



UL 1598C

STANDARD FOR SAFETY

Light-Emitting Diode (LED) Retrofit
Luminaire Conversion Kits

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UL Standard for Safety for Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits, UL 1598C

Second Edition, Dated September 8, 2023

Summary of Topics

This new edition of ANSI/UL 1598C dated September 8, 2023, includes the following changes in requirements:

- Scope expansion and restructuring of requirements; New Annex for LED retrofit kits for low voltage luminaires; New Annex for LED retrofit kits for commercial refrigerators and freezers; New and revised retrofit kit markings and instructions, and;***
- Enhanced delivery of installer information.***

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated February 17, 2023 and June 30, 2023.

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SEPTEMBER 8, 2023



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UL 1598C

Standard for Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits

First Edition – January, 2014

Second Edition

September 8, 2023

This ANSI/UL Standard for Safety consists of the Second Edition.

The most recent designation of ANSI/UL 1598C as an American National Standard (ANSI) occurred on September 8, 2023. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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

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INTRODUCTION

1 Scope

1.1 These requirements apply to light-emitting diode (LED) retrofit kits that are intended to retrofit existing light sources or other components in previously installed luminaires that already comply with one of the standards in [1.3](#).

1.2 These kits are intended for use with:

- a) Luminaires where specific luminaire models or part numbers as identified in the kit installation instructions; or
- b) One or more generic type luminaires that meet specific criteria identified in the kit installation instructions.

1.3 These kits are intended to retrofit the products covered by the following standards:

- a) UL 1598A, Standard for Marine Luminaires,
- b) UL 1573, Standard for Stage and Studio Luminaires,
- c) UL 1598, Standard for Luminaires,
- d) UL 2108, Standard for Low Voltage Lighting Systems,
- e) UL 471, Standard for Commercial Refrigerators and Freezers, or
- f) UL 60335-1, Standard for Household and similar electrical appliances – Safety – Part 1: General requirements, and UL 60335-2-89, Standard for Household and Similar Electrical Appliances – Safety – Part 2-89: Particular Requirements for Commercial Refrigerating Appliances and Ice-Makers with an Incorporated or Remote Refrigerant Unit or Motor-Compressor.

1.4 This standard does not cover luminaire reflector kits covered by the Standard for Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, UL 1598B.

1.5 The host luminaire is expected to have been designed and manufactured per the applicable standards for safety (See [1.3](#)). The host luminaire is also expected to have been appropriately installed per manufacturer instructions and applicable installation codes.

1.6 Components of LED retrofit kits can include, but are not limited to, LED lamps, LED arrays, LED controllers, LED drivers, power supplies, wiring, lampholders, brackets, wire connectors, reflectors, diffusers, and other associated mechanical, electrical, or optical devices.

1.7 In this standard the installation instructions is considered a component of retrofit kits. The information provided in the installation instructions is considered critical for appropriate selection and proper installation of retrofit kits.

1.8 This standard does not cover luminaire conversion lamps that are intended to replace existing lamps without any modification, rewiring, or component replacement in the luminaire other than direct replacement of the lamp using the existing lampholder. Requirements for these direct replacement lamps are specified in the Standard for Self-Ballasted Lamps and Lamp Adapters, UL 1993.

1.9 Use of this standard to cover retrofit kits intended for product types other than those noted in [1.3](#) may require an additional investigation.

2 Components

2.1 Except as indicated in this clause, a component of a product covered by this standard shall comply with the requirements for that component. See the Standards for Components annex for a list of standards covering components generally used in the products covered by this standard.

