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ANSI/CAN/UL/ULC 2586:2022

STANDARD FOR SAFETY

Hose Nozzle Valves for Flammable and Combustible Liquids

Approved American National Standard
ANSI

ANSI/UL 2586-2022

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UL Standard for Safety for Hose Nozzle Valves for Flammable and Combustible Liquids, ANSI/CAN/UL/ULC 2586

Second Edition, Dated January 22, 2021

Summary of Topics

This revision of ANSI/CAN/UL/ULC 2586 dated December 14, 2022 includes the following changes in requirements:

– Revision to Deformation Test with respect to anchoring; 11.2

– Revision to External Leakage Test to clarify that if a vacuum shutoff port opening is provided it shall be sealed; 3.9, 12.2 and 12.4

– Revision to Hose Nozzle Valve Guard Strength Test with respect to hose length size; 14.3

– Revision to Sensitivity Test with respect to hose length and clarification for "no pressure-no flow" nozzles; 17.2

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

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated February 25, 2022 and June 10, 2022.

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ANSI/CAN/UL/ULC 2586:2022

Standard for Hose Nozzle Valves for Flammable and Combustible Liquids

First Edition – April 2011

Second Edition

January 22, 2021

This ANSI/CAN/UL/ULC Safety Standard consists of the Second Edition including revisions through December 14, 2022.

The most recent designation of ANSI/UL 2586 as an American National Standard (ANSI) occurred on December 14, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, Preface or SCC Foreword.

This standard has been designated as a National Standard of Canada (NSC) on December 14, 2022.

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Preface

This is the Second Edition of ANSI/CAN/UL/ULC 2586, Standard for Hose Nozzle Valves for Flammable and Combustible Liquids.

UL is accredited by the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC) as a Standards Development Organization (SDO). ULC Standards is accredited by the Standards Council of Canada (SCC) as a Standards Development Organization (SDO).

This Standard has been developed in compliance with the requirements of ANSI and SCC for accreditation of a Standards Development Organization.

This ANSI/CAN/UL/ULC 2586 Standard is under continuous maintenance, whereby each revision is approved in compliance with the requirements of ANSI and SCC for accreditation of a Standards Development Organization. In the event that no revisions are issued for a period of four years from the date of publication, action to revise, reaffirm, or withdraw the standard shall be initiated.

In Canada, there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages.

This joint American National Standard and National Standard of Canada is based on, and now supersedes, the First edition of UL 2586 and the Fourth edition of CAN/ULC-S620.

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

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This Edition of the Standard has been formally approved by the UL Standards Technical Panel (STP) on Valves for Flammable Fluids, STP 842.

This list represents the STP 842 membership when the final text in this standard was balloted. Since that time, changes in the membership may have occurred.

STP 842 Membership

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This Standard is intended to be used for conformity assessment.

The intended primary application of this standard is stated in its scope. It is important to note that it remains the responsibility of the user of the standard to judge its suitability for this particular application.

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS FRANÇAISE ET ANGLAISE

INTRODUCTION

1 Scope

1.1 These requirements cover hose nozzle valves that are intended to be used for the control of flammable and combustible liquids. They are of the type used in motor fuel dispensing equipment. Hose nozzle valves covered by this standard are for use with flammable and combustible liquids which are handled at temperatures within the range of -20°F (-29°C) to 125°F (52°C) and an operating pressure of minimum 50 psi (350 kPa).

1.2 These requirements cover hose nozzle valves of the manually operated and automatic pressure operated type. When they form a part of an assembly which provides for additional functions or service, the requirements are outside the scope of these requirements.

1.3 These requirements do not cover the following:

a) Hose nozzle valves for handling liquids under cryogenic conditions.

b) Hose nozzle valves for general refinery service, offshore and pipe line terminals, natural gas processing plants, gas distribution systems, petrochemical processing facilities, or the like.

c) Hose nozzle valves operated wholly or partially by electricity or battery; or

d) Hose nozzle valve readers that are powered from internal batteries. These are covered under UL 1238A, Outline of Investigation for Battery Operated Hose Nozzle Valve Readers.

1.4 For hose nozzle valves intended to be used with gasoline/ethanol blends with nominal ethanol concentrations above 10%, refer to the Standard for Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 – E85), UL 2586A, for additional requirements.

1.5 For additional requirements for hose nozzle valves for biodiesel fuel and diesel/biodiesel blends with nominal biodiesel concentrations up to 20 % (B20), refer to the Standard for Hose Nozzle Valves for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations up to 20 Percent (B20), Kerosene, and Fuel Oil, UL 2586B.

