b) The text is at least 1.3 mm (0.05 in) high and contrasting in color to the background, and

c) If molded or stamped in a material, the text is at least 2.0 mm (0.08 in) high, and if not contrasting in color, a depth or raised height of at least 0.5 mm (0.02 in).

10.1.6 Pressure-sensitive labels of the permanent type (Type P) that are secured by adhesive shall be in accordance with CSA C22.2 No. 0.15 or UL 969. The adhesive of the pressure-sensitive labels shall be suitable for the application surface, temperature, and environment.

10.2 Identifications and ratings

10.2.1 A device shall be marked with the following:

a) Identification of the company responsible for the product, in accordance with Table 10.1, Item 1. The identification may be in a traceable code if the device is identified by a brand or trademark owned by a private labeler.

b) A catalog number, model number, series number, or other similar designation in accordance with Table 10.1, Item 2,

c) A date code or other dating period of manufacture not exceeding any three consecutive months, in accordance with Table 10.1, Item 3. The date marking may appear on the surface of the device or lamp base screw shell and may be abbreviated or appear in a nationally accepted conventional code or in a code affirmed by the manufacturer, if it:

1) Does not repeat in less than 10 years, and

2) Does not require reference to the production records of the manufacturer to determine when the product was manufactured, and

d) Factory identification, if more than one location, in accordance with Table 10.1, Item 4.

Table 10.1
List of required markings

(See Clauses 6.10.1, 6.10.2, 6.10.3, 7.1.1, 7.2.1, 7.3.1, 8.2.3, 8.5.3, 8.5.5, 8.5.6, 8.12.1, 8.14.1, 10.1.2 to 10.1.4, 10.2, 10.2.5, 10.2.6, 10.2.7, 10.4, and F.1)

Item	Product markings	Text	Format	Text reference
1	**Manufacturer's identification**		S13L1	10.2.1(a)
2	**Catalog number or similar product designation**		S13L1	10.2.1(b)
3	**Date marking (may be in code)**		S13L1	10.2.1(c)
4	**Factory identification, if more than one (may be in code)**		S13L1	10.2.1(d)
5	**____ VOLTS____ AMPS _____ WATTS ____ HERTZ or ____ V _____ A ____ W ____ Hz**		S13L1	10.2.2
6	**USE WITH LAMP OF _____ WATTS**		S13L1	10.2.3
7	**HIGH POWER FACTOR or HPF**		S13L1	10.2.5
8	**CAUTION**	Verbatim	S20L1	6.10.1, 6.10.2(a)
9	**RISK OF ELECTRIC SHOCK – USE IN DRY LOCATION ONLY or ELECTRIC SHOCK RISK – ONLY FOR DRY LOCATIONS**	Verbatim or Symbol	S13L1	7.1.1, 10.2.7

