

6.3 Requirements for Residential Luminaires

A luminaire is the lighting industry's term for light fixture. A luminaire consists of the housing, power supply (for instance a ballast, transformer, or driver), lamp, and optical components such as reflectors or lenses. A lamp is the lighting industry's term for a light bulb.

Although portable table and floor lamps are classified as luminaires, they are not covered by the Title 24 residential lighting Standards. However, portable luminaires are required to comply with the California Title 20 Appliance Efficiency Regulations.

Every installed luminaire shall be classified as either "high efficacy" or "low efficacy" for compliance with the residential lighting Standards. There are different requirements for high and low-efficacy luminaires. The rules for classifying a luminaire as high efficacy are explained further in sections 6.3.2 and 6.3.3 of this chapter.

6.3.1 Permanently Installed vs. Portable Luminaires

The residential lighting Standards require that all permanently installed luminaires be high efficacy as defined in §150.0(k)1, with some exceptions described in section 6.6 of this chapter. The residential lighting Standards do not apply to portable luminaires.

- A. Permanently installed luminaires include all luminaires attached to the inside or outside of a building or other structures on the same site. Permanently installed luminaires may have either plug-in or hardwired connections for electric power. This includes plug-in under-cabinet lighting where the luminaires are attached to the bottom of the cabinets.
- B. The definition of permanently installed lighting in §100.1 includes outdoor lighting mounted on poles, in trees, or in the ground. However, because outdoor lighting mounted on poles, in trees, or in the ground is not regulated by the residential lighting Standards, this portion of the definition applies only to nonresidential outdoor lighting applications.
 - 1. Permanently installed lighting includes the following:
 - a. Lighting attached to walls, ceilings, columns.
 - b. Track and flexible lighting systems.
 - c. Lighting inside permanently installed cabinets.
 - d. Lighting attached to the top or bottom of permanently installed cabinets.
 - e. Lighting attached to ceiling fans.
 - f. Lighting integral to exhaust fans.
 - g. Lighting that is integral to garage door openers if it is designed to be used as general lighting, is switched independently from the garage door opener, and does not automatically turn off after a pre-determined amount of time.

2. Permanently installed lighting does not include the following:
 - a. Portable lighting as defined by §100.1 (table and freestanding floor lamps with plug-in connections).
 - b. Lighting installed by the manufacturer in refrigerators, stoves, microwave ovens, exhaust hoods for cooking equipment, refrigerated cases, vending machines, food preparation equipment, and scientific and industrial equipment.
 - c. Lighting in garage door openers which consists of no more than two screw-based sockets integrated into the garage door opener by the manufacturer, where the lights automatically turn on when the garage door is activated, and automatically turn off after a pre-determined amount of time.
- C. Portable lighting, for residential applications, is defined as lighting with plug-in connections for electric power that is table and freestanding floor lamps. However, plug-in lighting attached to the bottom of a cabinet is considered permanently installed lighting.

6.3.2 Residential High Efficacy Luminaires

§150.0(k)1

A high efficacy luminaire is one that meets the criteria listed in Table 6-1, or if the lighting technology is not covered in Table 6-1, qualifies as high efficacy in accordance with Table 6-2.

To determine whether a luminaire is classified as high efficacy or low efficacy, first refer to Error! Reference source not found.. If the luminaire is not listed in either of the two columns in Table 6-1, then use Table 6-2, to determine whether it qualifies as high efficacy.

When required to calculate efficacy according to Table 6-2, simply divide the initial rated lumens of the lamp by the rated wattage of the lamp. Lamp lumens can typically be found on the lamp package or in a manufacturer's catalogue

6.3.3 Residential Low Efficacy Luminaires

§150.0(k)2

- A. A low efficacy luminaire is one that meets the criteria listed in Table 6-1. If a luminaire consists of a lighting technology that is not specifically covered by Table 6-1, it shall be classified as low efficacy if it does not meet the minimum efficacy requirements in Table 6-2.
- B. Typical examples of low efficacy luminaires include:
 1. LED lighting which has not been certified to the Energy Commission as high efficacy.
 2. Line-voltage socket or lamp holders, except for GU-24. These include conventional medium screw-base sockets, candelabra sockets, pin-based sockets, or any other type of line-voltage lamp holders capable of accepting any type of incandescent lamp, or any other type of low efficacy lamp.

