UL 912

STANDARD FOR SAFETY

Highway Emergency Signals

UL Standard for Safety for Highway Emergency Signals, UL 912

Sixth Edition, Dated November 26, 1997

Summary of Topics

This revision of UL 912 clarifies tests and markings.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated March 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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Standard for Highway Emergency Signals

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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 highway emergency signals intended to be carried on commercial automotive vehicles and to be used as emergency traffic warning signals in the event of enforced parking of the vehicle on a highway.

1.2 These requirements cover three types of warning signals: Liquid-Burning Flares, Red Electric Warning Lanterns, and Fusees.

1.3 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 General

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.2 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b) Is superseded by a requirement in this standard.

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

2.4 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.

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LIQUID-BURNING FLARES

CONSTRUCTION

3 General

3.1 These devices shall be provided in sets of three contained in a metal rack or box which can be securely mounted on the motor vehicle.

3.2 If a value for measurement as given in these requirements is followed by an equivalent value in other units, the first stated value is the requirement.

4 Fuel

4.1 Flares shall be designed for use with liquid fuel having a classification not greater than that of kerosene in accordance with the requirements in the Standard for Tests for Comparative Flammability of Liquids, UL 340.

5 Fuel Containers

5.1 Fuel containers and liquid-confining parts shall be made of material having a melting point (solidus temperature) of not less than 950°F (510°C) and affording resistance to corrosion equivalent to that of sheet steel having a thickness of not less than 0.026 inch (0.66 mm).

6 Burner Hoods

6.1 The burner shall be provided with a hood which can be secured to the body over the burner against a gasket which will prevent leakage of fuel while the device is not in use.

7 Stability

7.1 The design shall be such that the device will right itself when tilted so that the bottom forms an angle of 45 degrees with the horizontal.

PERFORMANCE

8 Vibration and Shock Test

8.1 Three sample flares, in the metal rack or metal box provided and mounted as in service, shall not show evidence of structural failure or leakage in the body, or at a joint, while and after being subjected to 1 hour of vertical displacement of an amplitude of 1/8 inch (3.2 mm) at a frequency of 12 – 13 cycles per second (Hz).

8.2 For this test, amplitude is defined as the maximum displacement of sinusoidal motion from position of rest or one-half of the total vibration table displacement.

9 Rain Test

9.1 The flares used for these tests shall be filled with kerosene to the level recommended in the manufacturer's instructions and shall have the wicks adjusted as recommended by the manufacturer.

9.2 After a preheating period of 5 minutes in still air, a sample flare, lighted and mounted in its normal operating position on a table rotating at 4 revolutions per minute (rpm) and in a wind of approximately 2 miles per hour (3.2 km/h), shall be subjected to a water spray from an adjustable, solid-cone nozzle[a] (such as the ordinary garden hose spray nozzle) set so that the nozzle outlet is 8 – 12 feet (2.4 – 3.6 m) horizontally from the sample and 1 – 3 feet (0.3 – 0.9 m) vertically above the sample, with the nozzle axis pointing upward at an angle of approximately 45 degrees from the horizontal and with the water striking the sample at an angle of approximately 45 degrees from the horizontal in a downward direction.

[a]Solid cone spray nozzles operating at 5 – 7-1/2 psi (34 – 52 kPa) give a spray consisting of relatively large drops when set so that the center of the stream at the flare shows 0.10 inch (2.5 mm) per minute precipitation. At higher pressures, the drops are smaller. These conditions are comparable to actual rain.

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9.3 Under these conditions and with a water pressure of 5 – 7-1/2 psi (34 – 52 kPa) at the nozzle, the rate of precipitation at the location of the sample is to be adjusted to 0.10 inch (2.5 mm) per minute. The sample is to be introduced gradually into the spray and after being placed in the test location shall continue to operate under these conditions for 15 minutes. This test is to be made on each of the three flares constituting a set. Two out of the three flares shall pass the test.