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

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

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

3 Units of Measurement

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

4 Referenced Publications

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

4.2 The following publications are referenced in this Standard:

UL 471, *Commercial Refrigerators and Freezers*

UL 486C, *Splicing Wire Connectors*

UL 746C, *Polymeric Materials – Use in Electrical Equipment Evaluations*

UL 969, *Marking and Labeling Systems*

UL 1411, *Transformer and Motor Transformers for Use in Audio-, Radio-, and Television-Type Appliance*

UL 1561, *Dry-Type General Purpose and Power Transformers*

UL 1573, *Stage and Studio Luminaires and Connector Strips*

UL 1598, *Luminaires*

UL 1598A, *Supplemental Requirements for Luminaires for Installation on Marine Vessels*

UL 1993, *Self-Ballasted Lamps and Lamp Adapters*

UL 2108, *Low Voltage Lighting Systems*

UL 2459, *Insulated Multi-Pole Splicing Wire Connectors*

UL 5085-1, *Low Voltage Transformers – Part 1: General Requirements*

UL 5085-2, *Low Voltage Transformers – Part 2: General Purpose Transformers*

UL 5085-3, *Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers*

UL 60335-1, *Household and similar electrical appliances – Safety – Part 1: General requirements*

UL 60335-2-89, *Household and Similar Electrical Appliances – Safety – Part 2-89: Particular Requirements for Commercial Refrigerating Appliances and Ice-Makers with an Incorporated or Remote Refrigerant Unit or Motor-Compressor*

UL 8750, *Light Emitting Diode (LED) Equipment For Use In Lighting Products*

5 Glossary

5.1 For the purposes of this standard, the following definitions apply.

5.2 HOST LUMINAIRE – A luminaire already installed in the field that is designated for field conversion of the illumination system with a retrofit kit.

5.3 INSTALLATION INSTRUCTION – A generic term for information that is provided with the product in printed form (e.g. an insert, a booklet) or additionally provided on a publicly accessible website to convey required markings, instructions, supporting information. The installation instructions may include other product information- unrelated to the requirements of this standard.

5.4 LUMINAIRE CONVERSION – The act of modifying, with additional parts, a host luminaire in service in order to convert the luminaire to an LED light source, from an incandescent, fluorescent, induction, or high intensity discharge light source.

Note 1: Luminaire conversion also covers host LED luminaires where a retrofit kit serves to replace or upgrade features of an LED luminaire. Luminaire conversion is expected to result in the host luminaire to continue to comply with the requirements of the applicable standard in [1.3](#) after installation. This is dependent, in part on the features affected by the installation of the retrofit kit and in part on the compliance of the existing (prior to retrofit) product (see [1.5](#)).

Note 2: For purposes of this standard, direct replacement of an incandescent, fluorescent, induction, or high intensity discharge lamp with a self-ballasted LED lamp, without any electrical or mechanical changes to the luminaire, is not considered to be a conversion.

5.5 RETROFIT KIT – In the context of these requirements, a kit is a complete assembly of parts including all component parts needed, installation instructions, and field applied luminaire marking labels when needed.

MECHANICAL CONSTRUCTION

6 General

6.1 After installation of the retrofit kit, a host luminaire shall comply with the mechanical construction requirements of the applicable host luminaire standard (See [1.3](#)).

6.2 After installation of a retrofit kit, all components of the retrofit kit and all components of the host luminaire that were affected by the installation of the retrofit kit shall be secured in place so that lamp

replacement, inspection of splices to the branch-circuit supply wires, and routine maintenance will not loosen components or joints in the assembly.

7 Polymeric Materials

7.1 A polymeric material serving as an enclosure or providing structural support for any electrical component or for any non-electrical component weighing more than 3 ounces (85 g) shall comply with the requirements of the applicable host luminaire standard (See [1.3](#)). For example, Retrofit kits for commercial refrigerators and freezers shall comply with Resistance to heat and fire requirements in Clause 30 of UL 60335-2-89.

7.2 In addition to complying with any metallized polymeric part requirements in the applicable host luminaire standard (See [1.3](#)), a metallized polymeric part that is spaced within 3 inches (76.2 mm) from any lampholder, lamp contact, lampholder lead, wiring, or other electrical component that are below the metallized surface shall comply with the applicable requirements for metallized plastic parts in UL 746C, if peeling of the conductive material from the polymeric parts can result in the risk of electric shock, fire, or operating temperature limits being exceeded.

