UL 87B

STANDARD FOR SAFETY

Standard for Power-Operated Dispensing Devices for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations up to 20 Percent (B20), Kerosene, and Fuel Oil

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UL Standard for Safety for Power-Operated Dispensing Devices for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations up to 20 Percent (B20), Kerosene, and Fuel Oil, UL 87B

First Edition, Dated February 13, 2015

Summary of Topics

This first edition of the Standard for Power-Operated Dispensing Devices for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations up to 20 Percent (B20), Kerosene, and Fuel Oil, Ul 87B, apply to power-operated dispensing devices, rated 600 V ac or less, for use with fuels.

The requirements are substantially in accordance with Proposal(s) on this subject dated October 17, 2014.

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ANSI/UL 87B-2015

UL 87B

Power-Operated Dispensing Devices for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations up to 20 Percent (B20), Kerosene, and Fuel Oil

Prior to the first edition, the requirements for the products covered by this standard were included in the Outline of Investigation for Power-Operated Dispensing Devices for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations up to 20 Percent (B20), Kerosene, and Fuel Oil, UL 87B.

First Edition

February 13, 2015

This ANSI/UL Standard for Safety consists of the First Edition.

The most recent designation of ANSI/UL 87B as an American National Standard (ANSI) occurred on February 13, 2015. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

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 http://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements apply to power-operated dispensing devices, rated 600 V ac or less, for use with fuels. Fuels, as defined by these requirements, include one or more of the fuels described in 1.2.

1.2 Dispensing devices covered by these requirements are intended for use with one or more of the following:

a) Diesel fuel and diesel fuel/biodiesel blends with nominal biodiesel concentrations up to 5 percent (B0 – B5) formulated in accordance with the Standard Specification for Diesel Fuel Oils, ASTM D975.

b) Diesel/biodiesel blends with nominal biodiesel concentrations from 5 percent up to 20 percent (B6 – B20) formulated in accordance with the Standard Specification for Diesel Fuel Oil, Biodiesel Blends (B6 – B20), ASTM D7467.

c) Biodiesel (B99.9/B100) formulated in accordance with the Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels, ASTM D6751.

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

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

1.3 Requirements for the installation and use of dispensing devices are included in the Code for Motor Fuel Dispensing Facilities and Repair Garages, ANSI/NFPA 30A, and the National Electrical Code, ANSI/NFPA 70.

1.4 These requirements apply to wiring methods used to install or interconnect such control equipment when the equipment is located directly on or within the housing of the dispensing device.

1.5 These requirements do not apply to control equipment that may authorize, monitor, or interrupt operation of a power-operated dispensing device, nor other auxiliary equipment. These products would be covered under the Standard for Control Equipment for Use with Flammable Liquid Dispensing Devices, UL 1238.

1.6 These requirements do not cover dispensing devices for use with gasoline or gasoline/ethanol blends of any concentration. These dispensing devices are covered under 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.

1.7 These requirements do not cover dispensing devices for use with LP-Gas, which are covered under the Standard for Power-Operated Dispensing Devices for LP-Gas, UL 495.

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1.8 These requirements do not cover equipment intended for diesel/biodiesel blends with a biodiesel concentration between B20 and B99.9/B100.

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 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 AIR GAP – A minimum of 1 inch (25.4 mm) free air space provided between the planes of Division 1 and Division 2 hazardous locations and an unclassified area of a dispensing device.

3.3 BASE – The part of the assembly that is intended to be secured to the foundation on which the device will be installed.

3.4 CLASS I HAZARDOUS LOCATIONS – Locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. For the purpose of these requirements, as applied to dispensing systems of other than the overhead type, the following classified areas are further defined. The area of the dispensing system covered by these requirements is the envelope defined by the maximum outer dimensions.

a) Class I, Group D, Division 1 –

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1) The area within a dispenser housing up to 4 feet (1.2 m) vertically above the base, except for that area defined as Division 2 or unclassified.

2) Any area within a nozzle boot.

b) Class I, Group D, Division 2 –

1) Areas within a dispenser housing above the Division 1 area.

2) The area surrounding the dispenser housing within 18 inches (46 cm) horizontally in all directions from the Division 1 area located within the housing.

