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NFPA 1911
Acceptance and Service Tests of Fire Department Pumping Apparatus
1987 Edition

NFPA

National Fire Protection Association Batterymarch Park, Quincy, MA 02269

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

Statement on NFPA Procedures

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NFPA 1911

Standard on

Acceptance and Service Tests of Fire Department Pumping Apparatus

1987 Edition

This edition of NFPA 1911, *Standard on Acceptance and Service Tests of Fire Department Pumping Apparatus*, was prepared by the Technical Committee on Fire Department Equipment, and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 18-21, 1987 in Cincinnati, Ohio. It was issued by the Standards Council on June 10, 1987, with an effective date of June 30, 1987.

The 1987 edition of this standard has been approved by the American National Standards Institute.

Origin and Development of NFPA 1911

This first edition of NFPA 1911 incorporates much of the material formerly included in the pamphlet "Fire Department Pumper Tests and Fire Stream Tables" published by the National Board of Fire Underwriters and, later, the Insurance Services Office. In 1981 all publishing rights for the pamphlet were transferred to NFPA.

The Fire Department Equipment Committee reworked the material which pertained to testing pumping apparatus into proper format as an NFPA standard. This is one of the Committee's documents on testing fire apparatus.

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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.

Contents

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Standard on

Acceptance and Service Tests of Fire Department Pumping Apparatus

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

Information on referenced publications can be found in Chapter 5.

Chapter 1 Administration

1-1 Scope. This standard shall cover tests, other than certification tests, of the pumps on fire department pumping apparatus built in accordance with NFPA 1901, *Standard for Automotive Fire Apparatus*, including acceptance tests made at the time of delivery and in-service tests made annually or on occasion. (*For information on certification tests, see NFPA 1901.*) This standard does not apply to apparatus equipped solely with booster pumps rated at less than 500 GPM (1892.5 L/min).

1-2 Purpose. This standard establishes the site, environmental, and equipment requirements for proper testing, and the procedures to be followed in performing tests.

1-3 Application. This standard shall serve those charged with conducting acceptance and in-service tests.

1-4 Definitions.

Acceptance Authority. The individual designated by the purchaser to have the authority to accept or reject the apparatus based on results of the acceptance tests.

Acceptance Tests. Tests made at the time the apparatus is delivered, at or near the location that it will be used, to assure the purchaser that the pump meets the performance requirements of the purchase contract.

Approved.* Acceptable to the "authority having jurisdiction."

Authority Having Jurisdiction.* The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

Certification Tests. Tests made at the apparatus manufacturer's plant and witnessed by a representative of a testing organization approved by the authority having jurisdiction, as required by NFPA 1901.

Compound Gage. A gage reading pressure from 0 to maximum in lbs per sq in. (Pa) and vacuum from 0 to 30 in. of mercury (Hg).

Discharge Pressure. The pressure at the point of gage attachment on the fire pump, as determined by the gage, and corrected for any gage error.

Dynamic Suction Lift. The sum of the vertical lift and the friction and entrance loss due to the flow through the suction strainers and hose.

Gallons. United States gallons.

GPM. Gallons per minute (1 gpm = 3.785 liters per minute, L/min).

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed.* Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

May. This term is used to state a permissive use or an alternative method to a specified requirement.

Net Pump Pressure. The sum of the discharge pressure and the dynamic suction lift when testing at draft, or the difference between the discharge pressure and the suction pressure when testing from a hydrant or other source of water under positive pressure.

PSI. Pounds pressure per sq in. (6.895 kPa).

PSIG. Gage pressure in lbs per sq in. (pressure above atmospheric pressure).

Pumping Apparatus. A piece of fire apparatus with a permanently mounted fire pump, a rated discharge capacity of 500 gpm (1892.5 L/min) or greater, and complying with Chapter 3 of NFPA 1901, *Standard for Automotive Fire Apparatus.* It may also include a water tank, hose body, aerial ladder, or other components.

Service Tests. Tests made occasionally (usually at least annually) after the pump has been put into service to determine if performance is still acceptable.

Shall. This term indicates a mandatory requirement.

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

Suction Pressure. The pressure at the point of gage attachment on the suction passageway of the fire pump, as determined by the gage, and corrected for any gage error.

Vertical Lift. The vertical distance from the surface of the water to the center of the pump suction inlet.

1-5 Units. Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI). The unit "liter" is outside of but recognized by SI and commonly used in international fire protection. Table 1-5 shows conversion factors that can be used when SI units are not shown in the text.

Table 1-5

1 ft = 0.3048 meters (m)
1 inch = 25.4 millimeters (mm)
1 gal = 3.785 Liters (L)
1 inch of mercury = 3.386 kilopascals (kPa)
1 psi = 6.895 kilopascals (kPa)
1 gal/min = 0.378 Liters/min (L/min)

Chapter 2 Equipment and Site Requirements

2-1 Site.

2-1.1 Tests at Draft. When tests are to be performed with the pump drafting, the test site shall be adjacent to a supply of clear water at least 4 ft (1.2 m) deep, with the water level not more than 10 ft (3 m) below the center of the pump suction inlet, and close enough to allow the suction strainer to be submerged at least 2 ft (0.6 m) below the surface of the water when connected to the pump by 20 ft (6.1 m) of suction hose.

2-1.2 Other Tests. When a suitable site for drafting is not available, the site shall provide a level area for stationing the apparatus, a source of water such as a fire hydrant connected to a water distribution system, and an area suitable for discharging the water.

2-2 Environmental Conditions.

2-2.1* Pump tests shall be performed when conditions are as follows:

Air temperature:	0° to 100°F (minus 18° to 38°C)
Water temperature:	35° to 90°F (2° to 32°C)
Barometric pressure:	(corrected to sea level) 29 in. Hg (737 mm Hg), minimum

2-3 Equipment.

2-3.1 Suction Hose and Strainer.

2-3.1.1 When testing a pump at draft, 20 ft (6.1 m) of suction hose of the appropriate size for the rated capacity of the pump per NFPA 1901, *Standard for Automotive Fire Apparatus*, and a suction strainer that will allow flow with total friction and entrance loss not greater than specified in NFPA 1901, shall be furnished.

2-3.1.2 When testing a pump from a hydrant or other source of water at positive pressure, the suction hose may be of any convenient size and length that will permit the necessary amount of water to reach the pump with a minimum suction pressure of 10 psig (69 kpa), and only the strainer at the pump inlet shall be required.

2-3.2* Discharge System. Sufficient fire hose shall be provided to allow discharge of rated capacity to the nozzles or other flow-measuring equipment without exceeding a flow velocity of 35 ft per second (10.67 m/s) (approximately 500 gpm [1892 L/min] for 2½-in. [63.5-mm] hose).

2-3.3 Flow-Measuring Equipment.

2-3.3.1* Nozzles. Where nozzles are used for flow measurements, they shall be smoothbore and of a size sufficient for anticipated flows. (*See Appendix C, Tables C-1(a), (b), (c), and (d), for information on determination of flow rates with nozzles.*)

2-3.3.1.1* Pitot tubes such as those illustrated in Figures A-2-3.3.1.1 (a)-(d) shall be used, and shall be of a type approved by the authority having jurisdiction.

2-3.3.2 Other Flow-Measuring Equipment. Other equipment such as flow meters, volumetric tanks, or weigh tanks may be used for measuring the flow if approved by the authority having jurisdiction.

2-3.4 Pressure-Measuring Equipment.