8 Adhesives

8.1 In addition to complying with any adhesive requirements in the applicable host luminaire standard (See [1.3](#)), an adhesive or adhesive tape shall not be relied upon to secure any part to a panel, bracket, or component of a luminaire, except as noted in [8.2](#).

8.2 An adhesive or adhesive tape used to secure a part to another part of a retrofit kit shall comply with the requirements for temperature, humidity, and indoor cyclic conditioning for adhesives in UL 746C. With regard to the temperature conditioning, a normal operating temperature of 90 °C (194 °F) shall be assumed unless temperature testing of the luminaire/kit combination indicates that a lower normal operating temperature applies. This requirement applies to all adhesives including an adhesive used to secure a metal foil reflecting surface or a laminate reflecting surface to the reflector base material.

9 Metal Thickness

9.1 Metal parts of a retrofit kit and those portions of a host luminaire serving as electrical enclosure that are affected by installation of the retrofit kit shall comply with the minimum metal thickness and material requirements in applicable host luminaire standard (See [1.3](#)).

ELECTRICAL CONSTRUCTION

10 General

10.1 After installation of a retrofit kit, a host luminaire shall comply with the electrical construction requirements in applicable host luminaire standard (See [1.3](#)).

11 Grounding

11.1 Except as noted in [11.2](#) and [11.3](#), or in an Annex of this standard, non-current-carrying metal parts and metallized polymeric parts that are accessible including user maintenance or component replacement without the use of tools and that can involve the risk of shock shall be bonded to ground or double insulated to comply with the applicable host luminaire standard (See [1.3](#)).

11.2 For non-current-carrying metal parts such as heat sinks that are integral to the lamp, the need for grounding or double insulation shall be determined by the basic lamp requirements in UL 1993.

11.3 For non-current-carrying metal parts of the LED components that are independent from the host luminaire or lamp(s), the need for grounding or double insulation shall be determined by the requirements for double insulated LED equipment in UL 8750.

11.4 A connector provided with a contact, or pole, for connection to an equipment grounding conductor shall be arranged so the grounding connection is the first to make and the last to disconnect.

Exception: This requirement does not apply when the ground path is not needed to reduce the risk of electric shock.

12 Wiring and Conductors

12.1 Supplemental wiring including wires for interconnection of kit components and connectors required for installation of the retrofit kit shall be included in the kit.

12.2 Supplemental wiring provided with the retrofit kit shall comply with the electrical construction requirements in the applicable host luminaire standard (See [1.3](#)).

Exception: Integral leads of components evaluated for use in the retrofit kit and used only for internal connections within the kit are exempt from the supplemental wiring requirements. This exception does not apply to wiring used to connect the kit to the host luminaire.

12.3 Connectors shall be suitable for the number and size of conductors to be spliced and comply with the requirements in either UL 486C or UL 2459. See also [11.4](#) regarding configuration requirement for connector with a contact or pole for grounding.

13 LED Components

13.1 Component parts of light emitting diode (LED) equipment, including LED drivers, controllers, and arrays shall comply with UL 8750.

13.2 LED lamps included in the retrofit kit shall comply with UL 1993.

13.3 Tubular LED lamps included in the retrofit kit that are intended to replace fluorescent lamps, and use existing lampholders only for mechanical support, (i.e. powered by a separate supply connections) shall comply with the requirements for tubular lamps in UL 1993.

14 Power Supplies and Transformers

14.1 General

14.1.1 Power supplies and transformers shall operate within their rated input and output ratings.

14.2 Power supplies

14.2.1 Except for features specified in this standard, power supplies shall comply with UL 8750.

14.3 Transformers

14.3.1 Except for features specified in this standard, a stand-alone transformer shall comply with the requirements of one of the following standards:

- a) UL 5085-1 and UL 5085-3;

- b) UL 1411;
- c) UL 5085-2; or
- d) UL 1561.