1.6 Products covered by this Standard are intended to be installed and used in accordance with the applicable Codes and Regulations as determined by the Authority Having Jurisdiction (AHJ), such as but not limited to:

a) In the United States:

Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A.

b) In Canada:

The National Fire Code of Canada.

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a product covered by this standard shall comply with the requirements for that component.

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

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

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

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

2.2 Units of measurement

2.2.1 When a value for measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

2.3 Reference Publications

2.3.1 The documents shown below are referenced in the text of this Standard. Any undated reference to a code or standard appearing in the requirements of this Standard shall be interpreted as referring to the latest edition of that code or standard.

UL Standards

UL 567, *Standard for Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Petroleum Products and LP-Gas*
UL 746C, *Standard for Polymeric Materials – Use in Electrical Equipment Evaluations*
UL 969, *Standard for Marking and Labeling Systems*
UL 1238A, *Outline of Investigation for Battery Operated Hose Nozzle Valve Readers*
UL 2586A, *Standard for Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 – E85)*
UL 2586B, *Standard for Hose Nozzle Valves for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations up to 20 Percent (B20), Kerosene, and Fuel Oil*

Other Standards

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*
ASTM B858, *Standard Test Method for Ammonia Vapor Test for Determining Susceptibility to Stress Corrosion Cracking in Copper Alloys*
ASTM/ANSI D4814, *Standard Specification for Automotive Spark-Ignition Engine Fuel*
ASTM/ANSI D4806, *Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel*
ASTM/ANSI D975, *Standard Specification for Diesel Fuel*
ASTM/ANSI D3699, *Standard Specification for Kerosene*
ASTM D396, *Standard Specification for Fuel Oils*
ASTM G151, *Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources*
ASTM G155, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*
CSA C22.2 No. 0.15, *Adhesive labels*
NFC, *National Fire Code of Canada*

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Garages*

Abbreviations

ANSI – American National Standards Institute
ASME – American Society of Mechanical Engineers
ASTM – American Society for Testing and Materials
CSA – CSA Group
NFPA – National Fire Protection Association

3 Glossary

3.1 ASTM IRM 903 / IRM 903 – High-swelling petroleum base oil described in ASTM D471, Standard Test Method for Rubber Property – Effect of Liquids.

3.2 ASTM REFERENCE FUEL H – A mixture of 85 % ASTM Reference Fuel C + 15 % Anhydrous Denatured Ethanol by volume.

3.3 AUTHORITY HAVING JURISDICTION (AHJ) – The governmental body responsible for the enforcement of any part of this Standard or the official or agency designated by that body to exercise such a function.

3.4 COMBUSTIBLE LIQUID – Any liquid having a flash point at or above 100°F (37.8°C) and below 200°F (93.3°C) and as defined in the National Fire Code of Canada and NFPA 30, Flammable and Combustible Liquids Code.

3.5 FLAMMABLE AND COMBUSTIBLE LIQUIDS – The fuels are formulated in accordance with Regulation of Fuels and Fuel Additives, 40 CFR 80, and the following:

a) Gasoline formulated in accordance with the Standard Specification for Automotive Spark-Ignition Engine Fuel, ASTM/ANSI D4814;

b) Gasoline/ethanol blends at levels designated as "gasohol" (E10) or less formulated in accordance with ASTM/ANSI D4814, when blended with denatured fuel ethanol formulated in accordance with the Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel, ASTM/ANSI D4806;

c) Diesel fuel formulated in accordance with the Standard Specification for Diesel Fuel Oils, ASTM/ANSI D975;

d) Kerosene formulated in accordance with the Standard Specification for Kerosene, ASTM/ANSI D3699; and

e) Fuel oil (heating fuel) formulated in accordance with the Standard Specification for Fuel Oils, ASTM D396.

3.6 FLAMMABLE LIQUID – Any liquid having a flash point below 100°F (37.8°C) and a vapour pressure not exceeding 40 psig [275 kPa (absolute)] at 100°F (37.8°C) and as defined in the National Fire Code of Canada and NFPA 30.

3.7 HOSE NOZZLE VALVES – A self-closing device designed to control the flow of flammable and combustible liquids. It is intended for use at the outlet end of a hose for dispensing flammable liquids.

a) AUTOMATIC HOSE NOZZLE VALVE – A hose nozzle valve which is held open during the entire filling operation. It may be held open by manual force or by an integral hold-open or latching device.

