



# UL 1248

## STANDARD FOR SAFETY

### Engine-Generator Assemblies for Use in Recreational Vehicles



UL Standard for Safety for Engine-Generator Assemblies for Use in Recreational Vehicles, UL 1248

Third Edition, Dated December 8, 2006

### **Summary of Topics**

***This revision to UL 1248 dated April 4, 2025 includes the withdrawal and replacement of ANSI/ISA MC 96.1, Temperature-Measurement Thermocouples in [19.7](#) and an editorial revision in [11.2.14](#) and [11.2.15](#).***

Text that has been changed in any manner or impacted by ULSE'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 28, 2025.

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**UL 1248**

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## INTRODUCTION

### ALL UNITS

#### 1 Scope

1.1 These requirements cover the fire and casualty aspects associated with the mechanical performance and the electrical features of engine driven generator assemblies intended for installation in recreational vehicles.

1.2 These requirements cover generators rated: 15 kilowatts or less, 115 volts, 2-wire single phase; 240 volts, 2-wire single phase; 115/230 volts, 3-wire single phase; 3 or 4 wire, any voltage, three phase. The generators may incorporate alternator or direct current generator sections for supplying energy to battery charging circuits. Only generators having systems voltages of less than 150 volts to ground are permitted for noncommercial applications.

1.3 These requirements cover both open and totally-enclosed generators.

1.4 A totally-enclosed generator is so enclosed as to prevent the free exchange of air between the inside and the outside of the enclosure for windings but not sufficiently enclosed as to be airtight.

1.5 A generator having ventilating openings that permit the passage of external cooling air over and around the windings is an open generator.

1.6 These requirements cover generator parts and combinations of such parts.

1.7 These requirements do not cover generators for use in hazardous locations as defined in the National Electrical Code.

1.8 These requirements cover only the identified hazard aspects of motor-generator assemblies intended for use with recreational vehicles. These requirements do not cover other possible hazard aspects of such equipment.

1.9 A product that contains features, characteristics, components, materials, or systems new or different from those in use when the standard was developed and that involves a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements as determined necessary to maintain the level of safety for the user of the product as originally anticipated by the intent of this standard.

#### 2 General

##### 2.1 Units of measurement

2.1.1 If a value for measurement is followed by a value in other units, in parentheses, the second value may be only approximate. 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 standard shall be interpreted as referring to the latest edition of that code or standard.

## 2.3 Terminology

2.3.1 The term "product" as used in this Standard, refers to any equipment covered by this Standard.

## 3 Components

3.1 Except as indicated in [3.2](#), a component of a product covered by this standard shall comply with the requirements for that component.

3.2 A component need not comply with a specific requirement that:

- a) Involves a feature or characteristic not needed in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

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

3.4 Specific components are recognized as being 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 for which they have been recognized.

3.5 If the manufacturer assigns a rating or an intended use to a component of a generator (for example, an integral auxiliary switch intended to control an external circuit) the component is to be evaluated for that rating or use or both.

## 4 Instructions and Drawings

4.1 Operating and installation instructions, or equivalent information, shall be furnished with each product. These instructions are to be used as a guide in the examination and test of the product and for this purpose a printed edition is not required.

4.2 The instructions should include such directions and information as deemed by the manufacturer to be adequate for attaining proper and safe installation, maintenance, and use of the product.

## CONSTRUCTION

### ALL UNITS

## 5 Protection Against Personal Injury

### 5.1 General

5.1.1 The material of a part (an enclosure, a frame, a guard, or the like), the failure of which might result in personal injury from contact with hazardous parts, shall have such properties as to meet the demand of expected loading conditions.

5.1.2 A component as mentioned in [5.1.1](#) that is exposed to impact shall withstand the ball-impact test described in [5.1.3](#):

- a) Without cracking which affects the functional strength of the part,

- b) Without being affected to the extent that hazardous moving parts would be exposed to accidental contact, and
- c) Without affecting the safe mechanical performance of the test assembly.

