UL 2586A

STANDARD FOR SAFETY

Hose Nozzle Valves for Gasoline and Gasoline/ Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 – E85)

UL Standard for Safety for Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 – E85), UL 2586A

First Edition, Dated February 20, 2015

Summary of Topics

This revision of ANSI/UL 2586A includes an editorial revision to Supplement SA.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated November 16, 2018.

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.

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UL 2586A

Standard for Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 – E85)

Prior to the first edition, the requirements for the products covered by this standard were included in the Outline of Investigation for Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 – E85), UL 2586A.

First Edition

February 20, 2015

This ANSI/UL Standard for Safety consists of the First Edition including revisions through April 1, 2019.

The most recent designation of ANSI/UL 2586A as an American National Standard (ANSI) occurred on April 1, 2019. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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

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INTRODUCTION

1 Scope

1.1 These requirements cover hose nozzle valves that are intended to be used for the control of motor fuels as indicated in 1.2. They are of the type used in motor fuel dispensing equipment. Hose nozzle valves covered by this standard are for use with motor fuels which are handled at temperatures within the range of minus 29°C (minus 20°F) to 52°C (125°F) and an operating pressure of minimum 50 psi (350 kPa).

1.2 Hoze nozzle valves covered by these requirements are intended for use with one or more of the following as applicable:

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

b) Gasoline/ethanol blends with nominal ethanol concentrations up to 25 percent ethanol (E25), consisting of gasoline formulated in accordance with the Standard Specification for Automotive Spark-Ignition Fuel, ASTM D4814, when blended with denatured fuel ethanol formulated to be consistent with the Standard Specification for Denatured Fuel Ethanol for Blending With Gasolines For Use as Automotive Spark-Ignition Engine Fuel, ASTM D4806; or

c) Gasoline/ethanol blends with nominal ethanol concentrations above 25 percent formulated in accordance with the Standard Specification in item (b) or formulated in accordance with the Standard Specification for Ethanol Fuel Blends for Flexible-Fuel Automotive Spark-Ignition Engines, ASTM D5798.

1.3 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.

1.4 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.

1.5 This standard does not cover hose nozzle valves for use with diesel, biodiesel, diesel/biodiesel blends, kerosene or fuel oil, which are covered under 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 This standard does not cover hose nozzle valves for use with liquefied petroleum gas (LP-Gas), which are covered under the Standard for Flow Control Valves for Anhydrous Ammonia and LP-Gas, UL 125.

1.7 Requirements for the installation and use of these dispensing devices are included in the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A.

1.8 Products intended to be rated for use with gasoline or gasoline/ethanol blends with nominal ethanol concentrations:

a) Up to 25 percent (E0 – E25) shall be evaluated using the CE25a test fluid as the only applicable test fluid;

b) Up to 40 percent (E0 – E40) shall be evaluated using both the CE25a and CE40a test fluid or;

c) Up to 85 percent shall be evaluated using both the CE25a and the CE85a test fluids.

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.

2.1.5 A hose nozzle valve with an integral swivel shall be additionally evaluated to the Electrical-Continuity and Operation Tests in the Standard for Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 – E85), UL 567A. The force is to be applied at the point on the swivel farthest from the joint. When necessitated by the swivel construction, this test is to be conducted on additional samples of the swivel with the load applied on the opposite side of the plane of rotation. See UL 567A, Figures 16.1 – 16.3 for examples.

2.2 Units of measurement

2.2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.3 Undated references

2.3.1 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.

3 Glossary

3.1 For the purpose of this standard, the following definitions apply.

3.2 BLENDING OPTION – Dispensing devices may be provided with an option that blends two specific fuels into one fuel to be dispensed. This blending occurs at the dispenser level and can be in two forms:

a) Fixed blending – Blending at the dispenser level that blends two specific fuels into one fuel to be dispensed, and that fuel to be dispensed is fixed. For example, fixed blending includes blend options where gasoline and denatured fuel ethanol can be blended to achieve E85, which is the actual dispensed fuel.

b) Variable blending – Blending at the dispenser level that blends two specific fuels into the fuel to be dispensed, but the fuel to be dispensed can be any of a number of previously set points. For example, variable blending includes blend options where gasoline and E85 can be blended to achieve E40, E60, and E85 as the actual dispensed fuel.

3.3 GASOLINE/ETHANOL BLENDS – Blended fuels composed of a gasoline component and an ethanol component. The numerical value corresponding to the ethanol component determines the blend rating (such as E85 for 85% ethanol, 15% gasoline).

3.4 HOSE NOZZLE VALVE, AUTOMATIC – 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.

3.5 HOSE NOZZLE VALVES – A self-closing device designed to control the flow of flammable and combustible liquids at an operating pressure of minimum 50 psi (345 kPa). It is intended for use at the outlet end of a hose for dispensing flammable liquids.