It incorporates a mechanism that shuts off the flow of liquid during refueling operations to prevent overflow from the fill opening when liquid reaches a predetermined point on the spout.

b) MANUALLY OPERATED HOSE NOZZLE VALVE – A hose nozzle valve that is manually held open during the entire filling operation and closes only upon release of the manual force.

c) VAPOR RECOVERY HOSE NOZZLE VALVE – A system constructed to capture vapors displaced during filling operations. The vapors are not processed during the course of this activity.

1) Assist Nozzle – A vacuum or pump is used to draw the vapors back to the tank.

2) Balance Nozzle – Displacement of vapors from tank being filled forces the vapor back into the storage tank.

3.8 SEALS:

a) DYNAMIC SEAL – A seal that is subject to mechanical movement or other applied forces that result in movement or flexing of the seal under normal use conditions.

b) STATIC SEAL – A seal that is not subject to mechanical movement or other applied forces other than compressing forces that are applied during installation, after which, the seal is held in place during normal use conditions.

3.9 VACUUM SHUTOFF PORT OPENING – An opening near the tip of the spout that connects to the vacuum tube and serves to vent the cavity above the vacuum diaphragm during refueling, and when blocked by liquid causes automatic shutoff.

CONSTRUCTION

4 Assembly

4.1 General

4.1.1 A hose nozzle valve shall include all of the components required for its intended function and installation.

4.1.2 A seat disc shall be attached to its poppet or holder or otherwise assembled so as to prevent it from becoming dislocated under service conditions as determined by the Hose Nozzle Endurance Test, Section 18. The means to secure the disc shall not rely upon cement or adhesive.

4.1.3 A brazing material used for joining liquid confining parts of a valve shall have a melting point (solidus temperature) of minimum 1000°F (538°C)

4.1.4 A hose nozzle valve with an integral swivel shall also conform to the requirements of Electrical-Continuity and Operation Tests in the Standard for Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Petroleum Products and LP-Gas, UL 567. The force shall be applied at the point on the swivel farthest from the joint. When necessitated by the swivel construction, this test shall be conducted on additional samples of the swivel with the load applied on the opposite side of the plane of rotation.

4.2 Hose nozzle valves

4.2.1 Automatic hose nozzle valves equipped with an integral hold open or latching device shall be so designed that, if left in the latched position after the flow has been stopped by means other than the automatic feature of the hose nozzle, it shall automatically unlatch when it is returned to the dispenser.

NOTE: This includes hose nozzle valves that close with a no pressure/no flow mechanism, as well as interlock hose nozzles valves that unlatch when removed from a vehicle fill pipe or when hung on the dispenser.

Exception: A hose nozzle valve for use in salt water or boat yard environments shall be of the automatic closing type without a latch-open device.

4.2.2 A hose nozzle valve shall be of the normally closed type. It shall be self-closing upon the manual or automatic release of the operating lever.

4.2.3 A guard shall be provided to guide or protect the free end of an operating lever and to prevent opening of the valve or damage to an operating part if the valve is dropped. A guard shall be of such strength as to permit operation of the valve subsequent to its being subjected to mechanical strength tests. See the Guard Strength Test, Section 14.

4.2.4 An operating lever shall possess the strength required to resist bending or breaking when tested in accordance with the requirements of this standard.

4.2.5 The closing action of a hose nozzle valve shall be in the direction of fluid flow. A seat seal or valve disc shall consist of resilient material and shall provide proper seating of a disc.

4.2.6 A hose nozzle valve shall be equipped with a spout not exceeding 12 in (305 mm) in length. Nozzles shall be of corrosion resistant material, such as brass, aluminum, or stainless steel.

4.2.7 A sand casting employed as a pressure confining part of a hose nozzle valve shall have a wall thickness of minimum 0.094 in (2.38 mm).

4.2.8 The means for attaching a spout to an automatic valve body shall permit ready replacement of a spout with the use of ordinary hand tools.

4.2.9 A hose nozzle valve shall be constructed so as to provide electrical continuity from end to end across all joints so that when in use, continuity is provided for grounding of static charges. Such continuity shall be inherent in the construction and shall not be accomplished by a jumper wire. See the Electrical Continuity Test, Section 22.

4.2.10 A hose nozzle valve intended for use in salt water marine or boat yard environments shall be constructed so as to comply with the applicable construction and performance requirements except that the tests specified in Sections 14, 15, 17, 21, and 22 shall be conducted following exposure to a salt enriched atmosphere as described in 23.2 – 23.6.

