C22.2 No. 12-1982 *(Reaffirmed 1999)*
Portable Luminaires

Environmental Products

General Instruction No. 5
C22.2 No. 12-1982
December 1996

Title: *Portable Luminaires* — originally published February 1982

Revisions issued:* General Instruction No. 2 — Date: August 1988
No. 3 — Date: June 1989
No. 4 — Date: July 1991

**If you are missing any General Instruction, please contact CSA Information Product Sales.*

The following revisions have been formally approved and are marked by a vertical line in the margin on the attached replacement pages:

Revised	None
New	Clauses 4.22 and 6.25
Deleted	None

C22.2 No. 12-1982 originally consisted of **40 pages** dated **February 1982**. It now consists of the following pages:

5, 6, 9, 10, 29-34 and **37–40** dated **February 1982**;
7 and **8** dated **August 1988**;
15, 16, 16A, 35, 36 and **36A** dated **June 1989**;
11–14, 17–20, 23–28, 28A, 28B, 41, 42 and **43** dated **July 1991**; and
3, 4, 21, 22, 22A and **28C** dated **December 1996**;

- Update your copy by inserting these revised pages.
- Keep the pages you remove for reference.

Contents

4.17.2 Materials shall be permanently retained in place.

4.18 Replacement of Lamps and Automatic Starters

4.18.1 Bare live parts shall not be exposed during the replacement operation or during cleaning of the luminaire, accessibility being determined by the probe in Clause 4.2.2.2. If replacement operations expose bare live parts, the device shall be marked in accordance with Clause 5.3.1(k).

4.18.2 Wiring joints or electrical components shall not be accessible to accidental handling that would loosen or otherwise damage these parts.

Note: *At least a separate barrier or a natural barrier provided by the construction of the device (see Clause 4.17) will be required.*

4.18.3 Parts that may be removed during normal use, such as for cleaning or relamping, shall be designed or marked to prevent replacement in a position that would affect the safe operation of the luminaire.

4.19 Incandescent Luminaire Kits

4.19.1 When assembled in the intended manner, a kit shall form an incandescent luminaire, with or without shade and with or without support or base, complying with all of the applicable requirements of this Standard.

4.19.2 No electrical components other than a lampholder having binding-screw terminals, a power-supply cord, and a cord switch shall be provided. A cord switch, if provided, shall be installed on the cord at the factory.

4.19.3 The complete kit shall be packaged in a single carton or container (see also Clause 5.4).

4.20 Grounding and Bonding

4.20.1 The methods and materials used for the grounding and bonding of a luminaire or the parts thereof shall comply with CSA Standard C22.2 No. 0.4, Bonding and Grounding of Electrical Equipment (Protective Grounding).

4.20.2 Residential-type luminaires intended for certain specific uses or damp or wet locations, such as extension hand-lamps, aquarium lamps, and plant-growing lamps, shall be grounded where the construction involves non-current-carrying metal parts that may become energized during general use or servicing.

4.20.3 Luminaires intended for commercial and industrial use shall have provision for grounding. This requirement includes the following types of luminaires:

(a) Hospital lamps;

(b) Photo-engravers' arc lamps;

(c) Drafting lamps;

(d) Machine-shop lamps;

(e) Machine-tool lamps;

(f) Illuminated shields for use with electric grinders;

(g) Lamp testers;

(h) Light channels for display of lamp shades;

(i) Table illuminators used in science and industry.

4.20.4 Non-current-carrying metal parts that are exposed during general use or servicing (eg, cleaning or relamping) and may become energized shall be bonded for grounding purposes, unless the electrical components within or adjacent to these metal parts are protected with additional insulating material (see Clause 4.17) having a minimum thickness of at least 0.032 inch.

Note: *The following would be acceptable:*

(a) 1/32-inch-nominal insulated wire with 1/32-inch-minimum wall sleeving of insulating material within a metal enclosure;

(b) 1/32-inch insulated wire within a plastic housing of at least 1/32-inch wall thickness;

(c) Bare live parts within a plastic enclosure that complies with Clause 4.2; or

(d) Bare live parts within a metal enclosure with 2 independent layers of insulation (see Clause 4.17), each not less than 1/32 inch thick.

4.21* Blades (Nightlights)

4.21.1* Blades of a nightlight shall comply with the requirements of Clauses 4.21.1 to 4.21.4, and the Blade Security Test of Clause 6.21. Nightlights using replaceable lamps shall then be evaluated with the probe of Figure 1, with a lamp installed.

4.21.2* Live parts of a nightlight shall remain inaccessible to the probe of Figure 1. Where necessary, an electrical indicator shall be used to determine whether or not contact is made.

4.21.3* Spacings of 1.2 mm shall be maintained between uninsulated live parts of opposite polarity and between uninsulated live parts and exposed non-current-carrying metal parts when the nightlight is installed in the intended manner.

4.21.4* The spacing requirement of Clause 4.21.3 shall not apply to the body of a neon lamp if, when the leads are short-circuited at the base of the lamp, the series resistor does not operate in excess of its nominal rating.

***Effective Date** — *January 31, 1992*

4.22 Floor-Type Portable Luminaires

A luminaire with an open top design facing upward and intended to prevent the lamp from being visible for indirect lighting, such as the torchiere type, and employing a tungsten-halogen lamp with an E26 medium screwbase or a lamp other than the conventional incandescent type with an E26 medium screwbase, shall withstand the Abnormal Operation Test of Clause 6.25 and be marked for keeping away from combustible materials in accordance with Item (l) of Clause 5.3.1.

Note: *A conventional incandescent lamp is an incandescent lamp that is not of the tungsten-halogen type.*

5. Marking

5.1 General. Each luminaire shall be plainly and permanently marked with the following information where it will be readily visible:

(a) Manufacturer's or submittor's name, trademark, or other recognized symbol of identification;

(b) Catalogue number, model number, or other type designations on luminaires such as transformer-operated, display, electronic (solid-state), garden, hospital, illuminated-shape, machine-shop and colour-wheel types;

(c) Input rating in volts, hertz (or cycles), and total amperes or watts, except on luminaires incorporating only incandescent lamps; and

(d) Secondary volts and amperes or volt amperes, where applicable.

5.2 Lamp Replacement Caution

5.2.1 Incandescent luminaires, which require a limitation of the lamp wattage, shall be permanently and legibly marked, where readily visible during relamping, with the following caution or equivalent:
MAX . . . WATTS, TYPE . . . .

Notes:

(1) *More than one wattage and type of lamp may be included in the caution if sufficient testing is conducted to confirm that the temperature requirements are met.*

(2) *A lamp replacement caution shall not be required for a luminaire if it complies with the normal-temperature test using lamps of the maximum size and type that it will accommodate.*

5.2.2 The caution shall be made in a permanent manner, the effects of temperature being considered. Lettering shall be upper case (Univers 65 or equivalent). "MAX" shall be at least 3/16 inch high (20 point). All other letters shall be at least 3/32 inch high (10 point). The caution shall be located and executed in such a manner that it is prominent during relamping and there shall be a contrast between the lettering and the background.

5.2.2A* Where size limitations exist (eg, nightlights), the lettering requirements shall be as specified in Clause 5.2.2 except:

(a)* "MAX" shall be at least 1/16 inch (7 point);

(b)* All other letters shall be 3/64 inch (5 point);

(c)† Where replacement lamps are limited to candelabra base only, the word "TYPE" may be omitted.
***Effective Date** — *August 31, 1988*
†**Effective Date** — *January 31, 1992*

5.2.3 Where special lamps are intended, the maximum wattage and burning position shall be indicated in an acceptable manner.

5.3 Additional Cautions or Warnings

5.3.1 The following cautions or warnings shall also be permanently marked on each luminaire, as required, in both English and French (equivalent wording will be accepted in all cases):

(a) FOR OUTDOOR USE and

POUR EMPLOI À L'EXTÉRIEUR.

This shall be legible during positioning of the luminaire for use;

(b)* Extension hand-lamps shall be marked:

FOR HEAVY-DUTY USE IN GARAGES OR SIMILAR LOCATIONS and

CONVIENT POUR USAGE INTENSIF DANS LES GARAGES OU AUTRES EMPLACEMENTS or

FOR LIGHT-DUTY USE IN NORMALLY DRY LOCATIONS and

CONVIENT POUR USAGE ORDINAIRE DANS LES EMPLACEMENTS SECS;

Residential reel-type:

FOR LIGHT-DUTY RESIDENTIAL USE ONLY and

CONVIENT SEULEMENT POUR USAGE ORDINAIRE RESIDENTIEL
***Effective Date** — *August 31, 1988*

(c) Luminaires intended for use in damp or wet locations such as aquarium hood- and extension hand-lamps shall have a warning to indicate that relamping or other servicing should not be carried out while the luminaire and/or the surroundings are damp or wet unless the plug is disconnected from the power supply;

(d) Luminaires intended for use in damp or wet locations shall be marked:

DO NOT SUBMERSE and

NE PAS IMMERGER;

(e) A warning to indicate the positions of use, which shall be legible during positioning of the luminaire for use. This warning is not required if:

(i) The luminaire is found suitable for use in all possible mounting positions; or

(ii) There is only one possible mounting position;

6.23.3* The Standard lamp shall then be inserted in each of the lampholders described in Clause 6.23.2, except that the lamp shall be fully seated in the lampholder. The depth of the lampholder cavity shall be measured from the plane of the depressed centre contact of the lampholder to the rim of the insulating liner or body and shall be not less than 17.5 mm.

6.24* Overlamping (Relampable Nightlights)

6.24.1* A nightlight intended for use with replaceable lamps rated less than 10 W shall not emit flame or molten metal or cause risk of fire or shock hazard when operated continuously with a 10 W lamp until ultimate results are observed.

Note: *In most cases, continuous operation for* 7 h *is necessary to determine ultimate results.*

***Effective Date** — *January 31, 1992*

6.25 Abnormal Operation Test

6.25.1 A luminaire shall be installed as intended with the lamp specified by the manufacturer. Lamp containment barrier, shade, and similar accessories shall be secured to the luminaire.

6.25.2 A dimmer or similar device provided as a part of the luminaire shall be bypassed for the test. A protective device that regulates or limits the operating temperature shall be bypassed if it does not comply with the requirements of the applicable CSA Part II Standard.

6.25.3 Any part of a luminaire that is not supported by a mechanical means or frictional contact and is readily removable without the use of a tool to achieve a more severe test condition shall be removed for the test.

6.25.4 The luminaire shall be draped with a simulated curtain. The simulated curtain shall consist of a single layer of white duck, with two layers of cheesecloth lining the white duck on the side facing the lamp. The white duck and cheesecloth shall be of the type specified in Clause 6.25.7. The simulated curtain shall cover and enclose the entire open top of the luminaire including the lamp, lamp containment barrier, and heat-producing components, with a minimum of 250 mm (10 in) overhang from the edge of the open top. The simulated curtain shall contour the open top over its edge with the two layers of cheesecloth draped over and lying loosely on the open top.

6.25.5 The luminaire shall be operated at the following test voltage for a minimum of 7 h and a maximum of 24 h:

(a) 5 ± 1.5% higher than the voltage at which the rated wattage of a nominal 120 V rated incandescent lamp, including the tungsten-halogen type, is obtained; or

(b) 5 ± 1.5% higher than the rated input voltage of the transformer or ballast for a transformer-operated or ballasted lamp.

6.25.6 There shall be no ignition, glowing, or charring of the simulated curtain during the test.

Notes:

(a) Glowing of a simulated curtain is determined by visual examination for broken fibres after removing the simulated curtain from the luminaire.

(b) Charring is the condition where a simulated curtain is black; it is more than discolouration.

6.25.7 Cheesecloth shall consist of bleached cheesecloth running 34 g/m^2 (0.11 oz/ft^2) with a thread count in the range 10–13 by 9–12 threads/cm (25–33 by 22–30 threads/in). White duck shall weigh 406 gm/m^2 (1.33 oz/ft^2).

General Instruction No. 4
C22.2 No. 12-1982
July 1991

CSA Standard C22.2 No. 12-1982, *Portable Luminaires,* was published in February 1982; it consisted of **40 pages**, each of which was dated **February 1982.** Amendments in the form of replacement pages were published in August 1988 and June 1989 (see General Instruction Nos. 2 and 3)*.

**If you do not have General Instruction Nos. 2 and 3, please contact CSA Standards Sales.*

Amendments to the Contents, Clauses 2.1, 3.2.1, and 5.2.2A, and the addition of Clauses 4.2.1.6, 4.9.1.7, 4.9.1.8, 4.9.2.7, 4.9.2.8, 4.9.2.8.1, 4.9.2.8.2, 4.9.2.8.3, 4.9.4.3, 4.11.13, 4.21, 4.21.1, 4.21.2, 4.21.3, 4.21.4, 5.3.1(o), 5.4.5, 6.16.4, 6.19, 6.19.1, 6.19.2, 6.20, 6.20.1, 6.20.2, 6.21, 6.21.1, 6.21.2, 6.21.3, 6.21.4, 6.22, 6.22.1, 6.22.2, 6.22.3, 6.22.4, 6.22.5, 6.22.6, 6.23, 6.23.1, 6.23.2, 6.23.3, 6.24, 6.24.1, and Figures 6, 7, and 8, and the deletion of Clause 4.14.4 have been formally approved and incorporated (and identified by a vertical line in the margin) in the attached replacement pages.

Errata to Clauses 1.3(b), 3.2.1, 4.11.5, 6.4.2, and 6.4.6 have also been incorporated and identified.

CSA Standard C22.2 No. 12-1982 now consists of the following pages:

5, 6, 9, 10, 29–34, and **37–40** dated **February 1982;**

7 and **8** dated **August 1988;**

15, 16, 16A, 35, 36, and **36A** dated **June 1989;**

3, 4, 11–14, 17–28, 28A, 28B, 28C, 41, 42, and **43** dated **July 1991.**

These replacement pages are to be inserted into your copy of the Standard; the pages replaced should be kept for reference.

Contents

C22.2 No. 12-1982
Portable Luminaires

1. Scope

1.1 This Standard applies to portable luminaires* for general household, commercial, and industrial use in dry, damp, and outdoor locations, and intended to be used in accordance with the Rules of the Canadian Electrical Code, Part I, in non-hazardous locations, on a nominal 120 V system.

**Throughout this Standard the term "portable luminaires" has been shortened to "luminaires".*

1.2 This Standard applies to portable incandescent and fluorescent luminaires for illuminative and decorative purposes and to combinations of these, such as: aquarium hoods, cabinets (illuminated bars, hutches, etc.), chain- and hook-supported types (including flexible-cord-, steel-cable- or rope-supported), colour wheels, drafting lamps, display types, electronic (flashing, touch-control) types, extension hand-lamps, fibre-optic types, floor lamps, garden lights, gimbal lights, hospital lamps, illuminated forms or shapes (figurines, fire logs, terrestrial globes, plaques, etc.), kits, lamp testers, light channels for display purposes, machine-shop lamps (e.g., illuminated shields for use with electric grinders), make-up mirrors, picture lamps, planter lamps, plug-in night-lights, pole lamps, room dividers, table lamps (including nursery, desk, novelty types, etc.), transformer-operated ultra-violet hobby lamps, and wall (pin-ups, under-cabinet) types.

***Note:** Luminaires intended for residential use, incorporating parts such as beverage cans, nostalgia items, etc., used as a base, stand, or shade, may include wording to indicate the name or trademark of the product usually contained.*

1.3 This Standard does not apply to:

(a) Christmas-tree and other decorative lighting outfits (except for colour wheels) covered by CSA Standard C22.2 No. 37, Christmas-Tree and Other Decorative Lighting Outfits;

(b) †Outdoor floodlight-type luminaires, fluorescent luminaires designed for commercial or industrial use and with one or more lamps rated at more than 20 W, and high-intensity discharge luminaires covered in CSA Standard C22.2 No. 9, Luminaires.

(c) Electric signs covered by CSA Standard C22.2 No. 2, Electric Signs;

(d) Electric displays and incandescent-lamp signs covered by CSA Standard C22.2 No. 7, Portable Electric Displays and Incandescent-Lamp Signs, except as noted in Clause 4.1.6;

(e) Therapeutic luminaires (e.g., infra-red, ultra-violet) covered by CSA Standard C22.2 No. 125, Electromedical Equipment;

(f)* Stage and studio luminaires covered by CSA Standard C22.2 No. 166, Stage and Studio Luminaires.

***Effective Date** — *June 30, 1989*
†**Effective Date** — *July 31, 1991*

2. Definitions

2.1 The following definitions apply in this Standard:

Candelabra screw lampholder (skeleton-type)* means a candelabra screw lampholder having one or more narrow strips of metal secured to a moulded, threaded body of a lampholder insulating material.
***Effective Date** — *January 31, 1992*

Direct Plug-In Night Light means a self-contained device rated 10 Watts or less.

Extension hand-lamp means an assembly consisting of a length of flexible cord with an attachment plug at one end and a hand-held lampholder with lamp-guard at the other, and classified as:

(a) ***Heavy-duty type*** intended for use in damp locations, garages, or similar locations;

(b) ***Light-duty type*** intended for use in normally dry locations and where it is not unduly exposed to damage from mechanical causes;

Lamp means a complete assembly consisting of the bulb, filament, filament leads and supports, screwshell or pins, contacts, etc.;

Luminaire means a complete lighting unit designed to accommodate a lamp or lamps, and to connect a lamp or lamps to a power supply;

Portable luminaire* means a luminaire connected to the power source by means of a cord and attachment plug, and of such size and/or mass as to permit ready movement from one location to another;
***Effective Date** — *June 30, 1989*

Relampable direct plug-in nightlight* means a direct plug-in nightlight constructed in such a way as to permit replacement of the lamp.
***Effective Date** — *January 31, 1992*

Shade (nightlight)* means a diffuser intended to reduce the glare of the lamp.
***Effective Date** — *January 31, 1992*

Light source means the lamp, lens or light shield;

Wiring device means an electrical component of a luminaire that is necessary for the intended use and/or proper control of the assembly involved but does not include wiring or lamps.

3. General Requirements

3.1 General requirements applicable to this Standard are given in CSA Standard C22.2 No. 0, Definitions and General Requirements.

3.1.1 Luminaires for use in hospitals (e.g., examining lamps, wall lamps installed above the head) shall also meet the applicable requirements of CSA Standard C22.2 No. 125, Electromedical Equipment.

3.2 Reference Publications

3.2.1 Where reference is made to CSA Standards of the Canadian Electrical Code, Parts I and II, such reference shall be considered to refer to the latest edition and revision thereto, unless otherwise specified. This Standard refers to the following such Standards and the year dates shown indicate the latest editions available at the time of printing:

C22.1-1986,
Canadian Electrical Code, Part I;

C22.2 No. 0-M1982,
Definitions and General Requirements;

C22.2 No. 0.4-M1982*,
Bonding and Grounding of Electrical Equipment (Protective Grounding);

C22.2 No. 0.6-M1982,
Flammability Testing of Polymeric Materials;

C22.2 No. 2-1956,
Electric Signs;

C22.2 No. 7-1938,
Portable Electric Displays and Incandescent-Lamp Signs;

C22.2 No. 9-M1989*,
Luminaires;

C22.2 No. 37-M1989*,
Christmas Tree and Other Decorative Lighting Outfits;

C22.2 No. 42-M1984,
General Use Receptacles, Attachment Plugs, and Similar Wiring Devices;

C22.2 No. 66-1988*,
Specialty Transformers;

C22.2 No. 84-1974,
Incandescent Lamps;

C22.2 No. 94-1976,
Special Purpose Enclosures 2, 3, 4, and 5;

†— Deleted

C22.2 No. 125-M1984,
Electromedical Equipment;

C22.2 No. 166-M1983*,
Stage and Studio Luminaires;

CAN/CSA-C22.2 No. 207-M1989†,
Portable and Stationary Electric Signs and Displays.

***Effective Date** — *June 30, 1989*
†**Effective Date** — *January 31, 1992*

3.2.2 Where reference is made to the following publications such reference shall be considered to refer to that edition listed below:

CSA Standard
C235-1969,
Preferred Voltage Levels for AC Systems, 0 to 50,000 Volts.

UL* Standard
UL No. 94-1973 (Second Edition),
Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

**Underwriters Laboratories, Inc.*

4. Construction

4.1 General

4.1.1 Component parts shall be of types specifically approved for the use intended or shall be investigated as an integral part of the luminaire.

4.1.2 Electrical components shall conform to the individual Canadian Electrical Code, Part II Standard covering such components, with exceptions where the application may allow a deviation.

4.1.3 Luminaires shall have the necessary strength and rigidity to resist the abuses to which they are liable to be subjected, without the required spacings of the electrical equipment being reduced or parts becoming loosened or displaced. Parts that may be removed during normal use, such as for cleaning or relamping, shall be designed

or marked to prevent replacement in a position that would affect the safe operation of the luminaire.

4.1.4 There shall be no sharp edges, burrs, etc., nor shall any method of construction be used that might damage electrical insulation, reduce electrical spacings, or cause injury to the user.

4.1.5 Except as permitted by Clause 4.3.7, a luminaire that is designed to be hung on a ceiling or wall shall not incorporate a bowl, shelf, hook, or any other provision intended for the support of any object, other than a shade, that is not a part of the luminaire.

4.1.6 Unless permitted elsewhere in this Standard, all electrical parts of luminaires and their enclosures shall be completely assembled at the factory.

4.2 Electrical Enclosures

4.2.1 General

4.2.1.1 Except as permitted by Clause 4.2.1.2, an enclosure shall be provided to:

(a) Prevent accidental contact with bare live parts operating at a potential of more than 30 V;

(b) Contain either flame or material caused by a fault in the electrical parts; and

(c) Protect electrical parts from mechanical damage and environmental conditions.

Note: *Examples of electrical parts are: separated conductors of Type SPT-1 (POT-64) flexible cord, conductors having 1/64 inch (nominal) or less insulation, wiring connections, resistors, capacitors, semi-conductor devices, open-type motors, open coil of transformers, and similar components.*

4.2.1.2 An enclosure shall not be required where:

(a) Live parts of lampholders or starter holders make connection directly to lamp or starter contacts;

(b) Conductors, including separated conductors of flexible cord, except as noted in Clause 4.2.1.1, are mechanically protected by the body or other parts (other than chain) of the luminaire or by sleeving (see Clauses 4.12.4, 4.12.5, and 4.17);

(c) Individual conductors having 1/32 inch thick (nominal) insulation are woven through the links of a chain; or

(d) Terminal connections in a recess of a wiring device covered with a barrier or compound complying with Clause 4.17.

4.2.1.3 Factory connections need not be accessible for servicing. Ample space shall be provided for the type of connections employed.

4.2.1.4 Where applicable, removable parts secured by friction or spring-retained shall comply with the bonding requirements of CSA Standard C22.2 No. 0.4, Bonding and Grounding of Electrical Equipment (Protective Grounding).

4.2.1.5 Floor or pole or similar room-divider types having the supporting stem made in interlocking sections that are separated for shipping purposes shall have:

(a) Splices and wiring (at the break in 2 adjacent sections) protected by an overall sleeve of insulating material at least 0.028 inch thick or by some other equivalent method;

(b) The protection extended over the wiring at least 4 inches on each side of the wiring splices; and

(c) The protection secured in position, e.g., with insulating tape at each end of a sleeve.

4.2.1.6 Assembly Security (Nightlights)* A nightlight using replaceable lamps shall comply with the requirements of the Lampholder Cavity Separation Test of Clause 6.19. A nightlight not employing a replaceable lamp shall comply with the requirements of the Pull Test of Clause 6.20. Each test shall require six representative samples.
***Effective Date** — *January 31, 1992*

4.2.2 Openings in and Degree of Enclosure

4.2.2.1 Parts that are required to be enclosed by Clause 4.2.1.1 shall not be accessible through any opening during operation, or during normal servicing such as relamping or cleaning (see also Clause 4.18), the accessibility being determined by the procedure outlined in Clause 4.2.2.2.

4.2.2.2 When inserted in every position, the probe illustrated in Figure 1 shall not contact parts that are required by Clause 4.2.1.1 to be enclosed. Where necessary, an electrical indicator shall be used to determine whether or not contact is made.

4.2.2.3 Recesses in the body of a wiring device shall not be considered as the sole enclosure for bare live parts.

4.2.2.4 Openings, if provided and regardless of shape, shall not adversely affect the strength or the rigidity of the enclosure.

4.2.2.5 Drain holes, if provided, shall be no less than 1/8 inch in diameter.

4.2.2.6 Openings located 1/2 inch or less from the surface on which an enclosure is intended to be mounted shall be considered as mounting holes (see Clause 4.2.2.7), and all other openings shall be considered as ventilating holes (see Clauses 4.2.2.8 and 4.2.2.9), except for drain holes, which shall comply with Clause 4.2.2.5.

4.2.2.7 Mounting holes shall:

(a) Not exceed 0.20 square inch in area for each hole;

(b) Not exceed, in total area, 0.35% of the total area of the enclosure mounting surface, except that additional mounting holes may be provided in a knock out form;

(c) Prevent turning* of the luminaire with the provision of at least 2 holes for a mounting surface up to 40 square inches in area, except that 1 hole is acceptable where additional positive means† is provided to prevent turning; and

**Turning that does not affect electrical parts or the temperature limits is permissible.*

†*This excludes flexible parts such as wiring and parts that are not intended for that purpose.*

(d) Provide increased support with at least an additional hole for each 200 square inches of total luminaire mounting surface in excess of 40 square inches.

4.2.2.8 Ventilating holes shall:

(a) Not exceed 1.50 square inches for each hole; and

(b) Not exceed, in total area, 15% of the total area of the enclosure.

4.2.2.9 Ventilating holes may be located in any surface, except that none shall be provided:

(a) In the mounting surface; or

(b) Directly below parts that are required by Clause 4.2.1.1 to be enclosed, unless the parts are baffled. (See Figure 2 and Clause 4.2.2.10.) "Directly below" is determined by drawing an imaginary cone, as shown in Figure 2, from the part involved. The cone shall always be drawn at the vertical regardless of the slope of the bottom of the enclosure. Any opening in the area of this circle is considered to be directly below the part involved.

4.2.2.10 A baffle as specified in Clause 4.2.2.9 shall:

(a) Be made of metal meeting the appropriate requirements of Clause 4.2; or

(b) Be made of non-metallic material complying with the flame test of Clause 6.5 or 6.6; and

(c) Be without perforations, except as noted in Item (e); and

(d) Be located within, and having a dimension at least equal to, the perimeter of the cone shown in Figure 2; and

(e) If made of perforated material, have one of the following constructions:

(i) A galvanized steel screen or the equivalent having a 14 × 14 mesh and wire with a diameter of 0.018 inch;

(ii) A panel in accordance with Table 1;

(iii) A perforated metal panel that complies with the flaming oil test specified in Clause 6.18.

4.2.3 Enclosure Materials

4.2.3.1 Enclosures shall be made of sheet metal, extruded metal, cast metal, or other suitable material such as glass, ceramic, or plastic.

4.2.3.2 Non-metallic enclosures shall be capable of withstanding the flame test of Clause 6.5 or 6.6 (except for glass or ceramic materials) and the mechanical strength tests of Clause 6.16.

4.2.3.3 Plain paper, fibre, or wood shall not be accepted unless lined with material that, along with the paper, fibre, or wood, complies with Clause 4.2.3.2.

4.2.3.4 Liners used with the materials noted in Clause 4.2.3.3 shall be secured with an adhesive or the equivalent.

4.2.3.5 The thickness of sheet metal shall be in accordance with Table 2.

4.2.3.6 The following definitions apply in Table 2:

(a) **Length** means the longest straight line that can be drawn on any unreinforced flat section;

(b) **Reinforced** means a form of construction that provides equivalent mechanical strength.

4.2.3.7 The thickness of cast metal shall be in accordance with Table 3.

4.2.3.8 Minimum thickness for extruded aluminum shall comply with Clauses 4.2.3.5 and 4.2.3.6.

4.3 Mounting Provisions

4.3.1 Openings for pin-up, wall-mounted luminaires shall:

(a) Be located such that a supporting hook, screw, etc. is prevented from contacting electrical parts;

(b) Not exceed 2 in number, with at least 1 hole or slot for each 5 pounds of the luminaire.

Note: *Pin-up holes need not be of the keyhole type.*

4.3.2 An external ring hanger shall be formed of metal or plastic, and shall be subjected to the loading test of Clause 6.7.

4.9.1.2 If knobs on switches, etc. are removable from outside the enclosure, their removal shall not expose live parts.

4.9.1.3 Wiring devices such as receptacles, switches, etc. used in luminaires intended for use in wet locations shall be of the weatherproof type.

4.9.1.4 Materials of which components are constructed shall be such that they will neither create a fire hazard nor be themselves injuriously affected by the highest temperature likely to be attained in normal use.

4.9.1.5 An aquarium-type luminaire shall be so designed that, under normal condition of use, water will not contact lamps, lampholders, switches, etc.

4.9.1.6* Direct plug-in nightlight blade materials may be constructed of copper or aluminum alloys which conform to the dimensional requirements as specified in CSA Standard C22.2 No. 42.
***Effective Date** — *August 31, 1988*

4.9.1.7* Conductive material of which nightlight components are constructed shall

(a) be of copper, copper alloy, aluminum, aluminum alloy, or other material (e.g. stainless steel) that has been investigated and found to be acceptable for the intended purpose;

(b) comply with the applicable requirements in the individual Canadian Electrical Code, Part II Standard(s) covering such components.

4.9.1.8* Nightlight plug face dimensions shall be as illustrated in Figure 6. A direct plug-in nightlight may employ smaller plug face dimensions provided the probe illustrated in Figure 7 does not make contact with the blades when applied around the perimeter of the plug face. The surface of the probe with the "w-z" dimension shall be applied against the external edge of the plug face, with the "y" dimension perpendicular to the blades.
***Effective Date** — *January 31, 1992*

4.9.2 Lampholders

4.9.2.1 A candle-type lampholder* shall be used only if:

(a) The lampholder is provided with a decorative, permanently secured, close-fitting enclosure meeting the applicable requirements of Clause 4.2 and, in addition to the paper covering on the screwshell, enclosing the entire lampholder and providing the required depth of the lamp cavity; and

(b) The lampholder is used in equipment intended only for use in dry locations.

**A candle-type lampholder is essentially a lampholder having bare live parts other than the centre contact andscrew shell and having a fibre outer casing supplied by the lampholder manufacturer.*

4.9.2.2 Screw-shells in lampholders of luminaires intended for use in wet or damp locations shall be of copper or copper alloy.

4.9.2.3 Lampholders for extension hand-lamps shall:

(a) Be complete with a handle;

(b)* Deleted;

(c) Be provided with a guard to protect the lampbulb and the lampholder;

(d)* Deleted;

(e) Have a jacket or cover of insulating material over the screw-shell suitable for the intended application (see Clause 4.2).

***Effective Date** — *August 31, 1988*

4.9.2.4 A porcelain lampholder mounted by means of a screw-ring shall be used with the gasket usually supplied with this type of lampholder and it shall be adequate for the intended use of the luminaire.

4.9.2.5 The lampholder body in luminaires intended for use with aquariums or in other damp or wet locations shall be of phenolic composition, glazed porcelain, or other material having equivalent moisture-resistant properties.

4.9.2.6 Chain- and hook-supported, cord-supported, clamp-on utility, and similar types of luminaires shall use lampholders having a body of insulating material such as phenolic composition or porcelain.

4.9.2.7* Skeleton-type screwshells of candelabra screw lampholders shall provide at least 2 full threads for electrical engagement with the mating lamp screw base.

4.9.2.8* Candelabra Screw Lampholders

4.9.2.8.1* Dimensions of candelabra screw lampholders of relampable direct plug-in nightlights shall comply with the requirements of Clauses 4.9.2.8.2 and 4.9.2.8.3 and the Depth of Holder Cavity Test of Clause 6.23.

4.9.2.8.2* Thread dimensions, other than the depth of holder cavity, shall comply with ANSI C81.10c, Standard Sheet 2-7. Compliance of the thread dimensions shall be established with the "GO" and "NOT-GO" gauges as specified in ANSI C81.10c, Standard Sheets 3-36 and 3-37 respectively.
***Effective Date** — *January 31, 1992*

4.9.2.8.3† Depth of the holder cavity, measured from the plane of the depressed centre contact to the rim of the insulating liner or body, shall be not less than 17.5 mm.
†Effective Date — *January 31, 1993*

4.9.3 Switches

4.9.3.1 The voltage rating of a switch shall be suitable for the load that it controls.

4.9.3.2 A switch that controls a tungsten-filament lamp load shall be "T"-rated or be suitable for use with tungsten-filament lamps on ac, in conjunction with an ampere rating equal to the load that it controls, or shall have an ampere rating at least 3 times the rating of the load.

4.9.3.3 For inductive loads, switches shall have a current rating of at least twice the total current of the load that it controls.

4.9.3.4 A switch, if provided, shall be connected in the supply side of the circuit and shall have an OFF position.

4.9.4 Receptacles

4.9.4.1 A receptacle in a luminaire that is required to be grounded (see Clause 4.20) shall be a 120-V, 2-pole, 3-wire grounding type.

4.9.4.2* — Deleted
***Effective Date** — *August 31, 1988*

4.9.4.3* A receptacle in a luminaire that is required to be polarized as specified in Clause 4.14 shall be of the polarized type.
***Effective Date** — *January 31, 1992*

4.9.5 Ballasts, Transformers, Capacitors, Resistors, and Other Auxiliary-Type Devices

4.9.5.1 Paper capacitors shall be impregnated or be so enclosed that moisture will be excluded.

4.9.5.2* — Deleted
***Effective Date** — *August 31, 1988*

4.9.5.3 Step-down transformers shall be of the isolating type meeting the applicable requirements of CSA Standard C22.2 No. 66, Specialty Transformers.

4.9.5.4* A direct plug-in device shall

(a) not exceed 2-1/2 lbs. with the exception of those provided with means of additional support;

(b) be enclosed as required by Clause 4.2.1;

(c) have the lamps connected in series where more than 1 lamp is controlled by the fluorescent ballast;

(d) not use the coverplate mounting screw as a means of support.
(See also Clauses 4.11.8 and 4.11.9.)
***Effective Date** — *August 31, 1988*

4.10 Gaskets

4.10.1 Gaskets shall be secured so that they are not liable to be readily damaged or discarded during operation or maintenance.

***Note:** The use of cement as the sole means of securing a gasket shall be subject to investigation.*

4.10.2 Gasket material shall:

(a) Retain its effectiveness in service;

(b) Not lose resilience or become sticky under any condition likely to be encountered; and

(c) Withstand continued exposure to heat and moisture.

4.10.3 Gaskets shall be used to prevent the entrance of moisture at mechanical joints and seams of luminaires intended for use in wet locations, unless the design is such that the luminaire prevents the entrance of moisture when set in any possible supporting position.

