

NFPA® 1962

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

2013 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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NFPA® 1962

Standard for the

Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances

2013 Edition

This edition of NFPA 1962, *Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances*, was prepared by the Technical Committee on Fire Hose. It was issued by the Standards Council on November 27, 2012, with an effective date of December 17, 2012, and supersedes all previous editions.

This edition of NFPA 1962 was approved as an American National Standard on December 17, 2012.

Origin and Development of NFPA 1962

NFPA originally developed a recommended practice for the care, maintenance, and use of fire hose in 1936 through its Committee on Field Practices. This document was designated NFPA 198, *Care of Fire Hose*, and was revised extensively through the years. In 1954, the Fire Hose Committee assumed responsibility for the document.

In 1979, NFPA 1962, *Standard for the Care, Use and Maintenance of Fire Hose Including Connections and Nozzles*, was issued as a new standard. The standard was completely rewritten but still contained portions of NFPA 198. The requirements were carefully developed to ensure a reasonable level of reliability for fire hose that is in service.

The 1993 edition recognized the increased use of hose testing machines in the test procedure section. The test requirements for booster and suction hose were revised by incorporating the information in the standard rather than referring to a different standard.

The 1998 edition defined separate test procedures for using a hose testing machine and using a stationary fire pump or pumper as the pressure source. It also required that unlined fire hose be replaced with lined fire hose when the unlined fire hose came due for testing.

In the 2003 edition, the title was changed to *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose*. The requirements for service testing new hose for the first time were revised. Discussion about using supply hose was revised to remove the implication that it can be used in certain attack applications, and the requirements related to the use of relief valves were more closely tied to the service test pressure of the hose. New requirements were added for inspection of the hose liner and attachment of shank-type couplings. Record-keeping requirements for occupant-use hose were revised to reflect that such hose is inspected and serviced similar to a fire extinguisher. The document was completely revised in accordance with the *Manual of Style for NFPA Technical Committee Documents*, and changes were made to improve understanding of the requirements.

The 2008 edition of NFPA 1962 included a new chapter for the use, inspection, and testing of fire hose-connected appliances. NFPA 1965, *Standard for Fire Hose Appliances*, which was issued in 2008, provided for minimum performance and operational requirements for new fire hose appliances, while NFPA 1962 provided testing criteria so that hose appliances could be tested and maintained in an equivalent manner.

In addition to a reorganization, the 2013 edition adds “replacement” to the title of the standard and to the title of Chapter 4. Table 7.1.1.1, the guideline for testing hose manufactured prior to July 1987, has been removed and replaced with language indicating the removal of any hose over 25 years old from service. A new chapter has been created just for nozzles, separating them from gaskets and couplings. Finally, a new annex, Annex B, Specifying and Procuring Fire Hose, has been added.



Documents

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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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NFPA 1962**Standard for the****Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances****2013 Edition**

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Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

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 D. 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 D.

Chapter 1 Administration

1.1 Scope. This standard covers the care, use, inspection, service testing, and replacement of fire hose, fire hose couplings, fire-fighting nozzles, and fire hose appliances, and the associated record keeping.

1.2 Purpose. The purpose of this standard is to provide requirements for the care, use, inspection, service testing, and replacement of fire hose, couplings, nozzles, and fire hose appliances so that the reliability of fire hose, nozzles, and fire hose appliances is increased when they are used at an incident.

1.2.1 The purpose of this standard is also to establish that safety is a primary concern for the continued in-service use of fire hose, couplings, nozzles, and fire hose appliances and that safety is the ultimate decision to retire fire hose, couplings, nozzles, and fire hose appliances.

1.3 Application. Unless otherwise noted, this standard shall apply to fire hose, coupling assemblies, nozzles, and fire hose

appliances, regardless of year of manufacture, while they are in storage, in service, in use, and after use.

1.4 Equivalency. Nothing in this standard shall prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard. Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency. The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.5* Units of Measurement. In this standard, inch-pound units for measurement are followed by an equivalent in metric units, but only the value that first appears shall be considered as the requirement, since the value in metric units could be approximate.

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 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2013 edition.