Exception: A hose nozzle valve is not required to operate in accordance with the requirements of Section 15 when, due to accumulation of salt in the sensing port, the hose nozzle valve does not operate to deliver fluid.

5 Materials

5.1 Liquid-confining parts of a hose nozzle valve or operating parts shall have the strength and durability to provide reliable service of the parts and of the assembly.

5.2 To conform to the requirements of 5.1, a material other than a valve disc or soft seat, a seal ring, a diaphragm, a gasket or vacuum or pressure caps shall have a melting point (solidus temperature) of minimum 650°F (343°C) and a tensile strength of minimum 10,000 psi (69 MPa) at 201°F (94°C).

5.3 When atmospheric corrosion of a part could interferes with the intended function of a valve or permits external leakage, the part shall be of a corrosion resistant material or be provided with a corrosion resistant coating.

5.4 A coating complying with the requirements of 23 shall provide resistance against corrosion to a degree not less than that provided by the coatings specified in 5.5.

5.5 Cadmium plating shall not be used. Zinc plating shall be minimum 0.0005 in (0.013 mm) thick other than on parts where threads constitute the major portion of the area, in which case the thickness of the zinc plating shall be minimum 0.00015 in (0.0038 mm).

5.6 A hose nozzle valve intended for use in salt water marine or boat yard environments shall be resistant to corrosion so as to comply with the requirements of the Salt Spray Test, Section 23.

5.7 A plant fiber gasket used to seal a fluid-retaining joint shall be not more than 1/32 in (0.8 mm) thick. A cork composition gasket shall be shellacked in place on one side and coated with graphite on the other. A synthetic rubber gasket shall have a thickness of not less than 1/64 in (0.4 mm) and not more than 3/32 in (2.4 mm).

6 Bodies and Covers

6.1 A threaded section of a body intended for the connection of pipe shall have a section to serve as a wrench grip.

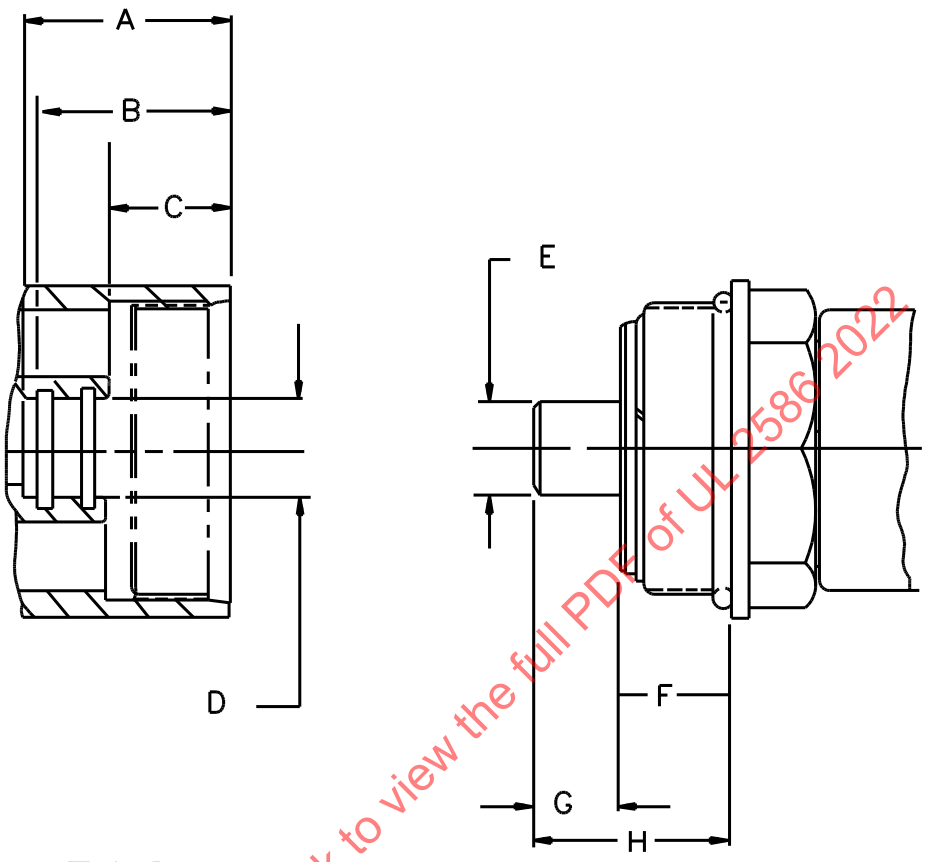
6.2 Pipe threads shall be in accordance with the Standard for Pipe Threads, General Purpose (Inch), ANSI/ASME B1.20.1.