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

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

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

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

3.8 SEALS, DYNAMIC – 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.

3.9 SEALS, STATIC – 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.

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 538°C (1000°F).

4.2 Hose nozzle valves

4.2.1 A hose nozzle valve shall be of the manually-operated or of the automatic type. A manually-operated valve requires the valve to be manually held open during the entire filling operation without the aid of hold-open devices or latches, but is capable of closing automatically. An automatic valve requires the valve to:

a) Be manually opened, but is capable of being held open during the filling operation by a latch or other device; and

b) Is provided with automatic closing features.

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 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, See Automatic hose nozzle valve, 15.1.2.

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 car fill pipe or when hung on the dispenser.

4.2.3 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.

4.2.4 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 Hose Nozzle Valve Guard Strength Test, Section 14.

4.2.5 An operating lever shall possess the strength required to resist bending or breaking when tested in accordance with these requirements. See the Hose Nozzle Endurance Test, Section 18.

4.2.6 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.

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

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

4.2.9 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.

4.2.10 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.

4.2.11 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 are to 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 Metallic materials

5.1.1 General

5.1.1.1 A metallic part, in contact with the fuels anticipated by these requirements, shall be resistant to the action of the fuel if degradation of the material will result in leakage of the fuel or if it will impair the function of the device. For all fuel ratings, see Corrosion due to fluid, 5.1.2.1. For products rated for gasoline/ethanol blends with nominal ethanol concentrations greater than 40 percent, see Metallic materials – system level, 5.1.3.

5.1.1.2 The exposed surfaces of metallic parts shall be resistant to atmospheric corrosion if this corrosion will lead to leakage of the fluid or if it will impair the function of the device. The material shall comply with the requirements in Atmospheric corrosion, 5.1.2.2. 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.

5.1.1.3 Metallic parts in contact with the fuels anticipated by these requirements shall not be constructed of lead, or materials that are substantially lead. In addition, no coatings or platings containing lead shall be used, such as terne-plated steel.

5.1.2 Metallic materials – material level

5.1.2.1 Corrosion due to fluid

5.1.2.1.1 All metallic materials used for fluid confining parts shall be resistant to corrosion caused by the fuels anticipated by these requirements. In addition, metallic materials, used internally in fluid confining parts, that are required to operate in some manner to address safety shall be resistant to corrosion caused by these fuels. Compliance is verified by the Long Term Exposure Test, Section 12.

5.1.2.1.2 A coating or plating, applied to a base metal, shall be resistant to the action of the fuels anticipated by these requirements as determined by the Long Term Exposure Test, Section 12.

5.1.2.2 Atmospheric corrosion

5.1.2.2.1 Metallic materials used for fluid confining parts shall be resistant to atmospheric corrosion. In addition, metallic materials that are required to operate to address safety shall be resistant to atmospheric corrosion. Ferrous materials of a thickness specified in the following items are acceptable for the preceding when uncoated:

a) A casting having a wall thickness of not less than 1/4 inch (6.4 mm) if shown by production test to be free of leakage; and

b) Fabricated sheet steel parts having a minimum wall thickness of 0.093 inch (2.36 mm).

5.1.2.2.2 A protective coating shall provide resistance against atmospheric corrosion to a degree not less than that provided by the protective coatings specified in 5.1.2.2.3.

5.1.2.2.3 Cadmium plating shall not be less than 0.0003 inch (0.008 mm) thick, and zinc plating shall not be less than 0.0005 inch (0.013 mm) thick, except on parts where threads constitute the major portion of the area in which case the cadmium or zinc plating shall not be less than 0.00015 inch (0.0038 mm) thick. Metallic parts are considered to comply with 5.1.2.2.1 when they are protected against atmospheric corrosion by:

a) Hot dipped, mill galvanized sheet steel complying with the coating designation G90 in Table I of the Specification for Sheet Steel, Zinc Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot Dip Process, ASTM A653/A653M; or

b) Coatings which have been determined to be equivalent to G90 under the requirements of the Standard for Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment, UL 1332.

5.1.2.2.4 A metallic material other than as described in 5.1.2.2.1 – 5.1.2.2.3 shall be painted or protected in a manner that has been determined to be equivalent.

5.1.3 Metallic materials – system level

5.1.3.1 Combinations of metallic materials in products rated for use with gasoline/ethanol blends with nominal ethanol concentrations greater than 40 percent shall be chosen to reduce degradation due to galvanic corrosion in accordance with 5.1.3.2 – 5.1.3.4.

5.1.3.2 Table 5.1 shows the galvanic series for metallic materials exposed to a conductive solution of sea water. The most active material in a given combination will experience increased levels of corrosion, while the most passive material in the combination will experience reduced levels of corrosion. The greater the separation of the materials in the galvanic series of Table 5.1, the more pronounced the effects would be. Table 5.1 serves as a guide in selecting the appropriate test conditions based on manufacturer specified material combinations.