4.11 Flexible Supply Cords

4.11.1 A luminaire shall be provided with a length of one of the types of flexible cord listed in Table 4, except that other types of cord may be used if they are found to be suitable for the particular application.

4.11.2 A hospital bed-lamp shall be provided with a flexible cord of Type SV, or the equivalent.

4.11.3* An extension handlamp shall use a flexible cord of at least

(a) Type SOW or STW for heavy-duty use; or

(b) Type SJOW or SJTW for light-duty use, except that if a self-retracting reel is incorporated, Type SVO or SVT may be used;

(c) the conductors shall be at least No. 18 AWG, except that where a receptacle is provided, they shall be at least No. 16 AWG with ground, and be not more than 50 feet in length.
***Effective Date** — *August 31, 1988*

4.11.4 Unless required or permitted otherwise in this Standard, cords for use in household luminaires shall be at least No. 18 AWG, Type SPT-1 (POT-64), except that the floor type and luminaires for commercial or industrial use shall be provided with at least Type SPT-2 (POT-32).

4.11.5* Luminaires intended for outdoor locations shall be used with at least No. 18 AWG, Type SJOW or SJTW.
***Effective Date** — *July 31, 1991*

4.11.6 Chain- and hook-supported types of luminaires shall use a minimum No. 18 AWG, Type SPT-2 (POT-32) 105°C flexible cord, at least 15 feet long, and the free end of the cord shall extend between 1 foot and 5 feet beyond the end of the chain.

4.11.7* — Deleted
***Effective Date** — *August 31, 1988*

4.11.8 Except as covered in the following note, a flexible cord shall extend at least 5 feet from the point at which the cord emerges from the body of the luminaire, the distance being measured to the face of the attachment plug. The free end of the flexible cord shall terminate in an attachment plug.

Note: *A cord suitable for at least hard usage such as Type SJ, SJT, or SJO on a luminaire intended for other than household use may extend less than 5 feet from the point at which the cord emerges from the body of the luminaire.*

4.11.9* If a luminaire is provided with a cord-type ballast or similar device, it shall be not less than 3 feet from the attachment plug.
***Effective Date** — August 31, 1988

4.11.10 A flexible cord shall not be used for the sole support of a luminaire or a part thereof, if the weight of the part to be supported exceeds 5 pounds.

4.11.11 Where a receptacle is assembled in a luminaire, the cord shall be at least No. 16 AWG, except that a minimum of No. 18 AWG may be used on a shaving or make-up mirror if it is marked in accordance with Clause 5.3.1(f).

4.11.12 There shall be no more than 1 supply cord to a luminaire.

4.11.13* For luminaires requiring polarization as specified in Clause 4.14, the attachment plug cap shall be polarized.
***Effective Date** — *January 31, 1992*

4.12 Internal Wiring

4.12.1 A luminaire shall be wired with conductors suitable for the temperature and voltages encountered. Some* of the types of wires and flexible cords, together with their respective maximum temperature and voltage ratings, are shown in Tables 4 and 5.

**Other types may be accepted subject to investigation.*

4.12.2 Except as permitted by Clause 4.12.3, conductors shall be not smaller than No. 18 AWG.

4.12.3 Conductors No. 22 AWG or No. 24 AWG may be used where:

(a) The lead is completely enclosed but not used in swivels;

(b) The length of the lead is not more than 6 inches;

(c) The wall thickness of the lead insulation is not less than 1/32 inch;

(d) No hazard is found to exist under any condition (see tests of Clause 6.4); and

(e) The wiring is in the secondary winding of a transformer or of a circuit using solid-state devices (e.g., on a printed circuit board).

4.12.4 Wires that are movable during normal use of the luminaire, such as in swivels, flexible goosenecks, etc., shall be of the stranded type.

4.12.5 Wiring not exceeding 2 inches in length and not in a raceway, if partially exposed, shall be mechanically protected by a sleeving (see Clause 4.17) that is secured in place over the conductors. The wiring and sleeving shall be routed and secured against the body or part of the luminaire by means of clips or the equivalent.

4.12.6 Wiring visible when shades, diffusers, or other parts are removed does not need additional protection, except that it shall be secured away from the hot bulb and so as to prevent accidental handling during lamp or starter replacement.

4.13 Bushings

4.13.1 A conductor-passage hole in sheet metal shall have a bushing unless the hole edge is rolled over smoothly at least 180°.

4.13.2 Holes for conductors in materials other than sheet metal (e.g., in cast metal, extruded metal, wood, thermoplastic, etc.) shall be free of sharp edges, burrs, fins, etc., and shall have a rolled edge or the equivalent.

4.13.3 Bushings shall be made of ceramic, urea, phenolic, melamine, self-extinguishing thermoplastic, or other equivalent materials.

Notes:
(1) Bushings made of rubber and so-called hot-moulded shellac and tar compositions are not acceptable.

(2) A fibre bushing may be used if the bushing is not less than 1/16 inch in thickness (with a minus tolerance of 1/64 inch for manufacturing variations).

(3) An insulated metal grommet is acceptable in lieu of an insulating bushing, provided that the insulating material used is not less than 1/32 inch in thickness and fills completely the space between the grommet and the metal in which it is mounted.

4.13.4 Bushings shall be secured in place.

4.14 Polarization and Identification

4.14.1 The screw-shell of a lampholder and the identified terminal or lead of a polarized cord connector, receptacle, or attachment plug shall be connected to the identified conductor.

4.14.2 A switch of the single-pole type shall not be connected in the identified conductor of a luminaire.

4.14.3 If an electric-discharge luminaire uses a single-pole switch, or incorporates a ballast that has an identified line lead or that is marked to indicate that one of its line leads is to be connected to the identified conductor of the supply circuit, one of the conductors of the supply cord shall be identified.

4.14.4* — Deleted
***Effective Date** — *January 31, 1992*

4.15 Strain Relief

4.15.1 A strain relief shall be provided such that a stress by pulling, pushing, flexing, or twisting on wiring or cord will not be transmitted to wiring connections or interior components.

Notes:
(1) Strain relief is not required where the supply cord is attached directly to a certified wiring device by the wiring device manufacturer and where tests equal to Clause 6.8 have been conducted during the certification investigation of the device.

(2) A knot in a cord or wiring is acceptable if the cord or wiring runs through a length of raceway, or the equivalent, such that strain relief as required by Clause 4.15.1 is provided.

4.15.2 If a knot in a cord or wiring serves as strain relief, the surface against which the knot may bear or with which it may come in contact shall be free from projections, sharp edges, burrs, fins, etc. that might damage the insulation on the conductors.

4.15.3 A knot shall be located so that it is not removable without disassembling the luminaire or parts of the luminaire.

4.15.4 Metallic crimp-type or set-screws of strain relief devices that bear directly on the cord shall not be used.

Note: *Other metallic crimp-type devices may be used on a jacketed cord or a non-jacketed cord that has supplementary protection.*

4.15.5 A thermoplastic set-screw type fitting shall be acceptable only when used with a jacketed-type flexible cord and if provided with a positive stop to prevent stress on the cord. It shall comply with the test of Clause 6.8 without adversely damaging the cord jacket, and it shall not be acceptable if the screw passes through the cord jacket.

4.15.6 Wiring splices in floor- or pole-type luminaires shall be provided with strain relief to prevent stress during packing, unpacking, and assembly.

4.16 Spacings

4.16.1 Except as permitted by Clauses 4.16.2 and 4.16.3, the spacing between the bare live parts of opposite polarity, and between bare live parts and non-current-carrying metal parts, shall be not less than 1/8 inch through air or over surface.

4.16.2 The minimum spacings for the separate components on a printed wiring assembly shall be 1/8 inch. The minimum spacings for printed circuit conductors shall be 3/64 inch.

4.16.3 When an insulating barrier or liner is used to obtain the spacings required by Clause 4.16.1, it shall:

(a) Be not less than 0.028 inch thick, except that it shall be not less than 0.010 inch thick if:

(i) Used in conjunction with a spacing not less than one-half of that required; and

(ii) Mica or the equivalent is held tightly in a fixed position by the parts between which the spacing is involved; and

(b) Comply with Clause 4.17.

4.17 Electrical Insulating Materials

4.17.1 Electrical insulation, including that used in component wiring devices, shall be of material that is suitable for the particular application and that will withstand the most severe conditions likely to be encountered in service. The acceptability of insulating material shall include consideration of the following:

(a) Mechanical strength;

(b) Dielectric strength;

(c) Heat- and moisture-resistant properties;

(d) Degree of enclosure of protection;

(e) Other factors that might have a bearing on the fire and accident hazard under conditions of actual use, such as arcing and aging; and

(f) Classification as at least slow-burning.

Note: *Materials such as mica, porcelain, phenolic composition, cold-moulded, and certain refractory materials are generally acceptable as the sole support of live parts. Other materials that are not suitable for general use, such as asbestos and magnesium oxide, may be accepted if used in conjunction with other more suitable materials, or if located and protected so that exposure to mechanical injury and the absorption of moisture are prevented.*

4.17.2 Materials shall be permanently retained in place.

4.18 Replacement of Lamps and Automatic Starters

4.18.1 Bare live parts shall not be exposed during the replacement operation or during cleaning of the luminaire, accessibility being determined by the probe in Clause 4.2.2.2. If replacement operations expose bare live parts, the device shall be marked in accordance with Clause 5.3.1(k).

4.18.2 Wiring joints or electrical components shall not be accessible to accidental handling that would loosen or otherwise damage these parts.

Note: *At least a separate barrier or a natural barrier provided by the construction of the device (see Clause 4.17) will be required.*

4.18.3 Parts that may be removed during normal use, such as for cleaning or relamping, shall be designed or marked to prevent replacement in a position that would affect the safe operation of the luminaire.

4.19 Incandescent Luminaire Kits

4.19.1 When assembled in the intended manner, a kit shall form an incandescent luminaire, with or without shade and with or without support or base, complying with all of the applicable requirements of this Standard.

4.19.2 No electrical components other than a lampholder having binding-screw terminals, a power-supply cord, and a cord switch shall be provided. A cord switch, if provided, shall be installed on the cord at the factory.

4.19.3 The complete kit shall be packaged in a single carton or container (see also Clause 5.4).

4.20 Grounding and Bonding

4.20.1 The methods and materials used for the grounding and bonding of a luminaire or the parts thereof shall comply with CSA Standard C22.2 No. 0.4, Bonding and Grounding of Electrical Equipment (Protective Grounding).

4.20.2 Residential-type luminaires intended for certain specific uses or damp or wet locations, such as extension hand-lamps, aquarium lamps, and plant-growing lamps, shall be grounded where the construction involves non-current-carrying metal parts that may become energized during general use or servicing.

4.20.3 Luminaires intended for commercial and industrial use shall have provision for grounding. This requirement includes the following types of luminaires:

(a) Hospital lamps;

(b) Photo-engravers' arc lamps;

(c) Drafting lamps;

(d) Machine-shop lamps;

(e) Machine-tool lamps;

(f) Illuminated shields for use with electric grinders;

(g) Lamp testers;

(h) Light channels for display of lamp shades;

(i) Table illuminators used in science and industry.

4.20.4 Non-current-carrying metal parts that are exposed during general use or servicing (e.g., cleaning or relamping) and may become energized shall be bonded for grounding purposes, unless the electrical components within or adjacent to these metal parts are protected with additional insulating material (see Clause 4.17) having a minimum thickness of at least 0.032 inch.

Note: *The following would be acceptable:*

(a) 1/32-inch-nominal insulated wire with 1/32-inch-minimum wall sleeving of insulating material within a metal enclosure;

(b) 1/32-inch insulated wire within a plastic housing of at least 1/32-inch wall thickness;

(c) Bare live parts within a plastic enclosure that complies with Clause 4.2; or

(d) Bare live parts within a metal enclosure with 2 independent layers of insulation (see Clause 4.17), each not less than 1/32 inch thick.

4.21* Blades (Nightlights)

4.21.1* Blades of a nightlight shall comply with the requirements of Clauses 4.21.1 to 4.21.4, and the Blade Security Test of Clause 6.21. Nightlights using replaceable lamps shall then be evaluated with the probe of Figure 1, with a lamp installed.

4.21.2* Live parts of a nightlight shall remain inaccessible to the probe of Figure 1. Where necessary, an electrical indicator shall be used to determine whether or not contact is made.

4.21.3* Spacings of 1.2 mm shall be maintained between uninsulated live parts of opposite polarity and between uninsulated live parts and exposed non-current-carrying metal parts when the nightlight is installed in the intended manner.

4.21.4* The spacing requirement of Clause 4.21.3 shall not apply to the body of a neon lamp if, when the leads are short-circuited at the base of the lamp, the series resistor does not operate in excess of its nominal rating.

***Effective Date** — *January 31, 1992*

5. Marking

5.1 General. Each luminaire shall be plainly and permanently marked with the following information where it will be readily visible:

(a) Manufacturer's or submittor's name, trademark, or other recognized symbol of identification;

(b) Catalogue number, model number, or other type designations on luminaires such as transformer-operated, display, electronic (solid-state), garden, hospital, illuminated-shape, machine-shop and colour-wheel types;

(c) Input rating in volts, hertz (or cycles), and total amperes or watts, except on luminaires incorporating only incandescent lamps; and

(d) Secondary volts and amperes or volt amperes, where applicable.

5.2 Lamp Replacement Caution

5.2.1 Incandescent luminaires, which require a limitation of the lamp wattage, shall be permanently and legibly marked, where readily visible during relamping, with the following caution or equivalent:
MAX . . . WATTS, TYPE . . . .

Notes:
(1) More than one wattage and type of lamp may be included in the caution if sufficient testing is conducted to confirm that the temperature requirements are met.

(2) A lamp replacement caution shall not be required for a luminaire if it complies with the normal-temperature test using lamps of the maximum size and type that it will accommodate.

5.2.2 The caution shall be made in a permanent manner, the effects of temperature being considered. Lettering shall be upper case (Univers 65 or equivalent). "MAX" shall be at least 3/16 inch high (20 point). All other letters shall be at least 3/32 inch high (10 point). The caution shall be located and executed in such a manner that it is prominent during relamping and there shall be a contrast between the lettering and the background.

5.2.2A* Where size limitations exist (e.g., nightlights), the lettering requirements shall be as specified in Clause 5.2.2 except:

(a)* "MAX" shall be at least 1/16 inch (7 point);

(b)* All other letters shall be 3/64 inch (5 point);

(c)† Where replacement lamps are limited to candelabra base only, the word "TYPE" may be omitted.
***Effective Date** — *August 31, 1988*
†**Effective Date** — *January 31, 1992*

5.2.3 Where special lamps are intended, the maximum wattage and burning position shall be indicated in an acceptable manner.

5.3 Additional Cautions or Warnings

5.3.1 The following cautions or warnings shall also be permanently marked on each luminaire, as required, in both English and French (equivalent wording will be accepted in all cases):

(a) FOR OUTDOOR USE and

POUR EMPLOI À L'EXTÉRIEUR.

This shall be legible during positioning of the luminaire for use;

(b)* Extension hand-lamps shall be marked:

FOR HEAVY-DUTY USE IN GARAGES OR SIMILAR LOCATIONS and

CONVIENT POUR USAGE INTENSIF DANS LES GARAGES OU AUTRES EMPLACEMENTS or

FOR LIGHT-DUTY USE IN NORMALLY DRY LOCATIONS and

CONVIENT POUR USAGE ORDINAIRE DANS LES EMPLACEMENTS SECS;

Residential reel-type:

FOR LIGHT-DUTY RESIDENTIAL USE ONLY and

CONVIENT SEULEMENT POUR USAGE ORDINAIRE RESIDENTIEL
***Effective Date** — *August 31, 1988*

(c) Luminaires intended for use in damp or wet locations such as aquarium hood- and extension hand-lamps shall have a warning to indicate that relamping or other servicing should not be carried out while the luminaire and/or the surroundings are damp or wet unless the plug is disconnected from the power supply;

(d) Luminaires intended for use in damp or wet locations shall be marked:

DO NOT SUBMERSE and

NE PAS IMMERGER;

(e) A warning to indicate the positions of use, which shall be legible during positioning of the luminaire for use. This warning is not required if:

(i) The luminaire is found suitable for use in all possible mounting positions; or

(ii) There is only one possible mounting position;

(f) The maximum allowable load in amperes that may be plugged into a receptacle shall be marked adjacent to the receptacle:

For example, 3 AMPS MAX;

(g) A luminaire that can be operated only on alternating current shall be marked:

AC ONLY and C.A. SEULEMENT, or with the symbol "~";

(h) An electric-discharge-lamp type that is designed for use with germicidal lamps shall be marked in a prominent location with the following warning:

FOR USE WITH GERMICIDAL LAMPS.
FOR PROTECTION OF THE EYES AND SKIN FOLLOW CAREFULLY THE INSTRUCTIONS PROVIDED WITH THE GERMICIDAL LAMP and

A N'UTILISER QU'AVEC DES LAMPES GERMICIDES. AFIN DE SE PROTÉGER LES YEUX ET LA PEAU, OBSERVER SCRUPULEUSEMENT LE MODE D'EMPLOI FOURNI AVEC LA LAMPE;

(i) Utility lamps shall be marked with the following caution:

NOT FOR USE WITH A THERAPEUTIC LAMP SUCH AS INFRA-RED AND ULTRAVIOLET TYPES and

NE PAS UTILISER AVEC UNE LAMPE THÉRAPEUTIQUE, PAR EXEMPLE, DU TYPE INFRAROUGE OU ULTRAVIOLET;

(j) A luminaire intended for use in hospitals shall be marked to indicate this use;

(k) Luminaires such as those using electronic circuitry to cause flashing of special-type lamps (e.g., a xenon-type lamp) and where lamp replacement requires exposure to bare live parts (see also Clause 4.18) shall be marked where legible during relamping:

TO PREVENT ELECTRICAL SHOCK, DISCONNECT FROM POWER SUPPLY AND ALLOW AT LEAST . . . MINUTES BEFORE REMOVING COVER and

POUR ÉVITER LES CHOCS ÉLECTRIQUES, DÉBRANCHER ET ATTENDRE AU MOINS . . . MINUTES AVANT D'ENLEVER LE COUVERCLE.

(l)* A luminaire having an external surface temperature exceeding 90°C (see Table 9) shall be marked:

KEEP AWAY FROM CURTAINS, DRAPERIES AND SIMILAR MATERIALS and

TENIR À L'ÉCART DES RIDEAUX, TENTURES ET OBJETS SEMBLABLES
***Effective Date** — *August 19, 1990*

(m)* Where a protective glass is required on luminaires to contain particles that may result from lamp shattering, the luminaire shall be marked as follows:

KEEP PROTECTIVE GLASS (OR EQUIVALENT) IN PLACE and

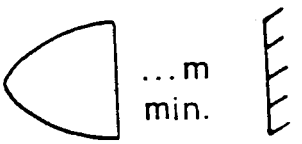
NE PAS ENLEVER LE VERRE PROTECTEUR (OU SON ÉQUIVALENT)

***Note:** Preceding markings (l) and (m) may appear on a label attached to the cord.*
***Effective Date** — *August 19, 1990*

(n)* A luminaire tested in accordance with Clause 6.3.5(e) or (f) shall have the following marking:

WARNING: PLACE LIGHT SOURCE NO CLOSER THAN...TO ANY SURFACE and

AVERTISSEMENT : LAISSER UNE DISTANCE D'AU MOINS...ENTRE LA SOURCE LUMINEUSE ET LA SURFACE LA PLUS PROCHE.

or 

***Effective Date** — *August 19, 1990*

(o)* A direct plug-in nightlight shall have the following marking on the smallest unit package:

WARNING: THIS IS NOT A TOY AND IS NOT INTENDED FOR USE BY CHILDREN. FOR SAFE USE, PLUG ONLY INTO EXPOSED WALL OUTLETS WHERE NIGHTLIGHT IS VENTILATED AND CANNOT CONTACT BED COVERINGS OR OTHER MATERIAL THAT MAY PRESENT A FIRE HAZARD. DO NOT USE WITH EXTENSION CORDS and

AVERTISSEMENT : CET ARTICLE N'EST PAS UN JOUET ET N'EST PAS CONÇU POUR ÊTRE UTILISÉ PAR DES ENFANTS. POUR UNE UTILISATION SÉCURITAIRE, BRANCHER À UNE PRISE NON DISSIMULÉE SITUÉE À UN EMPLACEMENT OÙ LA VENTILATION DE LA VEILLEUSE EST ASSURÉE ET OÙ CETTE DERNIÈRE NE RISQUE PAS DE TOUCHER DES ARTICLES DE LITERIE OU AUTRES MATÉRIAUX SUSCEPTIBLES DE PRÉSENTER UN RISQUE D'INCENDIE. NE PAS BRANCHER À UN PROLONGATEUR.
***Effective Date** — *January 31, 1992*

5.4 Instructions

5.4.1 General. Instructions and warnings shall be provided, as applicable, on the container or on a sheet supplied in the container of a luminaire, in both English and French, as specified in Clauses 5.4.2 to 5.4.4.

5.4.2 Instructions for the proper use of mounting hooks shall be provided with luminaires having long runs of chain or cord or similar types and shall include wording such as:

(a) "Use hook to support chain, not the electrical cord";

(b) "Do not install on radiant-heating type ceiling".

5.4.3 Kits shall be provided with instructions that include:

(a) An exploded view of the individual parts (together with an exploded view of the lampholder);

(b) Clear identification of the individual parts;

(c) Well-defined instructions to eliminate risk of error when assembling the parts;

(d) If a shade is not provided, all details regarding the type, material, minimum dimensions, and mounting of those shades with which the luminaire is intended to be used. A caution shall be included to the effect that any deviation from the recommended types of shade may constitute a fire hazard;

(e) If a support or base is not provided, details regarding the intended type of support or base and method of assembly;

(f) Any limitations of application of the luminaire and the following statement: "These instructions must be followed in order to meet the requirements of the Canadian Electrical Code, Parts I and II."

5.4.4 An assembly of the type described in the Note following Clause 4.3.6 shall be provided with instructions as outlined in Clause 5.4.2 as applicable (e.g., an exploded view of the lampholder is not required since the cord is attached at the factory).

5.4.5* Luminaires equipped with polarized 2-pole, 2-wire parallel-blade attachment plugs shall be marked with the following wording or its equivalent:

CAUTION: TO PREVENT ELECTRIC SHOCK, MATCH WIDE BLADE OF PLUG TO WIDE SLOT, FULLY INSERT and

ATTENTION : POUR ÉVITER UN CHOC ÉLECTRIQUE, PRÉSENTER LA LAME LARGE À LA FENTE LARGE ET POUSSER JUSQU'AU FOND.

The marking may appear on

(a) a tag attached to the cord near the attachment plug; or

(b) an instruction sheet which accompanies the device at the time of sale; or

(c) on a hang tag.

Lettering shall be upper case, 2.8 mm minimum for "CAUTION" and "ATTENTION", 1.6 mm minimum for the others.

***Effective Date** — *January 31, 1992*

5.5* Date Marking The month and year of manufacture, at least, shall be marked on each product or its carton. Date coding, serial numbers, or equivalent means may be used.

***Effective Date** — *August 31, 1988*

6. Tests

6.1 General

6.1.1 Except as otherwise indicated, tests required to determine compliance with this Standard shall be made, where possible, on 1 representative sample of the equipment or component thereof.

6.1.2 Tests need not be conducted in any order, unless specified, but shall be arranged to require the use of as few samples as possible (see Clause 6.1.1).

6.1.3 Except as noted in Clause 6.4.3 luminaires with Class 2 type transformers shall be tested in accordance with CSA Standard C22.2 No. 66, with adjustments made to suit the application.

6.2 Test Conditions

6.2.1 General. The tests shall be made under the following conditions, as applicable, unless specified otherwise.

6.2.2 Voltage and Frequency

6.2.2.1 Voltage. The test voltage shall be:

(a) The maximum of the normal operating range* of the nominal system voltage marked on the equipment; or

**This assumes a test lamp of rated wattage. If not, the test voltage shall be adjusted to give rated wattage. (See also Table 2 of CSA Standard C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 Volts.)*

(b) Such that standard test lamps will exhibit the required temperature characteristics shown in Tables 6, 7, and 8;

(c) Adjusted to give rated lamp-wattage on luminaires not marked with the voltage rating or where a standard test lamp is not available.

6.2.2.2 Frequency. Frequency-sensitive equipment shall be subjected to the tests while connected to a supply of rated frequency, except that equipment marked with more than one frequency shall be tested at the frequency that will produce the maximum temperature rise.

6.2.3 Test Lamps

6.2.3.1 The type and wattage of lamp or lamps specified (rated) by the manufacturer shall be used, except that, where the luminaire is provided with medium-base screw-shell lampholders and has one or more of the ratings shown in the Tables 6, 7, and 8, a standard test lamp(s) shall be used.

If the luminaire cannot physically accommodate the standard test lamp, the lamp type(s) recommended by the manufacturer shall be used.

Where a standard test lamp is available a luminaire rated for 1 wattage and type of lamp shall be subjected to at least 2 tests, one with a pattern test lamp and the second with a base test lamp, unless 1 lamp is available having both characteristics. When a luminaire is rated for more than 1 wattage and type of lamp, sufficient testing shall be conducted to ensure that maximum temperature conditions have been obtained.

6.2.3.2 Standard test lamps shall be installed in the lampholders and oriented so that the side of the lamps that exhibits the temperature characteristics will be aimed in the direction of temperature measurement.

6.2.3.3 The sample shall be installed or supported to simulate intended usage in accordance with the manufacturer's instructions and, where more than one method may be used, it shall be installed or supported to allow recording of the maximum conditions that may be encountered under the intended uses.

6.2.3.4 Tests shall be conducted in a room substantially free of draughts and maintained at an ambient of 25 ± 10°C. Temperature variations below or above 25°C shall be respectively added to or subtracted from the observed temperatures.

6.2.3.5 Temperatures shall be measured by thermocouples consisting of No. 30 AWG iron and constantan wire.

6.2.3.6 A thermocouple junction shall be secured in good thermal contact by taping it in place, except that where a metal surface is involved, brazing or silver soldering may be necessary.

6.3 Normal Temperature

6.3.1 A luminaire shall be supported and operated as intended in accordance with the manufacturer's instructions under the applicable conditions of Clause 6.2, until thermal equilibrium is attained, without causing temperatures higher than those specified in Table 9.

6.3.2 An integral protective device shall not operate during the normal-temperature test of a luminaire.

6.3.3 An aquarium hood or reflector shall be supported as intended on a glass tank of the maximum dimensions permitted by the hood and filled with water to within 1 inch of the top of the tank.

6.3.4 Extension Hand-Lamps with Take-Up Reel

6.3.4.1 For the heating test of a reel, a 60-Hz essentially sinusoidal current having a value equal to the maximum current rating of the reel shall be circulated through the flexible cord. The length of the cord to be left unreeled during the test shall be as indicated in Table 10.

6.3.4.2 If a thermoplastic-insulated cord is to be used with a reel, the latching mechanism of the reel, if any, shall be disengaged in order to place the cord under tension. There shall be no visible reduction in the thickness of the insulation on the side of the cord nearest the centre of the reel as determined by examination of 3 separate cuts across the retracted length of cord.

6.3.5* Adjacent Surface Temperatures

A luminaire having a light source that may be directed or positioned against adjacent or supporting surfaces shall be subjected to the following:

(a) The luminaire shall be placed with the light source directed toward the vertical test surface or horizontal supporting surface as close as the design will allow but not less than 15 cm;

(b) The distance is measured on the optical axis of the luminaire from the part of the luminaire or lamp that is nearest to the test surface;

(c) The choice between a vertical or horizontal surface shall depend on luminaire design and selection of the more severe condition for the luminaire;

(d) If the temperature of the test surface does not exceed 90°C, no related markings are required;

(e) If the temperature of the test surface exceeds 90°C, the test will continue until a distance is established at which the surface temperature under test does not exceed 90°C;

(f) If the minimum distance is specified by the manufacturer, the temperature test shall not be applicable to distances specified by the manufacturer that are less than or equal to 15 cm;

(g) A luminaire in compliance with (e) or (f) shall be marked in accordance with Clause 5.3.1(n).

***Effective Date** — *August 19, 1990*

6.3.6* Test Exemptions

6.3.6.1 The Normal Temperature Test shall not be required for portable luminaire designs that comprise all of the following:

(a) Open-top and open-bottom shades;

(b) Medium-base lampholders without an enclosing cup or similar housing;

(c) Lamps of the reflector or non-reflector type, mounted base-down and rated 300 W or less; and

(d) Power supply cords with the following ratings:

(i) 105°C minimum when using lamps rated 300 W;

(ii) 60°C minimum when using lamps rated 250 W or less.

6.3.6.2 The Normal Temperature Test shall be required where features are included in the above basic design that are expected to cause operating temperatures in excess of those specified in Table 9.
***Effective Date** — *June 30, 1989*

6.4 Abnormal Temperature

6.4.1 A luminaire having an external surface temperature exceeding 90°C, excluding the light source, shall be tested in accordance with Clause 6.4.7, and shall be marked in accordance with Clause 5.3.1(*l*).

6.4.2* A luminaire of the fluorescent, reactor, transformer, or solid-state type shall be subjected to the tests of Clause 6.4.9.
***Effective Date** — *July 31, 1991*

6.4.3 An overcurrent or thermal protective device shall be bypassed, except those which are an integral component such as the thermal protector in a fluorescent ballast.

6.4.4 The test shall be conducted until failure occurs, or for a maximum duration of 7 h.

6.4.5 The test surface shall consist of a knot-free pine board covered with a double layer of cheesecloth. The cheesecloth shall be bleached, 36-inches wide, running 14 to 15 yards per pound, and having what is known to the textile trade as a thread-count of 32 x 36.

6.4.6* Test Criteria. When operated under abnormal conditions the following shall be considered a hazard:

(a) Emission of flame or molten metal, excluding solder;

(b) Glowing, flaming, or charring of the test material;

(c) Deterioration of insulating materials exposing live parts that may cause an electrical shock hazard;

(d) Reduction of electrical spacings.

***Note:** Glowing or charring of cheesecloth is to be determined by visual examination for broken fibres after removing the cheesecloth from the test surface. Charring is more than discolouration; it is the condition in which the surface or test material is rendered black.*

The opening of a 15 A *branch circuit fuse constitutes completion of the test.*
***Effective Date** — *July 31, 1991*

6.4.7 Horizontal

6.4.7.1 A free-standing luminaire, as specified in Clause 6.4.1, shall be placed on an inclined flat surface in a position most likely to cause overturning. A luminaire that overturns when the surface is tilted 15° ± 1/2° from the horizontal shall be tested in accordance with Clause 6.4.7.2.

6.4.7.2 The luminaire shall be placed on the horizontal surface in the most unfavourable of the positions that may reasonably be expected.

6.4.8* — Deleted.

6.4.9* A luminaire as specified in Clause 6.4.2 shall be placed on the test surface and the following faults introduced:

(a) Fluorescent Types:

(i) Short-circuit starter or secondary circuit; and

(ii) Disconnect lamp.

(b) Transformer Type:

(i) Short-circuit.

(c) Solid-State Type:

(i) Open circuit or short-circuit any component which results in the worst condition.

***Effective Date** — *June 30, 1989*

6.5 Flame

6.5.1 Enclosures of non-metallic materials shall be subjected to the tests of Clauses 6.5.2 and 6.5.3 without:

(a) Supporting combustion for more than 30 s after any of the first 4 applications of the test flame;

(b) Supporting combustion for more than 60 s after the fifth application;

(c) Burning a hole through the material any time during the 5 applications; and

(d) Dropping flaming or molten particles during the test. Also, the material is not acceptable if it should disappear before the test is completed.

6.5.2 The apparatus for making the test shall consist of:

(a) A test shield of sheet metal 12 inches wide, 14 inches deep, and 24 inches high, open at the top and front, and a means of supporting the test specimen in a vertical position;

(b) A Tirril burner having a bore of 3/8 inch and a length of 4 inches above the primary-air inlets;

(c) A 20° angle block for supporting the burner;

(d) A supply of natural gas of approximately 1000 Btu per cubic foot at normal pressure (range of 3 to 5 inches of water); and

(e) A stop-clock.

6.5.3 The test shall be made in a room from which all draughts of air are excluded. A specimen of the moulded part or a 6-inch square plaque of the moulded material used having a minimum thickness not less than that of the part involved shall be supported in a vertical position in the test shield. The height of the flame, with the burner vertical, shall be adjusted to 5 inches with an inner blue cone 1-1/2 inches high. The burner shall be tilted to an angle of 20° from the vertical and the flame applied to the sample of material under test, so that the tip of the inner blue cone of the flame touches the specimen at a point approximately 3 inches above its lower end. The flame shall be brought up to the material in such a manner that the vertical plane through the axis of the burner will be perpendicular to the line of approach. The flame shall be applied for 15 s, and then removed for 15 s until 5 such applications have been made. The flame shall not be re-applied while the material is still burning.

6.6 Alternative Flame Tests

6.6.1 At the submittor's request, the flame test described in UL Standard No. 94, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, for plastic materials classed 94V-1 shall apply, provided that the luminaire complies with the following conditions:

(a) The luminaire shall have no user-serviceable parts, including the lamp;

(b) The maximum available voltage within the luminaire shall be 130 V rms (184 V peak);

(c) The overall length of the assembly, less the flexible cord, shall not exceed 3 feet;

(d) The luminaire shall contain no devices for electromagnetic energy storage (e.g., capacitors or inductors). Electromagnetic radio-frequency noise-suppressing devices and stray capacitances and inductances from wiring are excluded from this restriction;

(e) When bare metal parts, which are spaced 1/8 inch or less apart, are shorted, the maximum short-circuit available shall be 1.0 A;

(f) Where the short-circuit current between bare metal and insulated live parts exceeds 1 A, such wiring shall be so routed, secured, or clamped in place as to maintain separation so that parts of opposite polarity will be spaced apart a minimum of 1/8 inch;

(g) The luminaire shall be allowed to operate as in Items (d) or (e) under short-circuit conditions that cause a maximum rise in temperature, until temperature equilibrium is established. At the end of this time, there shall be no melting, charring, or ignition of any components or of any enclosing, encapsulating, or supporting parts, nor

6.6.2 In addition, where the assembly includes live metal conductors encapsulated in the material, the flame test shall be applied to samples containing the encapsulated conductors, as well as to samples that function purely as enclosures or supports for live metal conductors.

6.6.3* Direct plug-in nightlights shall be constructed of material demonstrated to be in compliance with the requirements of Test E of CSA Standard C22.2 No. 0.6.
***Effective Date** — *March 31, 1992*

6.7 Loading. Means provided for suspension of a luminaire shall be capable of supporting in tension, for 1 h, a load of 3 times the weight of the luminaire, but the load shall be not less than 25 ± 1/2 pounds even in the case of a luminaire weighing less than one-third of this amount. If supported at 2 or more points, the distribution of the load shall be similar to that which may be encountered in the field.

