Restrictions on the use of Certain Hazardous Substances in General Purpose Lights

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Introduction

Existing lighting choices for consumers contain toxic materials that, if released, can be harmful to people and the environment. For example, incandescent bulbs may contain lead and fluorescent bulbs and mercury.

Fluorescent lights are more efficient, effective, and economical than traditional incandescent bulbs, become increasingly popular lighting devices. However, when disposed of, fluorescent lights are considered hazardous wastes, therefore, these bulbs and tubes are prohibited from traditional disposal in California should be taken to a Household Hazardous Waste facility or to a Take It Back partner.

While growth in use of energy-efficient fluorescent lighting is increasing the amount of mercury-combusted produced, the US Environmental Protection Agency has concluded that shifting from incandescent to compact fluorescent lighting will result in a net reduction in total United States mercury emissions, a reduction of coal-fired electricity generation, a process that releases mercury into the atmosphere.

Concerned about the risk of mercury and lead exposure to the environment that could result from used fluorescent and some incandescent lights, in 2007 the California State Legislature enacted the Lighting Efficiency and Toxics Reduction Act or AB 1109 (Huffman, Ch. 534, Stats. 2007) to, in particular, restrict the amount of mercury and other hazardous substances allowed in general purpose lights. This law can be found in the California Health and Safety Code, division 20, Chapter 6.5, article 10.02 Lighting Toxics Reduction (Sections 25210.12).

http://www.dtsc.ca.gov/RoHS_Lighting.cfm
In addition to restricting toxics in general purpose lights, AB 1109 also required the California Ener
dot adopt energy-efficiency standards through regulations; and required DTSC, in coordination with the
Integrated Waste Management Board, to convene a taskforce to make recommendations on metho
proper management and collection of general purpose lights, including fluorescent bulbs and tubes

**Lighting Toxics Reduction and the EU RoHS Directive**

Lighting Toxics Reduction (Article 10.02) and the EU RoHS Directive.

Beginning January 1, 2010, Article 10.02 prohibits the sale of general purpose lights in California if they exceed h
substance concentration limits set forth in European Union(EU) legislation known as the RoHS Directive(Directiv
The RoHS Directive establishes allowable maximum concentrations for the following hazardous substances: mer
cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs)

Article 10.02 ("Lighting Toxics Reduction") also does the following:

- Restricts, beginning January 1, 2010, a person from manufacturing for sale in California, gener
  that contain levels of hazardous substances that would be prohibited by the EU pursuant to the l
  (Health & Saf. Code § 25210.9, subd. (a).)

- Exempts high output and very high output linear fluorescent lamps greater than 32 millimeters i
  preheat linear fluorescent lamps, high intensity discharge lamps, and compact fluorescent lamps
  inches in length.

- Requires manufacturers of general purpose lights that are sold or offered for sale in California t
  technical documentation upon request to DTSC demonstrating that the general purpose lights c
  RoHS Directive. (Health & Saf. Code § 25210.9, subd. (h).)

- Requires manufacturers of general purpose lights to provide sellers of general purpose lights in
  certification that the lighting complies with the EU RoHS Directive, upon request. The certificate
  the shipping container or on the packaging. (Health & Saf. Code § 25210.9, subd. (i).)

- Restricts, beginning January 1, 2010, a person from selling general purpose lights from manufa
  to provide required documentation or certification pursuant to Health and Safety Code section 2!
  subdivisions (h) and (i). (Health & Saf. Code § 25210.9, subd. (b)(2 & 3).)

This website summarizes California law and RoHS Directive provisions. It does not replace or supersede those l: actual regulatory requirements you should consult California statutes and RoHS Directive provisions.