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

NFPA 1963, *Standard for Fire Hose Connections*, 2009 edition.

2.3 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2009 edition.

NFPA 1961, *Standard on Fire Hose*, 2013 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 Braided Reinforcement. A hose reinforcement consisting of one or more layers of interlaced spiraled strands of yarn or wire, with a layer of rubber between each braid.



3.3.2* Coating. A protective material impregnated, saturated, or coated on the outside reinforcement layer of the hose to provide additional reinforcement or protection for the hose. [1961, 2013]

3.3.3 Coupling Slippage. Any permanent movement of the hose out of a coupling bowl, movement of an external coupling collar, or movement of the hose under an external coupling collar.

3.3.4 Delamination. The separation of the cover or liner from the textile reinforcement.

3.3.5* Fire Hose Appliance. A piece of hardware (excluding nozzles) generally intended for connection to fire hose to control or convey water.

3.3.6 Fold. A transverse bend (fold) occurring where the hose is lengthwise doubled over on itself, as on a pin rack.

3.3.7 Hose.

3.3.7.1* Attack Hose. Hose designed to be used by trained fire fighters and fire brigade members to combat fires beyond the incipient stage. [1961, 2013]

3.3.7.2* Booster Hose. A noncollapsible hose used under positive pressure having an elastomeric or thermoplastic tube, a braided or spiraled reinforcement, and an outer protective cover.

3.3.7.3 Covered Hose. A hose with a jacket covered and lined with a continuous synthetic rubber or plastic. The cover is usually thicker than a coating.

3.3.7.4 Fire Hose. A flexible conduit used to convey water. [1961, 2013]

3.3.7.5* Forestry Fire Hose. A hose designed to meet specialized requirements for fighting wildland fires. [1961, 2013]

3.3.7.6 Large-Diameter Hose. A hose of 3½ in. (90 mm) or larger size. [1961, 2013]

3.3.7.7 Occupant Use Hose. Fire hose designed to be used by the building's occupants to fight incipient fires prior to the arrival of trained fire fighters or fire brigade members. [1961, 2013]

3.3.7.8* Soft Suction Hose. See 3.3.7.10, Supply Hose.

3.3.7.9 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.).

3.3.7.10* Supply Hose. Hose designed for the purpose of moving water between a pressurized water source and a pump that is supplying attack lines. [1961, 2013]

3.3.8 Hose Line. One or more lengths of hose coupled together.

3.3.9 Hose Size. An expression of the internal diameter of the hose.

3.3.10* In Service. The status of hose stored in a hose house, on a rack or reel, or on a fire apparatus that is available and ready for immediate use at an incident.

3.3.11 In Storage. The status of hose not readily available for use because it is not at the scene of an incident and not loaded on a vehicle that can transport it to the scene.

3.3.12 In Use. The status of hose that has actually been deployed at an incident or during training whether or not water is running through the hose.

3.3.13* Leak. The movement of any water through a hose, coupling, nozzle, or appliance in an area that should not permit water to pass.

3.3.14 Multiple Jacket. A construction consisting of a combination of two separately woven reinforcements (double jacket) or two or more reinforcements interwoven.

3.3.15 Proof Test Pressure. A pressure equal to at least two times the service test pressure. [1961, 2013]

3.3.16 Service Test. Hydrostatic test conducted by users on in-service hose, couplings, nozzles, or appliances to determine suitability for continued service.

3.3.17 Single Jacket. A construction consisting of one woven jacket.

3.3.18 Slow-Operating Valve. A valve that has a mechanism to prevent movement of the flow-regulating element from the fully closed position to the fully opened position or vice versa in less than 3 seconds. [1901, 2009]

3.3.19 Spiral Reinforcement. A hose reinforcement consisting of pairs of layers of yarn spiraled with no interlacing between the individual layers. The layers of yarn in each pair are spirally wound in opposite directions. A layer of rubber separates each pair of spiraled layers.

3.3.20* Water Hammer. The surge of pressure caused when a high-velocity flow of water is abruptly shut off. The pressure exerted by the flowing water against the closed system can be seven or more times that of the static pressure.