2-3.4.1* Suction and pressure gages used for testing shall perform to ANSI B40.1, *Gauges — Pressure Indicating Dial-Type Elastic Element,* Grade A, and shall be at least 3½ in. (89 mm) in diameter. The suction (compound) gage shall have a range of 30 in. Hg vacuum to 150 psig (max.) or -100 to +900 kPa. The discharge gage shall have a range of zero to 400 psig, or zero to 2500 kPa. When testing at draft, the suction gage may consist of a mercury manometer or a vacuum gage conforming to ANSI B40.1, *Gauges — Pressure Indicating Dial-Type Elastic Element,* Grade A, at least 3½ in. (89 mm) in diameter.

2-3.4.2 Pitot gages used for testing shall conform to ANSI B40.1, *Gauges — Pressure Indicating Dial-Type Elastic Element,* Grade A, and shall be at least 2½ in. (63.5 mm) in diameter, with a range sufficient to have anticipated pressures within the middle third of the dial (*see A-2-3.4.1*).

2-3.4.3 All gages shall have been calibrated within the week preceding tests. Calibrating equipment shall consist of a dead weight gage tester or a master gage meeting ANSI B40.1, *Gauges — Pressure Indicating Dial-Type Elastic Element,* Grade 3A or 4A, calibrated by its manufacturer within the preceding year.

2-3.4.4 All gage connections shall include "snubbing" means, such as a needle valve, which can be used to damp out rapid gage needle movements.

2-3.5 Speed-measuring equipment shall consist of either a tachometer, measuring revolutions per minute, or a revolution counter and stop watch. When a tachometer is used, it shall be of a type approved by the authority having jurisdiction. When a revolution counter and stop watch are used, the stop watch shall be equipped with a full sweep second hand, or shall be of a digital reading type. All speed measurements shall be taken at the checking shaft outlet located at the pump operator's position or elsewhere (*see NFPA 1901, Standard for Automotive Fire Apparatus*).

2-3.6 Where tests are performed inside a structure or anywhere having limited air circulation, carbon monoxide monitoring equipment shall be used. Such equipment shall be checked and calibrated regularly and shall include a suitable warning device.

Chapter 3 Acceptance Tests

3-1* General.

3-1.1 Extent of test. The purchaser shall determine the extent of the acceptance test to be performed when the apparatus is delivered and shall specify the following:

(a) Whether the test is to be performed at draft or from another source of water such as a fire hydrant.

(b) Elements of the certification test (*see NFPA 1901, Standard for Automotive Fire Apparatus*) to be duplicated insofar as practical. The pumping test, overload test, pressure control test, and pump vacuum test portions of the certification test shall be performed as a minimum.

(c) Other tests required, e.g., tests at net pressures above 250 psi (1724 kPa).

(d) Identification of the acceptance authority.

3-2 Procedure.

3-2.1 Where the purchaser has specified acceptance tests identical to certification tests, the procedures required by applicable sections of NFPA 1901, *Standard for Automotive Fire Apparatus*, shall be followed.

3-2.2 Where other tests are specified, the tests shall be conducted as agreed upon by the acceptance authority and the manufacturer's authorized representative.

3-3 Test Results.

3-3.1* Results of all tests shall be recorded and the acceptance authority shall decide if the specified criteria have been met.

3-3.2 Where test results are not acceptable, the purchaser shall notify the manufacturer, in writing, of the discrepancies and other matters to be remedied in order to resubmit the pump for acceptance.

Chapter 4 Service Tests

4-1 General.

4-1.1* Frequency. Service tests shall be conducted at regular intervals as determined by the authority having jurisdiction, or whenever major repairs or modifications to the pump have been made, or whenever any component of the apparatus that is used in pump operations has been serviced. Each pump shall be tested at least once per year.

4-1.2* Purpose. Service tests are conducted to assure the user that the pump is capable of the required performance as determined by the authority having jurisdiction.

4-1.3 Extent of Test

4-1.3.1 A pumping test shall be conducted.

4-1.3.2 Other tests as specified by the authority having jurisdiction shall be conducted.

4-2 Conditions for Test.

4-2.1 Conditions for service tests shall be the same as for acceptance tests (*see Section 2-1*). If it is impractical to provide all specified conditions, the authority having jurisdiction may authorize tests under other conditions.

4-3 Procedure.

4-3.1 Pumping Test. The pump shall be subjected to a pumping test of at least forty minutes duration, consisting of at least twenty minutes pumping rated capacity at 150 psi (1034 kPa) net pump pressure, at least ten minutes pumping 70 percent rated capacity at 200 psi (1379 kPa) net pump pressure, and at least ten minutes pumping 50 percent rated capacity at 250 psi (1723 kPa) net pump pressure. The pump shall not be stopped except when discharges are closed to permit changing hose or nozzle.

4-3.2* Other Tests. Other tests shall be conducted at the direction of the authority having jurisdiction.

4-4 Test Results.

4-4.1 The ambient air temperature, water temperature, vertical lift, elevation of test site, and atmospheric pressure (corrected to sea level) shall be determined and recorded prior to and after each pump test.

4-4.2* The engine, pump, transmission, and all parts of the apparatus shall exhibit no undue heating, loss of power, overspeed, or other defect during the entire test. The capacity, discharge pressure, suction pressure, and engine speed shall be recorded at the beginning and the end of each phase of the pumping test, and the records placed on file.

4-4.3 Results of other tests shall be satisfactory to the authority having jurisdiction and shall be recorded and placed on file.

Chapter 5 Referenced Publications

5-1* The following documents or portions thereof are referenced within this document and shall be considered part of the requirements of this document. The edition indicated for each reference shall be the current edition as of the date of the NFPA issuance of this document.

5-1.1 NFPA Publications. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 1901-1985, *Standard on Automotive Fire Apparatus.*

5-1.2 ANSI Publications. American National Standards Institute, 1403 Broadway, New York, NY 10018.

ANSI B40.1-1985, *Gauges — Pressure Indicating Dial-Type Elastic Element.*

Appendix A

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

A-1-4 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.

Authority Having Jurisdiction. The phrase "authority having jurisdiction" is used in NFPA Standards 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, 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 delegated agent assumes the role of the "authority having jurisdiction"; at government installations, the commanding officer or departmental official may be the "authority having jurisdiction."

Listed. The means for identifying listed equipment may vary for each testing laboratory, inspection agency or other organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A-2-2.1 If conditions are not within the limits specified, the test should be delayed until they are satisfactory, or the tests performed and the results confirmed by another test at a later date. It is particularly important that the water supply be nonaerated and not over 90°F (32°C), as otherwise the pump performance may be affected seriously.

A-2-3.2 The discharge hose layout consists of 2½-in. (63.5 mm) or larger hose lines to one or more smoothbore nozzles of suitable size. The hose performs two functions: carrying the water from the pump to the nozzle, and providing enough total friction loss to reduce the pressure from the pump discharge pressure required to the nozzle pressure desired. If only a relatively short length of hose is required to perform the first function, the second function can be performed by increasing friction loss through partially closing the discharge valves on the pumper.

Discharge hose lines should be securely fastened to the pump outlets to avoid injury to personnel should the hose come loose from the coupling during the test. In most cases, a rope hose tool is adequate for the purpose.