3. Low voltage incandescent lighting.
 4. Track lighting of any type, or any other lighting systems which allows the addition or relocation of luminaires without altering the wiring of the system.
 5. Lighting systems which have modular components that allow conversion between screw-based and pin-based sockets without changing the luminaires' housing or wiring.
- C. Unfinished electrical boxes are also classified as low efficacy luminaires. This applies to electrical boxes that are finished with a blank cover or electrical boxes where no electrical equipment has been installed, where the electrical box can be used for a luminaire or a surface mounted ceiling fan.
- D. LED luminaires that have not been certified to the Energy Commission in accordance with the requirements in Reference Appendix JA-8, are classified as low efficacy, even if they meet the efficacy requirements of Table 6-2.
- E. See section 6.9 of this chapter for additional information about qualifying LED as high efficacy lighting.
- F. Any luminaire that contains a socket that can be fitted with an incandescent lamp is classified as low efficacy, even if a compact fluorescent or LED lamp is installed into that socket.
- G. The Standards do not recognize any socket adaptors as permanent, even when classified as permanent by the manufacturer.

Table 6-1 (Table 150.0-A in the Standards) Efficacy Classification of Common Light Sources

<p align="center">High Efficacy Light Sources</p> <p>Luminaires manufactured, designed and rated for use with only lighting technologies in this column shall be classified as high efficacy:</p>	<p align="center">Low Efficacy Light Sources</p> <p>Luminaires manufactured, designed or rated for use with any of the lighting technologies in this column shall be classified as low efficacy.</p>
<ul style="list-style-type: none"> • Pin-based linear fluorescent lamps or pin-based compact fluorescent lamps, provided that the ballast in the luminaire is electronic. Compact fluorescent lamps ≥ 13 watts have 4 pins for compliance with the electronic ballast requirements in §150.0(k)1D. • Pulse-start metal halide lamps. • High pressure sodium lamps. • GU-24 sockets rated for LED lamps. • GU-24 sockets rated for compact fluorescent lamps. • Luminaires using LED light sources which have been certified to the Commission as high efficacy in accordance with Reference Joint Appendix JA8. • Luminaire housings rated by the manufacturer for use with only LED light engines. • Induction lamps. <p>Note: Adaptors which convert an incandescent lamp holder to a high-efficacy lamp holder shall not be used to classify a luminaire as high efficacy, even if the manufacturer declares that such adaptors as permanent.</p>	<ul style="list-style-type: none"> • Line-voltage lamp holders (sockets) capable of operating incandescent lamps of any type. • Low-voltage lamp holders capable of operating incandescent lamps of any type. • High efficacy lamps installed in low-efficacy luminaires, including screw base compact fluorescent and screw base LED lamps. • Mercury vapor lamps. • Track lighting or other flexible lighting system which allows the addition or relocation of luminaires without altering the wiring of the system. • Luminaires using LED light sources which have not been certified to the Commission as high efficacy. • Lighting systems which have modular components that allow conversion between high-efficacy and low-efficacy lighting without changing the luminaires' housing or wiring. • Electrical boxes finished with a blank cover or where no electrical equipment has been installed, and where the electrical box can be used for a luminaire or a surface mounted ceiling fan.