Chapter 4 Care, Use, Inspection, Service Testing, and Replacement of Fire Hose

4.1 Attack Hose, Supply Hose, and Forestry Hose.

4.1.1 Hose shall be inspected in accordance with Section 4.5 when it is placed in service.

4.1.2* Hose that is in service shall be service tested as specified in Section 4.8 at least annually.

4.1.3 Hose shall be service tested in accordance with Section 4.8 the later of 1 year after its date of manufacture or before it is placed in service for the first time.

4.1.4 Hose held in storage for longer than 1 year shall be service tested in accordance with Section 4.8 before it is placed in service.

4.1.5* Only clean, dry hose shall be placed in service.

4.1.6* Hose carried on fire apparatus shall be loaded in such a way that air can circulate under the hose load to eliminate or reduce the growth of mildew in the hose jackets and rust and corrosion in the hose compartment.

4.1.7* Hose shall be removed from the apparatus and reloaded so that the folds occur at different positions with sufficient frequency to prevent damage and the setting of permanent folds in the rubber lining.

4.1.8 Large-diameter hose used to supply a pump from a hydrant shall be protected from chafing with chafing blocks or similar protection where it comes in contact with pavement or curbing.

4.1.9 When connecting a pump to a hydrant, the hose shall be bent slightly to avoid kinks when the water is turned on.

4.1.10 Supply Hose.

4.1.10.1* Hose marked SUPPLY HOSE shall not be used at operating pressures exceeding 185 psi (12.8 bar or 1275 kPa).

4.1.10.2* Discharge Relief Devices.

4.1.10.2.1 A relief device that discharges to atmosphere shall be used on the discharge side of the pump when pumping into supply hose.

4.1.10.2.2 The relief device shall be set so that the discharge pressure does not exceed the service test pressure of the hose being used.

4.1.10.2.3 The relief device shall be capable of dumping enough water to atmosphere to prevent the pressure in the discharge hose from exceeding the service test pressure of the hose if the flow is shut off downstream of the device.

4.1.10.3 Only slow-operating valves shall be used with supply hose.

4.1.10.4 Relay Operations.

4.1.10.4.1 Where supply hose is used in relay operations between pumps on fire department apparatus, the intake of each receiving pump shall be equipped with a relief valve.

4.1.10.4.2 The maximum pressure setting of the relief valve(s) shall be not more than 10 psi (0.7 bar or 69 kPa) over the static pressure of the water source to which it is connected or not more than 10 psi (0.7 bar or 69 kPa) over the discharge pressure of the supply pump in the relay.

4.1.10.4.3 In no event shall the relief valve be set to relieve at a pressure that exceeds 90 percent of the service test pressure of the hose used with the system.

4.1.11 Damage Prevention.

4.1.11.1* Hose, while in use, shall be positioned to minimize mechanical damage and heat exposure.

4.1.11.2* Vehicles shall not be driven over charged or uncharged fire hose unless the hose is bridged and the vehicle has sufficient ground clearance to cross the bridged hose.

4.1.11.3* Nozzles and valves shall be opened and closed slowly to prevent pressure surges and water hammer that can burst the hose and in turn cause injury to people or damage to the pump.

4.1.11.4 Care shall be taken to prevent the hose from chafing.

4.1.11.5 Care shall be taken to avoid dragging large-diameter fire hose, but if the hose must be dragged, it shall be dragged when flat.

4.1.11.6* When hose is in use during subfreezing weather, care shall be taken to prevent water from freezing inside the hose.

4.1.11.6.1 To help prevent freezing once the water is turned on, some water shall be left running through the hose.

4.1.11.6.2 When the hose line is no longer needed, it shall be uncoupled and drained before the water freezes.

4.1.12* Hose that has frozen during use shall be thawed and service tested as specified in Section 4.8 before being put back in service or in storage.

4.1.13* After each use and before being placed in storage or back in service, the hose shall be drained, cleaned, dried, and inspected as specified in Sections 4.5 and 4.6.

4.2* Occupant-Use Hose.

4.2.1 Occupant-use hose shall be inspected in accordance with Section 4.5 when it is placed in service.

4.2.2 In-service hose designed for occupant use only shall be removed and service tested as specified in Section 4.8 at intervals not exceeding 5 years after the date of manufacture and every 3 years thereafter.