Exception: Hose nozzle valves intended for use in installations where pipe fittings incorporate other than NPT type threads shall be permitted to be provided with pipe threads complying with a national pipe thread standard compatible with those fittings. The pipe thread type shall be identified in accordance with 29.5.

6.3 The couplings provided on coaxial type vapor recovery hose assemblies shall have male 1-7/8 – 12-SAE straight threads when the inner hose is intended to dispense the liquid fuel into the vehicle and 1-1/4 inch – 18 SAE Sstraight, M34 by 1.5 metric thread or 1 inch – 11-1/2 NPT threads , as required when the outer hose is intended to dispense the liquid fuel into the vehicle. All fittings shall be designed to fit the accessories connected to the hose couplings to form a leak tight connection. Coaxial type connections shall also have the dimensions as indicated in Figure 6.1.

Figure 6.1

Coaxial type connection



Item	Inch	(mm)
A	1.45 min	(36.8 min)
B	1.26 max	(32.0 max)
C	0.78 min	(19.8 min)
D	0.668 – 0.672	(17.0 – 17.1)
E	0.660 – 0.664	(16.8 – 16.9)
F	0.78 max	(19.8 max)
G	0.56 min	(14.2 min)
H	1.31 – 1.45	(33.3 – 36.8)

6.4 If the end connections of a vapor recovery fitting do not conform to the requirements specified in 6.3, the installation instructions which accompany each fitting shall indicate the specific equipment which is to be connected to the fitting.

6.5 Joints in a body formed of two or more parts shall be prevented from loosening as the result of the turning effort exerted by connecting or disconnecting piping. See the Deformation Test, Section 11.

6.6 Openings for bolts or screws used for assembly shall not extend through the outer walls of a body into a liquid-handling section.

7 Diaphragms

7.1 A diaphragm shall be protected from damage.

7.2 Metal parts coming in contact with a diaphragm shall have no sharp edges, burrs, projections, or the like which cause chafing or abrasion of the diaphragm.

8 Springs

8.1 A spring shall be guided and arranged to minimize binding, buckling, or other interference with its free movement. When required, the ends of a spring shall be closed and squared.

9 Operating Mechanisms

9.1 Screws and nuts used to attach operating parts to movable members shall be upset or otherwise locked to prevent loosening.

9.2 A manually-operated mechanism of a hose nozzle valve shall provide free movement of all parts.

PERFORMANCE

10 General

10.1 Except as otherwise indicated, representative samples of each type of hose nozzle valve shall be subjected to the tests described in these requirements. Additional samples of parts constructed of nonmetallic materials, such as seal materials and valve seat discs, shall be provided as required for physical and chemical tests.

10.2 Leakage tests for the portions of liquid handling hose nozzle valves shall be conducted using a source of aerostatic pressure. When leakage is observed, the tests shall be repeated with kerosene, Soltrol® 170, or a solvent considered equivalent to "white gasoline" that has a Kauri Butanol value of 44.

NOTE: Soltrol® is a Registered Trademark of Chevron Phillips Chemical Company LP.

10.3 Water or other liquid is not prohibited from being used for developing the required pressure in a hydrostatic pressure strength test.

11 Deformation Test

11.1 Joints in a hose nozzle valve shall not leak, nor shall there be evidence of loosening of joints, distortion, or other damage resulting from the stress imposed on pipe-threaded sections when tested in accordance with these requirements.

11.2 A length of Schedule 80 pipe shall be connected to a female pipe threaded section of the hose nozzle body. The hose nozzle valve or pipe shall be rigidly anchored or otherwise supported during the deformation test. The male threads shall be coated as specified by the manufacturer or have pipe joint sealing compound or polytetrafluoroethylene (PTFE) tape applied to them first. No more than four revolutions of polytetrafluoroethylene (PTFE) tape shall be applied. The connection shall be tightened to the torque specified in Table 11.1.

