UL 1573

STANDARD FOR SAFETY

Stage and Studio Luminaires and Connector Strips

UL Standard for Safety for Stage and Studio Luminaires and Connector Strips, UL 1573

Fourth Edition, Dated May 29, 2003

Summary of Topics

This revision to UL 1573 dated July 20, 2023 includes the following changes in requirements:

– Revision to Existing Definitions And Addition Of New Definitions To Help Users Interpret And Apply Requirements As Intended; 1.2, 1.2A and 1.2B

– Revision to Add Stability Requirements For Freestanding Lighting Equipment; 3.7, 3.20A, 3.43A, Table 3.1, 3.43B, and 4.2.

– Revision to Expand And Clarify Environmental Ratings Requirements; Sections 12, 13, 29A – 29E

– Revision to Update Isolation Devices Requirements; 29.1, 29.2, 29.3 and Table 29.1.

– Revision to Add Requirements for LED Light Sources; Sections 29F, 16, 16A and Table 15.1.

– Revision to Add Requirements For Equipment Having Cooling Fans; 17.1.1, 17.2.1 – 17.2.3, 17.3.1, Section 17.4 and 45.1.

– Revision to Add New Requirements For Equipment Having Wired Control Circuits; Supplement SA

– Revision to Add New Standard References To Annex A

– Editorial corrections to references; 39.1, Table 30.1, 47.6 and 51.1.

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 May 27, 2022 and April 7, 2023.

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MAY 29, 2003
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UL 1573

Standard for Stage and Studio Luminaires and Connector Strips

Prior to the first edition, the requirements for the products covered by this standard were included in the twelfth edition of the Standard for Electric Lighting Fixtures, UL 57.

The first, second, and third editions of this standard were titled Stage and Studio Lighting Units.

First Edition – January, 1985
Second Edition – February, 1994
Third Edition – October, 1996

Fourth Edition

May 29, 2003

This UL Standard for Safety consists of the Fourth Edition including revisions through July 20, 2023.

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 stage and studio luminaires rated 600 volts or less for use in theaters, studios, and similar locations in accordance with Articles 520 and 530 of the National Electrical Code, NFPA 70.

1.2 These requirements cover borderlights, spotlights, floodlights, footlights, professional photographic lights, portable strip lights, and the like, as well as connector strips, drop boxes, and the like, when rigged similarly to borderlights.

1.2A These requirements cover equipment with environmental ratings for dry, damp, or wet locations and may bear an optional Ingress Protection (IP) rating.

1.2B Lighting equipment in 1.1 and 1.2 use incandescent, fluorescent, light emitting diode (LED), high intensity discharge, Xenon, or other high pressure electric discharge light sources. These requirements do not cover stage and studio lighting equipment using a carbon arc light source.

1.3 These requirements do not cover miscellaneous special purpose lights, amateur movie lights, or lighting intended for residential use.

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components used in the products covered by this standard.

2.1.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

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

2.1.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

2.2 Units of measurement

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

2.2.2 Unless otherwise indicated, all voltage and current values mentioned in this standard are root-mean-square (rms).

2.3 Undated references

2.3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

2.4 Product configuration

2.4.1 Unless otherwise indicated in a specific requirement, all product orientations for which the manufacturer intends the product to be suitable shall be evaluated.

3 Glossary

3.1 For the purpose of this standard the following definitions apply.

3.2 ACCESSIBILITY BARRIER – A material provided to limit access to parts that present a risk of electric shock or injury. When determined to comply with applicable additional requirements, all or part of the accessibility barrier is capable of also serving as part of an enclosure or a lamp-containment barrier.

3.3 BACK-UP RESTRAINT DEVICE – A cable, chain, or other device not supporting an object but is provided to help prevent an object from falling to the floor when the normal means used for object securement fails.

3.4 BARN-DOOR – A shutter or flap attached to the front of a luminaire and used to control the shape of a light beam. Barn-doors are typically used in one or two pairs.