Table 10.1 Continued on Next Page

Table 10.1 Continued

Item	Product markings	Text	Format	Text reference
10	**SUITABLE FOR DAMP LOCATIONS, or FOR DAMP LOCATIONS, or RISK OF ELECTRIC SHOCK – DO NOT USE WHERE DIRECTLY EXPOSED TO WATER**	Verbatim or Symbol	S13L1	7.2.1, 10.2.7
11	**SUITABLE FOR WET LOCATIONS or FOR WET LOCATIONS**	Verbatim or Symbol	S13L1	7.3.1, 10.2.7
12	**SUITABLE FOR WET LOCATIONS – (to be followed by words describing the restricted positioning) as tested in 8.14, "SUITABLE" is optional**	Text or Symbol	S13L1	7.3.1, 8.14.1, 10.2.7
13	**DO NOT USE WITH DIMMERS or NOT FOR USE WITH DIMMERS**		S13L1	8.12.1.2
14	**DO NOT USE WITH STANDARD DIMMERS, SEE INSTRUCTIONS**		S13L1	8.12.1.3
15	**NOT FOR USE IN TOTALLY ENCLOSED LUMINAIRES or NOT FOR TOTALLY ENCLOSED LUMINAIRES**	Text or Symbol	S13L1	8.5.6, 10.2.5, 10.2.7
16	**MAX___WATTS TYPE _____ SHIELDED or** **MAX ____ W TYPE ___ SHIELDED (for adapters with tungsten-halogen lamps)**	Verbatim	S20L1	6.10.2
17	**MAX___WATTS TYPE _____or** **MAX ____ W TYPE ___ (for adapters with tungsten-halogen lamps)**	Verbatim	S20L1	6.10.1
18	**SUITABLE FOR OPEN LUMINAIRES (for adapters with tungsten-halogen lamps)**	Verbatim	S13L1	6.10.3
19	**"Hg" (In a circle)**	"Hg" verbatim, circle is a graphical element	S20L1	10.2.6
20	"Mercury disposal: epa.gov/cfl"	Verbatim	S20L1	10.2.6
	Instructions General			
21	**ADDED WEIGHT OF THE DEVICE MAY CAUSE INSTABILITY OF A FREE-STANDING PORTABLE LUMINAIRE**		L2	10.4.1
22	**USE ONLY WITH A PORTABLE TABLE LUMINAIRE THAT IS PROVIDED WITH A SHADE**		L2	10.4.1
23	**USE IN PORTABLE TABLE LUMINAIRES IN WHICH THE DISTANCE FROM THE BOTTOM OF THE BASE TO THE TOP OF THE LAMPHOLDER DOES NOT EXCEED THREE (3) TIMES THE MINIMUM BASE DIAMETER**		L2	10.4.3
24	**THIS DEVICE IS NOT INTENDED FOR USE WITH EMERGENCY EXITS or NOT FOR EMERGENCY LIGHTING**		L2	1.5 and 10.4.4
25	**SUITABLE FOR USE IN ENCLOSED LUMINAIRES**	Verbatim	S28L1	8.5.3(e)
26	**MIN. LAMP COMPARTMENT DIMENSIONS _(L)_ x (W)_ mm**	Verbatim	S28L1	8.5.3(e)
27	**USE IN OPEN LUMINAIRE ONLY**	Verbatim	S28L1	8.5.3(e)
28	**USE ONLY IN MODEL (model number) MANUFACTURED BY (manufacturer)**	Verbatim	S28L1	8.5.3(e)
29	**"Hg" (In a circle)** **"LAMP CONTAINS MERCURY"** **www.lamprecycle.org or www.epa.gov/bulbrecycling** **(Optional) "Manage in Accord with Disposal Laws"**	"Hg" verbatim, circle is a graphical element	S20L2	10.2.6
30	**"Contains mercury, For more on cleanup and safe disposal, visit epa.gov/cfl"**	Verbatim	S20L2	10.2.6

Note: The text shown in the table does not represent the actual minimum size and typestyle required. Text in parentheses ( ) is descriptive or informative and not part of the actual marking notice.

Table 10.2
Format minimum size designations for marking height and type face

(See Clause 10.1.3)

Size designation	Letter height mm (in)	Font size	Font type face uppercase
S13	1.3 (0.051)	5	Universal bold Arial bold Helvetica bold Zurich BT bold Sans Serif
S20	2.0 (0.079)	7.5	
S28	2.8 (0.110)	11	

Table 10.3
Format location designation for marking

(See Clause 10.1.3)

Location designation	Description	Marking
L1	On the product	Type P
L2	On smallest unit packaging, point-of-sale package, carton, or instruction sheet	Type T

Notes:

Type P designates a permanent marking that is intended to remain in the applied position for the lifetime of the device under conditions of normal use. It provides information required for the user maintenance over the expected life of the device. If a label is used, it must be made of material that complies with Clause 10.1.6.

Type T designates a temporary label, instruction sheet, or tag that provides installation instruction and information not required after installation. It is made of printed matter with or without attachment to the device.

10.2.2 A device shall be marked with an electrical input rating in volts, hertz, wattage, and current in accordance with Table 10.1, Item 5. Hertz can be omitted if volts is expressed as “VAC” and the device has been evaluated for 60 Hertz, or if volts is expressed as “VDC.”

10.2.3 A lamp adapter shall be marked with a wattage rating as specified in Table 10.1, Item 6.

10.2.4 A device with a power factor rating greater than 0.90 may be marked in accordance with Table 10.1, Item 7.

10.2.5 Unless the device is tested with the lens as described in Clause 8.5.6, the device shall be marked in accordance with Table 10.1, Item 15.