**What is the RoHS Directive?**
The RoHS Directive, the European Union legislation referenced in the California statutes on toxics in lighting, rest hazardous substances in the manufacture of electrical and electronic equipment (EEE). The term EEE includes li (as defined in Directive 2002/96/EC Annex IIA and IIB) and electric light bulbs and luminaries in households. (200:

The RoHS Directive restricts EEE containing lead, mercury, hexavalent chromium, cadmium, PBBs and PBDEs i
exceeding a maximum concentration value (MCV) from being put on the market. MCVs are set as follows by the

<table>
<thead>
<tr>
<th>Hazardous Substance</th>
<th>MCV (% by weight) in homogeneous materials</th>
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</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>0.1 % (1000 ppm)</td>
</tr>
<tr>
<td>Lead</td>
<td>0.1 % (1000 ppm)</td>
</tr>
<tr>
<td>Hexavalent chromium</td>
<td>0.1 % (1000 ppm)</td>
</tr>
<tr>
<td>PBBs</td>
<td>0.1 % (1000 ppm)</td>
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</tbody>
</table>
The RoHS Directive exempts certain applications of lead, mercury, cadmium and hexavalent chromium from these some cases establishes alternative limits.

### The RoHS Directive and lighting equipment

The RoHS Directive contains exemptions allowing mercury and certain applications of lead in lighting. All other hazardous substances may not exceed the MCV as a percentage by weight per homogenous material (please see RoHS Directive for more details). DTSC has created several flow charts as guidance outlining when these exemptions may be applied.

The RoHS Directive contains many exemptions that may apply to lighting equipment, which are summarized below:

- **RoHS Application 1**: Mercury in compact fluorescent lamps (CFLs) may not exceed 5 mg per lamp.
- **RoHS Application 2**: Mercury in a straight fluorescent lamp that is used for general purpose may not exceed 10 mg in halophosphate lamps, 5 mg in triphosphate lamps with a normal lifetime, and 8 mg in triphosphate lamps with a long lifetime.
- **RoHS Application 3**: No restrictions on the amount of mercury in a straight fluorescent lamp that is used for special purposes.
- **RoHS Application 4**: No restrictions on the amount of mercury in other lamps not mentioned in RoHS Directive.
- **RoHS Application 5**: No restrictions on the amount of lead in the glass of fluorescent tubes.
- **RoHS Application 6**: Lead used as an alloying element in steel can contain up to 0.35% lead by weight, 0.4% for aluminum and 4% lead by weight for copper alloy.
- **RoHS Application 7**: No restrictions on lead used in high melting temperature type solders (i.e. tin-lead base containing 85% by weight or more lead).
- **RoHS Application 16**: No restrictions on lead used in linear incandescent lamps with silicate coated tubes.
- **RoHS Application 19**: No restrictions on lead with PbBiSn-Hg and PbInSn-Hg in specific compositions as Pb with PbSn-Hg as auxiliary amalgam in very compact Energy Saving Lamps (ESL).

California modeled its Lighting Toxics Reduction law after the European Union’s (EU) RoHS Directive 2002/95/EC applications of lead, mercury, cadmium and hexavalent chromium that are exempt from the EU RoHS Directive are exempt from California law. It is very important to consult both the actual California law and RoHS Directive provisions determining whether an exemption applies.

### Commonly Used Terms

- Compact Fluorescents Lamps (CFLs)
- Incandescent lights (or lamp)
- General purpose lights
- Halophosphate fluorescent lamps
- High output or very high output straight (linear) fluorescent lamps
- Homogeneous material
- Straight triphosphate fluorescent lamps with a long lifetime
- Preheat fluorescent lamps
Compact Fluorescents Lamps (CFLs)

Compact fluorescents lamps (CFLs) are usually single-based fluorescent lighting with a plug-in or screw-in base and are generally smaller and more compact than linear fluorescents. They include bare and covered wattages and all shapes (twist, loop, globe, a-shape, flood, bullet, candle flame, etc.). Some CFLs are replace incandescent lighting in any type of lighting fixture. There are two general categories of CFLs:

1. FL with integrated ballast, which typically have a screw-in base
2. FL with non-integrated (separate) ballast, which are often pin-based

Incandescent lights (or lamp)

Incandescent lamps include traditional light bulbs that emit light by passing electric current through a filament of conducting material heated by an electric current. The California Energy Commission (CEC) has defined an "incandescent light" as one which is produced by a filament of conducting material heated by an electric current in an enclosure in which light is produced by a filament of conducting material heated by an electric current. (Regs., tit. 20 § 1062, subd. (k.).)