3.5 BORDERLIGHT – A striplight placed behind a stage border on rigging.

3.6 CLASS 2 CIRCUIT – A circuit supplied by a Class 2 power source.

3.7 CLASS 2 POWER SOURCE – One of the following power sources:

a) A transformer complying with the construction and performance requirements for Class 2 transformers in the Standard for Low Voltage Transformers – Part 1: General Requirements, UL 5085-1, and the Standard for Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers, UL 5085-3.

b) A power unit complying with the construction and performance requirements in the Standard for Class 2 Power Units, UL 1310.

c) Another power source confirmed to exhibit limited voltage, current, and power equivalent to that of (a) or (b), such as a limited-voltage/current circuit as described in Limited-Voltage/Current Circuits, Section 27.

NOTE: Wired control circuits including communication protocols such as those associated with the Universal Serial Bus (USB), IEEE 1394 bus, MIDI and DMX512 are considered Limited Power circuits in accordance UL 60950-1, and as such are recognized by Article 725 of the NEC, NFPA 70, as being equivalent to Class 2 circuits for the purpose of applying Article 725 Class 2 wiring methods.

3.8 CLASS 3 CIRCUIT – A circuit supplied by a Class 3 power source.

3.9 CLASS 3 POWER SOURCE – One of the following power sources:

a) A transformer complying with the construction and performance requirements for Class 3 transformers in the Standard for Low Voltage Transformers – Part 1: General Requirements, UL

5085-1, and the Standard for Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers, UL 5085-3.

b) A power unit complying with the construction and performance requirements for Class 3 Output Circuits in the Standard for Power Units Other Than Class 2, UL 1012.

c) Another power source confirmed to comply with construction and performance requirements equivalent to that of (a) or (b).

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

3.11 COLD HIGH-PRESSURE LAMP – An electric discharge lamp which exhibits a pressure within the arc envelope exceeding 103.4 kPa (15 psi) while at a temperature of 40°C (104°F) or less.

3.12 CONNECTOR STRIP – A wireway mounted on rigging (a network of lines and chains used for support and manipulation of scenery and equipment) or to the building structure above or adjacent to the luminaires it supplies. Receptacles or drop cords are provided for the connection of spotlights, floodlights, and portable striplights that are capable of being mounted to or suspended from the strip. A connector strip with many portable striplights is equivalent to a borderlight.

3.13 CORD CONNECTOR – A connector device for a flexible cord to which an attachment plug is connected.

3.14 CREEPAGE DISTANCE – The shortest distance measured over the surface of insulation between conductive parts.

3.15 DIFFERENT CIRCUITS – Circuits from different sources such as primary circuits with different branch-circuit overcurrent protective devices, primary and secondary circuits, and secondary circuits from different windings of an isolating transformer.

3.16 DISAPPEARING FOOTLIGHT – A footlight that folds flush with the stage floor when not in use.

3.17 DRIPPING MATERIAL BARRIER – A barrier provided to reduce the risk of molten metal, burning insulation, flaming particles, and the like from falling through an opening in the enclosure.

3.18 DROP BOX – A short connector strip with a temporary means of mounting to pipes on rigging.

3.19 DROP CORD – A length of pendant flexible cord or cable that terminates in a cord connector and that is permanently connected to the supply circuit.

3.20 ENCLOSURE – A material provided to enclose electrical parts and components that present a risk of fire. When determined to comply with applicable additional requirements, all or part of the enclosure is capable of also serving as an accessibility barrier, dripping material barrier, or lamp-containment barrier.

3.20A ENVIRONMENTAL LOCATIONS:

a) Dry Location – A location not normally subject to dampness, but may include a location subject to temporary dampness, as in the case of a building under construction, provided ventilation is adequate to prevent an accumulation of moisture.

Note: A special allowance in Article 520 of the NEC (NFPA 70) permits portable stage and studio lighting equipment and portable power distribution equipment not identified for outdoor use shall be permitted for temporary use outdoors, provided the equipment is supervised by qualified personnel while energized and barriered from the general public.

b) Damp Location – An exterior or interior location that is normally or periodically subject to condensation of moisture in, on, or adjacent to, electrical equipment, and includes partially protected locations.

c) Wet Location – A location in which water can drip, splash, or flow on or against electrical equipment.

