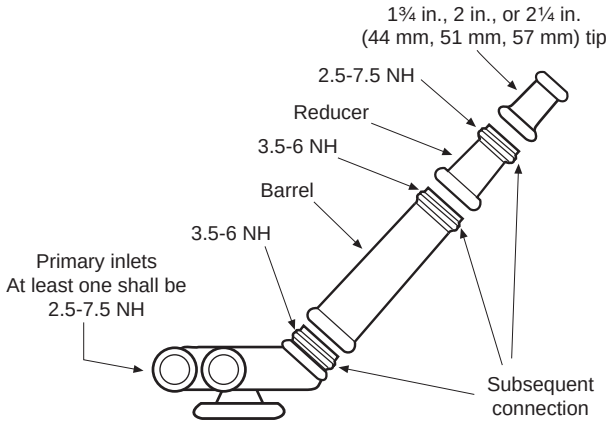


Figure 6-3.2.2 Large stream device rated over 1250 gpm (5000 L/min) but less than 3000 gpm (12,000 L/min).

6-3.2.3 Straight tip and spray nozzle tips that are designed to discharge flows between 400 and 1250 gpm (1600 and 5000 L/min) shall have 2.5-7.5 NH inlet thread.

6-3.2.4 Straight tip and spray nozzle tips designed to discharge flows above 1250 gpm (5000 L/min) but less than 3000 gpm (12,000 L/min) shall have 3.5-6 NH inlet thread.

6-3.2.5 Subsequent connections, straight tips, and spray nozzle tips on large stream devices over 3000 gpm (12,000 L/min) shall have an NH standard thread consistent with the nominal inlet or outlet size.

Chapter 7 Referenced Publications

7-1 The following documents or portions thereof are referenced within this standard as mandatory requirements and shall be considered part of the requirements of this standard. The edition indicated for each referenced mandatory document is the current edition as of the date of the NFPA issuance of this standard. Some of these mandatory documents might also be referenced in this standard for specific informational purposes and, therefore, are also listed in Appendix C.

7-1.1 NFPA Publication. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 1971, *Standard on Protective Ensemble for Structural Fire Fighting*, 1997 edition.

7-1.2 ANSI Publication. American National Standards Institute, 11 West 42nd Street, 13th floor, New York, NY 10036.

ANSI/ASME B1.2, *Gages and Gaging for Unified Inch Screw Threads*, 1983.

7-1.3 ASTM Publications. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 30, *Standard Specification for Copper-Brass Alloys in Ingot Form*, 1996.

ASTM B 117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*, 1995.

ASTM B 584, *Standard Specification for Copper Alloy Sand Castings for General Applications*, 1996.

ASTM D 395, *Standard Test Methods for Rubber Property — Compression Set*, 1989.

ASTM D 573, *Standard Test Method for Rubber Deterioration in an Air Oven*, 1988.

ASTM D 3183, *Standard Practice for Rubber — Preparation of Pieces for Test Purposes from Products*, 1984.

Appendix A Explanatory Material

Appendix A is not a part of the requirements of this NFPA document but is included for informational purposes only. This appendix contains explanatory material, numbered to correspond with the applicable text paragraphs.

A-1-1 Some fire-fighting organizations use small hose less than $^{3}/_{4}$ in. (19 mm) nominal diameter fitted with garden hose couplings. Such couplings should have 0.75-11.5 NH (garden hose thread) threads conforming to ANSI/ASME B1.20.7, *Standard on Hose Coupling Screw Threads.*

A-1-3 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A-1-3 Authority Having Jurisdiction. The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A-2-1 Figure A-2-1(a) shows an expansion ring coupling set for a set of threaded couplings. Figure A-2-1(b) shows a typical nonthreaded fire hose connection that connects to the fire hose with a tailpiece and external reattachable collar

A-3-2 American National Fire Hose Connection Screw Threads are also sometimes known by the abbreviations NST and NS.

A-3-6.3 See Figure A-3-6.3.