The size of nozzle used is usually chosen to give the desired discharge at a nozzle pressure between 60 and 70 psi (414 and 483 kPa). This pressure is neither so high that the pitot is difficult to handle in the stream nor so low that the normal inaccuracies of a gage used at low pressure would come into play. Nozzle (pitot) pressures less than 50 psi (345 kPa) or higher than 100 psi (690 kPa) should be avoided. The nozzle should always be securely tied; never allow a test to be made while depending on person(s) to hold the nozzle. Failure to abide by this precaution has caused serious injuries in many instances.

For the protection of the operator, whenever possible, the 250-psi (1723-kPa) test should be conducted using the pump discharge outlets on the opposite side of the apparatus from the control panel.

Table A-2-3.2 shows suggested hose and nozzle layouts, but other combinations of layouts may be used. If hose is slightly smaller or unusually rough, shorter lines or a larger nozzle may be necessary.

Table A-2-3.2 Hose and Nozzle Layout Suggestions

Discharge gpm	
2,000	Two 100-ft lines into 2-in. nozzle, in duplicate
1,750	Two 100-ft lines into 2-in. nozzle, in duplicate
1,500	Three 100-ft lines into 2-in. nozzle and one 50-ft line into 1⅜-in. or 1½-in. nozzle
1,250	Three 100-ft lines and one 50-ft line into 2¼-in. nozzle; or two 100-ft lines, into 1¾-in. nozzle and one 50-ft line into 1½-in. nozzle
1,000	Two or three 100-ft lines into 2-in. nozzle
750	Two 100-ft lines into 1¾-in. nozzle
500	One 50-ft line into 1⅜-in. or 1½-in. nozzle

NOTE 1: Where two or more lines are indicated, they are to be siamesed into a heavy stream appliance.

NOTE 2: This table provides hose and nozzle layout suggestions and does not preclude the use of other combinations of hose and nozzles.

The 50 to 350 ft (15 to 125 m) of 2½-in. (63.5 mm) hose used, depending on the hose layout and capacity of the pump to be tested, should be double-jacketed hose; that commonly used in the fire service is satisfactory. Hose should be in good condition and recently tested to at least 250 psig (1723 kPa).

A-2-3.3.1 Nozzles suitable for testing usually may be found in the regular equipment of a fire department; however, the actual coefficient of discharge of each nozzle should be known, otherwise test results may be erroneous. The actual coefficient of discharge must be determined by tests conducted by competent persons using equipment such as weigh tanks or calibrated flow meters. Portable or mounted turrets are preferable to hand-held nozzles when testing pumps.

Only smoothbore nozzles should be used. Care should be taken that washers or gaskets do not protrude into the pipe, because a perfectly smooth waterway is essential. When shutoff nozzles are used, particular care must be taken to see that they have no projections or breaks in the waterway and that the shutoff handle does not become partially closed.

Nozzle tips from ¾-in. (19-mm) to 2½-in. (63-mm) inside diameter are desirable for use during various capacity and pressure tests. They should be free of nicks and scratches to ensure a smooth stream. Tips should be measured, preferably after being attached and ready for the test, to ensure that there is no mistake about the size of the tip used.

A-2-3.3.1.1 A pitot tube with air chamber and pressure gage is necessary for determining the velocity pressure of the water at the nozzle. The pitot tube may be of several suitable types; the type shown in Figure A-2-3.3.1.1(a) may be readily constructed. It should be connected by brass or other nonferrous metal pipe fittings to an air chamber and pressure gage as shown in Figure A-2-3.3.1.1(b). A typical commercially available style is shown in Figure A-2-3.3.1.1(c). The pitot tube should be kept free of dirt and the air chamber free of water. Any water that accumulates in the air chamber should be removed after each test. The knife edges, indicated in Figure A-2-3.3.1.1(a), will get battered in service and must be kept sharp to reduce as much as possible spray caused by inserting the pitot into the stream.

To ensure accurate and consistent readings, pitot tubes should be fixed in the proper position. A mechanical device may be desirable to hold the pitot tube rather than holding it by hand [*see Figure A-2-3.3.1.1(d)*]. The proper position is in the center of the stream with the end of the tube a distance equal to half of the nozzle diameter away from the end of the nozzle.

A-2-3.4.1 It is important that gages be sufficiently accurate to assure that test results are reliable. Grade A gages per ANSI B40.1 or B40.1M must be accurate within 2 percent of the span over the entire scale, and within 1 percent over the middle half of the scale; this means that a 0-400 psi (0-2500 kPa) gage will be accurate within 4 psi (28 kPa) from 100 to 300 psi (625-1875 kPa). Grade 3A or 4A gages, which are used for calibrating other gages, must be accurate within 0.25 percent or 0.10 percent, respectively, over the entire span.

While 0-400 psi (0-2500 kPa) is not a "preferred" range per ANSI B40.1, such gages are readily available. Graduation increments should be no greater than twice the allowable error in the middle of the scale (8 psi maximum on a 0-400 psi Grade A gage or 28 kPa maximum on a 0-2500 kPa Grade A gage), and smaller increments are recommended. Many variations and special constructions are available, and gage manufacturers may be contacted for their recommendations.

A-3-1 Every new pump, on delivery and prior to acceptance, should be subjected to a test that will determine its ability to meet contract specifications.

A-3-3.1 Some test data forms for recording the test readings and other necessary data should be provided. Figure A-3-3.1 is an example of a suitable form. The use of such a form will help to assure that all needed data are obtained.

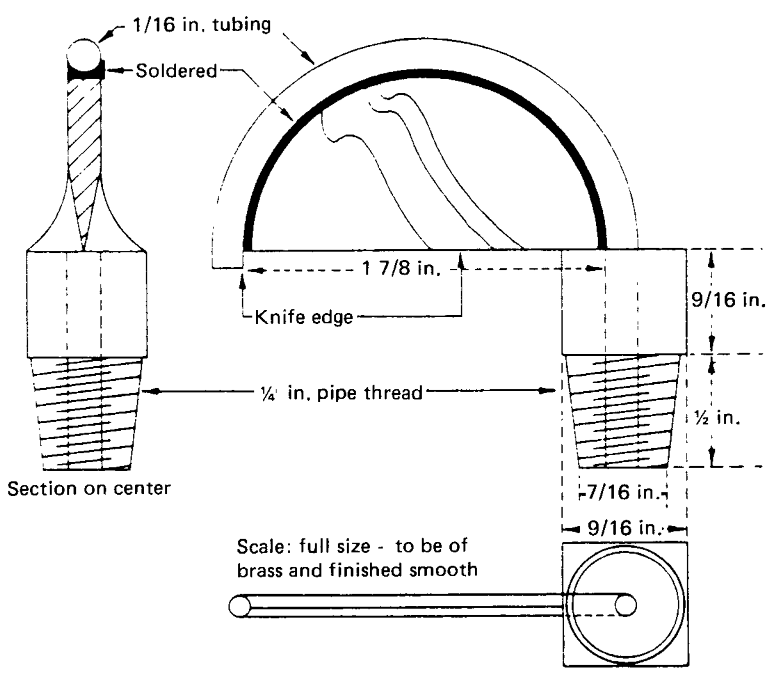

Figure A-2-3.3.1.1(a) Nozzle stream pitot tube.