3.21 FLOODLIGHT – A luminaire that produces an intense and broad light beam.

3.22 FOOTLIGHT – A striplight located at foot level along the front of the stage or cyclorama (a stretched cloth across the back of the stage used to form the background).

3.23 GOBO – A perforated plate or disk that is part of, or capable of being added to and supported by, a luminaire for the purpose of projecting images or patterns.

3.24 HAND-SECURED JOINT – A joint that is designed to be tightened or secured by hand and without the use of a tool. Examples of a hand-secured joint include a threaded knob, a twist-type latch, and a deflection-type tab or latch.

3.25 HIGH-PRESSURE LAMP – An electric discharge lamp which exhibits a pressure within the arc envelope exceeding 103.4 kPa (15 psi) at any time. Such lamps include short-arc xenon and other short-arc lamps. A high-pressure sodium lamp is not a high-pressure lamp as defined herein.

3.26 INTERLOCK MECHANISM – A mechanism that de-energizes parts involving a risk of electric shock or that stops moving parts before they become accessible to the user when the enclosure of the part is opened or a cover is removed.

3.27 IRIS – An adjustable arrangement of thin plates that form an opaque area with a variable circular opening in the center of the arrangement. The iris is used to control the size of a light beam, as from a spotlight.

3.28 KNOCKOUT – A precut portion of the wall of an outlet box or enclosure, or a feed connector that can be readily removed at the time of installation in order to provide an open hole for the attachment of a connector or fitting.

3.29 LAMP – A device consisting of a glass or quartz envelope, a filament and filament supports, electric arc electrodes, a base, and the like that is the source of illumination.

3.30 LAMP-CONTAINMENT BARRIER – A barrier intended to limit the emission of:

a) Quartz particles of a ruptured tungsten-halogen lamp or of an electric discharge lamp of other than the fluorescent type or

b) Lamp-envelope particles, lamp metal parts, and other lamp parts that result from the explosion of a high-pressure lamp.

3.31 LIGHT BEAM – The illumination generated by a lamp. The size and shape of the light beam is capable of being changed by barn-doors, shutters, and the like.

3.32 LIMITED-VOLTAGE/CURRENT CIRCUIT – A circuit that complies with the requirements specified in Limited-Voltage/Current Circuits, Section 27, and is supplied from an isolated secondary winding of a transformer.

3.33 LOW-VOLTAGE COMPONENT FAN – A component fan intended to be used in an isolated, secondary circuit, rated a maximum of 30 V rms (42.2 volts peak), or 60 V DC, and complying with the requirements for such fans in the Standard for Electric Fans, UL 507.

3.34 LUMINAIRE – A complete assembly that includes an enclosure, a lamp, a lampholder, a mounting means, a power supply connection means, and the like. A luminaire is also capable of including other parts such as barn-doors or shutters.

3.35 MOTOR DRIVE CIRCUIT – The circuitry intended to control the operation of a motor. Operation characteristics controlled include motor energization/deenergization and rotor speed, direction, or position.

3.36 NON-STANDARD RECEPTACLE, CORD CONNECTOR, and PLUG – A receptacle, cord connector, or plug that has a slot or blade or pin configuration that has not been assigned a voltage or current rating by a nationally-recognized, standards-developing organization or by the general practice of an industry. Stage-type fittings are categorized as non-standard.

3.37 OPENING – A hole in the wall of a required enclosure. An open hole and a knockout are both openings.

3.38 ORDINARY TOOLS – Flat-blade and cross-head screwdrivers, crescent wrenches, and pliers.

3.39 OVERHEAD PRODUCT – A product provided with a mounting means for mounting the product above the floor to a wall, ceiling, pipe, or other structure.