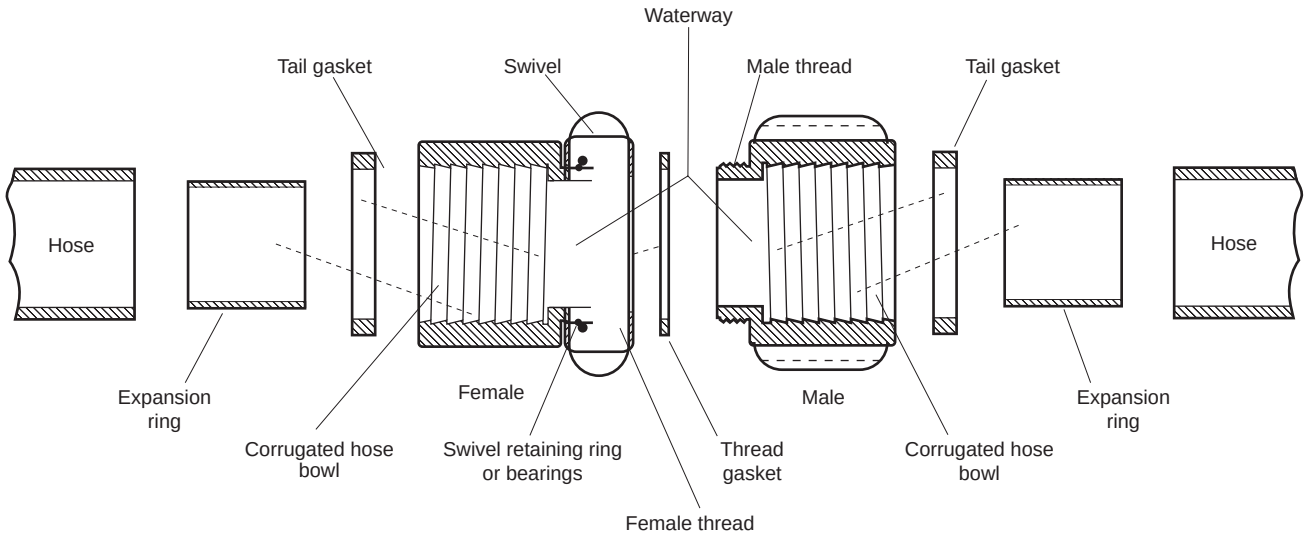


Figure A-2-1(a) An expansion ring coupling set.

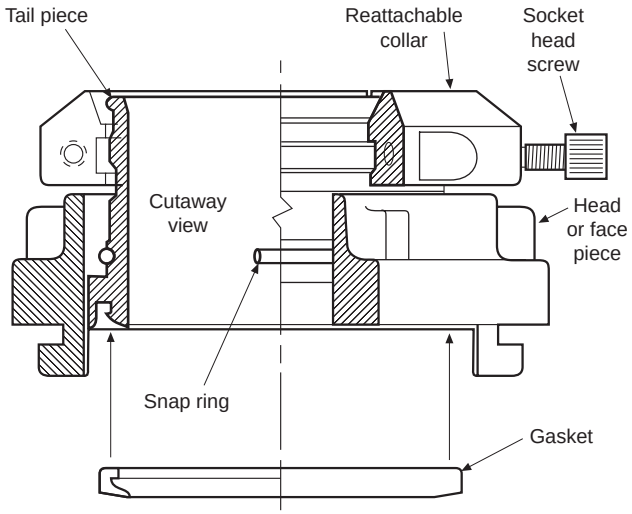
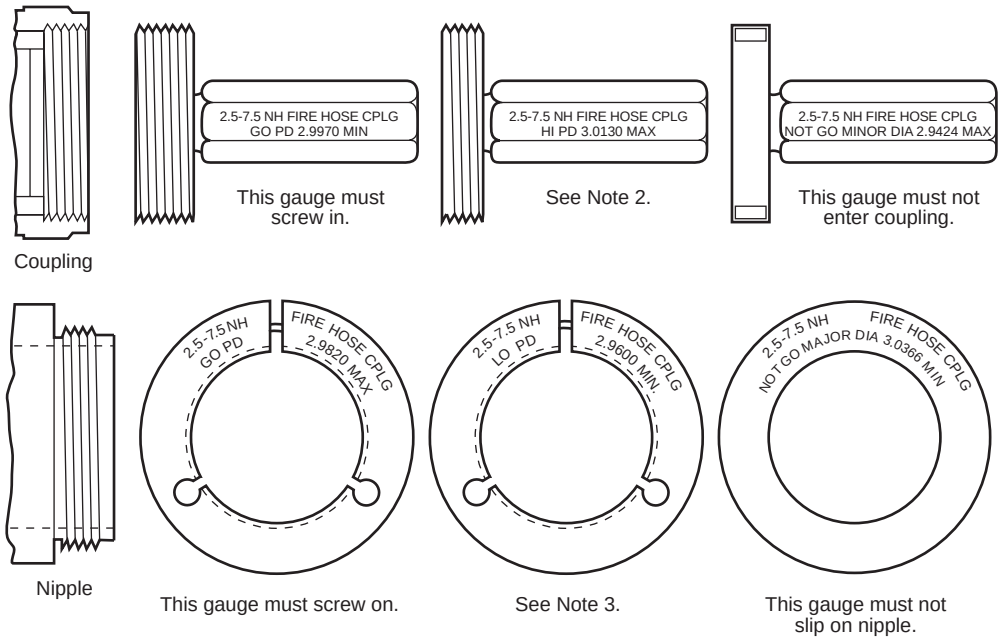