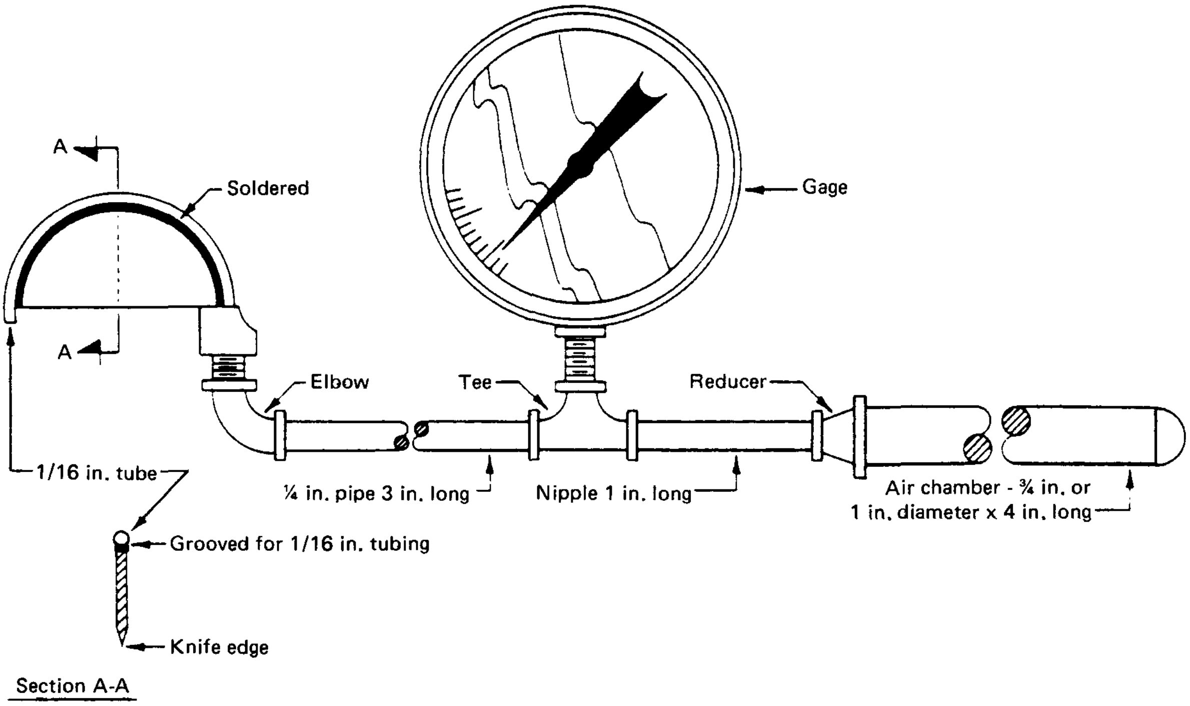

Figure A-2-3.3.1.1(b) Pitot tube assembly.

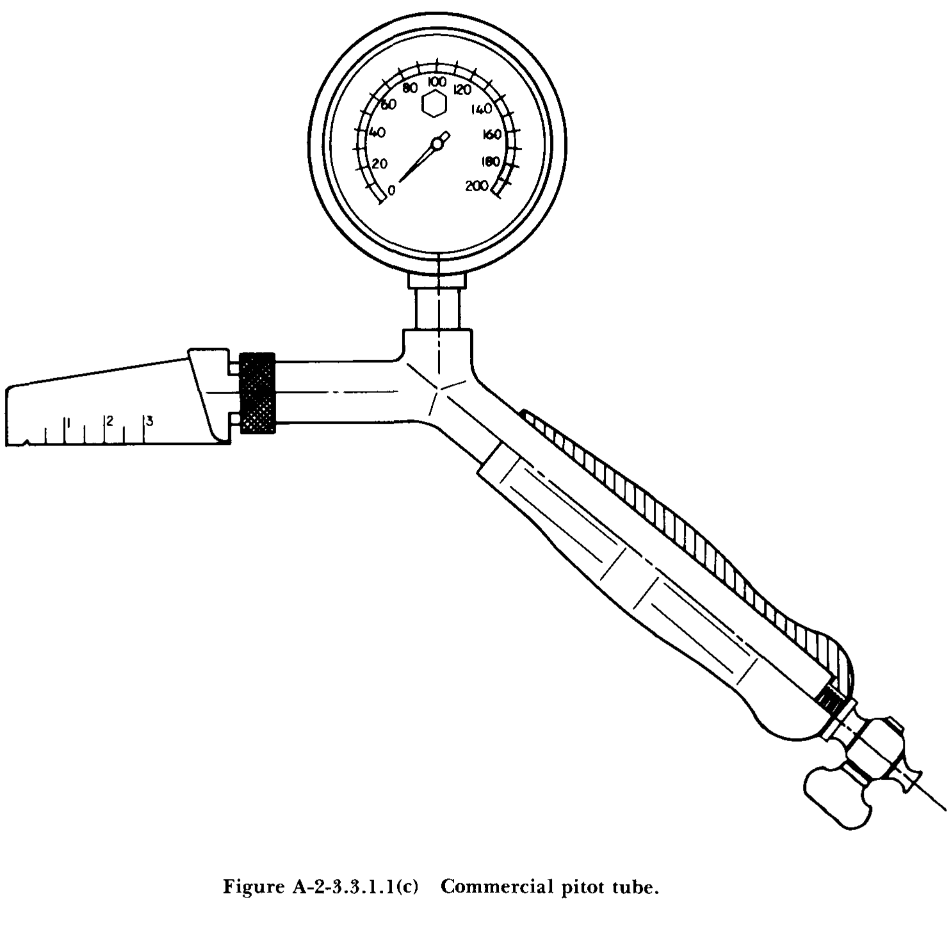

Figure A-2-3.3.1.1(c) Commercial pitot tube.

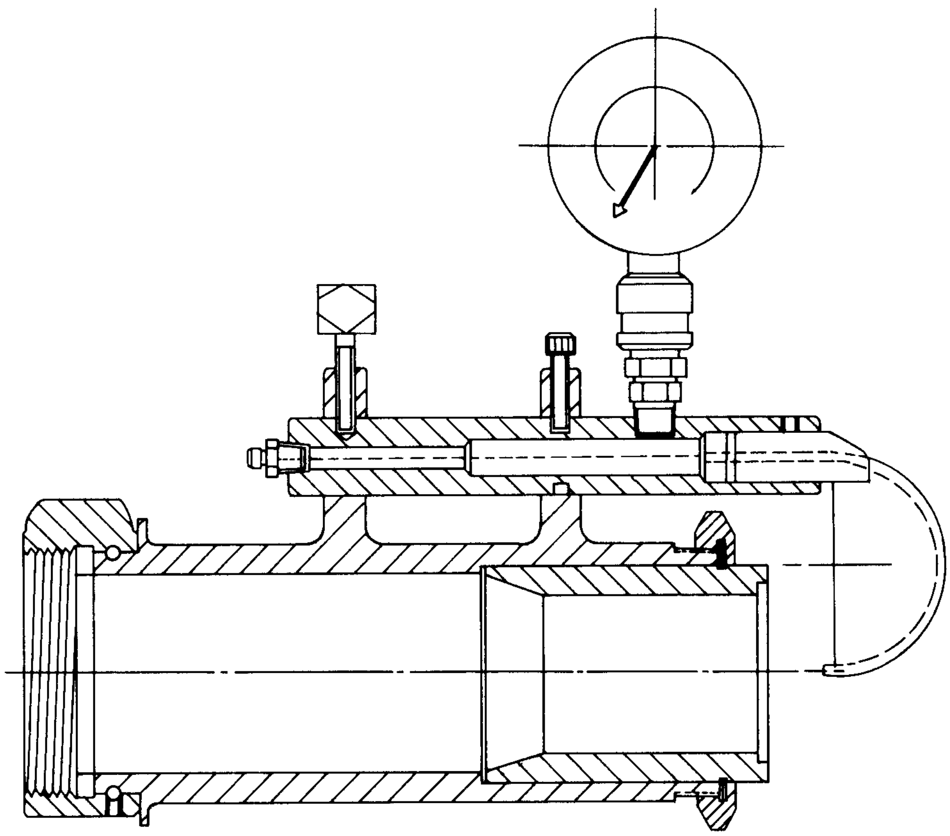

Figure A-2-3.3.1.1(d) Pitot tube attached to nozzle.