See [5.1.6](#)

5.1.3 The ball-impact test is to be conducted with a smooth steel sphere having a diameter of 2 inches (51 mm) and a mass of 1.18 pounds (0.54 kg). If the component being tested can be impacted from above, the sphere is to be allowed to fall vertically from rest to strike the component. Otherwise, the sphere is to be suspended by a cord and is to be allowed to fall from rest as a pendulum to strike the component. In either case, the vertical travel of the sphere is to be 4.24 feet (1.3 m).

5.1.4 If the component consists of a plastic or other nonmetallic material, the ball-impact test is to be performed on the samples in the "as-received" condition. The test is then to be repeated on a different sample or samples that have been cooled to room temperature after exposure to an air oven at 100°C (212°F) or the maximum temperature attained during the Temperature Test, Section [20](#), (whichever is higher) for 7 days. A part that is not capable of performing satisfactorily at this temperature may be tested at a lower temperature (not less than attained during the Temperature Test) but for a longer period of time. A part conditioned in the oven is to be supported while in the oven in the same manner it is supported on the product.

5.1.5 Upon removal from the oven mentioned in [5.1.4](#) and before being subjected to the ball-impact test, no sample shall show checking, cracking, or other deleterious effects from the oven conditioning, nor shall any sample show distortion sufficient to impede use of the product in its intended manner.

5.1.6 Deformation of a guard during the ball-impact test is acceptable if:

- a) Operation of the product or performance of the guard is not affected, and
- b) The guard can be readily restored to its original shape and location.

## 5.2 Enclosures and guards

### 5.2.1 General

5.2.1.1 An exposed hazardous moving part shall be so guarded as to adequately reduce the risk of injury to persons, except only as such part is necessarily exposed during normal operation and maintenance of the product.

5.2.1.2 Among the factors to be considered in judging the acceptability of an exposed moving part are:

- a) The degree of exposure,
- b) The sharpness of the moving part,
- c) The likelihood of accidental contact therewith,
- d) The speed of the moving part and
- e) The likelihood that fingers, arms, feet, or clothing would be endangered by the moving part.

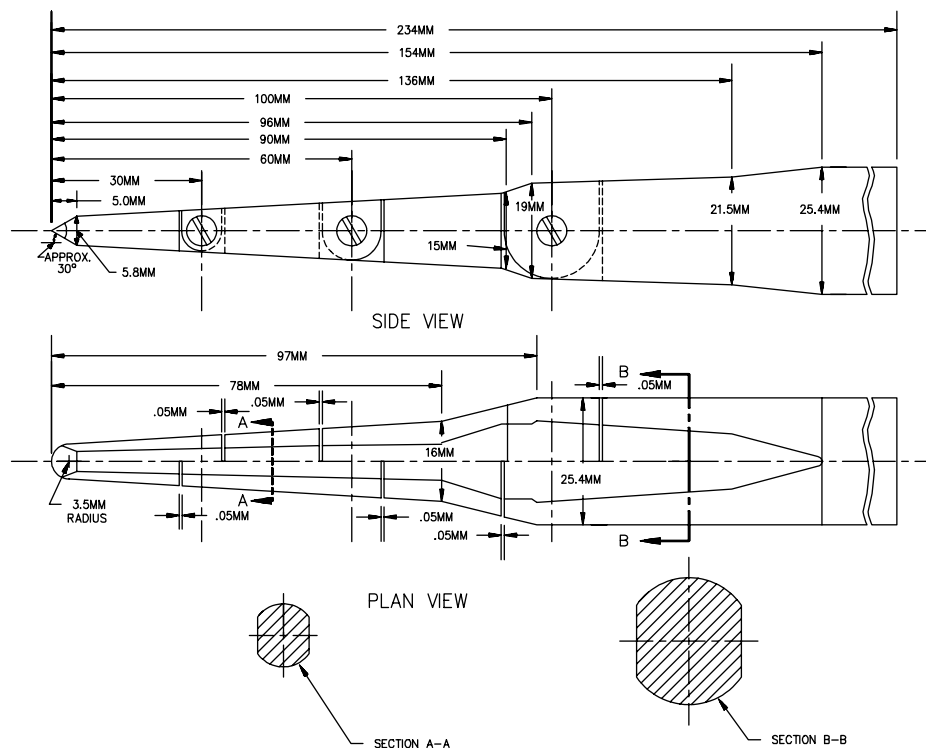
These factors are to be considered with respect to normal operation of the product and also during setting of any adjustments.