PERFORMANCE

15 General

15.1 Installation of the retrofit kit on the host luminaire when conducted in accordance with the installation instructions provided with the retrofit kit and using components and materials provided with the kit shall facilitate continued compliance of the retrofitted luminaire with the requirements of the applicable host luminaire standard (See [1.3](#)). Compliance with this requirement includes, but is not limited to, grounding and bonding, wire routing for mechanical protection of insulation, segregation of circuits such as line and Class 2 wiring, suitability of existing leads (length) for splicing, and any wire routing or mechanical issues that may be a result of abandoned components during the retrofit.

15.2 Compliance shall take into consideration all modifications made to the host luminaire as a result of the luminaire retrofit conversion. For specific model conversions, evaluation of compliance with this standard and UL 1598, would include a review and, if necessary, a trial installation of the retrofit kit using a sample of the specific luminaire installed as intended.

15.3 Compliance of a retrofit kits when intended for use with defined generic types of luminaires shall include evaluation of any necessary adaptations to address all potential luminaire construction variables within the scope of the luminaire as defined in the installation instructions.

MARKING AND INSTRUCTIONS

16 General

16.1 A retrofit kit shall be legibly marked using one of the following methods, in accordance with [Table 16.1](#):

- a) Lettering on a pressure-sensitive label;
- b) Paint stenciled lettering;
- c) Ink-stamped machine lettering;
- d) Ink-hand-stamped lettering;
- e) Indelibly printed lettering;
- f) Die-stamped lettering;
- g) Embossed lettering;
- h) Molded or cast lettering; or
- i) Etched lettering.

16.2 "Verbatim" in the "Text" column of [Table 16.1](#) 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 [Table 16.1](#) are not prohibited, subject to evaluation.

Table 16.1
List of Required Markings

Item	Installation instructions	Text	Format ^a	Reference
1.1	WARNING – Risk of fire or electric shock. Luminaire wiring and electrical parts may be damaged when drilling for installation of LED retrofit kit. Check for enclosed wiring and components.		S24-L3 and S24-L5	18.1 , 19.1.9
1.2	WARNING – RISK OF FIRE OR ELECTRIC SHOCK. THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.		S24-L5	19.1.6
1.3	WARNING – Risk of fire or electric shock. Install this kit only in luminaires that have the construction features and dimensions shown in the photographs and/or drawings.		S24-L5	19.1.6
1.4	Only those open holes indicated in these instructions 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.	Verbatim	S24-L5	19.1.7
1.5	Do not make or alter any open holes in an enclosure of wiring or electrical components during kit installation.	Verbatim	S24-L5	19.1.8
1.6	WARNING – To prevent wiring damage or abrasion, do not expose wiring to edges of sheet metal or other sharp objects.		S24-L5	19.1.6 , 19.1.7
1.7	WARNING: To avoid potential fire or shock hazard, do not use this retrofit kit in luminaires employing shunted bi-pin lampholders. Note: Shunted lamp holders are found only in fluorescent luminaires with Instant-Start ballasts. Instant-start ballasts can be identified by the words "Instant Start" or "I.S." marked on the ballast. This designation may be in the form of a statement pertaining to the ballast itself, or may be combined with the marking for the lamps with which the ballast is intended to be used, for example F40T12/IS. For more information, contact the LED luminaire retrofit kit manufacturer.		S24-L5	19.2.1
1.8	Installers should not disconnect existing wires from lampholder terminals to make new connections at lampholder terminals. Instead installers should cut existing lampholder leads away from the lampholder and make new electrical connections to lampholder lead wires by employing applicable connectors.		S24-L5	19.2.2
1.9	Installers should examine all parts that are not intended to be replaced by the retrofit kit for damage and replace any damaged parts prior to installation of the retrofit kit.		S24-L5	19.1.14
1.10	WARNING – Risk of fire. Input ratings may need to be determined based on any configuration(s) permitted by the installation instructions. Regardless of the configuration(s) of the retrofit kit, the input ratings of the overall retrofit kit shall not exceed the marked input ratings of the host luminaire.		S24-L5	19.1.16
1.11 ^{b,c}	The installation instructions shall indicate the environmental locations the retrofit kit is suitable for. (i.e. Damp locations or Wet locations)		S24-L5	19.1.17
1.12	Prior to installation, review all environmental designation locations in the retrofit kit installation instructions. Only install in damp or wet locations if so indicated in the installation instructions.		S24-L5	19.1.17

