

# CERTIFICATION Informs

An Urgent Bulletin from CSA International

Ref No: I10-064

Lighting Products No. 56

Date: April 28, 2010

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Announcing: Publication of the CSA INTERNATIONAL Technical Information Letter No. B-79, "Requirements for Retrofitted Luminaires and LED Retrofit Kits for Installation into Previously Installed Luminaires"

See Attachment 1 for affected Class Numbers.

## Who is affected?

Manufacturers of luminaire retrofit kits using LED light sources.

## What do you do?

1. This publication provides for new certification services that do not affect your currently certified product designs.
2. Please contact CSA engineering staff if you have questions or need information concerning this publication and how it applies to you.
3. If you would like to take advantage of the new certification services, initiate a certification project by contacting our Client Services Centre at 1-866-797-4272. Please supply appropriate supporting documentation\* and we will inform you of the samples required.

\*Technical information as well as company name, address, factory locations and CSA file number or master contract number (if assigned) when applying.

## Introduction:

Should this T.I.L. not be incorporated into the standard within five (5) years, it may be withdrawn and certifications will be cancelled.

Due to rapid changes in lighting technology and energy conservation issues, CSA International has received many requests for certification of the subject products. This Technical Information Letter (T.I.L.) **B-79** is published in response to requests to deal with the safety of retrofitted luminaires, in consultation with industry and other stakeholders.

## Background and Rationale:

This T.I.L. extends the scope of requirements published in T.I.L. No. B-64 to include products employing light-emitting-diode (LED) lamp technologies. These LED kits may consist of parts and/or subassemblies intended for field installation in Field Installed Luminaires. Refer to Attachment 2 for T.I.L. No. B-79.

See Attachment 3 for CSA International guidelines for retrofit program covered by the scope of T.I.L. No. B-79.

**For questions specific to your file or products contact your regular CSA International engineering staff.**

Go to <http://directories.csa-international.org/> and enter your Master Contract # and the class numbers associated with this Informs to view your certified products.

**For technical questions on this Informs**

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Visit us at [www.shopcsa.ca](http://www.shopcsa.ca) to purchase a Standard!

## **ATTACHMENT 1**

LED Retrofit kits for luminaires specified in Appendix A of Attachment 2 shall be Certified under

Classes:

3426 35, LUMINAIRES - Luminaire Fittings - LED Retrofit kits for luminaires

3426 95, LUMINAIRES - Luminaire Fittings - LED Retrofit kits for luminaires - Certified to US Standards

LED Tubular Lamp Retrofit Kit specified in Appendix B of Attachment 2 shall be Certified under

Classes:

3426 36, LUMINAIRES - Luminaire Fittings - LED Tubular Lamp Retrofit Kit

3426 96, LUMINAIRES - Luminaire Fittings - LED Tubular Lamp Retrofit Kit - Certified to US Standards

### **Affected Product Class Numbers**

Class No:

3421 01, LUMINAIRES - Luminaires - Incandescent

3421 81, LUMINAIRES - Incandescent - Certified to US Standards

3422 01, LUMINAIRES - Gas-tube Luminaires

3422 02, LUMINAIRES - Gas-tube Luminaires

3422 81, LUMINAIRES - Gas-tube Luminaires - Certified to US Standards

3423 01, LUMINAIRES - Luminaires - Recessed Type

3423 81, LUMINAIRES - Luminaires - Recessed Type - Certified to US Standards

3425 03, LUMINAIRES - Luminaires - Enclosed and Gasketed

3425 05, LUMINAIRES - Luminaires - Miscellaneous

3425 83, LUMINAIRES - Luminaires - Enclosed and Gasketed-Certified to US Standards

3425 85, LUMINAIRES - Luminaires - Miscellaneous - Certified to US Standards

3426 01, LUMINAIRES - Luminaire Fittings

3426 31, LUMINAIRES - Luminaire Fittings

3426 81, LUMINAIRES - Luminaire Fittings-Certified to US Standards

3426 91, LUMINAIRES - Luminaire Fittings - Certified to US Standards

3461 03, TRAFFIC SIGNS

3461 83, TRAFFIC SIGNS - Certified to U.S. Standards

## **ATTACHMENT 2**

### **TECHNICAL INFORMATION LETTER NO. B-79**

CSA International

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**Product Group:** Lighting Products

**Date:** April 28, 2010

**Issued By:** D.Lenasi

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**EQUIPMENT:** Retrofit Assemblies for Use in Luminaires

**ITEM:** Supplemental Requirements for Retrofitted Luminaires and LED Retrofit Kits for Installation into Previously Installed Luminaires

#### **Background and Rationale**

Due to rapid changes in lighting technology and energy conservation issues, CSA International has received many requests for certification of the subject products. This Technical Information Letter (T.I.L.) is published in response to requests to deal with the safety of retrofitted luminaires, in consultation with industry and other stakeholders.

This T.I.L. extends the scope of requirements published in TIL No. 64 to include products employing light-emitting-diode (LED) lamp technologies, with or without a driver or power supply, intended for direct connection to the mains or to a lamp holder. These LED kits may consist of parts and/or subassemblies intended for field installation in Field Installed Luminaires. The LED devices or kits are evaluated such that they will not adversely affect the operation of the complete unit when used in accordance with the manufacturer's instructions.

**Supplemental Requirements for Retrofitted Luminaires and LED Retrofit Kits for Installation into  
Previously Installed Luminaires**

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## INTRODUCTION

### 1. SCOPE

- 1.1. These requirements specify the minimum safety requirements for the light emitting diode (LED) retrofit kits that serve as an alternate source of illumination in the installed certified luminaires. Types of retrofit kits are listed in clause 1.3.
- 1.2. The components of a retrofit kit may include LED light sources, reflectors, LED drivers, lampholders, wiring, brackets, wire connectors, or similar items. These requirements include retrofit kits and other retrofit devices.
- 1.3. These requirements cover the following Retrofit kit categories:
  - a) **LED Retrofit Kit**  
This category includes retrofit kits consisting of light-emitting-diode (LED) light sources and LED drivers intended to replace a compact fluorescent, incandescent and/or HID light sources and where it is necessary to modify the luminaire. See Appendix A for particular supplemental requirements for this product category.
  - b) **LED Tubular Lamp Retrofit Kit**  
This category includes retrofit kits intended for replacement of linear fluorescent lamps. LED tubular lamps are either dimensionally interchangeable or non-interchangeable with ANSI standard lamps. See Appendix B for particular supplemental requirements for this product category.
- 1.4. These requirements are intended to supplement end-product standards requirements. In addition, the retrofitted luminaires are required to comply with CSA C22.2. No.250 / UL 1598: Luminaires. They shall comply with the Rules for non-hazardous locations of the Canadian Electrical Code, Part I, and the National Electrical Code, ANSI/NFPA 70.
- 1.5. These devices are not intended for:
  - a) Use with emergency exit fixtures or emergency exit lights.
  - b) Installation in luminaires used in air-handling registers.
- 1.6. Retrofitting may involve relocation, removal or replacement of wiring, reflectors, lampholders and ballasts/power supply of the original luminaire.

### 2. DEFINITIONS

- 2.1 LUMINAIRE — a complete lighting unit consisting of a lamp(s) or LED(s), together with the parts designed to distribute the light, to position and protect the lamps and LED driver (where applicable), and to connect the light source to the power supply.
  - a) ORIGINAL LUMINAIRE  
A compact fluorescent, incandescent and/or HID, Field Installed Luminaire (Originally Certified Luminaire)
  - b) RETROFITTED LUMINAIRE  
An Original Luminaire that is retrofitted with a retrofit assembly. The process of retrofitting may also involve relocation, removal or replacement of wiring, lampholders and ballasts/power supply.

- c) LUMINAIRE, SURFACE — a luminaire that is designed to be mounted directly to a wall or ceiling surface.
- d) LUMINAIRE, PENDANT — a luminaire that is designed to be suspended below the mounting surface.
- e) LUMINAIRE, RECESSED — a luminaire that is designed to be either wholly or partially recessed in a mounting surface.
  - i) Type IC (intended for insulation contact) — a recessed luminaire that is designed and identified for installation in a cavity filled with thermal insulation. The luminaire may be in direct contact with combustible materials and the insulation.
  - ii) Type Non-IC (not intended for insulation contact) — a recessed luminaire designed for installation in a cavity that has minimum dimensions and spacings to thermal insulation and combustible material in compliance with the installation code. It is not intended to be in contact or covered with thermal insulation.
- f) LUMINAIRE, OPEN— a luminaire with an exposed lamp compartment shall have no provision such as threaded canopies, clips, or thumbscrews to attach husks, diffusers, globes, shades, or other parts that can entrap heat. A luminaire with a base down lampholder and open top qualify as an open type luminaires when height/diameter ratio does not exceed 1.00.
- g) LUMINAIRE, ENCLOSED — any luminaire that does not qualify as an open luminaire.

## 2.2 RETROFIT ASSEMBLY (RETROFIT KIT)

- a) RETROFIT ASSEMBLY  
Electrical and mechanical components used to replace existing parts for illumination of an original luminaire in order to improve the luminaires efficiency. The components of a retrofit assembly are reflectors, LED drivers, lampholders, wiring, brackets, wire connectors, or similar items.
- b) CERTIFIED COMPONENT RETROFIT ASSEMBLY  
Certified component retrofit assemblies shall bear certification agency mark suitable for the purpose. See Attachment 3, Clause 4.1.