9.4 With the rate of rotation and the wind condition the same as specified in 9.2 and 9.3, the water pressure shall then be increased to a value of 10 – 12 psi (70 – 83 kPa) and the sample moved farther from the nozzle, if necessary, to a location giving a precipitation of 0.03 inch (0.8 mm) per minute, striking the sample at approximately 45 degrees from the horizontal. Under these conditions, the sample shall continue to operate for 30 minutes. This test shall be made on each of the three flares constituting a set. Two out of the three flares shall pass the test.

9.5 With the rate of rotation and the wind condition the same as described in 9.2 and 9.3, the water pressure shall be further increased to a value of 18 – 20 psi (124 – 138 kPa) and the sample moved farther from the nozzle, if necessary, to a location giving a precipitation of 0.01 inch (0.3 mm) per minute, striking the sample at approximately 45 degrees from the horizontal. Under these conditions, the sample shall continue to operate for 45 minutes. This test shall be made on each of the three flares constituting a set. Two out of the three flares shall pass the test.

10 Wind Test

10.1 The flares used for these tests shall be filled with kerosene to the level recommended by the manufacturer and shall have the wicks adjusted in accordance with the manufacturer's instructions.

10.2 A flare shall be lighted and allowed to burn in still air for a preheating period of 5 minutes. It shall then be placed suddenly in an air stream of 40 mph (64 km/h) and withdrawn. After rotating through approximately 45 degrees, it shall again be placed in the air stream and withdrawn. It shall be rotated again through an additional 45 degrees, approximately, and placed in the air stream and withdrawn a third time. If the flame is extinguished during any one of these three operations, the sample shall have failed to pass the test. The test shall then be repeated on each of the other two samples constituting a set. Two out of the three samples shall pass the test.

10.3 A flare, lighted and mounted in its normal operating position, rotating about its vertical axis at 4 rpm, shall be subjected to a horizontal current of air having a velocity the equivalent wind at 40 mph (64 km/h). This test shall continue for 15 minutes, and the flare shall remain lighted throughout the entire 15-minute period.

10.4 Upon completion of the above test, while lighted and rotated as specified above, the flare is to be subjected to a horizontal current of air having a velocity of 5 mph (8 km/h). The total uninterrupted burning time, including the first 15 minutes at 40 mph (64 km/h), shall be at least 12 hours.

10.5 The flare shall be capable of burning in ″still″ air following the foregoing tests.

11 Photometric Test

11.1 A sample flare, when subjected to a wind velocity of 5 mph (8 km/h) and 40 mph (64 km/h), respectively, shall produce a minimum of 0.10 candlepower (1.1 lx) in a horizontal direction.

INSTRUCTIONS AND MARKING

12 Instructions for Use

12.1 The manufacturer shall furnish printed instructions as to wick adjustment, maximum filling level, and method of installation.

13 Marking

13.1 Each device shall be marked with the following:

a) The manufacturer's or private labeler's name or identifying symbol and

b) The model, size, or style designation.

13.2 If a manufacturer produces liquid-burning flares at more than one factory, each device shall have a distinctive marking to identify it as the product of a particular factory.

ELECTRIC LANTERNS

CONSTRUCTION

14 General

14.1 These devices shall be provided in sets of three contained in a metal rack or box which can be securely mounted on the motor vehicle.

15 Color

15.1 The device shall provide a red light which may be flashing or steady burning.

15.2 The red lens provided for the foregoing purpose is considered to be a lens, the color of which under service conditions, employing a light source having the quality of International Commission on Illumination Illuminant A (incandescent lamp at 2,848°K), has a value of y not greater than 0.335, and a value of z not greater than 0.002, y and z being trichromatic coefficients derived on the basis of the 1931 ICI Standard Observer and Co-ordinate System. See the Standard Practice for Computing the Colors of Objects by Using the CIE System, ASTM E308-96.