10.2.6 In the United States, self-ballasted fluorescent lamps shall be marked as described in Table 10.1, Item (s) 19, 20 or both. The smallest unit packaging, point-of-sale package, carton, or “stuffer sheet” packed with a lamp shall contain the marking described in Table 10.1, Item(s) 29, 30 or both.

In Canada and Mexico, these requirements do not apply.

10.2.7 When a marking in Table 10.1 has a corresponding symbol in Annex F and instructions are included on the packaging explaining the pictogram's meaning, the symbol may be used in place of the corresponding text in Table 10.1.

10.3 Marking requirements in Mexico

10.3.1 In Mexico, markings and labels on devices or packaging shall meet the requirements of Clauses 10.3.2 to 10.3.4 as applicable.

10.3.2 In Mexico, markings and labels on devices or packaging shall meet the following requirements:

a) The use of a period as a decimal point shall not be used. A comma shall be used as a decimal point.

b) Magnitudes less than the unit shall be represented with a zero followed by #, where # equals magnitude (for example, 90 cm = 0,90 m).

c) Letter size shall not apply to any marking.

d) Where applicable, input voltages (V) and current symbols shall be:

1) c.a. or AC or ~

2) c.d. or DC.

10.3.3 In Mexico, devices shall be marked with the following:

a) The name or trademark, model, or manner in which the manufacturer or importer identifies the product,

b) Nominal input voltage, frequency, wattage, and current,

c) Date marking or code form,

d) The type of lamp and wattage in watts for adapters, and

e) A statement that identifies the origin of the product.

Notes:

1) The frequency can be omitted if the ballast is an electronic circuit that works independently of the input frequency within an interval from 50 Hertz to 60 Hertz.

2) If the product is marked with the input wattage and the power factor is 0,9 or greater, the current can be omitted.

3) The manufacturing date can be brief or use a code designated by the manufacturer.

f) A device that is not intended to be used in a dimming circuit shall be marked “Do not use with dimmers.”

g) A device can be marked as “High Power Factor” or “HPF” if the power factor measured is 0,9 or greater.

10.3.4 In Mexico, the packaging shall include the following:

a) The graphical representation or product name, unless this is obvious,

b) The national manufacturer or importer’s name, address, telephone number, and telex number,

c) The name or trademark, model number, or manner in which the manufacturer or importer identifies the product,

d) Nominal input voltage, frequency, wattage,

e) Number of pieces per carton.

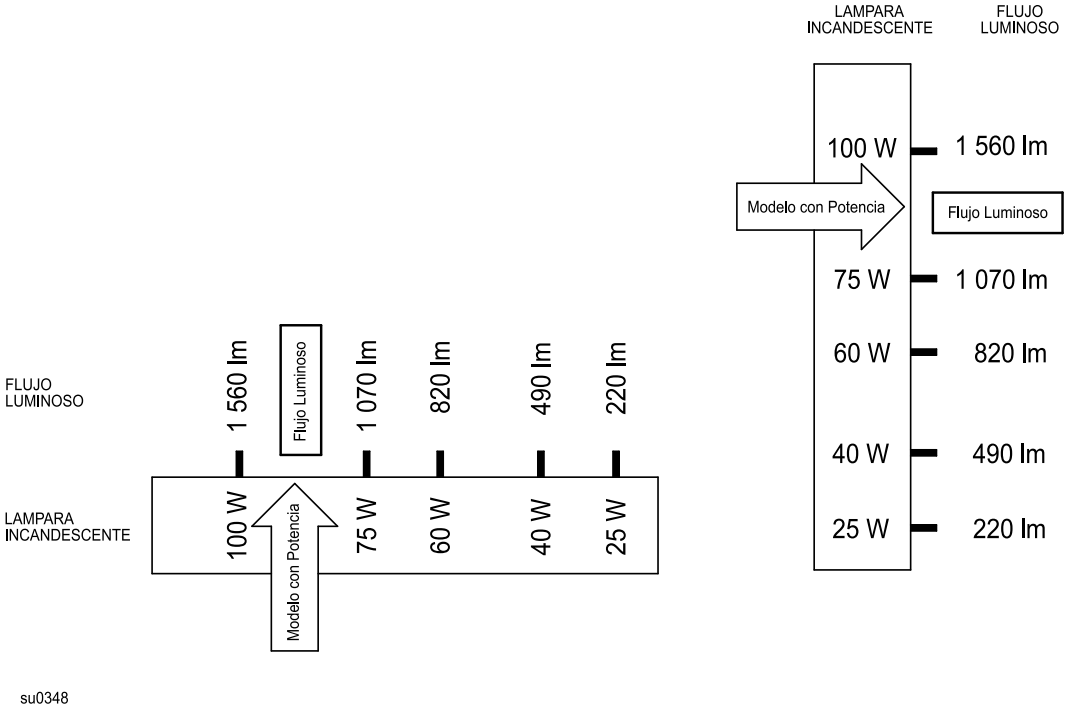
f) Comparative graphic scale that indicates the equivalence with respect to incandescent lamps being replaced, with exception of reflector type lamps (see Figure 10.1), and