6.8 Strain Relief

6.8.1 The assembly of a flexible cord of a luminaire shall withstand for 1 min a pull of 35 ± 1/2 pounds when tested as described in Clause 6.8.2.

6.8.2 The pull shall be applied by suspending a 35 ± 1/2 pound weight on the cord, with the force applied in a direction normal to the plane of the cord entry hole. If there is a movement of the cord of more than 1/16 inch or any loosening or breaking of wires at the points where the connections are secured, or where the conductors are permanently assembled to terminals, the construction is not acceptable.

6.9 Endurance (Extension-Lamp Cord Reel)

6.9.1 A cord reel provided as a component of a luminaire shall withstand 6000 cycles of operation of reeling and unreeling the cord in the intended manner in accordance with the manufacturer's instructions. There shall be no perceptible abrasion of, or other damage to, the cord or other parts.

6.9.2 During the endurance test the cord is to be unreeled to a length of 30 inches or more, by any convenient method representative of actual service,

and is to be re-coiled on the reel automatically by the action of the take-up mechanism. The cord is to be unreeled in such direction, with respect to the body of the reel, that the tendency to cause damage will be greatest, consideration being given to the intended method of mounting the reel.

6.10 Swivel Strength, Flexing, and Swivelling. A swivel joint shall be capable of withstanding:

(a) A torsion of 20 ± ½ inch-pounds for 1 min; and

(b) A straight pull of 100 ± 1 pounds or the maximum recommended by the manufacturer, whichever is greater, for a period of 1 min;

(c) A swivelling test of 6000 cycles of rotation, if the swivel joint is not limited to a maximum rotation of 370°, without damage to the jacket or the insulation of the conductors. One cycle shall consist of full rotation from stop and back again.

6.11 Stability. A free-standing luminaire shall be placed on the centre of a flat surface inclined at an angle of 8 ± 1/2° to the horizontal such that all edges of the luminaire are resting on the surface. The luminaire shall not overturn when adjusted to a position or positions most likely to cause overturning.

6.12 Humidity. A luminaire intended for wet or damp locations shall be exposed to a moist atmosphere at a relative humidity of 95 + 0, –5% and a temperature of 30 to 35°C for a period of 72 h. It shall then withstand the leakage and dielectric strength tests of Clauses 6.14 and 6.15

6.13 Weatherproofness

6.13.1 A luminaire intended for wet locations shall be mounted as in service and shall be tested for weatherproofness as specified in CSA Standard C22.2 No. 94, Special Purpose Enclosures 2, 3, 4, and 5.

6.13.2 Water shall not:

(a) Enter the luminaire in quantities sufficient to interfere with the operation of the luminaire or to create a hazard; and

(b) Have wetted electrical parts nor have come into contact with lamps (except those recognized for water contact).

6.13.3 The leakage current and dielectric strength tests of Clauses 6.14 and 6.15 shall be applied immediately after this test.

6.14 Leakage Current

6.14.1 The leakage current of a luminaire shall not exceed 0.5 mA when tested in accordance with Clause 6.14. In the case of luminaires intended for use in damp and wet locations, this test shall be applied immediately after the test of Clause 6.12 or 6.13, whichever is applicable, or after each where applicable.

6.14.2 The meter may be electronic or a direct indicating type, average responding, calibrated at 60 Hz and indicating the rms value of a pure sine wave, with an accuracy of 5% at an indication of 0.5 mA. The meter shall have a terminal impedance of 1500 Ω shunted by a 0.15 mF capacitor.

6.14.3 The test frequency shall be 60 Hz.

6.14.4 The applied voltage shall be in accordance with Clause 6.2.1.

6.14.5 The luminaire shall be at room temperature with all switches in the ON position and tested within 5 s of applying test voltage (switch S1 closed) and again after reaching normal operating temperatures.

6.14.6 The test circuit shall be as shown in Figure 5.

6.14.7 The tests shall be conducted with the switch S2 in position A, and repeated with the switch in position B.

6.14.8 The probe shown in Figure 5 shall be of a metal of the same dimensions and applied to the same openings as the probe required by Clause 4.2.2.2. The probe shall also be applied to any exterior metal part.

6.14.9 A luminaire having an insulating (e.g., plastic) enclosure shall have the probe required by Clause 6.14.8 applied to metal foil with an area 10 × 20 cm in contact with accessible surfaces of the luminaire. Where the accessible surface of the luminaire is less than 10 × 20 cm, the area of the metal foil shall be the same as that of the surface. The metal foil shall not remain in place long enough to affect normal operations, temperature, ventilation, or drainage.

6.14.10 The dielectric strength test of Clause 6.15 shall be applied immediately after this test.

6.15 Dielectric Strength

6.15.1 General. Compliance with the following shall be determined by means of a suitable testing transformer the output of which can be regulated. Starting at zero, the applied potential shall be increased gradually and at a uniform rate, until the required test value is reached unless breakdown occurs.

6.15.2 Fluorescent and Incandescent Types (Without Transformers). Luminaires, while at normal operating temperature, shall withstand without breakdown, for a period of 1 min, the application of a 60 Hz potential of 900 V between live parts and non-current-carrying metal parts for the incandescent type and 1000 V plus twice the rated voltage for the fluorescent type.

6.15.3 Luminaires with Class 2 Type Transformers. Immediately after the tests of Clause 6.4.8, the luminaire shall be capable of withstanding, without breakdown, for a period of 1 min, the application of an alternating potential of:

(a) 1000 V plus twice the maximum rated voltage of the primary winding, applied between the primary and secondary and between the primary and the core and enclosure; and

(b) 500 V between each extra-low potential winding and the core and enclosure.

6.15.4 Luminaires with Xenon Lamps. The insulation and spacings associated with the components of a high peak voltage source for xenon lamps shall be capable of withstanding for a period of 1 min without breakdown the application of a potential of 1-1/2 times the peak voltage of the source at rated frequency. This shall be accomplished by gradually increasing the voltage applied to the high-voltage source until the required test value is obtained in the output. If sufficient internal voltage cannot be obtained, an external test voltage may be applied.

6.15.5 Luminaires with Capacitors. A capacitor connected between an exposed metal part and a part involving shock hazard shall withstand without breakdown for a period of 1 min a 900 V ac potential at rated frequency applied as follows. Each of 10 samples of the capacitor shall be tested separately, and considered acceptable if none fail while the potential is being increased, and if not more than 3 fail in less than 1 min after the required test value has been reached.

6.16 Mechanical Strength

6.16.1 The following test shall be conducted on nonmetallic enclosures of luminaires containing bare live parts:

(a) Without cracking, chipping, breaking, or showing other similar signs of mechanical damage so as to expose bare live parts or reduce electrical spacings below those shown in Clause 4.16;

(b) In addition, for those luminaires intended for damp or wet locations, without damage as outlined in Item (a) so as to allow the entrance of moisture.

6.16.2 The luminaire enclosure shall be dropped onto a hardwood surface from a height of 3 feet, except that the height shall be 6 feet for pin-up types and the surface shall be concrete for those intended for use in damp or wet locations.

6.16.3* A portable extension handlamp shall not produce a risk of electric shock when dropped three times from a height of 6 feet (1.83 metres) onto a concrete surface in a manner most likely to produce unacceptable results. The envelope of the lamp may fracture but the integrity of the handlamp and guard shall be maintained as specified in Clause 4.2.
***Effective Date** — *August 31, 1988*

6.16.4* Impact (Nightlights). A nightlight shall be installed as intended and shall be subjected to an impact of 3.4 J, using a 50.8 mm diameter steel ball weighing 0.53 kg, swung as a pendulum. Test results shall be acceptable if a nightlight complies with Clause 4.2.2.2 after impact.
***Effective Date** — *January 31, 1992*

6.17 Accelerated Aging. This test applies to nonmetallic lamp guards of extension lamps, gaskets, glands, etc. Samples of the material shall be placed in a circulating-air oven set at a temperature and for a period of time as shown in Table 11. There shall be no cracking or other visible signs of deterioration.

6.18 Flaming Oil Test for Perforated Panels

6.18.1 This test shall be applied to perforated metal panels that are to be investigated for suitability for use as a barrier (see Clause 4.2.2.10).

6.18.2 The apparatus for this test shall consist of an iron ladle 2-1/2 inches in diameter, with a pouring lip, a heat-resistant glass dish, a stand for supporting the test specimen, a quantity of bleached cheesecloth running 14 to 15 square yards to the pound and having what is known to the trade as a count of 32 × 28, a supply of No. 2 furnace oil*, and a stop-clock.

**For further information see CSA Standard B140.0, General Requirements for Oil Burning Equipment.*

6.18.3 The test shall be made in a room from which all draughts of air are excluded. A specimen of the material shall be supported horizontally 2 inches above a layer of cheesecloth placed in a dish.

6.18.4 Ten cubic centimetres of No. 2 furnace oil poured into the ladle shall be ignited and allowed to burn for 1 min, after which it shall be poured at the rate of not less than 1 cubic centimetre per 3 seconds on the specimen from a position 4 inches above it.

6.18.5 Means shall be provided to ensure that only oil that passes through the test specimen makes contact with the cheesecloth.

6.18.6 The cheesecloth shall not be ignited through the application of the burning oil during 3 applications at 5-min intervals.

6.19* Lampholder Cavity Separation (Nightlights)

6.19.1* A nightlight using replaceable lamps shall withstand a pull of 89 N as specified in Clause 6.19.2 for a period of 1 min without separation.

6.19.2* The nightlight shall be supported by rigidly securing the blades to a rigid structure by any convenient means that does not distort the blades or nightlight body. The nightlight body shall not be restricted or supported so as to prevent an unhinging separation of the nightlight body. The 89 N force shall be gradually applied in a direction tending to separate the body assembly. The force shall be applied to the part of the nightlight body that does not support the blades, at a point between the two outermost threads of the lamp cavity.

6.20* Pull (Nightlights)

6.20.1* The body of a nightlight not employing replaceable lamps shall withstand a pull of 89 N as specified in Clause 6.20.2 for a period of 1 min without separation of the body assembly or disconnection from the blades, or both.

6.20.2* The top or front half of the nightlight body shall be rigidly supported by any convenient means. The 89 N force shall be supported from the blades by means of a yoke.

6.21* Blades (Nightlights)

6.21.1* The blades of a nightlight shall withstand for 2 min a pull of 89 N when tested in accordance with Clause 6.21.2. The test shall be conducted using 6 representative samples.

6.21.2* The nightlight body shall be supported on a horizontal steel plate with the blades projecting downward through a single circular hole having the smallest diameter that will accommodate them. The 89 N force shall be applied in a downward direction for 2 min to each blade in turn, then to both blades simultaneously. Displacement greater than 0.8 mm shall not be acceptable.

6.21.3* A nightlight shall be rigidly supported with blades facing upward. The nightlight shall be positioned so as not to restrict possible displacement of the plug blades or breakage of the enclosure. Each blade, in turn, shall be subjected to a force of 133 N applied gradually along the longitudinal axis of the blade in the direction of the plug face. The 133 N force shall be maintained for a period of 1 min. External deformation of the plug blades shall be acceptable. Penetration into the nightlight body by the nightlight blade or blades during the test shall not be acceptable.

6.21.4* Six new samples shall be tested as specified in Clause 6.21.3, except that both blades shall be simultaneously subjected to a single applied force of 178 N for a period of 1 min. External deformation of the plug blades shall be acceptable. Penetration into the nightlight body by the nightlight blades during the test shall not be acceptable.

6.22* Blanketing (Nightlights)

6.22.1* A nightlight employing a replaceable lamp shall not cause flannel blanket material or tissue paper to glow or flame when tested in accordance with Clauses 6.22.2 to 6.22.7.

6.22.2* A direct plug-in nightlight shall be installed in a vertically positioned receptacle, using the maximum rated lamp wattage. Receptacle slot orientation may be either horizontal or vertical such that the nightlight shall be oriented with the lamp axis closest to the vertical and the lamp in a base-down position. A shade that is removable without the use of tools or equivalent means shall be removed. The nightlight shall be switched on.

6.22.3* A vertically oriented, rectangular wood surface (knot-free) measuring 305 mm wide by a height extending from the floor to at least 150 mm above the installed nightlight, covered with two layers of tissue paper, shall be positioned parallel to the wall in front of the nightlight. The surface of the tissue paper shall contact the part of the nightlight (e.g. lamp, switch actuator, or nonremovable shade) that extends furthermost from the mounting surface.

6.22.4* A piece of flannel blanket material shall be folded so that four thicknesses are draped over and in contact with the nightlight. The material shall be sized to ensure that at least 305 mm of the material extends downward along each side of the nightlight. The blanket material for this test shall be 100% unbleached cotton flannelette.

6.22.5* The nightlight shall be energized with line voltage for 7 h or until glowing or flaming of the tissue paper or blanket material occurs.

6.22.6* A nightlight shall be oriented with the lamp axis closest to the horizontal, following the procedure described in Clause 6.22.2. The test outlined in Clauses 6.22.3 to 6.22.5 shall be repeated.

6.23* Depth of Holder Cavity (Candelabra)

6.23.1* With lamp shades and other removable covers and enclosures of the nightlight removed, the articulate probe illustrated in Figure 1 shall not contact the screwshell of the lamp screw base, or the screwshell of the lampholder, or other parts of the lampholder that are required to be enclosed, when the probe is applied in every possible position. For this test a Standard lamp, as illustrated in Figure 8, shall be inserted in the lampholder as described in Clause 6.23.2. Six representative samples shall be used for this test.

6.23.2* The Standard lamp shall be partially seated in the lampholder so as to provide electrical contact between the centre contact of the lamp and the centre contact of the lampholder. Where necessary, an electrical indicator may be used to determine when electrical contact has been established between the lamp and the lampholder.

6.23.3* The Standard lamp shall then be inserted in each of the lampholders described in Clause 6.23.2, except that the lamp shall be fully seated in the lampholder. The depth of the lampholder cavity shall be measured from the plane of the depressed centre contact of the lampholder to the rim of the insulating liner or body and shall be not less than 17.5 mm.

6.24* Overlamping (Relampable Nightlights)

6.24.1* A nightlight intended for use with replaceable lamps rated less than 10 W shall not emit flame or molten metal or cause risk of fire or shock hazard when operated continuously with a 10 W lamp until ultimate results are observed.

Note: *In most cases, continuous operation for* 7 h *is necessary to determine ultimate results.*

***Effective Date** — *January 31, 1992*

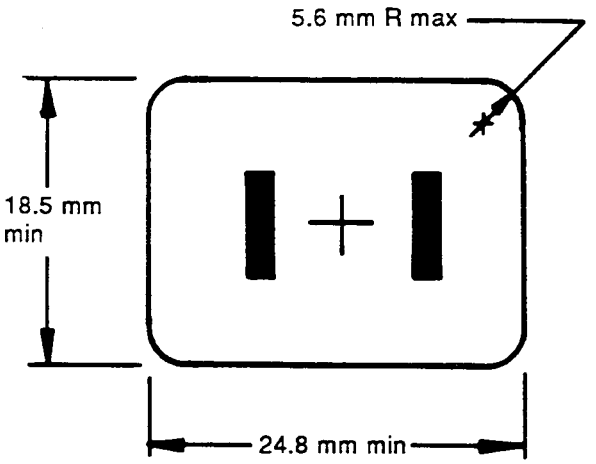
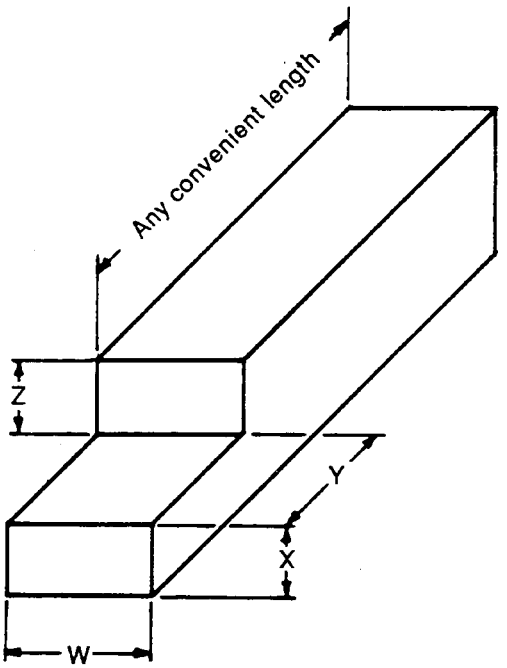


Figure 6*
Minimum Plug Face Dimensions
(See Clause 4.9.1.8.)

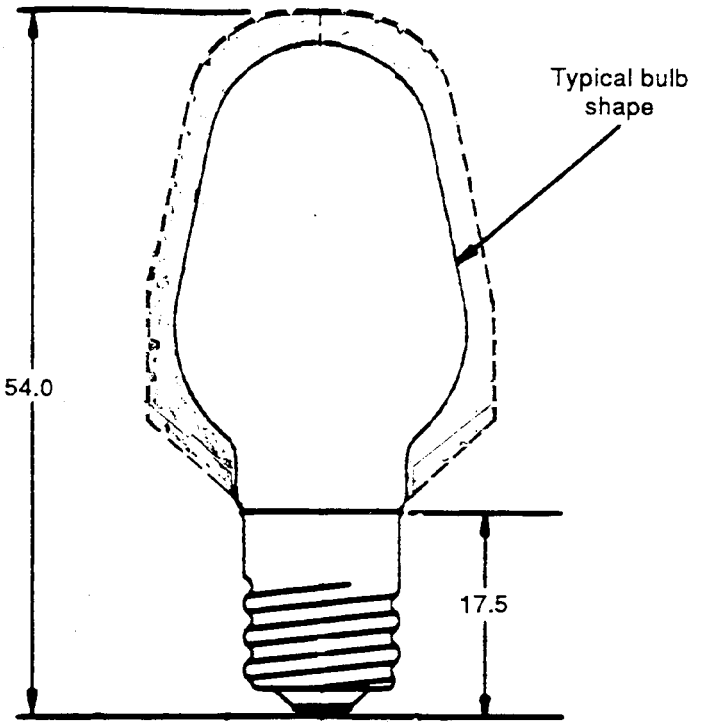
***Effective Date** — *January 31, 1992*



mm	W	X	Y	Z
	6.350	3.175	5.080	3.175

Figure 7*
Minimum Face Size Probe
(See Clause 4.9.1.8.)

***Effective Date** — *January 31, 1992*



Bulb:	C7 (C22)
Base:	Candelabra screw, E12/15
Overall length:	54.0 (2-1/8 in) max
	49.2 (1-15/16 in) min
Eccentricity:	3°

Note: *Dimensions are in millimetres, unless otherwise specified.*

Figure 8*
Standard Lamp for Depth of Holder Cavity Test
(See Clause 6.23.)

***Effective Date** — *January 31, 1992*

General Instruction No. 3

C22.2 No. 12-1982
June 1989

CSA Standard C22.2 No. 12-1982, *Portable Luminaires*, was published in February 1982; it consisted of 40 pages, each of which was dated February 1982. Amendments in the form of replacement pages were published in August 1988 (see General Instruction No. 2*).

**If you do not have General Instruction No. 2, please contact CSA, Standards Sales.*

Amendments to Clauses 1.3, 2.1, 3.2.1, 4.7.3.1, 5.3.1(n), 6.4.8, 6.4.9, and to Table 9 and the addition of Clauses 4.7.3.3, 6.3.5, and 6.3.6 have been formally approved and incorporated (and identified by a vertical line in the margin) in the attached replacement pages.

CSA Standard C22.2 No. 12-1982 now consists of the following pages:

5, 6, 9, 10, 13, 14, 29–34, and **37–40** dated **February 1982;**

3, 4, 7, 8, 17–22, 27, and **28** dated **August 1988;**

11, 12, 15, 16, 16A, 23–26, 26A, 35, 36, and **36A** dated **June 1989.**

These replacement pages are to be inserted into your copy of the Standard; the pages replaced should be kept for reference.

C22.2 No. 12-1982

Portable Luminaires

1. Scope

1.1 This Standard applies to portable luminaires* for general household, commercial, and industrial use in dry, damp, and outdoor locations, and intended to be used in accordance with the Rules of the Canadian Electrical Code, Part I, in non-hazardous locations, on a nominal 120 V system.

**Throughout this Standard the term "portable luminaires" has been shortened to "luminaires".*

1.2 This Standard applies to portable incandescent and fluorescent luminaires for illuminative and decorative purposes and to combinations of these, such as: aquarium hoods, cabinets (illuminated bars, hutches, etc.), chain- and hook-supported types (including flexible-cord-, steel-cable- or rope-supported), colour wheels, drafting lamps, display types, electronic (flashing, touch-control) types, extension hand-lamps, fibre-optic types, floor lamps, garden lights, gimbal lights, hospital lamps, illuminated forms or shapes (figurines, fire logs, terrestrial globes, plaques, etc.), kits, lamp testers, light channels for display purposes, machine-shop lamps (e.g., illuminated shields for use with electric grinders), make-up mirrors, picture lamps, planter lamps, plug-in night-lights, pole lamps, room dividers, table lamps (including nursery, desk, novelty types, etc.), transformer-operated ultra-violet hobby lamps, and wall (pin-ups, under-cabinet) types.

Note: *Luminaires intended for residential use, incorporating parts such as beverage cans, nostalgia items, etc., used as a base, stand, or shade, may include wording to indicate the name or trademark of the product usually contained.*

1.3 This Standard does not apply to:

(a) Christmas-tree and other decorative lighting outfits (except for colour wheels) covered by CSA Standard C22.2 No. 37, Christmas-Tree and Other Decorative Lighting Outfits;

(b)* Outdoor floodlight-type luminaires, fluorescent luminaires designed for commercial or industrial use and with one or more lamps rated at 20 W, and high-intensity discharge luminaires covered in CSA Standard C22.2 No. 9, Luminaires.

(c) Electric signs covered by CSA Standard C22.2 No. 2, Electric Signs;

(d) Electric displays and incandescent-lamp signs covered by CSA Standard C22.2 No. 7, Portable Electric Displays and Incandescent-Lamp Signs, except as noted in Clause 4.1.6;

(e) Therapeutic luminaires (e.g., infra-red, ultra-violet) covered by CSA Standard C22.2 No. 125, Electromedical Equipment;

(f)* Stage and studio luminaires covered by CSA Standard C22.2 No. 166, Stage and Studio Luminaires.

***Effective Date**—*June 30, 1989*

2. Definitions

2.1 The following definitions apply in this Standard:

Direct Plug-In Night Light means a self-contained device rated 10 Watts or less.

Extension hand-lamp means an assembly consisting of a length of flexible cord with an attachment plug at one end and a hand-held lampholder with lamp-guard at the other, and classified as:

(a) ***Heavy-duty type*** intended for use in damp locations, garages, or similar locations;

(b) ***Light-duty type*** intended for use in normally dry locations and where it is not unduly exposed to damage from mechanical causes;

Lamp means a complete assembly consisting of the bulb, filament, filament leads and supports, screwshell or pins, contacts, etc.;

Luminaire means a complete lighting unit designed to accommodate a lamp or lamps, and to connect a lamp or lamps to a power supply;

Portable luminaire* means a luminaire connected to the power source by means of a cord and attachment plug, and of such size and/or mass as to permit ready movement from one location to another;
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Light source means the lamp, lens or light shield;

Wiring device means an electrical component of a luminaire that is necessary for the intended use and/or proper control of the assembly involved but does not include wiring or lamps.

3. General Requirements

3.1 General requirements applicable to this Standard are given in CSA Standard C22.2 No. 0, Definitions and General Requirements.

3.1.1 Luminaires for use in hospitals (e.g., examining lamps, wall lamps installed above the head) shall also meet the applicable requirements of CSA Standard C22.2 No. 125, Electromedical Equipment.

3.2 Reference Publications

3.2.1 Where reference is made to CSA Standards of the Canadian Electrical Code, Parts I and II, such reference shall be considered to refer to the latest edition and revision thereto, unless otherwise specified. This Standard refers to the following such Standards and the year dates shown indicate the latest editions available at the time of printing:

C22.1-1986,
Canadian Electrical Code, Part I;

C22.2 No. 0-M1982,
Definitions and General Requirements;

C22.2 No. 0.4-M1982*,
Bonding and Grounding of Electrical Equipment (Protective Grounding);

C22.2 No. 0.6-M1982,
Flammability Testing of Polymeric Materials;

C22.2 No. 2-1956,
Electric Signs;

C22.2 No. 7-1938,
Portable Electric Displays and Incandescent-Lamp Signs;

C22.2 No. 9-M1989*,
Luminaires;

C22.2 No. 37-M1989*,
Christmas-Tree and Other Decorative Lighting Outfits;

C22.2 No. 42-M1984,
General Use for Receptacles, Attachment Plugs and Similar Wiring Devices;

C22.2 No. 66-1988*,
Specialty Transformers;

C22.2 No. 84-1974,
Incandescent Lamps;

C22.2 No. 94-1976,
Special Purpose Enclosures 2, 3, 4, and 5;

C22.2 No. 97-1969,
Outdoor and Submersible Floodlights;

C22.2 No. 125-M1984,
Electromedical Equipment;

C22.2 No. 166-M1983*,
Stage and Studio Luminaires.

***Effective Date**—*June 30, 1989*

3.2.2 Where reference is made to the following publications such reference shall be considered to refer to that edition listed below:

CSA Standard
C235-1969,
Preferred Voltage Levels for AC Systems, 0 to 50,000 Volts.

UL* Standard
UL No. 94-1973 (Second Edition),
Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

**Underwriters' Laboratories, Inc.*

4. Construction

4.1 General

4.1.1 Component parts shall be of types specifically approved for the use intended or shall be investigated as an integral part of the luminaire.

4.1.2 Electrical components shall conform to the individual Canadian Electrical Code, Part II Standard covering such components, with exceptions where the application may allow a deviation.

4.1.3 Luminaires shall have the necessary strength and rigidity to resist the abuses to which they are liable to be subjected, without the required spacings of the electrical equipment being reduced or parts becoming loosened or displaced. Parts that may be removed during normal use, such as for cleaning or relamping, shall be designed or marked to prevent replacement in a position that would affect the safe operation of the luminaire.

4.1.4 There shall be no sharp edges, burrs, etc., nor shall any method of construction be used that might damage electrical insulation, reduce electrical spacings, or cause injury to the user.

4.3.3*—Deleted
***Effective Date**—*August 31, 1988*

4.3.4 Electrical cord or wiring shall not be used for the support of a luminaire except as permitted by Clause 4.11.10.

4.3.5 An aquarium-type luminaire shall have flanges or other means to prevent it from being accidentally dislodged into the water.

4.3.6 Except as covered in the following note, luminaires shall have a base or other free-standing type of support (e.g., base and stand for a table or floor lamp), or means for pin-up or a similar type of mounting.

Note: *An assembly for indoor dry locations only, consisting of a length of flexible cord, an attachment plug, a lampholder with a side outlet for a supply cord and means for mounting the assembly (e.g., a short length of threaded nipple and a cork bottle stopper) in the neck of a bottle, or the equivalent, need not have means for mounting or support.*

4.3.7 The chain in chain- and hook-supported types of luminaires:

(a) Shall be not less than 12 feet nor more than 20 feet long;

(b) Shall not raise the total weight above 20 pounds when 4 feet of the chain, 4 feet of cord, and the lampholder assembly, including shade, glassware, and all decorative parts, are weighed together;

(c) Shall be provided with at least 2 hooks, packed with the lamp, together with means for securing the hooks to solid wooden structural members. Wood screws or the equivalent shall be not smaller than No. 10 with a nominal thread length of 1-1/4 inch*. Toggle bolts and similar devices are not acceptable for securing the hooks and any reference to their use shall not appear in the installation instructions (see Clause 5.4.1), advertising, etc.

**A minus tolerance of 1/8 inch is permitted.*

4.3.8 Cords intended to be supported on hooks of the type noted in Clause 4.3.7(c) shall have means of securing the cord to the hook (e.g., a plastic clamp).

4.3.9 Parts of luminaires supported from the ceiling by a means other than that outlined in Clauses 4.3.7 and 4.3.8 shall:

(a) Not exceed a dead weight of 20 pounds;

(b) Have a support, e.g., keeper wire, that complies with Clause 6.7;

(c) Have a supporting means that complies with the strength requirements of Clause 4.3.7(c).

4.3.10 A free-standing luminaire such as a floor or table type shall be provided with weights or the equivalent in the supporting base to prevent overturning, and shall be subjected to the stability test of Clause 6.11.

4.4 Corrosion Protection

4.4.1 External surfaces of iron or steel of luminaires intended for use in normally dry locations shall be protected by galvanizing, painting, or other suitable means. Loaders and base weights are not considered to require corrosion protection.

4.4.2 All surfaces of iron or steel of luminaires intended for use in wet or damp locations shall be protected by galvanizing, painting, or other suitable means.

4.5 Stems and Tubes

4.5.1 Stems and tubing shall be free from kinks or cracks and, if of metal, shall be not less than 0.020 inch in thickness, except that where threaded, metallic tubing shall be not less than 0.040 inch in thickness.

4.5.2 Rigid slow-burning tubing shall be not less than 0.050 inch in thickness when used in luminaires having medium-base or smaller lampholders. (See Clause 4.7.1 for definition of "slow-burning material".)

4.6 Mechanical Joints and Fastenings

4.6.1 Methods of making mechanical joints between and for the fastening of parts, shall be such as to prevent turning, which would result in damage to wires or wiring devices, after the assembly is completed. Frictional contact alone between parts shall not be used to prevent turning.

Note: *An adjustable, telescoping stem that complies with the torsion requirement in Clause 4.6 may use a fastening means for securing the telescoping parts that depends upon friction alone.*

4.6.2 Turning between metal parts shall be prevented by the use of a lock washer, a locknut seated against another nut or equivalent threaded assembly, or by some other equivalent method. A screw joint may be locked by solder, a set-screw, sealing, or the equivalent, except that sealing shall not be used if it destroys the electrical bond where bonding is required.

4.6.3 Screws used to mount components shall be provided with a means to prevent loosening.

4.6.4 Sheet metal nuts, if used for assembly or to prevent turning of threaded tubing not larger than 1/8 inch pipe size and on bolts or studs that are not greater than 1/4 inch in diameter, shall be of heat treated steel. Larger sizes may be used where they are not depended upon for mechanical strength.

4.6.5 A swivel joint shall be so constructed that turning will not cause damage to the insulation of the wires and it shall be so designed that rotation is limited to not more than 370°. If not limited to a maximum rotation of 370°, a swivel joint shall be capable of withstanding the swivelling test of Clause 6.10(c).

4.6.6 A swivel joint, if of metal, shall be of material not thinner than 0.040 inch if threaded and 0.020 inch if unthreaded. If other material is used, it shall be at least 0.050 inch thick. Sleeves or dust caps, if provided, may be of thinner material, provided that the wiring through the swivel is adequately protected against mechanical injury by the swivel body, ie, the wiring does not project outside the body of the swivel.

4.6.7 A swivel joint shall be capable of withstanding the torsion and pull tests of Clause 6.10.

4.6.8 The plant-growing section of a planter-type luminaire shall be completely separate from a raceway, enclosure, or any other compartment containing electrical parts, and there shall be no nail- or screw-type (or other similar type) fastenings between them that might allow water leakage into the electrical section.

4.6.9 The link of a chain shall be formed so that the joint is located not less than 30° from the vertical (see Figure 4). In the case of circular links, the joint shall be welded. (See loading test of Clause 6.7.)

4.6.10 Screw threads and sharp-pointed screws shall not extend into a wiring compartment for a distance of more than 3/16 inch, except that no limit need be applied if the wires (eg, because of lengths) are reliably held away from or positioned away from such screws. (See Clause 4.1.4.)

4.7 Shades, Diffusers, and Lamp Guards

4.7.1 Shades, diffusers and lamp guards shall be made of at least slow-burning material, except that those which form an enclosure or a part of an enclosure shall meet the requirements of Clause 4.2.

Note: *A slow-burning material is one that has the approximate burning characteristics of ordinary newsprint, including an ignition temperature of approximately 440°C. Included in the general classification of slow-burning materials are cellulose acetates, methyl methacrylates, polystyrene, polyvinyl chloride, nylon, cotton, silk, rayon (other than brushed rayon), wood, and paper.*

4.7.2 Nitrocellulose sheet, mouldings, or pyroxylin coatings on materials other than metal, either alone or as treatments, shall not be used.

4.7.3 Luminaires Using Tungsten-Halogen Lamps

4.7.3.1* Luminaires using tungsten-halogen lamps, except those with an integral outer envelope for which the lamp manufacturer does not require an enclosure, shall be provided with a lens or guard secured to the luminaire to contain major particles that may result from the lamp shattering.
***Effective Date**—June 30, 1989*

4.7.3.2 All openings in guards or enclosures of a luminaire shall be such that no part of a shattered lamp can leave the luminaire by a direct path. Screens, guards and baffles shall comply with the requirements as specified in items (a), (b), (c), and (e) of Clause 4.2.2.10.

4.7.3.3* Luminaires for use with tungsten-halogen lamps that have an integral outer envelope are exempt from the guarding requirements of Clause 4.7.3.1, and shall be marked in accordance with Clause 5.2.1, with the addition of the words "SHIELDED" and "AVEC ÉCRAN", as applicable.
***Effective Date**—June 30, 1989*

4.7.4 An extension hand-lamp shall be provided with a guard for the lamp that is made of metal or nonmetallic material (see tests of Clauses 6.16.2 and 6.17).

4.8 Wiring Joints and Terminal Connections

4.8.1 Where solder is used, the conductor shall be made mechanically secure before the solder is applied. The following are acceptable methods of mechanically securing the conductor:

(a) Twisting of wires together;

(b) Insertion of a bare conductor through a hole in a flat terminal;

(c) Insertion of a bare conductor straight into a terminal sleeve.

4.8.2 Soldered wiring splices or those made with uninsulated wire connectors shall be covered with at least 3 layers of insulating tape extending at least 1/2 inch on each side of the bare live parts or the equivalent, such as shrink-fit type tubing, which shall be retained securely over the joint (see also Clause 4.18).

4.8.3 Where luminaires are subject to vibration or similar effects, joints and connections shall be reliably secured, e.g., by soldering or welding or by pig-tail connectors having supplementary retention, etc.

4.8.4 Where connections are made to binding screw terminals:

(a) The wire strands shall be twisted prior to attachment under the terminal screws; and

(b) The wire shall be looped under the head in a clockwise direction.

4.9 Wiring Devices

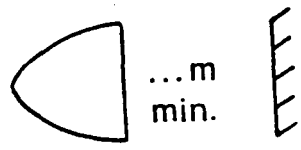
4.9.1 General

4.9.1.1 Wiring devices, such as switches, lampholders, etc., shall be prevented from any turning that would apply tension to splices or other wiring connections, cause damage to the wiring, or otherwise adversely affect the assembly. (See the appropriate requirements of Clause 4.6.)