15.3 A red lens shall not be acceptable if it is paler or yellower than the light-limit standard glasses when the two are illuminated by incandescent-lamp light.

PERFORMANCE

16 Test Sequence

16.1 The vibration and shock, rain, dust, and reliability and life tests shall be made on the same sample in that order.

17 Vibration and Shock Test

17.1 Three sample lanterns, in the metal box or rack provided and mounted as in service, shall not show evidence of structural failure, material physical weakness, loosening, or rupture of parts, after being subjected to 1 hour of vertical displacement of an amplitude of 1/16 inch (1.6 mm) at a frequency of 12 – 13 Hz.

17.2 Failure of the bulb shall not be considered as failure of the unit.

17.3 For this test, amplitude is defined as the maximum displacement of sinusoidal motion from position of rest or one-half of the total vibration table displacement.

18 Rain Test

18.1 A sample lantern, mounted in its normal operating position, and the container in its normal service position with drain holes open, shall be subjected to a precipitation of 0.1 inch (2.5 mm) of water per minute, delivered at an angle of 45 degrees from a nozzle with a solid-cone spray. During this test, the lamp shall revolve about its vertical axis at a rate of 4 rpm. This test shall be continued for 12 hours.

18.2 The lantern and container shall then be examined. An accumulation of more than 0.0169 ounce (1/2 cm^3) of water inside the lantern shall constitute a failure.

19 Dust Test

19.1 A sample unit shall be mounted in its normal operating position, at least 6 inches (152 mm) from the wall, in a box measuring 3 feet (0.9 m) in all directions, containing 10 pounds (4.5 kg) of finely powdered Portland cement in accordance with the Standard Specification for Portland Cement, ASTM C150-96. At intervals of 15 minutes, this dust is to be agitated by compressed air or fan blower by projecting blasts of air for a 2-second period in a downward direction into the dust in such a way that the dust is completely and uniformly diffused throughout the entire cube. The dust is then allowed to settle. This test shall be continued for 5 hours.

19.2 After the dust test, the exterior surface shall be cleaned, and if the maximum candlepower is within 10 percent of the maximum as compared with the condition after the unit is cleaned inside and out, it shall be considered adequately dust-tight.

20 Reliability and Life Tests

20.1 In the case of red electric warning lanterns which can be turned on or off at will, a sample unit shall be set up in complete form and operated for 1,000 cycles, using the operating unit or switch submitted with the device as a part thereof. This test shall be made at a rate not to exceed 50 times per minute. In the case of flashing units, the rate shall be slow enough to permit the unit to flash at least twice for each operation of the switch.

20.2 When this test is completed, the operating unit shall not show any evidence of physical weakness, excessive wear, or high resistance.

20.3 The lantern is to be turned on for a period of 12 hours. During this test, the ″on″ period for the flasher, if one is provided, shall be long enough at all times to permit the filament to come up to full brightness. The rate of flashing during the test shall not be more than 150 cycles per minute.

20.4 The device shall be operated in the manner intended and shall provide red light of at least the intensity prescribed below at the end of the 12 hour test, as provided in 20.3.

21 Photometric Tests

21.1 The lamps shall meet the following photometric requirements.

21.2 Directly to the front and rear of the lantern, on a horizontal line through the light source parallel to the road, the light shall have an intensity of at least 0.50 candlepower (5.4 lx).

21.3 In all directions within 10 degrees of this line there shall be at least 0.30 candlepower (3.2 lx).

21.4 In all directions within 30 degrees of this line there shall be at least 0.10 candlepower (1.1 lx).

21.5 The intensity shall not exceed 25 candlepower (268 lx) in any direction.

22 Low-Temperature Test

22.1 The device shall operate as intended at a temperature of minus 10°F (minus 23.3°C).

MARKING

23 General

23.1 Each device shall be marked with the following:

a) The manufacturer's or private labeler's identifying symbol;

b) The model, size, or style designation;

c) The shelf life of the battery; and

d) A warning to replace the battery after the expiration of the manufacturer's date.