3.40 POLE LEAST CAPABLE OF STRIKING GROUND – A pole that is referenced to ground or, by virtue of its position, potential, or both, relative to other poles of the device, is least capable of striking ground. Where two or more poles are equally least capable of striking ground, any one of the poles is capable of being categorized as the pole least capable of striking ground.

3.41 PORTABLE STRIPLIGHT – A short length of cord-connected striplight with a means for temporary mounting.

3.42 PROSCENIUM SIDELIGHT – A striplight on or in the proscenium (the wall that frames the stage and separates the stage from the auditorium).

3.43 RECEPTACLE – A connector device permanently connected to the supply circuit to which an attachment plug is connected.

3.43A RISK OF ELECTRIC SHOCK – A risk of electric shock exists between any two uninsulated conductive parts or between an uninsulated conductive part and earth ground if the continuous current flow through a 1500 Ω resistor in parallel with a 0.15μF capacitor connected between the two points exceeds 5 mA rms (7 mA peak) and if the open circuit voltage exceeds the limits specified in Table 3.1 for dry, damp, and wet locations.

Table 3.1
Voltage Limits

Waveform type[a]	Maximum voltage	
	Dry and damp locations	Wet locations
Sinusoidal ac	30 V rms	15 V rms
Non-sinusoidal ac	42.4 V peak	21.2 V peak
dc[b,c]	60 V	30 V

[a] For a combined ac + dc waveform, the wet location voltage limit must be the non-sinusoidal ac limit where the dc voltage is no more than 10.45 V, and must be (16.5 + 0.225 * dc voltage) V where the dc voltage is greater than 10.45 V. The dry and damp location voltage limit must be twice these amounts.

[b] If the peak-to-peak ripple voltage on a dc waveform exceeds 10% of the dc voltage, the waveform must be considered a combined waveform per footnote a.

[c] DC waveforms interrupted at frequencies between 10 and 200 Hz must be limited to 24.8 V in dry and damp locations, and 12.4 V in wet locations.

3.43B RISK OF FIRE – a risk of fire exists in all electrical circuits except:

a) When V_{max}, I_{max}, or VA_{max} are within the Class 2 circuit limitations as defined in Article 725 of the NEC;

b) A Limited-Voltage /Current Circuit complying with the requirements in Section 27;

c) A Limited Power Source complying with the requirements in the Standard for Information Technology Equipment – Part 1, UL 60950-1; or

d) A circuit that is limited to 15 W of power under normal and single fault conditions, as measured in accordance with the Circuit Power Limit Measurement test in UL 8750.

3.44 RISK OF INJURY TO PERSONS – A condition that exists when stationary parts (such as sharp metal edges and projections), moving parts (such as gears, chains, or linkages), falling objects, inadequate mechanical strength of material, or the physical instability of the equipment, are such that a person is capable of being injured.

3.45 SCROLLER – A mechanism with a roll of thin plastic film or other material which is part of, or shall be added to and supported by, a luminaire for the purpose of projecting images or colors. The film scrolls between two cylindrical drums on either side of the involved light aperture.

3.46 SECONDARY CIRCUIT – A circuit that is conductively connected to the secondary winding of a transformer.

3.47 SHUTTER – A mechanical device, similar to an iris, used to control the amount of illumination from a lamp.

3.48 SPOTLIGHT – A luminaire that produces a relatively intense light beam that illuminates only a small area, used especially to center attention on an object.

3.49 STANDARD RECEPTACLE, CORD CONNECTOR, or PLUG – A receptacle, cord connector, or plug that has a slot or blade or pin configuration assigned a voltage and current rating by a nationally-recognized, standards-developing organization or by the general practice of an industry. Examples of standard fittings as defined in this paragraph and used in this standard are:

a) Fittings with a slot, blade, pin, or sleeve configuration as specified in the Standard for Wiring Device Configurations, UL 1681, and other configurations specified in the National Electrical Manufacturers Association (NEMA) publications for wiring devices and

b) Fittings with a pin or sleeve configuration as specified in the Standard for Pin and Sleeve Configurations, UL 1686, or the Standard for Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type, UL 1682.