(n)* A luminaire tested in accordance with Clause 6.3.5(e) or (f) shall have the following marking:

WARNING: PLACE LIGHT SOURCE NO CLOSER THAN ... TO ANY SURFACE and

AVERTISSEMENT : LAISSER UNE DISTANCE D'AU MOINS ... ENTRE LA SOURCE LUMINEUSE ET LA SURFACE LA PLUS PROCHE.

or 

***Effective Date**—*August 19, 1990*

5.4 Instructions

5.4.1 General. Instructions and warnings shall be provided, as applicable, on the container or on a sheet supplied in the container of a luminaire, in both English and French, as specified in Clauses 5.4.2 to 5.4.4.

5.4.2 Instructions for the proper use of mounting hooks shall be provided with luminaires having long runs of chain or cord or similar types and shall include wording such as:

(a) "Use hook to support chain, not the electrical cord";

(b) "Do not install on radiant-heating type ceiling".

5.4.3 Kits shall be provided with instructions that include:

(a) An exploded view of the individual parts (together with an exploded view of the lampholder);

(b) Clear identification of the individual parts;

(c) Well-defined instructions to eliminate risk of error when assembling the parts;

(d) If a shade is not provided, all details regarding the type, material, minimum dimensions, and mounting of those shades with which the luminaire is intended to be used. A caution shall be included to the effect that any deviation from the recommended types of shade may constitute a fire hazard;

(e) If a support or base is not provided, details regarding the intended type of support or base and method of assembly;

(f) Any limitations of application of the luminaire and the following statement: "These instructions must be followed in order to meet the requirements of the Canadian Electrical Code, Parts I and II."

5.4.4 An assembly of the type described in the Note following Clause 4.3.6 shall be provided with instructions as outlined in Clause 5.4.2 as applicable (e.g., an exploded view of the lampholder is not required since the cord is attached at the factory).

5.5* Date Marking

The month and year of manufacture, at least, shall be marked on each product or its carton. Date coding, serial numbers, or equivalent means may be used.

***Effective Date**—*August 31, 1988*

6. Tests

6.1 General

6.1.1 Except as otherwise indicated, tests required to determine compliance with this Standard shall be made, where possible, on only 1 representative sample of the equipment or component thereof.

6.1.2 Tests need not be conducted in any order, unless specified, but shall be arranged to require the use of as few samples as possible (see Clause 6.1.1).

6.1.3 Except as noted in Clause 6.4.3 luminaires with Class 2 type transformers shall be tested in accordance with CSA Standard C22.2 No. 66, Special Transformers, with adjustments made to suit the application.

6.2 Test Conditions

6.2.1 General. The tests shall be made under the following conditions, as applicable, unless specified otherwise.

6.2.2 Voltage and Frequency

6.2.2.1 Voltage. The test voltage shall be:

(a) The maximum of the normal operating range* of the nominal system voltage marked on the equipment; or

**This assumes a test lamp of rated wattage. If not, the test voltage shall be adjusted to give rated wattage. (See also Table 2 of CSA Standard C235, Preferred Voltage Levels for AC Systems,* 0—50,000 *Volts.)*

(b) Such that standard test lamps will exhibit the required temperature characteristics shown in Tables 6, 7, and 8;

(c) Adjusted to give rated lamp-wattage on luminaires not marked with the voltage rating or where a standard test lamp is not available.

6.2.2 Frequency. Frequency-sensitive equipment shall be subjected to the tests while connected to a supply of rated frequency, except that equipment marked with more than one frequency shall be tested at the frequency that will produce the maximum temperature rise.

6.2.3 Test Lamps

6.2.3.1 The type and wattage of lamp or lamps specified (rated) by the manufacturer shall be used, except that, where the luminaire is provided with medium-base screw-shell lampholders and has one or more of the ratings shown in the Tables 6, 7, and 8, a standard test lamp(s) shall be used.

If the luminaire cannot physically accommodate the standard test lamp, the lamp type(s) recommended by the manufacturer shall be used.

Where a standard test lamp is available a luminaire rated for 1 wattage and type of lamp shall be subjected to at least 2 tests, one with a pattern test lamp and the second with a base test lamp, unless 1 lamp is available having both characteristics. When a luminaire is rated for more than 1 wattage and type of lamp, sufficient testing shall be conducted to ensure that maximum temperature conditions have been obtained.

6.2.3.2 Standard test lamps shall be installed in the lampholders and oriented so that the side of the lamps that exhibits the temperature characteristics will be aimed in the direction of temperature measurement.

6.2.3.3 The sample shall be installed or supported to simulate intended usage in accordance with the manufacturer's instructions and, where more than one method may be used, it shall be installed or supported to allow recording of the maximum conditions that may be encountered under the intended uses.

6.2.3.4 Tests shall be conducted in a room substantially free of draughts and maintained at an ambient of 25 ± 10°C. Temperature variations below or above 25°C shall be respectively added to or subtracted from the observed temperatures.

6.2.3.5 Temperatures shall be measured by thermocouples consisting of No. 30 AWG iron and constantan wire.

6.2.3.6 A thermocouple junction shall be secured in good thermal contact by taping it in place, except that where a metal surface is involved, brazing or silver soldering may be necessary.

6.3 Normal Temperature

6.3.1 A luminaire shall be supported and operated as intended in accordance with the manufacturer's instructions under the applicable conditions of Clause 6.2, until thermal equilibrium is attained, without causing temperatures higher than those specified in Table 9.

6.3.2 An integral protective device shall not operate during the normal-temperature test of a luminaire.

6.3.3 An aquarium hood or reflector shall be supported as intended on a glass tank of the maximum dimensions permitted by the hood and filled with water to within 1 inch of the top of the tank.

6.3.4 Extension Hand-Lamps with Take-Up Reel

6.3.4.1 For the heating test of a reel, a 60-Hz essentially sinusoidal current having a value equal to the maximum current rating of the reel shall be circulated through the flexible cord. The length of the cord to be left unreeled during the test shall be as indicated in Table 10.

6.3.4.2 If a thermoplastic-insulated cord is to be used with a reel, the latching mechanism of the reel, if any, shall be disengaged in order to place the cord under tension. There shall be no visible reduction in the thickness of the insulation on the side of the cord nearest the centre of the reel as determined by examination of 3 separate cuts across the retracted length of cord.

6.3.5* Adjacent Surface Temperatures

A luminaire having a light source that may be directed or positioned against adjacent or supporting surfaces shall be subjected to the following:

(a) The luminaire shall be placed with the light source directed toward the vertical test surface or horizontal supporting surface as close as the design will allow but not less than 15 cm;

(b) The distance is measured on the optical axis of the luminaire from the part of the luminaire or lamp that is nearest to the test surface;

(c) The choice between a vertical or horizontal surface shall depend on luminaire design and selection of the more severe condition for the luminaire;

(d) If the temperature of the test surface does not exceed 90°C, no related markings are required;

(e) If the temperature of the test surface exceeds 90°C, the test will continue until a distance is established at which the surface temperature under test does not exceed 90°C;

(f) If the minimum distance is specified by the manufacturer, the temperature test shall not be applicable to distances specified by the manufacturer that are less than or equal to 15 cm;

(g) A luminaire in compliance with (e) or (f) shall be marked in accordance with Clause 5.3.1 (n).

***Effective Date**—*August 19, 1990*

6.3.6* Test Exemptions

6.3.6.1 The Normal Temperature Test shall not be required for portable luminaire designs that comprise all of the following:

(a) Open-top and open-bottom shades;

(b) Medium-base lampholders without an enclosing cup or similar housing;

(c) Lamps of the reflector or non-reflector type, mounted base-down and rated 300 W or less; and

(d) Power supply cords with the following ratings:

(i) 105°C minimum when using lamps rated 300 W;

(ii) 60°C minimum when using lamps rated 250 W or less.

6.3.6.2 The Normal Temperature Test shall be required where features are included in the above basic design that are expected to cause operating temperatures in excess of those specified in Table 9.
***Effective Date**—*June 30, 1989*

6.4 Abnormal Temperature

6.4.1 A luminaire having an external surface temperature exceeding 90°C, excluding the light source, shall be tested in accordance with Clause 6.4.7, and shall be marked in accordance with Clause 5.3.1 (l).

6.4.2 A luminaire of the fluorescent, reactor, transformer, or solid-state type shall be subjected to the tests of Clause 6.4.8.

6.4.3 An overcurrent or thermal protective device shall be bypassed, except those which are an integral component such as the thermal protector in a fluorescent ballast.

6.4.4 The test shall be conducted until failure occurs, or for a maximum duration of 7 h.

6.4.5 The test surface shall consist of a knot-free pine board covered with a double layer of cheesecloth. The cheesecloth shall be bleached, 36-inches wide, running 14 to 15 yards per pound, and having what is known to the textile trade as a thread-count of 32 x 36.

6.4.6 Test Criteria. When operated under abornormal conditions the following shall be considered a hazard:

(a) Emission of flame or molten metal, excluding solder;

(b) Glowing, flaming, or charring of the test material;

(c) Deterioration of insulating materials exposing live parts that may cause an electrical shock hazard;

(d) Reduction of electrical spacings.

Note: *Glowing or charring of cheesecloth is to be determined by visual examination for broken fibres after removing the cheesecloth from the test surface.*

Charring is more than discoloration; it is the condition in which the surface or test material is rendered black.

The opening of a 15 A *branch circuit fuse constitutes completion of the test.*

6.4.7 Horizontal

6.4.7.1 A free-standing luminaire, as specified in Clause 6.4.1, shall be placed on an inclined flat surface in a position most likely to cause overturning. A luminaire that overturns when the surface is tilted 15° ± 1/2° from the horizontal shall be tested in accordance with Clause 6.4.7.2.

6.4.7.2 The luminaire shall be placed on the horizontal surface in the most unfavourable of the positions that may reasonably be expected.

6.4.8*—Deleted.

6.4.9* A luminaire as specified in Clause 6.4.2 shall be placed on the test surface and the following faults introduced:

(a) Fluorescent Types:

(i) Short-circuit starter or secondary circuit; and

(ii) Disconnect lamp.

(b) Transformer Type:

(i) Short-circuit.

(c) Solid-State Type:

(i) Open circuit or short-circuit any component which results in the worst condition.

***Effective Date**—*June 30, 1989*

6.5 Flame

6.5.1 Enclosures of non-metallic materials shall be subjected to the tests of Clauses 6.5.2 and 6.5.3 without:

(a) Supporting combustion for more than 30 s after any of the first 4 applications of the test flame;

(b) Supporting combustion for more than 60 s after the fifth application;

(c) Burning a hole through the material any time during the 5 applications; and

(d) Dropping flaming or molten particles during the test. Also, the material is not acceptable if it should disappear before the test is completed.

6.5.2 The apparatus for making the test shall consist of:

(a) A test shield of sheet metal 12 inches wide, 14 inches deep, and 24 inches high, open at the top and front, and a means of supporting the test specimen in a vertical position;

(b) A Tirril burner having a bore of 3/8 inch and a length of 4 inches above the primary-air inlets;

(c) A 20° angle block for supporting the burner;

(d) A supply of natural gas of approximately 1000 Btu per cubic foot at normal pressure (range of 3 to 5 inches of water); and

(e) A stop-clock.

6.5.3 The test shall be made in a room from which all draughts of air are excluded. A specimen of the moulded part or a 6-inch square plaque of the moulded material used having a minimum thickness not less than that of the part involved shall be supported in a vertical position in the test shield. The height of the flame, with the burner vertical, shall be adjusted to 5 inches with an inner blue cone 1-1/2 inches high. The burner shall be tilted to an angle of 20° from the vertical and the flame applied to the sample of material under test, so that the tip of the inner blue cone of the flame touches the specimen at a point approximately 3 inches above its lower end. The flame shall be brought up to the material in such a manner that the vertical plane through the axis of the burner will be perpendicular to the line of approach. The flame shall be applied for 15 s, and then removed for 15 s until 5 such applications have been made. The flame shall not be re-applied while the material is still burning.

6.6 Alternative Flame Tests

6.6.1 At the submittor's request, the flame test described in UL Standard No. 94, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, for plastic materials classed 94V-1 shall apply, provided that the luminaire complies with the following conditions:

(a) The luminaire shall have no user-serviceable parts, including the lamp;

(b) The maximum available voltage within the luminaire shall be 130 V rms (184 V peak);

(c) The overall length of the assembly, less the flexible cord, shall not exceed 3 feet;

(d) The luminaire shall contain no devices for electromagnetic energy storage (e.g., capacitors or inductors). Electromagnetic radio-frequency noise-suppressing devices and stray capacitances and inductances from wiring are excluded from this restriction;

(e) When bare metal parts, which are spaced 1/8 inch or less apart, are shorted, the maximum short-circuit available shall be 1.0 A;

(f) Where the short-circuit current between bare metal and insulated live parts exceeds 1 A, such wiring shall be so routed, secured, or clamped in place as to maintain separation so that parts of opposite polarity will be spaced apart a minimum of 1/8 inch;

(g) The luminaire shall be allowed to operate as in Items (d) or (e) under short-circuit conditions that cause a maximum rise in temperature, until temperature equilibrium is established. At the end of this time, there shall be no melting, charring, or ignition of any components or of any enclosing, encapsulating, or supporting parts, nor shall there be any evidence of exposure of live metal parts.

6.6.2 In addition, where the assembly includes live metal conductors encapsulated in the material, the flame test shall be applied to samples containing the encapsulated conductors, as well as to samples that function purely as enclosures or supports for live metal conductors.

6.6.3* Direct plug-in nightlights shall be constructed of material demonstrated to be in compliance with the requirements of Test E of CSA Standard C22.2 No. 0.6.
***Effective Date**—*March 31, 1992*

6.7 Loading. Means provided for suspension of a luminaire shall be capable of supporting in tension, for 1 h, a load of 3 times the weight of the luminaire, but the load shall be not less than 25 ± 1/2 pound even in the case of a luminaire weighing less than one-third of this amount. If supported at 2 or more points, the distribution of the load shall be similar to that which may be encountered in the field.

6.8 Strain Relief

6.8.1 The assembly of a flexible cord of a luminaire shall withstand for 1 min a pull of 35 ± 1/2 pounds when tested as described in Clause 6.8.2.

6.8.2 The pull shall be applied by suspending a 35 ± 1/2 pound weight on the cord, with the force applied in a direction normal to the plane of the cord entry hole. If there is a movement of the cord of more than 1/16 inch or any loosening or breaking of wires at the points where the connections are secured, or where the conductors are permanently assembled to terminals, the construction is not acceptable.

6.9 Endurance (Extension-Lamp Cord Reel)

6.9.1 A cord reel provided as a component of a luminaire shall withstand 6000 cycles of operation of reeling and unreeling the cord in the intended manner in accordance with the manufacturer's instructions. There shall be no perceptible abrasion of, or other damage to, the cord or other parts.

6.9.2 During the endurance test the cord is to be unreeled to a length of 30 inches or more, by any convenient method representative of actual service, and is to be recoiled on the reel automatically by the action of the take-up mechanism. The cord is to be unreeled in such direction, with respect to the body of the reel, that the tendency to cause damage will be greatest, consideration being given to the intended method of mounting the reel.

6.10 Swivel Strength, Flexing, and Swivelling. A swivel joint shall be capable of withstanding:

(a) A torsion of 20 ± 1/2 inch-pounds for 1 min; and

(b) A straight pull of 100 ± 1 pounds or the maximum recommended by the manufacturer, whichever is greater, for a period of 1 min;

(c) A swivelling test of 6000 cycles of rotation, if the swivel joint is not limited to a maximum rotation of 370°, without damage to the jacket or the insulation of the conductors. One cycle shall consist of full rotation from stop and back again.

6.11 Stability. A free-standing luminaire shall be placed on the centre of a flat surface inclined at an angle of 8 ± 1/2° to the horizontal such that all edges of the luminaire are resting on the surface. The luminaire shall not overturn when adjusted to a position or positions most likely to cause overturning.

6.12 Humidity. A luminaire intended for wet or damp locations shall be exposed to a moist atmosphere at a relative humidity of 95 +0, -5% and a temperature of 30 to 35°C for a period of 72 h. It shall then withstand the leakage and dielectric strength tests of Clauses 6.14 and 6.15.

6.13 Weatherproofness

6.13.1 A luminaire intended for wet locations shall be mounted as in service and shall be tested for weather-proofness as specified in CSA Standard C22.2 No. 94, Special Purpose Enclosures 2, 3, 4, and 5.

Table 8
Temperatures of Lamps for Testing Luminaires,
Special-Purpose Types

Watts		**150/R**	**250**
Locations*	**Temperature (°C)**		
1			128
2			137
3			140
4			139
5			120
6			110
7			92
8			78
Base		170	135

**These point designations are those shown in Figure 6 of CSA Standard C22.2 No. 84, Incandescent Lamps, with regard to thermocouple locations.*

Notes to Tables 6, 7, and 8:

(1) *The temperatures are based on a temperature in the test enclosure of* 25°C.

(2) *Tables 6 and 7 illustrate values for all general lighting types (e.g., Types A, T, and PS in Table 6 and R30 and R40 in Table 7), including the infra-red lamps, except as noted in Note 3.*

(3) *Values for the special-purpose lamps chart can be filled in after further studies (as needed). Criteria for coloured lamps, as well as the trilight types, are included in Tables 6 and 7,* **except for the 150 W/R coloured ("base" only) and the 250 W/non-reflector trilight type, which are shown in Table 8.**

(4) *In the selection of the above test lamp, a tolerance of up to* ±2°C *will be permitted for the temperature values at points that affect critical temperatures in the luminaires, but the variation below or above the values shall be respectively added to or subtracted from the observed temperatures. The negative tolerance for pattern temperatures may exceed* 2°C *at points that do not affect critical temperatures in the luminaire.*

Table 9

Limiting Temperatures for Lighting Devices

Item	Location	Maximum Temperature, °C
1.	(a) Supporting surface of luminaire	
	(b)**External surfaces of luminaire (excluding light source):	90
	(i) parts that are provided specifically for gripping or adjustment	
	Metallic	60
	Nonmetallic	75
	(ii) Table type	90
	(iii) Floor and Pin-up type	
	Under 4 feet	90
	Above 4 feet at most unfavourable adjustment	150
	**Effective Date—*August 19, 1990*	
	(c) Paper, wood, and ordinary wood fibre materials (including paper labels)*	90
	(d) Surfaces other than 1(a) that may be adjacent to the luminaire	90
	(e) Neoprene materials*	90
2.	(a) Coil windings and core, Class A insulation	95†
	(b) Coil windings and core, Class B insulation	120†
3.*	Ordinary rubber	60
4.*	(a) Urea materials	100
	(b) Melamine	130
	(c) Phenolic	150
	(d) Nylon (see Item 7)	105
	(e) Varnished cloth	85
	(f) Thermoplastic materials	105
5.*	On non-ferrous screw-shells and centre contacts and other current-carrying parts of lampholders	200
6.	On any sealing compound	15°C less than the melting or softening point
7.	On thermoplastic material not covered in Item 4(f) used for parts such as shades, diffusers, and support arms	See test of Clause 6.4.5.

(Continued)

Table 9 (Concluded)

Item	Location	Maximum Temperature, °C
8.‡	Capacitors	65
9.	Automatic fluorescent starter	80
10.*	Solid contacts (e.g., of a cord reel)	55

**These limits do not apply to a composition or construction that has been investigated and recognized as having a different temperature limit, e.g., nickel plating on parts noted in Item 5 above are suitable for a maximum temperature of* 218°C.

†*As determined by the rise-of-resistance method.*

‡*Also, capacitors may be marked otherwise.*

General Instruction No. 2

C22.2 No. 12-1982
August 1988

CSA Standard C22.2 No. 12-1982, *Portable Luminaires*, was published in February 1982; it consisted of 40 pages, each of which was dated February 1982.

Amendments to the Preface and Clauses 2.1, 3.2.1, 4.3.3 (deleted), 4.7.3, 4.9.1.6 (new), 4.9.2.3(b) and (d) (deleted), 4.9.4.2 (deleted), 4.9.5.2 (deleted), 4.9.5.4, 4.11.3, 4.11.7 (deleted), 4.11.9, 4.14.4 (new), 5.2.2A (new), 5.3.1, 5.5, 6.4, 6.6.3, 6.16.3, and Table 9 have been formally approved. These and errata to the Contents and Clauses 6.13 and 6.17 are incorporated (and identified by a vertical line in the margin) in the attached replacement pages.

CSA Standard C22.2 No. 12-1982 now consists of the following pages:

5, 6, 9, 10, 13, 14, 29–34, and **37–40** dated **February 1982;**

3, 4, 7, 8, 11, 12, 15–28, 35, 36, and **36A** dated **August 1988.**

These replacement pages are to be inserted into your copy of the Standard; the pages replaced should be kept for reference.

Contents

August 1988
(Replaces p. 3, February 1982)

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August 1988
(Replaces p. 7, February 1982)

Preface

This is the fourth edition of No. 12 of a series of Standards issued by the Canadian Standards Association under Part II of the Canadian Electrical Code. It supersedes the previous edition published in 1960.

This edition has undergone a general updating to remain abreast of current technology and includes requirements for portable luminaires for general household, commercial, and industrial use in dry, damp, and outdoor locations.

This Standard incorporates the following Electrical Bulletins:

Number	Date	Subject of Bulletin
628	February 8, 1966	Chain-supported Portable Electric Lighting Devices;
649D	December 30, 1968	Application of Electrical Bulletin No. 649 to Portable Lamps;
650	August 12, 1966	Temperature Test Procedure for Portable Incandescent Lighting Devices;
722B	June 6, 1971	Revised Requirements for Direct Plug-in Equipment
791A	November 20, 1979	Requirements for Swivels for Use with Portable Lamps;
814	March 1, 1971	Certification Requirements Covering Portable Incandescent Lamp Kits;
1169	June 27, 1978	Methods of Date Marking
1188	August 31, 1978	Alternative Flame Test for Non-Metallic Enclosures of Portable Fluorescent Lighting Devices Having No User-Serviceable Parts Including Lamps;
1259	February 7, 1980	Proposed revisions to CSA Standard C22.2 No. 12;
1276	July 16, 1980	Use of Polarized 2-Pole Parallel Blade Attachment Plugs with Portable Electric Lighting Devices (Including Extension-Lamp Cord Sets);
1318	May 22, 1981	Novelty Lamps.

For general information on the Standards of the Canadian Electrical Code, Part II, see the preface of the latest issue of CSA Standard C22.2 No. 0, Definitions and General Requirements.

This Standard was prepared under the jurisdiction of the Committee on CE Code, Part II, and was formally approved by this Committee.

Rexdale, February 1982

Note: *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the user of the Standard to judge its suitability for his or her particular purpose.*

All enquiries regarding this Standard should be addressed to Canadian Standards Association, 178 Rexdale Boulevard, Rexdale, Ontario M9W 1R3.

CSA Standards are subject to periodical review and suggestions for their improvement will be referred to the appropriate committee.

Requests for interpretation will also be accepted by the committee. They should be worded in such a manner as to permit a simple "yes" or "no" answer based on the literal text of the requirement concerned. Formal interpretations are published in "CSA Information Update". For subscription details and a free sample copy, write to CSA Information Centre or telephone (416) 744-4019.

August 1988
(Replaces p. 8, February 1982)

C22.2 No. 12-1982

Portable Luminaires

1. Scope

1.1 This Standard applies to portable luminaires* for general household, commercial, and industrial use in dry, damp, and outdoor locations, and intended to be used in accordance with the Rules of the Canadian Electrical Code, Part I, in non-hazardous locations, on a nominal 120 V system.

**Throughout this Standard the term "portable luminaires" has been shortened to "luminaires".*

1.2 This Standard applies to portable incandescent and fluorescent luminaires for illuminative and decorative purposes and to combinations of these, such as: aquarium hoods, cabinets (illuminated bars, hutches, etc), chain- and hook-supported types (including flexible-cord-, steel-cable- or rope-supported), colour wheels, drafting lamps, display types, electronic (flashing, touch-control) types, extension hand-lamps, fibre-optic types, floor lamps, garden lights, gimbal lights, hospital lamps, illuminated forms or shapes (figurines, fire logs, terrestrial globes, plaques, etc.), kits, lamp testers, light channels for display purposes, machine-shop lamps (e.g., illuminated shields for use with electric grinders), make-up mirrors, picture lamps, planter lamps, plug-in night-lights, pole lamps, room dividers, table lamps (including nursery, desk, novelty types, etc.) transformer-operated ultraviolet hobby lamps, and wall (pin-ups, under-cabinet) types.

Note: *Luminaires intended for residential use, incorporating parts such as beverage cans, nostalgia items, etc., used as a base, stand, or shade, may include wording to indicate the name or trademark of the product usually contained.*

1.3 This Standard does not apply to:

(a) Christmas-tree and other decorative lighting outfits (except for colour wheels) covered by CSA Standard C22.2 No. 37, Christmas-Tree and Other Decorative Lighting Outfits;

(b) Outdoor floodlight-type luminaires (except for garden lights) covered by CSA Standard C22.2 No. 97, Outdoor and Submersible Floodlights;

(c) Electric signs covered by CSA Standard C22.2 No. 2, Electric Signs;

(d) Electric displays and incandescent-lamp signs covered by CSA Standard C22.2 No. 7, Portable Electric Displays and Incandescent-Lamp Signs, except as noted in Clause 4.1.6;

(e) Therapeutic luminaires (e.g., infra-red, ultraviolet) covered by CSA Standard C22.2 No. 125, Electromedical Equipment;

(f) Fluorescent luminaires designed for commercial or industrial use and having an open-circuit voltage of more than 300 V, and with one or more lamps rated at more than 20 W, which are covered by CSA Standard C22.2 No. 162, Fluorescent Luminaires;

(g) High-intensity discharge luminaires covered by CSA Standard C22.2 No. 163, High Intensity Discharge Luminaires; and

(h) Stage, studio, and photographic luminaires covered by CSA Standard C22.2 No. 166, Stage, Studio and Photographic Luminaires.

2. Definitions

2.1 The following definitions apply in this Standard:

Extension hand-lamp means an assembly consisting of a length of flexible cord with an attachment plug at one end and a hand-held lampholder with lamp-guard at the other, and classified as:

(a) ***Heavy-duty type**** intended for use in damp locations, garages, or similar locations; and

(b) ***Light-duty type**** intended for use in normally dry locations and where it is not unduly exposed to damage from mechanical causes;

Lamp means a complete assembly consisting of the bulb, filament, filament leads and supports, screwshell or pins, contacts, etc;

Direct Plug-In Nightlight* means a self-contained device rated at 10 W or less;

Luminaire* means a complete lighting unit designed to accommodate a lamp or lamps, and to connect a lamp or lamps to a power supply;

Portable luminaire* means any luminaire that is cord-connected;

Light source* means the lamp, lens or light shield;

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(Replaces p. 11, February 1982)

Wiring device means an electrical component of a luminaire that is necessary for the intended use and/or proper control of the assembly involved but does not include wiring or lamps.

***Effective Date**—*August 31, 1988*

3. General Requirements

3.1 General requirements applicable to this Standard are given in CSA Standard C22.2 No. 0, Definitions and General Requirements.

3.1.1 Luminaires for use in hospitals (e.g., examining lamps, wall lamps installed above the head) shall also meet the applicable requirements of CSA Standard C22.2 No. 125, Electromedical Equipment.

3.2 Reference Publications

3.2.1 Where reference is made to CSA Standards of the Canadian Electrical Code, Parts I and II, such reference shall be considered to refer to the latest edition and revision thereto, unless otherwise specified. This Standard refers to the following such Standards and the year dates shown indicate the latest editions available at the time of printing:

C22.1-1986,
Canadian Electrical Code, Part I;

C22.2 No. 0-M1982,
Definitions and General Requirements;

C22.2 No. 0.4-1972,
Bonding and Grounding of Electrical Equipment (Protective Grounding);

C22.2 No. 0.6-M1982*,
Flammability Testing of Polymeric Materials
***Effective Date**—*August 31, 1988.*

C22.2 No. 2-1956,
Electric Signs;

C22.2 No. 7-1938,
Portable Electric Displays and Incandescent-Lamp Signs;

C22.2 No. 37-1964,
Christmas-Tree and Other Decorative Lighting Outfits;

C22.2 No. 42-M1984,
General Use Receptacles, Attachment Plugs and Similar Wiring Devices;

C22.2 No. 66-1956,
Speciality Transformers;

C22.2 No. 84-1974,
Incandescent Lamps;

C22.2 No. 94-1976,
Special Purpose Enclosures 2, 3, 4, and 5;

C22.2 No. 97-1969,
Outdoor and Submersible Floodlights;

C22.2 No. 125-M1984,
Electromedical Equipment;

C22.2 No. 166†,
Stage, Studio and Photographic Luminaires.

†*Under preparation. Refer to CSA Electrical Bulletin No. 1131, June 15, 1977,* Requirements Covering Stage and Studio Luminaires.

3.2.2 Where reference is made to the following publications such reference shall be considered to refer to that edition listed below:

CSA Standard
C235-1969,
Preferred Voltage Levels for AC Systems, 0 to 50,000 Volts;

UL* Standard
UL No. 94-1973 (Second Edition),
Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

**Underwriters Laboratories, Inc.*

4. Construction

4.1 General

4.1.1 Component parts shall be of types specifically approved for the use intended or shall be investigated as an integral part of the luminaire.

4.1.2 Electrical components shall conform to the individual Canadian Electrical Code, Part II Standard covering such components, with exceptions where the application may allow a deviation.

4.1.3 Luminaires shall have the necessary strength and rigidity to resist the abuses to which they are liable to be subjected, without the required spacings of the electrical equipment being reduced or parts becoming loosened or displaced. Parts that may be removed during normal use, such as for cleaning or relamping, shall be designed or marked to prevent replacement in a position that would affect the safe operation of the luminaire.

4.1.4 There shall be no sharp edges, burrs, etc., nor shall any method of construction be used that might damage electrical insulation, reduce electrical spacings, or cause injury to the user.

4.3.3*—Deleted
***Effective Date**—*August 31, 1988*

4.3.4 Electrical cord or wiring shall not be used for the support of a luminaire except as permitted by Clause 4.11.10.

4.3.5 An aquarium-type luminaire shall have flanges or other means to prevent it from being accidentially dislodged into the water.

4.3.6 Except as covered in the following note, luminaires shall have a base or other free-standing type of support (e.g., base and stand for a table or floor lamp), or means for pin-up or a similar type of mounting.

Note: *An assembly for indoor dry locations only, consisting of a length of flexible cord, an attachment plug, a lampholder with a side outlet for a supply cord and means for mounting the assembly (e.g., a short length of threaded nipple and a cork bottle stopper) in the neck of a bottle, or the equivalent, need not have means for mounting or support.*

4.3.7 The chain in chain- and hook-supported types of luminaires:

(a) Shall be not less than 12 feet nor more than 20 feet long;

(b) Shall not raise the total weight above 20 pounds when 4 feet of the chain, 4 feet of cord, and the lampholder assembly, including shade, glassware, and all decorative parts, are weighed together;

(c) Shall be provided with at least 2 hooks, packed with the lamp, together with means for securing the hooks to solid wooden structural members. Wood screws or the equivalent shall be not smaller than No. 10 with a nominal thread length of 1-1/4 inch*. Toggle bolts and similar devices are not acceptable for securing the hooks and any reference to their use shall not appear in the installation instructions (see Clause 5.4.1), advertising, etc.

**A minus tolerance of 1/8 inch is permitted.*

4.3.8 Cords intended to be supported on hooks of the type noted in Clause 4.3.7(c) shall have means of securing the cord to the hook (e.g., a plastic clamp).

4.3.9 Parts of luminaires supported from the ceiling by a means other than that outlined in Clauses 4.3.7 and 4.3.8 shall:

(a) Not exceed a dead weight of 20 pounds;

(b) Have a support, e.g., keeper wire, that complies with Clause 6.7;

(c) Have a supporting means that complies with the strength requirements of Clause 4.3.7(c).

4.3.10 A free-standing luminaire such as a floor or table type shall be provided with weights or the equivalent in the supporting base to prevent overturning, and shall be subjected to the stability test of Clause 6.11.

4.4 Corrosion Protection

4.4.1 External surfaces of iron or steel of luminaires intended for use in normally dry locations shall be protected by galvanizing, painting, or other suitable means. Loaders and base weights are not considered to require corrosion protection.

4.4.2 All surfaces of iron or steel of luminaires intended for use in wet or damp locations shall be protected by galvanizing, painting, or other suitable means.

4.5 Stems and Tubes

4.5.1 Stems and tubing shall be free from kinks or cracks and, if of metal, shall be not less than 0.020 inch in thickness, except that where threaded, metallic tubing shall be not less than 0.040 inch in thickness.

4.5.2 Rigid slow-burning tubing shall be not less than 0.050 inch in thickness when used in luminaires having medium-base or smaller lampholders. (See Clause 4.7.1 for definition of "slow-burning material".)

4.6 Mechanical Joints and Fastenings

4.6.1 Methods of making mechanical joints between and for the fastening of parts, shall be such as to prevent turning, which would result in damage to wires or wiring devices, after the assembly is completed. Frictional contact alone between parts shall not be used to prevent turning.

Note: *An adjustable, telescoping stem that complies with the torsion requirement in Clause 4.6 may use a fastening means for securing the telescoping parts that depends upon friction alone.*

4.6.2 Turning between metal parts shall be prevented by the use of a lock washer, a locknut seated against another nut or equivalent threaded assembly, or by some other equivalent method. A screw joint may be locked by solder, a set-screw, sealing, or the equivalent, except that sealing shall not be used if it destroys the electrical bond where bonding is required.

4.6.3 Screws used to mount components shall be provided with a means to prevent loosening.

4.6.4 Sheet metal nuts, if used for assembly or to prevent turning of threaded tubing not larger than 1/8 inch pipe size and on bolts or studs that are not greater than 1/4 inch in diameter, shall be of heat-treated steel. Larger sizes may be used where they are not depended upon for mechanical strength.

4.6.5 A swivel joint shall be so constructed that turning will not cause damage to the insulation of the wires and it shall be so designed that rotation is limited to not more than 370°. If not limited to a maximum rotation of 370°, a swivel joint shall be capable of withstanding the swivelling test of Clause 6.10(c).

4.6.6 A swivel joint, if of metal, shall be of material not thinner than 0.040 inch if threaded and 0.020 inch if unthreaded. If other material is used, it shall be at least 0.050 inch thick. Sleeves or dust caps, if provided, may be of thinner material, provided that the wiring through the swivel is adequately protected against mechanical injury by the swivel body, i.e., the wiring does not project outside the body of the swivel.

4.6.7 A swivel joint shall be capable of withstanding the torsion and pull tests of Clause 6.10.

4.6.8 The plant-growing section of a planter-type luminaire shall be completely separate from a raceway, enclosure, or any other compartment containing electrical parts, and there shall be no nail- or screw-type (or other similar type) fastenings between them that might allow water leakage into the electrical section.

4.6.9 The link of a chain shall be formed so that the joint is located not less than 30° from the vertical (see Figure 4). In the case of circular links, the joint shall be welded. (See loading test of Clause 6.7.)