Table 5.1
Galvanic series of metal materials

Most passive	Platinum
	Gold
	Graphite
	Silver
	Stainless Steel Type 316 (Passive)
	Stainless Steel Type 304 (Passive)
	Titanium
	13% Chromium Stainless Steel (Passive)
	76 Ni – 16 Cr –7 Fe Alloy (Passive)
	Nickel (Passive)
	Silver Solder
	M-Bronze
	G-Bronze
	70:30 Cupro Nickel
	Silicon Bronze
	Copper

Table 5.1 Continued on Next Page

Table 5.1 Continued

	Red Brass Aluminum Brass Admiralty Brass Yellow Brass 60 Ni – 30 Mo – 6 Fe – 1 Mn 76 Ni – 16 Cr – 7 Fe Alloy (Active) Nickel (Active) Manganese Bronze Tin Stainless Steel Type 316 (Active) Stainless Steel Type 304 (Active) 13% Chromium Stainless Steel (Active) Cast Iron Wrought Iron Mild Steel Aluminum 2024 Cadmium Alclad Aluminum 6053 Aluminum 1100 Galvanized Steel Zinc Magnesium Alloys
Most active	Magnesium
Note – Reprinted with permission from NACE. Based on table titled "Galvanic Series of Metals Exposed to Seawater" from NACE Corrosion Engineer's Reference Book, Third Edition © NACE International 2002.	

5.1.3.3 Plating, such as nickel plating, can be used to reduce or eliminate dissimilar metal contact areas, as long as the plating material complies with 5.1.3.2 as the contact metal. If used, the plating shall comply with the Long Term Exposure Test, Section 12.

5.1.3.4 Gaskets or nonmetallic spacers used to reduce or eliminate dissimilar metal contact areas, where permitted, shall be subjected to the applicable requirements for static seals in Nonmetallic materials, 5.2, when they are in contact with the fluid.

5.2 Nonmetallic materials

5.2.1 General

5.2.1.1 A nonmetallic part in contact with the fuels anticipated by these requirements, shall be resistant to the action of the fuel if degradation of the material will result in leakage of the fuel, or if it will impair the function of the device.

5.2.1.2 Gaskets or seals shall be designated as dynamic and/or static seals. See 3.7 and 3.8 respectively. If the type of seal cannot be determined, then the material shall be treated as both a static and a dynamic seal.

5.2.1.3 Gaskets and seals shall comply with the requirements as outlined in Nonmetallic materials – material level, 5.2.2, and Nonmetallic materials – system level, 5.2.3.

5.2.1.4 Nonmetallic materials in contact with the fuels anticipated by these requirements shall not be constructed of the following:

a) Polysulfide rubber;

b) Ethylene propylene diene monomer (EPDM) rubber;

c) Methyl-Methacrylate;

d) Polyvinyl Chloride (PVC);

e) Nylon 6/6; or

f) Polyurethane.

5.2.2 Nonmetallic materials – material level

5.2.2.1 Static seals

5.2.2.1.1 Static seals shall be evaluated in accordance with the Standard for Gaskets and Seals, UL 157, modified as indicated in 5.2.2.1.2 – 5.2.2.1.4. If a specific material complies with these requirements, the material can be considered to be qualified for system level testing.

5.2.2.1.2 A static seal shall be constructed of a material that is acceptable in accordance with the scope of the Standard for Gaskets and Seals, UL 157.

5.2.2.1.3 Static seals shall be subjected to the Volume Change and Extraction Test in accordance with the Standard for Gaskets and Seals, UL 157, except for the following modifications:

a) The test duration shall be 1000 hours;

b) The applicable test fluids shall be as described in Supplement SA; and

c) For all materials, the average volume change shall not exceed 40% swell (increase in volume) or 1% shrinkage (decrease in volume). In addition, the weight loss shall not exceed 10%. For coated fabrics, alternate limits can be used with the average volume change not

exceeding 60% swell or 5% shrinkage, and the weight loss shall not exceed 20%. There shall be no visual evidence of cracking or other degradation as a result of the exposure for any material including coated fabrics.

5.2.2.1.4 Static seals shall be subjected to the Compression Set Test in accordance with the Standard for Gaskets and Seals, UL 157, except for the following modifications:

a) The test duration shall be 1000 hours;

b) The samples shall be immersed, at room temperature, in the test fluids (see item c) while compressed for the entire test duration. No oven conditioning is required.

c) The applicable test fluids shall be as described in Supplement SA.

d) The recovery period shall consist of removing the sample from the compression device and immersing it in the applicable test fluid for 30 minutes at room temperature. The sample shall not be allowed to dry out due to exposure to air. The 30 minute immersion should use the same fluid as the test fluid for each sample.

e) For all materials, the average compression set is calculated and shall not exceed 35 percent. For coated fabrics, alternate limits can be used with the average compression set not exceeding 70 percent.