### 5.2.1.3 Features of guards to be considered include:

- a) Removability of the guard without the use of tools.
- b) Removability for servicing and the need for replacement.
- c) Strength and rigidity.
- d) Completeness.
- e) Creation of risks of personal injury, such as pinch points, and the necessity for additional handling because of increased need for servicing (such as cleaning).

5.2.1.4 An opening in a guard or enclosure for hazardous live parts or moving parts other than fans or blowers shall have a minor dimension of less than 1 inch (25.4 mm) and shall not permit the probe illustrated in [Figure 5.1](#) to contact the part when inserted through the opening with a force of 1 pound (4.4 N) to its maximum depth and in a straight or articulated position.

**Figure 5.1**  
**Articulated probe**



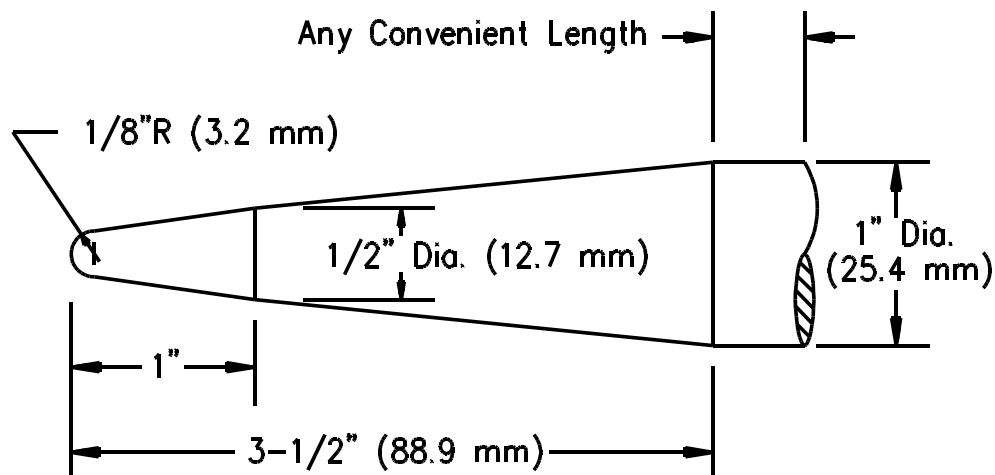
PA100

Probe available from Underwriters Laboratories Inc.

5.2.1.5 Fans, blowers, and other air moving components capable of inflicting injury shall be so guarded or enclosed as to minimize the likelihood of injury to persons during normal use.

5.2.1.6 The hazardous portion of a blade or blower wheel shall be so guarded that the probe illustrated in [Figure 5.2](#) will not contact a hazardous part when inserted through any opening in the guard and applied with a force of 1 pound (4.4 N).

**Figure 5.2**  
**Fan probe**



PA 160

5.2.1.7 A guard that must be removed to permit governor settings, lubricating, or similar adjustments or operations shall be hinged, chained, or otherwise fixed to the product.

## 5.2.2 Protection against corrosion

5.2.2.1 Parts formed of iron or steel and functioning as guard or enclosure for hazardous parts or acting as load supporting components where their failure could create a hazard, shall be protected against corrosion by painting, galvanizing, plating or by other equivalent means.

5.2.2.2 The requirement in [5.2.2.1](#) does not apply to bearings, laminations, or minor parts such as washers and screws, nor does it apply to a part where other specific requirements for materials or corrosion protection are noted.

5.2.2.3 Parts of an engine-generator assembly which are expected to be exposed to road splash and outside weather conditions where the failure could create a hazard, shall be specifically investigated to determine the suitability of their corrosion resistant properties.

### 5.3 Sharp edges

5.3.1 An edge, a projection, and a corner of an enclosure, frame, guard, handle, or the like, shall be smooth and rounded, and not sufficiently sharp to constitute a risk of personal injury in normal use and maintenance of a product.

