UL 783

STANDARD FOR SAFETY

Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations

UL Standard for Safety for Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations, UL 783

Sixth Edition, Dated April 28, 2003

Summary of Topics

This revision of ANSI/UL 783 dated November 20, 2020 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

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 requirements are substantially in accordance with Proposal(s) on this subject dated September 4, 2020.

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UL 783

Standard for Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations

The first through fourth editions were titled "Electric Flashlights and Lanterns for Use in Hazardous Locations, Class I, Groups C and D."

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This ANSI/UL Standard for Safety consists of the Sixth Edition including revisions through November 20, 2020.

The most recent designation of ANSI/UL 783 as a Reaffirmed American National Standard (ANS) occurred on October 26, 2020 ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 783 on December 13, 1983. 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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PART 1 – GENERAL REQUIREMENTS

INTRODUCTION

1 Scope

1.1 These requirements cover battery-operated flashlights and lanterns for use in hazardous locations, Class I, Division 1, Groups A, B, C and D; Class I, Division 2, Groups A, B, C, and D; Class II, Division 1, Groups F and G; and Class II, Division 2, Groups F and G as defined in the National Electrical Code, NFPA 70.

1.2 These requirements apply to complete products with self-contained batteries, and include products consisting of a battery pack assembly and light assembly with interconnecting flexible cord.

1.3 These requirements do not cover flashlights and lanterns of the explosion-proof type or other type of construction providing protection against ignition of flammable gas- or vapor-air atmospheres. Flashlights and lanterns that are intrinsically safe for Class I, Division 1 are covered by the Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations, UL 913. Flashlights designed for Zones 0, 1, and 2 are covered by the Standards for Electrical Apparatus for Explosive Gas Atmospheres, UL 60079 series.

1.4 These requirements cover equipment for use under the following atmospheric conditions:

a) A minimum ambient temperature of minus 25°C (minus 13°F);

b) An oxygen concentration not greater than 21 percent by volume; and

c) A nominal barometric pressure of one atmosphere.

2 General

2.1 Flashlights or lanterns for Division 1 that employ a lamp disconnect mechanism must meet the requirements in Part II of this standard.

2.2 Flashlights or lanterns for Division 1 that do not employ a lamp disconnect mechanism must meet the requirements in Part III of this standard.

2.3 Flashlights or lanterns for Division 2 must meet the requirements in Part IV of this standard.

2.4 A flashlight or lantern for Class II, Division 1 locations shall also comply with the requirements for Class I, Division 1, Group D.

2.5 If a flashlight or a lantern is intended for use with different types of batteries, such as with carbon-zinc or alkaline types, tests shall be conducted using each type of battery, unless tests on a specific battery type can be considered representative of all other battery types.

2.6 If a flashlight or a lantern is intended for use with different types of bulbs, tests shall be conducted using each type of bulb, unless tests on a specific bulb type can be considered representative of all other bulb types.

2.7 Electrical components other than batteries, lamps and switches used in the construction of a flashlight or lantern shall be provided with additional explosion protection suitable for the application.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 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.

5 Class I, Zone, and Group Equivalency

5.1 Class I, Zone 1, Group IIA

5.1.1 Electrical equipment intended to be marked in accordance with 11.2 shall comply with all the requirements of this standard for flashlights and lanterns for use in Class I, Division 1, Group D hazardous (classified) locations.

5.2 Class I, Zone 1, Group IIB

5.2.1 Electrical equipment intended to be marked in accordance with 11.3 shall comply with all the requirements of this standard for flashlights and lanterns for use in Class I, Division 1, Group C hazardous (classified) locations.

5.3 Class I, Zone 1, Group IIC

5.3.1 Electrical equipment intended to be marked in accordance with 11.4 shall comply with all the requirements of this standard for flashlights and lanterns for use in Class I, Division 1, Groups A and B hazardous (classified) locations.

5.4 Class I, Zone 2, Group IIA

5.4.1 Electrical equipment intended to be marked in accordance with 11.5 shall comply with all the requirements of this standard for flashlights and lanterns for use in Class I, Division 2, Group D hazardous (classified) locations.

5.5 Class I, Zone 2, Group IIB

5.5.1 Electrical equipment intended to be marked in accordance with 11.6 shall comply with all the requirements of this standard for flashlights and lanterns for use in Class I, Division 2, Group C hazardous (classified) locations.