3.50 STILL PHOTOGRAPHY LIGHT – A portable, spring-type clamp-on, or freestanding floodlight or spotlight intended for use in still photography studios, and using incandescent lamps totaling not more than 2000 watts or fluorescent lamps.

3.51 STRIPLIGHT – A continuous row of small floodlights wired in three or four circuits.

3.52 TRIP-FREE – A type of reset mechanism constructed so that, regardless of the position of the actuating handle, button or lever, the contacts cannot be held in the closed position when the unit has tripped.

3.53 WATER-SHIELD – A part other than a gasket that is wetted during the Rain Test, Section 47, and is relied upon to comply with the requirements of the rain test.

CONSTRUCTION – MECHANICAL

4 General

4.1 A luminaire shall be provided with a reflector(s) or other guards to protect the lamps from mechanical damage and inadvertent contact with scenery and other combustible material.

4.2 A freestanding luminaire, a unit that comes attached to a stand, or a unit that has a stand specifically intended for it shall be constructed so it does not tip over when subjected to the Stability Test, Section 35.

Exception: A luminaire that is intended for universal mounting onto a base or tripod that is not provided with the luminaire need not be tested for stability.

4.3 A product shall be provided with a means for mounting or support.

4.4 An overhead product intended to be suitable for use with an accessory shall be provided with means for mounting or support of the accessory.

Exception: An overhead product intended to be suitable for use with a cardboard color gel frame secured by adhesive tape, or another accessory with an equally low risk of injury when the accessory falls, is not required to be provided with means for mounting or support of the accessory.

4.5 A connector strip fabricated from sections joined together in the factory or the field shall be provided with a means for mounting or support of each section. A connector strip section having a length exceeding 3 m (10 feet) shall be provided with a means for mounting or support for every 2.4 m (8 feet) or partial 2.4 m of length. Mounting means shall be provided for a terminal box of a hanging connector strip at which a power supply cord terminates.

Exception: A connector strip section having a length of 0.9 m (3 feet) or less is not required to be provided with a means of mounting or support other than the joint to the adjacent section, when the adjacent section's means of mounting or support is located not more than 0.6 m (2 feet) from the joint.

5 Corrosion Protection

5.1 Iron and steel parts shall be protected against corrosion by painting, enameling, galvanizing, plating, or other equivalent means when the malfunction of such unprotected parts presents a risk of fire, electric shock, or injury to persons.

Exception No. 1: When the oxidation of iron or steel from exposure of the metal to air and moisture is not appreciable – thickness of metal and temperature also being factors – surfaces of sheet steel and cast-iron parts within an enclosure are not required to be protected against corrosion.

Exception No. 2: Bearings, laminations, or minor parts of iron or steel (such as washers, screws, and the like) are not required to be protected against corrosion.

6 Enclosures

6.1 All splices, taps, wires not jacketed with glass fiber sleeving with a wall thickness of at least 0.64 mm (0.025 inch), transformers, current-carrying parts or devices with exposed live metal, and leads or terminals for field connection of supply wires shall be enclosed in material specified in 6.2.

Exception No. 1: A component device (such as a motor) with an integral outer enclosure that complies with 6.2 is not required to be additionally enclosed.

Exception No. 2: Lampholder shells that are connected to the grounded (neutral) conductor and lampholder contacts that are accessible only during relamping are not required to be enclosed.

6.2 The enclosure required in 6.1 shall be constructed of metal, glass, ceramic, porcelain, or a polymeric material that complies with the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

6.3 After assembly, there shall be no openings in an enclosure other than those specified in Openings, Section 8.

7 Metal Thickness

7.1 Sheet metal

7.1.1 Sheet metal used in the construction of an enclosure or wireway shall be at least as thick as indicated in Table 7.1.

Exception No. 1: A minimum thickness is not specified for:

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

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

Exception No. 2: A form of construction that uses metal with a thickness less than required in Table 7.1 is not prohibited from being used when investigated and determined to provide strength and protection equivalent to constructions in compliance with Table 7.1.