### 5.4 Provision for mounting

5.4.1 Mounting provisions shall be provided with the product for securing the assembly to a vehicle structure. No drilling or cutting of the generator system shall be necessary to properly install the product. A unit mounted on a subbase and intended to slide out for servicing shall be provided with a stop to prevent pulling the unit free of its supporting structure.

### 5.5 Temperature

5.5.1 During the Temperature Test, Section 20, a temperature on the surface that may be contacted by the user shall be no more than the value indicated in [Table 5.1](#).

**Table 5.1**  
**Maximum surface temperature**

| Location                                                                                                                                                                                                                                                                                                                                                                               | Composition of surface |                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                        | Metal <sup>a</sup>     | Nonmetallic <sup>a</sup> |
| Handle, lever, or knob likely to be grasped for lifting or holding.                                                                                                                                                                                                                                                                                                                    | 50°C (122°F)           | 60°C (140°F)             |
| Handles or knobs which are expected to be contacted in normal operation, but do not involve lifting, carrying, or holding, and exterior surfaces subject to contact when the product is installed in accordance with the manufacturer's instructions. Items expected to be contacted in periodic servicing, e.g., oil dip sticks, radiator caps, or oil filter retainers are exempted. | 60°C (140°F)           | 85°C (185°F)             |
| <sup>a</sup> A handle, knob, or the like made of a material other than metal, which is plated or metal-clad having a thickness of 0.005 inch (0.13 mm) or less is considered to be and is judged as a nonmetallic part.                                                                                                                                                                |                        |                          |

## MECHANICAL SYSTEM

### 6 Fuel Systems – Gasoline

#### 6.1 Tanks and pumps

6.1.1 A fuel tank provided as part of the engine-generator assembly shall be constructed of painted mild steel having a minimum thickness of 0.032 inch (0.81 mm) or of material equivalent in strength, rigidity, and resistance to fire and corrosion. The joints shall be welded, brazed, soldered, or bonded. If soldered or bonded, the joints shall be of a construction which will retain the heads if the solder or bonding melts. Fittings and fill pipe, if soldered or bonded, shall be mechanically secured to the tank in addition to soldering or bonding.

6.1.2 If a tank is within or contiguous to the engine compartment the tank location and the facilities for filling shall be such that spillage or leakage will drain to the ground and not onto the engine or electrical- or exhaust-system parts. Spillage tests shall be conducted if necessary to determine compliance.

6.1.3 A fuel tank and fill fitting shall be so located as to minimize the possibility of damage to the tank or its fittings. The fill fitting and exhaust terminus shall be at least 3 feet (0.9 m) apart when installed in accordance with the manufacturer's instructions.

6.1.4 External fuel-confining parts of an electrically or mechanically operated fuel pump shall be of metal. Failure of operating parts shall not result in external leakage of fuel. Electrically-operated fuel pumps shall comply with the requirements of Components, Section [3](#).

6.1.5 An automatically operated positive shutoff shall be incorporated in the fuel line. This positive shutoff may be a part of the carburetor, fuel pump, or the like, or may be a separate fuel solenoid valve, and shall prevent fuel at 3 pounds per square inch (psi) (20.7 kPa) or less from flooding the carburetor and spilling into the compartment when the engine generator is not operating.

## 6.2 Fuel lines and fittings

6.2.1 Fuel lines shall be of annealed seamless drawn aluminum or steel tubing. Flexible tubing or hose shall be used only where necessary to absorb vibration.

6.2.2 Aluminum tubing shall have a nominal wall thickness of not less than 0.030 inch (0.76 mm), 0.0035 inch (0.089 mm) minus tolerance. Steel tubing shall have a wall thickness of not less than 0.028 inch (0.71 mm) and shall have a corrosion-resistant exterior coating equivalent to that afforded by paint.

6.2.3 Flexible tubing or hose shall conform with the Standard for Fuel and Oil Hose, ANSI/SAE J30-1987. Tubing shall not pull off fittings or fail when subjected to a 20 pound-force (89 N) axial pull test applied over a 1 minute period. The test shall be conducted at ambient conditions of  $70 \pm 9^{\circ}\text{F}$  ( $21 \pm 5^{\circ}\text{C}$ ) with tubing or hose wetted with fuel.

