

NFPA®

1963

**Standard for
Fire Hose Connections**

2019



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NFPA® 1963

Standard for

Fire Hose Connections

2019 Edition

This edition of NFPA 1963, *Standard for Fire Hose Connections*, was prepared by the Technical Committee on Fire Hose. It was issued by the Standards Council on November 5, 2018, with an effective date of November 25, 2018, and supersedes all previous editions.

This edition of NFPA 1963 was approved as an American National Standard on November 25, 2018.

Origin and Development of NFPA 1963

The development of a standard for screw threads and gaskets for fire hose connections began over 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 11 standard sizes of threaded connections from 3/4 in. to 8 in. (19 mm to 200 mm).

See Annex B for a detailed history of fire hose coupling thread standardization in the United States.

In recent history, editions of this standard were published in 1979, 1985, 1993, 1998, and 2003. The 1979 edition included metric conversion figures where applicable. Also, the number designation of the document was changed from NFPA 194 to NFPA 1963. Changes in 1985 were editorial.

The 1993 edition was a major expansion of the standard. A new chapter was added to cover general requirements for couplings and adapters. Another was added to cover nonthreaded connections in the 4 in. and 5 in. (100 mm and 125 mm) sizes. New material was added to the chapter on gaskets to cover 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 because requirements addressing those threads 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 the 1998 edition, the requirement for locks on caps used with nonthreaded couplings was removed, and some editorial revisions were made to the document.

The 2003 edition added dimensioning for an 8 in. (200 mm) NH thread. Format revisions were made to meet the requirements of the *Manual of Style for NFPA Technical Committee Documents*.

The 2009 edition permitted the use of pressure-only gaskets in nonthreaded caps for known pressure-only applications.

For the 2014 edition, the committee brought the equations into conformity with the *Manual of Style for NFPA Technical Committee Documents*. The committee also permitted all nonthreaded adapters to have gaskets but not necessarily pressure gaskets.

For the 2019 edition, the committee added many new requirements that were in NFPA 1965 because the committee is withdrawing NFPA 1965. A thorough comparison of NFPA 1963 and NFPA 1965 was completed by the committee and, where applicable, those requirements that were in NFPA 1965 that would pertain to NFPA 1963 were added to NFPA 1963. Given the amount of material that was moved from NFPA 1965 to NFPA 1963 for the 2019 edition, it would be best to refer to the document information page at www.nfpa.org for all of the specific added requirements.

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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.

Contents

Chapter 1 Administration	1963- 4	5.2 Thread Series Designation.	1963- 8
1.1 Scope.	1963- 4	5.3 Dimensions of American National Fire Hose Connection Screw Threads (NH).	1963- 9
1.2 Purpose.	1963- 4	5.4 Thread Dimensions.	1963- 9
1.3 Application.	1963- 4	5.5 Tolerance.	1963- 9
Chapter 2 Referenced Publications	1963- 4	5.6 Gauges and Gauging NH Threads.	1963- 12
2.1 General.	1963- 4	Chapter 6 Nonthreaded Connections	1963- 15
2.2 NFPA Publications.	1963- 4	6.1 General.	1963- 15
2.3 Other Publications.	1963- 4	6.2 Gauges.	1963- 15
2.4 References for Extracts in Mandatory Sections.	1963- 5	6.3 Locks.	1963- 15
Chapter 3 Definitions	1963- 5	6.4 Indicators.	1963- 16
3.1 General.	1963- 5	6.5 Force to Connect and Disconnect.	1963- 16
3.2 NFPA Official Definitions.	1963- 5	6.6 Caps.	1963- 17
3.3 General Definitions.	1963- 5	6.7 Adapters.	1963- 17
Chapter 4 General Coupling and Adapter Requirements	1963- 5	6.8 Hydrant and Fire Department Connections. .	1963- 17
4.1 Workmanship.	1963- 5	Chapter 7 Gaskets	1963- 19
4.2 Materials.	1963- 5	7.1 Threaded Coupling Gasket.	1963- 19
4.3 Minimum Waterway.	1963- 6	7.2 Nonthreaded Connection Gaskets.	1963- 19
4.4 Gasket Groove.	1963- 6	7.3 Tail Gasket.	1963- 19
4.5 Testing.	1963- 6	Chapter 8 Use of NH Threads and Nonthreaded Connections	1963- 20
4.6 Internal Strength.	1963- 6	8.1 Hose Coupling Threads.	1963- 20
4.7 Tensile Strength.	1963- 6	8.2 Connections for Fire Service Nozzles for Handlines.	1963- 20
4.8 Connect/Disconnect Capability.	1963- 6	8.3 Connections for Large-Stream Devices.	1963- 21
4.9 Rough Usage.	1963- 6	Annex A Explanatory Material	1963- 22
4.10 Coupling Retention.	1963- 7	Annex B History of Fire Hose Coupling Thread Standardization in the United States	1963- 26
4.11 Vacuum Tightness.	1963- 7	Annex C Informational References	1963- 27
4.12 Corrosion Resistance.	1963- 7	Index	1963- 28
4.13 Nonmetallic Materials.	1963- 7		
4.14 High-Temperature Performance.	1963- 7		
4.15 Low-Temperature Performance.	1963- 7		
4.16 Gasket Performance.	1963- 7		
4.17 Marking.	1963- 8		
Chapter 5 Screw Threads for Couplings and Adapters	1963- 8		
5.1 Basic Form of Thread.	1963- 8		

