



UL 330A

STANDARD FOR SAFETY

Hose and Hose Assemblies for Use
With Dispensing Devices Dispensing
Gasoline and Gasoline/Ethanol Blends
With Nominal Ethanol Concentrations
Up To 85 Percent (E0 – E85)

UL Standard for Safety for Hose and Hose Assemblies for Use With Dispensing Devices Dispensing Gasoline and Gasoline/Ethanol Blends With Nominal Ethanol Concentrations Up To 85 Percent (E0 – E85), UL 330A

First Edition, Dated November 5, 2019

Summary of Topics

This revision of ANSI/UL 330A dated April 16, 2020 includes the following changes in requirements:

Revision to Immersion and Tensile Strength and Elongation tests with respect to hose covers; [24.1.2](#), [28.1.1.1](#), [28.2.1.1](#)

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 revised requirements are substantially in accordance with Proposal(s) on this subject dated February 7, 2020.

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Standard for Hose and Hose Assemblies for Use With Dispensing Devices Dispensing Gasoline and Gasoline/Ethanol Blends With Nominal Ethanol Concentrations Up To 85 Percent (E0 – E85)

First Edition

November 5, 2019

This ANSI/UL Standard for Safety consists of the First Edition including revisions through April 16, 2020.

The most recent designation of ANSI/UL 330A as an American National Standard (ANSI) occurred on March 31, 2020. 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 and hose assemblies, including vapor recovery hose and assemblies, for use on dispensing devices for motor fuels. A flammable liquid hose assembly consists of flexible hose and fittings suitable for attachment to motor fuel dispensing equipment. Motor fuels, as defined by these requirements, include one or more of the fuels described in [1.2](#).

1.2 Hose and hose assemblies covered by these requirements are intended for use with one or more of the following motor fuels:

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 Gasoline 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 Specifications in item (b) or formulated in accordance with the Standard Specification for Ethanol Fuel Blends for Flexible-Fuel Automotive Spark-Ignition Engines, ASTM D5798, as applicable.

1.3 Hose assemblies are intended for use in accordance with the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A.

1.4 These requirements cover hose and hose assemblies (hose with couplings attached) in sizes up to and including 1-1/2 inches (38.1 mm).

1.5 Hose for conveying liquid fuel is intended for use at a maximum working pressure of 50 psig (345 kPa). Hose for conveying fuel vapors is intended for use at a maximum working pressure of 0.5 psig (3.4 kPa), including slight negative pressures from vacuum assist systems.

1.6 These requirements cover hose and hose assemblies for use at temperatures down to minus 40°C (minus 40°F) or optionally down to minus 54°C (minus 65°F).

1.7 These requirements also cover fuel hose assemblies optionally designated as “low permeation.” For the purposes of this standard, permeation is considered to encompass fuel loss through the flexible hose, fuel loss at the fittings and fuel loss at the connection between the hose assembly and the equipment to which it is intended to be attached in the dispensing system.

1.8 These requirements do not cover hose or hose assemblies, intended for use in automotive vehicles or in confined areas, except for locations inside the housings of dispensing devices complying with the Outline of Investigation For Power-Operated Dispensing Devices For Gasoline and Gasoline/Ethanol Blends With Nominal Ethanol Concentrations Up To 85 Percent (E0 – E85), UL 87A.

1.9 These requirements do not cover hoses or hose assemblies for use with any other fuel other than as described in [1.2](#).

1.10 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 Units of Measurement

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

2.2 Undated References

2.2.1 Any undated reference to a code or standard appearing in the requirements of this Outline shall be interpreted as referring to the latest edition of that code or standard.

3 Glossary

3.1 For the purposes of this outline, the following definitions apply.

3.2 **ADJUSTED MASS LOSS** – The mass loss of the blank (unfilled hose assembly) subtracted from the mass loss of a filled hose assembly. The purpose of this is to adjust for factors other than fuel permeation that may affect mass loss.

3.3 **BALANCE VAPOR RECOVERY HOSE** – A coaxial hose consisting of an inner line for conveying fuel and an outer line. Fuel vapors are permitted to return to the fuel dispenser in the annular space between the two lines.

3.4 **BLENDING OPTION** – Blending at the dispenser level that blends two specific fuels into the fuel to be dispensed. The fuel to be dispensed can be any of a number of set points. For example, blending includes blend options where gasoline and ethanol can be blended to achieve E40, E60, and E85 as the actual dispensed fuel.

3.5 **DISPENSING DEVICE** – A product consisting of various components that is used to control and meter the flow of liquid from an upstream storage device.

3.6 **HOSE ASSEMBLY VOLUME (V)** – The total volume in cubic centimeters of a capped hose assembly, calculated as follows:

$$V = D^2(L + 2d)\pi / 4$$

in which:

D = the inner diameter of the hose in centimeters, as determined in [16.5.3](#)

L = the length of the hose in centimeters, as determined in [16.5.1](#)

d = the depth of the cap in centimeters, as determined in [16.5.2](#)

3.7 LEAST SQUARES FIT LINE – A best fit line drawn through a set of data such that the sum of the squared residuals has its least value, a residual being the difference between an observed value (data point) and the line.

3.8 PERMEATION SURFACE AREA – The length of the hose as determined in [16.5.1](#) multiplied by the inner circumference of the hose, expressed in square meters. For vacuum-assist vapor recovery hose, the length of the hose is multiplied by the inner circumference of the outer hose. For balance vapor recovery hose, the length of the hose is multiplied by the average inner circumference of the outer hose.