Table 11.1
Torque requirements for pipe connections

Pipe size,	Outside diameter,		Torque,	
nominal inches	inches	(mm)	pound-inches	(N·m)
1/2	1.26 max	(21.34)	800	(90)
3/4	0.78 min	(26.67)	1000	(113)
1	0.668 – 0.672	(33.40)	1200	(137)
1-1/4	0.660 – 0.664	(42.16)	1450	(164)
1-1/2	0.78 max	(48.26)	1550	(175)

11.3 After the torque force has been applied to each connected pipe, the test sample shall be subjected to the External Leakage Test, Section 12.

11.4 Upon removal of the pipe from the test sample, the assembly shall be examined for loosening of body joints.

12 External Leakage Test

12.1 The external leakage test shall be conducted on as received samples and after the Guard Strength Test, Section 14, Pull Test, Section 16, Sensitivity Test, Section 17, and Endurance Test, Section 18.

12.2 The inlet of the test valve shall be connected to a system capable of supplying clean aerostatic or hydrostatic pressure as the test medium. All external leakage tests employing an aerostatic pressure source shall be maintained for at least 1 min. All external leakage tests employing a liquid as the test medium shall be maintained for at least 5 min. The outlet of the hose nozzle valve shall be sealed. If a vacuum shutoff port opening is provided it shall be sealed to prevent the test medium from returning into the nozzle. The test medium shall be admitted and maintained at the specified test pressure.

12.3 A hose nozzle valve is considered as complying when no leakage is observed. For leakage tests employing an aerostatic pressure source, with the fluid-containing parts of the test valve submerged in enough water to cover the entire hose nozzle valve while under the test pressure, no bubbles indicating leakage shall be observed.

12.4 A hose nozzle valve shall not leak through stem or body seals or other joints, or show evidence of porosity in castings when liquid-confining parts under rated operating pressure are subjected to any gauge pressure between 0 and 25 psi (0 and 172 kPa) with the valve in the open position and the outlet closed. If a vacuum shutoff port opening is provided it shall be sealed to prevent the test medium from returning into the nozzle.

12.5 If a hose nozzle valve is provided with a vapor return portion, the valve shall also be checked for leakage as indicated in 12.1 at 3/4 psig (5.17 kPa).

13 Seat Leakage Test

13.1 The seat leakage test shall be conducted on as received samples and after the Guard Strength Test, Section 14, Sensitivity Test, Section 17, and Hose Nozzle Endurance Test, Section 18.

13.2 The inlet of the test valve shall be connected to a system capable of supplying clean aerostatic or hydrostatic pressure as the test medium. All seat leakage tests employing aerostatic pressure source shall be maintained for at least 1 min. All seat leakage tests employing a liquid as the test medium shall be maintained for at least 5 min.

13.3 A hose nozzle valve shall not leak through stem or body seals or other joints, or show evidence of porosity in castings, when liquid-confining parts under rated operating pressure are subjected to any gauge pressure between 0 and 75 psi (0 and 518 kPa) with, the valve in the closed position.

14 Guard Strength Test

14.1 An operating lever guard of a hose nozzle valve shall protect the lever and valve operating parts from damage when tested as described below.

14.2 Prior to the beginning of this test, a hose nozzle valve shall be found in compliance with the requirements for external and seat leakage. See 12.4 and 13.1.

Exception: When alternate nonmetallic materials are used for the hose nozzle valve guard, the leakage tests prior to, and after the Guard Strength Test are not required.

14.3 The hose nozzle valve shall be attached to a 120 in ±1 in (3048 mm ±25.4 mm) length of appropriate diameter size gasoline hose. The valve shall be dropped from a height of 48 in ±0.5 in (1219 mm ±12.7 mm) onto a concrete floor, employing the hose in a manner which tends to make the operating lever guard strike the floor first as specified in 14.4.

14.4 For all hose nozzle valves, the test sample shall be dropped ten times. For hose nozzle valves that have a nonmetallic operating lever guard assembly and/or a nonmetallic vacuum cap the test sample shall be dropped ten times on the guard and ten times on the vacuum cap. The spout of the test sample need not incorporate a shear groove or machined weak section, even though such is normally provided in the assembly. When the spout breaks off during the test, it shall be replaced and the test continued. At the completion of this test, the operating lever guard shall remain intact. The test nozzle valve shall function as intended when operated as specified in 15.1.1.

Exception No. 1: A hose nozzle valve that uses the same material for the operating lever guard and the plastic vacuum cap need only be subjected to the drop test conducted on both parts after conditioning according to 14.6 (a) and (b). The remaining conditions [14.6 (c), (d), and (e)] and drop tests need only be conducted on the lever guard.