6.2.4 Fuel-line tubing fittings shall be of the type conforming to the Standard for Automotive Fittings, ANSI/SAE J512-1990, or the Standard for Fittings for Flared Copper Tubes, ANSI/ASME B16.26-1988, or the equivalent.

6.2.5 A body or fitting provided with tapered threads shall be threaded in accordance with the Standard for General Purpose Pipe Threads (Inch), ANSI/ASME B1.20.1-1983.

6.2.6 External fuel-confining parts of a filter, except a gasket or seal, shall be of metal. Glass filter bowls may be used where they are located within a compartment in which the system is installed.

6.2.7 Fuel lines shall be supported to minimize chafing and to maintain at least a 2 inch (51 mm) clearance from bare exhaust components. Electrical wiring shall not be tied to fuel lines and shall be routed so that it is not capable of inadvertently contacting fuel lines.

6.2.8 Fuel feed lines, valves, and fittings shall be located so that any leakage will not run off or drip on electrical- or exhaust-system parts.

## 6.3 Nonmetallic parts

6.3.1 A synthetic-rubber part, failure of which would allow gasoline leakage (other than hoses covered by specific requirements) in contact with gasoline shall not show excessive volume change or loss of weight when considered on the basis of its intended function, following immersion for 70 hours in the test liquid specified in [Table 6.1](#).

**Table 6.1**  
**Test liquids for nonmetallic materials**

| Liquid in contact with part | Test liquid                  |
|-----------------------------|------------------------------|
| Gasoline                    | ASTM Reference Fuels A and C |

6.3.2 A change in volume of not more than 25 percent swelling or 5 percent shrinkage, and a weight loss (extraction) of not more than 10 percent is considered as indicating compliance with [6.3.1](#).

6.3.3 A part made of synthetic rubber which may be affected by aging shall not crack or show visible evidence of deterioration following exposure for 96 hours to oxygen at a pressure of 300 psi (2.07 MPa) and a temperature of 70°C (158°F).

## 6.4 Corrosion resistance

6.4.1 If corrosion of a ferrous part will interfere with the proper functioning of a part, the part shall be provided with a corrosion-resistant protective coating.

6.4.2 A part made of drawn brass or machined from brass rod shall be capable of withstanding, without cracking, the 10-Day Moist Ammonia-Air Stress Cracking Test, Section [23](#).

## 6.5 Carburetors

6.5.1 Where a side or updraft carburetor is used, it shall be located so that overflow of gasoline due to excess choking will flow to ground and not contact electrical parts and exhaust system, or collect in an engine compartment. Nonmetallic drain hose, if used, shall comply with the fuel resistance, oil resistance, and dry-heat resistance tests of the Standard for Fuel and Oil Hose, ANSI/SAE J30-1987.

6.5.2 A downdraft carburetor, if mounted over an engine and having an external float bowl vent opening, shall have a vent overflow tube to direct fuel away from the engine in case of fuel overflow.

6.5.3 A backfire deflector shall be provided on each combustion air intake and, whether separate or a part of an air cleaner, shall conform with the requirements of Backfire-Deflector Test, Section [22](#).

## 7 Fuel Systems – Liquefied Petroleum Gas

### 7.1 General

7.1.1 Where an LP-Gas fuel system is provided as part of the generator system it shall include the complete fuel system installed at the factory, except as indicated in [7.1.2](#) and [7.1.3](#).

7.1.2 Products equipped to use a removable fuel container may be shipped without the fuel container if a metal nameplate that identifies the correct fuel-container assembly to be used is attached adjacent to the container-mounting hardware.

7.1.3 A generator unit may be arranged for LP-Gas fuel but intended for use with a remotely mounted tank not provided or part of the generator. Paragraphs concerning fuel containers do not apply to generator units of this type.

7.1.4 Nonductile (regular gray iron) cast iron shall not be used for LP-Gas confining parts.

7.1.5 A body or fitting provided with tapered threads shall be threaded in accordance with the Standard for General Purpose Pipe Threads (Inch), ANSI/ASME B1.20.1-1983.

7.1.6 Vaporizers, regulators, valves, filters, and other fuel-system components subject to container pressure shall be of a type designed for use with LP-Gas at a working pressure not less than 250 psi (1.75 MPa).