Table 6-2 – (Table 150.0-B in the Standards) Efficacy Classification of Uncommon Light Sources

<p>Use this table to determine luminaire efficacy and classification only for lighting systems not listed in TABLE 150.0-A</p>	
<p align="center">Luminaire Power Rating</p>	<p align="center">Minimum Luminaire Efficacy to Qualify as High Efficacy</p>
<p align="center">5 watts or less</p>	<p align="center">30 lumens per watt</p>
<p align="center">over 5 watts to 15 watts</p>	<p align="center">45 lumens per watt</p>
<p align="center">over 15 watts to 40 watts</p>	<p align="center">60 lumens per watt</p>
<p align="center">over 40 watts</p>	<p align="center">90 lumens per watt</p>
<p>Note: Determine minimum luminaire efficacy using the system initial rated lumens divided by the luminaire total rated system input power.</p>	

6.3.4 Residential Hybrid LED Luminaires

Some luminaires contain both LEDs and other light sources. These are known as hybrid LED luminaires. When the LED source has been certified to the Energy Commission as high efficacy, and the other light source in the hybrid luminaire also qualifies as high efficacy according to **Error! Reference source not found.** or **Error! Reference source not found.** of this chapter, the entire luminaire may be classified as high efficacy for compliance with the residential lighting Standards.

However, when a certified high efficacy LED source system is combined with a low efficacy lighting system in a Hybrid LED Luminaire, the high efficacy and low efficacy lighting systems shall each separately comply with the applicable requirements of §150.0(k). This means that the specific requirements of each residential room type apply to the high efficacy and low efficacy parts of the luminaire respectively.

6.3.5 GU-24 Luminaires

Luminaires with GU-24 sockets which are rated for use with only LED lamps, fluorescent lamps, or high intensity discharge lamps, are automatically classified as high efficacy for residential use, and are a cost-effective way of installing high efficacy lighting.

Luminaires with GU-24 sockets sold or offered for sale in California shall accept only high efficacy lamps, and GU-24 lamps shall only be high efficacy, according to the Title 20 Appliance Efficiency Regulations. The shape and size of the GU-24 socket enables it to be manufactured into any luminaire that could use an Edison Screw socket. This means that many residential luminaire manufacturers offer GU-24 sockets as an option in all their screw-based luminaires, making it possible for all these luminaires to be classified as high-efficacy without incurring additional cost.

Compact fluorescent lamps and LED lamps are available with GU-24 bases, as shown in Figure 6-36-3. Note that the Edison-base-to-GU-24 socket adaptor shown on the right side of Figure 6-3 shall never be recognized for compliance with the residential lighting Standards. However, California law does not prohibit the installation of such adaptors in previously installed luminaires, provided that such luminaires are not used to comply with Title 24.

Under the California Title 20 Appliance Efficiency Regulations, it is illegal to sell or offer for sale an incandescent lamp with a GU-24 base, a luminaire with a GU-24 socket that is rated for incandescent lamps, or an adaptor that converts a GU-24 socket to an Edison socket.



Figure 6-2 – GU-24 socket and base



Source: http://www.northernlightsusa.com/sites/default/files/imagecache/product_full/GU24_0.jpg.

Figure 6-3 – GU-24 Lamps

6.3.6 NO “Permanent” GU-24 Adaptors

Luminaires manufactured and rated with only GU-24 sockets are recognized as high efficacy. The Standards do not recognize any socket adaptor as being able to permanently convert one type of luminaire to another type of luminaire for compliance with the Standards. For example, there are no “permanent” adaptors recognized for converting a luminaire with an incandescent screw-base socket to a permanently installed compact fluorescent luminaire, regardless of manufacturer declarations.



Figure 6-4 – A screw-base to GU-24 socket adaptor is not recognized as high efficacy by Title 24.

6.3.7 LED Must Be Certified to Qualify as Residential High Efficacy

Unlike CFL and GU-24 luminaires, LED luminaires must be certified to the Commission by the manufacturer to qualify as “high efficacy”. If LEDs are not certified, they are classified as low efficacy regardless of their actual efficacy.

Screw-based compact fluorescent lamps have never been recognized as permanently installed fluorescent lighting systems for compliance with the Standards. Similarly, LED screw based lamps, and LED screw based light engines, are also not recognized as an LED luminaire for compliance with the Standards.

There are special provisions for LED lamps that have GU-24 bases—these qualify automatically as an LED luminaire. See section 6.3.5 of this chapter for additional information about luminaires with GU-24 sockets.