## 2.3 RISK OF ELECTRIC SHOCK

- a) ACCESSIBLE LIVE PART – Any conductive part of a device that is accessible to the user and presents a risk of electric shock. Accessibility is determined using the articulated test probe of Figure 19.22.1 in CSA C22.2 No. 250.0.
- b) RISK OF ELECTRIC SHOCK – A risk of shock exists between any two uninsulated conductive parts or between an uninsulated conductive part and earth ground, if the continuous current flow through a 1500 Ohm resistor in parallel with a 0.15  $\mu$ F capacitor connected between the two points exceeds a 5 mA rms (7 mA peak) and if the open circuit voltage exceeds 30 V r.m.s. (42.4 V peak) or 60 V d.c. for dry and damp or 15 V r.m.s. (21.2V peak) or 30 V d.c. for wet locations.

## 2.4 RISK OF FIRE – A risk of fire exists in all electrical circuits except:

- a) A Class 2 circuit, or
- b) A LPS (LVLE) circuit.

## 2.5 BONDING

- a) **BONDING:** A low impedance path obtained by permanently joining all non-current-carrying metal parts to ensure electrical continuity and having the capacity to conduct safely any current likely to be imposed on it.
- b) **BONDING CONDUCTOR** – a conductor that connects the non-current-carrying parts of electrical equipment, raceways, or enclosures to the service equipment or system grounding conductor.
- c) **BONDING TERMINAL** – A field or factory installed terminal consisting of connectors and hardware, e.g., bolts, studs, or screws, suitable for connecting a bonding conductor to equipment required to be bonded to ground.

2.6 **ENCLOSURE, ELECTRICAL** – A part of the equipment intended to limit access to parts that are operating at voltage levels in excess of Class 2 or LVLE.

2.7 **ENCLOSURE, FIRE** – A part of the equipment that is intended to minimize the spread of fire or flames from within a product.

## 2.8 ENVIRONMENTAL LOCATION

- a) **DAMP** – An exterior or interior location that is normally or periodically subject to condensation of moisture in, on or adjacent to electrical equipment and includes partially protected locations. For these requirements, the interior of a luminaire intended for wet locations is considered a damp location.  
*Note: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold storage warehouses.*
- b) **DRY** – In this T.I.L.: a location not normally subject to dampness, but may include a location subject to temporary dampness.  
*Note: For example, a building under construction.*
- c) **WET** – In this T.I.L.: a location in which water or other liquid can drip, splash, or flow on or against a device.  
*Note: For example, unprotected locations exposed to weather.*

2.9 **LIGHT EMITTING DIODE (LED)** – A p-n junction semiconductor device that emits incoherent optical radiation when biased in the forward direction.

- a) **LED ARRAY** – An assembly of LED packages on a printed circuit board, possibly with optical elements and additional thermal, mechanical, and electrical interfaces. The device does not contain a power source and is not connected directly to the branch circuit.
- b) **LED CONTROL MODULE (CONTROLLER)** – Electronic circuitry interposed between the power source and an LED array to limit voltage and current, dim, switch or otherwise control the electrical energy to the LED array. The device does not contain a power source and is not connected directly to the branch circuit.
- c) **LED DRIVER** – see under Power Source
- d) **LED LUMINAIRE** – A complete lighting unit consisting of an LED light source and power source together with parts to provide heat management, to distribute light, to position and protect the light source, and to connect the light source to a branch circuit. The LED light source may be an LED array, an LED module or an LED lamp. Often, collimation and/or secondary optics are needed to maximize light utilization. The LED luminaire is intended to connect directly to a branch circuit.

- e) LED MODULE – A component part of an LED light source that includes one or more LEDs that are connected to the load side of LED power source or LED driver. Electrical, electronic, optical, and mechanical components may also be part of an LED module.
- f) LED PACKAGE – An assembly of one or more LED die that contains wire bond connections, possibly with an optical element and thermal, mechanical, and electrical interfaces. The device does not include a power source and is not connected directly to the branch circuit.

2.10 LAMP – a device, intended to be inserted into a lampholder that emits incoherent optical radiation.

- a) LAMP, SELF-BALLASTED – a device provided with a lamp base and incorporating a non replaceable light source and any additional elements necessary for starting and stabilizing operation of the light source, which cannot be dismantled without being permanently damaged.
- b) LAMP ADAPTER – a self-ballasted lamp with a replaceable light source.
- c) LAMP CONNECTOR – a set of contacts attached to flexible conductors that provides a removable means for electrical connection to a lamp but does not provide mechanical support.
- d) LAMP COMPARTMENT – a part of the luminaire that surrounds the lamp, may be with or without a diffuser.
- e) DIFFUSER — a device to redirect or scatter the light from a source, primarily by the process of diffuses transmission.

2.11 POWER SOURCE – A transformer, power supply, or LED driver capable of controlling current, voltage or power within its design limits.

- a) POWER SOURCE, LIMITED POWER SOURCE (LPS) or LOW VOLTAGE LIMITED ENERGY (LVLE) – A power source identified as “LPS” or “LVLE” has no direct electrical connection between input and output, such as provided by a transformer or optical isolator, and with output parameters as follows: source with a maximum output voltage of 42.4 V peak ac (30 V rms) or 60 V dc; and a maximum output current limited to:
  - i) maximum 8 amps for 0 – 42.4 V peak ac, or 0 – 30 V dc, or
  - ii) 150/V amps, for a voltage between 30 – 60 V dc.

Measurements for determining LVLE circuit status shall be per the requirements in determination of Low-Voltage, Limited-Energy Circuit Status of 8.14 of UL 8750.

- b) LED DRIVER – A power source with integral control circuitry designed to meet the specific requirements of a LED lamp or a LED array.
  - i) LED DRIVER, CLASS 2 – A LED driver that operates within Class 2 limits.
  - ii) LED DRIVER, LPS – A LED driver that operates within LPS limits
- c) POWER SOURCE, SAFETY EXTRA-LOW VOLTAGE (SELV)  
A power source with a secondary circuit that is so designed and protected that under normal operating conditions and single fault conditions, its voltages are less than 30 V rms (42.4 V peak) or 60 V DC.

### 3 RETROFITTED ASSEMBLIES

#### 3.1 Retrofit Assembly (Retrofit Kit):

The installation of a Retrofit Kit is intended to be completed by a qualified electrician or by a person familiar with the construction and operation of the product and the hazards involved.

- a) Tasks involved: Lampholder relocation, removal, or replacement  
Removal of the existing ballast or power supply and/or LED driver installation  
Wire relocation, removal, replacement, or addition
- b) Suitable for dry, damp or wet location.

## **4 COMPONENTS**

- 4.1 Except as indicated in 4.2, a component of a product covered by this T.I.L. shall comply with the requirements for that component. See Appendix C (Informative) for a list of standards covering components used in the products covered by this T.I.L.
- 4.2 A component is not required to comply with a specific requirement that:
- a) Involves a feature or characteristic not required in the application of the component in the product covered by this T.I.L., or
  - b) Is superseded by a requirement in this T.I.L.
- 4.3 LED light sources, unless previously evaluated to applicable requirements of CSA C22.2 No. 1993 shall be subject to abnormal and component fault tests of UL 8750 Clause 8.5.2.

## **MECHANICAL CONSTRUCTION**

### **5 MEANS OF MOUNTING AND SECUREMENT**

- 5.1 At least one method of mounting each of the components of the retrofit assembly shall be provided.
- 5.2 A luminaire retrofit assembly and its parts (e.g. reflector) shall have means for mounting, including the special hardware if required, that comply with the loading test of Clause 16.15. of CSA C22.2 No.250.0.
- 5.3 A snap-in or tab-mounted part not provided with a knockout or conduit opening and not secured by at least one screw or rivet shall be assembled in accordance with the manufacturer's assembly instructions and comply with Clause 16.16 of CSA C22.2 No.250.0.
- 5.4. A snap-in or tab-mounted part of a luminaire provided with a knockout or conduit opening that is not additionally secured by at least one screw or rivet shall be assembled in accordance with the manufacturer's assembly instructions and comply with Clause 16.17 of CSA C22.2 No.250.0.
- 5.5 Except as permitted in Clause 5.6, means other than an adhesive or adhesive tape shall be provided to secure a part of the retrofit assembly to a panel, bracket, or component of a retrofitted luminaire.
- 5.6 An adhesive that has been investigated in accordance with the applicable requirements of CSA Standard C22.2 No. 60065:03, Clause 17.9.A.1, may be used to secure a metal foil reflecting surface or a laminated reflecting surface to the reflector base material.

### **6 METAL THICKNESS**

- 6.1 Metal parts of a retrofit assembly and those portions of a luminaire affected by installation of the reflector kit shall comply with the requirements in Metal thickness for enclosures, Clause 5.5, of CSA C22.2 No.250.0.
- 6.2 When a luminaire reflector is used as an electrical enclosure or a part of it, the reflector thickness shall comply with Clause 5.5, of CSA C22.2 No.250.0.

## 7 ENVIRONMENTAL CONSIDERATION

- 7.1 Except as indicated in Clause 7.2 and 7.3, a component of a LED retrofit kit lamps covered by this T.I.L. shall comply with the environmental condition requirements for that component.
- 7.2 A device intended for use in DAMP locations shall comply with the requirements for damp locations, Clause 5.2 of UL 8750.
- 7.3 A device intended for use in WET locations shall comply with the requirements for wet locations, Clause 5.3 of UL 8750.
- 7.4 LED lamps, connected directly to a branch circuit or to non-SELV power supply, shall additionally comply with the drop test per B1.5 of Appendix B and shall be marked per Table 14.1, Item 3.3.
- 7.5 A device intended for use only in dry locations shall be marked in accordance with Table 14.1, Item 3.13.
- 7.6 A device intended for use only in damp locations shall be marked in accordance with Table 14.1, Item 3.14.
- 7.7 A device intended for use only in wet locations shall be marked in accordance with Table 14.1, Item 3.15 or 3.16.