g) Average lamp life expressed in hours.

Figure 10.1

Graphic scale of luminous flux

(See Clause 10.3.4)



10.4 Instructions

10.4.1 A device weighing over 200 g (0.44 lbs) shall be provided with instructions in accordance with Table 10.1, Items 21 and 22.

10.4.2 A device, typically not intended for use in free-standing portable luminaires, such as a PAR- or R-shaped bulb, is not required to comply with Clause 10.4.1.

10.4.3 A device employing a lamp, such as a circular lamp, that extends outside of the harp of a portable luminaire shall be provided with an instruction in accordance with Table 10.1, Item 23, or shall be marked as required by Clause 10.4.1.

10.4.4 The instructions shall include the statement in Table 10.1, Item 24.

10.4.5 The instructions for a device marked in accordance with Table 10.1, Item 14, shall include the following or equivalent statement: "Only use the control provided with or specified by these instructions to control this lamp. This lamp will not operate properly when connected to a standard (incandescent) dimmer or dimming control."

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SUPPLEMENT SA – SUPPLEMENTAL REQUIREMENTS FOR LIGHT-EMITTING DIODES (LED)

SA1 Scope

SA1.1 Clause 1 applies and as amended below.

SA1.2 The text in the main body of this standard, along with this supplement, make up requirements for devices employing light-emitting-diode (LED) lamp technologies.

SA1.3 Where the requirements of any of the clauses of the main text are referenced in this supplement by the phrase “The requirements of clause ___ apply”, this phrase is to be interpreted as meaning that all requirements of the clause or paragraph of main text apply, except where it is clearly non-applicable to the product being evaluated.

SA1.4 The text in the main body of this standard using the word “ballast” is understood to also comprise LED drivers. The text in the main body of this standard using the word “lamp” is understood to also comprise LED arrays.

SA1.5 At various points in this supplement references are made to UL 8750 or CSA C22.2 No. 250.13.

SA1.6 These requirements cover:

a) Self-contained LED lamps, with control circuitry and driver, rated up to 347 V nominal for connection to screw-, pin-base, and recessed single contact (RSC or R7) lampholders,

b) Devices for replacement of an ANSI standardized fluorescent lamp, and consisting of light-emitting-diode (LED) lamp technologies, with control circuitry, and a driver or power supply. The LED driver and control circuitry will be either integral with the lamp or remote from the lamp – see SA6.13, and,

c) Component LED lamps, with or without control circuitry, an ANSI base other than bases mentioned in (1), for connection to LED driver having a low voltage output, such as replacement for tungsten-halogen, MR11 and MR16 shaped lamps – see SA6.14.

SA1.7 These requirements do not cover LEDs that are integral components and which form a non-replaceable part of a luminaire and which cannot be tested separately from the luminaire.

SA1.8 LED light sources having a means of supply connection other than lamp bases described above, are evaluated using requirements in UL 8750 or CSA C22.2 No. 250.13.

SA2 Reference Publications

SA2.1 Publications from Clause 2 apply.

SA3 Definitions

SA3.1 Terms from Clause 3 apply and as amended below.

SA3.2 BASIC INSULATION – electrical insulation of fiber or other polymeric material. Fiber and polymeric insulating materials are evaluated for moisture and puncture resistance, and electrical dielectric properties. Polymeric materials are additionally evaluated for electrical support properties sufficient for the application.