5.6 Class I, Zone 2, Group IIC

5.6.1 Electrical equipment intended to be marked in accordance with 11.7 shall comply with all the requirements of this standard for flashlights and lanterns for use in Class I, Division 2, Groups A and B hazardous (classified) locations.

6 Definitions

6.1 LAMP – A source of visible light. Examples include incandescent lamps, LEDs (light-emitting diodes) and clusters of LEDs.

6.2 LAMP DISCONNECT MECHANISM – A mechanism that disconnects an incandescent lamp from its supply circuit and prevents the ignition of a specified surrounding flammable gas or vapor-air atmosphere when the glass bulb surrounding the lamp filament is broken.

6.3 PRIMARY BATTERY – A battery that can be discharged only once. It is not designed to be rechargeable.

6.4 SECONDARY BATTERY – A battery that is intended to be discharged and recharged multiple times.

6.5 NONINCENDIVE CIRCUIT – A circuit, other than field wiring, in which any arc of thermal effect produced under intended operating conditions of the equipment is not capable, under specified test conditions, of igniting the flammable gas-air, vapor-air, or dust-air mixture.

6.6 MAXIMUM SERVICE TEMPERATURE – The highest temperature reached on a specified component of the device under normal operating conditions.

6.7 PROTECTIVE COMPONENT OR ASSEMBLY– A component or assembly that is so unlikely to become defective in a manner that will lower the ignition safety of the circuit that it may be considered not subject to fault when analysis or tests for ignition safety are conducted.

CONSTRUCTION

7 Enclosure

7.1 Except as noted in 7.2, exposed external surfaces of the enclosure and parts shall be made of nonsparking material such as brass, aluminum or polymeric materials unless the part is protected by a recess or by a guard.

7.2 An exposed external surface of an enclosure or part may be of a sparking material if an investigation indicates that percussion sparks capable of igniting a flammable atmosphere are unlikely.

7.3 Polymeric materials used in the construction of an enclosure or part of an enclosure shall possess sufficient strength, rigidity and properties as to be suitable for the application.

8 Protection Against Corrosion

8.1 All metallic parts of a flashlight or lantern shall be:

a) Made of corrosion-resistant material such as aluminum, brass, or stainless steel, or

b) Made of ferrous metals other than stainless steel protected against corrosion by, for example, zinc or cadmium coating, plating, enameling, painting, varnishing or lacquering.

9 Cells and Batteries

9.1 Battery cells shall be of a type from which there can be no spilling of electrolyte or shall be enclosed to prevent contact between the electrolyte and circuits and components where safety can be affected.

9.2 The flashlight or lantern shall be constructed to prevent shorting between internal cells, unless the shorting does not result in an ignition source.

9.3 Where primary batteries are used in tests, fresh cells shall be used.

9.4 Where secondary batteries are used in tests, the cells shall first be charged and discharged at least twice before any tests are carried out. On the second or subsequent discharge, the capacity of each cell shall be confirmed as being within the manufacturer's specification to ensure that tests can be carried out using fully charged cells.

9.5 For the purpose of evaluation and test, the battery voltage shall be that obtained per 38.1.

9.6 For the purpose of evaluation and test, the battery short-circuit current shall be that obtained per 38.2.

9.7 A compartment containing secondary batteries shall not be sealed in such a manner as to prevent the dissipation of hydrogen gas. Any compartment joint that is not tightly closed and gasketed (or similarly sealed) is considered sufficient for the dissipation of hydrogen gas.

9.8 Flashlights and lanterns provided with external contacts for charging batteries must be constructed such that an ignition source does not exist when the shorting of the contacts is considered. Where protective components are used to meet this requirement, 2.7 applies.

