UL 153

STANDARD FOR SAFETY

Portable Electric Luminaires

UL Standard for Safety for Portable Electric Luminaires, UL 153

Thirteenth Edition, Dated March 3, 2014

Summary of Topics

These revisions to ANSI/UL 153 dated April 3, 2024 includes the following changes in requirements:

– Clarification on power supply for portable luminaires with USB/POE connections; 8.2, 8.2.1, 199.1

– Removal of maximum number of convenience receptacle used in portable luminaires; 1.4, 26.4, 44.2

– Portable luminaires use with LED light source only; 48.1, 144.6.4, 144.11A, 204.3

– Clarification of power supply cord size, maximum receptacle load and marking for portable work lights and portable hand lights; 127.1.5, 127.3.2, 138.5.3, 138.5.4, 138.9.3

– Editorial revisions; 25.2, Battery Tests being put into its own section, 197.2, Appendix A

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 new and revised requirements are substantially in accordance with Proposal(s) on this subject dated November 3, 2023 and February 16, 2024.

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Comments or proposals for revisions on any part of the Standard may be submitted to ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover portable luminaires and subassemblies whose primary function is task or ambient illumination. These products are intended for use in accordance with the National Electrical Code, ANSI/NFPA 70.

1.2 These requirements cover portable luminaires intended for connection to a nominal 120-volt, 15- or 20-ampere branch circuit, by means of an attachment plug, a mating connector assembly, or a non-integral power supply.

1.2.1 These requirements also cover portable luminaires intended to receive power through a USB connection, or power over ethernet (POE) using category 5 (CAT5) or similar cables and 8P8C (RJ45) connectors. These portable luminaires do not include and need not be marked to specify their power source.

1.2.2 The requirements in Supplement SA also cover battery-operated portable luminaire intended to be used while disconnected from any external power source.

1.3 Light emitting diode (LED) components and subassemblies integral to a portable luminaire covered by this standard shall comply with the applicable requirements of the Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products, UL 8750.

1.4 These requirements do not cover portable luminaires within the scope of the following standards:

Standard for Electric Signs, UL 48

Standard for Portable Sun/Heat Lamps, UL 482

Standard for Seasonal and Holiday Decorative Products, UL 588[a]

Standard for Luminaires for Use in Hazardous (Classified) Locations, UL 844

Standard for Household and Commercial Furnishings, UL 962[b]

Standard for Electric Aquarium Equipment, UL 1018

Standard for Temporary Lighting Strings, UL 1088

Standard for Relocatable Power Taps, UL 1363[c]

Standard for Flashlights, UL 1576

Standard for Direct Plug-In Nightlights, UL 1786

Standard for Rope Lights, UL 2388

Standard for Horticultural Luminaire Systems, UL 8800

Standard for Portable UV Germicidal Equipment With Uncontained UV Sources, UL 8803

[a] UL 588 and UL 153 can be used for string lights for all-year use that use 18 AWG and larger cord sizes. UL 588 is the only applicable Standard for String lights for all-year use and lighting strings employing cords smaller than 18 AWG. All other seasonal and holiday decorative products, regardless of the size of the cord, are only covered under the scope of UL 588.

[b] UL 962 applies where furnishings have integral illumination intended for aesthetic purposes and with only a modest contribution to ambient illumination levels.

[c] UL 1363 applies for relocatable power taps where illumination is a secondary function of the device.

1.5 Work lights and portable hand lights that include primary or secondary battery packs are within the scope of the Standard for Flashlights and Lanterns, UL 1576.

2 Glossary

2.1 For the purpose of these requirements the following definitions apply.

2.2 ADAPTER – A component of a lighting assembly intended to mate with a base and provide mechanical attachment and electrical connection for interchangeable lighting assemblies.

2.3 ADAPTER FOR TRACK STYLE UNIT – A component of a lighting assembly intended to mate with a track and provide mechanical securement and electrical connection for track-style type units.

2.4 BALLAST – A current limiting device required to start and operate fluorescent lamps.

2.5 BASE – A weighted free standing or wall-mounted, cord-connected support that provides the electrical supply to one or more replaceable or interchangeable lighting assemblies.

2.5.1 BATTERY CELL – The basic manufactured unit of a battery. Provides electrical energy by direct conversion of chemical energy and designed to be charged electrically. Consists of electrodes, separators, electrolyte, container and terminals.

2.6 BATTERY, PRIMARY – A battery that can only be discharged once, not designed to be electrically recharged.

2.7 BATTERY, SECONDARY – A battery intended to be charged and discharged multiple times under prescribed rates of charging and discharging in accordance with the battery manufacturer's recommendations.

2.8 BULB (LAMP) – See 2.25.

2.9 CLASS 2 CIRCUIT – A circuit supplied by an isolating source whose electrical output complies with the requirements of the Standard for Class 2 Power Units, UL 1310, the LPS (limited power source) parameters of the Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1 or the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1, the LVLE (low voltage limited energy) parameters of the Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products, UL 8750, or the Limited Power Source Test of the Standard for Household and Commercial Batteries, UL 2054. Also includes POE and USB power sources.

2.10 CLEARANCE DISTANCE – The shortest distance measured through air between conductive parts.

2.11 COMBUSTION – Burning; or a chemical process (as an oxidation) accompanied by the evolution of light and heat. Examples of combustion are any blackening or disintegration, glowing, flaming or charring of any material or test indicators such as tissue paper, cheesecloth or wood.

2.12 COMPACT FLUORESCENT LAMP – A fluorescent lamp that is formed such that both ends fit into a support that is inserted into a single lampholder.

2.12.1 CONVENIENCE RECEPTACLE – A 15- or 20-amp receptacle suitable for a NEMA-style plug (see 32.1) without a dedicated or defined load and intended for only occasional use. It may be integral with the portable luminaire body or at the end of an attached load-side cord. Load-side connectors or receptacles specifically for interconnected units (per Section 33) are not considered convenience receptacles, regardless of their configuration.

2.13 CONVERTIBLE UNIT – A portable luminaire provided with instructions and a kit that converts the portable luminaire to a fixed luminaire (lighting fixture).

2.14 DECORATIVE PART – A part whose total or partial destruction does not affect intended performance of the portable luminaire.