SA3.3 BARRIER – a part of the device intended to physically limit access to parts that pose a risk of electric shock. A barrier can be an insulating material in contact with other conductive parts or a conductive material isolated from other conductive parts.

SA3.4 CIRCUIT, CLASS 2 – a circuit of a low voltage and limited power nature such that the circuit components can be installed with the simplified installation manner described in Article 725 of the ANSI/NFPA 70 for the United States, or Section 16 of Canadian Electrical Code, Part I, in Canada. The circuit supplied by an isolating source complies with the electrical limits and test requirements of:

a) UL 1310, or the Class 2 requirements of the UL 5085-3 for the United States, or

b) CAN/CSA-C22.2 No. 223, or the Class 2 requirements of the CSA C22.2 No. 66.1 for Canada.

Note: For the purposes of this standard, Limited Power Sources complying with UL 60950-1 or CAN/CSA-C22.2 No. 60950-1 are deemed to be equivalent to Class 2 power supplies with respect to risk of electric shock and risk or fire.

SA3.5 DIRECT CURRENT (DC) – a voltage or current waveform where the instantaneous value does not vary.

SA3.6 LED ARRAY (LED MODULE) – an assembly of one or more discrete LED electronic components on a printed circuit board, typically with optics and additional thermal, mechanical, and electrical interfaces.

SA3.7 LED DRIVER – a power source and control circuitry to control the voltage or current to LEDs. The control circuitry can range from a simple (bridge rectifier and resistor) to complex (incorporating power factor control, constant voltage or constant current outputs, and the like).

SA3.8 LED LAMP, COMPONENT – an LED device without integral power source and with an ANSI standardized base designed for connection to a luminaire. The bulb can take the shape of an incandescent lamp it is intended to replace, such as MR-16.

SA3.9 LED LAMP, SELF-CONTAINED (INTEGRATED) – a device with an LED array, an integrated driver, and an ANSI standardized base that is designed to connect to a supply branch circuit via an ANSI standardized lampholder. In North America, a “standardized base” refers to an ANSI standard base.

Note: In Canada, tubular self-contained LED lamps may be connected to non-ANSI standardized lampholders that are approved for the application.

SA3.10 LED LENS, INTEGRAL – the optical element integral to an LED package that focuses or diffuses the light from the LED die(s). Optical assemblies secured to the LED package after package manufacture (such as during the assembly of an LED array) are not considered integral LED lenses.

SA3.10A LINEAR LED LAMP – A double-ended self-contained LED lamp intended for direct connection to a voltage-controlled power source (i.e.: branch circuit, low-voltage transformer, etc.) and provided with ANSI standardized LED lamp bases. This excludes lamps with bases traditionally associated with fluorescent lamps (e.g.: G5, G13, G20, Fa8 and R17d).

SA3.11 POLARIZATION – observing the identification of the grounded supply conductor for electrical connection of certain components in order not to increase the risk of electric shock. (Not related to polarization of light.)

SA3.12 RETROFIT LUMINAIRE CONVERSION – the act of modifying, with additional parts, a luminaire that was already manufactured and in service in order to convert the luminaire to an LED light source, from an incandescent, fluorescent, or high intensity discharge light source. For this standard, direct replacement of an incandescent to LED lamp, without any electrical or mechanical changes, is not considered to be a luminaire conversion.

SA3.13 WORKING VOLTAGE – the highest voltage to which the insulation under consideration is or can be subjected when the equipment is operating at its rated voltage under conditions of normal use.

SA3.14 USE, GENERAL – a device that has been determined acceptable for direct installation in field applications in accordance with country-specific national electrical codes. A device complying with the requirements of this standard is considered to be for general use.

SA3.15 USE, SPECIAL – a device intended as a component of a luminaire or a unique application and subject to additional considerations when the final application is known. A device complying with the requirements of this standard and any additional requirements for the final application is considered to be for special use.

SA4 General Requirements

SA4.1 Requirements from Clause 4 apply.

SA5 Mechanical Construction

SA5.1 Enclosures

SA5.1.1 Requirements from Clause 5.1 apply and as amended below.

SA5.1.2 Lamp enclosures can be partially or entirely of glass. Glass is considered to be an inorganic material that can vary considerably in mechanical strength and resistance to cracking or breaking. Requirements in this supplement evaluate the material for lamp applications.