## 8 (Reserved)

## ELECTRICAL CONSTRUCTION

### 9 BONDING AND GROUNDING

- 9.1 Except as permitted in Clauses 9.2 and 9.3, grounding and bonding of a retrofit assembly shall comply with CSA C22.2 No.0.4 and Clause 6.14, of CSA C22.2 No.250.0.
- 9.2 A metalized or metallic film laminated reflector need not be bonded to ground, provided that:
- it is located more than 75 mm (3 in) horizontally from a lampholder, lamp contact, lampholder lead, wiring, and other electrical components (excluding the fluorescent lamps) that are below the metal surface; or
  - It is not likely to become energized by other electrical components that it encloses.
- 9.3 Bonding terminals means
- A Retrofitted Luminaire shall use:
- An existing grounding terminal or
  - A new grounding terminal as per Clause 6.14, of CSA C22.2 No.250.0.

*Note: All new bonding terminals shall be permanently marked with G, GR, GRD, GRND, GROUND or one of the symbols from IEC 60417:*



Symbol 5017



Symbol 5019\*

**\* #5019 is preferred marking when a symbol is used**

## 10 LAMP HOLDERS

- 10.1 Installation of a Retrofit assembly that involves relocation or removal of lampholders and lampholder leads originally supplied with the luminaire shall comply with the requirements in this section.
- 10.2 Replacement lampholders provided as a part of a retrofit assembly shall be suitable for use with the type of LED kit marked on installation instructions.
- 10.3 After installation of a retrofit assembly, lampholder connections shall comply with the requirements in Lampholders, Clause 8.4, of CSA C22.2 No.250.0.

## 11 ELECTRICAL CONNECTION

- 11.1 A device that is not marked in accordance with Table 14.1, Item 1.10, shall comply with the dimmer Tests, Subsection 8.12 of CSA C22.2 No.1993.
- 11.2 Supplemental wiring or connectors required for installation of the retrofit assembly shall be included in the kit. The connectors shall be suitable for the number and size of conductors with which they are intended to be used. The supplemental wiring shall comply with the requirements in Electrical construction, Clause 6, of CSA C22.2 No.250.0.
- 11.3 The conductors and flexible cords employed in a Class 2 circuit with a maximum available power of 50 Watts, shall be suitable for the current but not less than 24 AWG (0.21 mm<sup>2</sup>), with a minimum of 1/64-inch (0.4-mm) thick insulation.
- 11.4 Wiring and connectors should be suitable for the environmental conditions; e.g. wet locations, as applicable
- 11.5 Separation of circuits shall be evaluated to Clause 7.5 of UL 8750, and Clause 6.17 of CSA C22.2 No. 250.
- 11.6 A replacement or new power supply shall comply with any the following requirements:
  - a) 

CSA C22.2 No 250.0	Luminaires
CAN/CSA C22.2 No 223	Power Supplies with Extra-Low-Voltage Class 2 Outputs
CSA C22.2 No. 107.1	General Use Power Supplies
CAN/CSA C22.2 No. 60950-1	Information Technology Equipment - Safety - Part 1
  - b) 

UL 1598	Luminaires
UL 1310	Class 2 Power Units
UL 1012	Power Units Other Than Class 2
UL 60950-1	Information Technology Equipment - Safety - Part 1

## 12 Guidelines for Investigation of Retrofitted Luminaires

When establishing compliance with end product Standard C22.2 No. 250.0, the items such as listed below shall be taken in consideration:

- 12.1 Wiring on or within luminaires shall be neatly arranged without excess wiring, shall not be exposed to mechanical injury, and the conductors shall be arranged so that they are not subjected to temperatures above those for which they are rated.
- 12.2 Luminaires, lampholders, and associated equipment shall be installed so that no live part is exposed to contact.
- 12.3 Feeder and branch-circuit conductors within 75 mm (3 in.) of a LED driver shall have an insulation temperature rating not lower than 90°C (194°F) unless supplying a luminaire marked as suitable for a different insulation temperature.
- 12.4 Bodies of luminaires shall provide ample space for splices and taps and for the installation of devices, if any.
- 12.5 Every luminaire shall be installed so that the connections between the luminaire conductors and the branch circuit conductors may be inspected without disconnecting any part of the wiring unless the connection employs a plug and receptacle.

## 13 (Reserved)

## MARKINGS AND INSTRUCTIONS

### 14. Markings

- 14.1. A retrofit kit and a retrofitted luminaire shall be legibly marked using one of the following methods, in accordance with Table 14.1:
  - a) Lettering on a pressure-sensitive label;
  - b) Paint stencilled lettering;
  - c) Ink-stamped machine lettering;
  - d) Ink-hand-stamped lettering;
  - e) Indelibly printed lettering;
  - f) Die-stamped lettering;
  - g) Embossed lettering; or
  - h) Moulded or cast lettering.
- 14.2. A marking shall be of minimum size (S\_) and in the location (L\_) as shown in the FORMAT column in Table 14.1 and as defined in Table 14.2.
- 14.3. “Verbatim”, shown in the TEXT column of Table 14.1 indicates that the marking shall consist of only the exact words shown or a marking including those words and conveying the original intent. Alternative wording for other markings in the Table are not prohibited, subject to evaluation.

**Table 14.1  
List of required markings**

*(All Warning labels for Canada shall be in both official languages English and French)*

Item	Title	Text	Format	Clause reference
<b>1</b>	<b>Installation instructions</b>			
1.1	<b>WARNING – RISK OF FIRE OR ELECTRIC SHOCK. LUMINAIRES WIRING, POWER SUPPLY, OR OTHER ELECTRICAL PARTS MAY BE DAMAGED WHEN DRILLING FOR INSTALLATION OF RETROFIT ASSEMBLY HARDWARE. INSPECT WIRING AND COMPONENTS FOR DAMAGE.</b>		S24-L3 S24-L5	16.1, 17.8
1.2	<b>WARNING – RISK OF FIRE OR ELECTRIC SHOCK. DO NOT ALTER, RELOCATE, OR REMOVE WIRING, LAMPHOLDERS, POWER SUPPLY, OR ANY OTHER ELECTRICAL COMPONENT.</b>		S24-L5	17.10
1.3	<b>WARNING – RISK OF FIRE OR ELECTRIC SHOCK. INSTALLATION OF THIS RETROFIT ASSEMBLY REQUIRES A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE LUMINAIRE’S ELECTRICAL SYSTEM AND THE HAZARD INVOLVED. IF NOT QUALIFIED, DO NOT ATTEMPT INSTALLATION. CONTACT A QUALIFIED ELECTRICIAN.</b>		S24-L5	17.10
1.4	<b>WARNING – RISK OF FIRE OR ELECTRIC SHOCK. INSTALL THIS KIT ONLY IN THE LUMINAIRES THAT HAS THE CONSTRUCTION FEATURES AND DIMENSIONS SHOWN IN THE PHOTOGRAPHS AND/OR DRAWINGS.</b>		S24-L5	17.5
1.5	<b>ONLY THOSE OPEN HOLES INDICATED IN THE PHOTOGRAPHS AND/OR DRAWINGS MAY BE MADE OR ALTERED AS A RESULT OF KIT INSTALLATION. DO NOT LEAVE ANY OTHER OPEN HOLES IN AN ENCLOSURE OF WIRING OR ELECTRICAL COMPONENTS.</b>	Verbatim	S24-L5	17.6
1.6	<b>DO NOT MAKE OR ALTER ANY OPEN HOLES IN AN ENCLOSURE OF WIRING OR ELECTRICAL COMPONENTS DURING KIT INSTALLATION.</b>	Verbatim	S24-L5	17.7
1.7	<b>WARNING – TO PREVENT WIRING DAMAGE OR ABRASION, DO NOT EXPOSE WIRING TO EDGES OF SHEET METAL OR OTHER SHARP OBJECTS.</b>		S24-L5	17.14
1.8	<b>WARNING – RISK OF FIRE OR ELECTRIC SHOCK. NOT FOR DIRECT REPLACEMENT OF FLUORESCENT LAMPS. USE ONLY WITH [Manufacturer] [Catalogue Number] POWER SUPPLY. SEE INSTRUCTIONS.</b>		S24-L7 S24-L5	B2.4 B3.4
1.9	<b>THE RETROFIT KIT IS ACCEPTED AS A COMPONENT OF A LUMINAIRE WHERE THE SUITABILITY OF THE COMBINATION SHALL BE DETERMINED BY CSA OR AUTHORITIES HAVING JURISDICTION</b>	Verbatim	S24-L5	15.1
1.10	<b>NOT FOR USE WITH DIMMERS</b>		S16-L7 S24-L5	11.1
<b>2</b>	<b>Identification Markings</b>			
2.1	MANUFACTURER’S OR SUBMITTOR’S IDENTIFICATION		S16-L2	15.1
2.2	MODEL DESIGNATION OR CATALOGUE NUMBER;		S16-L2	15.1
2.3	DATE CODE		S16-L2	15.1
<b>3</b>	<b>User maintenance</b>			