3.9 REINFORCEMENT – Natural or synthetic fibers or fabric, or metallic wire that is wrapped, braided or spiral wound in one or more layers over the tube, intended to provide longitudinal and transverse (hoop) strength to the hose.

3.10 SEAL, 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.

3.11 SEAL, STATIC – A seal that is not subject to mechanical movement or other applied forces other than compressing forces that are applied during installation and maintained during normal use conditions.

3.12 VACUUM-ASSIST VAPOR RECOVERY HOSE – A coaxial hose consisting of an inner vacuum line for vapor recovery and an outer line. Fuel is dispensed through the annular space between the two lines.

PERFORMANCE

4 Tube and Cover

4.1 Single-line hose and double-line vapor recovery hose

4.1.1 The tube shall be made from a material resistant to the fuels anticipated by these requirements.

4.1.2 The cover shall be made from a material resistant to the fuels anticipated by these requirements and ozone.

4.1.3 The tube and cover shall be of uniform thickness, and free from pitting, blisters, or other imperfections. This requirement is not intended to exclude the use of a corrugated cover.

4.2 Coaxial vapor recovery hose

4.2.1 The tube and cover, if any, of the inner hose shall be made from materials resistant to the fuels anticipated by these requirements.

4.2.2 The tube of the outer hose or a homogeneous outer hose shall be made from materials resistant to the fuels anticipated by these requirements.

4.2.3 The cover of the outer hose or a homogeneous outer hose shall be made from a material resistant to the fuels anticipated by these requirements and ozone. An outer homogeneous thermoplastic hose with no separate layer of reinforcement shall also be made from a material resistant to sunlight.

4.2.4 The tube and cover shall be of uniform thickness and free from pitting, blisters, or other imperfections. This requirement is not intended to exclude the use of a corrugated tube, cover, or outer vapor hose.

5 Thickness of Cover

5.1 The thickness of the cover shall not be less than 0.047 inch (1.19 mm) when measured in accordance with [5.2](#) – [5.6](#).

Exception: This requirement does not apply to the cover of the inner hose and the outer vapor hose of a coaxial type vapor recovery hose.

5.2 For removing irregularities in samples, the buffing machine or skiving machine outlined in the Standard Practice for Rubber – Preparation of Product Pieces for Test Purposes from Products, ASTM D3183, is to be used.

5.3 The abrasive wheel of the buffing machine is to be No. 30 – 60 grit and the diameter and rotary velocity of the wheel are to be such that it will have a peripheral speed of 4000 ± 700 feet per minute (20.3 ± 3.6 m/s). The machine is to be provided with a slow feed so that very little compound can be removed at one cut to avoid overheating of the specimen.

5.4 A dial micrometer graduated to 0.001 inch (0.03 mm) that exerts a load of 2.82 – 3.00 ounces (80 – 85 grams) by means of a weight is to be used to measure thickness. The load is to be applied through a flat contact foot 0.25 ± 0.01 inch (6.4 ± 0.3 mm) in diameter.

5.5 To determine the thickness of the tube and cover, a strip, 6 – 8 inches (152.4 – 203.2 mm) long and 1 inch (25.4 mm) wide, or as close to 1 inch (25.4 mm) as possible from small diameter hose, is to be cut longitudinally from the hose, and the part separated from the plies. When the thickness of the part is not uniform around the circumference of the hose, the strip is to be cut from the thinnest portion of the sample.

5.6 The strip specimen is to be buffed or skived to remove the impressions left by the fabric or braid or other surface irregularities, using the equipment described in [5.2](#) and [5.3](#). A series of five thickness measurements are to be taken within the area from which the impressions have been removed, and the maximum reading obtained is to be taken as the thickness of the part.

6 Internal Diameter

6.1 The internal diameter of a hose shall be equal to the nominal diameter $\pm 1/32$ inch (0.8 mm) for sizes up to and including $3/4$ inch (19.0 mm) and $\pm 1/16$ inch (1.6 mm) for larger sizes.

6.2 A tapered plug gauge of wood or metal having a taper of $3/8$ inch per foot (31.3 mm/m), marked to indicate variations of $1/64$ inch (0.4 mm) in diameter, or a set of wood or metal plug gauges, straight or ball type, in increments no greater than 0.01 inches (0.25 mm) for hoses in sizes 1 inch (25.4 mm) and less and 0.02 inches (0.51 mm) for hoses in sizes greater than 1 inch (25.4 mm), shall be used for measuring the internal diameter. An expanding ball gauge, and a micrometer or other equivalent means to accurately measure the expanded ball, are required in some cases. See [6.3](#).

6.3 The end of the hose is to be cut square. When a tapered plug gauge is used, the plug gauge is to be inserted in the hose sample until a close fit is obtained without forcing. The diameter of the gauge at the end of the sample, to the nearest $1/64$ inch (0.4 mm), is to be recorded as the internal diameter of the hose. When a set of straight or ball-type plug gauges is used, the diameter of the gauge, which when inserted in the hose sample gives a close fit without forcing, is to be recorded as the internal diameter of the hose. When the end of a wire-braided hose is constricted or flared, the inside diameter is to be measured 1 inch (25.4 mm) from the end to be representative of the inside diameter by means of an expanding ball gauge.