Table 16.1 Continued on Next Page

Table 16.1 Continued

Item	Installation instructions	Text	Format ^a	Reference
Luminaire Markings (to be Affixed to Host Luminaire)				
1.13	"This luminaire has been modified to operate LED lamps. Do not attempt to install or operate ____ lamps in this luminaire" "*" shall be replaced by the original illumination type such as "fluorescent," "HID," etc.	Verbatim	S24-L1 ^d	19.1.12
1.14	LED Lamp Replacement Marking – Identification of the replacement LED lamp type/model to be used along with manufacturer and ordering information.		S24-L1 ^d	19.1.13
1.15	For a tubular LED lamp conversion, there shall be text or a diagram showing how the supply connections were made to the lampholders so the correct connections will be made to the lamp when the lamp is installed or replaced.		S24-L1 ^d	19.1.15
Host Luminaire Type Markings				
1.16	RETROFIT ONLY WITH (Manufacturer) (Catalog Number) LUMINAIRE.		S24-L4 and S24-L5	19.1.18
1.17	"For use with ____ luminaires." "*" shall be replaced by the host luminaire type(s) such as fluorescent, incandescent, HID, recessed can lighting, office-furnishing lights, surface mounted, wall mounted, recessed non-IC, recessed IC, etc.		S24-L5	19.1.19
1.18	Suitable for open type luminaires.		S24-L5	19.1.19
1.19	Suitable for closed type luminaires.		S24-L5	19.1.19
1.20	"Suitable for use with luminaires with maximum ____ lamps." "*" shall be replaced by the maximum number of lamps that can be used in the host luminaires.		S24-L5	19.1.19
1.21	"Suitable for use with luminaires with ____ lamp compartment." "*" shall be replaced by the minimum or specific dimensions of lamp compartment of the host luminaires.		S24-L5	19.1.19
1.22	Suitable for operation in luminaires with ambient not exceeding ____°C.		S24-L5	19.1.19
Identification Markings				
2.1	Retrofit kit manufacturer's identification and Catalog number (or model designation) on a component of the kit or separate label.		S16-L2	17.1
2.2	SEE (SPECIFIC URL OR "QR CODE" INSERTED HERE) FOR COMPLETE INSTALLATION INSTRUCTIONS	Verbatim	S16-L2 and S24-L5; or S24-L4 and S24-L5	19.1.2
^a See Tables 20.1.2 and 20.1.3 in UL 1598, for format minimum size designation height, typeface and location. ^b See UL 1598 for definitions of dry, damp and wet locations. ^c This marking is required only for retrofit kits intended for damp or wet locations. ^d These markings may be provided on one or more field applied labels. The separate pressure-sensitive label shall comply with UL 969.				

16.3 No supplemental or revised electrical input ratings or environmental location rating or markings shall be applied or affixed to any component of the retrofit kit that is already provided with its own ratings.

17 Identification

17.1 A retrofit kit shall be marked with the retrofit kit's catalog number or model designation, and the retrofit kit manufacturer's name, trademark, or other descriptive marking in accordance with [Table 16.1](#), Item 2.1:

- a) On at least one of the components of a retrofit kit; or
- b) On a separate pressure-sensitive label intended to be applied to the retrofitted host luminaire after installation of the retrofit kit.

18 Installation Marking

18.1 A retrofit kit that requires drilling or punching of holes into the structure of the luminaire for kit installation shall be marked in accordance with [Table 16.1](#), Item 1.1.

19 Installation Instructions

19.1 General requirements for all luminaire conversions

19.1.1 An LED retrofit kit shall be provided with installation instructions that cover all aspects of luminaire alteration required for the installation of the LED retrofit kit. 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 installer to distinguish all applicable features of the luminaire and the LED retrofit kit.