4.6.10 Screw threads and sharp-pointed screws shall not extend into a wiring compartment for a distance of more than 3/16 inch, except that no limit need be applied if the wires (e.g., because of lengths) are reliably held away from or positioned away from such screws. (See Clause 4.1.4.)

4.7 Shades, Diffusers, and Lamp Guards

4.7.1 Shades, diffusers and lamp guards shall be made of at least slow-burning material, except that those which form an enclosure or a part of an enclosure shall meet the requirements of Clause 4.2.

Note: *A slow-burning material is one that has the approximate burning characteristics of ordinary newsprint, including an ignition temperature of approximately* 440°C. *Included in the general classification of slow-burning materials are cellulose acetates, methyl methacrylates, polystyrene, polyvinyl chloride, nylon, cotton, silk, rayon (other than brushed rayon), wood, and paper.*

4.7.2 Nitrocellulose sheet, mouldings, or pyroxylin coatings on materials other than metal, either alone or as treatments, shall not be used.

4.7.3* Luminaires Using Tungsten-Halogen Lamps

4.7.3.1 Tungsten Halogen lamps shall be provided with a lens or guard secured to the luminaire to contain major particles that may result from the lamp shattering.

4.7.3.2 All openings in guards or enclosures of a luminaire shall be such that no part of a shattered lamp can leave the luminaire by a direct path. Screens, guards and baffles shall comply with the requirements as specified in items (a), (b), (c), and (e) of Clause 4.2.2.10.

***Effective Date**—*August 31, 1988*

4.7.4 An extension hand-lamp shall be provided with a guard for the lamp that is made of metal or non-metallic material (see tests of Clauses 6.16.2 and 6.17).

4.8 Wiring Joints and Terminal Connections

4.8.1 Where solder is used, the conductor shall be mechanically secure before the solder is applied. The following are acceptable methods of mechanically securing the conductor:

(a) Twisting of wires together;

(b) Insertion of a bare conductor through a hole in a flat terminal;

(c) Insertion of a bare conductor straight into a terminal sleeve.

4.8.2 Soldered wiring splices or those made with uninsulated wire connectors shall be covered with at least 3 layers of insulating tape extending at least 1/2 inch on each side of the bare live parts or the equivalent, such as shrink-fit type tubing, which shall be retained securely over the joint (see also Clause 4.18).

4.8.3 Where luminaires are subject to vibration or similar effects, joints and connections shall be reliably secured, e.g., by soldering or welding or by pig-tail connectors having supplementary retention, etc.

4.8.4 Where connections are made to binding screw terminals:

(a) The wire strands shall be twisted prior to attachment under the terminal screws; and

(b) The wire shall be looped under the head in a clockwise direction.

4.9 Wiring Devices

4.9.1 General

4.9.1.1 Wiring devices, such as switches, lampholders, etc., shall be prevented from any turning that would apply tension to splices or other wiring connections, cause damage to the wiring, or otherwise adversely affect the assembly. (See the appropriate requirements of Clause 4.6.)

4.9.1.2 If knobs on switches, etc. are removeable from outside the enclosure, their removal shall not expose live parts.

4.9.1.3 Wiring devices such as receptacles, switches, etc. used in luminaires intended for use in wet locations shall be of the weatherproof type.

4.9.1.4 Materials of which components are constructed shall be such that they will neither create a fire hazard nor be themselves injuriously affected by the highest temperature likely to be attained in normal use.

4.9.1.5 An aquarium-type luminaire shall be so designed that, under normal condition of use, water will not contact lamps, lampholders, switches, etc.

4.9.1.6* Direct plug-in nightlight blade materials may be constructed of copper or aluminum alloys which conform to the dimensional requirements as specified in CSA Standard C22.2 No. 42.
***Effective Date**—*August 31, 1988*

4.9.2 Lampholders

4.9.2.1 A candle-type lampholder* shall be used only if:

(a) The lampholder is provided with a decorative, permanently secured, close-fitting enclosure meeting the applicable requirements of Clause 4.2 and, in addition to the paper covering on the screwshell, enclosing the entire lampholder and providing the required depth of the lamp cavity; and

(b) The lampholder is used in equipment intended only for use in dry locations.

**A candle-type lampholder is essentially a lampholder having bare live parts other than the centre contact and screw shell and having a fibre outer casing supplied by the lampholder manufacturer.*

4.9.2.2 Screw-shells in lampholders of luminaires intended for use in wet or damp locations shall be of copper or copper alloy.

4.9.2.3 Lampholders for extension hand-lamps shall:

(a) Be complete with a handle;

(b)* Deleted;

(c) Be provided with a guard to protect the lampbulb and the lampholder;

(d)* Deleted;

(e) Have a jacket or cover of insulating material over the screw-shell suitable for the intended application (see Clause 4.2).

***Effective Date**—*August 31, 1988*

4.9.2.4 A porcelain lampholder mounted by means of a screw-ring shall be used with the gasket usually supplied with this type of lampholder and it shall be adequate for the intended use of the luminaire.

4.9.2.5 The lampholder body in luminaires intended for use with aquariums or in other damp or wet locations shall be of phenolic composition, glazed porcelain, or other material having equivalent moisture-resistant properties.

4.9.2.6 Chain- and hook-supported, cord-supported, clamp-on utility, and similar types of luminaires shall use lampholders having a body of insulating material such as phenolic composition or porcelain.

4.9.3 Switches

4.9.3.1 The voltage rating of a switch shall be suitable for the load that it controls.

4.9.3.2 A switch that controls a tungsten-filament lamp load shall be "T"-rated or be suitable for use with tungsten-filament lamps on ac, in conjunction with an ampere rating equal to the load that it controls, or shall have an ampere rating at least 3 times the rating of the load.

4.9.3.3 For inductive loads, switches shall have a current rating of at least twice the total current of the load that it controls.

4.9.3.4 A switch, if provided, shall be connected in the supply side of the circuit and shall have an OFF position.

4.9.4 Receptacles

4.9.4.1 A receptacle in a luminaire that is required to be grounded (see Clause 4.20) shall be a 120-V, 2-pole, 3-wire grounding type.

4.9.4.2*—Deleted
***Effective Date**—*August 31, 1988*

4.9.5 Ballasts, Transformers, Capacitors, Resistors, and Other Auxiliary-Type Devices

4.9.5.1 Paper capacitors shall be impreganted or be so enclosed that moisture will be excluded.

4.9.5.2*—Deleted
***Effective Date**—*August 31, 1988*

4.9.5.3 Step-down transformers shall be of the isolating type meeting the applicable requirements of CSA Standard C22.2 No. 66, Specialty Transformers.

4.9.5.4* A direct plug-in device shall

(a) not exceed 2 1/2 lbs. with the exception of those provided with means of additional support;

(b) be enclosed as required by Clause 4.2.1;

(c) have the lamps connected in series where more than 1 lamp is controlled by the fluorescent ballast;

(d) not use the coverplate mounting screw as a means of support.
(See also Clauses 4.11.8 and 4.11.9.)
***Effective Date**—August 31, 1988*

4.10 Gaskets

4.10.1 Gaskets shall be secured so that they are not liable to be readily damaged or discarded during operation or maintenance.

***Note:** The use of cement as the sole means of securing a gasket shall be subject to investigation.*

4.10.2 Gasket material shall:

(a) Retain its effectiveness in service;

(b) Not lose resilience or become sticky under any condition likely to be encountered; and

(c) Withstand continued exposure to heat and moisture.

4.10.3 Gaskets shall be used to prevent the entrance of moisture at mechanical joints and seams of luminaires intended for use in wet locations, unless the design is such that the luminaire prevents the entrance of moisture when set in any possible supporting position.

4.11 Flexible Supply Cords

4.11.1 A luminaire shall be provided with a length of one of the types of flexible cord listed in Table 4, except that other types of cord may be used if they are found to be suitable for the particular application.

4.11.2 A hospital bed-lamp shall be provided with a flexible core of Type SV, or the equivalent.

4.11.3* An extension handlamp shall use a flexible cord of at least

(a) Type SOW or STW for heavy-duty use; or

(b) Type SJOW or SJTW for light-duty use, except that if a self-retracting reel is incorporated, Type SVO or SVT may be used;

(c) the conductors shall be at least No. 18 AWG, except that where a receptacle is provided, they shall be at least No. 16 AWG with ground, and be not more than 50 feet in length.
***Effective Date**—August 31, 1988*

4.11.4 Unless required or permitted otherwise in this Standard, cords for use in household luminaires shall be at least No. 18 AWG, Type SPT-1 (POT-64), except that the floor type and luminaires for commercial or industrial use shall be provided with at least Type SPT-2 (POT-32).

4.11.5 Luminaires intended for outdoor locations shall be used with at least No. 18 AWG, Type SJOW.

4.11.6 Chain- and hook-supported types of luminaires shall use a minimum No. 18 AWG, Type SPT-2 (POT-32) 105°C flexible cord, at least 15 feet long, and the free end of the cord shall extend between 1 foot and 5 feet beyond the end of the chain.

4.11.7* Deleted
***Effective Date**—August 31, 1988*

4.11.8 Except as covered in the following note, a flexible cord shall extend at least 5 feet from the point at which the cord emerges from the body of the luminaire, the distance being measured to the face of the attachment plug. The free end of the flexible cord shall terminate in an attachment plug.

***Note:** A cord suitable for at least hard usage such as Type SJ, SJT, or SJO on a luminaire intended for other than household use may extend less than 5 feet from the point at which the cord emerges from the body of the luminaire.*

4.11.9* If a luminaire is provided with a cord-type ballast or similar device, it shall not be less than 3 feet from the attachment plug.
***Effective Date**—August 31, 1988*

4.11.10 A flexible cord shall not be used for the sole support of a luminaire or a part thereof, if the weight of the part to be supported exceeds 5 pounds.

4.11.11 Where a receptacle is assembled in a luminaire, the cord shall be at least No. 16 AWG, except that a minimum of No. 18 AWG may be used on a shaving or make-up mirror if it is marked in accordance with Clause 5.3.1(f).

4.11.12 There shall be no more than 1 supply cord to a luminaire.

4.12 Internal Wiring

4.12.1 A luminaire shall be wired with conductors suitable for the temperature and voltages encountered. Some* of the types of wires and flexible cords, together with their respective maximum temperature and voltage ratings, are shown in Tables 4 and 5.

**Other types may be accepted subject to investigation.*

4.12.2 Except as permitted by Clause 4.12.3, conductors shall be not smaller than No. 18 AWG.

4.12.3 Conductors No. 22 AWG or No. 24 AWG may be used where:

(a) The lead is completely enclosed but not used in swivels;

(b) The length of the lead is not more than 6 inches;

(c) The wall thickness of the lead insulation is not less than 1/32 inch;

(d) No hazard is found to exist under any condition (see tests of Clause 6.4); and

(e) The wiring is in the secondary winding of a transformer or of a circuit using solid-state devices (e.g., on a printed circuit board).

4.12.4 Wires that are movable during normal use of the luminaire, such as in swivels, flexible goosenecks, etc., shall be of the stranded type.

4.12.5 Wiring not exceeding 2 inches in length and not in a raceway, if partially exposed, shall be mechanically protected by a sleeving (see Clause 4.17) that is secured in place over the conductors. The wiring and sleeving shall be routed and secured against the body or part of the luminaire by means of clips or the equivalent.

4.12.6 Wiring visible when shades, diffusers, or other parts are removed does not need additional protection, except that it shall be secured away from the hot bulb and so as to prevent accidental handling during lamp or starter replacement.

4.13 Bushings

4.13.1 A conductor-passage hole in sheet metal shall have a bushing unless the hole edge is rolled over smoothly at least 180°.

4.13.2 Holes for conductors in materials other than sheet metal (e.g., in cast metal, extruded metal, wood, thermoplastic, etc.) shall be free of sharpe edges, burrs, fins, etc., and shall have a rolled edge or the equivalent.

4.13.3 Bushings shall be made of ceramic, urea, phenolic, melamine, self-extinguishing thermoplastic, or other equivalent materials.

Notes:
(1) Bushings made of rubber and so-called hot-moulded shellac and tar compositions are not acceptable.

(2) A fibre bushing may be used if the bushing is not less than 1/16 inch in thickness (with a minus tolerance of 1/64 inch for manufacturing variations).

(3) An insulated metal grommet is acceptable in lieu of an insulating bushing, provided that the insulating material used is not less than 1.32 inch in thickness and fills completely the space between the grommet and the metal in which it is mounted.

4.13.4 Bushings shall be secured in place.

4.14 Polarization and Identification

4.14.1 The screw-shell of a lampholder and the identified terminal or lead of a polarized cord connector, receptacle, or attachment plug shall be connected to the identified conductor.

4.14.2 A switch of the single-pole type shall not be connected in the identified conductor of a luminaire.

4.14.3 If an electric-discharge luminaire uses a single-pole switch, or incorporates a ballast that has an identified line lead or that is marked to indicate that one of its line leads is to be connected to the identified conductor of the supply circuit, one of the conductors of the supply cord shall be identified.

4.14.4* Except for direct plug-in nightlights, polarization requirements are as specified in Clause 4.14.1.
***Effective Date**—*August 31, 1988*

4.15 Strain Relief

4.15.1 A strain relief shall be provided such that a stress by pulling, pushing, flexing, or twisting on wiring or cord will not be transmitted to wiring connections or interior components.

Notes:
(1) Strain relief is not required where the supply cord is attached directly to a certified wiring device by the wiring device manufacturer and where tests equal to Clause 6.8 have been conducted during the certification investigation of the device.

(2) A knot in a cord or wiring is acceptable if the cord or wiring runs through a length of raceway, or the equivalent, such that strain relief as required by Clause 4.15.1 is provided.

4.15.2 If a knot in a cord or wiring serves as strain relief, the surface against which the knot may bear or with which it may come in contact shall be free from projections, sharp edges, burrs, fins, etc. that might damage the insulation on the conductors.

4.15.3 A knot shall be located so that it is not removable without disassembling the luminaire or parts of the luminaire.

4.15.4 Metallic crimp-type or set-screws of strain relief devices that bear directly on the cord shall not be used.

Note: *Other metallic crimp-type devices may be used on a jacketed cord or a non-jacketed cord that has supplementary protection.*

4.15.5 A thermoplastic set-screw type fitting shall be acceptable only when used with a jacketed-type flexible cord and if provided with a positive stop to prevent stress on the cord. It shall comply with the test of Clause 6.8 without adversely damaging the cord jacket, and it shall not be acceptable if the screw passes through the cord jacket.

4.15.6 Wiring splices in floor- or pole-type luminaires shall be provided with strain relief to prevent stress during packing, unpacking, and assembly.

4.16 Spacings

4.16.1 Except as permitted by Clauses 4.16.2 and 4.16.3, the spacing between the bare live parts of opposite polarity, and between bare live parts and non-current-carrying metal parts, shall be not less than 1/8 inch through air or over surface.

4.16.2 The minimum spacings for the separate components on a printed wiring assembly shall be 1/8 inch. The minimum spacings for printed circuit conductors shall be 3/64 inch.

4.16.3 When an insulating barrier or liner is used to obtain the spacings required by Clause 4.16.1, it shall:

(a) Be not less than 0.028 inch thick, except that it shall not be less than 0.010 inch thick if:

(i) Used in conjunction with a spacing not less than one-half of that required; and

(ii) Mica or the equivalent is held tightly in a fixed position by the parts between which the spacing is involved; and

(b) Comply with Clause 4.17.

4.17 Electrical Insulating Materials

4.17.1 Electrical insulation, including that used in component wiring devices, shall be of material that is suitable for the particular application and that will withstand the most severe conditions likely to be encountered in service. The acceptability of insulating material shall include consideration of the following:

(a) Mechanical strength;

(b) Dielectric strength;

(c) Heat- and moisture-resistant properties;

(e) Degree of enclosure of protection;

(f) Other factors that might have a bearing on the fire and accident hazard under conditions of actual use, such as arcing and aging; and

(g) Classification as at least slow-burning.

Note: *Materials such as mica, porcelain, phenolic composition, cold-moulded, and certain refractory materials are generally acceptable as the sole support of live parts. Other materials that are not suitable for general use, such as asbestos and magnesium oxide, may be accepted if used in conjunction with other more suitable materials, or if located and protected so that exposure to mechanical injury and the absorption of moisture are prevented.*

4.17.2 Materials shall be permanently retained in place.

4.18 Replacement of Lamps and Automatic Starters

4.18.1 Bare live parts shall not be exposed during the replacement operation or during cleaning of the luminaire, accessibility being determined by the probe in Clause 4.2.2.2. If replacement operations expose bare live parts, the device shall be marked in accordance with Clause 5.3.1(k).

4.18.2 Wiring joints or electrical components shall not be accessible to accidental handling that would loosen or otherwise damage these parts.

Note: *At least a separate barrier or a natural barrier provided by the construction of the device (see Clause 4.17) will be required.*

4.18.3 Parts that may be removed during normal use, such as for cleaning or relamping, shall be designed or marked to prevent replacement in a position that would affect the safe operation of the luminaire.

4.19 Incandescent Luminaire Kits

4.19.1 When assembled in the intended manner, a kit shall form an incandescent luminaire, with or without shade and with or without support or base, complying with all of the applicable requirements of this Standard.

4.19.2 No electrical components other than a lampholder having binding-screw terminals, a power-supply cord, and a cord switch shall be provided. A cord switch, if provided, shall be installed on the cord at the factory.

4.19.3 The complete kit shall be packaged in a single carton or container (see also Clause 5.4).

4.20 Grounding and Bonding

4.20.1 The methods and materials used for the grounding and bonding of a luminaire or the parts thereof shall comply with CSA Standard C22.2 No. 0.4, Bonding and Grounding of Electrical Equipment (Protective Grounding).

4.20.2 Residential-type luminaires intended for certain specific uses or damp or wet locations, such as extension hand-lamps, aquarium lamps, and plant-growing lamps, shall be grounded where the construction involves non-current-carrying metal parts that may become energized during general use or servicing.

4.20.3 Luminaires intended for commercial and industrial use shall have provision for grounding. This requirement includes the following types of luminaires:

(a) Hospital lamps;

(b) Photo-engravers' arc lamps;

(c) Drafting lamps;

(d) Machine-shop lamps;

(e) Machine-tool lamps;

(f) Illuminated shields for use with electric grinders;

(g) Lamp testers;

(h) Light channels for display of lamp shades;

(i) Table illuminators used in science and industry.

4.20.4 Non-current-carrying metal parts that are exposed during general use or servicing (e.g., cleaning or relamping) and may become energized shall be bonded for grounding purposes, unless the electrical components within or adjacent to these metal parts are protected with additional insulating material (see Clause 4.17) having a minimum thickness of at least 0.032 inch.

Note: *The following would be acceptable:*

(a) 1/32-inch-nominal insulated wire with 1/32-inch-minimum wall sleeving of insulating material within a metal enclosure;

(b) 1/32-inch insulated wire within a plastic housing of at least 1/32-inch wall thickness;

(c) Bare live parts within a plastic enclosure that complies with Clause 4.2; or

(d) Bare live parts within a metal enclosure with 2 independent layers of insulation (see Clause 4.17), each not less than 1/32 inch thick.

5. Marking

5.1 General. Each luminaire shall be plainly and permanently marked with the following information where it will be readily visible:

(a) Manufacturer's or submittor's name, trademark, or other recognized symbol of identification;

(b) Catalogue number, model number, or other type designations on luminaires such as transformer-operated, display, electronic (solid-state), garden, hospital, illuminated-shape, machine-shop and colour-wheel types;

(c) Input rating in volts, hertz (or cycles), and total amperes or watts, except on luminaires incorporating only incandescent lamps; and

(d) Secondary volts and amperes or volt amperes, where applicable.

5.2 Lamp Replacement Caution

5.2.1 Incandescent luminaires, which require a limitation of the lamp wattage, shall be permanently and legibly marked, where readily visible during relamping, with the following caution or equivalent:

MAX... WATTS, TYPE....

Notes:
(1) *More than one wattage and type of lamp may be included in the caution if sufficient testing is conducted to confirm that the temperature requirements are met.*

(2) *A lamp replacement caution shall not be required for a luminaire if it complies with the normal-temperature test using lamps of the maximum size and type that it will accommodate.*

5.2.2 The caution shall be made in a permanent manner, the effects of temperature being considered. Lettering shall be upper case (Univers 65 or equivalent). "MAX" shall be at least 3/16 inch high (20 point). All other letters shall be at least 3/32 inch high (10 point). The caution shall be located and executed in such a manner that it is prominent during relamping and there shall be a contrast between the lettering and the background.

5.2.2A* Where size limitations exist (e.g., nightlights), the lettering requirements shall be as specified in Clause 5.2.2 except:

(a) "MAX" shall be at least 1/16 inch (7 point);

(b) All other letters shall be 3/64 inch (5 point).

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5.2.3 Where special lamps are intended, the maximum wattage and burning position shall be indicated in an acceptable manner.

5.3 Additional Cautions or Warnings

5.3.1 The following cautions or warnings shall also be permanently marked on each luminaire, as required, in both English and French (equivalent wording will be accepted in all cases):

(a) FOR OUTDOOR USE and

POUR EMPLOI À L'EXTÉRIEUR.

This shall be legible during positioning of the luminaire for use;

(b)* Extension hand-lamps shall be marked:

FOR HEAVY-DUTY USE IN GARAGES OR SIMILAR LOCATIONS and

CONVIENT POUR USAGE INTENSIF DANS LES GARAGES OU AUTRES EMPLACEMENTS or

FOR LIGHT-DUTY USE IN NORMALLY DRY LOCATIONS and

CONVIENT POUR USAGE ORDINAIRE DANS LES EMPLACEMENTS SECS;

Residential reel-type:

FOR LIGHT-DUTY RESIDENTIAL USE ONLY and

CONVIENT SUELEMENT POUR USAGE ORDINAIRE RESIDENTIEL

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(c) Luminaires intended for use in damp or wet locations such as aquarium hood- and extension hand-lamps shall have a warning to indicate that relamping or other servicing should not be carried out while the luminaire and/or the surroundings are damp or wet unless the plug is disconnected from the power supply;

(d) Luminaires intended for use in damp or wet locations shall be marked:

DO NOT SUBMERSE and

NE PAS IMMERGER;

(e) A warning to indicate the positions of use, which shall be legible during positioning of the luminaire for use. This warning is not required if:

(i) The luminaire is found suitable for use in all possible mounting positions; or

(ii) There is only one possible mounting position;

(f) The maximum allowable load in amperes that may be plugged into a receptacle shall be marked adjacent to the receptacle:

For example, 3 AMPS MAX;

(g) A luminaire that can be operated only on alternating current shall be marked:

AC ONLY and C.A. SEULEMENT, or with the symbol "~";

(h) An electric-discharge-lamp type that is designed for use with germicidal lamps shall be marked in a prominent location with the following warning:

FOR USE WITH GERMICIDAL LAMPS.
FOR PROTECTION OF THE EYES AND SKIN FOLLOW CAREFULLY THE INSTRUCTIONS PROVIDED WITH THE GERMICIDAL LAMP and

A N'UTILISER QU'AVEC DES LAMPES GERMICIDES.
AFIN DE SE PROTÉGER LES YEUX ET LA PEAU, OBSERVER SCRUPULEUSEMENT LE MODE D'EMPLOI FOURNI AVEC LA LAMPE;

(i) Utility lamps shall be marked with the following caution:

NOT FOR USE WITH A THERAPEUTIC LAMP SUCH AS INFRA-RED AND ULTRAVIOLET TYPES
and

NE PAS UTILISER AVEC UNE LAMPE THÉRAPEUTIQUE, PAR EXEMPLE, DU TYPE INFRAROUGE OU ULTRAVIOLET;

(j) A luminaire intended for use in hospitals shall be marked to indicate this use;

(k) Luminaires such as those using electronic circuitry to cause flashing of special-type lamps (e.g., a xenon-type lamp) and where lamp replacement requires exposure to bare live parts (see also Clause 4.18) shall be marked where legible during relamping:

TO PREVENT ELECTRICAL SHOCK, DISCONNECT FROM POWER SUPPLY AND ALLOW AT LEAST ... MINUTES BEFORE REMOVING COVER and

POUR ÉVITER LES CHOCS ÉLECTRIQUES, DÉBRANCHER ET ATTENDRE AU MOINS ... MINUTES AVANT D'ENLEVER LE COUVERCLE.

(l)* A luminaire having an external surface temperature exceeding 90°C (see Table 9) shall be marked:

KEEP AWAY FROM CURTAINS, DRAPERIES AND SIMILAR MATERIALS and

TENIR À L'ÉCART DES RIDEAUX, TENTURES ET OBJETS SEMBLABLES

(m)* Where a protective glass is required on luminaires to contain particles that may result from lamp shattering, the luminaire shall be marked as follows:

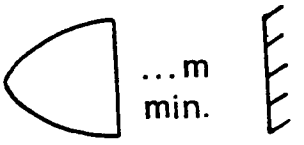
KEEP PROTECTIVE GLASS (OR EQUIVALENT) IN PLACE and
NE PAS ENLEVER LE VERRE PROTECTEUR (OU SON ÉQUIVALENT)

Note: *Preceding markings (l) and (m) may appear on a label attached to the cord.*

(n)* A luminaire having a light source that may be directed against adjacent or supporting surfaces, and produces a temperature exceeding 90°C on those surfaces as determined by the Normal Temperature Test of Clause 6.3 (See Table 9), shall have the following marking adjacent to the light source:

WARNING: PLACE LIGHT SOURCE NO CLOSER THAN ... TO ANY SURFACE and

AVERTISSEMENT : LAISSER UNE DISTANCE D'AU MOINS ... ENTRE LA SOURCE LUMINEUSE ET LA SURFACE LA PLUS PROCHE.

or 

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5.4 Instructions

5.4.1 General. Instructions and warnings shall be provided, as applicable, on the container or on a sheet supplied in the container of a luminaire, in both English and French, as specified in Clauses 5.4.2 to 5.4.4.

5.4.2 Instructions for the proper use of mounting hooks shall be provided with luminaires having long runs of chain or cord or similar types and shall include wording such as:

(a) "Use hook to support chain, not the electrical cord";

(b) "Do not install on radiant-heating type ceiling".

5.4.3 Kits shall be provided with instructions that include:

(a) An exploded view of the individual parts (together with an exploded view of the lampholder);

(b) Clear identification of the individual parts;

(c) Well-defined instructions to eliminate risk of error when assembling the parts;

(d) If a shade is not provided, all details regarding the type, material, minimum dimensions, and mounting of those shades with which the luminaire is intended to be used. A caution shall be included to the effect that any deviation from the recommended types of shade may constitute a fire hazard;

(e) If a support or base is not provided, details regarding the intended type of support or base and method of assembly;

(f) Any limitations of application of the luminaire and the following statement: "These instructions must be followed in order to meet the requirements of the Canadian Electrical Code, Parts I and II.

5.4.4 An assembly of the type described in the Note following Clause 4.3.6 shall be provided with instructions as outlined in Clause 5.4.2 as applicable (e.g., an exploded view of the lampholder is not required since the cord is attached at the factory).

5.5* Date Marking. The month and year of manufacture, at least, shall be marked on each product or its carton. Date coding, serial numbers, or equivalent means may be used.

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6. Tests

6.1 General

6.1.1 Except as otherwise indicated, tests required to determine compliance with this Standard shall be made, where possible, on only 1 representative sample of the equipment or component thereof.

6.1.2 Tests need not be conducted in any order, unless specified, but shall be arranged to require the use of as few samples as possible (see Clause 6.1.1).

6.1.3 Except as noted in Clause 6.4.3 luminaires with Class 2 type transformers shall be tested in accordance with CSA Standard C22.2 No. 66, Specialty Transformers, with adjustments made to suit the application.

6.2 Test Conditions

6.2.1 General. The tests shall be made under the following conditions, as applicable, unless specified otherwise.

6.2.2 Voltage and Frequency

6.2.2.1 Voltage. The test shall be:

(a) The maximum of the normal operating range* of the nominal system voltage marked on the equipment; or

**This assumes a test lamp of rated wattage. If not, the test voltage shall be adjusted to give rated wattage. (See also Table 2 of CSA Standard C235, Preferred Voltage Levels for AC Systems, 0—50,000 Volts.)*

(b) Such that standard test lamps will exhibit the required temperature characteristics shown in Tables 6, 7, and 8;

(c) Adjusted to give rated lamp-wattage on luminaires not marked with the voltage rating or where a standard test lamp is not available.

6.2.2.2 Frequency. Frequency-sensitive equipment shall be subjected to the tests while connected to a supply of rated frequency, except that equipment marked with more than one frequency shall be tested at the frequency that will produce the maximum temperature rise.

6.2.3 Test Lamps

6.2.3.1 The type and wattage of lamp or lamps specified (rated) by the manufacturer shall be used, except that, where the luminaire is provided with medium-base screw-shell lampholders and has one or more of the ratings shown in Tables 6, 7, and 8, a standard test lamp(s) shall be used.

If the luminaire cannot physically accommodate the standard test lamp, the lamp type(s) recommended by the manufacturer shall be used.

Where a started test lamp is available a luminaire rated for 1 wattage and type of lamp shall be subjected to at least 2 tests, one with a pattern test lamp and the second with a base test lamp, unless 1 lamp is available having both characteristics. When a luminaire is rated for more than 1 wattage and type of lamp, sufficient testing shall be conducted to ensure that maximum temperature conditions have been obtained.

6.2.3.2 Standard test lamps shall be installed in the lampholders and oriented so that the side of the lamp that exhibits the temperature characteristics will be aimed in the direction of temperature measurement.

6.2.3.3 The sample shall be installed or supported to simulate intended usage in accordance with the manufacturer's instructions and, where more than one method may be used, it shall be installed or supported to allow recording of the maximum conditions that may be encountered under the intended uses.

6.2.3.4 Tests shall be conducted in a room substantially free of draughts and maintained at an ambient of 25 ± 10°C. Temperature variations below or above 25°C shall be respectively added to or subtracted from the observed temperatures.

6.2.3.5 Temperatures shall be measured by thermocouples consisting of No. 30 AWG iron and constantan wire.

6.2.3.6 A thermocouple junction shall be secured in good thermal contact by taping it in place, except that where a metal surface is involved, brazing or silver soldering may be necessary.

6.3 Normal Temperature

6.3.1 A luminaire shall be supported and operated as intended in accordance with the manufacturer's instructions under the applicable conditions of Clause 6.2, until thermal equilibrium is attained, without causing temperatures higher than those specified in Table 9.

6.3.2 An integral protective device shall not operate during the normal-temperature test of a luminaire.

6.3.3 An aquarium hood or reflector shall be supported as intended on a glass tank of the maximum dimensions permitted by the hood and filled with water to within 1 inch of the top of the tank.

6.3.4 Extension Hand-Lamps with Take-Up Reel

6.3.4.1 For the heating test of a reel, a 60-Hz essentially sinusoidal current having a value equal to the maximum current rating of the reel shall be circulated through the flexible cord. The length of the cord to be left unreeled during the test shall be as indicated in Table 10.

6.3.4.2 If a thermoplastic-insulated cord is to be used with a reel, the latching mechanism of the reel, if any, shall be disengaged in order to place the cord under tension. There shall be no visible reduction in the thickness of the insulation on the side of the cord nearest the centre of the reel as determined by examination of 3 separate cuts across the retracted length of cord.

6.4* Abnormal Temperature

6.4.1 A luminaire having an external surface temperature exceeding 90°C, excluding the light source, shall be tested in accordance with Clause 6.4.7, and shall be marked in accordance with Clause 5.3.1(l).

6.4.2 A luminaire of the fluorescent, reactor, transformer, or solid-state type shall be subjected to the tests of Clause 6.4.8.

6.4.3 An overcurrent or thermal protective device shall be bypassed, except those which are an integral component such as the thermal protector in a fluorescent ballast.

6.4.4 The test shall be conducted until failure occurs, or for a maximum duration of 7 h.

6.4.5 The test surface shall consist of a knot-free pine board covered with a double layer of cheesecloth. The cheesecloth shall be bleached, 36-inches wide, running 14 to 15 yards per pound, and having what is known to the textile trade as a thread-count of 32 x 36.

6.4.6 Test Criteria. When operated under abnormal conditions the following shall be considered a hazard:

(a) Emission of flame or molten metal, excluding solder;

(b) Glowing, flaming, or charring of the test material;

(c) Deterioration of insulating materials exposing live parts that may cause an electrical shock hazard;

(d) Reduction of electrical spacings.

Note: *Glowing or charring of cheesecloth is to be determined by visual examination for broken fibres after removing the cheesecloth from the test surface.*

Charring is more than discoloration; it is the condition in which the surface or test material is rendered black.

The opening of a 15 A branch circuit fuse constitutes completion of the test.

6.4.7 Horizontal

6.4.7.1 A free-standing luminaire, as specified in Clause 6.4.1, shall be placed on an inclined flat surface in a position most likely to cause overturning. A luminaire that overturns when the surface is tilted 15° ± 1/2° from the horizontal shall be tested in accordance with Clause 6.4.7.2.

6.4.7.2 The luminaire shall be placed on the horizontal surface in the most unfavourable of the positions that may reasonably be expected.

6.4.8 A luminaire as specified in Clause 6.4.2 shall be placed on the test surface and the following faults introduced:

(a) Fluorescent Types:

(i) Short-circuit starter or secondary circuit; and

(ii) Disconnect lamp.

(b) Transformer Type:

(i) Short-circuit.

(c) Solid-State Type:

(i) Open circuit or short-circuit any component which results in the worst condition.

***Effective Date**—August 31, 1988*

6.5 Flame

6.5.1 Enclosures of non-metallic materials shall be subjected to the tests of Clauses 6.5.2 and 6.5.3 without:

(a) Supporting combustion for more than 30 s after any of the first 4 applications of the test flame;

(b) Supporting combustion for more than 60 s after the fifth application;

(c) Burning a hole through the material any time during the 5 applications; and

(d) Dropping flaming or molten particles during the test. Also, the material is not acceptable if it should disappear before the test is completed.

6.5.2 The apparatus for making the test shall consist of:

(a) A test shield of sheet metal 12 inches wide, 14 inches deep, and 24 inches high, open at the top and front, and a means of supporting the test specimen in a vertical position;

(b) A Tirril burner having a bore of 3/8 inch and a length of 4 inches above the primary-air inlets;

(c) A 20° angle block for supporting the burner;

(d) A supply of natural gas of approximately 1000 Btu per cubic foot at normal pressure (range of 3 to 5 inches of water); and

(e) A stop-clock.