Exception: For compression static face seals under constant pressure, alternate limits can be used with the average compression set not exceeding 50 percent.

Exception: This requirement does not apply to composite gasket materials as defined in accordance with the Standard for Gaskets and Seals, UL 157.

5.2.2.2 Dynamic seals

5.2.2.2.1 Dynamic seals shall be evaluated in accordance with the Standard for Gaskets and Seals, UL 157, modified as indicated in 5.2.2.2.2 – 5.2.2.2.4. If a specific material complies with these requirements, the material can be considered to be qualified for system level testing.

5.2.2.2.2 A dynamic seal shall be constructed of a material that is acceptable in accordance with the scope of the Standard for Gaskets and Seals, UL 157.

5.2.2.2.3 Dynamic seals shall be subjected to the Volume Change and Extraction Test in accordance with the Standard for Gaskets and Seals, UL 157, except for the following modifications:

a) The test duration shall be 1000 hours;

b) The applicable test fluids shall be as described in Supplement SA; and

c) For all materials, the average volume change for a gasket or seal material shall not exceed 40% swell (increase in volume) or 1% shrinkage (decrease in volume). In addition, the weight loss shall not exceed 10%. For coated fabrics, alternate limits can be used with the average volume change not exceeding 60% swell or 5% shrinkage, and the weight loss shall not exceed 20%. There shall be no visual evidence of cracking or other degradation as a result of the exposure for any material including coated fabrics.

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5.2.2.2.4 Dynamic seals shall be subjected to the Tensile Strength and Elongation Test in accordance with the Standard for Gaskets and Seals, UL 157, except for the following modifications:

a) The test duration shall be 1000 hours;

b) The applicable test fluids shall be as described in Supplement SA; and

c) For all materials, the average tensile strength and the average elongation of materials shall not be less than 60% of the as-received values. For coated fabrics, alternate limits can be used with the average tensile strength and the average elongation not less than 30% of the as-received values.

5.2.3 Nonmetallic materials – system level

5.2.3.1 For all materials, gaskets and seals that have been shown to comply with the applicable requirements for static seals in the Standard for Gaskets and Seals, UL 157, or with the requirements under material level tests shall be subjected to the system level tests after the Long Term Exposure Test, Section 12. Static seals shall be provided in accordance with 12.2.5.

5.3 Casting impregnation materials

5.3.1 Material level

5.3.1.1 Casting impregnation materials shall be evaluated at the material level in accordance with the requirements in the Standard for Power-Operated Dispensing Devices For Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 – E85), UL 87A.

5.3.2 System level

5.3.2.1 The casting impregnation material, applied as intended to a casting, shall comply with the Long Term Exposure Test, Section 12. The casting shall not show indications of porosity leakage at any point during or after this test.

5.4 Internal parts

5.4.1 Nonmetallic parts located internally to a fluid confining part, degradation of which would not directly result in leakage, is not required to comply with Nonmetallic materials, 5.2. The part shall be tested in accordance with 5.4.2.

5.4.2 Internal nonmetallic parts shall be tested during the Long Term Exposure Test, Section 12. During this test, the part shall not degrade to the extent that visible particles can be observed in the fluid.

5.5 Blending options

5.5.1 Hose nozzle valves intended for use with dispensing equipment that provides for a variable blending option, at gasoline/ethanol blends with nominal ethanol concentrations above 25 percent, shall be subjected to the Blending Cycling Test, Section 26.

5.5.2 Hose nozzle valves intended for use with dispensing equipment that provides for a fixed blending option, as gasoline/ethanol blends with nominal ethanol concentrations above 25 percent, shall be evaluated in accordance with (a) or (b):

a) If intended to be located after the blending option such that the hose nozzle valve is only subjected to the final blended fuel, then the Blending Cycling Test, Section 26, is not required.

b) If intended to be located at or before the blending option such that it is subjected to different gasoline/ethanol blend levels, the hose nozzle valve shall be subjected to the Blending Cycling Test, Section 26.

5.5.3 Hose nozzle valves intended for use with dispensing equipment that provides for a variable or fixed blending of gasoline/ethanol blends with nominal ethanol concentrations below 25 percent are considered acceptable without further evaluation for the blending option.