Exception No. 2: When alternate nonmetallic materials are used for the hose nozzle valve guard, testing to verify operation as specified in 15.1.1 is not required.

14.5 Following completion of the tests described in 14.3 and 14.4, the test valve shall conform to the requirements for external and seat leakage. See 12.4 and 13.1.

14.6 All hose nozzle valves that have a nonmetallic lever guard assembly and/or a nonmetallic vacuum cap shall be conditioned at the following temperatures and fluids;

a) 24 ± 0.5 h at -40 ±1.8°F (-40 ±1°C);

b) At least 60 days at 212 ±1.8°F (100 ±1°C);

c) 168 ±0.5 h exposure to vapors of ASTM Reference Fuels C and H at 23 ±2°C (73 ±4°F), 50 ±10 % RH;

d) 720 ± 0.5 h UV and water, or at least 1000 h Xenon (ASTM G151 and G155);

e) After three cycles of:

1) 24 ±0.5 h at 176 ±1.8°F (80 ±1°C), 96 ±4 % RH;

2) 24 ±0.5 h at -40 ±1.8°F (-40 ±1°C);

3) 24 ±0.5 h at 176 ±1.8°F (80 ±1°C), RH is not controlled; and

4) 24 ±0.5 h at -40 ±1.8°F (-40 ±1°C).

Exception No. 1: Acetal polymers are not subjected to fluids described in (c).

Exception No. 2: The exposures described in (d) are not required if the material has been rated for outdoor use according to the requirements of UL 746C, Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, and the exposure to UV light, water exposure and immersions tests have been conducted for that rating.

A different sample shall be used for each conditioning and after each conditioning the nonmetallic lever guard assembly and/or a nonmetallic vacuum cap shall be dropped as described in 14.3 and 14.4.

After the ten drops the guard assembly and/or a nonmetallic vacuum cap shall not break or crack.

15 Operation Test

15.1 Automatic hose nozzle valve

15.1.1 An automatic hose nozzle valve shall function as intended when operated at least ten times at each notch setting. The inlet flow pressure shall be limited to a gauge pressure of 8 psi (55 kPa) using an acceptable pumping unit, flow regulator, and pressure regulator. The resultant flow shall be measured. When the flow rate exceeds 5 US gal/min (19 L/min) at an inlet pressure of 8 psig (55 kPa), the test shall be conducted at a flow rate of 5 US gal/min (19 L/min) at any resulting inlet flow pressure.

Exception: The valve is not prohibited from being operated at a flow rate of 5 US gal/min (19 L/min) at any resulting inlet flow pressure when this is followed by operating the valve at an inlet flow pressure of 8 psi (55 kPa) at any resulting flow rate.

15.1.2 Automatic hose nozzle valves equipped with an integral hold open or latching device shall shut off or cease the flow of liquid when tested as described below.

a) A sample of the hose nozzle valve shall be connected to a pump with a control valve in the piping to limit the pressure and flow of kerosene or Soltrol® 170.

b) For nozzles with a "no pressure-no flow" feature the nozzle shall be latched open at the flow rates in (c) indicated below. With the nozzle held or latched open, the supply pump shall be shut down and the pressure was allowed to drop to zero. The supply shall then be turned on again to determine if the nozzle automatically closed. This shall be repeated 10 times at each flow rate.

c) For nozzles with an "Interlock" feature the nozzle shall be latched open at the flow rates as indicated below while the operator manually pulls the interlock device to activate the nozzle mechanism. While the liquid is flowing and the nozzle held or latched open, the interlock shall be

released to determine if the nozzle automatically closed. This shall be repeated 10 times in each flow rate.

Flow Rates:

1) High latch (high flow) position with inlet flow pressure at 21.75 psig (150 kPa); and

2) Low latch (low flow) with inlet flow pressure at 8 psig (55 kPa).

15.2 Bellows secondary shut off operation

15.2.1 Hose nozzles valves designed with a bellows secondary shut off feature shall shutoff operation to the nozzle when operated as intended. This test shall be repeated after the Bellows Secondary Shut off Operation Test, Section 19.

16 Pull Test

16.1 An automatic hose nozzle valve shall shear or break off so as to separate the valve body from the spout when subjected to a right angle pull force of not more than:

a) 150 lbf (668 N) for a nozzle with a spout diameter less than 1 in (25.4 mm) or

b) 180 lbf (801 N) for a nozzle with a spout diameter of 1 in (25.4 mm) to 1-1/4 in (31.75 mm).