6.5.3 The test shall be made in a room from which all draughts of air are excluded. A specimen of the moulded part or a 6-inch square plaque of the moulded material used having a minimum thickness not less than that of the part involved shall be supported in a vertical position in the test shield. The height of the flame, with the burner vertical, shall be adjusted to 5 inches with an inner blue cone 1-1/2 inches high. The burner shall be tilted to an angle of 20° from the vertical and the flame applied to the sample of material under test, so that the tip of the inner blue cone of the flame touches the specimen at a point approximately 3 inches above its lower end. The flame shall be brought up to the material in such a manner that the vertical plane through the axis of the burner will be perpendicular to the line of approach. The flame shall be applied for 15 s, and then removed for 15 s until 5 such applications have been made. The flame shall not be re-applied while the material is still burning.

6.6 Alternative Flame Test

6.6.1 At the submittor's request, the flame test described in UL Standard No. 94, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, for plastic materials classed 94V-1 shall apply, provided that the luminaire complies with the following conditions:

(a) The luminaire shall have no user-serviceable parts, including the lamp;

(b) The maximum available voltage within the luminaire shall be 130 V rms (184 V peak);

(c) The overall length of the assembly, less the flexible cord, shall not exceed 3 feet;

(d) The luminaire shall contain no devices for electromagnetic energy storage (e.g., capacitors or inductors). Electromagnetic radio-frequency noise-suppressing devices and stray capacitances and inductances from wiring are excluded from this restriction;

(e) When bare metal parts, which are spaced 1/8 inch or less apart, are shorted, the maximum short-circuit available shall be 1.0 A;

(f) Where the short-circuit current between bare metal and insulated live parts exceeds 1 A, such wiring shall be so routed, secured, or clamped in place as to maintain separation so that parts of opposite polarity will be spaced apart a minimum of 1/8 inch;

(g) The luminaire shall be allowed to operate as in Items (d) or (e) under short-circuit conditions that cause a maximum rise in temperature, until temperature equilibrium is established. At the end of this time, there shall be no melting, charring, or ignition of any components or of any enclosing, encapsulating, or supporting parts, nor shall there be any evidence of exposure of live metal parts.

6.6.2 In addition, where the assembly includes live metal conductors encapsulated in the material, the flame test shall be applied to samples containing the encapsulated conductors, as well as to samples that function purely as enclosures or supports for live metal conductors.

6.6.3* Direct plug-in nightlights shall be constructed of material demonstrated to be in compliance with the requirements of Test E of CSA Standard C22.2 No. 0.6.
***Effective Date**—*March 31, 1992*

6.7 Loading. Means provided for suspension of a luminaire shall be capable of supporting in tension, for 1 h, a load of 3 times the weight of the luminaire, but the load shall be not less than 25 ± 1/2 pound even in the case of a luminaire weighing less than one-third of this amount. If supported at 2 or more points, the distribution of the load shall be similar to that which may be encountered in the field.

6.8 Strain Relief

6.8.1 The assembly of a flexible cord of a luminaire shall withstand for 1 min a pull of 35 ± 1/2 pounds when tested as described in Clause 6.8.2

6.8.2 The pull shall be applied by suspending a 35 ± 1/2 pound weight on the cord, with the force applied in a direction normal to the plane of the cord entry hole. If there is a movement of the cord of more than 1/16 inch or any loosening or breaking of wires at the points where the connections are secured, or where the conductors are permanently assembled to terminals, the construction is not acceptable.

6.9 Endurance (Extension-Lamp Cord Reel)

6.9.1 A cord reel provided as a component of a luminaire shall withstand 6000 cycles of operation of reeling and unreeling the cord in the intended manner in accordance with the manufacturer's instructions. There shall be no perceptible abrasion of, or other damage to, the cord or other parts.

6.9.2 During the endurance test the cord is to be unreeled to a length of 30 inches or more, by any convenient method representative of actual service, and is to be recoiled on the reel automatically by the action of the take-up mechanism. The cord is to be unreeled in such direction, with respect to the body of the reel, that the tendency to cause damage will be greatest, consideration being given to the intended method of mounting the reel.

6.10 Swivel Strength, Flexing, and Swivelling. A swivel joint shall be capable of withstanding:

(a) A torsion of 20 ± 1/2 inch-pounds for 1 min; and

(b) A straight pull of 100 ± 1 pounds or the maximum recommended by the manufacturer, whichever is greater, for a period of 1 min;

(c) A swivelling test of 6000 cycles of rotation, if the swivel joint is not limited to a maximum rotation of 370°, without damage to the jacket or the insulation of the conductors. One cycle shall consist of full rotation from stop and back again.

6.11 Stability. A free-standing luminaire shall be placed on the centre of a flat surface inclined at an angle of 8 ± 1/2° to the horizontal such that all edges of the luminaire are resting on the surface. The luminaire shall not overturn when adjusted to a position or positions most likely to cause overturning.

6.12 Humidity. A luminaire intended for wet or damp locations shall be exposed to a moist atmosphere at a relative humidity of 95 +0, -5% and a temperature of 30 to 35° for a period of 72 h. It shall then withstand the leakage and dielectric strength tests of Clauses 6.14 and 6.15.

6.13 Weatherproofness

6.13.1 A luminaire intended for wet locations shall be mounted as in service and shall be tested for weatherproofness as specified in CSA Standard C22.2 No. 94, Special Purpose Enclosures 2, 3, 4, and 5.

6.13.2 Water shall not:

(a) Enter the luminaire in quantities sufficient to interfere with the operation of the luminaire or to create a hazard; and

(b) Have wetted electrical parts nor have come into contact with lamps (except those recognized for water contact).

6.13.3 The leakage current and dielectric strength tests of Clauses 6.14 and 6.15 shall be applied immediately after this test.

6.14 Leakage Current

6.14.1 The leakage current of a luminaire shall not exceed 0.5 mA when tested in accordance with Clause 6.14. In the case of luminaires intended for use in damp and wet locations, this test shall be applied immediately after the test of Clause 6.12 or 6.13, whichever is applicable, or after each where applicable.

6.14.2 The meter may be electronic or a direct indicating type, average responding, calibrated at 60 Hz and indicating the rms value of a pure sine wave, with an accuracy of 5% at an indication of 0.5 mA. The meter shall have a terminal impedance of 1500 Ω shunted by a 0.15 mF capacitor.

6.14.3 The test frequency shall be 60 Hz.

6.14.4 The applied voltage shall be in accordance with Clause 6.2.1.

6.14.5 The luminaire shall be at room temperature with all switches in the ON position and tested within 5 s of applying test voltage (switch S1 closed) and again after reaching normal operating temperatures.

6.14.6 The test circuit shall be as shown in Figure 5.

6.14.7 The tests shall be conducted with the switch S2 in position A, and repeated with the switch in position B.

6.14.8 The probe shown in Figure 5 shall be of a metal of the same dimensions and applied to the same openings as the probe required by Clause 4.2.2.2. The probe shall also be applied to any exterior metal part.

6.14.9 A luminaire having an insulating (e.g., plastic) enclosure shall have the probe required by Clause 6.14.8 applied to metal foil with an area 10 x 20 cm in contact with accessible surfaces of the luminaire. Where the accessible surface of the luminaire is less than 10 x 20 cm, the area of the metal foil shall be the same as that of the surface. The metal foil shall not remain in place long enough to affect normal operations, temperature, ventilation, or drainage.

6.14.10 The dielectric strength test of Clause 6.15 shall be applied immediately after this test.

6.15 Dielectric Strength

6.15.1 General. Compliance with the following shall be determined by means of a suitable testing transformer the output of which can be regulated. Starting at zero, the applied potential shall be increased gradually and at a uniform rate, until the required test value is reached unless breakdown occurs.

6.15.2 Fluorescent and Incandescent Types (Without Transformers). Luminaires, while at normal operating temperature, shall withstand without breakdown, for a period of 1 min, the application of a 60 Hz potential of 900 V between live parts and non-current-carrying metal parts for the incandescent type and 1000 V plus twice the rated voltage for the fluorescent type.

6.15.3 Luminaires with Class 2 Type Transformers. Immediately after the tests of Clause 6.4.8, the luminaire shall be capable of withstanding, without breakdown, for a period of 1 min, the application of an alternating potential of:

(a) 1000 V plus twice the maximum rated voltage of the primary winding, applied between the primary and secondary and between the primary and the core and enclosure; and

(b) 500 V between each extra-low potential winding and the core and enclosure.

6.15.4 Luminaires with Xenon Lamps. The insulation and spacings associated with the components of a high peak voltage source for xenon lamps shall be capable of withstanding for a period of 1 min without breakdown the application of a potential of 1-1/2 times the peak voltage of the source at rated frequency. This shall be accomplished by gradually increasing the voltage applied to the high-voltage source until the required test value is obtained in the output. If sufficient internal voltage cannot be obtained, an external test voltage may be applied.

6.15.5 Luminaires with Capacitors. A capacitor connected between an exposed metal part and a part involving shock hazard shall withstand without breakdown for a period of 1 min a 900 V ac potential at rated frequency applied as follows. Each of 10 samples of the capacitor shall be tested separately, and considered acceptable if none fail while the potential is being increased, and if not more than 3 fail in less than 1 min after the required test value has been reached.

6.16 Mechanical Strength

6.16.1 The following test shall be conducted on non-metallic enclosures of luminaires containing bare live parts:

(a) Without cracking, chipping, breaking, or showing other similar signs of mechanical damage so as to expose bare live parts or wiring joints or reduce electrical spacings below those shown in Clause 4.16;

(b) In addition, for those luminaires intended for damp or wet locations, without damage as outlined in Item (a) so as to allow the entrance of moisture.

6.16.2 The luminaire enclosure shall be dropped onto a hardwood surface from a height of 3 feet, except that the height shall be 6 feet for pin-up types and the surface shall be concrete for those intended for use in damp or wet locations.

6.16.3* A portable extension handlamp shall not produce a risk of electric shock when dropped three times from a height of 6 feet (1.83 metres) onto a concrete surface in a manner most likely to produce unacceptable results. The envelope of the lamp may fracture but the integrity of the handlamp and guard shall be maintained as specified in Clause 4.2

***Effective Date**—*August 31, 1988*

6.17 Accelerated Aging. This test applies to non-metallic lamp guards of extension lamps, gaskets, glands, etc. Samples of the material shall be placed in a circulating-air oven set at a temperature and for a period of time as shown in Table 11. There shall be no cracking or other visible signs of deterioration.

6.18 Flaming Oil Test for Perforated Panels

6.18.1 This test shall be applied to perforated metal panels that are to be investigated for suitability for use as a barrier (see Clause 4.2.2.10).

6.18.2 The apparatus for this test shall consist of an iron ladle 2-1/2 inches in diameter, with a pouring lip, a heat-resistant glass dish, a stand for supporting the test specimen, a quantity of bleached cheesecloth running 14 to 15 square yards to the pound and having what is known to the trade as a count of 32 x 28, a supply of No. 2 furnace oil*, and a stop-clock.

**For further information see CSA Standard B140.0, General Requirements for Oil Burning Equipment.*

6.18.3 The test shall be made in a room from which all draughts of air are excluded. A specimen of the material shall be supported horizontally 2 inches above a layer of cheesecloth placed in a dish.

6.18.4 Ten cubic centimetres of No. 2 furnace oil poured into the ladle shall be ignited and allowed to burn for 1 min, after which it shall be poured at the rate of not less than 1 cubic centimetre per 3 seconds on the specimen from a position 4 inches above it.

6.18.5 Means shall be provided to ensure that only oil that passes through the test specimen makes contact with the cheesecloth.

6.18.6 The cheesecloth shall be ignited through the application of the burning oil during 3 applications at 5-min intervals.

Table 8

Temperatures of Lamps for Testing Luminaires, Special-Purpose Types

Watts →		150/R	250
Locations* ↓	**Temperature (°C)**		
1			128
2			137
3			140
4			139
5			120
6			110
7			92
8			78
Base →		170	135

**These point designations are those shown in Figure 6 of CSA Standard C22.2 No. 84, Incandescent Lamps, with regard to thermocouple locations.*

Notes to Tables 6, 7, and 8:

(1) *The temperatures are based on a temperature in the test enclosure of 25° C.*

(2) *Tables 6 and 7 illustrate values for all general lighting types (e.g., Types A, T, and PS in Table 6 and R30 and R40 in Table 7), including the infra-red lamps, except as noted in Note 3.*

(3) *Values for the special-purpose lamps chart can be filled in after further studies (as needed). Criteria for coloured lamps, as well as the trilight types, are included in Tables 6 and 7,* **except for the 150 W/R coloured ("base" only) and the 250 W/non-reflector trilight type, which are shown in Table 8.**

(4) *In the selection of the above test lamp, a tolerance of up to ± 2°C will be permitted for the temperature values at points that affect critical temperatures in the luminaires, but the variation below or above the values shall be respectively added to or subtracted from the observed temperatures. The negative tolerance for pattern temperatures may exceed 2°C at points that do not affect critical temperatures in the luminaire.*

Table 9

Limiting Temperatures for Lighting Devices

Item	Location	Maximum Temperature, °C
1.	(a) Supporting surface of luminaire (b) External surface of luminaire (excluding light source):	90
	(i)* Parts that are contacted or (gripped for adjustment:	
	Metallic Nonmetallic	60°C 75°C
	*Effective Date—*May 31, 1990*	
	(ii) Table type	90°C
	(iii) Floor and Pin-up type	
	Under 4 feet Above 4 feet at most unfavourable adjustment	90°C 150°C
	(c) Paper, wood, and ordinary wood fibre materials (including paper labels)*	
	(d) Surfaces other than 1(a) that may be adjacent to the luminaire	
	(e) Neoprene materials*	
2.	(a) Coil windings and core, Class A insulation	95†
	(b) Coil windings and core, Class B insulation	120†
3.*	Ordinary rubber	60
4.*	(a) Urea materials	100
	(b) Melamine	130
	(c) Phenolic	150
	(d) Nylon (see Item 7)	105
	(e) Varnished cloth	85
	(f) Thermoplastic materials	105
5.*	On non-ferrous screw-shells and centre contacts and other current-carrying parts of lampholders	200
6.	On any sealing compound	15°C less than the melting or softening point
7.	On thermoplastic material not covered in Item 4(f) used for parts such as shades, diffusers, and support arms	See test of Clause 6.4.5.

(Continued)

Table 9 (Concluded)

Item	Location	Maximum Temperature, °C
8.‡	Capacitors	65
9.	Automatic fluorescent starter	80
10.	Solid contacts (e.g., of a cord reel)	55

**These limits do not apply to a composition or construction that has been investigated and recognized as having a different temperature limit, e.g., nickel plating on parts noted in Item 5 above are suitable for a maximum temperature of* 218°C.

†*As determined by the rise-of-resistance method.*

‡*Also, capacitors may be marked otherwise.*

General Instruction No. 1
C22.2 No. 12-1982
February 1982

CSA Standard C22.2 No. 12-1982, *Portable Luminaires*, consists of **40 pages**, each dated **February 1982.**

This Standard, like all CSA Standards, is subject to periodic review, and amendments in the form of replacement pages may be issued from time to time; such pages will be mailed automatically to those purchasers who complete and return the attached card.* Some Standards require frequent revision between editions, whereas others require none at all. It is planned to issue new editions of the Standard, regardless of the amount of revision, at intervals not greater than 5 years. Except in unusual circumstances, replacement pages will not be issued during the last year of that edition.

**This card will appear with General Instruction No. 1 only.*

Although any replacement pages that have been issued will be sold with the Standard, it is for the purchaser to insert them where they apply. The responsibility for ensuring that his or her copy is complete rests with the holder of the Standard, who should, for the sake of reference, retain those pages which have been replaced.

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Preface

This is the fourth edition of No. 12 of a series of Standards issued by the Canadian Standards Association under Part II of the Canadian Electrical Code. It supersedes the previous edition published in 1960.

This edition has undergone a general updating to remain abreast of current technology and includes requirements for portable luminaires for general household, commercial, and industrial use in dry, damp, and outdoor locations.

This Standard incorporates the following Electrical Bulletins:

Number	Date	Subject of Bulletin
628	February 8, 1966	Chain-supported Portable Electric Lighting Devices;
649D	December 30, 1968	Application of Electrical Bulletin No. 649 to Portable Lamps;
650	August 12, 1966	Temperature Test Procedure for Portable Incandescent Lighting Devices;
791A	November 20, 1979	Requirements for Swivels for Use with Portable Lamps;
814	March 1, 1971	Certification Requirements Covering Portable Incandescent Lamp Kits;
1169	June 27, 1978	Methods of Date Marking
1188	August 31, 1978	Alternative Flame Test for Non-Metallic Enclosures of Portable Fluorescent Lighting Devices Having No User-Serviceable Parts Including Lamps;
1259	February 7, 1980	Proposed revisions to CSA Standard C22.2 No. 12;
1276	July 16, 1980	Use of Polarized 2-Pole Parallel Blade Attachment Plugs with Portable Electric Lighting Devices (Including Extension-Lamp Cord Sets);
1318	May 22, 1981	Novelty Lamps.

For general information on the Standards of the Canadian Electrical Code, Part II, see the preface of the latest issue of CSA Standard C22.2 No. 0, Definitions and General Requirements.

This Standard was prepared under the jurisdiction of the Committee on CE Code, Part II, and was formally approved by this Committee.

Rexdale, February, 1982

Note: *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the user of the Standard to judge its suitability for his or her particular purpose.*

All enquiries regarding this Standard should be addressed to Canadian Standards Association, 178 Rexdale Boulevard, Rexdale, Ontario M9W 1R3.

CSA Standards are subject to periodical review and suggestions for their improvement will be referred to the appropriate committee.

Requests for interpretation will also be accepted by the committee. They should be worded in such a manner as to permit a simple "yes" or "no" answer based on the literal text of the requirement concerned. Formal interpretations are published in "CSA Information Update". For subscription details and a free sample copy, write to CSA Information Centre or telephone (416) 744-4058.

February, 1982

Foreword

Certification organizations, as accredited by the Standards Council of Canada, have their own criteria and procedures for certification services. The following paragraphs define CSA Certification policies.

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In performing its functions in accordance with its objectives, CSA does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of the Association represent its professional judgement given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed.

Products in substantial accord with this Standard but which exhibit a minor difference or a new feature may be deemed to meet the Standard providing the feature or difference is found acceptable utilizing appropriate CSA Certification Division Operating Procedures.

Products which comply with this Standard shall not be certified if they are found to have additional features which are inconsistent with the intent of this Standard.

Products shall not be certifiable if they are discovered to contravene applicable laws or regulations.

Testing techniques, test procedures and instrumentation frequently must be prescribed by the CSA Certification Division in addition to the technical requirements contained in Standards of CSA.

In addition to markings specified in the Standard the CSA Certification Division may require special cautions, markings and instructions that are not specified by the Standard.

Some tests required by CSA Standards may be inherently hazardous. The Association neither assumes nor accepts any responsibility for any injury or damage that may occur during or as the result of tests, wherever performed, whether performed in whole or in part by the manufacturer or the Association, and whether or not any equipment, facility or personnel for or in connection with the test is furnished by the manufacturer or the Association.

Manufacturers should note that, in the event of the failure of the CSA Certification Division to resolve an issue arising from the interpretation of requirements, there is an appeal procedure: the complainant should submit the matter, in writing, to the Secretary of the Canadian Standards Association.

If this Standard is to be used in obtaining CSA Certification please remember, when making application for certification, to request all current Amendments (see General Instruction page), Bulletins, Notices and Technical Information Letters that may be applicable and for which there may be a nominal charge. For such information or for further information concerning details about CSA Certification please address your inquiry to the Applications and Records Section, Canadian Standards Association, 178 Rexdale Boulevard, Rexdale, Ontario M9W 1R3.

Publication Date—February 28, 1982
(i.e., the date on or after which this Standard may, at the discretion of the applicant, be used for certification).

* **Effective Date**—February 28, 1984
(i.e., the date on which this Standard shall be applicable to equipment being submitted for certification and to equipment already certified and manufactured on or after that date).

* *Unless otherwise noted in the text or General Instruction.*

C22.2 No. 12-1982

Portable Luminaires

1. Scope

1.1 This Standard applies to portable luminaires* for general household, commercial, and industrial use in dry, damp, and outdoor locations, and intended to be used in accordance with the Rules of the Canadian Electrical Code, Part I, in non-hazardous locations, on a nominal 120 V system.

**Throughout this Standard the term "portable luminaires" has been shortened to "luminaires".*

1.2 This Standard applies to portable incandescent and fluorescent luminaires for illuminative and decorative purposes and to combinations of these, such as aquarium hoods, cabinets (illuminated bars, hutches, etc.), chain- and hook-supported types (including flexible-cord-, steel-cable- or rope-supported), colour wheels, drafting lamps, display types, electronic (flashing, touch-control) types, extension hand-lamps, fibre-optic types, floor lamps, garden lights, gimbal lights, hospital lamps, illuminated forms or shapes (figurines, fire logs, terrestrial globes, plaques, etc.), kits, lamp testers, light channels for display purposes, machine-shop lamps (e.g., illuminated shields for use with electric grinders), make-up mirrors, picture lamps, planter lamps, plug-in night-lights, pole lamps, room dividers, table lamps (including nursery, desk, novelty types, etc.), transformer-operated ultra-violet hobby lamps, and wall (pin-ups, under-cabinet) types.

Note: *Luminaires intended for residential use, incorporating parts such as beverage cans, nostalgia items, etc., used as a base, stand, or shade, may include wording to indicate the name or trademark of the product usually contained.*

1.3 This Standard does not apply to:

(a) Christmas-tree and other decorative lighting outfits (except for colour wheels) covered by CSA Standard C22.2 No. 37, Christmas-Tree and Other Decorative Lighting Outfits;

(b) Outdoor floodlight-type luminaires (except for garden lights) covered by CSA Standard C22.2 No. 97, Outdoor and Submersible Floodlights;

(c) Electric signs covered by CSA Standard C22.2 No. 2, Electric Signs;

(d) Electric displays and incandescent-lamp signs covered by CSA Standard C22.2 No. 7, Portable Electric Displays and Incandescent-Lamp Signs, except as noted in Clause 4.1.6;

(e) Therapeutic luminaires (e.g., infra-red, ultra-violet) covered by CSA Standard C22.2 No. 125, Electromedical Equipment;

(f) Fluorescent luminaires designed for commercial or industrial use and having an open-circuit voltage of more than 300 V, and with one or more lamps rated at more than 20 W, which are covered by CSA Standard C22.2 No. 162, Fluorescent Luminaires;

(g) High-intensity discharge luminaires covered by CSA Standard C22.2 No. 163, High Intensity Discharge Luminaires; and

(h) Stage, studio, and photographic luminaires covered by CSA Standard C22.2 No. 166, Stage, Studio and Photographic Luminaires.

2. Definitions

2.1 The following definitions apply in this Standard:

Extension hand-lamp means an assembly consisting of a length of flexible cord with an attachment plug at one end and a hand-held lampholder with lamp-guard at the other, and classified as:

(a) ***Heavy-duty type*** intended for use in damp locations, garages, or similar locations and having a flexible cord suitable for extra-hard usage; and

(b) ***Light-duty type*** intended for use in normally dry locations and where it is not unduly exposed to damage from mechanical causes, and having a flexible cord suitable for hard usage;

Lamp means a complete assembly consisting of the bulb, filament, filament leads and supports, screw-shell or pins, contacts, etc.;

Wiring device means an electrical component of a luminaire that is necessary for the intended use and/or proper control of the assembly involved but does not include wiring or lamps.

3. General Requirements

3.1 General requirements applicable to this Standard are given in CSA Standard C22.2 No. 0, Definitions and General Requirements.

3.1.1 Luminaires for use in hospitals (e.g., examining lamps, wall lamps installed above the head) shall also meet the applicable requirements of CSA Standard C22.2 No. 125, Electromedical Equipment.

3.2 Reference Publications

3.2.1 Where reference is made to CSA Standards of the Canadian Electrical Code, Parts I and II, such reference shall be considered to refer to the latest edition and revision thereto, unless otherwise specified. This Standard refers to the following such Standards and the year dates shown indicate the latest editions available at the time of printing:

C22.1-1978,
Canadian Electrical Code, Part I;

C22.2 No. 0-1975,
Definitions and General Requirements;

C22.2 No. 0.4-1972,
Bonding and Grounding of Electrical Equipment (Protective Grounding);

C22.2 No. 2-1956,
Electric Signs;

C22.2 No. 7-1938,
Portable Electric Displays and Incandescent-Lamp Signs;

C22.2 No. 37-1964,
Christmas-Tree and Other Decorative Lighting Outfits;

C22.2 No. 66-1956,
Specialty Transformers;

C22.2 No. 84-1974,
Incandescent Lamps;

C22.2 No. 94-1976,
Special Purpose Enclosures 2, 3, 4, and 5;

C22.2 No. 97-1969,
Outdoor and Submersible Floodlights;

C22.2 No. 125-1979,
Electromedical Equipment;

C22.2 No. 162*,
Fluorescent Luminaires;

C22.2 No. 163*,
High Intensity Discharge Luminaires;

C22.2 No. 166†,
Stage, Studio and Photographic Luminaires.

**Under preparation.*

†*Under preparation. Refer to CSA Electrical Bulletin No. 1131, June 15, 1977, Requirements Covering Stage and Studio Luminaires.*

3.2.2 Where reference is made to the following publications such reference shall be considered to refer to that edition listed below:

CSA Standard
C235-1969,
Preferred Voltage Levels for AC Systems, 0 to 50,000 Volts;

UL* Standard
UL No. 94-1973 (Second Edition),
Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

**Underwriters Laboratories, Inc.*

4. Construction

4.1 General

4.1.1 Component parts shall be of types specifically approved for the use intended or shall be investigated as an integral part of the luminaire.

4.1.2 Electrical components shall conform to the individual Canadian Electrical Code, Part II Standard covering such components, with exceptions where the application may allow a deviation.

4.1.3 Luminaires shall have the necessary strength and rigidity to resist the abuses to which they are liable to be subjected, without the required spacings of the electrical equipment being reduced or parts becoming loosened or displaced. Parts that may be removed during normal use, such as for cleaning or relamping, shall be designed or marked to prevent replacement in a position that would affect the safe operation of the luminaire.

4.1.4 There shall be no sharp edges, burrs, etc., nor shall any method of construction be used that might damage electrical insulation, reduce electrical spacings, or cause injury to the user.

4.1.5 Except as permitted by Clause 4.3.7, a luminaire that is designed to be hung on a ceiling or wall shall not incorporate a bowl, shelf, hook, or any other provision intended for the support of any object, other than a shade, that is not a part of the luminaire.

4.1.6 Unless permitted elsewhere in this Standard, all electrical parts of luminaires and their enclosures shall be completely assembled at the factory.

4.2 Electrical Enclosures

4.2.1 General

4.2.1.1 Except as permitted by Clause 4.2.1.2, an enclosure shall be provided to:

(a) Prevent accidental contact with bare live parts operating at a potential of more than 30 V;

(b) Contain either flame or material caused by a fault in the electrical parts; and

(c) Protect electrical parts from mechanical damage and environmental conditions.

Note: Examples of electrical parts are: separated conductors of Type SPT-1 (POT-64) flexible cord, conductors having 1/64 inch (nominal) or less insulation, wiring connections, resistors, capacitors, semiconductor devices, open-type motors, open coil of transformers, and similar components.

4.2.1.2 An enclosure shall not be required where:

(a) Live parts of lampholders or starter holders make connection directly to lamp or starter contacts;

(b) Conductors, including separated conductors of flexible cord, except as noted in Clause 4.2.1.1, are mechanically protected by the body or other parts (other than chain) of the luminaire or by sleeving (see Clauses 4.12.4, 4.12.5, and 4.17);

(c) Individual conductors having 1/32 inch thick (nominal) insulation are woven through the links of a chain; or

(d) Terminal connections in a recess of a wiring device covered with a barrier or compound complying with Clause 4.17.

4.2.1.3 Factory connections need not be accessible for servicing. Ample space shall be provided for the type of connections employed.

4.2.1.4 Where applicable, removable parts secured by friction or spring-retained shall comply with the bonding requirements of CSA Standard C22.2 No. 0.4, Bonding and Grounding of Electrical Equipment (Protective Grounding).

4.2.1.5 Floor or pole or similar room-divider types having the supporting stem made in interlocking sections that are separated for shipping purposes shall have:

(a) Splices and wiring (at the break in 2 adjacent sections) protected by an overall sleeve of insulating material at least 0.028 inch thick or by some other equivalent method;

(b) The protection extended over the wiring at least 4 inches on each side of the wiring splices; and

(c) The protection secured in position, e.g., with insulating tape at each end of a sleeve.

4.2.2 Openings in and Degree of Enclosure

4.2.2.1 Parts that are required to be enclosed by Clause 4.2.1.1 shall not be accessible through any opening during operation, or during normal servicing such as relamping or cleaning (see also Clause 4.18), the accessibility being determined by the procedure outlined in Clause 4.2.2.2.

4.2.2.2 When inserted in every position, the probe illustrated in Figure 1 shall not contact parts that are required by Clause 4.2.1.1 to be enclosed. Where necessary, an electrical indicator shall be used to determine whether or not contact is made.

4.2.2.3 Recesses in the body of a wiring device shall not be considered as the sole enclosure for bare live parts.

4.2.2.4 Openings, if provided and regardless of shape, shall not adversely affect the strength or the rigidity of the enclosure.

4.2.2.5 Drain holes, if provided, shall be no less than 1/8 inch in diameter.

4.2.2.6 Openings located 1/2 inch or less from the surface on which an enclosure is intended to be mounted shall be considered as mounting holes (see Clause 4.2.2.7), and all other openings shall be considered as ventilating holes (see Clauses 4.2.2.8 and 4.2.2.9), except for drain holes, which shall comply with Clause 4.2.2.5.

4.2.2.7 Mounting holes shall:

(a) Not exceed 0.20 square inch in area for each hole;

(b) Not exceed, in total area, 0.35% of the total area of the enclosure mounting surface, except that additional mounting holes may be provided in a knock out form;

(c) Prevent turning* of the luminaire with the provision of at least 2 holes for a mounting surface up to 40 square inches in area, except that 1 hole is acceptable where additional positive means† is provided to prevent turning; and

**Turning that does not affect electrical parts or the temperature limits is permissible.*

†This excludes flexible parts such as wiring and parts that are not intended for that purpose.

(d) Provide increased support with at least an additional hole for each 200 square inches of total luminaire mounting surface in excess of 40 square inches.

4.2.2.8 Ventilating holes shall:

(a) Not exceed 1.50 square inches for each hole; and

(b) Not exceed, in total area, 15% of the total area of the enclosure.

4.2.2.9 Ventilating holes may be located in any surface, except that none shall be provided:

(a) In the mounting surface; or

(b) Directly below parts that are required by Clause 4.2.1.1 to be enclosed, unless the parts are baffled. (See Figure 2 and Clause 4.2.2.10.) "Directly below" is determined by drawing an imaginary cone, as shown in Figure 2, from the part involved. The cone shall always be drawn at the vertical regardless of the slope of the bottom of the enclosure. Any opening in the area of this circle is considered to be directly below the part involved.

4.2.2.10 A baffle as specified in Clause 4.2.2.9 shall:

(a) Be made of metal meeting the appropriate requirements of Clause 4.2; or

(b) Be made of non-metallic material complying with the flame test of Clause 6.5 or 6.6; and

(c) Be without perforations, except as noted in Item (e); and

(d) Be located within, and having a dimension at least equal to, the perimeter of the cone shown in Figure 2; and

(e) If made of perforated material, have one of the following constructions:

(i) A galvanized steel screen or the equivalent having a 14 x 14 mesh and wire with a diameter of 0.018 inch;

(ii) A panel in accordance with Table 1;

(iii) A perforated metal panel that complies with the flaming oil test specified in Clause 6.18.

4.2.3 Enclosure Materials

4.2.3.1 Enclosures shall be made of sheet metal, extruded metal, cast metal, or other suitable material such as glass, ceramic, or plastic.

4.2.3.2 Non-metallic enclosures shall be capable of withstanding the flame test of Clause 6.5 or 6.6 (except for glass or ceramic materials) and the mechanical strength tests of Clause 6.16.

4.2.3.3 Plain paper, fibre, or wood shall not be accepted unless lined with material that, along with the paper, fibre, or wood, complies with Clause 4.2.3.2.

4.2.3.4 Liners used with the materials noted in Clause 4.2.3.3 shall be secured with an adhesive or the equivalent.

4.2.3.5 The thickness of sheet metal shall be in accordance with Table 2.

4.2.3.6 The following definitions apply in Table 2:

(a) **Length** means the longest straight line that can be drawn on any unreinforced flat section;

(b) **Reinforced** means a form of construction that provides equivalent mechanical strength.

4.2.3.7 The thickness of cast metal shall be in accordance with Table 3.

4.2.3.8 Minimum thickness for extruded aluminum shall comply with Clauses 4.2.3.5 and 4.2.3.6.

4.3 Mounting Provisions

4.3.1 Openings for pin-up, wall-mounted luminaires shall:

(a) Be located such that a supporting hook, screw, etc. is prevented from contacting electrical parts;

(b) Not exceed 2 in number, with at least 1 hole or slot for each 5 pounds of the luminaire.

Note: *Pin-up holes need not be of the keyhole type.*

4.3.2 An external ring hanger shall be formed of metal or plastic, and shall be subjected to the loading test of Clause 6.7.

4.3.3 A hook or similar means shall be provided on an extension hand-lamp for hang-up mounting.

4.3.4 Electrical cord or wiring shall not be used for the support of a luminaire except as permitted by Clause 4.11.10.

4.3.5 An aquarium-type luminaire shall have flanges or other means to prevent it from being accidentally dislodged into the water.

4.3.6 Except as covered in the following note, luminaires shall have a base or other free-standing type of support (e.g., base and stand for a table or floor lamp), or means for pin-up or a similar type of mounting.

Note: *An assembly for indoor dry locations only, consisting of a length of flexible cord, an attachment plug, a lampholder with a side outlet for a supply cord and means for mounting the assembly (e.g., a short length of threaded nipple and a cork bottle stopper) in the neck of a bottle, or the equivalent, need not have means for mounting or support.*

4.3.7 The chain in chain- and hook-supported types of luminaires:

(a) Shall be not less than 12 feet nor more than 20 feet long;

(b) Shall not raise the total weight above 20 pounds when 4 feet of the chain, 4 feet of cord, and the lampholder assembly, including shade, glassware, and all decorative parts, are weighed together;

(c) Shall be provided with at least 2 hooks, packed with the lamp, together with means for securing the hooks to solid wooden structural members. Wood screws or the equivalent shall be not smaller than No. 10 with a nominal thread length of 1-1/4 inch*. Toggle bolts and similar devices are not acceptable for securing the hooks and any reference to their use shall not appear in the installation instructions (see Clause 5.4.1), advertising, etc.

**A minus tolerance of 1/8 inch is permitted.*

4.3.8 Cords intended to be supported on hooks of the type noted in Clause 4.3.7(c) shall have means of securing the cord to the hook (e.g., a plastic clamp).