Figure A-2-1(b) A nonthreaded fire hose connection.



[See Tables 3-6.1(b) and 3-6.1(c) for complete dimensions for these gauges.]

Note 1: The GO plain ring gauge and the GO plain plug gauge have not been included in Figure A-3-6.3 since the sharpness of the crests of the external and internal threads will be considered generally acceptable if the GO thread ring gauge and the GO thread plug gauge assemble on the two mating parts of the coupling.

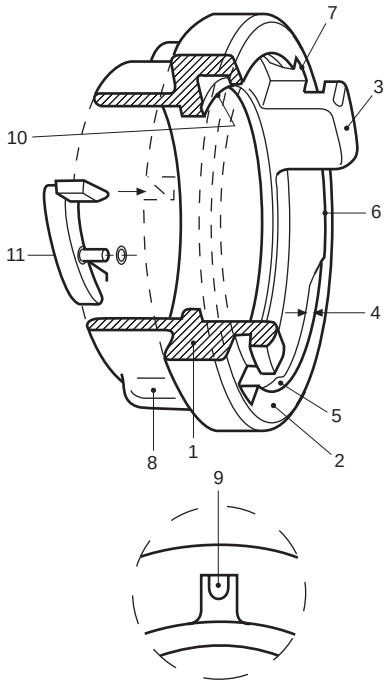
Note 2: Internal threads are acceptable when the HI thread plug is applied to the coupling thread if (a) it does not enter, or if (b) all complete coupling threads can be entered, provided that a definite drag (from contact with the coupling material) results on or before the second turn of entry. The gauge should not be forced after the drag becomes definite.

Note 3: External threads are acceptable when the LO thread ring gauge is applied to the nipple thread if (a) it is not entered, or if (b) all complete nipple threads can be entered, provided that a definite drag (from contact with the nipple material) results from contact on or before the second turn of entry. The gauge should not be forced after the drag is definite.

Figure A-3-6.3 Gauges for 2.5-7.5 NH threads.

A-3-6.4 Note that setting plug gauges is necessary only for setting of adjustable thread ring gauges and for checking solid ring gauges.

A-4-1 Figure A-4-1 shows the names of the various parts of a nonthreaded coupling.



Legend:

1. Circumferential O.D.: The largest outer diameter of connection that protects the connection from damage.
2. Coupling face: The front part of the connection from which dimensions are developed.
3. Internal lug: The two internal lugs with recesses that fit on the ramp under the face of the cam head.
4. Ramp: The inclined plane under the face of the cam head that, when turned clockwise, increases pressure on lip seals.
5. Lug stop: The stop at the end of the ramp that the internal lug comes against.
6. Lug recess: Recessed area where opposite internal lugs enter the ramp.
7. Cleaning port: Area on end of connection face where dirt is pushed in by mating lug.
8. External wrenching lug: The external ribs or lugs on back diameter of connection head.
9. External wrenching lug indicator: The identification on rib or lug that, when lined up together, indicates the connection is fully engaged.
10. Tail place recess: The recess counterbore on the interface of the cam head that the tail piece rides in.
11. Lock: To keep the connection from becoming unintentionally disengaged.

Figure A-4-1 Diagram of a nonthreaded connection.

A-4-2 The Type A test gauge checks the distance from under the high point of the two ramps of a nonthreaded connection to the corresponding connection's gasket face, which is at the centerline between the gauge and the connection when they are connected. The Type B test gauge checks the distance from under the two lugs of a nonthreaded connection to the corresponding connection's gasket face, which is at the centerline between the gauge and the connection when they are connected.

A-4-3.1 During the transition in a fire department from couplings without locks to couplings with locks, there will be times when hose will be coupled together with one coupling being a locking type and the other a nonlocking type. Consideration should be given to painting a ring in a distinctive color on the hose near the couplings with locks to alert the fire fighter to the presence of the lock. Disconnection procedures are different for couplings with locks.