The market for LED luminaires has given rise to new types of luminaires and new terminology within the lighting industry. This new terminology can be confusing;

Table 6- sets out the five types of LED lighting, and shows how to determine whether each type is high efficacy or low efficacy.

Table 6-3 – Classification of LED Luminaire Types

LED Type	Common examples	Is this a high efficacy luminaire?	Method for calculating Installed Kitchen lighting power
A. Integral LED luminaire	Most LED under cabinet luminaires Most LED picture lights	Yes, if it has been certified to the Energy Commission	Treat as LED luminaire (§130.0(c)9)
B. Luminaire with replaceable LED light engine	Recessed LED luminaires that have a replaceable proprietary light engine	Yes, if it does not contain a screw base or other ANSI base, and the light engine has been certified to the Energy Commission	Treat as LED luminaire (§130.0(c)9)
C. Integrated LED lamp with GU-24 base	GU-24 LED lamps LED trims designed to fit into recessed cans not having incandescent sockets.	Yes, if the luminaire has a GU-24 socket and is rated for use with only LEDs.	Treat as LED luminaire (§130.0(c)9)
D. Integrated LED lamps with any type of incandescent base	Screw-based LED lamps or LED trims designed to fit into incandescent recessed cans.	Never qualify as high efficacy	Treat as a line-voltage luminaire or line-voltage track as applicable (§130.0(c)2 or 7)
E. Non-integrated LED lamp	MR16 or MR11 lamps with “bi-pin” (GU5.3 or GX5.3) sockets that are powered by a 12V transformer	Never qualify as high efficacy	Treat as low voltage lighting (§130.0(c)8)
F. Luminaire housings rated by the manufacturer for use with only LED light engines.	Recessed down lights, surface or wall mounted residential lights, outdoor luminaires and flood lights.	Only if, at the time the Certificate of Installation is completed, it has been fitted with a LED light engine which has been certified as high efficacy to the Energy Commission	Treat as LED luminaire (§130.0(c)9)

The six types of LED lighting in Table 6-3 are defined as follows:

A. Integral LED luminaire.

These are luminaires in which the LEDs cannot be removed from the luminaire. The luminaire forms a single unitary device in which the lamps are not replaceable. Many picture lights and under cabinet lights are integral LED luminaires. Integral LED luminaires are high efficacy if they are certified by the manufacturer to the Commission (as described in Reference Joint Appendix JA8). LED luminaires not certified to the Energy Commission are classified as low efficacy, regardless of their actual efficacy.

B. Luminaire with replaceable LED light engine

These are similar to integrated LED lamps (above), except that the socket is not an ANSI standard socket, and is designed to connect to a luminaire housing rated for LED light engines. The connection may include a quick connect, GU-24, or other type of non-incandescent lamp holder. Many recessed LEDs are built this way. Integral LED luminaires are high efficacy only if they are certified by the manufacturer to the Energy Commission (as described in Reference Joint Appendix JA8. See section 6.9 of this chapter).

C. Integrated LED lamp with GU-24 base

These are LED lamps which contain their own drivers, and can be directly connected to a GU-24 line-voltage socket through an ANSI GU-24 standard base.

D. Integrated LED Lamps with Any Type of Incandescent Base

These are lamps which contain their own drivers, and can be directly connected to a line-voltage socket through any type of incandescent base. Integrated LED lamps that fit into any type of incandescent luminaire never qualify as high efficacy luminaires for compliance with the Standards because they can be replaced with incandescent lamps.

E. Non-integrated LED lamp

These are similar to an integrated LED lamp with an incandescent base except that the replaceable part (the lamp) does not contain its own driver (the driver is located within the luminaire). Non-integrated lamps must have ANSI sockets. Most low-voltage LED track spotlights are non-integrated lamps. These lamps never qualify as high efficacy luminaires because they could easily be replaced with incandescent lamps.