6 Bodies and Covers

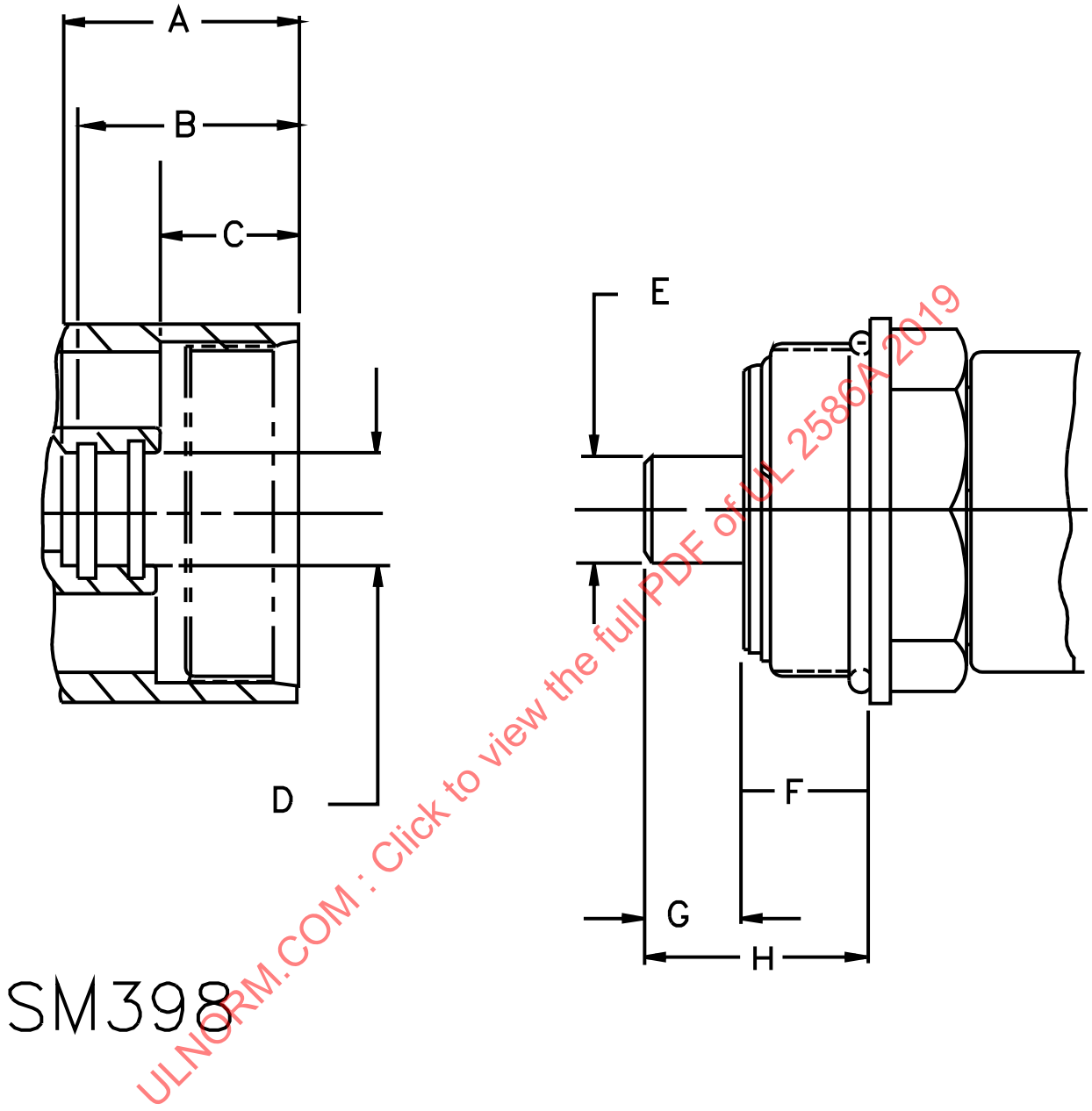
6.1 A threaded section of a body intended for the connection of pipe shall have a section to serve as a wrench grip.

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 Straight, 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 are to 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 (above), 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 employed in a dispensing device assembly to reduce the risk of leakage, or in a safety mechanism, such as is employed in an operating handle, shall:

a) Be protected against abrasion and corrosion; and

b) Demonstrate no loss in strength following subjection to a compression force of three times that exerted by the spring in any position of its intended function.

8.3 In reference to 8.1(a), springs that are exposed to the fuels anticipated by these requirements shall comply with the applicable material requirements from Materials, Section 5. Springs not exposed to fuels, but exposed to the environment, shall comply with the atmospheric corrosion requirements in 5.1.2.2.

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 are to be subjected to the tests described in these requirements. The order of tests, as far as applicable, is to be as indicated in Sections 11 – 26, with the exception of the specific test sequence shown in 10.3. 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 All tests shall be performed using the test fluids specified for that test. No substitution of test fluids is allowed. When the test indicates that CE25a, CE40a or CE85a are to be used, the test fluid shall be prepared as described in Supplement SA.

