



UL 87

STANDARD FOR SAFETY

Power-Operated Dispensing Devices for Petroleum Products

UL Standard for Safety for Power-Operated Dispensing Devices for Petroleum Products, UL 87

Twelfth Edition, Dated March 24, 2016

Summary of Topics

This revision of UL 87 dated September 4, 2019 includes the following changes in requirements:

Editorial revisions and clarification of requirements

Adding zones to the different divisions

Revisions to hose nozzle requirements

Harmonizing text with UL 87A and UL 87B requirements for Marking and Instructions

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 May 3, 2019 and July 12, 2019.

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UL 87

Standard for Power-Operated Dispensing Devices for Petroleum Products

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The Department of Defense (DoD) has adopted UL 87 on March 11, 1991. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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 apply to power-operated dispensing devices for petroleum products such as gasoline for use as motor fuel. Requirements for the installation and use of these dispensing devices are included in the Automotive and Marine Service Station Code, NFPA 30A, and the National Electrical Code, NFPA 70.

1.2 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. These requirements do not apply to control equipment that may authorize, monitor, or interrupt operation of a power-operated dispensing device. Such equipment includes panel mounted equipment located adjacent to the dispensing device, remote consoles located inside a permanent structure, and auxiliary equipment physically attached to the dispensing device or enclosed by the pedestal and housing.

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. See Appendix A for a list of typical standards covering components used in the products covered by this standard.

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, Division 2, Zone 1 or Zone 2 hazardous locations and an unclassified area of a dispensing device.

3.3 BASE – That part of the assembly which 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. Such areas for overhead type systems shall be as specified in the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A. 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 or Zone 1 –

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, Zone 2, or unclassified.

2) Any area within a nozzle boot.

b) Class I, Group D, Division 2 or Zone 2 –

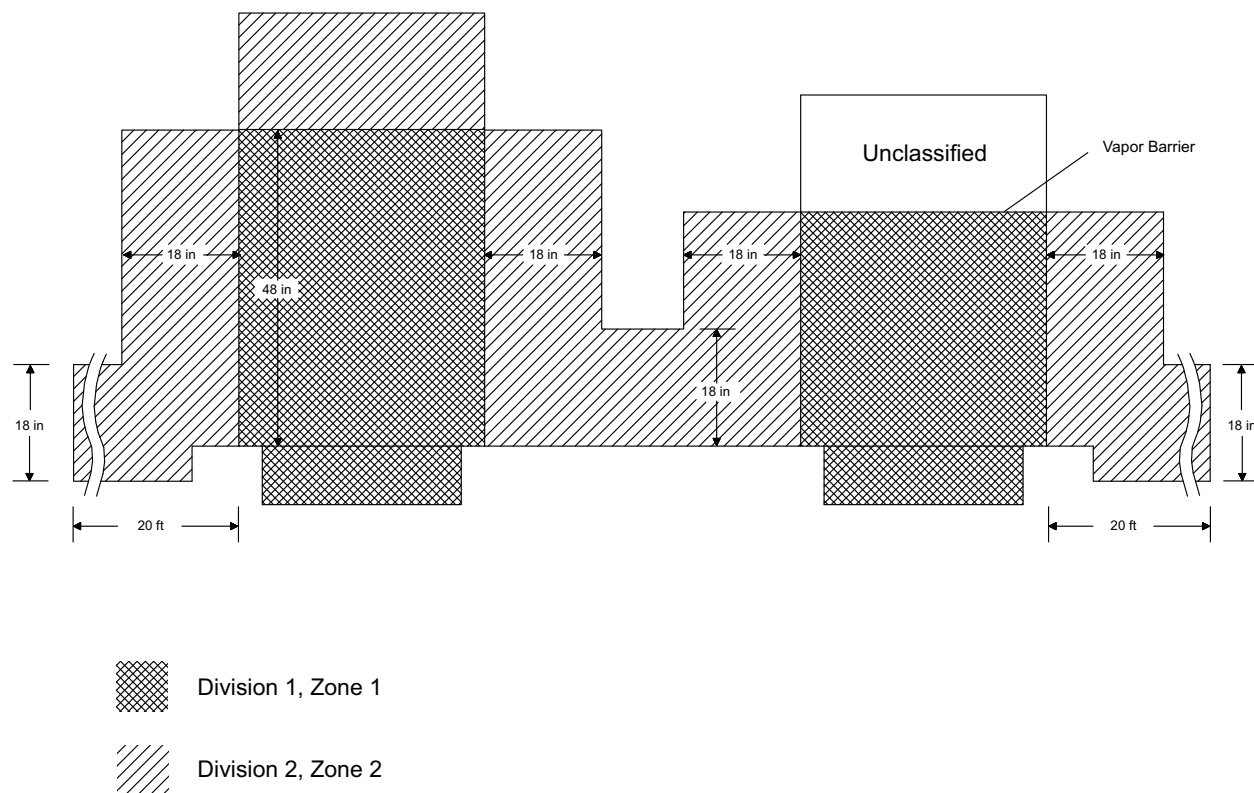
1) Areas within a dispenser housing above the Division 1 or Zone 1 area.