A-4-1.1 Data submitted at the time of the delivery test and all results of service tests should be maintained in a permanent file so that the condition of the pump can be compared over years of operation.

A-4-1.2 Investigation has shown that where regular and systematic tests of pumps are not made, defects often exist, and may continue undetected for considerable periods under the light demands at ordinary fires and only become apparent at a large fire where the pump is called on to perform at or near rated capacity. Furthermore, regular tests are valuable training for pump operators, for in only a few departments do they receive sufficient training in operating pumps at draft. The breakdown of a pump at a fire or the inability of the crew to operate it properly may cause needless loss of life and property.

A-4-3.2 A test of the automatic pump pressure control device is strongly recommended. If the pump is a two-stage (series/parallel) unit, operation of the transfer ("change-over") valve should be checked thoroughly. If the apparatus is equipped with a water tank, the tank-to-pump flow rate also should be checked. See NFPA 1901, *Standard on Automotive Fire Apparatus*, for appropriate tests.

A-4-4.2 When a pump is operating at or near full engine power while stationary, the heat generated may raise the temperature of certain chassis and/or pumping system components above the level that can be touched without extreme discomfort or injury; however, as long as the apparatus can be operated and used satisfactorily for the required duration of the test under such conditions, it should be considered acceptable.

A-5-1 These references are listed separately to facilitate updating to the latest edition by the user.

SERVICE TEST RESULTS

PUMPER NO ____________

MANUFACTURER ____________ YEAR BUILT ____________

Manufacturer's Model ____________ Manufacturer's Serial No. ____________

ENGINE. Make and Model ____________

PUMP Make and Model ____________ Rated Capacity ____________ gpm at ____________ psi

GEAR RATIO Engine to Pump Capacity ____________ 200 psi ____________ 250 psi ____________

TRANSMISSION GEAR USED · Capacity ____________ 200 psi ____________ 250 psi ____________

Suction Size ____________ Length ____________ Lift ____________

Hand Counter Speed Check Readings taken from ____________

Ratio to Engine 1 to ____________

CAPACITY TEST:

Layout ____________ Nozzle Size ____________

Time	Counter	RPM	Tach	Pump Pressure		Pitot
				Appar Gage	Test Gage	

250 PSI TEST:

Layout ____________ Nozzle Size ____________

Time	Counter	RPM	Tach	Pump Pressure		Pitot
				Appar Gage	Test Gage	

200 PSI TEST:

Layout ____________ Nozzle Size ____________

Time	Counter	RPM	Tach	Pump Pressure		Pitot
				Appar Gage	Test Gage	

FINAL RESULTS

	Capacity	200 psi	250 psi
Duration			
Ave Noz Pressure			
Correction			
Corrected Press			
Gallons Per Min			
Displacement			
" (Nominal)			
Slip Per Cent			
Pump Stg (Ser Par)			
Ave Pump Press *			
RPM-Engine			
RPM-Pump			

*Test gage reading

REMARKS

Tested at ____________ Witnessed by ____________ Date ____________

Figure A-3-3.1 Acceptance or Service Test Results.

Appendix B History

A pamphlet entitled, "Fire Department Pumper Tests and Fire Stream Tables," published in 1910, described the methods of testing steam fire engines, which had been in use for years, and stated that these tests had been found practicable, exact, and of great value. Until then, the character of tests made in many cities, and especially those for acceptance, were usually more spectacular than exact.

At the convention of the International Association of Fire Engineers in Milwaukee in 1911, the Committee on Exhibits conducted some performance tests on automobile pumping engines. The following year at Denver, the Committee on Exhibits, with the assistance of engineers of the National Board of Fire Underwriters, conducted tests on 7 pumping engines discharging under net pumping pressures of 120 psi, 200 psi, and 250 psi; duration of various runs was from 3 to 11 minutes. By the next convention of the IAFE in New York City in 1913, the Committee had developed the test procedure that consisted of 6 hrs running at capacity at 120 psi, 3 hrs run at ½ capacity at 200 psi, and 3 hrs run at ⅓ capacity at 250 psi. This test procedure was used for many years.

The 1939 and 1941 editions of the "Suggested Specifications for Motor Fire Apparatus," issued by the National Board of Fire Underwriters, outlined the above-mentioned tests, which were later termed "Class B" requirements; the "Class A" requirements, delivery of capacity at 150 psi, 70 percent of capacity at 200 psi, and delivery of 50 percent of capacity at 250 psi, were noted as an optional specification. The 1947 edition defined the two classes, and the 1956 edition eliminated the Class B designation.

As a result of this gradual change, most pumpers built prior to 1939 were Class B, those built from 1939 through 1956 were Class A or B, and those built from 1957 on are Class A.

The fifth edition of *Fire Department Pumper Tests and Fire Stream Tables* (1950) described the test for what had been established as Class A pumpers, which specified the delivery of rated capacity at 150 psi, 70 percent of capacity at 200 psi, and 50 percent of capacity at 250 psi. This is the test now in use; Class B pumpers are no longer recognized for original purchase.

In January 1981, the Insurance Services Office, successor to the former National Board of Fire Underwriters, transferred all publishing rights of this pamphlet to the National Fire Protection Association. In the NFPA publication, SPP-67, several changes were made, including:

1. A modification of the description of the type of tests performed to correlate with requirements contained in NFPA 1901, *Standard on Automotive Fire Apparatus.*
2. Reduction in the test dealing with testing of positive displacement pumps, especially rotary gear pumps.
3. Insertion of additional cautionary statements and increased emphasis on safety precautions that should be followed during tests.
4. A new table showing the relative carrying capacity of hose from 2½ to 6 in. in diameter.

In 1982, the NFPA Technical Committee on Fire Department Equipment began the development of this Standard, which incorporates much of the material formerly included in the pamphlet but presents it in proper form for incorporation in purchase specifications and other formal documents.

Appendix C Conducting Pumping Tests

Test Parameters

At the start of the test, attention should be paid to the ease with which the pump takes suction. Before starting to prime the pump, close all discharge, drain, and booster tank valves and petcocks; make sure that suction gaskets are in place and free from foreign matter; and tighten suction caps and couplings.

In testing a pump, there are three variable factors, interrelated in that a change in one factor will always produce a change in at least one of the others. The three variables are pump speed, net pump pressure, and pump discharge rate. For example, an increase in speed of the pump will increase the discharge or the pressure or both. Adjustments of variables through changing the position of the engine throttle (modifies pump speed), changing the hose layout or gate valve positions (modifies pump pressure), or changing the nozzle size (modifies discharge) are the only ways to reach the standard test condition desired.