General purpose lights

Health and Safety Code section 25210.10 defines "general purpose lights" to include "lamps, bulbs, and other electric devices that provide functional illumination for indoor residential, indoor commercial, and outdoor use." Some examples may include:

1. Compact Florescent lamps
2. Straight (linear) fluorescent lamps
3. Incandescent lights (including halogen)
4. Light Emitting Diodes (LEDs)

The definition of "general purpose lights" excludes the following specialty lighting: appliance, black colored, infrared, left-hand thread, marine, marine signal service, mine service, plant light, reflector service, shatter resistant, sign service, silver bowl, showcase, three-way, traffic signal, and vibration resistant.

Halophosphates fluorescent lamps

The inside of a fluorescent lamp is coated with a phosphor powder, which produces visible light when struck by ultraviolet (UV) light. Various blends of phosphors are used in fluorescent lamps to determine the type of light emitted (cold, cool, warm). Halophosphates are an older class of phosphors that are limited in their ability to provide a high-color rendering index (CRI) for the light tube's or bulb's CRI is a measure of how accurately the colors of objects appear under its light. The higher the number, the closer the colors are to natural light. Most halophosphate fluorescent lamps have a CRI of less than 80.

Most halophosphate straight (linear) lamps (LFLs) are T12 models. Other less common halophosphate sizes include T6s as well as T6s and T17s.

Please note: Not all T12 lamps use halophosphate phosphors. Some T12s, which typically have a CRI of 80 or more than 80, are not considered halophosphate. As triphosphate fluorescent lamps, the triphosphate mercury requirements set forth in RoHS exemption 2 may be applicable.

http://www.dtsc.ca.gov/RoHS_Lighting.cfm

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Also, some T12 triphosphate fluorescent lamps with a high CRI are considered linear fluorescent lights used for "because they are designed to be shatter resistant or are used for displays, signage, backlighting, appliances, aqua lights. These may be exempted from EU RoHS requirements for mercury content under RoHS exemption-Applic

**High output or very high output straight (linear) fluorescent lamps**

*Health and Safety Code section 25210.9, subdivision (e) exempts high output and very high output straight (linear) lamps greater than 32 millimeters in diameter from the RoHS Directive hazardous substance restrictions.*

"High output" and "very high output" straight (linear) fluorescent lamps usually have a lower starting temperature and lumen output than standard fluorescents. The words "high output" or "very high output" are usually abbreviated to HO or VHO. These lamps are typically used for outdoor lighting, sign lighting, coolers and freezers. The most common T12/HO or T12/VHO, but there are also some high output/very high output T5s and T8s.

The ballasts for high output and very high output lamps are usually larger than standards types and they tend to produce more heat. Some HO lamps also have a single pin end (T12s specifically) and others have a recessed double contact that does not match up to fixtures designed for standard fluorescent light bulbs.

Some high output and very high output lamps used for general purpose lighting are covered under Section 25210 (e), while others are not. In addition, mercury content may not be restricted in most T5 and T8 HO and VHO fluorescent lamps because under EU RoHS Directive exemptions they are often considered “straight fluorescent lamps for special purposes” (amalgam lamps).

**Homogeneous material**

The term “Homogeneous material” is defined in RoHS Directive guidance documents to mean “a material that can mechanically disjointed into different materials.” (Frequently Asked Questions on Directive 2002/95/EC on the Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) and Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE), p.17.)