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

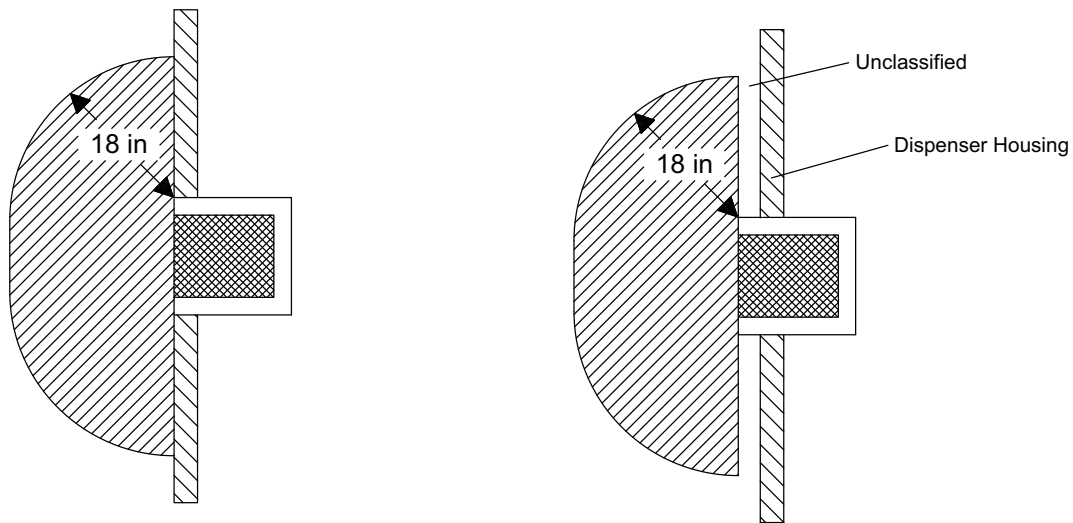
See Figures 3.1 and 3.2 for an illustration of Class I and Zone hazardous locations.

Figure 3.1
Hazardous location classifications within a typical dispenser
 Dispenser Without Vapor Barrier Construction Dispenser With Vapor Barrier Construction