23.2 If a manufacturer produces electric lanterns at more than one factory, each lantern shall have a distinctive marking to identify it as the product of a particular factory.

FUSEES

CONSTRUCTION

24 General

24.1 A fusee shall consist of material containing flare composition and an integral means for effecting ignition by friction. The assembly shall be in the tubular form.

24.2 A fusee shall be identifiable by its standard burning time. The standard burning time shall be given in minutes and be one of the following:

5 minutes
10 minutes
15 minutes
20 minutes
30 minutes

24.3 A fusee shall burn with a red flame. The tube shall be colored red to indicate its burning color.

24.4 A fusee having a nominal burning time of 5 minutes shall not exceed a 9-inch (229-mm) overall length and a 1-1/8-inch (29-mm) diameter exclusive of a handle. A fusee having a nominal burning time of 10 minutes shall not exceed a 14-inch (356-mm) overall length and a 1-1/8-inch (29-mm) diameter.

25 Heads and Caps

25.1 The head of a fusee shall be protected by a removable cap not less than 1-3/4 inches (44.5 mm) long. The head composition shall not completely cover the end of the fusee and shall be protected from moisture by a waterproof coating. The entire rim of the head shall be free from ignition compound.

25.2 The cap shall be constructed so that after detachment it forms a device for lighting the ignition composition by friction. The ignition composition and the scratch surface shall be protected against accidental exposure and ignition.

25.3 The cap shall be constructed to prevent the inner surface of the cap from contacting the head. The cap shall be fastened to the body of the fusee to prevent unintentional detachment.

25.4 A cap and its fastenings shall not cover or obscure any of the marking requirements included in Marking, General, Section 35.

26 Chemical Compositions

26.1 A flare color composition containing sulphur shall not contain any amount of a chlorate in excess of 0.5 percent.

26.2 A fusee containing any amount of chlorate shall not contain ammonium salts.

26.3 A fusee deemed not to have potassium perchlorate contained therein shall not contain potassium perchlorate as an additive in either the fuse composition or the ignition composition.

PERFORMANCE

27 Strength Test

27.1 A complete fusee shall withstand without breaking or rupture a weight of 80 pounds (352 N) applied at the center of a 6-inch (152-mm) horizontal span of the fusee, or a weight of 120 pounds (528 N) so applied over a 4-inch (102-mm) horizontal span, for a period of 5 minutes.

27.2 In conducting the test the fusee is to be horizontally supported by two flat bearing surfaces 1/4 inch (6.4 mm) wide with the clear distance between the supports maintained as specified in 27.1. The appropriate load is to be applied at the center of the span using a wire loop bearing on the center of a 1 inch (25 mm) wide half-ring section of rigid metallic tubing having an inside diameter of 1-1/4 inches (32 mm).

27.3 The 4-inch (102-mm) span is to only be used for testing those fusees having a length incapable of accommodating the 6-inch (152-mm) span.

28 Striking Test

28.1 The ignition or head composition of a fusee shall withstand the application of the effort necessary to effect ignition without breaking or becoming detached in whole or in significant part from the fusee.

28.2 At least two fusees of each size or rating are to be exposed to the test for striking.

29 Water Immersion Test

29.1 The ignition compound, as provided on a fusee, shall withstand immersion in water at a temperature of 70°F (21.1°C) for a period of 10 minutes without impairing the efficiency of accomplishing full and prompt ignition in the usual manner.

29.2 This test is to be performed using at least one sample of each size fusee both with the cap in place and removed. The body of the test sample is to be immersed horizontally so that the upper portion is maintained at a depth of 2 inches (51 mm) below the water surface. At the end of the submergence period, excess water shall be removed from the striking surface of any cap used, and in all cases from the ignition mix, by wiping or other means.