The pump should be operated at reduced capacity and pressure for several minutes to allow the engine and transmission to warm up. The pump is gradually speeded up until the desired pressure at the pump is reached. If the pressure will not come up to the desired level, a length or two of hose may have to be added, a smaller nozzle used, or a discharge valve throttled. When the desired pressure is obtained at the pump, the pitot should be read to see if the required amount of water is being delivered.

If the discharge is not as great as desired and it is believed that the pump will deliver a greater quantity of water, the discharge may be increased by further speeding up the pump, but if speeding up the pump increases the pump pressure more than 5 or 10 psi (34 or 69 kPa), a length of hose should be taken out, a discharge valve opened slightly, or a larger nozzle used.

A speed reading should be taken at frequent intervals, corresponding to the time the pressure readings were taken. Counting the revolutions for one minute generally gives readings of sufficient accuracy.

When using a stop watch, the best and most accurate method is to leave the stop watch running at all times, engaging the revolution counter at a chosen instant and disengaging when the hand of the stop watch makes a passage on the same point on the dial one minute later.

After the engine has warmed up, there should be little change in the engine speed. It should be realized that any change in engine speed must, of necessity, produce a corresponding change in pump discharge pressure and hence in pitot reading, and that other things being equal, any change in pitot reading indicates a change in engine speed. A change in pump speed will also cause a change in discharge pressure, so that whenever pump speed, discharge pressure, and pitot readings do not show corresponding changes, it is safe to say that some reading is in error or some condition has arisen that affects the readings and needs correction. Engine speeds can be changed by working the hand throttle at the operator's position.

It is common but faulty practice to read a pressure gage at the highest point in the swing of its needle; the center of the needle swing should always be read, as this is the average pressure. A needle valve in the line to the gage (a "snubber") may be throttled to prevent excessive vibration, but if throttled too much, the gage pointer will no longer indicate the pressure correctly; never attempt to eliminate all of the pointer movements.

Special care should be taken in reading the pitot pressure; the pitot tube should be held in the center of the stream and with the tip about half the nozzle diameter away from the end of the nozzle. If the pitot is brought closer to the nozzle, the reading will be erroneously increased.

Short lines of hose are always more convenient for a test layout than long ones. It is generally better to use a single line of 100 ft for the pressure tests and restrict the discharge at the pump discharge valve enough to increase the friction loss so that the desired discharge pressure will be obtained. By closely watching the pitot reading, the valve can be gradually closed as the engine speed is increased, until the discharge pressure and pitot pressure readings are both as desired. Care should be taken to make sure that the valve does not jar either open or closed as, in either case, both the capacity and discharge pressure will be affected.

Trouble Shooting

Most tests are conducted without incident. Nevertheless, trouble does develop during some tests and an effort should be made to locate the source of trouble while the apparatus remains at the test site. Some difficulties that may be experienced, and suggestions on how to trace and correct them, are discussed in the following paragraphs.

Failure to prime a centrifugal pump is a frequent source of trouble, and the usual cause is an air leak in the suction hose or pump. One way to trace this trouble is to remove all discharge hose lines, cap all discharge openings, and the suction hose, and operate the priming mechanism in accordance with the manufacturer's recommendations. Study the suction gage to determine maximum vacuum developed, which should be at least 22 in. of mercury at altitudes of less than 1000 ft. Stop the primer. If the vacuum drops 10 or more inches in less than 5 minutes, there is a leak in the suction hose or pump assembly; it may be in a valve, drain cock, piping, casing, or pump packing. The leakage may be located by listening for air movement. Another method is to connect the pump to a convenient hydrant, cap the pump discharge outlets, open the hydrant, and watch for water leaks. A leak can usually be corrected at the test site.

Two possible causes for failure of the pump to deliver the desired capacity and/or pressure are insufficient power and restricted suction. Insufficient power is indicated by the inability of the engine to reach the required speed for the desired pumping condition. The operator may have failed to advance the throttle far enough, may be using the wrong transmission gear position, the engine may be in need of a tune-up, the grade of fuel may be improper for adequate combustion, or there may be vaporization in the fuel line.

Restricted suction is indicated if the pump speed is too high for the capacity and pressure levels attained, and may be the result of any one or combination of the following conditions: suction hose too small, high altitude, suction lift too high, improper type of strainer, clogged suction strainer at the pump or at the end of the suction hose, aerated water, water too warm (over 90°F or 32°C), collapsed or defective suction hose, and foreign material in pump. An air leak in the suction connections or the pump suction manifold will also result in excessive pump speed, and eventually may cause loss of prime and complete cessation of flow.

Insufficient pressure when operating a centrifugal pump may be the result of pumping too much water for the power available and, in multistage pumps, pumping in "volume" position instead of required "pressure" position. This can be checked by partially closing off all discharge valves until only a small flow is observed, then opening the throttle until the desired pressure is reached, followed by slowly opening discharge valves and increasing engine speed as necessary to maintain pressure until desired capacity is obtained. An improperly adjusted or inoperative transfer valve may prevent building up of adequate pressure. Likewise, the automatic pressure control may be set too low or be defective.

Excessive engine speed may be the result of operating the pumper with the wrong transmission gear in use, stuck throttle control cable, restricted suction, not having the suction hose under a sufficient depth of water, or an air leak on the suction side of the pump. Of course, it may be the result of pump wear, in which case repairs must be made and another test performed subsequently.

A slip of the revolution counter or its fitting will show an apparently decreased speed, and frequent checks should be made with the pumper tachometer to verify a change in speed. A clogged pitot tube will cause a drop in the gage reading.

Calculating the Results

If nozzles and pitot tubes have been used to measure pump capacity, the values of capacity are determined by the following formula:

$$\text{Gallons per minute} = 29.83\, c\, d^2 \sqrt{p}$$

where d = diameter of nozzle in inches

p = pressure of pitot gage, psi

c = coefficient of discharge of the nozzle used.

The pitot pressure should be the average of several readings and corrected for gage error.

For nozzles sized from ¼ inch to 2¼ inches, values of capacity may be approximated from Tables C-1 (a), (b), (c), and (d); however, as these values are based on certain assumed coefficients of discharge, they may be considerably at variance with the actual values. For nozzles larger than 2¼ inches, approximate values of capacity may be obtained from Table C-4.

Lift

The lift is the difference in elevation between the water level and the center of the pump suction inlet when a pumper is drafting water. The "maximum lift" is the greatest difference in elevation at which the pumper can draft the required quantity of water under the established physical characteristics of operation; these include the design of the pump, the adequacy of the engine, the condition of pump and engine, the size and condition of suction hose and strainers, the elevation of the pumping site above sea level, atmospheric pressure, and temperature of the water. The theoretical values of lift and maximum lift must be reduced by the entrance and friction losses in

Table C-1(a) Discharge Table for Smooth Nozzles.