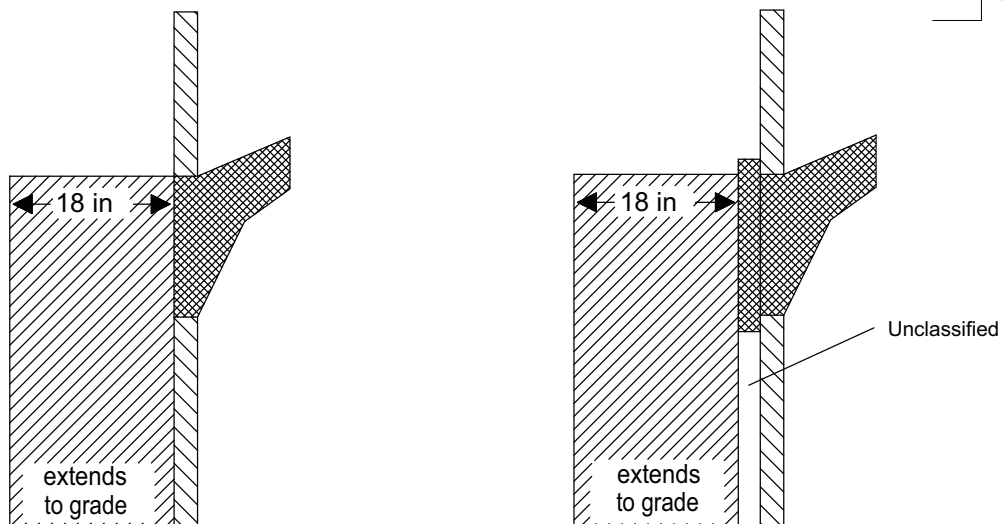


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Figure 3.2
Hazardous location classifications associated with a hose nozzle valve boot
TOP VIEW



SIDE VIEW



Unclassified area might be a Division 2 or Zone 2 area if there is a Division 1 or Zone 1 area on the other side of the housing



Division 1 or Zone 1



Division 2 or Zone 2

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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 involving 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 alternating-current (rms) (42.4 volts peak or direct current) 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.

3.8A 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.

3.8B 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.

3.9 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.

3.10 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.

3.11 MASTER-SATELLITE DISPENSER COMBINATION – Consists of two or more dispensing devices, one defined as the "Master" dispenser and the other(s) as the "Satellite" dispenser.

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

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

3.14 PUMPING UNIT – A power- or hand-operated pump for petroleum products which may incorporate a strainer, air separator, relief device, or other auxiliary parts.

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

3.16 VAPOR BARRIER – A solid, unpierced partition located between Division 1, Division 2, Zone 1, or Zone 2 hazardous 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.

3.17 VAPOR RECOVERY SYSTEM – A system constructed to capture vapors displaced during filling operations. The vapors are not processed during the course of this activity. Examples of vapor recovery systems include balance-pressure vapor displacement systems and vacuum-assist systems.

CONSTRUCTION

4 General

4.1 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 retractor, hose-nozzle valve, motor control, locking mechanism, piping, and 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.

4.2 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.

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

4.4 A dispensing device, other than one including a hose reel or weighted loop in its assembly, may be furnished without the hose.

4.5 When a dispensing device is provided with a hose retrieving mechanism intended for use with coaxial type hose, the dispensing device shall be marked as specified in 42.1.1(c).

4.6 A dispensing device may be furnished without a hose-nozzle valve if the dispensing device is marked as specified in 42.1.1(d).

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

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

5 Materials

5.1 Fluid-containing parts other than a seal ring or gasket shall have a melting point (solidus temperature) of not less than 950°F (510°C) and a tensile strength of not less than 10,000 psi (68.9 MPa) at 400°F (204°C).

5.2 A nonmetallic part in contact with the fluid to be handled shall be subjected to the following tests:

a) Polymeric parts that are affected by aging shall not crack or show visible evidence of deterioration following exposure for 168 hours in an air oven at a temperature of $100 \pm 1^\circ\text{C}$ ($212 \pm 2^\circ\text{F}$).

b) An elastomeric part:

1) Is to be immersed in ASTM Reference Fuel C, ASTM Reference Fuel A, and IRM Oil No. 903. Following the immersion, the elastomeric part shall not show a volume change of more than 25 percent swelling (40 percent in Reference Fuel C) or 1 percent shrinkage and the weight loss (extraction) shall not be more than 10 percent. The immersion-extraction test is not to be conducted with reference Fuel A and IRM Oil No. 903.

2) Shall not crack or show visible evidence of deterioration following exposure to an aging test as specified in the Standard for Gaskets and Seals, UL 157. The maximum service temperature used to determine the conditioning time and temperature for the oven aging is determined to be 60°C (140°F) unless the product is designated for use at a higher temperature.