NFPA 1963

Standard for

Fire Hose Connections

2019 Edition

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A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex C.

Chapter 1 Administration

1.1* Scope.

1.1.1 This standard gives the performance and requirements for new fire hose couplings and adapters with nominal sizes from ¾ in. (19 mm) through 8 in. (200 mm) and the specifications for the screw thread connections on those couplings and adapters.

1.1.2 This standard also gives the performance and requirements for the mating surfaces of nonthreaded fire hose couplings and adapters with nominal sizes of 4 in. (100 mm) and 5 in. (125 mm).

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 Application.

1.3.1 The requirements of this standard shall apply to the following coupling and adapters in the sizes defined in Section 1.1.

- (1) Fire hose couplings
- (2) Booster hose couplings
- (3) Suction hose couplings
- (4) Adapters
- (5) Reducers
- (6) Caps
- (7) Plugs
- (8) Connections on fire hose appliances where they attach to fire hose

Δ **1.3.2** The requirements of this standard shall also apply to screw thread connections and nonthreaded mating surfaces on the following devices in the sizes defined in Section 1.1:

- (1) Pump intake connections on fire apparatus
- (2) Pump discharge connections on fire apparatus
- (3) Sprinkler connections
- (4) Standpipe connections
- (5) Hose connections on fire hydrants
- (6) Connections on all other hose fittings and appliances that attach to fire pumps, fire hose, or hydrants

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2018 edition.

2.3 Other Publications.

Δ **2.3.1 ASME Publications.** ASME International, Two Park Avenue, New York, NY 10016-5990.

ASME B1.2, *Gages and Gaging for Unified Inch Screw Threads*, 83rd edition, 1991, reaffirmed 2007.

Δ **2.3.2 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM B30, *Standard Specification for Copper Alloys in Ingot Form*, 2016.

ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*, 2016.

ASTM B584, *Standard Specification for Copper Alloy Sand Castings for General Applications*, 2014.

ASTM D395, *Standard Test Methods for Rubber Property — Compression Set*, 2016.

ASTM D573, *Standard Test Method for Rubber Deterioration in an Air Oven*, 2004, reapproved 2015.

ASTM D3183, *Standard Practice for Rubber — Preparation of Pieces for Test Purposes from Products*, 2010, reapproved 2015.

2.3.3 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2019 edition.

NFPA 1961, *Standard for Fire Hose*, 2013 edition.

NFPA 1964, *Standard for Spray Nozzles*, 2018 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Shall. Indicates a mandatory requirement.

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

3.3 General Definitions.

3.3.1 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.

3.3.1.1 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.

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

3.3.2 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."

3.3.3 Bowl Gasket. See 3.3.8.1.

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

3.3.5 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.

3.3.6 Face Gasket. See 3.3.8.2.

3.3.7 Fire Department Connection. A connection through which the fire department can pump supplemental water into the sprinkler system, standpipe, or other water-based fire protection systems, thereby supplementing existing water supplies. [24, 2019]

3.3.8 Gasket.

3.3.8.1 Bowl Gasket. See *Tail Gasket*.

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

3.3.8.3 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.