10 Internal Conductors

10.1 Internal conductors shall have sufficient ampacity as to be suitable for the application.

MARKING

11 Details

11.1 Each product shall be marked with the following:

a) The name or trademark of the manufacturer or other organization that is responsible for the product.

b) A distinctive catalog designation to specifically identify the product.

c) The maximum ambient temperature rating, when other than 40° C (104° F), or the minimum ambient temperature when less than minus 25°C (minus 13°F), or both.

d) Designation of the hazardous location in which the product is intended to be used; for example, "Class ___, Division___, Group ___."

e) The designation of any replacable lamp to be used; for example, "Use type ___ lamp (or bulb) only " or equivalent. This marking may be located on the reflector if readily visible when the lamp is being replaced.

f) The number, type, size, and voltage of batteries to be employed.

g) The word "WARNING " and the following or equivalent statement: "Risk of ignition – Do not open in a hazardous area."

h) Rechargeable flashlights or lanterns should be marked with the word "WARNING " and the following or equivalent statement: "Risk of ignition – Do not charge batteries in a hazardous area."

i) Maximum operating temperature or operating temperature class as specified in Table 11.1, when the operating temperature exceeds 100°C (212°F). This marking shall be based on the maximum temperature obtained in the temperature tests. The operating temperature or temperature class shall be near the marking required by (d). It shall be identified as "Operating Temperature _____," or "Operating Temperature Class _____," or the equivalent.

Table 11.1
Temperature marking

Maximum operating temperature		Operating temperature code or identification number
°C	°F	
450	842	T1
300	572	T2
280	536	T2A
260	500	T2B
230	446	T2C
215	419	T2D
200	392	T3
180	356	T3A
165	329	T3B
160	320	T3C
135	275	T4
120	248	T4A
100	212	T5
85	185	T6

11.2 In addition to the marking requirement in 11.1(d), equipment that has been investigated and found to comply with the requirements for Class I, Division 1, Group D locations may additionally be marked Class I, Zone 1, Group IIA.

11.3 In addition to the marking requirement in 11.1(d), equipment that has been investigated and found to comply with the requirements for Class I, Division 1, Group C locations may additionally be marked Class I, Zone 1, Group IIB.

11.4 In addition to the marking requirement in 11.1(d), equipment that has been investigated and found to comply with the requirements for Class I, Division 1, Groups A and B locations may additionally be marked Class I, Zone 1, Group IIC.

11.5 In addition to the marking requirement in 11.1(d), equipment that has been investigated and found to comply with the requirements for Class I, Division 2, Group D locations may additionally be marked Class I, Zone 2, Group IIA.

11.6 In addition to the marking requirement in 11.1(d), equipment that has been investigated and found to comply with the requirements for Class I, Division 2, Group C locations may additionally be marked Class I, Zone 2, Group IIB.

11.7 In addition to the marking requirement in 11.1(d), equipment that has been investigated and found to comply with the requirements for Class I, Division 2, Groups A and B locations may additionally be marked Class I, Zone 2, Group IIC.

11.8 All markings shall be permanent, legible, and prominent, and shall be located on the outside of the product except as noted in 11.1(e).

11.9 A marking for a flashlight or lantern for Division 1 shall be molded, die-stamped, paint-stenciled, stamped or etched metal that is permanently secured, indelibly stamped lettering, or shall be a nonmetallic pressure-sensitive label which complies with the applicable sections of the Standard for Marking and Labeling Systems, UL 969, for Division 1 hazardous (classified) locations. Ordinary usage, handling, and

the like, of the product, and the flammable gas- or vapor-air atmospheres in which the product is intended to be used, shall be considered in the determination of the permanency of the marking.

11.10 A marking for a flashlight or lantern for Division 2 shall meet the requirements in 11.9 or shall be a nonmetallic pressure-sensitive label which complies with the applicable sections of the Standard for Marking and Labeling Systems, UL 969.

11.11 If a manufacturer produces flashlights or lanterns at more than one factory, each such product shall have a distinctive marking to identify it as the product of a particular factory.

11.12 A flashlight containing three or more size D batteries that is intended for a Class I, Group C location shall be marked with the word "CAUTION" and the following or the equivalent: "Risk of explosion – Use only carbon/zinc batteries."

11.13 The maximum-operating temperature or temperature code shall be in an individual block on the nameplate and shall be properly identified; for example, "Operating temperature _____", or "Operating Temperature Class _____", or the equivalent.

PART II – DIVISION 1 FLASHLIGHTS WITH LAMP DISCONNECT MECHANISMS – SPECIFIC REQUIREMENTS

CONSTRUCTION

12 Filament Disconnect Mechanism

12.1 The lamp compartment shall be provided with a filament disconnect mechanism that shall disconnect the lamp bulb from the circuit and prevent the ignition of specified surrounding flammable gas or vapor-air atmospheres when the glass bulb surrounding the lamp filament is broken. The lamp filament disconnect mechanism shall be actuated by a reliable means, such as by compression spring action. Where it is necessary to use nonmetallic components in the lamp filament disconnect mechanism, they shall be made of a material that has been investigated for acceptability at the operating temperatures and in the hazardous atmospheres in which the product is intended to be used.