F. Luminaire housings rated by the manufacturer for use with only LED light engines

These are luminaire housings into which LED light engines can be installed. An LED light engine is defined in ANSI/IES RP-16-10 as an integrated assembly comprised of LED packages (components) or LED arrays (modules), LED driver, and other optical, thermal, mechanical and electrical components. The device is intended to connect directly to the branch circuit through a custom connector compatible with the LED luminaire for which it was designed and does not use an ANSI standard base.

It is expected that an LED light engine, which has been certified by the manufacturer to the Energy Commission as high efficacy, has been installed prior to completion of the Certificate of Installation by the licensee of record (see section 6.10 of this chapter).

6.3.8 Electronic Ballasts

§150.0(k)1D

Fluorescent lamps with a power rating of 13 watts or more shall have electronic ballasts that operate the lamp at a frequency of 20 kHz or more. Most commonly available electronic ballasts meet this requirement.

If in doubt, look at the number of pins protruding from the compact fluorescent lamp base. Pin-based compact fluorescent lamps operated with electronic ballasts typically have four-pin lamp holders. Pin-based compact fluorescent lamps with two-pin lamp holders typically indicate that the ballast is magnetic. Be careful not to confuse pin-based CFL sockets with GU-24 sockets.

There are additional requirements for compact fluorescent ballasts, when in recessed luminaires, to be certified to the Energy Commission. See section 6.3.9 of this chapter for additional information.

High intensity discharge (HID) lamps (like pulse-start metal halide or high-pressure sodium) are not required to have electronic ballasts. This requirement does not apply to HID luminaires.

6.3.9 Ballasts for Residential Recessed Luminaires

§110.9(f)

For recessed luminaires with compact fluorescent ballasts, the ballasts shall be certified to the Energy Commission. For additional information on certifying ballasts and other devices to the Energy Commission, see section 6.2 of this chapter.

The luminaire shall be designed and installed to allow ballast maintenance and replacement to be readily accessible to building occupants from below the ceiling without requiring the cutting of holes in the ceiling.

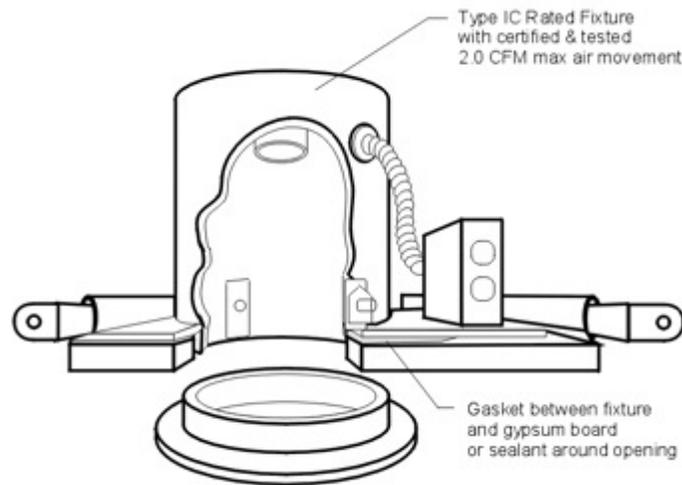


Figure 6-5 –Airtight, Type IC Luminaire

6.3.10 Night Lights

§150.0(k)1E

Permanently installed night lights and night lights integral to an installed luminaire or exhaust fan shall be rated to consume no more than 5W of power per luminaire or exhaust fan, as determined by §130.0(c).

Night lights are not required to be controlled by vacancy sensors, regardless of the type of room they are located in.

Note: Indicator lights that are integral to lighting controls shall not consume more than 5W of power per switch in accordance with §110.9(a)5.

6.3.11 Lighting Integral to Exhaust Fans

§150.0(k)1F

Lighting integral to exhaust fans shall meet the applicable requirements of §150.0(k). However, lighting which is part of a kitchen stove exhaust hood is not required to comply with §150.0(k).

This lighting integral to exhaust fans shall be controlled separately from the exhaust fan according to §150.0(k)2B.