The guidance further defines homogeneous as "is of uniform composition throughout” and mechanically disjointed can, in principle, be separated by mechanical actions such as: unscrewing, cutting, crushing, grinding, and abrasion (Frequently Asked Questions on Directive 2002/95/EC on the Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) and Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) Examples of “homogeneous materials” include individual types of glass, metals, alloys, resins and coatings.

**Straight triphosphate fluorescent lamps with a long lifetime**

*The EU RoHS Directive contains an exemption for straight triphosphate fluorescent lamps with a long lifetime where:*  

RoHS Application 2. *Mercury in a straight fluorescent lamp may not exceed:*  

8 mg in triphosphate lamps with a long lifetime

Health and Safety Code section 25210.9 references the current EU RoHS standards. However, the EU is currently revising the definition of “long” lifetime triphosphate lamps. It has been proposed to amend the EU definition “long lifetime” to refer to a test method where the lamp is tested on a modern electronic ballast (equivalent to an “instant start” ballast in the US) and turned on for hours (“three hour starts”). If the EU amends the RoHS Directive to incorporate this revised criterion for “lifetime,” it may be applicable in California as well.

Generally, the term “standard life” is used by the lighting industry to describe a fluorescent lamp with a rated life of 25,000 hours. This is consistent with the current EU proposal to use "lifetime" to mean having a rated life of > 25,000 hours.
Manufacturers usually label triphosphate fluorescent lamps with a life > 24,000 hours with a symbol or word to distinguish them from “normal” lifetime lamps (e.g., (LL) long life, (XLL) extra long life, PLUS, (XL) extra life, (SXL) super long life) performance.

**Preheat fluorescent lamps**

*Health and Safety Code section 25210.9, subdivision (e) exempts preheat straight (linear) fluorescent lamps from hazardous substance restrictions.*

Preheat fluorescent lamps are designed to be used in fixtures with a starter - a switch that briefly allows electrical through the lamp’s filaments. The filaments heat the gas inside the lamp, which allows electricity to flow. Preheat lamps can be identified from their relatively short rated life (5,000 to 9,000 hours) and their relatively low CRI (50-80); they will usually be indentified in most manufacturers’ catalogs as the “average rated life”, and many of them are class halophosphates.

**Specialty Lighting**

California law excludes “specialty lighting” from the definition of general purpose lights. Specialty lighting includes:

- appliance, black light, bug, colored, infrared, left-hand thread, marine, marine signal service, mine service, plant life rough service, shatter resistant, sign service, silver bowl, showcase, three-way, traffic signal, and vibration service resistant.

**Straight (linear) fluorescent lamps**

Straight (linear) fluorescent lamps generally have a double–pinned base. Their shape and size are expressed by consisting of the letter “T”, meaning the bulb is tubular, followed by a number. The number is the diameter of the lamp in inches (T2 – T12). Fluorescent tubes are available in lengths ranging between 6 inches and 96 inches (8 feet). Properties of straight fluorescent lamps are determined by the phosphors used to coat the inside of the tube.

The EU RoHS Directive does not restrict the quantity of mercury in straight fluorescent lamps that do not fall into exemption categories (see RoHS exemption-Application 4).

A guidance document issued by the United Kingdom (UK) Department for Business Enterprise and Regulatory Reform assist those placing EEE on the market in the UK provides the following examples of lamps that are not subject to restrictions: non-linear lamps such as u-bent and circular models, induction fluorescents, neon lamps and high int lamps - including mercury vapor, high and low pressure sodium, and metal halide lamps.

**Straight (linear) fluorescent lamp used for “special purposes”**

*The EU RoHS Directive does not restrict the quantity of mercury in fluorescent lamps for special purposes.*

The UK Guidance lists the following examples of halophosphate fluorescent lamps used for “special purposes”: tanning, lamps used in appliances such as refrigeration units, black lights (i.e., ultraviolet lights), aquarium and sh models, long length lamps (greater than 1800mm in length), disinfection lamps with special components (e.g. internal or external protection sleeves), lamps with special ignition features (e.g. designed for low temperatures), amalgar signs, and LCD back light lamps. (This is list of examples and should not be considered all-inclusive.)