3) The area within 18 inches horizontally, in all directions from the opening of a nozzle boot not isolated by a vapor tight partition, except that the area is not required to be extended around a 90 degree or greater corner.

3.5 DISPENSER, REMOTE CONTROL TYPE – A dispensing device that does not contain a power-operated pump as part of the assembly, and which is intended for connection to a fluid piping system containing the power-operated pumps at a remote location. Also commonly identified as a “dispenser”.

3.6 DISPENSER, SELF-CONTAINED – A dispensing device that includes a power-operated pump as part of the assembly. Also commonly identified as a “pump” or “suction dispenser”.

3.7 DISPENSING DEVICE – A product consisting of various components as applicable, which are used to control and meter the flow of liquid from an upstream storage device.

3.8 ELECTRICAL CIRCUITS –

a) High Voltage Circuit – A circuit having a potential of not more than 600 volts and having circuit characteristics in excess of those of a low voltage or Class 2 circuit.

b) Low Voltage Circuit – A circuit involving a potential of not more than 30 volts ac (rms) (42.4 volts peak or dc) and

1) Supplied by a Class 2 transformer, or by a battery, by a battery and fixed impedance, or by a transformer and fixed impedance each of which, as a unit, is in compliance with what is required for a Class 2 transformer, or

2) Limited to a maximum of 100 volt-amperes.

A circuit derived from a source of supply classified as a high voltage circuit, by connecting resistance in series with the supply circuit as a means of limiting the voltage and current, is not considered to be a low voltage circuit.

c) Intrinsically Safe Circuit – A circuit incapable of releasing sufficient electrical energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture. Abnormal conditions include unintentional damage to any part of the equipment or wiring, insulation or other malfunction of electrical components, application of overvoltage, adjustment and maintenance operations, and other similar conditions.

3.9 DIESEL/BIODIESEL BLENDS – Blended fuels composed of a diesel component and a biodiesel component. The numerical value corresponding to the biodiesel component determines the blend rating (such as B20 for 20% biodiesel, 80% diesel).

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3.10 HANGING HARDWARE – The portion of the dispensing device that is connected to the outlet of the dispenser and consists of a hose assembly and hose nozzle valve, and with emergency breakaway couplings and swivel connectors as needed.

3.11 HOUSING – That section of the device that encloses and is intended to protect operating parts, control mechanisms, or other mechanical or electrical components, the damage of which would render the device incapable of being operated as intended, lead to tampering, introduce the possibility of escape of liquid, or expose bare live electrical parts.

3.12 INTENDED CARE AND USAGE – Intended care means tasks such as lubrication and cleaning. Intended usage covers the manipulations involved in starting the dispenser, dispensing the liquid, and restoring the dispenser to its standby condition.

3.13 MASTER-SATELLITE DISPENSER COMBINATION – Consists of two or more dispensing devices. The “Master” dispenser controls the dispensing operation; the “Satellite” dispenser actually dispenses as well, but is not used to control the dispensing function.

3.14 PANEL – A principal section of a housing or enclosure. A mounting arrangement for control and other components.

3.15 PEDESTAL – That part of the structure above the base which supports the component units, and to which they are attached.

3.16 PUMPING UNIT – A power-operated pump for diesel or diesel/biodiesel blends, which may incorporate a strainer, air separator, relief device, or other auxiliary part.

3.17 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.

3.18 SEALS, 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.

3.19 UNCLASSIFIED AREA – An area within a dispenser housing isolated from Division 1 or Division 2 locations by a vapor barrier or a solid nozzle boot, but not completely surrounded by a Division 1 or Division 2 area, that does not contain a level of flammable gases or vapors that are capable of producing explosive or ignitable mixtures.

3.20 VAPOR BARRIER – A solid, unpierced partition located between Division 1 or Division 2 locations and unclassified areas of a dispensing device. The vapor barrier is intended to reduce the entry of flammable gases or vapors into unclassified areas.

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CONSTRUCTION

4 General Construction

4.1 General

4.1.1 A power-operated dispensing device includes as needed a base, housing or pedestal, power-operated pump, pressure relief device, strainer, meter, valves as required, hose, hose nozzle valve, motor control, locking mechanism, piping, electrical wiring, and fixtures. The pump may be integral with the dispensing device, or the dispensing device may be designed for use with a separate pump.