See sections 6.5.2 for more information about lighting attached to or integral to exhaust fans.

6.3.12 IC/AT Luminaires Recessed in Ceilings

§150.0(k)8

Luminaires recessed in ceilings must meet special requirements due to the potential for thermal bridging and air paths through the ceiling insulation, and to the potential for heat build-up in the fixture to compromise the performance of the lamp. Air leaks degrade insulation performance, and can also permit condensation on the cold surface of the luminaire if exposed to moist air; for instance, in a bathroom.

Under the 2013 code, these requirements apply to all recessed luminaires (under the 2008 code they applied only to luminaires in insulated ceilings).

Luminaires recessed in ceilings must meet three requirements:

- A. They shall be listed, as defined in §100.1, for zero clearance insulation contact (IC) by Underwriters Laboratories or other nationally recognized testing/rating laboratories. This enables insulation to be packed in direct contact with the luminaire.
- B. They shall have a label certifying that the luminaire has airtight construction. Airtight construction means that leakage through the luminaire will not exceed 2.0 CFM when exposed to a 75 Pascals pressure difference, when tested in accordance with ASTM E283 (An exhaust fan housing shall not be required to be certified airtight).
- C. They shall be sealed with a gasket or caulking between the luminaire housing and ceiling, and shall have all air leak paths between conditioned and unconditioned spaces sealed with a gasket or caulk, to prevent the flow of heated or cooled air out of the living areas and into the ceiling cavity.

The residential lighting Standards allow the use of either a gasket or caulking, and do not favor one of these methods over the other. See section 6.3.13 of this chapter for helpful information on what to look for to make sure that all air leak paths have been sealed.

The following performance requirements also apply:

- A. They be certified to the Commission to comply with the applicable ballast requirements in §110.9(f) (150.0(k)8D)
- B. They shall allow ballast maintenance and replacement to be readily accessible to building occupants from below the ceiling without requiring the cutting of holes in the ceiling (150.0(k)8E)
- C. Ballasts for fluorescent lamps rated 13 watts or greater shall be electronic and shall have an output frequency no less than 20 kHz. 150.0(k)1D

Example 6-1: Recessed luminaires: fire-rated housings

Question

If a factory manufactured fire rated luminaire housing is placed over a recessed luminaire in a multi-family residential dwelling unit, is the luminaire still required to comply with the IC requirements?

Answer

There are limited applications where a non-IC luminaire may be used in conjunction with a manufactured fire rated luminaire housing in a multi-family residential dwelling unit. However, the luminaire shall still comply with all of the airtight requirements.

A non-IC luminaire may be used in a ceiling in conjunction with a fire rated housing only if all three of the following conditions are met:

1. The multi-family dwelling unit is an occupancy type R1 or R2; and
2. The luminaire is recessed between different dwelling units that are regulated by California Building Code §712.4.1.2; and
3. The manufactured fire rated housing is rated for a minimum of 1 hour fire in accordance with UL 263.

6.3.13 Building Official Inspection of IC/AT Requirements

§150.0(k)12

- A. As covered in section 6.3.12 of this chapter, recessed luminaires shall be IC rated and have a gasket or caulking between the housing and ceiling to prevent the flow of heated or cooled air between conditioned and unconditioned spaces.
- B. The luminaire shall include a label certifying airtight or similar designation to show air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283. The label shall be clearly visible for the building inspector. The building inspector may verify the IC and ASTM E283 labels at a rough inspection. If verified at final inspection the building inspector may have to remove the trim kit to see the labels.
- C. The ASTM E283 certification is a laboratory procedure intended to measure only leakage of the luminaire housing or, if applicable, of an airtight trim kit, and not the installation.

Luminaire housings labeled as airtight, airtight ready or other airtight designation does not establish that a luminaire has been installed airtight.

The luminaire manufacturer shall provide instructions that explain the entire assembly required to achieve an airtight installation.

- D. There are several different methods used by manufacturers to meet the airtight standards. The residential lighting Standards do not favor one airtight method over another, including they do not prefer the use of gaskets over caulk, or the use of caulk over gaskets for compliance with the Standards.