10.3 The tests in the following sequence are to be performed on one sample of a hose nozzle valve for each applicable test fluid as described in the Long Term Exposure Test, Section 12. The remaining tests in this standard may be performed in any order on the same samples or on additional samples as needed.

a) Long Term Exposure Test, Section 12;

b) External Leakage Test, Section 13;

c) Electrical Continuity Test, Section 22;

d) Hose Nozzle Endurance Test, Section 18;

e) External Leakage Test, Section 13;

f) Electrical Continuity Test, Section 22;

g) Hydrostatic Strength Test, Section 21.

10.4 To reduce the effects of seal dry out due to removal of the test fluid after specific tests, the tests in the given sequence in 10.3 shall be started within 4 hours of removal of the previous test fluid. If necessary to coordinate testing, the sample may be left filled with the most recent test fluid at room temperature until the next test is initiated. If the previous test used an aerostatic or hydrostatic source, the sample shall be filled with kerosene.

10.5 Leakage tests for the portions of liquid handling hose nozzle valves are to be conducted using a source of aerostatic pressure. When leakage is observed, the tests shall be repeated with kerosene or Soltrol 170.

10.6 Water shall be 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 The sample hose nozzle valve used in this test is to be rigidly anchored or otherwise supported. A length of Schedule 80 pipe is to be connected to a female pipe threaded section of the body, the male threads having first been lubricated with SAE No. 10 machine oil. Each pipe is then to be tightened to the torque specified in Table 11.1.

Table 11.1
Torque requirements for pipe connections

Pipe size, nominal inches	Outside diameter, inches	(mm)	Torque, pound-inches	N·m
1/2	0.840	21.34	800	90
3/4	1.050	26.67	1000	113
1	1.315	33.40	1200	137
1-1/4	1.660	42.16	1450	164
1-1/2	1.900	48.26	1550	175

11.3 After the torque force has been applied to each connected pipe, the test sample is to be subjected to the External Leakage Test, Section 13.

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

11.5 If external leakage is noted at the thread joint between the pipe and body, the joint is to be remade using a pipe joint sealing material and retested for leakage.

12 Long Term Exposure Test

12.1 General

12.1.1 The test outlined in 12.2 – 12.4 is to be performed on one or two samples of the device. If the product is rated for use with gasoline or a gasoline/ethanol blend with a nominal ethanol concentration of up to 25 percent (E0 – E25), then the test shall be performed using the CE25a test fluid. If the product is rated for use with gasoline or a gasoline/ethanol blends with a nominal ethanol concentration of up to 40 percent (E0 – E40), then the test shall be performed using both the CE25a and CE40a test fluids. If the product is rated for use with a gasoline/ethanol blend with a nominal ethanol concentration of up to 85 percent, then the test shall be performed using both the CE25a and the CE85a test fluids. See Supplement SA for the test fluids.

12.2 Samples

12.2.1 A sample of a complete hose nozzle valve is to be tested. All inlet openings of the samples shall be sealed in accordance with 12.2.3. The outlet of the hose nozzle valve is considered sealed by the actual valve mechanism of the hose nozzle valve.

12.2.2 If platings or coatings are used internal to the device, additional samples may be used. See 12.4.2.

12.2.3 Closures shall be provided to seal off inlet and outlet openings of all samples in accordance with 12.2.1. These closures shall be fabricated of materials as specified in 12.2.4. The closures shall be provided with a 1/4 inch NPT opening for connection to the test apparatus. All closures shall be installed by the manufacturer and provided with a torque rating. There will be no other adjustment to connections for the duration of the test.

12.2.4 Material combinations at the product and closure interface will be as specified by the manufacturer. All closures for hose nozzle valves rated for gasoline/ethanol blends with nominal ethanol concentrations up to 25 percent shall be fabricated of suitable materials. All closures for hose nozzle valves rated for gasoline/ethanol blends with nominal ethanol concentrations above 25 percent shall be fabricated of the materials representing permitted material to which the device may be connected; such as aluminum closures representing aluminum tubing. Table 5.1 shall be used to determine the worst case material interactions based on the materials specified by the manufacturer. Materials specified by the manufacturer but not included in Table 5.1 shall be tested as necessary to represent worst case conditions.

12.2.5 Material combinations at the product and closure interface will be a specified by the manufacturer. All closures for devices rated for gasoline/ethanol blends with nominal ethanol concentrations up to 25 or 40 percent shall be fabricated of suitable materials. All closures for devices rated for gasoline/ethanol blends with nominal ethanol concentrations above 25 percent shall be fabricated of the materials representing permitted material to which the device may be connected; such as aluminum closures representing an aluminum fitting or tube. Table 5.1 shall be used to determine the worst case metal interactions. Materials that are specified by the manufacturer, but are not included in Table 5.1 shall be tested as necessary to represent worst case conditions.