4.1.2 A dispensing device may be of the self-contained type with components mounted in a common pedestal and housing, or it may comprise separate assemblies intended for installation as individual units but in conjunction with each other.

4.1.3 Devices having self-contained pumping units are judged on the use of suction lifts of not less than 2 feet (61 cm).

4.1.4 The construction shall be such that parts can be replaced or reassembled to function as intended after being dismantled.

4.1.5 The device shall incorporate provisions for support independent of piping, tubing, or conduit that may be connected thereto.

4.1.6 Fluid confining parts, except gaskets, seals, or hoses, shall be constructed of metallic materials.

4.2 Hose assemblies

4.2.1 A dispensing device may be furnished without a hose assembly. The dispenser shall be marked in accordance with 43.1.1(c) whether the hose assembly is furnished or not.

4.2.2 When the hose is located inside the housing, the assembly shall be such that electrical parts will not be sprayed with liquid in the case of hose leakage. In a weighted loop application, provision shall be made to prevent the weight from pulling on the hose coupling.

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4.3 Strainers

4.3.1 A dispensing device shall be provided with at least one strainer. The strainer shall comply with Strainers, Section 12. The strainer or strainer assembly shall be constructed and located to permit the removal and replacement of the straining element without breaking liquid lines or disturbing any part of the dispensing device assembly and to permit ready access for cleaning with minimum spillage of fluid.

4.4 Electrically operated valves

4.4.1 A dispensing device for use in a remote control system, or a single inlet dual outlet self-contained dispensing device, incorporating only one pump, shall have in each discharge line a shutoff valve that closes at the time or before the hose nozzle valve is hung in place on the device.

4.4.2 A power-operated dispensing device of the self-contained single outlet type is not required to be equipped with a shutoff valve as specified in 4.4.1.

4.4.3 A plug or rotating disc type valve employing the bearing surface of the plug or disc as the liquid seal to the exterior of the valve body shall not be used in liquid lines.

4.4.4 An electrically operated shutoff valve shall close upon being de-energized, regardless of the position of any operating lever or reset handle.

4.4.5 Valves, as needed, are required in the construction of dispensing devices in order to maintain system priming thereby minimizing the risk of seal dry out.

4.5 Hose nozzle valve

4.5.1 A dispensing device may be furnished without a hose nozzle valve provided it is marked in accordance with 43.1.1(c).

4.6 Mechanically operated valves

4.6.1 A plug or rotating disc type valve, employing the bearing surface of the plug or disc as the liquid seal to the exterior of the valve body, shall not be used in liquid lines.

4.6.2 A petcock or other manually operated valve shall not be provided, which when open, permits the discharge of fluid.

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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. See the Long Term Exposure Test, Section 28.

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.

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.

5.1.1.4 With reference to the above requirements, metallic parts include metallic materials used to form fluid confining parts as well as metallic coatings or plating that may be applied to a base material.

5.1.2 Atmospheric corrosion

5.1.2.1 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 (e.g. thermal links on shear valves) shall be resistant to atmospheric corrosion. Ferrous materials of the 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;

b) Standard pipe and fittings conforming to the Standard for Welded and Seamless Wrought Steel Pipe, ANSI/ASME B36.10M; and

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

5.1.2.2 A protective coating shall provide resistance against atmospheric corrosion to a degree not less than that provided by the protective coatings specified in 5.1.2.3.

5.1.2.3 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 5.1.2.1 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.

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5.1.2.4 A metallic material other than as described in 5.1.2.1 – 5.1.2.3 shall be painted or protected in a manner that has been determined to be equivalent.

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 3.17 and 3.18 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 Materials – system level, 5.3.

5.2.1.4 Materials used in the construction of hoses shall comply with Hose Assemblies, Section 16.

5.2.1.5 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.

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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 testing.

5.2.2.1.2 A static seal shall be constructed of a material that is acceptable in accordance with the scope of 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 compressions set is calculated and shall not exceed 35%. For coated fabrics, alternate limits can be used with the average compression set not exceeding 70%.

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

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