4.2.3 When hose is taken out of service for testing, replacement hose shall be installed on the rack, on the reel, or in the storage area until the tested hose is returned to service.

4.2.4 In-service hose shall be unracked, unreeled, or unrolled and physically inspected as specified in Section 4.5 at least annually. The hose shall be reracked, rereeled, or re-rolled so that any folds do not occur at the same position on the hose.

4.2.5 Damage Prevention.

4.2.5.1* Hose stored on racks or reels shall be protected from the weather and any local environmental condition potentially harmful to the hose.

4.2.5.2 Hose shall be protected from mechanical damage and exposure to heat.

4.2.5.3* Enclosures for occupant-use hose shall be constructed and the hose stored in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

4.2.6 In areas where rodents can pose a problem, the hose shall be visually inspected more frequently for rodent damage.

4.2.7 After each use and before being placed back in service, the hose shall be inspected as specified in Section 4.5, service tested as specified in Section 4.8, and cleaned and dried as specified in Section 4.6.

4.3 Booster Hose.

4.3.1 Booster hose shall be inspected in accordance with Section 4.5 when it is placed in service.

4.3.2 Booster hose that is in service shall be service tested as specified in Section 4.9 at least annually.

4.3.3 Booster hose shall be service tested in accordance with Section 4.9 the later of 1 year after its date of manufacture or before it is placed in service for the first time.

4.3.4 Booster hose held in storage for longer than 1 year shall be service tested in accordance with Section 4.9 before it is placed in service.

4.3.5* Hose shall be stored out of direct sunlight and as recommended by the manufacturer.

4.3.6 Hose shall not be stored kinked and, if stored on a reel, care shall be taken to avoid twisting the hose when rolling it onto the reel.

4.3.7 Covered hose that has exposed reinforcement either shall be removed from service, repaired, and service tested or shall be condemned.

4.4 Suction Hose.

4.4.1 Suction hose shall be inspected in accordance with Section 4.5 when it is placed in service.

4.4.2 Suction hose that is in service shall be service tested as specified in Section 4.10 at least annually.

4.4.3* Hose shall be stored out of direct sunlight and as recommended by the manufacturer.

4.4.4 Hose that has exposed or damaged reinforcement either shall be removed from service, repaired, and service tested or shall be condemned.

4.4.5 Foreign objects of any kind, including items of equipment, shall not be carried inside the hose.

4.4.6* Suction hose shall not be used under positive pressure unless it has been specifically designed for such use.

4.5 Hose Inspection.

4.5.1 Physical inspection shall determine if the hose and couplings have been vandalized, are free of debris, and exhibit no evidence of mildew, rot, or damage by chemicals, burns, cuts, abrasion, and vermin.

4.5.2 During the inspection, a check shall be made to determine if the service test of the hose is current.

4.5.3 Liner Inspection.

4.5.3.1 The interior of the hose at each end shall be visually inspected for any physical signs of liner delamination.

4.5.3.2* If the liner shows signs of delamination, the hose shall be condemned.

4.5.4 If the hose fails the physical inspection (*see 4.5.1*), it shall be removed from service and either repaired as necessary and service tested as specified in Section 4.8, Section 4.9, or Section 4.10, as appropriate, or condemned.

4.5.5 The couplings shall be inspected as specified in 7.1.3 and 7.1.4.

4.5.6 Where nozzles are required on occupant-use hose, they shall be inspected as specified in Section 5.2.

4.6 Cleaning and Drying.

4.6.1* After each use, all hose shall be cleaned.

4.6.2 If dirt cannot be thoroughly brushed from the hose or if the hose has come in contact with harmful materials, the hose shall be washed.

4.6.3 If, during use, the hose has been exposed to hazardous materials, it shall be decontaminated by the method approved for the contaminant.

4.6.4 Covered hose shall be permitted to be wiped dry.

4.6.5* Hose shall not be dried on hot pavements or under intense sunlight.

4.7* Storage.