2.15 DOUBLE INSULATION – An insulation system comprised of basic and supplementary insulation, with the two insulations physically separated and arranged so that they are not simultaneously subjected to the same deteriorating influences (temperature, contaminants, and the like) to the same degree. Each insulation layer (basic and supplementary) is individually able to comply with the spacings and dielectric voltage withstand requirements of this standard.

2.16 END CAP – A cover intended to close the open end of a track.

2.17 EXPOSED PART – A part that is not enclosed to prevent contact.

2.17.1 FREESTANDING PORTABLE LUMINAIRE – A portable luminaire designed to be stable and intended to be operated unattended while on a horizontal surface (e.g., table or floor).

2.18 FRICTION MATERIAL – Rubber or elastomer with or without dimples or ridges. Plastic or metal with or without dimples or ridges is not determined to be a friction material.

2.19 GUARD – That portion of the portable luminaire that prevents inadvertent contact with the lamp. Is able to be integral with the shield.

2.20 HOUSED PART – A part that is prevented from being contacted by a housing that does not meet the requirements for enclosing live parts.

2.20.1 HYGROSCOPIC – A material, including those identified as deliquescent, that absorbs atmospheric moisture at normal room temperatures. Examples include salts of various types, including calcium chloride, magnesium chloride, potassium carbonate, and others.

2.21 INTERCONNECTED UNIT – A luminaire designed to receive and/or provide power to or from another luminaire through a series connection.

2.22 INTERCONNECTING CORD – A conductor running between two luminaires.

2.23 INTERLOCK SWITCH – A switch that de-energizes the lamps when the portable luminaire is opened or when the lamp is replaced.

2.24 ISOLATED SECONDARY CIRCUIT – A circuit derived from an isolated secondary winding of a transformer and that has no direct connection back to the line-connected circuit (other than through grounding means). A secondary circuit that has a direct connection back to the line-connected circuit is determined to be part of the line-connected circuit.

2.25 LAMP – A light source of any configuration (e.g., bulb, tube, LED array or module, etc.), replaceable or not, intended to illuminate the environment where the portable luminaire is located.

2.26 LAMP ADAPTER – A self-ballasted lamp with a replaceable light source.

2.27 LAMP, SELF-BALLASTED – A device provided with a lamp base and incorporating a non-replaceable light source and any additional elements necessary for starting and stabilizing operation of the light source, which cannot be dismantled without being permanently damaged. May be identified as "SBCFL" when the light source is fluorescent or "SBLED" when the light source is LED.

2.28 LAMP CONTAINMENT BARRIER – Any part of a portable luminaire that encloses the lamp.

2.29 LIGHTING ASSEMBLY, INTERCHANGEABLE – An assembly consisting of a lighting unit and an adapter. One or more lighting assemblies is used with a base to make up the portable luminaire for interchangeable lighting assemblies.

2.30 LIGHTING ASSEMBLY, TRACK-STYLE – An assembly consisting of a lighting unit and an adapter. One or more lighting assemblies is used with a track to make up the track-style type unit.

2.31 LIGHTING UNIT, INTERCHANGEABLE – An assembly that includes a lamp enclosure or lamp compartment and any components and parts required for connecting the lamp compartment or enclosure to the adapter for interchangeable lighting assemblies.

2.32 LIGHTING UNIT, TRACK-STYLE – An assembly that includes a lamp enclosure or lamp compartment and any components and parts required for connecting the lamp compartment to the adapter for the track-style type units.

2.33 LINE OF SIGHT – A straight, unbroken, unobstructed, direct line between the eye and an object (for example, the lamp).

2.34 LIVE PART – A metal or other conductive part that has a potential difference during operation with respect to ground or any other conductive part.

2.35 LOW-VOLTAGE CIRCUIT – A circuit involving an open circuit potential within the levels permitted for a Class 2 circuit.

2.36 MANUFACTURER – The organization responsible for producing or distributing the product.

2.37 NORMAL MAINTENANCE AND USE – The cleaning, adjusting, moving, maintaining, and using of the portable luminaire. Includes items such as:

a) Replacing a lamp, starter or fuse;

b) Adjusting an illumination level; and

c) Removal or cleaning of all parts not secured by use of tools.

2.38 ORDINARY TOOL – A tool, such as a flat-blade or cross-head screwdriver, a nut driver, or pliers.

2.38.1 PLANT LUMINAIRE – A portable luminaire with an integral platform or container onto (or into) which a living plant is to be located, primarily for decorative purposes. There is no specific size limitation for a plant luminaire. Luminaires intended to grow plants, vegetables, or herbs on a commercial scale are better identified as "horticultural luminaires" and are not within the scope of this standard.

2.39 PLAY VALUE – A characteristic of products with features that promote a child's interactive exploration and use a child's imagination and ability to pretend to create enjoyable play and incorporates a child's interest to encourage repeat play. Such features may include interactive characteristics similar to those of familiar toys (i.e., stuffed animals, model vehicles with moving parts, buildings, sports equipment, cartoon characters, playhouses, or a “busy box” with lights, sliding or rotating features, or manually actuated music, and similar features), that are attractive to children eight years or less in age. Non-interactive features like decorative displays with pre-set patterns, pictures, or music may be entertaining, but do not necessarily have play value.

2.40 POLYMERIC MATERIAL – A material made of a chemical compound or mixture of compounds formed by polymerization and consisting of repeating structural units. Polymeric materials include thermoplastic, thermosetting, and elastomeric materials. A thermoplastic material is able to be easily softened and resoftened by repeated heating. A thermosetting material cures by chemical reaction when heated and, when cured, is unable to be resoftened by reheating. An elastomeric material is capable of being stretched at room temperature to at least twice its length under low stress and recovers to its original length when released from the stress.

2.41 PORTABLE CABINET LIGHT – A portable lamp intended for installation into an open or enclosed cabinet such as a china hutch, bookcase, bed headboard, or kitchen cabinet.

2.42 PORTABLE CABINET LIGHT, POT STYLE – A portable cabinet light intended for recessed mounting within a cavity above the shelf to which it is secured.

2.43 PORTABLE CABINET LIGHT ACCESSORY – Components such as interconnecting cord sets, dimmers, or switch assemblies intended to be used with portable cabinet luminaires.