Nozzle Pressure Measured by Pitot Gage

Nozzle Pressure in psi	Nozzle diam. in inches. ¼ (gpm)	5/16	3/8	7/16	Nozzle Pressure in psi	Nozzle diam. in inches. ¼ (gpm)	5/16	3/8	7/16
5	4	6	9	13	**60**	14	22	31	43
6	4	6	10	14	**62**	14	22	32	44
7	4	7	11	15	**64**	14	22	32	45
8	5	7	11	16	**66**	14	23	33	46
9	5	8	12	17	**68**	14	23	33	46
10	6	9	13	18	**70**	15	24	34	47
12	6	10	15	19	**72**	15	24	34	48
14	7	11	15	21	**74**	15	24	35	48
16	7	12	16	22	**76**	15	24	35	49
18	7	12	17	24	**78**	15	24	36	50
20	8	13	18	25	**80**	16	25	36	50
22	8	13	19	26	**82**	16	25	37	51
24	8	13	20	27	**84**	16	25	37	51
26	9	14	21	29	**86**	16	26	37	52
28	9	14	21	30	**88**	16	26	38	53
30	10	15	22	31	**90**	17	27	39	53
32	10	15	23	32	**92**	17	27	39	54
34	11	16	23	33	**94**	17	27	39	54
36	11	16	24	34	**96**	17	27	40	55
38	11	17	25	35	**98**	17	27	40	55
40	11	18	26	35	**100**	18	28	41	56
42	11	18	26	36	**105**	18	29	42	57
44	12	18	27	37	**110**	19	29	43	59
46	12	19	28	38	**115**	19	30	43	60
48	12	19	28	39	**120**	19	31	44	61
50	13	20	29	40	**125**	20	31	45	63
52	13	20	29	40	**130**	20	32	46	64
54	13	20	30	41	**135**	21	33	47	65
56	13	21	30	42	**140**	21	33	48	66
58	13	21	31	43	**145**	21	34	49	68
60	14	22	31	43	**150**	22	34	50	69

Assumed coefficient of discharge = 0.98¼ 0.98¼ 0.98½ 0.98½

Table C-1(b) Discharge Table for Smooth Nozzles.

Nozzle Pressure Measured by Pitot Gage

Nozzle Pressure in psi	Nozzle diam. in inches. ½ (gpm)	5/8	¾	7/8	Nozzle Pressure in psi	Nozzle diam. in inches. ½ (gpm)	5/8	¾	7/8
5	16	26	37	50	**60**	57	89	130	174
6	18	28	41	55	**62**	58	90	132	177
7	19	30	44	59	**64**	59	92	134	180
8	21	32	47	64	**66**	60	93	136	182
9	22	34	50	67	**68**	60	95	138	185
10	23	36	53	71	**70**	61	96	140	188
12	25	40	58	78	**72**	62	97	142	191
14	27	43	63	84	**74**	63	99	144	193
16	29	46	67	90	**76**	64	100	146	196
18	31	49	71	95	**78**	65	101	148	198
20	33	51	75	101	**80**	66	103	150	201
22	34	54	79	105	**82**	66	104	152	204
24	36	56	82	110	**84**	67	105	154	206
26	37	59	85	115	**86**	68	107	155	208
28	39	61	89	119	**88**	69	108	157	211
30	40	63	92	123	**90**	70	109	159	213
32	41	65	95	127	**92**	70	110	161	215
34	43	67	98	131	**94**	71	111	162	218
36	44	69	100	135	**96**	72	113	164	220
38	45	71	103	138	**98**	73	114	166	223
40	46	73	106	142	**100**	73	115	168	225
42	47	74	109	146	**105**	75	118	172	230
44	49	76	111	149	**110**	77	121	176	236
46	50	78	114	152	**115**	79	123	180	241
48	51	80	116	156	**120**	80	126	183	246
50	52	81	118	159	**125**	82	129	187	251
52	53	83	121	162	**130**	84	131	191	256
54	54	84	123	165	**135**	85	134	195	262
56	55	86	125	168	**140**	87	136	198	266
58	56	87	128	171	**145**	88	139	202	271
60	57	89	130	174	**150**	90	141	205	275

Assumed coefficient of discharge = 0.98½ 0.98¾ 0.98¾ 0.98¾

Table C-1(c) Discharge Table for Smooth Nozzles.

Nozzle Pressure Measured by Pitot Gage

Nozzle Pressure in psi	Nozzle diam. in inches. 1 (gpm)	1⅛	1¼	1⅜	1½	Nozzle Pressure in psi	Nozzle diam. in inches. 1 (gpm)	1⅛	1¼	1⅜	1½
5	66	84	103	125	149	**60**	229	290	357	434	517
6	72	92	113	137	163	**62**	233	295	363	441	525
7	78	99	122	148	176	**64**	237	299	369	448	533
8	84	106	131	158	188	**66**	240	304	375	455	542
9	89	112	139	168	200	**68**	244	308	381	462	550
10	93	118	146	177	211	**70**	247	313	386	469	558
12	102	130	160	194	231	**72**	251	318	391	475	566
14	110	140	173	210	249	**74**	254	322	397	482	574
16	118	150	185	224	267	**76**	258	326	402	488	582
18	125	159	196	237	283	**78**	261	330	407	494	589
20	132	167	206	250	298	**80**	264	335	413	500	596
22	139	175	216	263	313	**82**	268	339	418	507	604
24	145	183	226	275	327	**84**	271	343	423	513	611
26	151	191	235	286	340	**86**	274	347	428	519	618
28	157	198	244	297	353	**88**	277	351	433	525	626
30	162	205	253	307	365	**90**	280	355	438	531	633
32	167	212	261	317	377	**92**	283	359	443	537	640
34	172	218	269	327	389	**94**	286	363	447	543	647
36	177	224	277	336	400	**96**	289	367	452	549	654
38	182	231	285	345	411	**98**	292	370	456	554	660
40	187	237	292	354	422	**100**	295	374	461	560	667
42	192	243	299	363	432	**105**	303	383	473	574	683
44	196	248	306	372	442	**110**	310	392	484	588	699
46	200	254	313	380	452	**115**	317	401	495	600	715
48	205	259	320	388	462	**120**	324	410	505	613	730
50	209	265	326	396	472	**125**	331	418	516	626	745
52	213	270	333	404	481	**130**	337	427	526	638	760
54	217	275	339	412	490	**135**	343	435	536	650	775
56	221	280	345	419	499	**140**	350	443	546	662	789
58	225	285	351	426	508	**145**	356	450	556	674	803
60	229	290	357	434	517	**150**	362	458	565	686	817

Assumed coefficient of discharge = 0.99 0.99 0.99 0.99¼ 0.99½

Table C-1(d) Discharge Table for Smooth Nozzles.

Nozzle Pressure Measured by Pitot Gage

Nozzle Pressure in psi	Nozzle diam. in inches. 1⅝ (gpm)	1¾	1⅞	2	2¼	Nozzle Pressure in psi	Nozzle diam. in inches. 1⅝ (gpm)	1¾	1⅞	2	2¼
5	175	203	234	266	337	**60**	607	704	810	920	1167
6	192	223	256	292	369	**62**	617	716	823	936	1187
7	207	241	277	315	399	**64**	627	727	836	951	1206
8	222	257	296	336	427	**66**	636	738	850	965	1224
9	235	273	314	357	452	**68**	646	750	862	980	1242
10	248	288	330	376	477	**70**	655	761	875	994	1260
12	271	315	362	412	522	**72**	665	771	887	1008	1278
14	293	340	391	445	564	**74**	674	782	900	1023	1296
16	313	364	418	475	603	**76**	683	792	911	1036	1313
18	332	386	444	504	640	**78**	692	803	924	1050	1330
20	350	407	468	532	674	**80**	700	813	935	1063	1347
22	367	427	490	557	707	**82**	709	823	946	1076	1364
24	384	446	512	582	739	**84**	718	833	959	1089	1380
26	400	464	533	606	769	**86**	726	843	970	1102	1396
28	415	481	554	629	799	**88**	735	853	981	1115	1412
30	429	498	572	651	826	**90**	743	862	992	1128	1429
32	443	514	591	673	854	**92**	751	872	1002	1140	1445
34	457	530	610	693	880	**94**	759	881	1012	1152	1460
36	470	546	627	713	905	**96**	767	890	1022	1164	1476
38	483	561	645	733	930	**98**	775	900	1032	1176	1491
40	496	575	661	752	954	**100**	783	909	1043	1189	1506
42	508	589	678	770	978	**105**	803	932	1070	1218	1542
44	520	603	694	788	1000	**110**	822	954	1095	1247	1579
46	531	617	710	806	1021	**115**	840	975	1120	1275	1615
48	543	630	725	824	1043	**120**	858	996	1144	1303	1649
50	554	643	740	841	1065	**125**	876	1016	1168	1329	1683
52	565	656	754	857	1087	**130**	893	1036	1191	1356	1717
54	576	668	769	873	1108	**135**	910	1056	1213	1382	1750
56	586	680	782	889	1129	**140**	927	1076	1235	1407	1780
58	596	692	796	905	1149	**145**	944	1095	1257	1432	1812
60	607	704	810	920	1168	**150**	960	1114	1279	1456	1843