12.3 Method

12.3.1 The sample is to be exposed to the applicable test fluid in accordance with 12.1.1. The test fluids shall be prepared using the instructions in Supplement SA.

12.3.2 A quick connect device is connected to the 1/4 inch NPT connection at the inlet, and is used to fill the samples with the applicable test fluids. A source of pressure may be used to assist in filling or draining the samples, however, the pressure shall not exceed the rated pressure of the valve under test. Once the samples are filled to exclude all air, they are closed off and sealed. The samples are then placed in the test chamber.

12.3.3 The chamber temperature is increased to 60 ±2°C (140 ±4°F). When the chamber reaches this temperature, the exposure period begins. The samples are exposed to the applicable test fluid at 60 ±2°C for approximately 168 hours. At the end of this duration, the exposure period is halted and the chamber is allowed to cool. The samples are subjected to a 50 psi (347 kPa) pressure for one minute. The fluid is then drained from the samples and observed in accordance with 12.4.2. After this observation, the fluid is discarded. The samples are then immediately refilled with new test fluid and the chamber temperature is allowed to increase to 60 ±2°C again. The total duration of the test shall equal 1,008 hours of exposure at 60 ±2°C.

12.3.4 At the end of the total exposure duration, the test fluid is left in the samples and the samples are removed from the chamber. The samples are then subjected to the test sequence as outlined in 10.3 and in accordance with 10.4. Prior to the initiation of the test sequence, the Long Term Exposure test fluid is to be drained and discarded.

12.3.5 If the device contains any parts or surfaces that are plated or coated, if the device uses casting impregnation materials to eliminate porosity leakage, or if the device contains internal nonmetallic parts, the plating, coating, impregnation, or internal parts are tested both during and after this exposure. See 12.4.2 and 12.4.4.

12.4 Results

12.4.1 There shall be no leakage during this test. If leakage is observed at any point during the test, the test is to be stopped.

12.4.2 For platings or coatings, there shall be no softening of the plating or coating material. Compliance is checked by observance of the drained test fluid. There shall be no evidence of visible flaking or material. In addition, there shall be no substantial discoloration of the test fluid when observing the drained fluid. Discoloration is an indication of chemical attack on the plating or coating internal to the device. In order to determine that the base metal is not exposed, visual inspections shall be made. If the visual inspection requires examination of internal surfaces, the samples shall be cut open to determine compliance. If this is necessary, additional samples can be used to determine compliance with this requirement, such that the remaining test sequence will not be disturbed by cutting open samples. However, both the samples to be cut open and the samples to be used for the test sequence are required to complete the Long Term Exposure Test, Section 12.

12.4.3 For casting impregnation materials, the samples shall not show evidence of porosity leakage during or after the fluid exposure duration.

12.4.4 For internal nonmetallic parts, there shall be no visible evidence of this material in the drained test fluid.

13 External Leakage Test

13.1 All hose nozzle valves subjected to this test shall be subjected to a test pressure as indicated in 13.4. Test pressures shall be developed from a hydrostatic or aerostatic source.

13.2 With reference to 13.1, hose nozzle valves may be subjected to an aerostatic or hydrostatic pressure source. For tests performed using an aerostatic pressure source, the hose nozzle shall be submerged in water to a depth of approximately 25.4 mm (1 inch) while under test pressure, for a duration of 1 minute. There shall be no bubbles observed in the water, indicating leakage observed, during the duration. For tests performed using a hydrostatic pressure source, the test duration is to be 5 minutes.

13.3 For all hose nozzle valves, there shall be no leakage outside of fluid confining areas and there shall be no evidence of casting porosity leakage during this test.

13.4 For all tests, the inlet of the device is to be connected to the source of pressure of 25 psi (173 kPa) with the valve open and the outlet blocked. The test is repeated with a test pressure of 75 psi (518 kPa) with the valve closed and the outlet open.

13.5 A positive shutoff valve and a calibrated pressure indicating device shall be installed in the pressure supply piping. The pressure indicating device is to be installed in the piping between the shutoff valve and the device under test.

13.6 In accordance with 13.5, the pressure indicating device shall comply with one of the following:

a) An analog gauge having a pressure range such that the test pressure is between 30 and 70 percent of the maximum scale reading of the gauge;

b) A digital pressure transducer, or other digital gauge, that is calibrated over a range of pressure that includes the test pressure; or

c) Other devices that are equivalent to the devices in (a) and (b).

13.7 If a hose nozzle valve is provided with a vapor return portion, the valve shall also be checked for leakage as indicated in 13.2 at 3/4 psig.

14 Hose Nozzle Valve 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 is to be found in compliance with the requirements for external leakage. See External Leakage Test, Section 13.