2.44 PORTABLE HAND LIGHT ACCESSORY – A component of a hand light such as a lampholder assembly, a lamp guard with or without a hook for hanging, or a handle. These accessories are intended for assembly by the user or for use in other portable hand light applications.

2.45 PORTABLE HAND LIGHTS – A complete assembly consisting of a handle, a lampholder assembly, a guard and a power-supply cord.

2.46 PORTABLE LUMINAIRE – A portable luminaire, also commonly known as a portable lamp, as defined in the scope of the Standard. For purposes of requirements in the Standard, the term “portable luminaire,” “luminaire,” and “unit” are used interchangeably.

2.46.1 POWER OVER ETHERNET (POE) – A wiring system conforming to the Standard for Ethernet, IEEE 802.3, that uses category 5 (CAT5) or similar cables and connectors to concurrently carry power and data, with voltage and power within the Class 2 limits of the National Electric Code, ANSI/NFPA 70. Includes PoE (type 1, 15.4 W max), POE+ (type 2, 30 W max), and 4PPoe / PoE++ (type 3, 60 W max and type 4, 100 W max).

2.47 POWER SUPPLY – An electronic assembly designed to convert and regulate an electrical power source to some defined (range of) output voltage and/or current. Within the context of this standard, this term also applies to assemblies commonly referred to as ballasts, drivers, or other assemblies that perform this function.

2.48 POWER SUPPLY, NON-INTEGRAL – A power supply contained in a separate enclosure from that of the portable luminaire lighting assembly, electrically connected at the supply side to a nominal 120 V branch circuit and at the load side to the lighting assembly at some other voltage. Direct plug-in and through-cord power supplies are common forms of non-integral power supplies. Within the context of this definition, a power supply includes fluorescent ballasts, LED drivers, and other electronic assemblies intended to operate incandescent, electroluminescent, or other lighting source types.

2.49 POWER-SUPPLY CORD FITTER – That portion of the assembly that terminates the power-supply cord at the track, connecting the conductors to the bus bars in the track.

2.50 REACTANCE BALLAST – A ballast, the impedance of which is provided by:

a) Inductive reactance;

b) Capacitive reactance; or

c) Both inductance and capacitive reactance.

2.51 REACTOR (SIMPLE REACTANCE) BALLAST – A reactance type ballast in which the impedance (inductive reactance) is provided by a single coil and core - not a transformer. A reactor ballast usually has one lead in and one lead out.

2.52 SECONDARY CIRCUIT – A circuit that is supplied by an induced voltage from a primary where a primary circuit is that supplied by a branch circuit.

2.53 SHADE – The portion of the portable luminaire within which the lamp is located. The light from the lamp is diffused, deflected, reflected, transmitted through, or absorbed by the shade. The shade may be a functional or supportive part, or a decorative part.

2.54 SIGN – A self-contained, cord or permanently-connected, electrically illuminated product, usually with advertising or other words or symbols, intended to convey information or attract attention in a commercial setting.

2.55 SODALIME GLASS – Window glass which typically has a greenish tint readily discernible by viewing the glass from the edge. It scratches easily as compared to other types of glass. Sodalime glass is not determined to be heat resistant unless it is tempered.

2.56 SUBASSEMBLY – Consists of all the parts to a portable luminaire in an easy to assemble form either for “building” a unit (such as a craft kit) or rewiring a portable luminaire. They are intended to be assembled by a person presumed to possess little or no knowledge or no knowledge of electrical circuitry.

2.57 TEMPORARY – Used only for the amount of time required to complete the job. Not intended for long term use in one location. When the job is complete, the work light is moved to the next work area or stored until the next job.

2.58 TORCHIERE – A portable luminaire supported by the floor having a bowl shaped shade with the concave surface facing upward (open top/closed bottom design) intended to provide indirect light. This includes both opaque and translucent type shades. The lamp (bulb) is typically 5 – 6 feet (1.27 – 1.52 m) above the floor and is hidden from direct view by the concave shade. A floor unit that has an adjustable bowl shaped shade where the concave surface of the shade can be directed upward to an angle greater than 45 degrees from the horizontal is also defined as a torchiere.

2.59 TRACK – An enclosure that houses the bus bars and that houses or is integral with the bus bar support. Track is usually made of extruded material that usually resembles an “H” in cross section, with two vertical members connected by a horizontal member. The bus bar support and bus bars are factory-mounted in the lower half of the “H” and the connection of lighting assemblies is accomplished through the open bottom.

2.60 TUNGSTEN-HALOGEN DOUBLE ENVELOPE LAMP – See 2.62. The lamp also includes an outer integral glass envelope.

2.61 TUNGSTEN-HALOGEN LAMP, SUITABLE FOR USE IN OPEN LUMINAIRE – A lamp that complies with the following:

a) The lamp containment and UV filter requirements of UL 153 and is identified as a “Classified” lamp; or

b) The lamp is single enveloped, complies with the Standard for Incandescent Lamps – Safety Specifications, Part 3: Tungsten Halogen Lamps (non-vehicle), ANSI/IEC C78.60432:3, and the lamp manufacturer declares on the lamp package that the lamp is suitable for use in an open luminaire; or

c) The lamp is provided with an integral outer lamp envelope and the lamp manufacturer does not provide a caution requiring an additional lamp containment barrier or UV filter.

2.62 TUNGSTEN-HALOGEN SINGLE ENVELOPE LAMP – An incandescent lamp with a quartz or glass envelope, filled with a halogen gas, and a tungsten filament.

2.63 ULTRAVIOLET (UV) FILTER – A portion of the portable luminaire that limits ultraviolet (UV) emissions.

2.63.1 Universal Serial Bus (USB) – A wiring system for communication and power transfer between a wide range of digital devices. Several versions exist (USB 1.0, 2.0, 3.0, type C, Power Delivery), all with power levels evaluated under the Limited Power Source (LPS) protocol of the Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1 or the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1, (and similar) standard and conforming to the Class 2 limits of the National Electric Code, ANSI/NFPA 70.

2.64 USER SERVICING – See 2.37.

2.65.1 WATER SHIELD – A part or assembly of parts whose function is to exclude water from some portion of the portable luminaire. A water shield may additionally serve other functions.