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

3.3.9 Large-Stream Device. Any device that discharges water at a flow rate greater than 400 gpm (1600 L/min).

3.3.10 NH. An American National Fire Hose Connection Screw Thread. (See *Section 5.2*.)

3.3.11 Nonthreaded Coupling or Adapter. See 3.3.1.1.

3.3.12 Nozzle.

3.3.12.1 Spray Nozzle. A nozzle intended for connection to a hose line or monitor to discharge water in either a spray pattern or a straight stream pattern as selected by the operator. [1964, 2018]

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

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

3.3.14 Screw Thread Coupling or Adapter. See 3.3.1.2.

3.3.15 Spray Nozzle. See 3.3.12.1.

3.3.16 Straight Tip Nozzle. See 3.3.12.2.

3.3.17 Suction Hose. A hose that is designed to prevent collapse under vacuum conditions so that it can be used for drafting water from below the pump (lakes, rivers, wells, etc.). [1961, 2013]

3.3.18 Tail Gasket. See 3.3.8.3.

3.3.19 Thread Gasket. See 3.3.8.4.

Chapter 4 General Coupling and Adapter Requirements

4.1* Workmanship. The coupling assembly or adapter shall be made and finished in a workmanship-like manner throughout.

4.1.1 All edges shall be chamfered and free from burrs.

4.1.2 Hose bowl or tailpiece lips shall be rounded to prevent damage to the hose.

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

4.3 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 $\frac{1}{4}$ in. (6.4 mm) on couplings of nominal size $2\frac{1}{2}$ in. (65 mm) or less and not more than $\frac{1}{2}$ in. (12.7 mm) on couplings of nominal size greater than $2\frac{1}{2}$ in. (65 mm). Gaskets shall not protrude into the waterway.

4.3.1 The waterway of a size-increasing-style coupling, other than a shank-type coupling, shall be no smaller than the nominal size of the hose to which it is attached.

4.3.2 The waterway of a size-reducing-style coupling, other than a shank-type coupling, shall be no smaller than the nominal size of the attachment face.

4.4 Gasket Groove. All sizes of internal NH threaded couplings, connections, or adapters shall have a standard gasket groove diameter as shown in Table 5.4.2, column K. (See also Figure 5.1.5.1, dimension K.)

4.5 Testing. Tests required by this standard shall be conducted by the manufacturer or by an approved testing facility designated by the manufacturer.

4.5.1 All tests shall be conducted on standard commercially available product.

4.5.2 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.

4.6 Internal Strength.

4.6.1 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 ($\frac{1}{2}$ ml per minute), and three times the service test pressure plus 100 psi (690 kPa) without separation. It shall be tested in accordance with 4.6.2 to prove compliance.

4.6.2 Internal Strength Test.

4.6.2.1 The coupling or adapter shall be plugged and adapted on one end to accept a pump connection from a hydrostatic test table.

4.6.2.2 The other end shall be plugged or adapted to accept a petcock to remove air.

4.6.2.3 The coupling or adapter shall be filled with water until all air has been exhausted and the petcock closed.

4.6.2.4 Pressure shall be applied until the test pressure is reached.

4.6.2.5 The test pressure shall be held for at least 15 seconds but not more than 60 seconds.

4.7 Tensile Strength.

4.7.1 Couplings shall have a tensile strength of at least 1200 lb/in. (210 N/mm) of diameter. They shall be tested in accordance with 4.7.2 to prove compliance.

4.7.2 Tensile Strength Test.

4.7.2.1 A pair of couplings shall be attached to a section of hose.

4.7.2.2 The couplings shall be connected together and the hose installed in a tension testing machine such that the tension will be on the couplings.

4.7.2.3 A tensile load shall be applied at a rate of not more than 2 in. (51 mm) per minute up to 1200 lb/in. (210 N/mm) of nominal hose diameter.

4.7.3 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.

4.8 Connect/Disconnect Capability.

4.8.1 Couplings shall be capable of being connected and disconnected at least 3000 times without leakage or failure. They shall be tested in accordance with 4.8.2 to prove compliance.

4.8.2 Connect/Disconnect Capability Test.

4.8.2.1 Tests shall be conducted on standard commercial product without lubrication.

4.8.2.2 Hose couplings shall be completely connected and disconnected to each other at least 3000 times.

4.8.2.3 At the completion of this portion of the test, the couplings shall be attached to hose such that tested couplings can be connected together.