Item	Title	Text	Format	Clause reference
3.1	<b>REPLACE ONLY WITH [Manufacturer] [Catalogue Number] XXX.</b> XXX is replaced with: LED Kit or LED driver, as applicable		S24-L6	A1.7
3.2	Input rating in volts and total amperes or watts, and secondary volts and amperes or volt amperes (as applicable)		S24-L3	A1.7
3.3	<b>“CAUTION: SHOCK AND FIRE HAZARD, DO NOT USE WHEN ENCLOSURE IS BROKEN”</b>		S24-L1 S24-L5	7.3 B1.6.2
3.4	A retrofit kits are tested with minimum compartment as described in (Cl A1.5 of Appendix A) , and are marked: <b>"MIN LAMP COMPARTMENT X mm DIAMETER" or "MIN LAMP COMPARTMENT XX cm3.</b> (XX representing minimum lamp compartment volume that the LED kit has been tested for.)		S16-L2 S24-L5	A1.6.1 A1.6.2 A1.6.3 A1.6.4
3.5	<b>MIN. LAMP COMPARTMENT DIMENSIONS _(L)_ X (W)_X (H) mm</b>		S16-L2 S24-L5	A1.6.5
3.6	<b>USE ONLY WITH [Manufacturer] [Catalogue Number] LUMINAIRE,</b> as applicable.		S24-L6 S24-L5	A1.6.5
3.7	Marking: <b>SUITABLE FOR “TYPE IC” OR “TYPE NON-IC”, LUMINAIRES,</b> as applicable		S16-L2 S24-L5	A1.6.3 A1.6.4
3.8	Unless a retrofit kit is tested in surface mounted enclosed luminaire as per Cl .A1.6.2 of Appendix A) , the device shall be marked: <b>“USE ONLY IN SURFACE MOUNTED, OPEN LUMINAIRES”</b>		S16-L2 S24-L5	A1.6.1
3.9	<b>“SUITABLE FOR USE IN ENCLOSED SURFACE MOUNTED LUMINAIRES”</b>		S16-L2 S24-L5	A1.6.2
3.10	Unless a retrofit kit is tested in recessed mounted enclosed luminaire as per Cl .A1.6.4 of Appendix A) , the device shall be marked: <b>“USE ONLY IN OPEN LUMINAIRES”</b>		S16-L2 S24-L5	A1.6.3
3.11	<b>“SUITABLE FOR USE IN ENCLOSED RECESSED LUMINAIRES”</b>		S16-L2 S24-L5	A1.6.4
3.12	<b>REPLACE ONLY WITH [Manufacturer] [Catalogue Number] XXX.</b> XXX is replaced with: LED Lamp or LED driver, as applicable		S24-L6	B2.4 B3.4
3.13	<b>RISK OF ELECTRIC SHOCK – USE IN DRY LOCATION ONLY</b>		S16-L1 S24-L5	7.5
3.14	<b>SUITABLE FOR DAMP LOCATIONS or RISK OF ELECTRIC SHOCK – DO NOT USE WHERE DIRECTLY EXPOSED TO WATER</b>		S16-L1 S24-L5	7.6
3.15	<b>SUITABLE FOR WET LOCATIONS</b>		S16-L1 S24-L5	7.7
3.16	<b>SUITABLE FOR WET LOCATIONS – MUST BE USED XXX</b> XXX is replaced with words describing the restricted positioning		S16-L1 S24-L5	7.7

Table 14.2

Format location designation for marking

Location designation	Description	Label exposed to a drv/damp environment	Label exposed to a wet environment
L1	Visible during relamping, and after installation	Type P	Type P
L2	Visible during installation	Type N	Type P
L3	Visible during installation and inspection of wire connections, located near the supply connections	Type N	Type P
L4	On the smallest unit package or carton	Type T	Type T
L5	On an instruction sheet or tag	Type T	Type T
L6	To be affixed on retrofitted luminaire and visible during component replacement	Type P	Type P
L7	On the lamp	Type P	Type P

**Type P designates a permanent label** that is intended to remain in the applied position for the lifetime of the luminaire under conditions of normal use. It provides information required for user maintenance over the expected life of the product. Pressure-sensitive labels and nameplates of the permanent type (Type P) that are secured by adhesive shall be in accordance with CSA C22.2 No. 0.15 or UL 969. Stamped ink markings shall comply with Cl. 20.3.1 of CSA C22.2 No. 250.0. The characters of embossed, moulded, or cast lettering, either in or out, shall be a minimum of 0.25 mm (0.010 in) in depth. Include rob test 250

**Type N designates a non-permanent label or nameplate** that is intended to remain in place only for the purpose of installation. It shows the certification mark, manufacturer's identification, and product identification. It is made of paper with an adhesive backing.

**Type T designates a temporary label, instruction sheet, or tag** that is not required after installation. It provides installation instructions, and information not required after installation. It is made of printed matter with or without adhesive and/or attachment, and is intended to be included with, or attached to, the product.

Format minimum size designation for marking height and typeface

Size designation	Letter height mm (in)	Font size (points)	Font typeface, upper case
S16	1.6 (0.062)	6	Not specified
S24	2.4 (0.094)	10	Univers bold Arial bold Helvetica bold Zurich BT Bold

## **15 IDENTIFICATION**

- 15.1 Main component of a retrofit assembly such as a LED Array, LED Module or LED Package shall be marked with the retrofit assembly manufacturer's name, trademark, or other descriptive marking in accordance with Table 14.1, Item 1.9 and Items 2.1, 2.2 and 2.3.

## **16 INSTALLATION MARKING**

- 16.1 A retrofit assembly that requires drilling or punching of holes into the structure of the luminaire for kit installation shall be marked in accordance with Table 14.1, Item 1.1.

## **17 INSTALLATION INSTRUCTIONS**

- 17.1 A retrofit assembly shall be provided with installation instructions that cover all aspects of luminaire alteration required for the installation of the retrofit assembly. Each step shall be clearly explained and, when necessary, accompanied by an illustration showing execution of the step. All illustrations shall be legible to allow the user to distinguish all applicable features of the luminaire and the retrofit assembly.
- 17.2 The installation instructions shall include photographs or line drawings of the luminaire or luminaires intended to be used with the retrofit assembly clearly showing:
- a) The luminaire without diffuser as it is seen by the installer of a retrofit assembly;
  - b) Details of all panels, brackets, or components and their orientation prior to luminaire alteration when these details are important to installation of the retrofit assembly as it is intended to be used;
  - c) All dimensions and spacings of all luminaire walls, panels, brackets, openings, lampholders, and similar items that are relied upon to comply with the requirements of this T.I.L.; and
- 17.3 For a retrofit assembly that is bulk packaged, one set of installation instructions shall be provided with each carton.
- 17.4 The installation instructions shall specify all components of the retrofit assembly before any installation steps are given so that the user is able to check the content of the retrofit assembly.
- 17.5 The installation instructions shall include the marking described in Table 14.1, Item 1.4.
- 17.6 When the installation of a retrofit assembly requires the making or altering of one or more open holes in an enclosure of current-carrying parts, the installation instructions shall identify the dimensions of all such open holes in a photograph or drawing. The installation instructions shall include the marking described in Table 14.1, Item 1.5.
- 17.7 When the installation of a retrofit assembly does not require the making of any open holes in an enclosure of live parts, the installation instructions shall include the marking described in Table 14.1, Item 1.6.
- 17.8 The installation instructions for a retrofit assembly that requires drilling or punching of holes into the structure of the luminaire of kit installation shall include an instruction as described in Table 14.1, Item 1.1.
- 17.9 Installation instructions for a retrofit assembly that involves the alteration of retrofit assembly brackets or luminaire brackets shall include illustrations that show the appearance of the bracket or brackets before and after alteration. All dimensions of the brackets shall be clearly indicated and the instructions shall describe a method of bracket alteration and the type of tool to be used.

- 17.10 The installation instructions for a retrofit assembly shall include an instruction in accordance with Table 14.1, Item 1.2 and Item 1.3.
- 17.11 The installation instructions for retrofit assembly shall include figures showing the supply, LED driver, lampholder, and wiring configuration for the luminaires with which the retrofit assembly is intended to be used. Each figure shall:
- a) Include wiring diagrams for only one configuration which will show the electrical position of all components before and after retrofit assembly installation;
  - b) Be on a separate page;
  - c) Be referenced in the text of the instructions; and
  - d) Identify all wiring splice points pertinent to kit installation.
- All LED drivers, lampholders, wiring, and other electrical components shall be consistently identified by a unique number or name in all wiring diagrams. Any conductor capping required for retrofit assembly installation shall also be identified in the figure.
- 17.12 Installation instructions for a Retrofit assembly that requires the removal of lampholders shall indicate that the lampholders and lampholder leads shall be removed.
- 17.13 The installation instructions of a Retrofit assembly shall include a statement to warn the user that each lampholder shall be installed only in the intended manner and location.
- 17.14 The installation instructions for Retrofit assemblies involving the removal, relocation, or reconnection of wiring shall include the marking described in Table 14.1, Item 1.7.
- 17.15 A retrofit assembly that requires supplemental wiring shall clearly indicate on the figures described in 17.11 the conductors that are to be added and their related splices.