2.66 WORK LIGHT – A cord and plug connected light for illumination of work areas such as construction sites, loading docks, and machinery work stations. Work lights are not intended to be hand held during use. Work lights are not intended for use in hazardous locations as defined in the National Electric Code, ANSI/NFPA 70.

3 Organization and Application

3.1 The requirements are organized as follows:

Construction requirements:

Sections 7 – 47 – applicable to all portable luminaires; and

Sections 48 – 142 – applicable to specific type units.

Performance tests:

Sections 143 – 161 – applicable to all portable luminaires; and

Sections 162 – 197 – applicable to specific type units.

Marking requirements:

Section 198 – applicable to all portable luminaires; and

Sections 199 – 216 – applicable to specific type units.

Instruction requirements:

Section 218 – applicable to all portable luminaires; and

Sections 219 – 231 – applicable to specific type units.

Manufacturing and production tests:

Appendix B – applicable to all portable luminaires.

3.2 A portable luminaire is capable of having multiple supplementary requirements that are applicable. For example, a work light, in addition to complying with the general and the work light sections of the standard, shall also be required to comply with the supplementary requirements for tungsten-halogen and wet location type units when these requirements are applicable. Specific unit features which limit the application of the requirement(s) are identified by headings, subheadings, or the text of the paragraph. When a product type reference is not specified, the requirement is applicable to all portable luminaires.

4 Components

4.1 Except as indicated in 4.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

4.2 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.

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

4.4 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.

5 Units of Measurement

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

5.2 Unless indicated otherwise, all voltage and current values specified in this standard are rms.

6 Undated References

6.1 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.

CONSTRUCTION

MECHANICAL CONSTRUCTION – GENERAL

7 General

7.1 These requirements apply to all portable luminaires and shall be used in conjunction with the applicable supplementary requirements in this standard.

8 Assembly and Packaging

8.1 Any portion of a portable luminaire that is detachable, for shipping purposes or otherwise, shall be constructed such that it is only able to be assembled in the intended manner.

Exception: A part that is capable of being detached and assembled without compromising the mechanical or electrical integrity of the unit is capable of being assembled in more than one manner.

8.2 A portable luminaire shall be shipped from the factory in a carton or as an unpackaged complete assembly. Unassembled parts, such as glassware, chains, and similar components, when required elsewhere in the standard to accompany the product, shall be included. Decorative glassware is not required to be mounted in a frame or holder and is able to be separately wrapped to protect it from breakage during shipment.

8.2.1 A portable luminaire designed for use with a non-integral power supply shall comply with (a), (b), or (c) below:

a) The portable luminaire is packaged with a compatible power supply;

b) The power supply is separately shipped and is marked in accordance with Section 199 (markings for non-integral power supply); or

c) The portable luminaire is intended to operate from USB, or POE power sources.

Note: See glossary for defined terms.

8.3 A portable luminaire is not required to be completely mechanically assembled when:

a) All parts required to assemble the product, other than an ordinary tool, are provided with the unit;

b) Splices or electrical connections are not exposed nor require completion in the assembly;

c) The integrity of the strain relief at all wiring terminations is intact (see Strain Relief Test, Section 154);

d) Assembly instructions are provided in accordance with 218.2; and

e) When assembled in accordance with the manufacturer's instructions, the unit complies with the requirements in this standard.

Exception No. 1: A splice or connection is capable of being exposed or incomplete when it consists of interlocking plug/receptacle parts where the means of maintaining polarity and strain relief are inherent to the construction of the interlocking parts.

Exception No. 2: An insulation-piercing or crimp connector is capable of being exposed during the assembly operation when:

a) All live parts of the connector and the conductors are insulated; and

b) The splice is located such that it and the conductors connected to it are unable to inadvertently snagged or grabbed.

8.4 When wires pass through a joint between sections of a portable luminaire that are separable for packing purposes, the wires exposed at the joint prior to assembly shall contain no splices. During assembly, the joint shall either:

a) Be limited, by threads or mechanical interference or similar, to no more than 360 degrees of rotation; or

b) Comply with the Power Supply Cord Twist Test, Section 157.

8.5 When fiberglass sleeving is provided for reducing the risk of cutting or abrasion of wiring between sections of a portable luminaire separable for packing purposes as noted in 8.3 and 8.4, the sleeving shall be secured in place by means other than friction. Unless the assembly is obvious between potential pinch points, the sleeving should not require careful positioning by the user to avoid damage to the wiring.

8.6 When a splice or an electrical connection is located in a section of a portable luminaire that is separable for packing purposes, as noted in 8.3 and 8.4, the unit shall be provided with strain relief to reduce the risk of stress being transmitted to the splice or electrical connection during unpackaging and assembly of the luminaire. The strain relief shall be reliable and not easily defeated by the user. See the Strain Relief Test, Section 154.

8.7 When in any position of adjustment, a spring-loaded or adjustable section of a pole unit shall not transmit stress to a splice or wiring within any section of the unit either during assembly or when completely assembled. For example, the stem of an adjustable height floor unit shall raise and lower without binding or crimping the wiring of the unit.

9 Enclosures

9.1 A portable luminaire shall be constructed so that it has the mechanical strength required to resist the handling to which it is likely to be subjected, without resulting in a risk of fire, electric shock, or injury to persons due to total or partial collapse of any part with resulting reduction of spacings (electrical or thermal), loosening or displacement of parts, or other serious defects.

9.2 Where an enclosure relies on adhesive for compliance with 9.1, the adhesive shall be evaluated and found suitable for the associated temperature, environmental exposure, surface materials, and mechanical forces.

9.3 A portable luminaire shall be constructed so that all user servicing is completed without subjecting any wiring, component, or part to mechanical damage, or reducing electrical spacings.

9.4 A portable luminaire shall be constructed of material such as glass, metal, urea, porcelain, phenolic composition, plastic or wood. Hygroscopic materials are permitted only for portable luminaires supplied by a non-integral class 2 power supply.

9.5 A live part operating above Class 2 circuit limits shall be enclosed in a material with fire containment capability, such as metal, glass, ceramic, porcelain, or a polymeric material that complies with Section 12, during normal maintenance and use.