19.1.2 In lieu of providing all requirements of this section in printed form, a simplified instruction sheet may be provided in combination with a publicly accessible website containing all of the requirements of this section if the simplified instruction sheet as well as either the equipment or equipment packaging is marked in accordance with [Table 16.1](#), Item 2.2. The simplified instruction sheet shall contain all the applicable markings that are in format L5 in [Table 16.1](#) in addition to the requirements of [19.1.5](#) and [19.1.16](#).

19.1.3 The installation instructions shall include photographs or line drawings of the luminaire or luminaires intended to be used with the retrofit kit clearly showing:

- a) The luminaire without the LED retrofit kit as it is seen by the installer of the retrofit kit;
- b) Details of all panels, brackets, and components and their orientation prior to luminaire alteration if these details are important to installation of the retrofit kit as it is intended to be used;
- c) All dimensions and spacings of all luminaire walls, panels, brackets, openings, parts to be removed, and similar items that are relied upon to comply with the requirements of this standard; and
- d) All vents and the air path in a luminaire used as an air handling register.

19.1.4 For an LED retrofit kit that is bulk packaged, at least one set of installation instructions shall be provided with the smallest shipping carton.

19.1.5 The installation instructions shall specify all components of the retrofit kit before any installation steps are given so that the user is able to check the content of the retrofit kit.

19.1.6 The installation instructions shall include the markings specified in [Table 16.1](#), Items 1.2, 1.3, and 1.6.

19.1.7 If the installation of a retrofit kit 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 specified in [Table 16.1](#), Item 1.4.

19.1.8 If the installation of a retrofit kit does not require the making of any open holes in an enclosure of live parts, the installation instructions shall include the marking specified in [Table 16.1](#), Item 1.5.

19.1.9 Installation instructions for a retrofit kit that involves the alteration of retrofit kit 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.

19.1.10 The installation instructions shall include figures showing the components and wiring configuration for the luminaires with which the LED retrofit kit 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 the retrofit installation;
- b) Be on a separate page;
- c) Be referenced in the text of the instructions;
- d) Identify all wiring splice points pertinent to kit installation, including supply connections, connections to lampholders, and polarity if applicable; and
- e) All components and wiring shall be consistently identified by a unique number or name in all wiring diagrams. Any unused conductors shall be identified in the figure and reliably insulated or capped with a wire connector.

19.1.11 Installation instructions for LED retrofit kits that require the removal of lampholders shall indicate that the lampholders and lampholder leads shall be removed.

19.1.12 For LED retrofit kits that reuse existing lampholders or otherwise permit the insertion of previously used lamps shall have markings noted in [Table 16.1](#), Item 1.13, applied to the retrofitted luminaire where visible during relamping.

19.1.13 LED retrofit kits that involve replaceable lamps shall include the markings noted in [Table 16.1](#), Item 1.14, applied to the retrofitted luminaire where visible during relamping.

19.1.14 LED retrofit kits that foresee reuse of existing components, such as lampholders, shall include the markings in [Table 16.1](#), Item 1.9 in the installation instructions. This is to advise the kit installer to examine all parts that are not intended to be replaced by the retrofit kit for damage and replace any damaged parts prior to installation of the retrofit kit.

19.1.15 If the retrofit kit is for use with tubular LED lamps, the installation instructions shall include text and/ or diagrams showing how the supply connections are to be made to the lampholders, see [Table 16.1](#), Item 1.15. This is to facilitate correct connections to the tubular LED lamp when it is installed or replaced.

19.1.16 Installation instructions shall include the input ratings of the overall kit or provide sufficient guidance to determine the kit's overall input ratings, see [Table 16.1](#), Item 1.10. This is to assure that the input current and power for the retrofit kit will not exceed the marked ratings of the host luminaire, regardless of any field selectable configurations for the kit per the installation instructions.