## **Appendix A (normative) LED Retrofit Kit**

### **A1 LED Retrofit Kits**

- A1.1 This category includes retrofit kits consisting of light-emitting-diode (LED) light sources and LED drivers/power supplies intended to replace a compact fluorescent, incandescent and/or HID light sources and where it is necessary to modify the luminaire. The modification may involve removing the lamp ballast or rewiring lampholders within the luminaire in order to power the LED light source. Luminaires suitable to be modified to accommodate the LED retrofit kits are shown in Clause A1.2. These luminaires are defined in Clause 2.1, Definitions.
- A1.2 LED retrofit kits in this category shall comply with the applicable requirements of:
- a) This T.I.L.
  - b) CSA C22.2.No 1993 / UL 1993, Self-Ballasted Lamps and Lamp Adapters
  - c) UL 8750, Light Emitting Diode (LED) Light Sources For Use In Lighting Products
- A1.3 LED retrofit kits suitable for installation in the following types of luminaires to be retrofitted, shall be subjected to the normal temperature test, Clause 8.3 of UL 8750 using the test fixture specified in Clause A1.5, followed by the dielectric voltage withstand test, Clause 8.4 of UL 8750, along with the following additional test and marking requirements of this T.I.L.
- A1.3.1 Surface Mounted, Open Luminaires  
Additional test requirements: The LED light source of a LED retrofit kit shall comply with the test requirements of Clause A2.1.  
  
Marking requirements: The LED retrofit kit shall be marked in accordance with Clause A1.6.1.
- A1.3.2 Surface Mounted, Enclosed Luminaires  
Additional test requirements: The LED light source of a LED retrofit kit shall comply with the test requirements of Clause A3.1.  
  
Marking requirements: The LED retrofit kit shall be marked in accordance with Clause A1.6.2.
- A1.3.3 Type Non-IC Recessed Mounted, Open Luminaires  
Additional test requirements: The LED light source of a LED retrofit kit shall comply with the test requirements of Clause A4.1.  
  
Marking requirements: The LED retrofit kit shall be marked in accordance with Clause A1.6.3.
- A1.3.4 Type Non-IC Recessed Mounted, Enclosed Luminaires  
Additional test requirements: The LED light source of a LED retrofit kit shall comply with the test requirements of Clause A5.1.  
  
Marking requirements: The LED retrofit kit shall be marked in accordance with Clause A1.6.4.

A.1.3.5 Type IC Recessed Mounted, Open Luminaires  
Additional test requirements: The LED light source of a LED retrofit kit shall comply with the test requirements of Clause A4.2.

Marking requirements: The LED retrofit kit shall be marked in accordance with Clause A1.6.3.

A.1.3.6 Type IC Recessed Mounted, Enclosed Luminaires  
Additional test requirements: The LED light source of a LED retrofit kit shall comply with the test requirements of Clause A5.2.

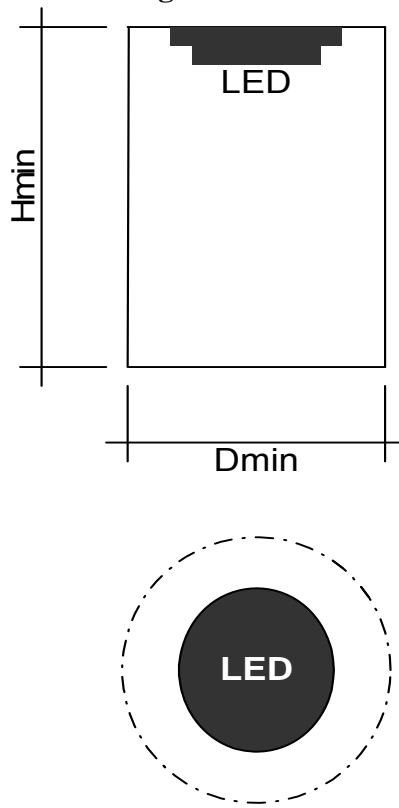
Marking requirements: The LED retrofit kit shall be marked in accordance with Clause A1.6.4.

A1.4 LED retrofit kits for installation in custom luminaire (per customer specification), as per Clause A1.6.5, shall be subjected to normal temperature test, Clause 8.3 of UL 8750 within specific luminaire model. This normal temperature test is to be conducted at  $25\text{ C} \pm 5\text{ C}$  luminaire ambient or at elevated ambient temperature per customer specification. Test results shall also be corrected to 25 C or elevated ambient temperature specified by customer. For the purpose of this test a luminaire provided by a customer shall be used. Normal temperature test is followed by the dielectric voltage withstand test, Clause 8.4 of UL 8750, along with the following additional test and marking requirements of this T.I.L.

A1.5 The LED light source of a LED retrofit kit shall be tested in the smallest standard test fixture of Table A1 that can physically fit. A LED light source exceeding the diameter of the largest standard test fixture of Table A1 shall be tested using custom test cylinder.

<b>Type</b>	<b>Dmin</b>	<b>Hmin</b>
Standard	76 mm (3 in)	115 mm (4.5 in)
Standard	100 mm (4 in)	150 mm (6.0 in)
Standard	127 mm (5 in)	180 mm (7.0 in)
Standard	152 mm (6 in)	215 mm (8.5 in)
Standard	203 mm (8 in)	280 mm (11 in)
Custom	As per customer specification	

**Figure A1:**



The test fixture (cylinder) shall be a steel 0.76 mm to 1.27 mm (0.030 to 0.50 in) thick cylinder, closed at the top, open at the bottom, painted white on all sides. The locations of the wire connection and thermocouples are as follows:

Connection: Use wire integral to the LED light source (module) or use type TEW, No 18 AWG\*, for a direct connection or to provided terminals as appropriate.

Note: \* Another wire type and/or gauge may be used where specified by the manufacturer.

Thermocouples: Cylinder top temperature 25 mm (1.0 in) from centre line.

A1.6 Markings, Retrofit Kits suitable for use with a following luminaires:

**A1.6.1 Surface Mounted, Open Luminaires**

The LED light source of a LED retrofit kit intended for use in luminaires having the smallest diameter open diffuser where it will physically fit is marked for installation only in an open surface-mounted luminaire in accordance with Table 14.1, Item. 3.4 and Item. 3.8.

**A1.6.2 Surface Mounted, Enclosed Luminaires**

The LED light source of a LED retrofit kit intended for use in the smallest diameter enclosed luminaire where it will physically fit, and in totally enclosed luminaires is marked for installation only in a surface-mounted luminaire in accordance with Table 14.1, Item. 3.4 and Item. 3.9.

### A1.6.3 Type IC and Type Non-IC Recessed Mounted, Open Luminaires

The LED light source of a LED retrofit kit intended for use in the smallest diameter enclosed recessed luminaire where it will physically fit, and is not intended for use in enclosed luminaires is marked for installation only in an open recessed-mounted luminaire in accordance with Table 14.1, Item. 3.4, Item.3.10 and Item.3.7. as applicable.

### A1.6.4 Type IC and Type Non-IC Recessed Mounted, Enclosed Luminaires

The LED light source of a LED retrofit kit intended for use in the smallest diameter enclosed recessed luminaire where it will physically fit, and is intended for use in totally enclosed luminaires is marked suitable for installation in a closed recessed-mounted luminaire in accordance with Table 14.1, Item. 3.4, Item.3.11 and Item.3.7.

### A1.6.5 Custom LED Kits for all Luminaire Types

LED retrofit kits intended for use in the custom built luminaires are Marked for installation only in specific luminaire model in accordance with Table 14.1, Item.3.5 or Item.3.6 as applicable.

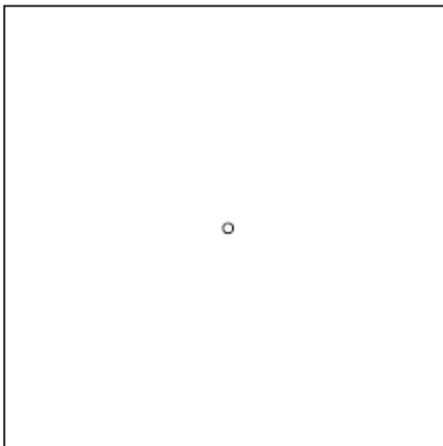
A1.7 A LED retrofit kit shall be provided with a label with marking(s) in accordance with Table 14.1, Item 3.1 and Item 3.2 for labelling the retrofitted luminaire.

A1.8 Each LED retrofit kit shall be permanently labelled with a CSA monogram and a qualifier adjacent to the mark: "Retrofit assembly installation subject to approval." See Appendix 3, Clause 4.1.1 for details.

## A.2 Surface Mounted, Open Luminaire Test Requirements

A2.1 The LED light source of a LED retrofit kit shall be subjected to the normal temperature test of Clause 14.2 of CSA C22.2 No. 250.0. The test fixture (cylinder) as defined by Clause A1.5 and as shown in Figure A1 and shall be mounted to the 12.5 mm (1/2 in trade size) thick plywood panel, 610 x 610 mm (24 x 24 in) and 6 mm (0.25 in) opening for wire to pass through as shown on Figure A2. A square plywood panel is then secured to a surface ceiling temperature test apparatus specified in Clause 19.10 of the CSA C22.2 No. 250.0.

**Figure A.2**  
**Surface Ceiling Temperature Test Apparatus**



### A3 Surface Mounted, Enclosed Luminaire Test Requirements

A3.1 The LED light source of a LED retrofit kit shall be subjected to the test of Clause A.2.1 except the cylinder bottom shall be closed off with a minimum 2.5 mm (0.1 in) thick piece of window glass of appropriate size.