Exception No. 1: A current-carrying part of a wiring device (such as the screw shell and center contact of a lampholder, and the lampholder contacts, starter holder contacts, and similar components of a fluorescent

lamp) that are normally fitted with a functional component (a lamp, a starter, and similar components during use of the unit is not required to be additionally enclosed.

Exception No. 2: A component, such as a ballast, that has an integral outer housing that has been evaluated as an enclosure is not required to be additionally enclosed.

Exception No. 3: The power-supply cord is not required to be contained within the unit.

Exception No. 4: A wire with minimum 0.030 inch (0.76 mm) thermoplastic insulation is not prohibited from being exposed for 2 inches (50.8 mm) or less when it is securely held in place and is routed in close proximity to a portion of the lamp such that the risk of being inadvertently snagged is minimized.

Exception No. 5: A wire or bundle of wires for a lamp supported lampholder is not prohibited from being exposed when:

a) The exposed wire or bundle of wires is covered with a glass fiber sleeve or thermoplastic tubing that extends from a point inside the enclosure to within 1/2 inch (12.7 mm) of the lampholder, and the sleeving has a wall thickness of at least 0.017 inch (0.42 mm);

b) The hole in the housing through which the nonenclosed wires emerge is not larger than 5/8 inch (15.9 mm) diameter, or has an area of 0.31 square inch (200 mm ^{2}) when other than round in shape; and

c) The wires are provided with a strain relief device at the portable luminaire end, and the device complies with the Strain Relief Test, Section 154.

Exception No. 6: A wire or cord with a minimum 0.030 inch (0.76 mm) thermoplastic insulation and an insulation-piercing or a crimp connector having all live parts of the connector and the conductors insulated are only required to be housed within the unit such that they are unable to be grasped, pulled, or inadvertently snagged. For instance, it meets the intent of the requirement to have a metal base with a felt pad for a bottom cover where the felt pad is secured by an adhesive and the weight of the unit.

Exception No. 7: Wood and other organics are permitted for enclosing combustible parts that are insulated with material rated V2 or better.

10 Metal Thickness for Enclosures

10.1 The thickness of sheet metal used in a portable luminaire shall not be less than specified in Table 10.1.

Exception No. 1: A form of construction that uses metal having a thickness less than specified is able to be used when investigated and found to comply with the applicable tests in Metal Thickness Equivalency Tests, in the Standard for Luminaires, UL 1598.

Exception No. 2: The thickness of metal is not specified for:

a) A decorative part;

b) A reflector part that does not form part of the enclosure; or

c) Any part not required to serve as the enclosure, provide structural integrity, or act as support of a wiring device.

Table 10.1
Thickness of sheet metal

Largest dimension	Conditions of use	Minimum thickness of sheet metal					
		Uncoated		Zinc-coated		Copper, brass, or aluminum	
		Inch	(mm)	Inch	(mm)	Inch	(mm)
Not more than 26 inches (660 mm)	Component Support	0.020	(0.51)	0.023	(0.58)	0.025	(0.64)
		0.016[a]	(0.41)[a]	0.019[a]	(0.48)[a]	0.020[a]	(0.51)[a]
	No Component Support	0.016	(0.41)	0.019	(0.48)	0.020	(0.51)
		0.013[a]	(0.33)[a]	0.016[a]	(0.41)[a]	0.016[a]	(0.41)[a]
Not more than 50 inches (1.27 m)	Component Support	0.026	(0.66)	0.029	(0.74)	0.032	(0.81)
		0.020[a]	(0.51)[a]	0.023[a]	(0.58)[a]	0.025[a]	(0.64)[a]
	No Component Support	0.020	(0.51)	0.023	(0.58)	0.025	(0.64)
		0.016[a]	(0.41)[a]	0.019[a]	(0.48)[a]	0.020[a]	(0.51)[a]
More than 50 inches (1.27 m)	Component Support	0.042	(1.07)	0.045	(1.14)	0.050	(1.27)
		0.031[a]	(0.79)[a]	0.034[a]	(0.86)[a]	0.040[a]	(1.02)[a]
	No Component Support	0.031	(0.79)	0.034	(0.86)	0.040	(1.02)
		0.026[a]	(0.66)[a]	0.029[a]	(0.74)[a]	0.032[a]	(0.81)[a]

[a] Only when the surface involved is curved, ribbed, flanged, or reinforced with additional metal. A surface is determined to be flanged when the two opposite longer sides are bent at right angles to the surface to form 1/2 inch (12.7 mm) or wider flanges.

10.2 Table 10.1 applies to any single surface or single flat sheet. Values for the thickness of sheet steel are based on uncoated material. Rigid members consisting of 1/2 by 1/2 inch (12.7 by 12.7 mm), 90 degree angle strips formed of sheet steel not less than 0.031 inch (0.79 mm) thick, or flat steel bars not less than 3/8 inch (9.5 mm) wide and 1/8 inch (3.2 mm) thick shall be used to reinforce and divide a larger area into sections for which lighter metal is able to be used. Such reinforcement, unless along the greater dimension of the surface, shall also be secured to the adjacent sides of the enclosure. A single sheet of metal having a bent corner that forms an angle of not more than 120 degrees is determined to be reinforced at that corner, and the thickness is based on the length and area of the maximum flat surface involved.

10.3 The minimum thickness of cast metal shall be in accordance with Table 10.2.

Exception: A form of construction that uses metal having a thickness less than specified is able to be used when investigated and found to comply with the applicable tests in Metal Thickness Equivalency Tests, in the Standard for Luminaires, UL 1598.

Table 10.2
Thickness of cast metal

Metal	Minimum thickness, inch (mm)			
	At unreinforced areas		At all other areas[a]	
Die-cast metal	5/64	(2.0)	3/64	(1.2)
Cast malleable iron or permanent mold cast aluminum	3/32	(2.4)	1/16	(1.6)
Other cast metal	1/8	(3.2)	3/32	(2.4)

[a] Applicable for the base of threads, and for surfaces that are curved, ribbed, or otherwise reinforced so as to meet the intent of the requirements, or for a surface of such shape or size that the required mechanical strength is provided.