5.3 The volume change and extraction tests are to be conducted in accordance with the Standard for Gaskets and Seals, UL 157.

5.4 A metallic part shall be resistant to atmospheric corrosion if the corrosion of such part may permit external leakage or impair the intended operation of the product. Ferrous materials of the thickness specified in the following items have been investigated and determined to be 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 from 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).

5.5 A protective coating shall provide resistance against corrosion to a degree not less than that provided by the protective coatings specified in 5.6.

5.6 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 protected against 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,

comply with the intent of 5.5. When coating is used on a fluid casting and is capable of contacting the fluid, the coating shall be investigated in order to determine its compatibility with the fluid intended to be dispensed.

5.7 A metallic part other than those described in 5.4 and 5.6 and subject only to atmospheric corrosion shall be painted or protected in a manner that has been determined to be equivalent to retard corrosion.

5.8 Sand castings used in the construction of fluid-confining parts, whose malfunction permits external leakage, shall be free from porosity leakage and shall have a thickness of not less than that specified in Table 5.1. See the High-Pressure Leakage Test, Section 28, and the Manufacturing and Production Tests, Sections 38 – 41.

Table 5.1
Minimum thickness of liquid-confining sand-castings

Material	inch	(mm)
Cast iron	3/16	4.8
Malleable iron, ductile iron, or cast steel	1/8	3.2
Brass or bronze	3/32	2.4
Aluminum	5/32	4.0

5.9 For flanges, a plant-fiber gasket shall be not more than 1/32 inch (0.8 mm) thick. A cork composition gasket shall be shellacked in place on one side and coated with graphite on the other.

6 Base

6.1 The base shall be ordinary cast iron of 1/4 inch (6.4 mm) minimum thickness, of commercial grade steel of 0.093 inch (2.36 mm) minimum thickness, or of other materials or constructions that have been determined to be equivalent strength.

6.2 The base shall be provided with bolt holes to accommodate bolts not less than 1/2 inch (12.7 mm) diameter for anchoring the dispenser. At least two holes shall be provided if the dispenser is not more than 6 feet (1.83 m) tall and at least four holes if the dispenser is over 6 feet tall. If two holes are provided, they shall be located on opposite sides of the base and at least 13 inches (330 mm) apart. If more than two holes are provided, they shall be located approximately symmetrically on a bolt circle having a diameter of not less than 13 inches. The bolt holes shall be accessible, such as by being located in the base at the sides of the dispenser provided with doors or removable panels.

6.3 The requirement specified in 6.2 does not apply to a farm or non-retail type of dispenser of a special design which includes other provision for anchoring the dispenser.

7 Pedestal

7.1 The pedestal shall be made of cast iron, sheet steel, or of a framework consisting of angle iron, wrought-iron or steel pipe, or made of a construction that has been determined to be equivalent.

7.2 Piping carrying liquid shall not serve as a part of the pedestal.

7.3 The pedestal shall provide strength and rigidity for the assembled structure. Provisions, such as by bolting or welding, shall be made to prevent loosening of joints of the pedestal. See 8.8.

8 Housing

8.1 Exposure of the assembly to the weather shall not interfere with the intended performance of the operating parts which it encloses. A recess or depression in the housing that may collect water shall be arranged to direct such collection to the outside or to points within the structure where it can fall to the ground without damage to the internal components.

8.2 A part employed in a main side section of a housing shall be no less than the strength that has been investigated and determined to be equivalent to that of sheet steel having a minimum thickness of 0.036 inch (0.91 mm).

8.3 Stainless steel having a minimum thickness of 0.026 inch (0.66 mm), unreinforced aluminum having a minimum thickness of 0.053 inch (1.35 mm), or reinforced aluminum having a minimum thickness of 0.041 inch (1.04 mm) has been investigated and determined to be the equivalent of carbon steel having the thickness specified in 8.2.

8.4 The top housing or canopy shall provide no less protection for internal parts than that of sheet steel having a minimum thickness of 0.031 inch (0.79 mm) or nonmetallic material complying with 8.7. The top housing shall be secured in place by mechanical means.