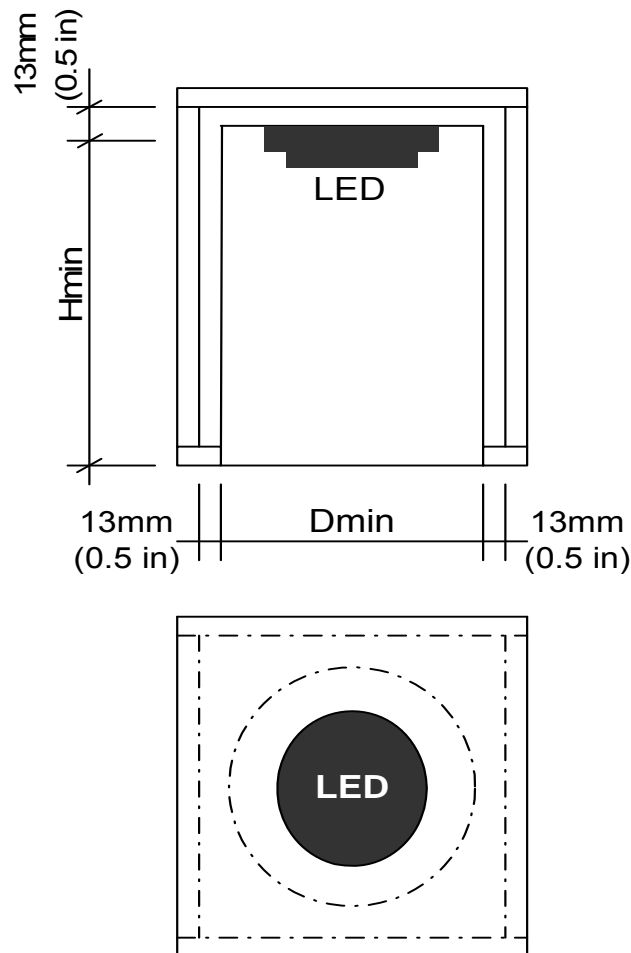
### A4 Type Non-IC and Type IC Recessed, Open Luminaire Test Requirements

#### A4.1 Type Non-IC Recessed, Open Luminaire Test Requirements

##### A4.1.1 Normal Temperature Test

The LED light source of a LED retrofit kit shall be subject to the normal temperature test of Clause 14.5 of CSA Standard C22.2 No. 250.0. The test fixture shall be in accordance with Clause A1.5. The test fixture shall be installed in a rectangular test box having four sides, a top, and bottom. The cylinder shall be flush to the test box bottom. The wood bottom shall have an opening the size of the cylinder diameter. All sides and the top shall be 13 mm (0.5 in) from the nearest part of the cylinder. The test fixture is shown at Figure A.4.1.

**Figure A.4.1**  
**Recessed Temperature Test Box**

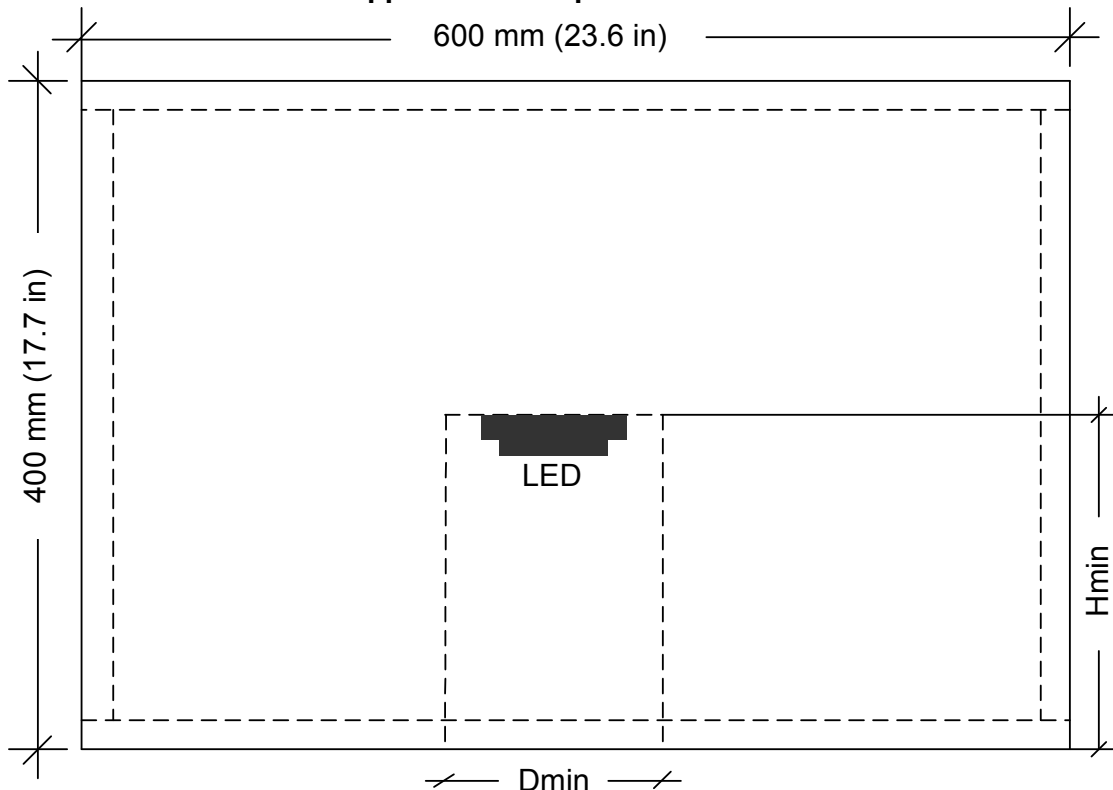


The plywood used for constructing temperature test boxes shall be 12-mm (1/2-in trade size) thick with at least one side that has all voids filled and sanded.

## A4.1.2 Misapplication Temperature Test

- A4.1.2.1 The LED light source of a LED retrofit kit shall be subject to the misapplication temperature test. The test fixture shall be in accordance with Clauses A1.5. The test fixture shall be installed in a center of the bottom plate of a rectangular plywood box as illustrated in Figure A.4.2. Thermal insulation shall be poured into the chamber through the open top, to fill the test box to obtain thermal resistance equivalent to  $R = 0.93 \pm 0.088$  or  $RSI=5.3 \pm 0.5$  per inch. The top of the chamber shall then be reinstalled. The test fixture shall be flush to the test box bottom. The wood bottom shall have an opening the size of the cylinder diameter. The plywood box dimensions are as per Figure A.4.2: square base 600 mm by 600 mm, 400 mm high.
- A4.1.2.2 The LED light source of a LED retrofit kit shall be tested under the misapplication conditions for duration of 24 hours. Temperature of the test fixture shall not exceed temperature limits of Table 14.1.2 of CSA Std. C22.2 No. 250.0, and there shall be no evidence of damage to electrical parts or wiring (e.g. charring, burning, or distortion, etc.). Operation of a protective device shall be considered acceptable.
- A4.1.2.3 Immediately following the misapplication temperature test the LED light source shall be capable of withstanding the dielectric voltage-withstand test of Clause 8.4, UL 8750.

**Figure A.4.2**  
**Misapplication Temperature Test Box**



Thermocouples: Cylinder top temperature 25 mm (1.0 in) from centre line.

#### **A4.2 Type IC Recessed, Open Luminaire Test Requirements**

The LED light source of a LED retrofit kit shall be subjected to the normal temperature test of Clause 14.7 of CSA C22.2 No. 250.0. The test fixture shall be in accordance with Clause A4.1.2.1 and Figure A4.2.

#### **A5 Type Non-IC and Type IC Recessed, Enclosed luminaire Test Requirements**

##### **A5.1 Type - Non-IC Recessed, Enclosed Luminaire Test Requirements**

The LED light source of a LED retrofit kit shall be subjected to the normal temperature test of Clause A4.1.1 with the bottom of the test fixture closed off with a minimum 2.5 mm (0.1 in) thick piece of window glass of appropriate size.

##### **A5.2 Type IC Recessed, Enclosed Luminaire Test Requirements**

The LED light source of a LED retrofit kit shall be subjected to the normal temperature test of Clause A4.2 with the bottom of the test fixture closed off with a minimum 2.5 mm (0.1 in) thick piece of window glass of appropriate size.

#### **A6 *Custom LED Kit***

Additionally Luminaire retrofit kits shall be tested in accordance with the temperature test requirements of Clause 8.3, followed by a Dielectric voltage withstand test of Clause 8.4 outlined in UL 8750.

## Appendix B (normative) for TIL B-79 LED Tubular Lamp Retrofit Kit

### B1 LED Tubular Lamp Retrofit Kits

B1.1 LED tubular lamp retrofit kits are intended to replace lighting system in a luminaire already installed. The luminaire is the type employing double ended (linear) fluorescent lamps.

LED tubular lamps shall not be directly connected to a branch circuit or to existing ballast, unless otherwise stated.

B1.2 LED tubular lamp retrofit kits shall comply with the applicable requirements of:

- a) This T.I.L.
- b) CSA C22.2.No 1993 / UL 1993, Self-Ballasted Lamps and Lamp Adapters
- c) UL 8750, Light Emitting Diode (LED) Light Sources For Use In Lighting Products

B1.3 Each LED Tubular Lamp Retrofit Kit shall be permanently labelled with a CSA monogram and a component qualifier (triangle) adjacent to the mark. See Appendix 3, Clause 4.1.2 for details.

### B1.3 Definitions

B1.3.1 The LED lamp in a LED tubular lamp retrofit kit is classified into two groups, "interchangeable" and "non-interchangeable".

B1.3.2 Interchangeable LED lamp is intended to be installed in place of a fluorescent lamp using the lampholders of a luminaire already installed. The base configuration and lamp dimensions of the LED lamp are the same as the dimensional characteristics of the ANSI standard lamps in accordance with the following ANSI-IEC Standards:

- a) ANSI\_IEC C78.81, "American National Standard for Electric Lamps - Double-Capped Fluorescent Lamps - Dimensional and Electrical Characteristics,"
- b) ANSI\_IEC C78.901, "American National Standard for Electric Lamps - Single-Based Fluorescent Lamps - Dimensional and Electrical Characteristics."