4.7.1 Hose shall be kept out of direct sunlight and in a well-ventilated location.

4.7.2 All hose shall be drained and thoroughly dried before being placed in storage.

4.7.3 Hose shall be stored only after it has been inspected in accordance with Section 4.5 and has been cleaned and dried.

4.7.4 Hose that is out of service for repair shall be tagged as specified in 4.11.1.6 and 4.11.3.6 and kept separated from any hose in storage that is ready for service.

4.8 Service Testing Attack, Supply, and Forestry Hose.

4.8.1 Hose manufactured prior to July 1987 to meet the requirements of the 1979 and previous editions of NFPA 1961, *Standard on Fire Hose*, shall be removed from service.

4.8.2* Hose manufactured during July 1987 or after that date to the 1987 or subsequent editions of NFPA 1961 shall be service tested as specified in Section 4.8.

4.8.2.1 Attack fire hose shall be service tested to a minimum of 300 psi (20.7 bar or 2070 kPa) or a pressure not to exceed the service test pressure marked on the hose.

4.8.2.2 Supply fire hose shall be service tested to a minimum of 200 psi (13.8 bar or 1380 kPa) or a pressure not to exceed the service test pressure marked on the hose.

4.8.2.3 Forestry fire hose shall be service tested to a minimum of 300 psi (20.7 bar or 2070 kPa) or a pressure not to exceed the service test pressure marked on the hose.

4.8.2.4 Occupant-use hose shall be tested to the service test pressure marked on the hose.

4.8.2.5 Proof pressure tests for hoses shall be conducted only at the point of manufacture or at a facility equipped to perform those tests.

4.8.2.6 Tests in the field shall not subject the hose to its proof test pressure.

4.8.3 After the correct service test pressure has been determined for each length of hose to be tested, the service test shall be conducted as specified in Section 4.8.4.

4.8.4 Service Test Procedure.

4.8.4.1 Each length of hose to be service tested shall be inspected as specified in Section 4.5.

4.8.4.2 Any length of hose that fails the inspection shall be removed from the service test area and repaired as necessary or condemned.

4.8.4.3 All lengths of hose in the same hose line shall be of the same service test pressure.

4.8.4.4* The total length of any hose line in the hose test layout to be service tested shall not exceed 300 ft (91 m).

4.8.4.5 The hose test layout shall be straight, without kinks or twists.

4.8.4.6* All 3½ in. (89 mm) and larger diameter hose shall be service tested while lying on a horizontal surface.

4.8.4.7* A test location shall be selected that allows connection of the hose testing apparatus (pressure source) to a water source.

4.8.4.8* A hose testing machine, a stationary pump, or a pump on a fire department apparatus shall be used as a pressure source.

4.8.4.8.1 If a hose testing machine is used, the procedure defined in 4.8.5 shall be used.

4.8.4.8.2 If a stationary pump or a pump on a fire department apparatus is used, the procedure defined in 4.8.6 shall be used.

4.8.4.9 At the conclusion of the test, the hose records specified in Section 4.11 shall be updated to indicate the results of the service test for each length of hose tested.

4.8.4.10* Any hose that fails the inspection defined in Section 4.5, bursts or leaks during the service test, or has couplings that leak or are otherwise found defective as defined in 7.1.3 shall be tagged as required in 4.11.1.6 or 4.11.3.6 and removed from service.

4.8.4.10.1 If the hose leaks or the hose jacket fails inspection, a distinguishing mark noting the location of the defect(s) shall be placed on the hose.

4.8.4.10.2 If the couplings fail or are defective, they shall be repaired or replaced.

4.8.4.10.3* If the hose cannot be repaired, the couplings shall be removed from both ends.

4.8.4.11 If the hose is repaired, or the couplings are repaired or replaced, the hose shall be service tested in accordance with Section 4.8 before being placed back in service.

4.8.4.12 After testing, all hose shall be thoroughly cleaned, drained, and dried as specified in Section 4.6 before being placed in service or in storage.

4.8.5 Service Test Using a Hose Testing Machine. The procedure defined in this subsection shall be used when hose is service tested using a hose testing machine.