4.3.9 Parts of luminaires supported from the ceiling by a means other than that outlined in Clauses 4.3.7 and 4.3.8 shall:

(a) Not exceed a dead weight of 20 pounds;

(b) Have a support, e.g., keeper wire, that complies with Clause 6.7;

(c) Have a supporting means that complies with the strength requirements of Clause 4.3.7(c).

4.3.10 A free-standing luminaire such as a floor or table type shall be provided with weights or the equivalent in the supporting base to prevent overturning, and shall be subjected to the stability test of Clause 6.11.

4.4 Corrosion Protection

4.4.1 External surfaces of iron or steel of luminaires intended for use in normally dry locations shall be protected by galvanizing, painting, or other suitable means. Loaders and base weights are not considered to require corrosion protection.

4.4.2 All surfaces of iron or steel of luminaires intended for use in wet or damp locations shall be protected by galvanizing, painting, or other suitable means.

4.5 Stems and Tubes

4.5.1 Stems and tubing shall be free from kinks or cracks and, if of metal, shall be not less than 0.020 inch in thickness, except that where threaded, metallic tubing shall be not less than 0.040 inch in thickness.

4.5.2 Rigid slow-burning tubing shall be not less than 0.050 inch in thickness when used in luminaires having medium-base or smaller lampholders. (See Clause 4.7.1 for definition of "slow-burning material".)

4.6 Mechanical Joints and Fastenings

4.6.1 Methods of making mechanical joints between and for the fastening of parts, shall be such as to prevent turning, which would result in damage to wires or wiring devices, after the assembly is completed. Frictional contact alone between parts shall not be used to prevent turning.

Note: *An adjustable, telescoping stem that complies with the torsion requirement in Clause 4.6 may use a fastening means for securing the telescoping parts that depends upon friction alone.*

4.6.2 Turning between metal parts shall be prevented by the use of a lock washer, a locknut seated against another nut or equivalent threaded assembly, or by some other equivalent method. A screw joint may be locked by solder, a set-screw, sealing, or the equivalent, except that sealing shall not be used if it destroys the electrical bond where bonding is required.

4.6.3 Screws used to mount components shall be provided with a means to prevent loosening.

4.6.4 Sheet metal nuts, if used for assembly or to prevent turning of threaded tubing not larger than 1/8 inch pipe size and on bolts or studs that are not greater than 1/4 inch in diameter, shall be of heat-treated steel. Larger sizes may be used where they are not depended upon for mechanical strength.

4.6.5 A swivel joint shall be so constructed that turning will not cause damage to the insulation of the wires and it shall be so designed that rotation is limited to not more than 370°. If not limited to a maximum rotation of 370°, a swivel joint shall be capable of withstanding the swivelling test of Clause 6.10(c).

4.6.6 A swivel joint, if of metal, shall be of material not thinner than 0.040 inch if threaded and 0.020 inch if unthreaded. If other material is used, it shall be at least 0.050 inch thick. Sleeves or dust caps, if provided, may be of thinner material, provided that the wiring through the swivel is adequately protected against mechanical injury by the swivel body, i.e., the wiring does not project outside the body of the swivel.

4.6.7 A swivel joint shall be capable of withstanding the torsion and pull tests of Clause 6.10.

4.6.8 The plant-growing section of a planter-type luminaire shall be completely separate from a raceway, enclosure, or any other compartment containing electrical parts, and there shall be no nail- or screw-type (or other similar type) fastenings between them that might allow water leakage into the electrical section.

4.6.9 The link of a chain shall be formed so that the joint is located not less than 30° from the vertical (see Figure 4). In the case of circular links, the joint shall be welded. (See loading test of Clause 6.7.)

4.6.10 Screw threads and sharp-pointed screws shall not extend into a wiring compartment for a distance of more than 3/16 inch, except that no limit need be applied if the wires (e.g., because of lengths) are reliably held away from or positioned away from such screws. (See Clause 4.1.4.)

4.7 Shades, Diffusers, and Lamp Guards

4.7.1 Shades, diffusers and lamp guards shall be made of at least slow-burning material, except that those which form an enclosure or a part of an enclosure shall meet the requirements of Clause 4.2.

Note: *A slow-burning material is one that has the approximate burning characteristics of ordinary newsprint, including an ignition temperature of approximately* 440°C. *Included in the general classification of slow-burning materials are cellulose acetates, methyl methacrylates, polystyrene, polyvinyl chloride, nylon, cotton, silk, rayon (other than brushed rayon), wood, and paper.*

4.7.2 Nitrocellulose sheet, mouldings, or pyroxylin coatings on materials other than metal, either alone or as treatments, shall not be used.

4.7.3 Where tungsten-halogen lamps are used, a guard shall be secured over the lamp to contain all particles that might result from the lamp's shattering.

4.7.4 An extension hand-lamp shall be provided with a guard for the lamp that is made of metal or non-metallic material (see tests of Clauses 6.16.2 and 6.17).

4.8 Wiring Joints and Terminal Connections

4.8.1 Where solder is used, the conductor shall be made mechanically secure before the solder is applied. The following are acceptable methods of mechanically securing the conductor:

(a) Twisting of wires together;

(b) Insertion of a bare conductor through a hole in a flat terminal;

(c) Insertion of a bare conductor straight into a terminal sleeve.

4.8.2 Soldered wiring splices or those made with uninsulated wire connectors shall be covered with at least 3 layers of insulating tape extending at least 1/2 inch on each side of the bare live parts or the equivalent, such as shrink-fit type tubing, which shall be retained securely over the joint (see also Clause 4.18).

4.8.3 Where luminaires are subject to vibration or similar effects, joints and connections shall be reliably secured, e.g., by soldering or welding or by pig-tail connectors having supplementary retention, etc.

4.8.4 Where connections are made to binding screw terminals:

(a) The wire strands shall be twisted prior to attachment under the terminal screws; and

(b) The wire shall be looped under the head in a clockwise direction.

4.9 Wiring Devices

4.9.1 General

4.9.1.1 Wiring devices, such as switches, lampholders, etc., shall be prevented from any turning that would apply tension to splices or other wiring connections, cause damage to the wiring, or otherwise adversely affect the assembly. (See the appropriate requirements of Clause 4.6.)

4.9.1.2 If knobs on switches, etc. are removable from outside the enclosure, their removal shall not expose live parts.

4.9.1.3 Wiring devices such as receptacles, switches, etc. used in luminaires intended for use in wet locations shall be of the weatherproof type.

4.9.1.4 Materials of which components are constructed shall be such that they will neither create a fire hazard nor be themselves injuriously affected by the highest temperature likely to be attained in normal use.

4.9.1.5 An aquarium-type luminaire shall be so designed that, under normal condition of use, water will not contact lamps, lampholders, switches, etc.

4.9.2 Lampholders

4.9.2.1 A candle-type lampholder* shall be used only if:

(a) The lampholder is provided with a decorative, permanently secured, close-fitting enclosure meeting the applicable requirements of Clause 4.2 and, in addition to the paper covering on the screw-shell, enclosing the entire lampholder and providing the required depth of the lamp cavity; and

(b) The lampholder is used in equipment intended only for use in dry locations.

**A candle-type lampholder is essentially a lampholder having bare live parts other than the centre contact and screw shell and having a fibre outer casing supplied by the lampholder manufacturer.*

4.9.2.2 Screw-shells in lampholders of luminaires intended for use in wet or damp locations shall be of copper or copper alloy.

4.9.2.3 Lampholders for extension hand-lamps shall:

(a) Be complete with a handle;

(b) Be of the switch-less type and have a copper screw-shell if the extension lamp is of the heavy-duty type;

(c) Be provided with a guard to protect the lamp-bulb and the lampholder;

(d) Have a protective guard for the operating arm of a switched lampholder; and

(e) Have a jacket or cover of insulating material over the screw-shell suitable for the intended application (see Clause 4.2).

4.9.2.4 A porcelain lampholder mounted by means of a screw-ring shall be used with the gasket usually supplied with this type of lampholder and it shall be adequate for the intended use of the luminaire.

4.9.2.5 The lampholder body in luminaires intended for use with aquariums or in other damp or wet locations shall be of phenolic composition, glazed porcelain, or other material having equivalent moisture-resistant properties.

4.9.2.6 Chain- and hook-supported, cord-supported, clamp-on utility, and similar types of luminaires shall use lampholders having a body of insulating material such as phenolic composition or porcelain.

4.9.3 Switches

4.9.3.1 The voltage rating of a switch shall be suitable for the load that it controls.

4.9.3.2 A switch that controls a tungsten-filament lamp load shall be "T"-rated or be suitable for use with tungsten-filament lamps on ac, in conjunction with an ampere rating equal to the load that it controls, or shall have an ampere rating at least 3 times the rating of the load.

4.9.3.3 For inductive loads, switches shall have a current rating of at least twice the total current of the load that it controls.

4.9.3.4 A switch, if provided, shall be connected in the supply side of the circuit and shall have an OFF position.

4.9.4 Receptacles

4.9.4.1 A receptacle in a luminaire that is required to be grounded (see Clause 4.20) shall be a 120-V, 2-pole, 3-wire grounding type.

4.9.4.2 A receptacle in an extension hand-lamp shall be permitted only in a light-duty type.

4.9.5 Ballasts, Transformers, Capacitors, Resistors, and Other Auxiliary-Type Devices

4.9.5.1 Paper capacitors shall be impregnated or be so enclosed that moisture will be excluded.

4.9.5.2 Fluorescent-lamp ballasts, unless of the simple-reactance type, shall be of the thermally protected type.

4.9.5.3 Step-down transformers shall be of the isolating type meeting the applicable requirements of CSA Standard C22.2 No. 66, Specialty Transformers.

4.9.5.4 A fluorescent-lamp ballast connected in a flexible cord shall:

(a) Not exceed 2-1/2 pounds;

(b) Be enclosed as required by Clause 4.2.1;

(c) Be of the simple-reactance type; and

(d) Have the lamps connected in series where more than one lamp is controlled by the ballast.

(See also Clauses 4.11.8 and 4.11.9.)

4.10 Gaskets

4.10.1 Gaskets shall be secured so that they are not liable to be readily damaged or discarded during operation or maintenance.

Note: *The use of cement as the sole means of securing a gasket shall be subject to investigation.*

4.10.2 Gasket material shall:

(a) Retain its effectiveness in service;

(b) Not lose resilience or become sticky under any condition likely to be encountered; and

(c) Withstand continued exposure to heat and moisture.

4.10.3 Gaskets shall be used to prevent the entrance of moisture at mechanical joints and seams of luminaires intended for use in wet locations, unless the design is such that the luminaire prevents the entrance of moisture when set in any possible supporting position.

4.11 Flexible Supply Cords

4.11.1 A luminaire shall be provided with a length of one of the types of flexible cord listed in Table 4, except that other types of cord may be used if they are found to be suitable for the particular application.

4.11.2 A hospital bed-lamp shall be provided with a flexible cord of Type SV, or the equivalent.

4.11.3 An extension hand-lamp shall use cord of at least Type SJOW or SJTW for light-duty use and at least Type SOW or STW for heavy-duty use. The cord size shall be at least No. 18 AWG, except that, where a receptacle is provided in the lamp handle, it shall be at least No. 16 AWG, shall have a grounding conductor, and shall be not more than 50 feet in length.

4.11.4 Unless required or permitted otherwise in this Standard, cords for use in household luminaires shall be at least No. 18 AWG, Type SPT-1 (POT-64), except that the floor type and luminaires for commercial or industrial use shall be provided with at least Type SPT-2 (POT-32).

4.11.5 Luminaires intended for outdoor locations shall be used with at least No. 18 AWG, Type SJOW.

4.11.6 Chain- and hook-supported types of luminaires shall use a minimum No. 18 AWG, Type SPT-2 (POT-32) 105°C flexible cord, at least 15 feet long, and the free end of the cord shall extend between 1 foot and 5 feet beyond the end of the chain.

4.11.7 Where a through-cord fluorescent-lamp ballast is used, the flexible cord shall be at least Type SPT-2 (POT-32) cord for a ballast weighing less than 2 pounds; otherwise, the cord shall be at least Type SJ (see also Clause 4.9.5.4).

4.11.8 Except as covered in the following note, a flexible cord shall extend at least 5 feet from the point at which the cord emerges from the body of the luminaire, the distance being measured to the face of the attachment plug. The free end of the flexible cord shall terminate in an attachment plug.

Note: *A cord suitable for at least hard usage such as Type SJ, SJT, or SJO on a luminaire intended for other than household use may extend less than 5 feet from the point at which the cord emerges from the body of the luminaire.*

4.11.9 If a fluorescent luminaire is provided with a cord-type ballast, the overall length of the cord, including the ballast, shall be not less than 5 feet, and the ballast shall be not less than 2 feet and not more than 4 feet from the attachment plug.

4.11.10 A flexible cord shall not be used for the sole support of a luminaire or a part thereof, if the weight of the part to be supported exceeds 5 pounds.

4.11.11 Where a receptacle is assembled in a luminaire, the cord shall be at least No. 16 AWG, except that a minimum of No. 18 AWG may be used on a shaving or make-up mirror if it is marked in accordance with Clause 5.3.1(f).

4.11.12 There shall be no more than 1 supply cord to a luminaire.

4.12 Internal Wiring

4.12.1 A luminaire shall be wired with conductors suitable for the temperature and voltages encountered. Some* of the types of wires and flexible cords, together with their respective maximum temperature and voltage ratings, are shown in Tables 4 and 5.

**Other types may be accepted subject to investigation.*

4.12.2 Except as permitted by Clause 4.12.3, conductors shall be not smaller than No. 18 AWG.

4.12.3 Conductors No. 22 AWG or No. 24 AWG may be used where:

(a) The lead is completely enclosed but not used in swivels;

(b) The length of the lead is not more than 6 inches;

(c) The wall thickness of the lead insulation is not less than 1/32 inch;

(d) No hazard is found to exist under any condition (see tests of Clause 6.4); and

(e) The wiring is in the secondary winding of a transformer or of a circuit using solid-state devices (e.g., on a printed circuit board).

4.12.4 Wires that are movable during normal use of the luminaire, such as in swivels, flexible goosenecks, etc., shall be of the stranded type.

4.12.5 Wiring not exceeding 2 inches in length and not in a raceway, if partially exposed, shall be mechanically protected by a sleeving (see Clause 4.17) that is secured in place over the conductors. The wiring and sleeving shall be routed and secured against the body or part of the luminaire by means of clips or the equivalent.

4.12.6 Wiring visible when shades, diffusers, or other parts are removed does not need additional protection, except that it shall be secured away from the hot bulb and so as to prevent accidental handling during lamp or starter replacement.

4.13 Bushings

4.13.1 A conductor-passage hole in sheet metal shall have a bushing unless the hole edge is rolled over smoothly at least 180°.

4.13.2 Holes for conductors in materials other than sheet metal (e.g., in cast metal, extruded metal, wood, thermoplastic, etc.) shall be free of sharp edges, burrs, fins, etc., and shall have a rolled edge or the equivalent.

4.13.3 Bushings shall be made of ceramic, urea, phenolic, melamine, self-extinguishing thermoplastic, or other equivalent materials.

Notes:
(1) Bushings made of rubber and so-called hot-moulded shellac and tar compositions are not acceptable.

(2) A fibre bushing may be used if the bushing is not less than 1/16 inch in thickness (with a minus tolerance of 1/64 inch for manufacturing variations).

(3) An insulated metal grommet is acceptable in lieu of an insulating bushing, provided that the insulating material used is not less than 1/32 inch in thickness and fills completely the space between the grommet and the metal in which it is mounted.

4.13.4 Bushings shall be secured in place.

4.14 Polarization and Identification

4.14.1 The screw-shell of a lampholder and the identified terminal or lead of a polarized cord connector, receptacle, or attachment plug shall be connected to the identified conductor.

4.14.2 A switch of the single-pole type shall not be connected in the identified conductor of a luminaire.

4.14.3 If an electric-discharge luminaire uses a single-pole switch, or incorporates a ballast that has an identified line lead or that is marked to indicate that one of its line leads is to be connected to the identified conductor of the supply circuit, one of the conductors of the supply cord shall be identified.

4.15 Strain Relief

4.15.1 A strain relief shall be provided such that a stress by pulling, pushing, flexing, or twisting on wiring or cord will not be transmitted to wiring connections or interior components.

Notes:
(1) Strain relief is not required where the supply cord is attached directly to a certified wiring device by the wiring device manufacturer and where tests equal to Clause 6.8 have been conducted during the certification investigation of the device.

(2) A knot in a cord or wiring is acceptable if the cord or wiring runs through a length of raceway, or the equivalent, such that strain relief as required by Clause 4.15.1 is provided.

4.15.2 If a knot in a cord or wiring serves as strain relief, the surface against which the knot may bear or with which it may come in contact shall be free from projections, sharp edges, burrs, fins, etc. that might damage the insulation on the conductors.

4.15.3 A knot shall be located so that it is not removable without disassembling the luminaire or parts of the luminaire.

4.15.4 Metallic crimp-type or set-screws of strain relief devices that bear directly on the cord shall not be used.

Note: *Other metallic crimp-type devices may be used on a jacketed cord or a non-jacketed cord that has supplementary protection.*

4.15.5 A thermoplastic set-screw type fitting shall be acceptable only when used with a jacketed-type flexible cord and if provided with a positive stop to prevent stress on the cord. It shall comply with the test of Clause 6.8 without adversely damaging the cord jacket, and it shall not be acceptable if the screw passes through the cord jacket.

4.15.6 Wiring splices in floor- or pole-type luminaires shall be provided with strain relief to prevent stress during packing, unpacking, and assembly.

4.16 Spacings

4.16.1 Except as permitted by Clauses 4.16.2 and 4.16.3, the spacing between the bare live parts of opposite polarity, and between bare live parts and non-current-carrying metal parts, shall be not less than 1/8 inch through air or over surface.

4.16.2 The minimum spacings for the separate components on a printed wiring assembly shall be 1/8 inch. The minimum spacings for printed circuit conductors shall be 3/64 inch.

4.16.3 When an insulating barrier or liner is used to obtain the spacings required by Clause 4.16.1, it shall:

(a) Be not less than 0.028 inch thick, except that it shall be not less than 0.010 inch thick if:

(i) Used in conjunction with a spacing not less than one-half of that required; and

(ii) Mica or the equivalent is held tightly in a fixed position by the parts between which the spacing is involved; and

(b) Comply with Clause 4.17.

4.17 Electrical Insulating Materials

4.17.1 Electrical insulation, including that used in component wiring devices, shall be of material that is suitable for the particular application and that will withstand the most severe conditions likely to be encountered in service. The acceptability of insulating material shall include consideration of the following:

(a) Mechanical strength;

(b) Dielectric strength;

(c) Insulation resistance;

(d) Heat- and moisture-resistant properties;

(e) Degree of enclosure of protection;

(f) Other factors that might have a bearing on the fire and accident hazard under conditions of actual use, such as arcing and aging; and

(g) Classification as at least slow-burning.

Note: *Materials such as mica, porcelain, phenolic composition, cold-moulded, and certain refractory materials are generally acceptable as the sole support of live parts. Other materials that are not suitable for general use, such as asbestos and magnesium oxide, may be accepted if used in conjunction with other more suitable materials, or if located and protected so that exposure to mechanical injury and the absorption of moisture are prevented.*

4.17.2 Materials shall be permanently retained in place.

4.18 Replacement of Lamps and Automatic Starters

4.18.1 Bare live parts shall not be exposed during the replacement operation or during cleaning of the luminaire, accessibility being determined by the probe in Clause 4.2.2.2. If replacement operations expose bare live parts, the device shall be marked in accordance with Clause 5.3.1(k).

4.18.2 Wiring joints or electrical components shall not be accessible to accidental handling that would loosen or otherwise damage these parts.

Note: *At least a separate barrier or a natural barrier provided by the construction of the device (see Clause 4.17) will be required.*

4.18.3 Parts that may be removed during normal use, such as for cleaning or relamping, shall be designed or marked to prevent replacement in a position that would affect the safe operation of the luminaire.

4.19 Incandescent Luminaire Kits

4.19.1 When assembled in the intended manner, a kit shall form an incandescent luminaire, with or without shade and with or without support or base, complying with all of the applicable requirements of this Standard.

4.19.2 No electrical components other than a lampholder having binding-screw terminals, a power-supply cord, and a cord switch shall be provided. A cord switch, if provided, shall be installed on the cord at the factory.

4.19.3 The complete kit shall be packaged in a single carton or container (see also Clause 5.4).

4.20 Grounding and Bonding

4.20.1 The methods and materials used for the grounding and bonding of a luminaire or the parts thereof shall comply with CSA Standard C22.2 No. 0.4, Bonding and Grounding of Electrical Equipment (Protective Grounding).

4.20.2 Residential-type luminaires intended for certain specific uses or damp or wet locations, such as extension hand-lamps, aquarium lamps, and plant-growing lamps, shall be grounded where the construction involves non-current-carrying metal parts that may become energized during general use or servicing.

4.20.3 Luminaires intended for commercial and industrial use shall have provision for grounding. This requirement includes the following types of luminaires:

(a) Hospital lamps;

(b) Photo-engravers' arc lamps;

(c) Drafting lamps;

(d) Machine-shop lamps;

(e) Machine-tool lamps;

(f) Illuminated shields for use with electric grinders;

(g) Lamp testers;

(h) Light channels for display of lamp shades;

(i) Table illuminators used in science and industry.

4.20.4 Non-current-carrying metal parts that are exposed during general use or servicing (e.g., cleaning or relamping) and may become energized shall be bonded for grounding purposes, unless the electrical components within or adjacent to these metal parts are protected with additional insulating material (see Clause 4.17) having a minimum thickness of at least 0.032 inch.

Note: *The following would be acceptable:*

(a) 1/32-inch-nominal insulated wire with 1/32-inch-minimum wall sleeving of insulating material within a metal enclosure;

(b) 1/32-inch insulated wire within a plastic housing of at least 1/32-inch wall thickness;

(c) Bare live parts within a plastic enclosure that complies with Clause 4.2; or

(d) Bare live parts within a metal enclosure with 2 independent layers of insulation (see Clause 4.17), each not less than 1/32 inch thick.

5. Marking

5.1 General. Each luminaire shall be plainly and permanently marked with the following information where it will be readily visible:

(a) Manufacturer's or submittor's name, trademark, or other recognized symbol of identification;

(b) Catalogue number, model number, or other type designations on luminaires such as transformer-operated, display, electronic (solid-state), garden, hospital, illuminated-shape, machine-shop and colour-wheel types;

(c) Input rating in volts, hertz (or cycles), and total amperes or watts, except on luminaires incorporating only incandescent lamps; and

(d) Secondary volts and amperes or volt amperes, where applicable.

5.2 Lamp Replacement Caution

5.2.1 Incandescent luminaires, which require a limitation of the lamp wattage, shall be permanently and legibly marked, where readily visible during relamping, with the following caution or equivalent:

MAX . . . WATTS, TYPE . . . .

Notes:
(1) *More than one wattage and type of lamp may be included in the caution if sufficient testing is conducted to confirm that the temperature requirements are met.*

(2) *A lamp replacement caution shall not be required for a luminaire if it complies with the normal-temperature test using lamps of the maximum size and type that it will accommodate.*

5.2.2 The caution shall be made in a permanent manner, the effects of temperature being considered. Lettering shall be upper case (Univers 65 or equivalent). "MAX" shall be at least 3/16 inch high (20 point). All other letters shall be at least 3/32 inch high (10 point). The caution shall be located and executed in such a manner that it is prominent during relamping and there shall be a contrast between the lettering and the background.

5.2.3 Where special lamps are intended, the maximum wattage and burning position shall be indicated in an acceptable manner.

5.3 Additional Cautions or Warnings

5.3.1 The following cautions or warnings shall also be permanently marked on each luminaire, as required, in both English and French (equivalent wording will be accepted in all cases):

(a) FOR OUTDOOR USE and

POUR EMPLOI A L'EXTÉRIEUR.

This shall be legible during positioning of the luminaire for use;

(b) Extension hand-lamps shall be marked:

FOR HEAVY-DUTY USE IN GARAGES OR SIMILAR LOCATIONS and

CONVIENT POUR USAGE INTENSIF DANS LES GARAGES OU AUTRES EMPLACEMENTS or

FOR LIGHT-DUTY USE IN NORMALLY DRY LOCATIONS and

CONVIENT POUR USAGE ORDINAIRE DANS LES EMPLACEMENTS SECS;

(c) Luminaires intended for use in damp or wet locations such as aquarium hood- and extension hand-lamps shall have a warning to indicate that relamping or other servicing should not be carried out while the luminaire and/or the surroundings are damp or wet unless the plug is disconnected from the power supply;

(d) Luminaires intended for use in damp or wet locations shall be marked:

DO NOT SUBMERSE and

NE PAS IMMERGER;

(e) A warning to indicate the positions of use, which shall be legible during positioning of the luminaire for use. This warning is not required if:

(i) The luminaire is found suitable for use in all possible mounting positions; or

(ii) There is only one possible mounting position;

(f) The maximum allowable load in amperes that may be plugged into a receptacle shall be marked adjacent to the receptacle:

For example, 3 AMPS MAX;

(g) A luminaire that can be operated only on alternating current shall be marked:

AC ONLY and C.A. SEULEMENT, or with the symbol " ";

(h) An electric-discharge-lamp type that is designed for use with germicidal lamps shall be marked in a prominent location with the following warning:

FOR USE WITH GERMICIDAL LAMPS.
FOR PROTECTION OF THE EYES AND SKIN FOLLOW CAREFULLY THE INSTRUCTIONS PROVIDED WITH THE GERMICIDAL LAMP and

A N'UTILISER QU'AVEC DES LAMPES GERMICIDES.
AFIN DE SE PROTÉGER LES YEUX ET LA PEAU, OBSERVER SCRUPULEUSEMENT LE MODE D'EMPLOI FOURNI AVEC LA LAMPE;

(i) Utility lamps shall be marked with the following caution:

NOT FOR USE WITH A THERAPEUTIC LAMP SUCH AS INFRA-RED AND ULTRAVIOLET TYPES and

NE PAS UTILISER AVEC UNE LAMPE THÉRAPEUTIQUE, PAR EXEMPLE, DU TYPE INFRAROUGE OU ULTRAVIOLET;

(j) A luminaire intended for use in hospitals shall be marked to indicate this use;

(k) Luminaires such as those using electronic circuitry to cause flashing of special-type lamps (e.g., a xenon-type lamp) and where lamp replacement requires exposure to bare live parts (see also Clause 4.18) shall be marked where legible during relamping:

TO PREVENT ELECTRICAL SHOCK, DISCONNECT FROM POWER SUPPLY AND ALLOW AT LEAST . . . MINUTES BEFORE REMOVING COVER and

POUR ÉVITER LES CHOCS ÉLECTRIQUES, DÉBRANCHER ET ATTENDRE AU MOINS . . . MINUTES AVANT D'ENLEVER LE COUVERCLE.

5.4 Instructions

5.4.1 General. Instructions and warnings shall be provided, as applicable, on the container or on a sheet supplied in the container of a luminaire, in both English and French, as specified in Clauses 5.4.2 to 5.4.4.

5.4.2 Instructions for the proper use of mounting hooks shall be provided with luminaires having long runs of chain or cord or similar types and shall include wording such as:

(a) "Use hook to support chain, not the electrical cord";

(b) "Do not install on radiant-heating type ceiling".

5.4.3 Kits shall be provided with instructions that include:

(a) An exploded view of the individual parts (together with an exploded view of the lampholder);

(b) Clear identification of the individual parts;

(c) Well-defined instructions to eliminate risk of error when assembling the parts;

(d) If a shade is not provided, all details regarding the type, material, minimum dimensions, and mounting of those shades with which the luminaire is intended to be used. A caution shall be included to the effect that any deviation from the recommended types of shade may constitute a fire hazard;

(e) If a support or base is not provided, details regarding the intended type of support or base and method of assembly;

(f) Any limitations of application of the luminaire and the following statement: "These instructions must be followed in order to meet the requirements of the Canadian Electrical Code, Parts I and II."

5.4.4 An assembly of the type described in the Note following Clause 4.3.6 shall be provided with instructions as outlined in Clause 5.4.2 as applicable (e.g., an exploded view of the lampholder is not required since the cord is attached at the factory).

5.5 Date Marking. The month and year of manufacture, at least, shall be marked on each product. Date coding, serial numbers, or equivalent means may be used.

6. Tests

6.1 General

6.1.1 Except as otherwise indicated, tests required to determine compliance with this Standard shall be made, where possible, on only 1 representative sample of the equipment or component thereof.

6.1.2 Tests need not be conducted in any order, unless specified, but shall be arranged to require the use of as few samples as possible (see Clause 6.1.1).

6.1.3 Except as noted in Clause 6.4.2 luminaires with Class 2 type transformers shall be tested in accordance with CSA Standard C22.2 No. 66, Specialty Transformers, with adjustments made to suit the application.

6.2 Test Conditions

6.2.1 General. The tests shall be made under the following conditions, as applicable, unless specified otherwise.

6.2.2 Voltage. The test voltage shall be:

(a) The maximum of the normal operating range* of the nominal system voltage marked on the equipment; or

**This assumes a test lamp of rated wattage. If not, the test voltage shall be adjusted to give rated wattage. (See also Table 2 of CSA Standard C235, Preferred Voltage Levels for AC Systems, 0—50,000 Volts.)*

(b) Such that standard test lamps will exhibit the required temperature characteristics shown in Tables 6, 7, and 8;

(c) Adjusted to give rated lamp-wattage on luminaires not marked with the voltage rating or where a standard test lamp is not available.

6.2.2 Frequency. Frequency-sensitive equipment shall be subjected to the tests while connected to a supply of rated frequency, except that equipment marked with more than one frequency shall be tested at the frequency that will produce the maximum temperature rise.

6.2.3 Test Lamps

6.2.3.1 The type and wattage of lamp or lamps specified (rated) by the manufacturer shall be used, except that, where the luminaire is provided with medium-base screw-shell lampholders and has one or more of the ratings shown in the Tables 6, 7, and 8, a standard test lamp(s) shall be used.

If the luminaire cannot physically accommodate the standard test lamp, the lamp type(s) recommended by the manufacturer shall be used.

Where a standard test lamp is available a luminaire rated for 1 wattage and type of lamp shall be subjected to at least 2 tests, one with a pattern test lamp and the second with a base test lamp, unless 1 lamp is available having both characteristics. When a luminaire is rated for more than 1 wattage and type of lamp, sufficient testing shall be conducted to ensure that maximum temperature conditions have been obtained.

6.2.3.2 Standard test lamps shall be installed in the lampholders and oriented so that the side of the lamps that exhibits the temperature characteristics will be aimed in the direction of temperature measurement.

6.2.3.3 The sample shall be installed or supported to simulate intended usage in accordance with the manufacturer's instructions and, where more than one method may be used, it shall be installed or supported to allow recording of the maximum conditions that may be encountered under the intended uses.

6.2.3.4 Tests shall be conducted in a room substantially free of draughts and maintained at an ambient of 25 ± 10°C. Temperature variations below or above 25°C shall be respectively added to or subtracted from the observed temperatures.

6.2.3.5 Temperatures shall be measured by thermocouples consisting of No. 30 AWG iron and constantan wire.

6.2.3.6 A thermocouple junction shall be secured in good thermal contact by taping it in place, except that where a metal surface is involved, brazing or silver soldering may be necessary.

6.3 Normal Temperature

6.3.1 A luminaire shall be supported and operated as intended in accordance with the manufacturer's instructions under the applicable conditions of Clause 6.2, until thermal equilibrium is attained, without causing temperatures higher than those specified in Table 9.

6.3.2 An integral protective device shall not operate during the normal-temperature test of a luminaire.

6.3.3 An aquarium hood or reflector shall be supported as intended on a glass tank of the maximum dimensions permitted by the hood and filled with water to within 1 inch of the top of the tank.

6.3.4 Extension Hard-Lamps with Take-Up Reel

6.3.4.1 For the heating test of a reel, a 60-Hz essentially sinusoidal current having a value equal to the maximum current rating of the reel shall be circulated through the flexible cord. The length of the cord to be left unreeled during the test shall be as indicated in Table 10.

6.3.4.2 If a thermoplastic-insulated cord is to be used with a reel, the latching mechanism of the reel, if any, shall be disengaged in order to place the cord under tension. There shall be no visible reduction in the thickness of the insulation on the side of the cord nearest the centre of the reel as determined by examination of 3 separate cuts across the retracted length of cord.

6.4 Abnormal Conditions

6.4.1 A luminaire of the fluorescent or transformer type, and those having a solid-state control shall be subjected to the tests in Clause 6.4 under the applicable conditions of Clause 6.2, unless specified otherwise.

6.4.2 An overcurrent or thermal-protective device shall be bypassed in the tests, except those which are built into a component such as the thermal protector in a fluorescent lamp ballast and except where specified.

6.4.3 Unless stated otherwise, only 1 abnormal condition shall be introduced for each application of a test, i.e., a test may have to be repeated several times, each time using a different fault condition.

Note: *At the discretion of the testing authority, where several abnormal tests are required on a particular luminaire, the number of tests conducted may be kept to a minimum, for example, by concluding that the application of 1 fault condition should lead to a similar or more favourable result when certain other faults are introduced.*

6.4.4 For each test, the luminaire shall be set or mounted as intended on a 1-inch-thick, dressed, soft wood (e.g., pine) surface covered with a layer of white tissue paper.

6.4.5 During or on completion of any of the tests, there shall be no evidence of:

(a) A fire hazard (including smoke, molten materials, flaming materials, and discolouration, deformation, or decomposition of plastics);

(b) Electrical shock hazard (e.g., deterioration of insulating materials such as the insulation on conductors that would expose live parts; movement of parts in an enclosure that results in reduction of electrical spacings); insulation resistance as measured between external metal and live parts normally operating at more than 30 V being less than 50 000 Ω;

(c) Any other hazardous condition; or

(d) A fire hazard to the paper covering or mounting surface of the luminaire noted in Clause 6.4.4.

Note: *The opening of a 15-A branch-circuit fuse constitutes the completion of the test.*

6.4.6 The various components of a solid-state control (e.g., capacitors, diodes, etc.) shall be short-circuited or open-circuited, whichever results in the most severe condition.

6.4.7 Abnormal Heating (Cord Reel). The following abnormal heating test shall be conducted on the cord and reel of an extension hand-lamp to determine the effect on the cord. The reel need not be operable at the completion of this test, but no hazard, as outlined in Clause 6.4.5, or rupture of the grounding fuse shall result.

The abnormal heating test shall be conducted at the following values and in increasing order:

(a) Currents in excess of the maximum current rating of the cord reel, but at no more than the value specified in Item (b);

(b) 110% of the current rating of the maximum-current-rated fuse that can be accommodated by the fuseholder of a branch-circuit to which the cord reel normally would be connected.

The reel shall be placed on and under a double layer of cheesecloth and, if of metal, shall be grounded through a 3-A fuse. Each part of the test shall be conducted with the cord and reel energized until ultimate results have been observed. In some cases, this may necessitate continuous operation for from 7 to 8 hours.