A-4-5.1 The forces defined in this requirement are intended to provide nonthreaded connections that are able to be connected and disconnected easily by hand and without the use of wrenches when the connectors are not under pressure.

A-4-5.3 Figure A-4-5.3 shows an example of the setup and location of the torque wrench, test wrench, nonthreaded connector, and test gauge.

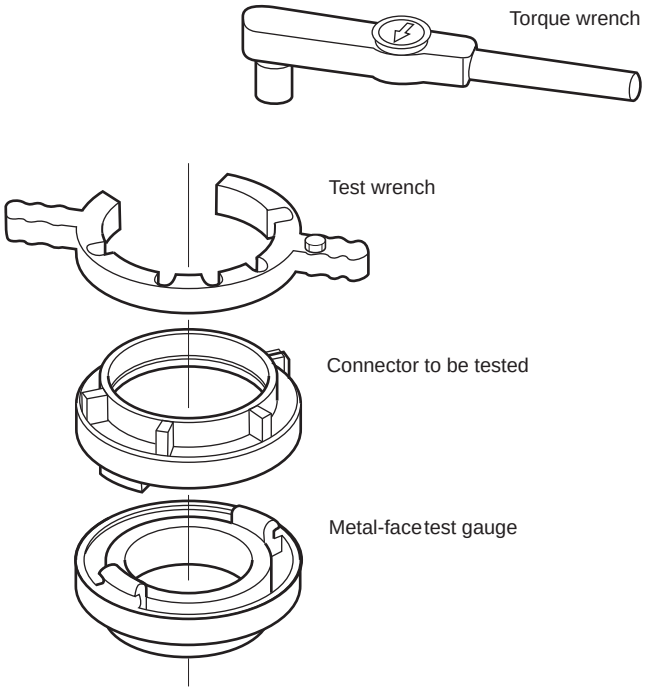


Figure A-4-5.3 Arrangement for testing nonthreaded connections.

Other methods of measuring force to connect can be used if the methods of measurement produce the same results. A second method of testing the force to connect and disconnect against the test gauges is to fit the metal-face gauge with a plug that has a hex head connection for the torque wrench on the back side of the gauge at the center of rotation. The nonthreaded connector to be tested is then held stationary in a vise or similar device, and the metal-face gauge is mated to the nonthreaded connection with the torque wrench measuring the amount of force to connect and disconnect the two parts. When the force is measured at any point other than as defined in 4-5.3, the acceptable range of force values will need to be calculated for the position of the torque wrench.

A-5-3 It is important when ordering couplings and tail gaskets for recoupling hose with expansion ring couplings that the appropriate tail gasket be provided. The coupling manufac-

turer needs the outside diameter of the hose and the wall thickness of the hose to provide the proper coupling and gasket. Also, the length of the expansion ring must be consistent with the length of the coupling bowl.

A-6-1 Where local fire hose coupling threads are not standard, swivel adapters, with the NH female thread and the local male thread, and with the local female thread and the NH male thread, should be carried on the apparatus, stored in hose houses, and so forth.

A-6-1.1 See A-1-1.

A-6-1.10 Where the hydrant connections have local threads, adapters with the NH male thread and the local female thread for intake supply hose, and the NH female thread and the local female thread for hard suction hose, should be provided. Where in-service hard suction hose has couplings that are of a different size, or has threads other than the NH standard, an adapter to the proper size and to the NH standard thread should be provided and attached to the hard suction hose couplings. *(See Figure A-6-1.10.)*

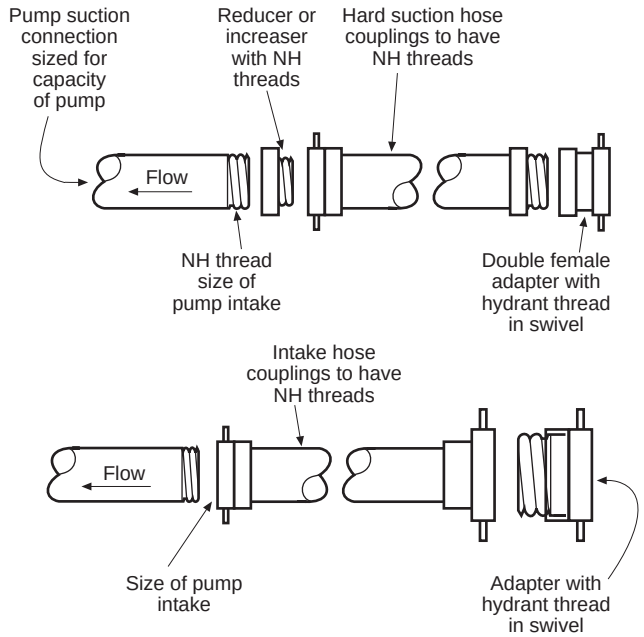


Figure A-6-1.10 Suction inlet for local threads.