4.8.2.4 The tested couplings when connected together shall withstand the service test pressure of the hose without leakage or failure.

4.9 Rough Usage.

4.9.1 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 4.9.2 to prove compliance.

4.9.2 Rough Usage Test.

4.9.2.1 Couplings shall be installed on approximately 10 ft (3 m) lengths of fire hose.

4.9.2.2 The couplings shall be coupled together, forming a loop in the hose.

4.9.2.3 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.

4.9.2.4 The procedure in 4.9.2.3 shall be repeated three times.

4.9.2.5 The couplings shall operate freely and shall show no signs of deformation when inspected inside and outside.

4.9.2.6 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.

4.9.2.7 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.

4.10 Coupling Retention.

4.10.1 Couplings shall remain on the hose without movement up to the rated burst pressure of the hose. They shall be tested in accordance with 4.10.2 to prove compliance.

4.10.2 Coupling Retention Test.

4.10.2.1 The couplings shall be attached to a 3 ft (1 m) length of hose.

4.10.2.2 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.

4.10.2.3 The position of the coupling with relation to the hose shall be marked.

4.10.2.4 The pressure in the hose/coupling assembly shall then be raised at a rate of 300 psi/min to 1000 psi/min (2068 kPa/min to 6895 kPa/min) until the rated burst pressure of the hose is reached.

4.10.2.5 The pressure shall be held for a minimum of 15 seconds but not longer than 60 seconds.

4.10.2.6 The hose shall show no signs of movement from the coupling.

4.11 Vacuum Tightness.

4.11.1 When couplings are used on 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 4.11.2 to prove compliance.

4.11.2 Vacuum Tightness Test.

4.11.2.1 The coupling shall be attached to a suitable section of suction hose.

4.11.2.2 A blank cap shall be attached to the coupling on one end, and a vacuum pump shall be attached to the other end.

4.11.2.3 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.

4.12 Corrosion Resistance.

4.12.1 Couplings having parts other than high-strength yellow brass No. 8A as defined in ASTM B30, *Standard Specification for Copper Alloys in Ingot Form*, or ASTM B584, *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 4.12.2.

4.12.2 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 B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*, for a period of 120 hours.

4.13 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.

4.14 High-Temperature Performance.

4.14.1 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 4.14.2 to prove compliance.

4.14.2 High-Temperature Performance Test.

4.14.2.1 Dry couplings with gaskets installed shall be conditioned in an oven at 275°F (135°C) for 4 hours.

4.14.2.2 Immediately upon their removal from the oven, the torque to connect and disconnect the couplings shall be measured and shall be within the original torque range.

4.15 Low-Temperature Performance.

4.15.1 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 4.15.2 to prove compliance.

4.15.2 Low-Temperature Performance Test.

4.15.2.1 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.

4.15.2.2 Following this exposure, the coupling shall be dropped from a height of 10 ft (3 m) onto its longitudinal axis.

4.15.2.3 The torque to connect and disconnect the couplings shall then be measured and shall be no greater than the torque required before the test.

4.16 Gasket Performance. The gasket material used with any coupling or adapter shall meet the test requirements of 4.16.1 through 4.16.3.

4.16.1 Low-Temperature Test.

4.16.1.1 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.

4.16.1.2 Immediately upon removal from the test chamber, the gasket shall not crack when squeezed from any two opposite points into a figure 8 configuration.

4.16.2 Accelerated Aging Test.

4.16.2.1 Samples of the gasket material shall be prepared in accordance with the procedures described in ASTM D3183, *Standard Practice for Rubber — Preparation of Pieces for Test Purposes from Products*.

4.16.2.2 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 D573, *Standard Test Method for Rubber — Deterioration in an Air Oven*.

4.16.2.3 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.

4.16.3 Compression Set Test.

4.16.3.1 A sample of gasket material shall be compressed as defined in Method B of ASTM D395, *Standard Test Methods for Rubber Property — Compression Set*, and subjected to heat treatment at $158^{\circ}\text{F} \pm 1^{\circ}\text{F}$ ($70^{\circ}\text{C} \pm 1^{\circ}\text{C}$) for a period of 24 hours.

4.16.3.2 The compression set of the sample of gasket material so tested shall not exceed 15 percent of the original thickness.