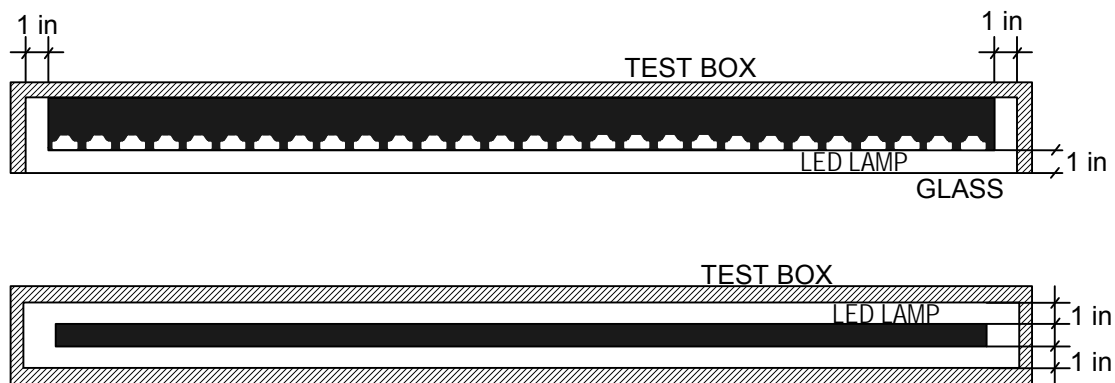
B1.3.3 Non-interchangeable LED lamp is provided with any of the following methods for connection to the luminaire:

- a) A lamp base with configuration different from the dimensional characteristics of the ANSI standard lamps: or
- b) Without a lamp base but furnished with integral leads and/or terminals for connection to the luminaire; or
- c) A lamp base having the same configuration as the dimensional characteristics of the ANSI standard lamp shall be used only for mounting and/or mechanical lamp securement. An electrical connection shall be provided with integral leads and/or terminals for connection to the luminaire

## B1.4 Temperature Test

- B1.4.1 The lamp of a LED tubular lamp retrofit kit shall be subjected to the temperature test of Clause 8.5 of CSA C22.2 No. 1993. The test fixture for testing the lamp shall be in accordance with Clause B1.4.2. The temperature of components shall not exceed their rated values.
- B1.4.2 The sides and top of the test fixture shall be constructed of 12.7 mm (1/2 in trade size) thick minimum grade C-D or better plywood. The bottom shall be closed off with a minimum 2.5 mm (0.1 in) thick piece of window glass of appropriate size.
- B1.4.3 The test box shall have a square cross-section. The dimensions of the sides of the square shall be equal to the overall LED lamp dimensions plus 25.5 mm (1.0 in). See Figure B1.4 for details.

**Figure B1.4**  
**Temperature Test Box**



## B1.5 Drop Test

The drop test shall be conducted in accordance with Clause 8.8 of CSA C22.2 No. 1993 and shall comply with the following accessibility criteria:

- B1.5.1 **Dry and Damp Location**  
There shall be no damage to the polymeric enclosure, breakage, crack, holes or openings of the glass or polymeric bulb resulting in risk of electric shock by accessing the live parts.
- Accessibility is determined using the test articulate probe in Figure 9.3 of CSA C22.2 No. 1993.
  - Risk of electric shock is determined by measuring the voltage and a current between accessible live part(s) and the earth ground. An aluminum foil applied to the accessible live part(s) may be used as a probe. The current flow is measured through a 1500 Ohm resistor in parallel with a 0.15  $\mu$ F capacitor. The current shall not exceed a 5 mA rms (7 mA peak) if the open circuit voltage does not exceed 30 V rms (42.4 V peak).
- B1.5.2 **Wet Location**  
For wet location devices, there shall be no damage to the enclosure or to the glass or polymeric bulb creating any crack, holes or openings.

## B1.6 Tests for Wet Location

- B1.6.1 The lamp of a LED tubular lamp retrofit kit intended for use in WET locations shall comply with the requirements for wet locations of Clause 7.3.1 of CSA C22.2 No. 1993.
- B1.6.2 A LED lamp intended to be connected directly to a branch circuit or to non-SELV power supply shall in addition be subjected to the drop test of Clause B1.5.2 and shall be marked in accordance with Table 14.1, Item 3.3.

## B2 LED Tubular Lamp Retrofit Kits with Interchangeable LED Lamps

- B2.1 Interchangeable LED lamps shall not be directly connected to a branch circuit or to an existing ballast.
- B2.2 A LED tubular lamp retrofit kit shall consist of the following:
- Class 2 or LPS (LVLE) type LED driver, as defined in item (a) and (b) of Clause 2.11, shall be constructed as follows:
    - an acceptable means on the primary side of the LED driver for connection to the branch circuit conductors;
    - wire and wire connectors on the secondary side of the LED driver for connection to the lampholders of the fluorescent luminaire that is to be retrofitted; and
    - the LED driver may be internal or external to the lamp enclosure;
  - LED lamp with base configuration and lamp dimensions same as the dimensional characteristics of the ANSI standard lamp;
  - Installation instructions.
- B2.3 Abnormal Operation Test
- B2.3.1 A LED lamp shall be operated with 600 V a.c. applied to the pins of the opposite side of the lamp for double ended LED lamps.
- B2.3.2 The abnormal operation test shall be performed for 7 hours or until the lamp circuit opens. There shall be no visible signs of increased shock or fire hazard.
- B2.4 LED tubular lamp retrofit kit shall be:
- Installed in accordance with the installation instructions marked on or provided with the pack;
  - Marked in accordance with Table 14.1 Item 1.8; and
  - Provided with a label for lamp replacement of the LED lamp and a label for LED driver replacement for the LED driver. The labels shall be in accordance with item 3.12 of Table 14.1. They shall be affixed to the retrofitted luminaire.

## B3 LED Tubular Lamp Retrofit Kits with Non-Interchangeable LED Lamps

- B3.1 Non-interchangeable LED lamps may be directly connected to a branch circuit if:
- Meets requirements of Clause B1.5.2 for dry, damp or wet location after a drop test of Clause B1.5, and b) or c);
  - LED lamps are connected to a branch circuit by wire harnesses, terminals, wire connectors and/or suitable means and do not use lampholders for electrical connection;
  - Use custom lampholders investigated and approved for an application;
  - Meet the Risk of Electric Shock Measurements of Clause B3.5.
- B3.2 Non-interchangeable LED lamp can meet dimensional characteristics of ANSI standard lamp of Clause B1.3.2 providing that ANSI type lampholders provide only mechanical securement with no electrical connection to LED lamp.

B3.3 A retrofit kit with non-interchangeable LED lamps shall consist of:

- a) Class 2 or LPS (LVLE) type LED driver, as defined in item (a) of Clause 2.11, shall be constructed as follows:
  - An acceptable means on the primary side of the LED driver for connection to the branch circuit conductors;
  - Wire, wire harnesses, terminals, wire connectors and/or suitable means on the secondary side of the LED driver for connection to the LED lamp or for connection to the non-ANSI type lampholders of item (c) below; and
- b) The LED driver may be internal or external to the lamp enclosure. LED lamp with non-ANSI lamp base or with integral leads or terminals for connection to the LED driver;
- c) Non-ANSI type lampholders, as applicable;
- d) Mounting means, as applicable;
- e) Installation instructions.

B3.4 A LED tubular lamp retrofit kit shall be:

- a) Installed in accordance with the installation instructions marked on or provided with the pack
- b) Marked in accordance with Table 14.1 Item 1.8, and
- c) Provided with a label for lamp replacement for the LED lamp and a label for LED driver replacement for the LED driver. The labels shall be in accordance with item 3.12 of Table 14.1. They shall be affixed to the retrofitted luminaire.

B.3.5 Risk of Electric Shock Measurements

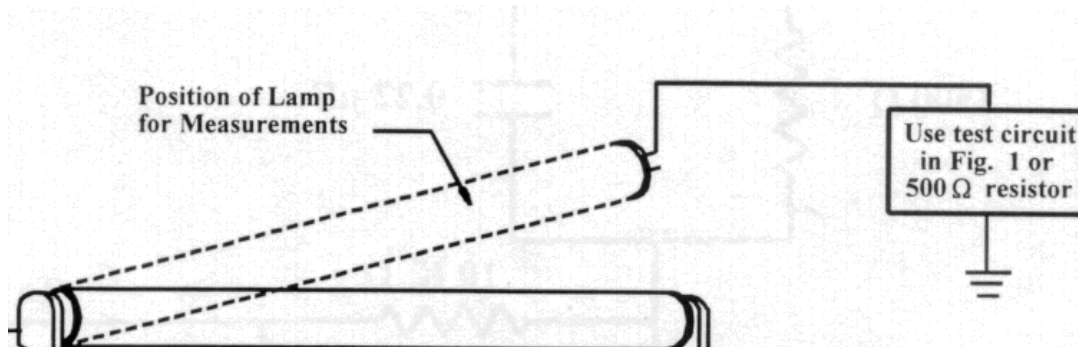
B3.5.1 LED Tubular Lamp Kit that are directly connected to a branch circuit and where there is a risk of electric shock shall be in compliance with a Risk of Electric Shock Measurements.

B3.5.2 A noninductive resistor of 500 ohms shall be connected between one of the accessible lamp pins or live parts and ground, as shown in Figure B3.5, and the current through the 500 ohm resistor shall be measured. The measured values of a peak current shall not exceed the limit of 7.07 milliamperes.