WARNING: Because there is a potential for catastrophic failure during the service testing of fire hose, it is vital that safety precautions be taken to prevent exposure of anyone to this danger. Do not deviate from the procedures prescribed herein.

4.8.5.1 Hose Testing Machine Integrity. The condition of the hose testing machine shall be thoroughly checked daily before each testing session and before the machine is used after being transported to a new testing site.

4.8.5.1.1 The hose testing machine shall be carefully examined for damaged components that might fail during the test.

4.8.5.1.2 If any damage is discovered, the hose testing machine shall not be used until the damaged component(s) is repaired or replaced.

4.8.5.1.3 A pressure leak integrity test shall be performed on the machine to determine whether the pressurized outlet side of the machine and its related components are leak-free.

4.8.5.1.3.1 The fire hose outlet connection(s) of the machine shall be capped or otherwise closed.

4.8.5.1.3.2 Pressure shall be applied through the machine using the integral pump to a level that is 10 percent higher than the highest service test pressure needed for the hose to be tested.

4.8.5.1.3.3 The pressure shall be held for 3 minutes with the pump turned off.

4.8.5.1.3.4 If leaks are detected, the testing machine shall not be used until the leaking component(s) is repaired or replaced.

4.8.5.1.4 The test gauge that is used to read the test pressure shall have been calibrated within the previous 12 months.

4.8.5.1.5 If the hose machine incorporates elevated outlets for water supply that are higher than the inflated diameter of the hose from the testing surface, a means to vent trapped air shall be provided between the hose and the outlet valve.

4.8.5.2 Conducting the Test.

4.8.5.2.1 The test layout shall be connected to the outlet side of the water supply valve on the hose testing machine.

4.8.5.2.2 A test cap with a bleeder valve shall be attached to the far end of each hose line in the test layout. If a test cap is not available, a nozzle with a nontwist shutoff shall be permitted to be used.

4.8.5.2.3 With the test cap valve or the nozzle open, the pressure shall be raised gradually to 45 psi $\pm$ 5 psi (3.1 bar $\pm$ 0.35 bar or 310 kPa $\pm$ 35 kPa).

4.8.5.2.4* After the hose test layout is full of water, all the air in each hose line shall be exhausted by raising the discharge end of each hose line above the highest point in the system.

WARNING: All air must be removed from the hose before the valve in the test cap or the nozzle is closed and the pressure raised. The development of test pressures introduces the potential for a serious accident if air remains in the system.

4.8.5.2.5 If the hose testing machine incorporates elevated outlets for water supply that are higher than the inflated diameter of the hose from the testing surface, air shall be vented next to the water input end.

4.8.5.2.6 The nozzle or test cap valve shall be closed slowly, and then the outlet water supply valve shall be closed.

4.8.5.2.7* The hose directly in back of the test cap or the nozzle shall be secured to avoid possible whipping or other uncontrolled reactions in the event of a hose burst.

4.8.5.2.8 With the hose at 45 psi $\pm$ 5 psi (3.1 bar $\pm$ 0.35 bar or 310 kPa $\pm$ 35 kPa), it shall be checked for leakage at each coupling and the couplings tightened with a spanner wrench where necessary.

4.8.5.2.9* Each hose shall then be marked around its full circumference at the end or back of each coupling or collar to determine, after the hose has been drained, if the coupling or collar has slipped during the test.

4.8.5.2.10 All personnel other than those persons required to perform the remainder of the procedure shall clear the area.

4.8.5.2.11 The pressure shall be raised slowly at a rate not greater than 15 psi (1 bar or 103 kPa) per second until the service test pressure is attained and then maintained, by pressure boosts if necessary, for the duration of the stabilization period.

4.8.5.2.12 The stabilization period shall be not less than 1 minute per 100 ft (30 m) of hose in the test layout.

4.8.5.2.13 After the stabilization period, the hose test layout shall hold the service test pressure for 3 minutes without further pressure boosts.

4.8.5.2.14 While the hose test layout is at the service test pressure, the hose shall be inspected for leaks.

4.8.5.2.14.1 If the inspecting personnel walk the test layout to inspect for leaks, they shall be at least 15 ft (4.5 m) to the left