**State regulated general service incandescent lamps**

*Health and Safety Code section 25210.9 subdivision (g) exempts “state-regulated general service incandescent lamps” “enhanced spectrum lamps” as defined in subdivision (k) of Section 1602 of Title 20 of the California Code of Reg January 1, 2014 from hazardous substance restrictions.*
The California Energy Commission defines a “state regulated general service incandescent lamp” as a standard halogen type lamp that meets all of the following criteria:

1. It is intended for general service application and medium screw base;
2. It has a wattage rating > 25 watts and < 150 watts;
3. It has a rated voltage range at least partially within 110 and 130 volts;
4. It has a bulb finish of the frost, clear or soft white type; and

The California Energy Commission has also defined enhanced spectrum lamps in regulation. For more information on spectrum lamps, see subdivision (k) of Section 1602 of Title 20 of the California Code of Regulations.

**Solder**

The *EU RoHS Directive contains an exemption for lead from MCV restrictions when it is used for “high temperature solders,”* ([see RoHS Exemption – Application 7](http://www.dtsc.ca.gov/RoHS_Lighting.cfm)).

**UK guidance** defines solder as “an alloy used to create metallurgical bonds between two or more metal surfaces for electrical and/or physical connection.”

The [UK guidance](http://www.dtsc.ca.gov/RoHS_Lighting.cfm) provides this information, which may be helpful in determining whether and when the “high temp exemption applies to solder used in lighting equipment:

> “The high melting temperature type solder exemption has been introduced to allow the use of lead in sold specific applications (such as in power semiconductor package manufacturing), for which viable lead-free alternatives have not yet been identified. This exemption is permitted as there are no alternative alloys with melting point and which are ductile. The high electrical conductivity and unique mechanical properties of high melting point tin-lead alloy make the material malleable and better able to withstand both temperature physical stress. Such properties ensure fewer defects during manufacturing and high reliability throughout of the component, thereby also resulting in fewer components going into the waste stream.”

**Triphosphate fluorescent lamps**

The inside of a fluorescent lamp is coated with a phosphor powder, which produces visible light when struck by ultraviolet light. Various blends of phosphors are used in fluorescent lamps to determine the type of light emitted (cold, cool, warm white).

Triphosphates (also referred to as “tri-band phosphates”) are a newer class of phosphors used to make fluoresce more efficient than the older halophosphate type lamps. Most triphosphate fluorescent lamps have a relatively high rated life of 15,000 hours or more.

Straight triphosphate fluorescent lamps are commonly available in five types:

1. T5s (except preheat models)
2. T8s (except preheat models)
3. T10s
4. T2s (if they are cold cathode tubes, these bulbs are exempted as “special purpose” lamps)
5. T12s with a high CRI (usually >80) designed to run on an electronic ballast.

**Frequently Asked Questions (FAQ)**

- View all answers

  Q. When testing incandescent light bulbs for lead, what parts would be considered a “homogenous material”?

http://www.dtsc.ca.gov/RoHS_Lighting.cfm
Q. As a manufacturer am I required to provide certification to a seller for my “general purpose lights” sold in California?

Q. As a manufacturer, am I required to submit documentation to DTSC for my “general purpose lights” sold in California?

Q. Are there any exemptions that allow lead in light bulbs?

Q. Are luminaries considered a “general purpose light” as that term is defined in Health and Safety Code section 25210?

Q. Is a ballast considered a part of a general purpose light as that term is defined in Health and Safety Code section 25210?

Q. Are light bulbs in toys and other devices that contain small discrete lighting considered general purpose lights as defined in Health and Safety Code section 25210.10?

Q. I have read the RoHS Directive and I noticed it references the WEEE Directive. How do these two directives relate?

Q. As a retailer, after January 1, 2010, can I still sell my existing stock of lighting even though those lights may not comply with RoHS restrictions?