10.4 Metallic tubing shall not be less than 0.040 inch (1.02 mm) thick when cut threads are employed.

10.5 Unthreaded metallic tubing or metallic tubing having rolled threads shall not be less than 0.025 inch (0.64 mm) thick.

10.6 The thickness of tubing is to be measured with a round-nose micrometer.

10.7 An enclosure, a frame, a guard, a handle, or similar part shall not be sufficiently sharp to constitute a risk of injury to persons in normal maintenance and use.

11 Corrosion Protection

11.1 Each external iron or steel surface of a portable luminaire enclosure or wireway shall be protected from corrosion.

Exception No. 1: Enclosed steel pipe stems are not required to be protected against corrosion.

Exception No. 2: Threaded holes and the cut edges and punched holes of an enclosure, and similar parts, formed of galvanized stock are not required to be protected against corrosion.

Exception No. 3: Cast materials are not required to have corrosion protection.

12 Polymeric Enclosures

12.1 A polymeric material, used as a part or all of the enclosure of a portable luminaire as specified in Enclosures, Section 9, shall have:

a) Mechanical temperature indexes (including impact) as a result of long term aging as described in the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B; and

b) Been evaluated for use in portable luminaires in accordance with the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

Exception No. 1: A polymeric material used as an enclosure for a dry location unit does not require the volume resistivity test.

Exception No. 2: The distortion under load test is not required when the mold stress relief test is conducted.

Exception No. 3: For units which are not mounted to a surface, the impact test shall include the drop test, and the ball impact test is not required.

Exception No. 4: The mold-stress relief distortion test shall be conducted using the air-oven method only. The test-cell method is not required.

Exception No. 5: The input after mold stress relief distortion, the abnormal conditions test, and the severe conditions test are not required.

Exception No. 6: The mold stress relief distortion test is not required on extruded or protruded materials.

12.2 A polymeric material is relied upon to provide all or a portion of the strain relief, shall comply with the requirements of the Strain Relief Test, Section 154, after the Mold Stress Relief Distortion Test in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

13 Decorative Parts

13.1 A decorative part of polymeric material located near a lamp or other component that generates heat shall:

a) Be present on the portable luminaire when it is temperature tested in accordance with the Normal Temperature Test, Sections 143 – 147; and

b) Not melt or deform in any way that interferes with the normal operation of the unit or results in a risk of fire or electric shock during the temperature test.

13.2 A decorative part is able to be constructed of any material when the failure of the part does not interfere with the performance of the portable luminaire. Hygroscopic materials are permitted only for portable luminaires supplied by a non-integral class 2 power supply.

14 Enclosure Openings

14.1 An opening in a portable luminaire enclosure described in Enclosures, Section 9, shall comply with the requirements for the Accessibility of Live Parts, Section 23.

14.2 An enclosure containing an open core-and-coil device shall not contain open holes or open seams.

Exception No. 1: An opening provided for an automatic starter meets the intent of the requirement when it is no more than 1/8 inch (3.2 mm) diameter larger than the diameter of the starter.

Exception No. 2: Openings provided in through-cord transformers or direct plug-in transformers meet the intent of the requirement when the transformer complies with the Standard for Power Units Other Than Class 2, UL 1012, the Standard for Class 2 Power Units, UL 1310, or the Standards for Low Voltage Transformers – Part 1: General Requirements, UL 5085-1 and Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers, UL 5085-3.

Exception No. 3: A unit that incorporates an open coil type transformer or power supply is able to have open holes in the enclosure as specified in Table 14.1 when the transformer has been determined to comply with the abnormal test specified in the Standard for Transformers and Motor Transformers for Use in Audio-, Radio-, and Television-Type Appliances, UL 1411, abnormal and short circuit test in the Standards for Low Voltage Transformers – Part 1: General Requirements, UL 5085-1 and Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers, UL 5085-3, or when a power supply has been investigated to determine compliance with the abnormal, burnout, and short-circuit tests specified in the Standard for Power Units Other Than Class 2, UL 1012, or the Standard for Class 2 Power Units, UL 1310.

Exception No. 4: An enclosure of an open coil ballast or transformer is able to have open holes in its surface when a metal baffle is provided that complies with Figure 14.1 and the following:

a) The distance between the baffle and the outer enclosure, X, shall not exceed 1/4 inch (6.4 mm).

b) The dimensions of the baffle, Y, shall be at least the cross-sectional dimensions of the live part.

c) The distance where the enclosure overlaps the baffle, Z, shall be at least two times the distance between the baffle and the outer enclosure (X).

Exception No. 5: A fluorescent unit that incorporates an open coil type ballast is able to have open holes in the enclosure as specified in Table 14.1 when the ballast complies with the Class P requirements of the Standard for Fluorescent-Lamp Ballasts, UL 935.

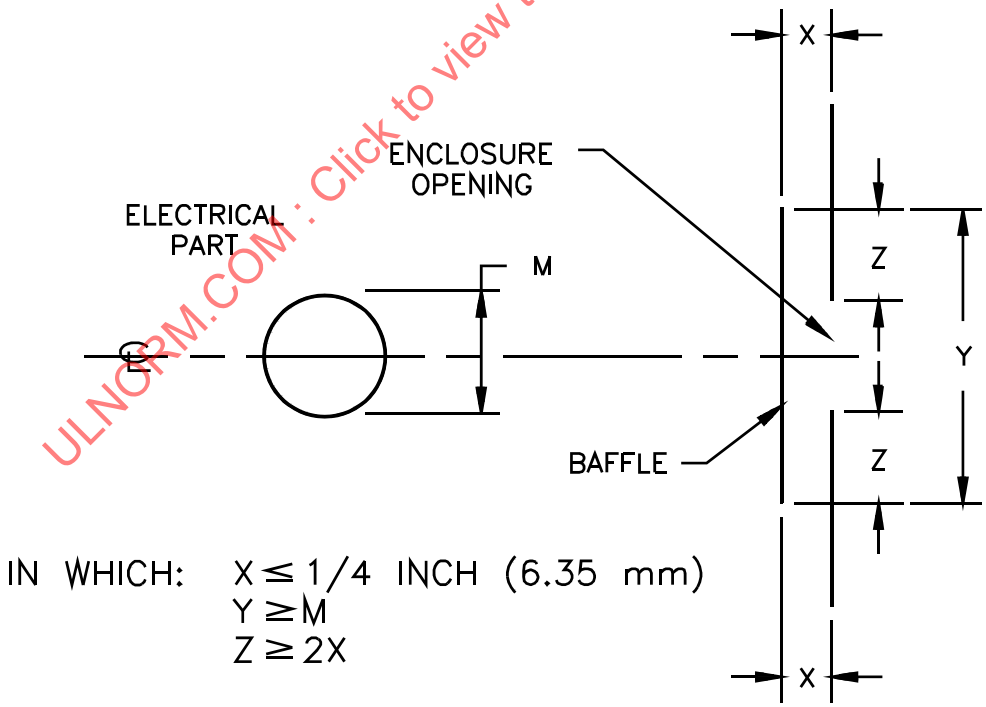
Exception No. 6: A high intensity discharge unit that incorporates an open coil type ballast is able to have open holes in the enclosure as specified in Table 14.1 when the ballast complies with the burnout test requirements of the Standard for High-Intensity-Discharge Lamp Ballasts, UL 1029.