12.2 If the construction of the product is such that the lamp filament disconnect mechanism depends upon the physical movement of the batteries away from contact with the bulb, consideration shall be given to the possible effects caused by degradation of the battery, such as swelling or leaking.

12.3 Among the factors that shall be taken into consideration when judging the acceptability of a nonmetallic material for compliance with the requirements in 12.1 are resistance to:

a) Mechanical damage;

b) Impact;

c) Moisture absorption;

d) Combustion;

e) Solvents as covered by the hazardous location group classification; and

f) Distortion at temperatures to which the material may be subjected under conditions of normal or abnormal use. All of these factors shall be considered with respect to thermal aging. Also, see Nonmetallic Filament-Disconnect Mechanism, 16.1.

PERFORMANCE

13 Lamp Bulb Breakage Tests

13.1 A flashlight or lantern with a lamp disconnect mechanism that is for use in Division 1 shall be subjected to the Lamp Bulb Breakage Test described in Section 27.

14 Spark Ignition Test

14.1 A flashlight or lantern with a lamp disconnect mechanism that is for use in Division 1 shall be subjected to the Spark Ignition Test described in Section 28. The test shall be performed using the maximum battery voltage as per 9.5, and the maximum battery short-circuit current as per 9.6 with the tests factor in 28.1.2 applied.

15 Temperature Tests

15.1 A flashlight or lantern with a lamp disconnect mechanism that is for use in Class I, Division 1 shall be subjected to the Temperature Test described in Section 30. The marked temperature class as per 11.1(i) shall be determined by the maximum temperature obtained on any part of the flashlight or lantern, including the lamp.

15.2 A flashlight or lantern with a lamp disconnect mechanism that is for use in Class II, Division 1 shall be subjected to the Grain Dust Temperature Test described in Section 31. The marked temperature class as per 11.1(i) shall be determined by the maximum temperature obtained on any part of the flashlight or lantern, including the lamp, taking into account 15.3.

15.3 A flashlight or lantern for use in Class II, Division 1 shall not have any part exceed a temperature of 165°C (329°F).

16 Test on Nonmetallic Filament Disconnect Mechanism

16.1 A flashlight or lantern with a non-metallic lamp disconnect mechanism that is for use in Division 1 shall be subjected to the Test on Nonmetallic Filament Disconnect Mechanism described in Section 29.

Exception: A filament disconnect mechanism having nonmetallic components made of only a phenolic material (phenol-formaldehyde resin) need not be tested.

17 Drop Test

17.1 A flashlight or lantern with a lamp disconnect mechanism that is for use in Division 1 shall be subjected to the 3-Foot Drop Test described in Section 33.

PART III – DIVISION 1 FLASHLIGHTS WITHOUT LAMP DISCONNECT MECHANISMS – SPECIFIC REQUIREMENTS

CONSTRUCTION

18 General

18.1 A Division 1 flashlight or lantern that does not contain a mechanism as described in Section 12, Filament Disconnect Mechanism, shall meet the requirements in Sections 19 – 21.

PERFORMANCE

19 Spark-Ignition Test

19.1 A flashlight or lantern without a lamp disconnect mechanism that is for use in Division 1 shall be subjected to the Spark Ignition Test described in Section 28. The test shall be performed using the maximum battery voltage as per 9.5, and the maximum battery short-circuit current as per 9.6 with the tests factor in 28.1.2 applied.

20 Temperature Tests

20.1 A flashlight or lantern without a lamp disconnect mechanism that is for use in Class I, Division 1 shall be subjected to the Temperature Test described in Section 30. The marked temperature class as per 11.1(i) shall be determined by the maximum temperature obtained on any part of the flashlight or lantern, including the lamp.

20.2 A flashlight or lantern without a lamp disconnect mechanism that is for use in Class II, Division 1 shall be subjected to the Grain Dust Temperature Test described in Section 31. The marked temperature class as per 11.1(i) shall be determined by the maximum temperature obtained on any part of the flashlight or lantern, including the lamp, taking into account 21.3.