Exception: When alternate non-metallic materials are used for the hose nozzle valve guard, the prior and after leakage tests are not required.

14.3 The test valve is to be attached to a 10 foot (3.1 m) length of appropriate diameter size gasoline hose. The valve is to be dropped from a height of 4 feet (1.2 m) 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 is to 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 is to 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 is to remain intact. The test nozzle valve is to function as intended when operated as specified in 15.1.1.

Exception: A hose nozzle valve that uses the same material for the operating lever guard and the plastic vacuum cap only needs the drop test conducted on both parts after conditions a and b. The remaining conditions (c, d, e, and f) and drop tests only need to be conducted on the lever guard. Refer to 14.6 for the different conditions.

14.5 Following completion of the tests in 14.3 and 14.4, the test valve is to conform to the requirements for external leakage. See External Leakage Test, Section 13.

14.6 For 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 hours at minus 40°C;

b) 60 days at 100°C;

c) 168 hour exposure to vapors of ASTM Reference Fuels C and H;

d) 720 h UV and water, or 1000 h Xenon;

e) After three cycles of:

1) 24 hours at 80°C, 96 ±4 percent RH;

2) 24 h at minus 40°C;

3) 24 h at 80°C; and

4) 24 h at minus 40°C.

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

Exception No. 2: The 720 h UV (d) is not required if the material has a UL 746C outdoor use rating and the exposure to UV light, water exposure and immersions tests have been conducted.

14.7 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 drop as described in 14.3.

14.8 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 is to be limited to a gauge pressure of 8 psi (55 kPa) using an acceptable pumping unit, flow regulator, and pressure regulator. The resultant flow is to be measured. When the flow rate exceeds 5 gallons per minute at an inlet pressure of 8 psig, the test is to be conducted at a flow rate of 5 gallons (19 L) per minute at any resulting inlet flow pressure.

Exception: The valve is not prohibited from being operated at a flow rate of 5 gallons per minute at any resulting inlet flow pressure when this is followed by operating the valve at an inlet flow pressure of 8 psi 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.

15.1.3 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.

15.1.4 For nozzles with a ″no pressure-no flow″ feature the nozzle was latched open at the flow rates indicated below. With the nozzle held or latched open, the supply pump was shut down and the pressure was allowed to drop to zero. The supply was than turned on again to determine if the nozzle automatically closed. This was repeated 10 times at each flow rate.

15.1.5 For nozzles with an ″Interlock″ feature the nozzle was 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 was flowing and the nozzle held or latched open, the operator released the interlock to determine if the nozzle automatically closed. This is repeated 10 times in each flow rate.

Flow Rates

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

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

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 pounds (668 N) for a nozzle with a spout diameter less than 1 inch (25.4 mm) or

b) 180 pounds (801 N) for a nozzle with a spout diameter of 1 inch to 1-1/4 inch.

16.2 Compliance with 16.1 is capable of being obtained by a weak section groove in the spout located not more than 1 inch (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 are to 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 leakage. See External Leakage Test, Section 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 17.1 is to be determined by a series of tests in which a sample valve is inserted into a simulated fill opening having its bottom edge located 22 inches (559 mm) above a concrete floor. Prior to the test, the sample is to be attached to a 10 foot (3.05 m) length of gasoline hose of the same size as the inlet of the nozzle. The test is 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 are to be made at each rate with the valve latched in each of its hold-open positions.

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. See External Leakage Test, Section 13.

18 Hose Nozzle Endurance Test

18.1 A hose nozzle valve shall perform in the intended manner during the test described in accordance with 18.2 – 18.6. During this test, there shall be no external leakage, no sticking of the valve in the open position, nor shall the valve become inoperative such that external leakage of the test fluid is observed. Required corrosion protection shall not be impaired.

18.2 All samples of the hose nozzle valve subjected to the Long Term Exposure Test, Section 12, are to be operated for 100,000 cycles of operation while handling the test fluid indicated in 18.5 with rated pressure on the valve seat.

18.3 Prior to the beginning of this test, an automatic hose nozzle valve is to function as intended, described as not allowing fluid flow when the valve is closed and that the valve shall be able to close when the actuator is released.

18.4 This test is to be conducted in a manner that subjects the discharge side of a valve to the pressures and flow of 10 GPM ± 1 GPM fluid. A hose nozzle valve is to be operated during this test at its maximum rated pressure with the valve in the closed position.

18.5 This test is to be conducted at a rate not faster than 10 times per minute using kerosene or Soltrol 170 as the test fluid. A strainer having a straining element with screening openings not smaller than those of a 50-mesh screen is to be installed in the supply line near the inlet to the valve.

18.6 Following the completion of the test, the hose nozzle valve shall not leak externally. For an automatic hose nozzle valve, the automatic shut off feature shall still function as intended.

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