SA5.2 Openings

SA5.2.1 Requirements from Clause 5.2 apply and as amended below.

SA5.2.2 No openings are permitted for devices designated for wet locations.

SA5.3 Polymeric materials

SA5.3.1 Requirements from Clause 5.3 apply and as amended below.

SA5.3.2 The enclosing diffuser for an LED shall have a flammability rating as indicated in Table SA5.1. Different flammability ratings are assigned depending on the power available to the LED array and whether the LED driver has an isolated or direct connected output – see SA6.4.

Table SA5.1
LED lens and diffuser flammability ratings

Power Source	Class 2[a]	Isolated, non-Class 2[b]	Direct connected
Enclosure type needed	**None**	**Fire**	**Fire and electrical**
Integral LED Lens	Not defined	V1	V1
Other lenses and diffusers	Not defined	V0[c]	V0

[a] Power sources that also fall into this category include:

1) Limited Power Sources (LPS) compliant with UL 60950-1 or CAN/CSA-C22.2 No. 60950-1,

2) Low Voltage, Limited Energy (LVLE) power sources compliant with UL 8750 or CSA C22.2 No. 250.13, and

3) Power sources not considered a risk of fire per 4.5.2.

[b] Power sources isolated from the mains that are not a risk of shock (per 4.5.1) also fall into this category.

[c] May be V1 or SC1 if the total volume of all diffusers is less than 2500 mm^3 (0.156 in^3). The flammability of small parts may alternatively be determined using UL 1694.

SA5.3.3 A polymeric sheet insulating material used between a live part and an accessible non-current-carrying metal part, such as a heat sink, shall comply with the applicable requirements of this clause and is considered basic insulation.

SA5.3.4 A conductive coating applied to a surface such as the inside surface of a cover, enclosure, reflector, or the like shall comply with the requirements for metallized parts in UL 746C.

Note: This does not apply to coatings applied to compartments or in locations where the electrical parts would represent neither a risk of fire nor a risk of electric shock if they were to come into contact with conductive debris under any condition of use.

SA5.3.5 An adhesive used to secure the enclosure of a product that poses a risk of electric shock or risk of fire shall comply with the adhesive support test of UL 8750 or CSA C22.2 No. 250.13. Fusion techniques, such as solvent cementing, ultrasonic welding, electromagnetic induction, and thermal welding are not subject to this test.

SA5.4 Weight and moment

SA5.4.1 Requirements from Clause 5.4 apply and as amended below.

SA5.4.2 Requirements from Clause 5.4 apply only to the lamps with the bases specified in Clause 5.4.

SA5.4.3 Unless there is provision to support additional mass (weight) so the device is not solely supported by general use lampholders, a device supported only by a pair of pin bases and holders (SA6.13) shall have a mass (weight) not more than:

a) 0.2 kg (7 oz or 0.44 lbs) when using a G5 base, or

b) 0.5 kg (17.6 oz or 1.1 lbs) when using a G13 base.

SA5.4.4 A GZ4 or G5.3 lampholder for low voltage lamps is not intended to support the mass (weight) of the lamp, so there is no specified value.

SA6 Electrical Construction

SA6.1 Lamp bases and lampholders

SA6.1.1 Requirements from Clause 6.1 apply and as amended below.

SA6.1.2 A lamp with other than an Edison screwbase shall have a base that complies the dimensions of a base described in ANSI C81.61.

SA6.1.3 Certain ANSI pin bases are designated for low voltage (< 30 V). See UL 1598 or CSA C22.2 No. 250.0 for a listing of the low voltage bases.

SA6.1.4 For devices substituting for linear fluorescent lamps, Clause SA6.13, some contacts for the G5 or G13 lamp bases are not used for electrical connections and will only be intended for mechanical support of the lamp. Such contacts shall have no connection, and, if two unused contacts are in a single lamp base, the contacts shall not be connected (short-circuited) together or be connected (short-circuited) to any dead metal part of the lamp base. These devices shall be subjected to the Isolation of lamp pins, Clause SA8.20.

SA6.2 Current-carrying parts

SA6.2.1 Requirements from Clause 6.2 apply and as amended below.