20.3 A flashlight or lantern for use in Class II, Division 1 shall not have any part exceed a temperature of 165°C (329°F).

21 Mechanical Tests

21.1 General

21.1.1 A flashlight or lantern without a lamp disconnect mechanism that is for use in Division 1 shall be subjected to the mechanical tests described in 21.2 and 21.3.

21.2 Impact Test

21.2.1 A flashlight or lantern without a lamp disconnect mechanism that is for use in Division 1 shall be subjected to the Impact Test as described in Section 34, taking into account 21.2.2, where applicable.

21.2.2 Where portions of the external construction that provide protection for the lamp of a flashlight or lantern in accordance with 21.1.1 are made of polymeric materials, the samples used for the test indicated in 21.2.1 shall first be evaluated for thermal endurance. The samples shall first be subjected to the test of Thermal Endurance to Heat as described in Section 35. Immediately following, while the samples are still at the temperature required by Section 35, they shall then be subjected an Impact Test as described in Section 34. The same samples shall then be subjected to the test of Thermal Endurance to Cold, Section 36. Immediately following, while the samples are still at the temperature required by Section 36, they shall again be subjected to an Impact Test as described in Section 34.

21.3 30-Foot Drop Test

21.3.1 A flashlight or lantern without a lamp disconnect mechanism that is for use in Division 1 shall be subjected to the 30-Foot Drop Test as described in Section 32.

21.3.2 Where portions of the external construction that provide protection for the lamp of a flashlight or lantern in accordance with 21.1.1 are made of polymeric materials, the samples used for the test indicated in 21.3.1 shall first be evaluated for thermal endurance. The samples shall first be subjected to the test of

Thermal Endurance to Heat as described in Section 34, then to the test for Thermal Endurance to Cold as described in Section 36. The samples shall then be allowed to return to room ambient temperature, after which they shall be subjected to the 30-Foot Drop Test as described in Section 32.

PART IV – FLASHLIGHTS AND LANTERNS FOR USE IN DIVISION 2 LOCATIONS – SPECIFIC REQUIREMENTS

CONSTRUCTION

22 General

22.1 A flashlight or lantern for Division 2 shall meet the requirements in Sections 23 – 26.

PERFORMANCE

23 Spark-Ignition Test

23.1 A flashlight or lantern for use in Class I, Division 2 shall be subjected to the Spark-Ignition Test described in Section 28. The test factor in 28.1.2 does not apply.

23.2 The spark-test apparatus shall be inserted in the circuit under test at each point where an interruption normally occurs.

24 Temperature Test

24.1 A flashlight or lantern for use in Class I, Division 2 shall be subjected to the Temperature Test described in Section 30. The marked temperature class as per 11.1 (i) shall be determined by the maximum temperature obtained on any part of the flashlight or lantern, including the lamp.

24.2 A flashlight or lantern for use in Class II, Division 2 shall be subjected to the Temperature Test described in Section 30. The marked temperature class as per 11.1 (i) shall be determined by the maximum temperature obtained on any external part of the flashlight or lantern, taking into account 24.3.

24.3 A flashlight or lantern for use in Class II, Division 2, Groups F and G shall not have any external part exceed a temperature of 165°C (329°F).

25 Drop Test

25.1 A flashlight or lantern for use in Division 2 shall be subjected to the 3-Foot Drop Test described in Section 33.

26 Dust-Tight Enclosure Test

26.1 A flashlight or lantern for use for Class II, Division 2 shall be subjected to the Dust-Tight Enclosure Test described in Section 37. No water shall enter the enclosure during the test.

PART V – PERFORMANCE

TESTS

27 Lamp Bulb Breakage Test

27.1 A flashlight or lantern utilizing a disconnect mechanism shall be subjected to the tests described in 27.2 – 27.6. The heated filament of the lamp bulb shall not ignite the surrounding flammable mixture during the tests.

27.2 At least ten tests shall be conducted using the flammable mixtures specified in 27.3.

27.3 The flammable gas- or vapor-air mixtures to be used for tests are as follows:

a) For Group D, propane in mixture with air, 5.25 ±0.25 percent by volume.

b) For Group C, and for equipment for both Groups C and D, ethylene in mixture with air, 7.8 ±0.5 percent by volume.

c) For Groups A and B, and for equipment for Groups A, B, C and D, hydrogen in mixture with air, 21.0 ±2.0 percent by volume.