Assumed coefficient of discharge = 0.995 0.995 0.996 0.997 0.997

the suction hose equipment to obtain the actual or measurable lift.

The vacuum, or negative pressure, on the suction side of a pump is measured in inches of mercury, usually written as in. Hg or "Hg (Hg is the chemical symbol for mercury). A vacuum of one inch of mercury is equal to a negative pressure of 0.49 lbs per sq. in.; or 1 in. Hg = 0.49 psi. A positive pressure of 0.49 psi at the bottom of a container 1 in. square will support a column of water

1.13 ft high; therefore, a negative pressure of 0.49 psi at the top of the container will support the same column of water. This means 1 in. Hg = 0.49 psi = 1.13 ft of water head.

Effect of Altitude

When drafting water, the pump produces a partial vacuum in the suction hose and the atmospheric pressure on the surface of the water forces water into the suction hose and the pump. As the elevation above sea level of the pumping site increases, the atmospheric pressure decreases. The loss of lift at various elevations is given in Table C-2.

The data in Table C-2 assume that the engine of the pumper is adequate at all elevations. However, the power available for driving a pump from naturally aspirated gasoline engines decreases about 4 percent (up to 3 percent for diesel engines that are naturally aspirated) for each 1,000 ft of elevation. Therefore, a gasoline engine that was just adequate at sea level would be about 35 percent deficient at 7,000 ft altitude.

A difference in barometric pressure due to weather conditions will have the same result as a change in altitude. The difference in barometric pressure due to operation on a rainy day instead of a cool, clear day could easily mean a 1 ft difference in lift.

Table C-2 Loss of Lift at Various Elevations

Elevation above sea level feet	Loss of lift feet of water
1,000	1.22
2,000	2.38
3,000	3.50
4,000	4.75
5,000	5.80
6,000	6.80
7,000	7.70

Pump Design and Suction Hose

At the time of purchase, a pump must be able to develop a vacuum of 22 in. with a capped suction hose and must hold the vacuum with a drop not in excess of 10 in. in 5 minutes. This is basically a test of the priming system and the tightness of pump and fittings, not a test of the ability to maintain a vacuum while pumping water; the latter is an entirely different pump design problem.

The size, length, and condition of suction hose, as well as altitude, water temperature, and barometric pressure are other factors that affect operations at draft. See Table C-3 for average minimum discharge with various sizes and lengths of suction hose at specified lifts.

Another factor that greatly affects performance is the difference between actual discharge being pumped and the designed rated capacity. A 750-gpm pump with a 30 ft length of 5-in. suction hose would probably have a maximum lift of about 15 ft, while a 1,500-gpm pump drafting only 750 gpm through 30 ft of 5-in. suction hose would probably have a maximum lift of about 20 ft or, through 30 ft of 6-in. suction hose, a maximum of 23 ft.

Table C-3 Minimum Discharge Expected of a Pump in Good Condition Operating at Draft at Various Lifts.

Conditions: Operating at Net Pump Pressure of 150 psi; Altitude of 1,000 ft; Water Temperature of 60°F; Barometric Pressure of 28.94 in. Hg (poor weather conditions).

Rated Capacity, Pump		500 gpm		750 gpm		1000 gpm		1250 gpm	1500 gpm		
Suction Hose Size		4"	4½"	4½"	5"	5"	6"	6"	6"	Dual 5"	Dual 6"
Lift in Feet: 4	20' Suction Hose (Two Sections)	590	660	870	945	1160	1345	1435	1735	1990	2250
6		560	630	830	905	1110	1290	1375	1660	1990	2150
8		530	595	790	860	1055	1230	1310	1575	1810	2040
10		500	560	750	820	1000	1170	1250	1500	1720	1935
12		465	520	700	770	935	1105	1175	1410	1615	1820
14		430	480	650	720	870	1045	1100	1325	1520	1710
16		390	430	585	655	790	960	1020	1225	1405	1585
18	30' Suction Hose (Three Sections)	325	370	495	560	670	835	900	1085	1240	1420
20		270	310	425	480	590	725	790	955	1110	1270
22		195	225	340	375	485	590	660	800	950	1085
24		65	70	205	235	340	400	495	590	730	835

NOTES:
1. Net pump pressure is 150 psi. Operation at a lower pressure will result in an increased discharge; operation at a higher pressure, a decreased discharge.
2. Data based on a pumper with ability to discharge rated capacity when drafting at not more than a 10-foot lift. Many pumpers will exceed this performance and therefore will discharge greater quantities than shown at all lifts.

Table C-4 Nozzle Factors

Diameter of the nozzle in inches	Factors: Fresh Water	Factors: Salt (sea) Water
2	119	117
2¼	150	148
2½	186	183
2¾	225	222
3	267	264
3¼	314	310
3½	364	359
3¾	418	413
4	476	470
4¼	537	530
4½	602	594
4¾	671	662
5	743	734
6	1,070	1,057

Capacity in gallons per minute is determined by the following formula:

$$GPM = (F)\sqrt{p}$$

F = factor from the table

p = pressure at pitot gage, psi

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SUBMITTING PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

Contact NFPA Standards Administration for final date for receipt of proposals on a specific document.

INSTRUCTIONS

Please use the forms which follow for submitting proposed amendments. Use a separate form for each proposal.

1. For each document on which you are proposing amendment indicate:
   (a) The number and title of the document
   (b) The specific section or paragraph.

2. Check the box indicating whether or not this proposal recommends new text, revised text, or to delete text.

3. In the space identified as "Proposal" include the wording you propose as new or revised text, or indicate if you wish to delete text.

4. In the space titled "Statement of Problem and Substantiation for Proposal" state the problem which will be resolved by your recommendation and give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If a statement is more than 200 words in length, the technical committee is authorized to abstract it for the Technical Committee Report.

5. Check the box indicating whether or not this proposal is original material, and if it is not, indicate source.

6. If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

NOTE: The NFPA Regulations Governing Committee Projects in Paragraph 10-10 state: Each proposal shall be submitted to the Council Secretary and shall include.

(a) identification of the submitter and his affiliation (Committee, organization, company) where appropriate, and

(b) identification of the document, paragraph of the document to which the proposal is directed, and

(c) a statement of the problem and substantiation for the proposal, and

(d) proposed text of proposal, including the wording to be added, revised (and how revised), or deleted.