Table 14.1
Maximum size of miscellaneous open holes

Opening shape	Dimension		Maximum area	
	Inch	(mm)	in^2	(cm^2)
Slot[a]	3/8 (width)	(9.6)	1-1/2	(9.68)
Square	1/2 (side)	(12.7)	–	–
Round	1/2 (diameter)	(12.7)	–	–
Irregular	–	–	1-1/2	(9.68)

[a] An open hole between two assembled parts that does not exceed 1/32 inch (0.8 mm) is not required to comply with the area limitation.

Figure 14.1
Relationship of baffle and electrical part to prevent emission



14.3 An enclosure shall not contain any opening that is usable for mounting the portable luminaire.

Exception No. 1: An opening that does not involve access to the enclosure interior is permitted.

Exception No. 2: A keyhole slot is not prohibited from being open when it is in accordance with 71.2.

15 Wireways and Tubing

15.1 A portable luminaire shall be constructed so that when wires are pulled through, or the unit otherwise wired, the covering or insulation on the conductors are not damaged against any surface they are able to contact. Also see Protection of Wiring, Section 30, for additional requirements.

15.2 Wireways shall be free from burrs and fins.

15.3 Tubing that is used as a wireway shall be free from kinks and cracks.

15.4 Screw threads of sheet metal screws and self-tapping screws shall not be exposed for a distance of more than 3/16 inch (4.8 mm) in a wireway.

Exception: The screw threads are not prohibited from being exposed for more than 3/16 inch (4.8 mm) when the wires are held away from or prevented from contacting the screw threads.

16 Shade Construction

16.1 A portable luminaire shall be shipped with a shade unless:

a) The shade functions only as a decorative part and instructions are provided in accordance with 219.1.1;

b) The design is not intended for use with a shade and instructions are provided in accordance with 219.1.2; or

c) The design is not intended for and has no means to readily attach a shade.

16.2 A portable wall, table or floor type luminaire having a shade with one or more of the following features shall comply with the General – Abnormal Operation Tests, Section 149:

a) The adjustable or flexible shade is able to be adjusted against the supporting surface so as to block the air flow to the lamp;

b) There are multiple shades such that one shade directs light onto another; or

c) The shade is able to fold up so as to block the air flow to the lamp.

16.3 A portable luminaire complying with the Temperature Test-Exempt Units requirements of Sections 49 or 63 is able to have a shade constructed of any material.

16.4 A shade shall reliably maintain its dimensions. For example, a breeze shall not be able to blow the cloth of a cloth shade closer to the lamp.

Exception: A shade is not required to reliably maintain its dimensions when the shade is used in accordance with the requirements for the minimum possible dimensions the shade is capable of attaining.

16.5 A dust cover is able to be provided over a shade only when instructions for removal are provided in accordance with 201.3.

Exception: The instructions are able to omitted when the dust cover does not restrict or reduce the required open area of the shade.

17 Strain Relief

17.1 A portable luminaire shall be provided with strain relief so that a pull exerted on the power supply cord is not transmitted directly to a terminal splice, or interior wiring of the unit. See Strain Relief Test, Section 154.

Exception No. 1: Additional strain relief is not required to be provided when the conductors of the supply cord are permanently assembled to a wiring device (such as a switch), lampholder, or similar device by the manufacturer of the wiring device, in such a manner that replacement of the cord requires the disassembly of the device by the removal of a rivet, drive screw, drive pin, or similar component.

Exception No. 2: Additional strain relief is not required to be provided when a lampholder has insulation piercing terminals and is identified as not requiring an additional strain relief device.

17.2 A metal strain-relief clamp or band used with Type SP-2 or lighter general-use, rubber-insulated cord shall be provided with auxiliary insulation over the cord for mechanical protection.

Exception: The auxiliary insulation is able to be omitted for Type SV or SVO cord.

17.3 A clamp of any material (metal or otherwise) shall not be used with Type SPE-2, SPT-2, SVT, or SVTO cord.

Exception No. 1: The construction is able to be evaluated for use when the cord is protected by varnished-cloth or similar material under the clamp.

Exception No. 2: A strain-relief bushing of insulation material that has been investigated for the purpose is able to be used.

17.4 Auxiliary insulation is not required for a clamp used for strain relief of thermoplastic-insulated cord heavier than type SPT-2, SVT, or SVTO when tested in accordance with the Strain Relief Test, Section 154, with no damage to the cord insulation.

17.5 When a knot in a flexible cord serves as strain relief, any surface against which the knot is able to bear or with which it is able to come in contact shall be free from projections, sharp edges, burrs, fins and similar conditions, that are capable of damaging the insulation on the conductors.

18 Portable Luminaires Having Play Value

18.1 A portion of a portable luminaire that has play value for children eight years or less in age and is intended to be removed from the unit and played with (for example a plush doll not integral with the luminaire) shall comply with the Standard Consumer Safety Specification for Toy Safety, ASTM F963. It is not possible to specify the conditions of tests for all constructions; however, the tests shall include evaluation of impact, bite, flexure, torque, tension, compression, sharp point, sharp edge, and small parts.

18.2 The portable luminaire shall not overturn when tested in accordance with the Stability Test, Section 153, with a 15 degree inclined plane.