4.17 Marking. The fire hose connection or fitting shall be permanently and legibly marked on the outside surface of the product, with the manufacturer's name or trademark, the thread size, and designation (e.g., 1½ in. NH). Minimum letter height shall be 0.1 in. (2.55 mm). Also, the fire hose connection or fitting shall be permanently and legibly marked on the outside surface of the product, with the country of manufacturing origin.

Chapter 5 Screw Threads for Couplings and Adapters

5.1 Basic Form of Thread.

5.1.1 Basic thread form, as specified in Figure 5.1.1, shall have an included angle of 60 degrees and truncated top and bottom.

5.1.2 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.

5.1.3 The flat at the root and crest of the basic thread, as specified in Figure 5.1.1, shall be $\frac{1}{8}$ times the pitch or 0.125 times the pitch (p).

5.1.4 The height of the basic thread shall be

N

[5.1.4]

$$\text{or } h = 0.649519 \times p$$

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

where:

h = basic thread height in inches

p = pitch in inches ($p = 1/n$)

n = number of threads per inch

5.1.5* Blunt Start.

5.1.5.1 The outer ends of all external and internal threads shall be terminated by the blunt start, or Higbee cut, as shown in Figure 5.1.5.1, on full thread to avoid crossing and mutilation of thread.

5.1.5.2 The blunt start shall have a minimum length of not less than the radius formed by a cutter with a radius not less than the height of the thread.

5.1.5.3 The maximum length of the blunt start shall not exceed 10 degrees of arc.

5.2 Thread Series Designation.

5.2.1* 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).

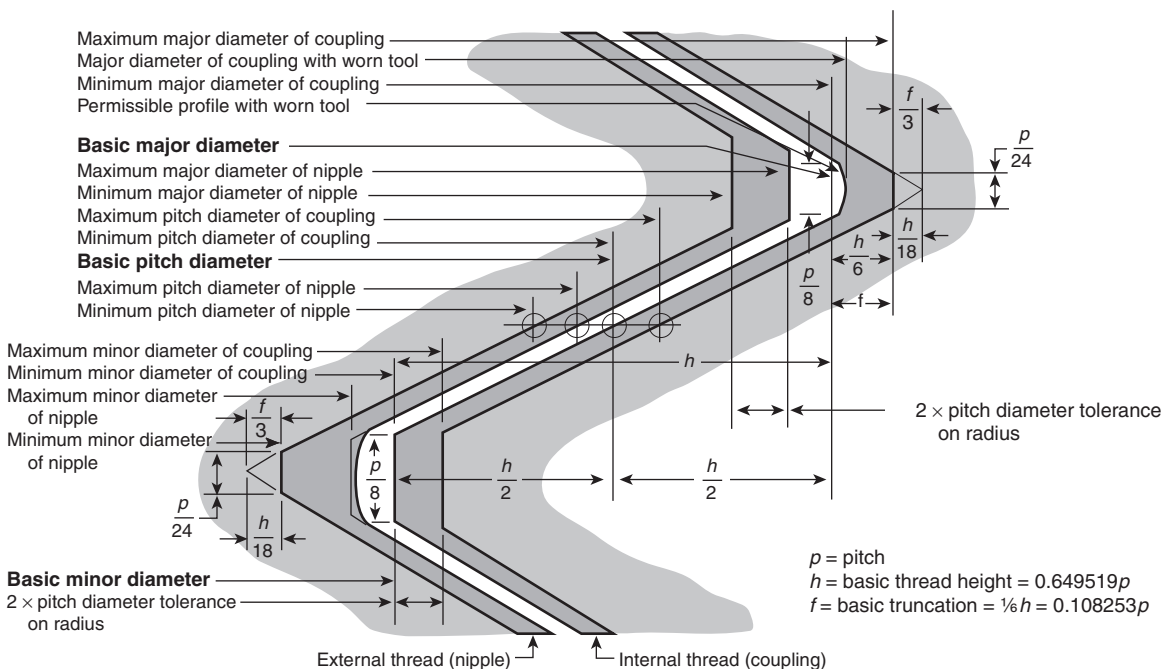


FIGURE 5.1.1 Form of Thread of American National Fire Hose Connection Screw Thread (NH) (See Table 5.4.1 for dimensions.)