Because a luminaire housing is not always installed perfectly parallel to the ceiling surface, both methods have their benefits as follows:

1. Caulk will generally fill in and seal wide and uneven gaps. However, after the caulk dries, it may permanently attach the luminaire housing or trim to the ceiling surface. Therefore, the caulk may need to be cut away from the ceiling surface in the event that a luminaire housing or trim needs to be moved away from the ceiling.
2. Many gaskets allow the luminaire housing or trim to be readily moved away from the ceiling surface after it has been installed. However, if the gasket is too thin, or not made out of an air stopping type of material, it may not sufficiently reduce the air flow between the conditioned and unconditioned spaces.

Although the Standards do not specify the type of material needed for a gasket, it is likely that an open cell type of foam, particularly if the gasket is relatively thin, will not create an airtight barrier.

- E. The primary intent is to install a certified airtight luminaire so that it is sufficiently airtight to prevent the flow of heated or cooled air between conditioned and unconditioned spaces. All air leak paths through the luminaire assembly or through the ceiling opening shall be sealed. Leak paths in the installation assembly that are not part of the ASTM E283 testing shall be sealed with either a gasket or caulk.

One example may apply for assemblies where a certified airtight luminaire housing is installed in an adjustable mounting frame; all air leak paths between the certified airtight luminaire housing and the adjustable mounting frame shall be sealed, either with a gasket or caulk.

Following is the process for verifying that the requirements for an airtight installation are met.

1. Manufacturer specifications (a "cut sheet") of the certified airtight luminaire housing(s) and installation instructions shall be made available with the plans to show all components of the assembly that will be necessary to insure there is an airtight installation consistent with §150.0(k)8. This allows the building inspector to know what method the luminaire manufacturer specifies to achieve airtight installation, and therefore, at what phase of construction the building inspector shall inspect the luminaire for airtight compliance.
2. One of the following primary methods is specified by the luminaire manufacturer to insure an airtight seal of the certified airtight housing to the ceiling:
 - a. A gasket is attached to the bottom of the certified airtight housing prior to the installation of the ceiling (i.e. drywall or other ceiling materials) to create an airtight seal. The gasket may be preinstalled at the factory, or may need to be field installed. For field installed gaskets, instructions on how the gasket is to be attached shall be provided by the manufacturer. The luminaire shall be installed so that the gasket will be sufficiently compressed by the ceiling when the ceiling is installed. A gasket that is too thin will not provide an airtight seal.
 - b. A gasket is applied between the certified airtight housing and the ceiling opening after the ceiling has been installed. The gasket creates the airtight seal. The cut sheet and installation instructions for achieving the airtight conditions shall indicate how the gasket is to be attached.
 - c. Caulk is applied between the certified airtight housing and the ceiling after the ceiling has been installed. The caulk creates the airtight seal. The cut sheet or installation instructions for achieving the airtight conditions shall specify the type of caulk that must be used and how the caulk shall be applied.
 - d. A certified airtight trim kit is attached to the housing after the ceiling has been installed. The certified airtight trim kit in combination with the luminaire housing makes the manufactured luminaire airtight.

Note that a decorative luminaire trim that is not ASTM E283 certified does not make the manufactured luminaire airtight. Most decorative luminaire trims are not designed to make a luminaire airtight. Rather, these trims are used to provide a finished look between the ceiling and luminaire housing, and may include a reflector, baffle, and/or lens.

However, some trim kits are specifically designed to be a critical component used to make a luminaire installation airtight. These trim kits shall be certified airtight in accordance with ASTM E283. Certified airtight trim kits typically consist of a one-piece lamp-holder, reflector cone, and baffle.

The cut sheet and installation instructions for achieving the airtight conditions shall show which certified airtight trim kits are designed to be installed with the luminaire housing, and how the certified airtight trim kits shall be attached. A gasket shall be installed between the certified airtight trim kit and the ceiling.