A-6-2 Connections with NH threads covered in 6-2.1 through 6-2.5 should have adapters with the internal local thread preconnected to the appliance.

The various subsequent connections on a fire service nozzle are designed with standard NH thread to allow the nozzle tip to be removed and hose connected to extend the line. This operation is particularly beneficial when the attack starts with large hand-held lines, and these are later reduced to smaller lines for overhaul.

A-6-2.5 The use of the specified size thread makes it possible to attach these nozzles to any standard $2^1/_2$-in. (65-mm) and $1^1/_2$-in. (38-mm) playpipe or shutoff valve and also to advance the nozzle by connecting $1^1/_2$-in. (38-mm) hose between the spray nozzle and the valve.

A-6-3.1 Fire department large stream devices with a single large diameter input are designed to rely on the positioning of the hose as part of the stability for the device. The manufacturer's instructions for use should be carefully followed with all large stream devices. A device designed with a single hose line inlet system is different from a device designed with a multiline inlet system, and trying to supply one device with adapters and fittings from different size hose can create a dangerous situation.

A-6-3.2 A flow of 400 gpm (1600 L/min) is the maximum normally obtained with a handline nozzle using a standard $1^1/_4$-in. (31.8-mm) straight tip nozzle. A flow of 1250 gpm (5000 L/min) is the maximum normally obtained with a portable turret nozzle using a 2-in. (51-mm) straight tip nozzle.

Appendix B History of Fire Hose Coupling Thread Standardization in the United States

This appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

The need for securing uniformity and interchangeability of fire hose coupling threads was demonstrated by the Boston conflagration of November 1872. The following year, standardization was proposed by the International Association of Fire Engineers (IAFE), now the International Association of Fire Chiefs (IAFC). In subsequent years, various suggested standard threads were considered. A special committee of the IAFE prepared a report adopted by its 1891 convention in which the present principal dimensions for $2^1/_2$-in. fire hose coupling screw threads were suggested, but no specifications for the shape of thread were included.

Little more was done toward standardization until difficulties with nonstandard threads were encountered by fire departments called to assist at the Baltimore conflagration of 1904. The following year the National Fire Protection Association (NFPA) took up the project actively, appointing a Committee on Standard Thread for Fire Hose Couplings. In that year this committee developed general screw thread specifications covering the $2^1/_2$-in., 3-in., $3^1/_2$-in., and $4^1/_2$-in. sizes, using as a basis the earlier report of the IAFE committee and working with the active cooperation of the American Water Works Association (AWWA). The principal dimensions for the $2^1/_2$-in. couplings of $7^1/_2$ threads per inch and $3^1/_{16}$-in. outside diameter of the external thread (ODM) were selected to facilitate conversion of existing couplings, the majority of which had either seven or eight threads per inch, and 3-in. or $3^1/_3$-in. ODM.

During the years that followed until 1917, this committee worked diligently to secure recognition of these specifications as a "National Standard" and their adoption by cities and towns throughout the United States. Its efforts were rewarded with considerable success, and, in addition, as many as 20 organizations officially approved and adopted the standard. It was also published by the National Board of Fire Underwriters (NBFU) in 1911, the American Society of Mechanical Engineers (ASME) in 1913, the U.S. Bureau of Standards as Circular No. 50 (1914 and 1917), and the AWWA.

Between 1920 and 1923, a series of conferences were held that were attended by representatives of the manufacturers of fire hose couplings, the National Board of Fire Underwriters, the National Screw Thread Commission (NSTC), and the

ASME. These resulted in an agreement concerning the standardization of screw thread tolerances, allowances, and methods of gauging. Efforts to bring about the general adoption of the standard throughout the country were continued.

In October 1923, NBFU, NFPA, and ASME requested the American Standards Association (ASA) to approve and designate this standard as an "American Standard." Shortly after that date, ASA assigned joint sponsorship for the project to NBFU, AWWA, and ASME. At that time, through the cooperation of a group of gauging experts, including members of NSTC, the limiting dimensions were added to the original specifications, and the standard for fire hose coupling screw threads for sizes $2^1/_2$-in. and larger was approved by the ASA in May 1925.