27.4 The flashlight or lantern with new (fresh) or fully charged batteries shall be installed in a test chamber. As an alternative, the flashlight or lantern may be connected to a power supply that has characteristics equivalent to new (fresh) or fully charged batteries. The test chamber shall be provided with gas inlet and outlet connections to the pipelines carrying the flammable mixture. For test purposes, appropriate openings shall be made in the sample product to permit the flammable mixture to flow readily around the lamp bulb and the filament disconnect mechanism. The flammable mixtures shall be prepared by suitable auxiliary equipment capable of preparing and maintaining predetermined concentrations of the mixtures.

27.5 Apparatus shall be provided in the test chamber for breaking the glass envelope of the lamp bulb either by a sharp blow or by pinching or squeezing the sides of the glass envelope. The apparatus shall be constructed so that it does not damage the lamp bulb filament when breaking the surrounding glass bulb. The lens of the flashlight or lantern may be omitted or may be cut away to accommodate the breaking means.

27.6 The flammable mixture is to flow through the casing of the product and into the surrounding test chamber until the original air has been displaced. Samples shall be taken and analyzed to verify the flammable mixture present. The lamp is then to be lighted by the intended battery supply provided for the product and the glass envelope of the lamp bulb shall be broken by operating the lamp-bulb-breakage apparatus.

28 Spark-Ignition Tests

28.1 General

28.1.1 All circuits requiring spark ignition testing shall be tested to ensure that they are incapable of causing ignition under the conditions specified in this standard, taking into account the appropriate gas group or groups.

28.1.2 When conducting tests which require the application of a test factor, a factor of 1.5 shall be applied to the current by one of the following methods or its equivalent:

a) The battery short-current value shall be simulated with a suitable power supply, and this value increased so that the current level is increased by a factor of 1.5.

b) The intended batteries shall be used, two in parallel for double current, yielding an energy factor greater than 1.5.

28.1.3 Specialized test apparatus as described in 28.2 shall be used rather than the contacts used in the field. The test apparatus contacts shall be operated in a chamber filled with the most readily ignited mixture of the test gas with air as determined by verification in accordance with 28.3 and 28.4.

28.1.4 Each circuit shall be tested for the following number of revolutions of the tungsten wire holder in the spark test apparatus:

a) For circuits that utilize a power supply, a trial at 400 revolutions, 200 revolutions for each polarity, shall be performed.

b) For circuits that utilize batteries, four trials with fresh or fully charged batteries, two for each polarity, shall be performed. Each trial shall be 100 revolutions.

28.2 Test Apparatus

28.2.1 The spark test apparatus is to consist of an explosion chamber of about 250 cubic centimeters (15.25 cubic inches) volume, in which circuit-making-and-breaking sparks can be produced in the presence of the prescribed test mixture.

28.2.2 The spark-test apparatus to be used is described in the Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1 Hazardous (Classified) Locations, UL 913.

28.3 Gas Mixtures

28.3.1 The purity of commercially available gases and vapors is normally adequate for these tests, but those of a purity less than 95 percent should not be used. The effect of normal variations in laboratory temperature and pressure and of the humidity of the air in the gas mixture is also likely to be small. Any significant effects of these variables will become apparent during the routine verification of the spark test apparatus.

28.3.2 For Group D, the test mixture shall be 5.25 ±0.25 percent propane in air.

28.3.3 For Group C, the test mixture shall be 7.8 ±0.5 percent ethylene in air.

28.3.4 For Groups A and B, the test mixture shall be 21.0 ±2.0 percent hydrogen in air.

28.3.5 Apparatus that is intended for use in a particular gas or vapor and that will be marked accordingly shall be tested in the most easily ignited concentration of that gas or vapor in air.

28.4 Verification of Spark Test Apparatus

28.4.1 The sensitivity of the spark-test apparatus shall be checked before and after each test series in accordance with 28.4.2 and 28.4.3. The test apparatus shall be operated in one of two verification circuits, a 24-volt d-c inductive circuit containing a 0.095 henry air-core coil or a 24-volt d-c resistive circuit (inductance less than 10 μH). The current in the verification circuits shall be set at the value specified for the appropriate test mixture in Table 28.1, and the spark apparatus is to comply with the "must ignite" specifications in the table.