3. The following methods for insuring an airtight seal between the certified airtight housing or certified airtight trim and the ceiling shall be field verified at different phases during construction:
 - a. A gasket attached to the bottom of the certified airtight housing shall be inspected prior to the installation of the ceiling when the rough-in electrical work is visible.

The inspector shall review the cut sheet or installation instructions to make sure the housing and gasket have been installed correctly.

All gaskets shall be permanently in place at the time of inspection. It is important that once the ceiling material is installed the gasket will be in continuous, compressed contact with the backside of the ceiling and that the housing is attached securely to avoid vertical movement.

The housing shall be installed on a plane that is parallel to the ceiling plane to assure continuous compression of the gasket.

- b. A gasket applied between the certified airtight housing and the ceiling after the ceiling has been installed shall be inspected after the installation of the ceiling.

The inspector shall review the cut sheet or installation instructions to make sure the housing and gasket have been installed correctly.

The gasket shall be permanently in place at the time of inspection. It is important that the gasket is in continuous, compressed contact with the ceiling, and that the housing is attached securely to avoid vertical movement.

- c. Caulk applied between the certified airtight housing and the ceiling after the ceiling has been installed shall be inspected after the installation of the ceiling.

The inspector shall review the cut sheet or installation instructions to make sure the housing has been installed correctly and the caulk has been applied correctly. It is important and that the housing is attached securely to avoid vertical movement.

- d. A certified airtight trim kit shall be inspected after the installation of the ceiling and the installation of the trim.

The inspector shall review the cut sheet or installation instructions to make sure the luminaire housing and the certified airtight trim kit have been installed correctly. It is important that the housing and the certified airtight trim kit are attached securely to avoid vertical movement.

The ASTM E283 certification is a laboratory procedure where the trim kit is tested on a smooth mounting surface. However, it is common for certified airtight trim kits to be installed against a textured ceiling or other irregular ceiling surface. It is important that the gasket is in continuous, compressed

contact with the ceiling and the certified airtight trim kit. Therefore, it is important to visually inspect the certified airtight trim kit and gasket next to the ceiling to assure that a continuous seal has been produced.

Certified airtight trim kits may be installed on luminaire housings that may or may not be certified airtight. If the trim kit is certified airtight, it shall also have a sealed gasket between the trim kit and ceiling.

6.3.14 Recommendations for Luminaire Specifications

It is important that luminaires are described fully in the specifications and on drawings so that contractors and subcontractors provide and install residential lighting systems that comply with the residential lighting Standards. The specifications should be clear and complete so that contractors understand what is required to comply with the Standards.

Following are a few suggestions to help reduce the chance that there may be costly change orders required to bring a non-complying building into compliance.

- A. Include all applicable residential lighting requirements in the general notes on the drawings and other bid documents.
- B. Include the residential lighting requirements with each luminaire listed in the lighting schedule text and details, for example:

Table 6-4 –Recommendations for Luminaire Specifications

Luminaire Type	Recommended Type of Notes for Luminaire Schedule
Bath Bar	Bath bar, GU-24 sockets rated for use with only LED lamps.
Ceiling fixture (i.e., for a bathroom application)	Fluorescent surface-mounted ceiling luminaire, with one F32-T8 fluorescent lamp and electronic ballast, meeting the requirements of §150.0(k).
LED Recessed Can (i.e., for a kitchen application)	LED recessed can certified by the manufacturer to the Energy Commission, housing rated only for use with LED and not containing incandescent sockets of any kind, meeting the IC, and airtight requirements of §150.0(k).
Incandescent Recessed Can (i.e., for a Kitchen application)	Low-voltage recessed can with a maximum relamping wattage of 50 W, meeting the labeling, IC, and Airtight requirements of §150.0(k).
Chandelier	Chandelier, controlled by a dimmer switch meeting the requirements of §150.0(k) where the dimmer is certified to the Energy Commission by the manufacturer.
Vacancy Sensor (Manual-on Occupant Sensor)	Vacancy sensor certified to the Energy Commission by the manufacturer.