In 1917, by mutual agreement, the field work of the NFPA committee concerned with encouraging adoption and application of the standard was taken over by a Committee on Fire Prevention and Engineering Standards of the NBFU. At the same time, NFPA organized a Committee on Small Hose Couplings to develop standards on fire hose screw threads in sizes from $^1/_2$-in. to 2-in. nominal diameters. A standard covering these sizes was developed and adopted by NFPA in 1922. These smaller size couplings had the same general characteristics of thread design as the standard couplings for $2^1/_2$-in. and larger hose. The NFPA's Standard for Small Hose Coupling Screw Threads was submitted to the ASA for approval in 1926 and is the basis for the current fire hose screw thread dimensions included in this standard.

The National Screw Thread Commission also had prepared dimensions for the screw threads of small hose couplings $^1/_2$-in. to 2-in., inclusive, which were published in 1921, 1924, and 1928 reports. The pitches and other dimensions of these threads, except for the garden hose size, varied from those proposed by the NFPA for use on fire hose, which requires a heavier thread that can be connected quickly in the field.

In January 1927, the ASME requested the ASA to authorize the organization of a sectional committee to complete the standardization of fire hose couplings and to attempt to unify and complete the dimensions of small hose couplings. A sectional committee was organized in October 1928, under the sponsorship of the ASME, to prepare specifications for screw threads for small hose couplings ranging from $^1/_2$-in. to 2-in. nominal size. Data on these smaller threads were published by ASA.

Subsequently, it was found that almost every pump manufacturer was using different threads on 4-in., 5-in., and 6-in. supply hose and fittings required on certain sizes of fire department pumping engines so that the supply hose from one pumper could not be used on another pumper at the same time. Accordingly, in 1955, NFPA adopted standards for threads on these three sizes of fire hose.

In 1956, NFPA adopted dimensions for gaskets for standard fire hose couplings of all sizes from $^3/_4$-in. to 6-in. couplings, as well as data on the required gasket seat dimensions. Gaskets were felt to be an essential feature of a fire hose coupling standard because hose connections feature swivel or "female" fittings that must provide a tight waterway when connected to the opposing thread.

NFPA also prepared a text showing the suggested application of the standard to various items of fire-fighting equipment because experience had shown that the wrong size of standard thread was sometimes used, limiting the effectiveness of the equipment.

In 1961, the duties of the ASA sectional committee were transferred to a newly established subcommittee of the ASA Sectional Committee on the Standardization of Pipe Threads, for which the ASME and the American Gas Association (AGA) were joint sponsors. The subcommittee was organized to deal with threads for fire hose couplings and fittings.

A survey conducted by NFPA in 1965 showed that 65 percent of the fire departments serving U.S. communities of over 20,000 population use standard fire hose coupling screw threads on all sizes of hose. The percentage using standard threads on the following sizes were: $^3/_4$-in. and 1-in. threads, 95 percent standard; $^1/_2$-in. threads, 84 percent standard; $2^1/_2$-in. threads, 73 percent standard. The degree of standardization is believed to be considerably higher in smaller communities, many of which organized their fire departments subsequent to the adoption of the standard. Approximately half of the U.S. states have laws supporting fire hose thread standardization.

In 1965, at its 69th annual meeting, the NFPA passed a resolution to intensify its efforts to accomplish complete standardization of fire hose screw threads throughout the country by asking for assistance from all fire chiefs, fire organizations, industrial organizations, manufacturers, and governmental agencies.

The NFPA, the IAFC, the International Association of Fire Fighters, the American National Standards Institute, the AWWA, and many others have assisted on the standardization program.

In 1967, the NFPA revised NFPA 194, *Standard for Screw Threads and Gaskets for Fire Hose Couplings,* to include the new material available from the ASA subcommittee. Several editorial changes were adopted in 1968.

Appendix C Referenced Publications

C-1 The following documents or portions thereof are referenced within this standard for informational purposes only and are thus not considered part of the requirements of this standard unless also listed in Chapter 7. The edition indicated here for each reference is the current edition as of the date of the NFPA issuance of this standard.

C-1.1 NFPA Publication. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 194, *Standard for Screw Threads and Gaskets for Fire Hose Couplings,* 1967.

C-1.2 ANSI Publication. American National Standards Institute, 1430 Broadway, New York, NY, 10018.

ANSI/ASME B1.20.7, *Standard on Hose Coupling Screw Threads,* 1991.

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