The cheesecloth shall be bleached, 36-inches wide, running 14 to 15 yards per pound, and having what is known to the trade as a count of 32 x 26.

6.4.8 Transformers Having Class 2 Characteristics

6.4.8.1 Open-Circuit Secondary Voltage. The open-circuit secondary voltage of a transformer shall comply with Clause 6.3.1 or 6.4.1 of Section B of CSA Standard C22.2 No. 66, Specialty Transformers.

6.4.8.2 Current Output. The current output of a transformer shall comply with Clauses 6.3.2.1 to 6.3.2.4 of Section B of CSA Standard C22.2 No. 66.

6.4.8.3 Calibration of Protective Devices. The calibration of a protective device provided as a component part of a transformer shall comply with Clause 6.4.2 of Section B of CSA Standard C22.2 No. 66.

6.5 Flame

6.5.1 Enclosures of non-metallic materials shall be subjected to the tests of Clauses 6.5.2 and 6.5.3 without:

(a) Supporting combustion for more than 30 s after any of the first 4 applications of the test flame;

(b) Supporting combustion for more than 60 s after the fifth application;

(c) Burning a hole through the material any time during the 5 applications; and

(d) Dropping flaming or molten particles during the test. Also, the material is not acceptable if it should disappear before the test is completed.

6.5.2 The apparatus for making the test shall consist of:

(a) A test shield of sheet metal 12 inches wide, 14 inches deep, and 24 inches high, open at the top and front, and a means of supporting the test specimen in a vertical position;

(b) A Tirril burner having a bore of 3/8 inch and a length of 4 inches above the primary-air inlets;

(c) A 20° angle block for supporting the burner;

(d) A supply of natural gas of approximately 1000 Btu per cubic foot at normal pressure (range of 3 to 5 inches of water); and

(e) A stop-clock.

6.5.3 The test shall be made in a room from which all draughts of air are excluded. A specimen of the moulded part or a 6-inch square plaque of the moulded material used having a minimum thickness not less than that of the part involved shall be supported in a vertical position in the test shield. The height of the flame, with the burner vertical, shall be adjusted to 5 inches with an inner blue cone 1-1/2 inches high. The burner shall be tilted to an angle of 20° from the vertical and the flame applied to the sample of material under test, so that the tip of the inner blue cone of the flame touches the specimen at a point approximately 3 inches above its lower end. The flame shall be brought up to the material in such a manner that the vertical plane through the axis of the burner will be perpendicular to the line of approach. The flame shall be applied for 15 s, and then removed for 15 s until 5 such applications have been made. The flame shall not be re-applied while the material is still burning.

6.6 Alternative Flame Test

6.6.1 At the submittor's request, the flame test described in UL Standard No. 94, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, for plastic materials classed 94V-1 shall apply, provided that the luminaire complies with the following conditions:

(a) The luminaire shall have no user-serviceable parts, including the lamp;

(b) The maximum available voltage within the luminaire shall be 130 V rms (184 V peak);

(c) The overall length of the assembly, less the flexible cord, shall not exceed 3 feet;

(d) The luminaire shall contain no devices for electromagnetic energy storage (e.g., capacitors or inductors). Electromagnetic radio-frequency noise-suppressing devices and stray capacitances and inductances from wiring are excluded from this restriction;

(e) When bare metal parts, which are spaced 1/8 inch or less apart, are shorted, the maximum short-circuit available shall be 1.0 A;

(f) Where the short-circuit current between bare metal and insulated live parts exceeds 1 A, such wiring shall be so routed, secured, or clamped in place as to maintain separation so that parts of opposite polarity will be spaced apart a minimum of 1/8 inch;

(g) The luminaire shall be allowed to operate as in Items (d) or (e) under short-circuit conditions that cause a maximum rise in temperature, until temperature equilibrium is established. At the end of this time, there shall be no melting, charring, or ignition of any components or of any enclosing, encapsulating, or supporting parts, nor shall there be any evidence of exposure of live metal parts.

6.6.2 In addition, where the assembly includes live metal conductors encapsulated in the material, the flame test shall be applied to samples containing the encapsulated conductors, as well as to samples that function purely as enclosures or supports for live metal conductors.

6.7 Loading. Means provided for suspension of a luminaire shall be capable of supporting in tension, for 1 h, a load of 3 times the weight of the luminaire, but the load shall be not less than 25 ± 1/2 pound even in the case of a luminaire weighing less than one-third of this amount. If supported at 2 or more points, the distribution of the load shall be similar to that which may be encountered in the field.

6.8 Strain Relief

6.8.1 The assembly of a flexible cord of a luminaire shall withstand for 1 min a pull of 35 ± 1/2 pounds when tested as described in Clause 6.8.2.

6.8.2 The pull shall be applied by suspending a 35 ± 1/2 pound weight on the cord, with the force applied in a direction normal to the plane of the cord entry hole. If there is a movement of the cord of more than 1/16 inch or any loosening or breaking of wires at the points where the connections are secured, or where the conductors are permanently assembled to terminals, the construction is not acceptable.

6.9 Endurance (Extension-Lamp Cord Reel)

6.9.1 A cord reel provided as a component of a luminaire shall withstand 6000 cycles of operation of reeling and unreeling the cord in the intended manner in accordance with the manufacturer's instructions. There shall be no perceptible abrasion of, or other damage to, the cord or other parts.

6.9.2 During the endurance test the cord is to be unreeled to a length of 30 inches or more, by any convenient method representative of actual service, and is to be re-coiled on the reel automatically by the action of the take-up mechanism. The cord is to be unreeled in such direction, with respect to the body of the reel, that the tendency to cause damage will be greatest, consideration being given to the intended method of mounting the reel.

6.10 Swivel Strength, Flexing, and Swivelling. A swivel joint shall be capable of withstanding:

(a) A torsion of 20 ± 1/2 inch-pounds for 1 min; and

(b) A straight pull of 100 ± 1 pounds or the maximum recommended by the manufacturer, whichever is greater, for a period of 1 min;

(c) A swivelling test of 6000 cycles of rotation, if the swivel joint is not limited to a maximum rotation of 370°, without damage to the jacket or the insulation of the conductors. One cycle shall consist of full rotation from stop to stop and back again.

6.11 Stability. A free-standing luminaire shall be placed on the centre of a flat surface inclined at an angle of 8 ± 1/2° to the horizontal such that all edges of the luminaire are resting on the surface. The luminaire shall not overturn when adjusted to a position or positions most likely to cause overturning.

6.12 Humidity. A luminaire intended for wet or damp locations shall be exposed to a moist atmosphere at a relative humidity of 95 +0, -5% and a temperature of 30 to 35°C for a period of 72 h. It shall then withstand the leakage and dielectric strength tests of Clauses 6.14 and 6.15.

6.13 Weatherproofness

6.13.1 A luminaire intended for wet locations shall be mounted as in service and shall be tested for weatherproofness as specified in CSA Standard C22.2 No. 94, Special Purpose Enclosures 2, 3, 4, and 5.

6.13.2 Water shall not:

(a) Enter the luminaire in quantities sufficient to interfere with the operation of the luminaire or to create a hazard; and

(b) Have wetted electrical parts nor have come into contact with lamps (except those recognized for water contact).

6.13.3 The leakage current and dielectric strength tests of Clauses 6.14 and 6.15 shall be applied immediately after this test.

6.14 Leakage Current

6.14.1 The leakage current of a luminaire shall not exceed 0.5 mA when tested in accordance with Clause 6.14. In the case of luminaires intended for use in damp and wet locations, this test shall be applied immediately after the test of Clause 6.12 or 6.13, whichever is applicable, or after each where applicable.

6.14.2 The meter may be electronic or a direct indicating type, average responding, calibrated at 60 Hz and indicating the rms value of a pure sine wave, with an accuracy of 5% at an indication of 0.5 mA. The meter shall have a terminal impedance of 1500 Ω shunted by a 0.15 mF capacitor.

6.14.3 The test frequency shall be 60 Hz.

6.14.4 The applied voltage shall be in accordance with Clause 6.2.1.

6.14.5 The luminaire shall be at room temperature with all switches in the ON position and tested within 5 s of applying test voltage (switch S1 closed) and again after reaching normal operating temperatures.

6.14.6 The test circuit shall be as shown in Figure 5.

6.14.7 The tests shall be conducted with the switch S2 in position A, and repeated with the switch in position B.

6.14.8 The probe shown in Figure 5 shall be of a metal of the same dimensions and applied to the same openings as the probe required by Clause 4.2.2.2. The probe shall also be applied to any exterior metal part.

6.14.9 A luminaire having an insulating (e.g., plastic) enclosure shall have the probe required by Clause 6.14.8 applied to metal foil with an area 10 x 20 cm in contact with accessible surfaces of the luminaire. Where the accessible surface of the luminaire is less than 10 x 20 cm, the area of the metal foil shall be the same as that of the surface. The metal foil shall not remain in place long enough to affect normal operations, temperature, ventilation, or drainage.

6.14.10 The dielectric strength test of Clause 6.15 shall be applied immediately after this test.

6.15 Dielectric Strength

6.15.1 General. Compliance with the following shall be determined by means of a suitable testing transformer the output of which can be regulated. Starting at zero, the applied potential shall be increased gradually and at a uniform rate, until the required test value is reached unless breakdown occurs.

6.15.2 Fluorescent and Incandescent Types (Without Transformers). Luminaires, while at normal operating temperature, shall withstand without breakdown, for a period of 1 min, the application of a 60 Hz potential of 900 V between live parts and non-current-carrying metal parts for the incandescent type and 1000 V plus twice the rated voltage for the fluorescent type.

6.15.3 Luminaires with Class 2 Type Transformers. Immediately after the tests of Clause 6.4.8, the luminaire shall be capable of withstanding, without breakdown, for a period of 1 min, the application of an alternating potential of:

(a) 1000 V plus twice the maximum rated voltage of the primary winding, applied between the primary and secondary and between the primary and the core and enclosure; and

(b) 500 V between each extra-low potential winding and the core and enclosure.

6.15.4 Luminaires with Xenon Lamps. The insulation and spacings associated with the components of a high peak voltage source for xenon lamps shall be capable of withstanding for a period of 1 min without breakdown the application of a potential of 1-1/2 times the peak voltage of the source at rated frequency. This shall be accomplished by gradually increasing the voltage applied to the high-voltage source until the required test value is obtained in the output. If sufficient internal voltage cannot be obtained, an external test voltage may be applied.

6.15.5 Luminaires with Capacitors. A capacitor connected between an exposed metal part and a part involving shock hazard shall withstand without breakdown for a period of 1 min a 900 V ac potential at rated frequency applied as follows. Each of 10 samples of the capacitor shall be tested separately, and considered acceptable if none fail while the potential is being increased, and if not more than 3 fail in less than 1 min after the required test value has been reached.

6.16 Mechanical Strength

6.16.1 The following test shall be conducted on non-metallic enclosures of luminaires containing bare live parts:

(a) Without cracking, chipping, breaking, or showing other similar signs of mechanical damage so as to expose bare live parts or wiring joints or reduce electrical spacings below those shown in Clause 4.16;

(b) In addition, for those luminaires intended for damp or wet locations, without damage as outlined in Item (a) so as to allow the entrance of moisture.

6.16.2 The luminaire enclosure shall be dropped onto a hardwood surface from a height of 3 feet, except that the height shall be 6 feet for pin-up types and the surface shall be concrete for those intended for use in damp or wet locations.

6.16.3 Resistance to Impact at Low Temperature. Non-metallic lamp guards assembled on lamphandles of extension hand-lamps shall not crack, chip, or rupture when subjected to an impact force of 6 foot-pounds at a temperature of -33.9°C to -35°C.

The apparatus for this test shall include a device for impacting the samples, a refrigerator capable of maintaining the specified temperature, and short lengths of 2 x 4 inch dressed wooden (spruce) pieces. The impact apparatus shall consist of 2 vertically mounted uprights provided with grooves that serve as a track for the impact component. The impact component shall be 3 pounds (+0, -0.25 ounces) in weight and provided with a steel hammer head for striking the test specimen. The hammer head shall be 1-1/8 inch in diameter (± 0.001 inch) and have a flat surface 1 inch in diameter with slightly rounded edges. The impact component shall be provided with a locking mechanism that permits it to be released from the specified heights as determined from a scale attached to one of the vertically mounted uprights. The refrigerator shall be equipped with a metal post having a solid base. The top of the post shall be provided with means for securely holding the 2 x 4 inch dressed wooden piece on which the test specimens are impacted.

Six samples of the lamp guards assembled on lamp-handles shall be placed in the refrigerator chamber together with the wooden pieces and suitable gloves, and maintained at the specified temperature for a period of 24 h. Immediately following the temperature conditioning, each of the specimens shall be placed with the back side of the lampguard resting on the wooden piece fastened to the top of the post within the refrigerator chamber, and subjected to the impact of the steel hammer head falling freely from a height of 24 inches. Each specimen is subjected to only 1 blow from the hammer. The temperature within the refrigerator chamber shall be observed to ensure that it does not rise above -33.9°C throughout the test.

Following the impact, each specimen shall be visually examined for cracks, etc. If 1 of the 6 specimens fails in the impact test, the lampguards under test shall be considered unacceptable.

6.17 Accelerated Aging. This test applies to non-metallic lamp guards of extension lamps, gaskets, glands, etc. Samples of the material shall be placed in a circulating-air oven set at a temperature and for a period of time as shown in Table 10. There shall be no cracking or other visible signs of deterioration.

6.18 Flaming Oil Test for Perforated Panels

6.18.1 This test shall be applied to perforated metal panels that are to be investigated for suitability for use as a barrier (see Clause 4.2.2.10).

6.18.2 The apparatus for this test shall consist of an iron ladle 2-1/2 inches in diameter, with a pouring lip, a heat-resistant glass dish, a stand for supporting the test specimen, a quantity of bleached cheesecloth running 14 to 15 square yards to the pound and having what is known to the trade as a count of 32 x 28, a supply of No. 2 furnace oil*, and a stop-clock.

**For further information see CSA Standard B140.0, General Requirements for Oil Burning Equipment.*

6.18.3 The test shall be made in a room from which all draughts of air are excluded. A specimen of the material shall be supported horizontally 2 inches above a layer of cheesecloth placed in a dish.

6.18.4 Ten cubic centimetres of No. 2 furnace oil poured into the ladle shall be ignited and allowed to burn for 1 min, after which it shall be poured at the rate of not less than 1 cubic centimetre per 3 seconds on the specimen from a position 4 inches above it.

6.18.5 Means shall be provided to ensure that only oil that passes through the test specimen makes contact with the cheesecloth.

6.18.6 The cheesecloth shall not be ignited through the application of the burning oil during 3 applications at 5-min intervals.

Table 1

Acceptable Perforated Metal Plates

Thickness, Inch	Diameter of Holes, Inch	Spacing of Holes Centre to Centre, Inch
0.030	0.045	0.067 (233 holes per sq. in.)
0.030	3/64 (0.047)	3/32 (0.093)
0.035	0.075	1/8 (0.125) (72 holes per sq. in.)
0.039	1/16 (0.063)	7/64 (0.109)

Table 2

Thickness of Uncoated Sheet Metal

Specific Construction		Minimum Thickness, Inch			
		Steel		Copper, Brass, Aluminum	
		Unreinforced	Reinforced†	Unreinforced	Reinforced†
At Opening for Conduit Connection		0.030	—	0.036	—
Length More than 26 inches	No Electrical Component Support*	0.020	0.016	0.22	0.017
	Electrical Component Support	0.026	0.20	0.028	0.022
Length Not More than 26 inches	No Electrical Component Support*	0.016	0.013	0.020	0.014
	Electrical Component Support	0.020	0.016	0.025	0.020
Length Not More than 15 inches	Electrical Component Support	0.016	—	0.020	—
Supporting Any Convenient Receptacle‡		0.020	—	0.020	—

The minimum requirements under "No Electrical Component Support" are the thicknesses required whether or not **non-electrical parts, such as decorations, are attached. The thickness requirements increase as **electrical** components are mounted on the enclosure.*

†The minimum acceptable thicknesses where the metal has been reinforced to provide the strength contemplated.

‡Where a receptacle is supported on an enclosure that is required to be thicker than 0.020 inch, the thicker requirement will apply.

Notes:

***(1)** Examples of acceptable methods of reinforcement are:*

(a) A single piece of sheet metal that is formed to result in a maximum internal angle of 120° (see Figure 3);

(b) 1/2 inch by 1/2 inch, 90° angles formed from sheet steel of 0.032 inch minimum thickness that are used to divide a surface into smaller sections and, unless along the greater dimension, are additionally secured to the adjacent sides of the enclosure;

(c) Flat steel bars a minimum of 3/8 inch wide and 1/8 inch thick, used and secured as in Item (b);

(d) Curved, ribbed, or flanged surfaces.*

**A surface is considered flanged if the opposite longer sides are bent 1/2 inch or wider at right angles to the surface.*

***(2)** For coated or finished metals, the minimum thickness is considered to be obtained if the overall thickness exceeds that required in Table 2 by at least 0.0005 inch for each side coated or finished.*

Table 3

Thickness of Cast Metal

Metal	Minimum Thickness, Inch	
	Unreinforced	**Reinforced***
Cast	1/8	3/32
Malleable Iron Permanent Mould-Cast Aluminum	3/32	1/16
Die-Cast	5/64	3/64

**Acceptable:*

(a) At base of threads;

(b) For a surface that is curved or ribbed or otherwise reinforced;

(c) For a surface of such shape or size, or both, that the strength contemplated is provided.

Table 4

Conditions of Use, Voltage, and Temperature Ratings of Flexible Cords

Use		Kind	CSA Type Designation	Voltage Rating, Volts	Temperature Rating, °C	Reference Notes
Dry Locations Only	Not for Hard Usage	Heat-Resistant Flexible Cord	GTFC	600	125	1
			GTFPO	600	125	1
			GTFPD	600	125	1
Damp or Dry Locations	Not for Hard Usage	Flexible Cord	SV	300	60	
			SVO	300	60	3, 4
			SVT	300	60	2, 4
			SPT-1	300	60	2
			SPT-2	300	60	2
		Heater Cord	HPN	300	90	4, 7
Damp or Dry Locations	For Hard Usage	Flexible Cord	SJ	300	60	
			SJO	300	60	3, 4
			SJT	300	60	2, 4
			SPT-3	300	60	2
		Heater Cord	HSJO (1/64, 1/32)	300	90	8
	For Extra-Hard Usage	Flexible Cord	S	600	60	
			SO	600	60	3, 4
			ST	600	60	2, 4
Wet (or Damp) or Dry Locations	For Hard Usage	Outdoor Flexible Cord	SJOW	300	60	4, 5, 6
			SJTW	300	60	5
	For Extra-Hard Usage	Outdoor Flexible Cord	SOW	600	60	4, 5, 6
			STW	600	60	5

Notes:

(1) *The cotton or rayon braid on the conductors of Type GTFC and the cotton or rayon outer covering on Types GTFPO and GTFPD are limited to 90°C; the 125°C rating applies only to the conductor insulation.*

(2) *When Types SPT-1, SPT-2, SPT-3, SVT, SJT, and ST are provided with thermoplastic conductor insulation and thermoplastic jacket material, both rated at 105°C this overall temperature rating is surface-marked on the jacket in addition to the type designation.*

(3) *When Types SVO, SJO, and SO are provided with conductor insulation and jacket material, both rated at 90°C, this overall temperature rating is surface-marked on the jacket in addition to the type designation.*

(4) *When exposed to oil, the temperature rating of the jacket of Types SVO, SVT, SJO, SJT, HSJO, SO, ST, SOW, and SJOW and the insulation of Type HPN heater cord is limited to 60°C regardless of the temperature rating of the conductor insulation.*

(5) *Types SJOW, SJTW, SOW, and STW are surface-printed to show the type designation.*

(6) *When Types SJOW and SOW are also provided with 90°C insulation, this temperature rating of the insulation is surface-marked on the jacket.*

(7) *When Type HPN is provided with 105°C insulation, this temperature rating is surface-marked on the cord.*

(8) *When Type HSJO heater cord is provided with 90°C ethylene propylene rubber insulation (no asbestos insulation), the type designation "90°C" and "CR" are surface-printed on the cord.*

Table 5

Conditions of Use, Voltage, and Temperature Ratings of Internal Wires

Use		Kind	CSA Type Designation	Voltage Rating, V	Temperature Rating, °C	Reference Notes
Dry Location Only	Not for Hard Usage	Fixture	GTF (1/32, 3/64)	600	125	3
		Coil-Lead Wire	CL 1251	600	125	3
Damp or Dry Locations		Equipment Wire	TEWN (1/64)	600	150	1, 3
			TEW (1/32)	600	105	1, 3
			SEWF-1	300	150	2
			SEWF-2	600	150	2
			SEW-1	300	200	2
			SEW-2	600	200	

Notes:

(1) When exposed to oil, the insulation of Types TEW and TEWN is limited to 60°C.

(2) Types SEWF-1 and SEWF-2 with a nickel or nickel-coated copper conductor having a rating of 200°C *and Types SEW-1 and SEWF-1 with a nickel conductor may also have a temperature rating of* 25°C.

(3) For applications involving inductively and conductively coupled circuits where the current is limited or controlled by a transformer, reactor, or resistor, a voltage rating of 1000 V *is permitted.*

Table 6

Temperatures of Lamps for Testing Luminaires, Non-reflector Types

Watts →	40	50	60	75	100	125	150	200	250	300
Locations* ↓	Temperature (°C)									
1	49	59	59	68	81		88	92	100	108
2	47	59	59	69	83		93	98	107	116
3	44	57	57	66	81		97	106	115	125
4	40	53	53	61	74		97	113	125	137
5	36	48	48	55	65		94	115	130	146
6	33	42	42	48	55		89	109	127	146
7	30	36	36	42	47		80	101	121	133
8	27	31	31	36	38		66	85	112	112
Base →	135	135	135	135	135		135	135	135	135

Table 7

Temperatures of Lamps for Testing Luminaires, Reflector Types

Watts →	40	50	75	100	125	150	200	250	300
Locations* ↓	Temperature (°C)								
1	41	41	48	48	50	69	76	87	87
2	39	39	48	48	51	68	77	87	90
3	36	36	47	48	52	65	77	87	93
4	35	35	50	50	52	66	75	87	96
5	34	34	53	53	53	70	76	89	105
6	33	33	53	54	54	74	86	95	115
7	32	32	50	54	55	75	88	97	121
8	31	31	41	51	57	66	87	102	121
Base →	155	155	155	155	155	155	155	165	170

Table 8

Temperatures of Lamps for Testing Luminaires, Special-Purpose Types

Watts →	**150/R**	**250**
Locations* ↓	**Temperature (°C)**	
1		128
2		137
3		140
4		139
5		120
6		110
7		92
8		78
Base →	170	135

**These point designations are those shown in Figure 6 of CSA Standard C22.2 No. 84, Incandescent Lamps, with regard to thermocouple locations.*

Notes to Tables 6, 7, and 8:

(1) The temperatures are based on a temperature in the test enclosure of 25°C.

(2) Tables 6 and 7 illustrate values for all general lighting types (e.g., Types A, T, and PS in Table 6 and R30 and R40 in Table 7), including the infra-red lamps, except as noted in Note 3.

(3) Values for the special-purpose lamps chart can be filled in after further studies (as needed). Criteria for coloured lamps, as well as the trilight types, are included in Tables 6 and 7, ***except for the 150 W/R coloured ("base" only) and the 250 W/non-reflector trilight type, which are shown in Table 8.***

(4) In the selection of the above test lamp, a tolerance of up to ± 2°C will be permitted for the temperature values at points that affect critical temperatures in the luminaires, but the variation below or above the values shall be respectively added to or subtracted from the observed temperatures. The negative tolerance for pattern temperatures may exceed 2°C at points that do not affect critical temperatures in the luminaire.

Table 9

Limiting Temperatures for Lighting Devices

Item	Location	Maximum Temperature, °C
1.	(a) Supporting surface of luminaire	
	(b) External surfaces of luminaire (except lamp)	90
	(c) Paper, wood, and ordinary wood fibre materials (including paper labels)*	
	(d) Surfaces other than 1(a) that may be adjacent to the luminaire	
	(e) Neoprene materials*	
2.	(a) Coil windings and core, Class A insulation	95†
	(b) Coil windings and core, Class B insulation	120†
3.*	Ordinary rubber	60
4.*	(a) Urea materials	100
	(b) Melamine	130
	(c) Phenolic	150
	(d) Nylon (see Item 7)	105
	(e) Varnished cloth	85
	(f) Thermoplastic materials	105
5.*	On non-ferrous screw-shells and centre contacts and other current-carrying parts of lampholders	200
6.	On any sealing compound	15°C less than the melting or softening point
7.	On thermoplastic material not covered in Item 4(f) used for parts such as shades, diffusers, and support arms	See test of Clause 6.4.5.
8.‡	Capacitors	65
9.	Automatic fluorescent starter	80
10.*	Solid contacts (e.g., of a cord reel)	55

**These limits do not apply to a composition or construction that has been investigated and recognized as having a different temperature limit, e.g., nickel plating on parts noted in Item 5 above are suitable for a maximum temperature of 218°C.*

†As determined by the rise-of-resistance method.

‡Also, capacitors may be marked otherwise.

Table 10

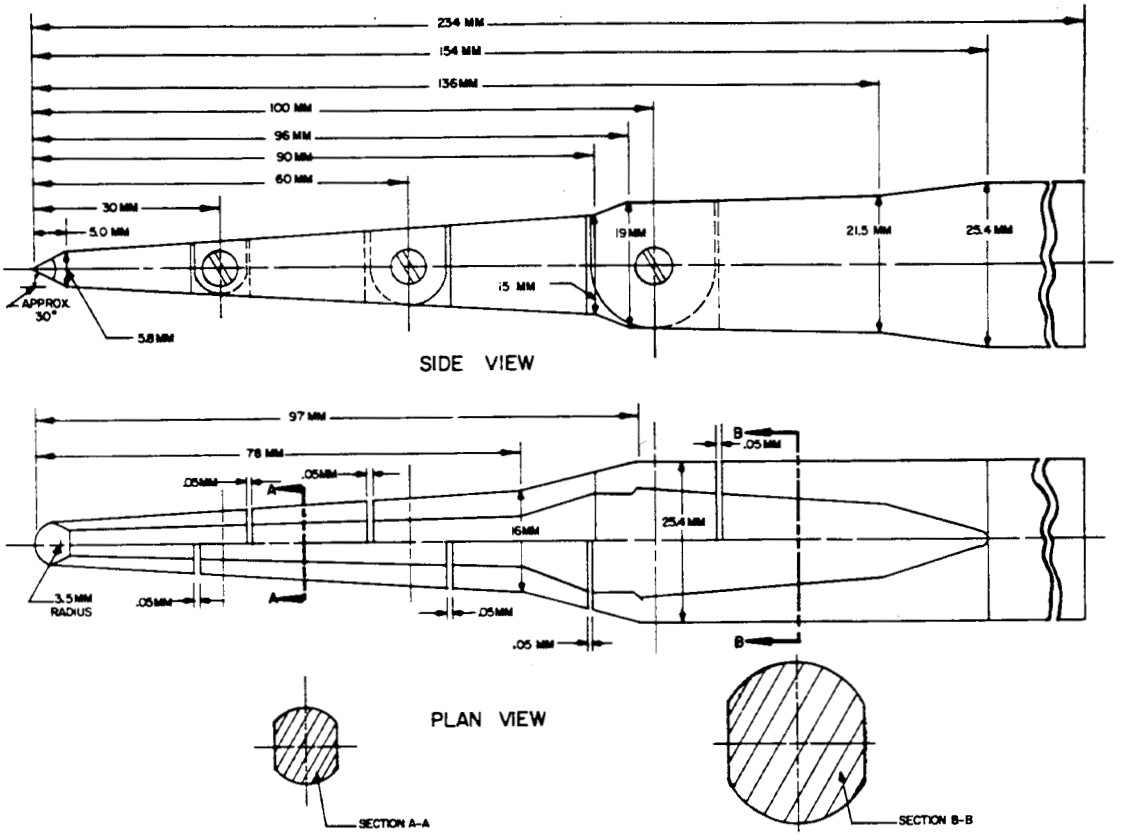
Unreeled Length of Cord

Total Length of Cord Can be Retracted onto Reel	Total Length of Cord Provided on Reel	Length of Cord to be Left Unretracted for Test
Yes	18 feet or more	6 feet
Yes	Less than 18 feet, but more than 6 feet.	One-third of the total length.
Yes	6 feet or less	2 feet
No	18 feet or more	The length that cannot be retracted, but not less than 6 feet.
No	Less than 18 feet, but more than 6 feet.	The length that cannot be retracted, but not less than one-third of the total length.
No	6 feet or less	The length that cannot be retracted, but not less than 2 feet.

Table 11

Oven Temperatures for Aging Test

Temperature Rating of Material, °C	Duration of Test, Days	Oven Temperature, °C
75	10	100 ± 1
90	7	121 ± 1
105	7	136 ± 1
200	7	225 ± 1



Material; Metal; pointed end to first knucle.

Tolerances: 0.2 mm except at gaps between knuckles.

Figure 1
Articulate Probe

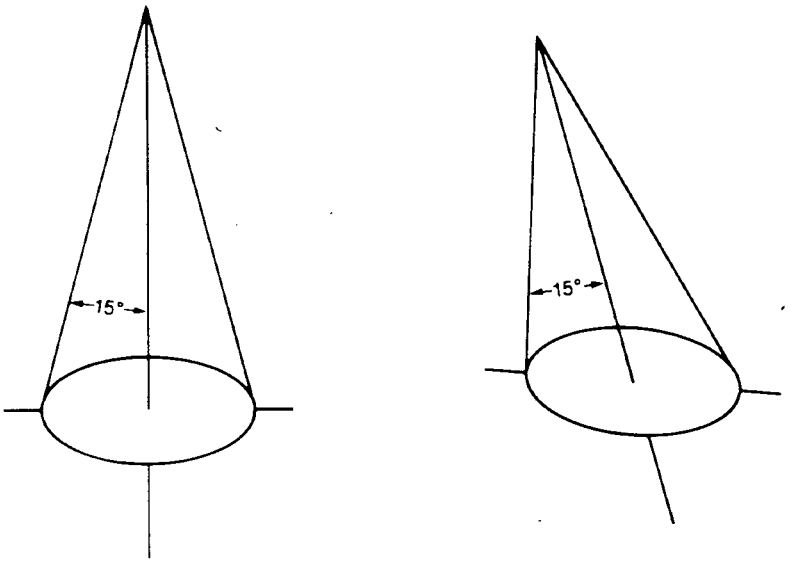
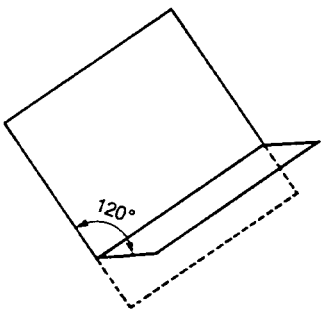
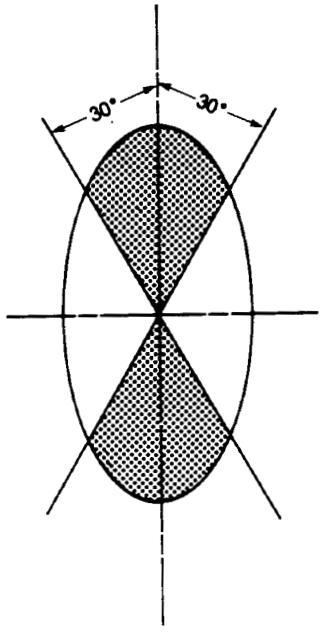


Figure 2
Interpretation of "Directly Below" (see Clause 4.2.2.9(b))



Note: *Dotted lines indicate flat sheet before forming.*

Figure 3
Maximum Internal Angle



Note: *A split in a chain link is not permissible in the shaded areas. (See Clause 4.6.10.)*

Figure 4
Chain-Link Joint

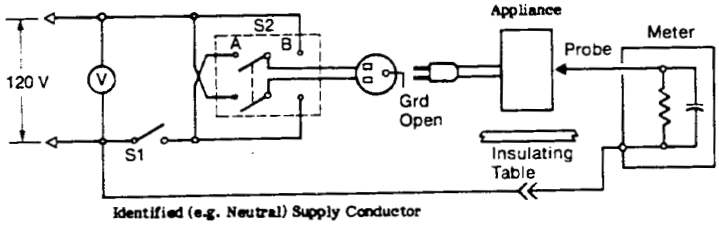


Figure 5
Leakage-Current Measurement Circuit

Proposal for Change

To help our volunteer members to assess proposals to change requirements we recommend that each proposal for change be submitted in writing and identify the
(a) Standard number;
(b) Clause number;
(c) proposed wording of the Clause (requirement, test, or pass/fail criterion) using mandatory language and underlining those words changed from the existing Clause (if applicable); and
(d) rationale for the change, including all supporting data necessary to be considered.
The proposal should be submitted to the Standards Administrator at least one month prior to the next meeting of the Committee. It is CSA Committee practice that only those proposals sent out to members prior to a meeting can be the subject of discussion and action. This is to allow the members time to consider the proposal and to do any research they may feel necessary.

Date: _____ - _____ - _____
YY MM DD

To: The Standards Administrator of CSA Standard _____

From: _____

Affiliation: _____

Address: _____

_____

Phone: _____ **Fax:** _____

Re: Request for an Amendment, Deletion, or Addition to Clause(s) _____

Proposed change:

(Use reverse and additional pages as required.)

Product Description Produit	Quantity Nombre	Price Prix	Sub-Total Total	Shipping (see chart) Frais de port (voir grille)	Sub-Total Total	GST* TPS*	PST** TVP**	Sub-Total Total	QST*** TVQ***	Sub-Total Total
	x	=	+	=	+	+	=	+	=	
	x	=	+	=	+	+	=	+	=	
	x	=	+	=	+	+	=	+	=	
	x	=	+	=	+	+	=	+	=	
	x	=	+	=	+	+	=	+	=	
								Grand Total/Total global :		

* Add GST to all Canadian Orders. (NOTE: The CE Code Handbook and all PLUS products are GST exempt.) / Ajouter la TPS à toute commande passée au Canada. (NOTE. Le Guide explicatif du CCE et les répertoires sont exempts de TPS.)
** Add PST on all orders for electronic products placed in Alberta, British Columbia, Manitoba, New Brunswick or Ontario. / Ajouter la TVP à toute commande de produits électroniques passée en Alberta, en Colombie-Britannique, au Manitoba, au Nouveau Brunswick et en Ontario.
*** Add QST to all Quebec orders. (NOTE: The CE Code Handbook and all PLUS products are QST exempt.) / Ajouter la TVQ à toute commande passée au Québec. (NOTE. Le Guide explicatif du CCE et les répertoires sont exempts de TVQ.)

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