19.1.17 The suitability of a retrofit kit for installation in a damp or wet location shall be identified in the installation instructions in accordance with the markings in [Table 16.1](#), Items 1.11 and 1.12. Also see [16.3](#).

19.1.18 If retrofit kits are intended for specific luminaire models, as defined in [1.2\(a\)](#), the smallest unit package or carton and installation instructions shall provide with instructions sufficient for identifying the manufacturer and model designation(s) of the host luminaires for which they are intended in accordance with the markings in [Table 16.1](#), Item 1.16.

19.1.19 If retrofit kits are intended for one or more generic type luminaires as defined in [1.2\(b\)](#), installation instructions shall provide with instructions sufficient for identifying the luminaire types and features that establish compatibility of the kit with the host luminaire. Refer to [Table 16.1](#), items 1.17 to 1.22 as applicable.

19.2 Specific requirements for fluorescent lamps to LED conversions

19.2.1 All tubular fluorescent to LED retrofit kits that require both line and neutral power to be connected to the same lampholder shall be provided with the warning marking in [Table 16.1](#), Item 1.7, as part of the installation instructions, or on a separate stuffer sheet provided with each kit, or marked on the kit itself.

19.2.2 LED Retrofit kits that utilize existing fluorescent lampholders shall have the marking in [Table 16.1](#), Item 1.8.

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ANNEX A (Normative) – ADDITIONAL REQUIREMENTS FOR LED RETROFIT CONVERSION KITS FOR MARINE LUMINAIRES

A1 Scope

A1.1 These requirements apply to retrofit kits intended for luminaires covered by the scope of UL 1598A.

A1.2 Applications excluded from the scope of UL 1598A, are also excluded from the scope of this supplement.

A1.3 All requirements in the main body of this standard also apply to these retrofit kits unless specifically superseded by a requirement in this supplement.

A2 Glossary

A2.1 INSIDE DRIPPROOF-TYPE LUMINAIRE – A luminaire intended for use on a marine vessel in an inside damp or wet location and subject to oil or water drippage.

A2.2 INSIDE-TYPE LUMINAIRE – A luminaire intended for use on a marine vessel in an inside dry or damp location.

A2.3 OUTSIDE-TYPE LUMINAIRES – A luminaire intended for use outside or in other severely wet locations on a marine vessel.

A3 General Requirements

A3.1 Retrofit kits shall be constructed such that, after their installation, converted marine luminaires continue to comply with all mechanical, electrical and environmental construction requirements in UL 1598A applicable to the marine luminaire type for which it is marked and intended (See [Table A4.1](#)), including:

- a) Corrosion protection;
- b) Openings;
- c) Joints and gaskets;
- d) Mounting means;
- e) Glass and lamp support;
- f) General electrical construction;
- g) Convenience receptacles, switches and fuses;
- h) Lampholders;
- i) Wiring and conductors; and
- j) Power supply connections.

A3.2 If a retrofit kit requires modifying the luminaire in a way that could affect its corrosion protection or water resistance (i.e.: adding openings, modifying gaskets, new ferrous parts, etc.) then the appropriate environmental and corrosion resistance tests from UL 1598A shall be conducted on the converted luminaire.

A4 Additional Markings and Instructions

A4.1 Retrofit kits intended for one or more generic type luminaires, as defined in [1.2\(b\)](#), shall be marked with the marine luminaire type for which it is intended, as follows:

Table A4.1
Marine Luminaire Type Marking

Item	Marking	Text	Format
1.1	FOR INSIDE TYPE LUMINAIRES	VERBATIM	S16-L2
1.2	FOR INSIDE DRIPPROOF TYPE LUMINAIRES	VERBATIM	S16-L2
1.3	FOR OUTSIDE TYPE (FRESH WATER) LUMINAIRES	VERBATIM	S16-L2
1.4	FOR OUTSIDE TYPE LUMINAIRES or FOR OUTSIDE TYPE (SALT WATER) LUMINAIRES	VERBATIM	S16-L2