16.2 Compliance with the requirements of 16.1 may be obtained by a weak section groove in the spout located not more than 1 in (25.4 mm) from the end of the valve body or body adapter and designed to fracture upon application of the specified right angle pull force or less. To determine conformance with the requirement, tests shall be conducted with the spout portion of the valve fixed at the designed break or shear point, and the specified right angle pull force applied using a length of gasoline hose of the same size as the inlet of the nozzle attached to the test sample at the inlet end of the valve body.

16.3 Following the test specified in 16.1 and 16.2, the spout shall be replaced and the valve shall be in compliance with the requirements for external and seat leakage requirements. See 12 and 13.

17 Sensitivity Test

17.1 An automatic hose nozzle valve latch shall stop the flow of liquid or unlatch when the valve is released from a fill opening or upon impact with the driveway.

17.2 Compliance with the requirements of 17.1 shall be determined by a series of tests in which a hose nozzle valve is inserted into a simulated fill opening having its bottom edge located 22 in ±0.5 in (559 mm ±12.7 mm) above a concrete floor. Prior to the test, the sample shall be attached to a 120 in ±1.0 in (3048 mm ±25.4 mm) length of gasoline hose of the same size as the inlet of the nozzle. The test shall be conducted by pulling the sample from the opening at both slow and fast rates in a manner such that the valve strikes the concrete before the hose. Five trials shall be made at each rate with the valve latched in each of its hold-open positions.

Note: For nozzles with a "no pressure-no flow" feature, enough pressure shall be applied to hold the latch in the hold-open position.

17.3 With reference to the test sequence specified in 17.2 "slow" is considered to be just fast enough to cause release from the fill opening, and "fast" is considered to be a rapid motion as could result from a fast-accelerating automobile driving away from a dispensing device.

17.4 Following the test specified in 17.1 and 17.2, the valve shall be in compliance with the requirements for external leakage and seat leakage. See Sections 12 and 13.

18 Endurance Test

18.1 A hose nozzle valve shall perform as intended for at least 100,000 cycles of operation when handling the fluid in accordance with 18.6 at the rated temperature in accordance with 18.7 and with rated pressure on the valve seat with the valve in the closed position. There shall be no external leakage, no sticking of the valve, nor shall the valve become inoperative, and in the case of an automatic hose nozzle valve, the automatic shut off shall shutoff the flow of the liquid. Required corrosion protection shall not be impaired.

18.2 Prior to the beginning of this test, the hose nozzle valve shall be found in conformance with the requirements for deformation, operation, external leakage and seat leakage.

18.3 Following the completion of the endurance test, the test valve shall comply with the requirements for operation, external and seat leakage.

18.4 An endurance test shall be conducted in a manner which subjects the discharge side of a hose nozzle valve to a fluid flow rate of 10 ±1 US gal/min (37.9 ±3.8 L/min). A hose nozzle valve shall be operated during this test at its rated pressure with the valve in the closed position.

18.5 An endurance test shall be conducted at a rate not faster than 10 times per minute. A strainer having a straining element with screening openings not smaller than those of a 50-mesh screen shall be installed in the supply line near the inlet to the valve.

18.6 The fluid to be handled by a hose nozzle valve during an endurance test shall be kerosene or Soltrol® 170 for valves for gasoline and similar liquids.

18.7 The endurance test shall be conducted with the air ambient at 70 ±10°F (21 ±5.5°C) when the specified temperature rating is within the range of -20°F (-29°C) to 125°F (52°C).

19 Bellows Secondary Shut Off Operation Test

19.1 A hose nozzle valve with a bellows secondary shut off feature shall perform as intended for 6,000 cycle of operation. The sample shall be pressurized at its rated pressure with the valve in the closed position. The hose nozzle valve shall then be operated as intended to start the flow of the fluid and then the shut off mechanism shall be activated. The flow of test fluid shall shut off.

20 Visible Discharge Indicator Tests

20.1 Thermal shock test

20.1.1 A visible discharge indicator shall withstand without evidence of cracking or breakage a sudden temperature reduction from an initial temperature 212 ±1.8°F (100 ±1°C) to 32 ±1.8°F (0 ±1°C).

20.1.2 Three samples of the indicator shall be conditioned in water for 15 min at 212 ±1.8°F (100 ±1°C). Immediately after the 15 min the samples shall be plunged into water maintained at 32 ±1.8°F (0 ±1°C) and then checked for cracking or breakage.