B3.5.3 Where the frequency is over 60 Hz, the leakage current tester having M.I.U units shall be used, as referenced in Std. UL 935 and IEC 990 "Methods of measurement of touch-current and protective conductor current". The maximum peak M.I.U shall be used as per Table 1 of CSA T.I.L. B-68, or Table 24.1 of UL 935.

Note: The M.I.U. means Meter Indicating Units and equals the millivolt peak from the meter divided by 500. It is the peak value of a 60 Hz sinusoidal current in mA. In this case,

**Figure B3.5**  
**Risk of Electric Shock Measurements**



## Appendix C (informative) Standards for Components

Components	CSA Standards	UL Standards
Bonding and grounding of electrical equipment	CAN/CSA-C22.2 No. 0.4 Bonding of electrical equipment	UL 1598 Applicable Portions related to Grounding and Bonding
Cord sets and power supply cords	CSA C22.2 No. 21, Cord sets and power supply cords	UL 817, Cord Sets and Power-Supply Cords
Fuses	CSA C22.2 No. 248.x series Low-voltage fuses	UL 248.x series Low-voltage fuses
Fuse holders 22.2 No. 43, Lampholders	CSA C22.2 No. 43, Lampholders	UL 496, Lampholders
LED light sources, LED controllers and LED power supplies	N/A	UL 8750 Light Emitting Diode (LED) Light Sources For Use In Lighting Products
Adhesive	CSA C22.2 No. 60065-03 Audio, Video and Similar Electronic Apparatus	N/A
Power Supplies (LED drivers)	CSA C22.2 No. 250.0, Luminaires CSA C22.2 No. 223, Power Supplies with Extra-Low-Voltage Class 2 CSA Outputs C22.2 No. 107.1, General Use Power Supplies CSA C22.2 No. 60950-1, Information Technology Equipment – Safety – Part 1	UL, Luminaires UL 1310, Class 2 Power Units UL 1012, Power Units Other Than Class 2 UL 60950-1, Information Technology Equipment – Safety – Part 1
Switches	CSA C22.2 No. 55, Special use switches vC22.2 No. 61058-1, Switches for appliances	UL 1054, Special-Use Switches UL 61058-1, Switches for Appliances
Special use connectors	CSA C22.2 No. 182.3 Special Use Attachment Plugs, Receptacles and Connectors	UL 1977 Component Connectors for use in Data, Signal, Control and Power applications
Insulated multi pole splicing wire connectors	CSA C22.2 No. 2459 Insulated Multi-pole Splicing Wire Connectors	UL 2459, Safety of Insulated Multi-Pose Splicing Wire Connectors
Wire connector terminals	CSA C22.2 No. 65, Wire connectors CSA C22.2 No. 153, Quick connect terminals	UL 310, electrical quick connect terminals UL 486A-486B, Wire connectors

## **ATTACHMENT 3**

### **CSA International guidelines for Component Certification of the LED Retrofit Kit and the evaluation of these kits in Field Installed Luminaires (Retrofitted Luminaires).**

#### **CONTENTS**

- 1. Scope**
- 2. Technical Requirements**
- 3. CSA International Procedure for Component Certification of the LED Retrofit Kit and Investigation of the Retrofitted Luminaires**
  - 3.1 Component Certification of the LED Retrofit Kit
  - 3.2 CSA Investigation of the LED Retrofitted Luminaire
- 4. Marking**
  - 4.1 Component Certified Retrofit Assemblies
  - 4.2 Approved Retrofitted Luminaires
- 5. Letter of Attestation, Sample**

## **1. Scope**

- 1.1 This investigation service covers the evaluation of retrofit assemblies (Kits) to be incorporated in previously installed fluorescent, incandescent and HID luminaires. Retrofit assemblies (Kit) include LED light sources.
- 1.2 At the customer's request CSA is able to conduct an investigation for each installation site of a retrofitted luminaire, and issue a Letter of Attestation and accompanying technical report. Additionally, CSA can provide a special inspection service where the Letter of Attestation and technical report have been issued and where at least one luminaire of each type and/or model has been approved and labelled by CSA.

## **2. Technical Requirements**

- 2.1 CSA Component Certification of a LED retrofit kit is based upon establishing compliance with T.I.L, B-79.
- 2.2 CSA investigation of retrofitted luminaires is based upon establishing compliance with requirements of the attached T.I.L. No. B-79 and/or the following applicable standards:
  - a) Luminaires, CSA C22.2. No.250 -08/ UL 1598,
  - b) Light Emitting Diode (LED) Light Sources for Use in Lighting Products, UL 8750.
  - c) Meets the requirements of Section 1.2 of this TIL, Guidelines for Investigation of Retrofitted Luminaires
- 2.3 Retrofitted luminaires shall be marked as per Item 4.2 of this attachment, and Clause 14.

## **3. CSA International Procedure for Component Certification of the LED Retrofit Kit and Investigation of the Retrofitted Luminaires**

### **3.1 Component Certification of the LED Retrofit Kit**

- 3.1.1 At the customer's request and with the completion of an Application/Service Agreement for CSA Certification, CSA will open a project in order to commence the Certification process.
- 3.1.2 Upon satisfactory evaluation of the Retrofit Kit or assembly, a CSA Product Description Report will be completed, and the Certificate of Compliance will be issued allowing submitter to mark Certified Retrofit Assemblies with a CSA mark outlined in marking section, Item 4.1 of this attachment, and in accordance with instructions of CSA Product Description Report.

### **3.2 CSA Investigation of the LED Retrofitted Luminaire**

- 3.2.1 At the customer's request along with submitted information as outlined in Item 3.2.4 of this Attachment and the completion of an Application/Service Agreement for CSA investigation. A CSA representative will issue a quotation. Upon customer's acceptance, CSA certifier will carry out an evaluation of a sample retrofitted luminaire in accordance with "Technical Requirements" Item 2.2 of this Attachment.

- 3.2.2 Upon satisfactory evaluation of the retrofitted fluorescent, incandescent, or H.I.D. luminaire including the construction, installation instructions and test results a CSA Product Description Report will be completed.
- 3.2.3 A Letter of Attestation will be issued by CSA and given to the customer. A sample of the CSA Letter of Attestation is shown in Item 5 of this Attachment.
- 3.2.4 Client Information Requirements for retrofitted luminaires  
The application must contain sufficient detail to enable a complete evaluation and must address each of the information requirements listed below. It is essential that submitted information is clear, concise and complete.
- a) Retrofit luminaire site address
  - b) Original luminaire: Manufacturer's name, model no. (e.g. A1, A2...), electrical rating, overall dimensions; or detailed description of the luminaire complete with photographs.
  - c) Number of luminaires per site and per original luminaire model.
  - d) Retrofit Assembly description or a Certified Retrofit Assembly Model Number.  
Note: More than one Retrofit Assembly Type may be used to retrofit the same Original Luminaire (e.g. A1 may be retrofitted with R1A1 or R2A1 retrofit assembly). Therefore in this example the same original luminaires may have two representative retrofitted luminaires.
  - e) New model designation shall be assigned to each Retrofitted Luminaire Model. (e.g. "B/Rm-2x4-###") where "B/Rm" may be building No. /Room name or some other unique form of identification.
  - f) Electrical Permit Number, as applicable.
- 3.2.5 Additionally as requested by a CSA Customer CSA International can provide an on site service such as a CSA Special Inspection (SI). Upon successful investigation a CSA Special inspection label will be affixed to each retrofitted luminaire.

## 4. Markings

### 4.1 Certified Retrofit Assemblies:

Certified retrofit assemblies shall bear a certification agency mark suitable for the purpose. For CSA International, each retrofit assembly described in Appendix A and Appendix B shall be permanently and legibly marked as follows:

- (a) The CSA component mark indicates that a retrofit kit meets the applicable Canadian standard requirements as indicated in this TIL.
- (b) The CSA US component mark indicates that a retrofit kit meets the applicable US standard requirements as indicated in this TIL.
- (c) The CSA C-US component mark indicates that a retrofit kit meets both of the applicable Canadian and US standard requirements as indicated in this TIL.



## 4.2 Investigated Retrofitted Luminaires:

- 4.2.1 A following minimum markings shall be affixed to each retrofitted luminaire.
- (a) Contractor's or installer's identification (company name, trade name/trademark);
  - (b) CSA File Number
  - (c) Model designation or catalogue number of the Retrofitted Luminaire;
  - (d) Input rating in volts and total amperes or watts, and secondary volts and amperes or Volt-amperes for a LED driver, frequency, and maximum lamp wattage.
  - (e) Lamp replacement information: LED Lamp/Kit catalogue No., located where readily visible during relamping and shall have temperature rating minimum as label replaced.
  - (f) Permit number, as applicable;
  - (g) Other marking required by end product (retrofitted luminaire) standard and TIL B-79 may apply.

Notes: Marking shall be permanently applied to non-removable part of the luminaire (for example marking the reflector will not be acceptable). For dry location, a laser printout on labelled approved for use with a laser printers are considered acceptable; for damp and wet location the labels and printing system has to be approved by CSA.





Report:  
Project:

Master Contract:  
Date:

ORIGINAL LUMINAIRE MODEL NUMBER: <xxxx>  
Manufacturer's identification: <xxxx>

CERTIFIED LED RETROFIT KIT: Model No <xxxx>  
RETROFITTED LUMINAIRE MODEL NUMBER : <xxxx>

ELECTRICAL RATING: Input<xxx V, xx W (xx A) 60 Hz> Output<xxx V, xx A>  
Manufacturer's identification: <xxxx> (if different than submittor)

### Product History



Project	Date	Description
		Original Investigation   Report issued.



SAMPLE