18.3 A toy or stuffed animal suspended from a unit shall be designed for unexpected, forceful removal and shall comply with the requirements in the Test for Suspended Toys, Section 180.

18.4 The portable luminaire shall be marked in accordance with the requirements in 198.11.

Exception: The marking is able to be modified to indicate that the risks are associated with the luminaire portion and not to the separable portion having play value.

19 Resistance to Liquid Damage

19.1 When a portable luminaire is intended to be used where the deterioration or breakage of a liquid container, seal, or similar component increases the risk of electric shock or liquid spillage, the container, seal, or similar component shall be resistant to deterioration from the liquid intended to be used in contact with that component. The liquid shall be evaluated with respect to its toxic, acid, alkaline, flame and conductive properties. The determination of resistance to deterioration is based upon the material comprising the container, seal, or similar component, its size and shape, the mode of application, and other factors.

19.2 *Deleted*

20 Portable Luminaire Containing Hazardous Substance

20.1 A portable luminaire containing a hazardous substance, such as the mixture of chemicals used as decorative fluid in lava-type lamps, shall be evaluated with respect to ease of ignition, and whether the substance is toxic. The risk of injury shall be assessed on the basis of the amount of the substance or concentration and a one time exposure due to an accidental spill. Inhalation of vapors, contact with skin or eyes, and ingestion are to be considered as probable events. Chemical changes due to exposure to light (UV) and heat (operating temperature) also are to be determined.

20.2 A container of a hazardous substance shall not be adversely affected by the substance. Gaskets, seals, and caps shall not be adversely affected by the substance.

20.3 Soft glass shall not be used as a container of a hazardous substance.

20.4 The unit shall comply with the marking in 198.12.

20A Plant Luminaires

20A.1 General

20A.1.1 A portable luminaire intended to support or contain a plant shall be additionally evaluated for compliance with this section. This intent and the applicability of this section is to be determined by the design of the product, the use instructions, or the claims of the producer.

20A.1.2 For the purpose of this Standard and in the context of clause 1.1, plant hosting is considered a “task”. However, a portable luminaire may provide ambient lighting in addition to this task lighting.

20A.1.3 Portable luminaires intended for commercial-scale plant growth operations are not within the scope of this standard. Portable luminaires subject to the requirements of this section are limited to those intended for a residential setting where the plant is a peripheral and small scale use of the space.

20A.1.4 A portable plant luminaire whose light source may emit hazardous UV, blue, or infrared radiation shall qualify as Risk Group 0 when subjected to the Photobiological Safety Assessment of UL 8800, Standard for Horticultural Lighting Equipment and Systems.

NOTE: Standard incandescent or fluorescent lamps, and LEDs operating only in the visible light spectrum (400 – 700 nm), are not subject to this requirement.

20A.2 Resistance to moisture

20A.2.1 If the intended use of the portable luminaire involves introducing water (or other liquids) in the vicinity of any parts operating above Class 2 voltage limits for wet locations, the portable luminaire shall be evaluated for compliance with the Leakage Current Measurement Test, Section 161.

20A.3 Resistance to chemicals

20A.3.1 User instructions shall be reviewed for all chemical agents (fertilizers, soil or water supplements, or similar) that the manufacturer identifies as eligible for use with the portable luminaire. If the degradation of any portable luminaire materials could result in increased risk of fire or electric shock injury when exposed to these agents, at least one of the following mitigations are required:

a) The material(s) shall be evaluated and determined to be adequately resistant to the degrading effects of the agent(s).

b) The luminaire design and user instructions shall provide sufficient guidance to preclude exposure of the material(s) to the agent(s).

20A.3.2 If either mitigation (a) or (b) from 20A.3.1 is applicable, the instructions shall also provide guidance for detecting early indications of material degradation and steps to either arrest further development (i.e., stop using certain agents) or to halt all use of the portable luminaire.

20A.4 Lamp replacement

20A.4.1 If the portable luminaire has a user-replaceable light source, the user instructions shall provide guidance for acquiring a suitable replacement light source. This is in addition to the lamp replacement markings of Sections 201 – 205, as applicable. The instructions shall include the statement “Replace only with a light source of similar spectral bandwidth emissions”, or similar wording. A statement referring to a specific light source (i.e., catalog number) provided by the producer and designed for the same spectral output is a permitted alternative to this statement.

ELECTRICAL CONSTRUCTION – GENERAL

21 General

21.1 These requirements apply to all portable luminaires and shall be used in conjunction with the applicable supplementary requirements in this standard.

22 Assembly and Packaging

22.1 A portable luminaire shall be completely wired with each electrical component mounted in place and with each splice and connection completed.

Exception No. 1: A detachable power-supply cord is able to be disconnected from the product, as long as it is packaged with the product.

Exception No. 2: A portable luminaire consisting of a wiring harness that snap-fits into a decorative housing is not required to be assembled when such assembly precludes required packaging of the housing for shipping. For example, a ceramic or glass figurine requires packaging material inside and outside to prevent breakage during shipping.

Exception No. 3: Pendant switches (through cord) are able to be shipped unattached with the unit when installation instructions are included to indicate the intended power supply cord is Type SPT-2.

Exception No. 4: Attachment plugs with pin type (insulation piercing) terminals are able to be shipped unattached with the unit when installation instructions are included. See 32.4.

23 Accessibility of Live Parts

23.1 Each part or device that is required by Enclosures, Section 9, to be enclosed shall be located or shielded so that it is not accessible to unintentional contact by persons during normal use, including relamping, replacement of an automatic starter, or other user maintenance services.

Exception No. 1: An uninsulated live part that operates at a potential of 30 volts rms or less and 42.4 volts peak and is able to be accessible in accordance with Secondary Low Voltage Circuits, Section 38.

Exception No. 2: Wiring that is visible and follows the contour of the portable luminaire is able to be accessible during relamping, when it is not spliced and strain relief is maintained at all wiring terminations.

23.2 A live part is determined to be inaccessible when a probe as illustrated in Figure 23.1 is unable to be manipulated such that it touches any part. The probe is to be articulated into any configuration and rotated or angled to any capable position before, during, or after inserting into the opening.

Figure 23.1

Accessibility probe