

## Investigation Guideline



Appendix 125  
January 2003

# Electrical Lighting Products

## I. Introduction

### A. Background Information

In 1998, light fixtures, lamps and light bulbs were collectively associated with an estimated 60 deaths and an estimated 250 injuries. In 1999, 5 percent of all consumer product-related electrocutions were associated with lighting equipment.

We are specifically interested in malfunctions of lighting products that result in fires, potential fire hazards, and/or shock hazards. The purpose of the investigations is to identify the mode of failure in each scenario, and better understand how they relate to the severity of the accident and the associated casualties.

In addition to filling out the Data Record Sheet (DRS) attached to the back, please provide any relevant information that is discovered in the investigation process that may not have been specifically requested for in this guideline or the DRS.

### B. Product Information

#### 1. General Description

The major components associated with lighting equipment are the *bulb* (also referred to as the *lamp*), the *fixture*, the *lampholder*, and the *switch*. Portable lighting products will have a *power-supply cord* and *plug*. The *connection* is an important component for fixed lighting products which will usually be directly connected to the branch circuit wiring; some may have a *power-supply cord* and *plug*.

- Bulb:** The most common types of bulbs available in the market are incandescent, fluorescent, and halogen. Some high intensity discharge bulbs such as high-pressure sodium bulbs, mercury bulbs, and metal halide bulbs may also be encountered, especially in outdoor lighting.

- Fixture:** The majority of the fixtures are either portable or permanent. Portable fixtures include table, desk, and floor lamps, and nightlights. Most trouble lights and workshop lights are also portable. Permanent fixtures include hanging, surface mounted, or recessed lighting products that fit on ceilings, walls, furniture (e.g. under bookcase

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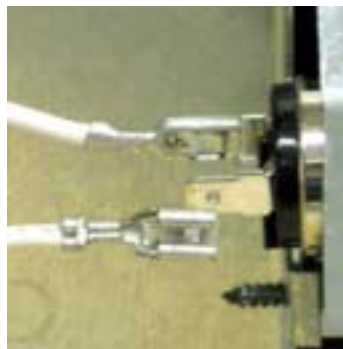
shelves, inside china cabinets, on headboards, etc.), or appliances. Track lights and under-the-counter lighting products are usually permanent fixtures. Diagrams of sample installations (surface mounted or recessed) are attached to the back of this guideline.

- Lampholder:** The lampholder is the part of the fixture that holds the bulb. Different types of bulbs require different lampholders to work properly. The screw shell type lampholder is probably the most common. Other lampholders include the brackets that hold fluorescent tubes and/or halogen bulbs.
- Cord:** Lighting products that use plug-in cords may be used with extension cords. In such cases, information on the condition, length, and gauge of both the original and the extension cords is useful. See Appendix 8, guideline on Extension Cords.
- Switch:** Many types of switches could be encountered with both portable and permanent lighting fixtures. Some of the more common types are the simple on/off switch, the dimmer switch, and the touch switch. Permanent lighting fixtures may have multiple switches and they may not be on the fixture. Some portable lighting fixtures may be plugged into a switched electrical outlet. In this case, the switch would be on the wall.
- Connection:** The wire connection is an important component of the permanent lighting products. Connections are often made with twist-on connectors, push-in connectors, or crimps, as shown below.

Twist-on connector



Push-in connector



Crimps



### C. Specific Items of Interest

- We are particularly interested in the mode of failure. We want to know if it was the bulb, the fixture, the lampholder, the cord, the switch, or the connection that was the primary source of failure.
- We are also very interested in any labeling on the product. For instance, the “IC” marking on a fixture indicates that the product is designed for use on an insulated ceiling. So whenever an insulated ceiling is present, we are interested in knowing if the product is marked “IC”.

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### D. Headquarters Contact

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## II. Instructions for Collecting Information

### A. Description of the Incident Environment

- Use the following product codes on Form 182 for identification purposes:

0628: Electric chandeliers, hanging lamps, and other attached fixtures

4070: Floor or table lamps, halogen

4071: Floor or table lamps, electric (excluding halogen)

0627: Light bulbs

1533: Nightlights

1452: Outdoor electric lighting equipment

0877: Trouble lights or extension worklights

4039: Other electric lighting equipment

4041: Electric lighting equipment, not specified

4042: Lighting equipment, not specified

In the synopsis of the report, please use the word *lighting* to ease the computer-based data retrieval process.

- Pre-incident: Include in this portion of the narrative a description of the circumstances that led up to the incident.

- Incident: Describe in the narrative how the incident happened with supporting facts.

- Post-incident: Describe in the narrative the deaths, injuries, the type of treatment administered, and extent of property damage. Describe the current condition of the lighting product in question.

### B. Description of Injured Persons and Product Interaction

Describe any experience or knowledge the victim(s) had of the product and the hazards involved. If applicable, indicate if any instruction manual was included with the purchase of the product and if the victim(s) had read and understood the instructions.

### C. Description of Product

- Describe the type of bulb involved in the incident (incandescent, fluorescent, halogen, etc.).

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- Specify the number of bulbs and the wattage of each bulb in fixture.
  
- Indicate the type of fixture as to whether it was portable (such as lamps, nightlights or work lights) or permanent (hanging, recessed or surface mounted on ceiling, wall, furniture, or appliance).
  
- If the fixture has a shade or cover, describe what type (e.g. bulb completely enclosed, bulb partially enclosed space below/open above, etc.) Include a sketch.
  
- If there is a power-supply cord, describe the type of plug (2-pronged (one prong wider or not), 3-pronged, adapter attached, etc.).
  
- If there is a power-supply cord, indicate if an extension cord was used; if yes, specify length. Specify all markings on the original and extension cords.
  
- Describe product characteristics (length, size, dimensions, volts, amps, watts, UL or other certification of performance with specific standards, etc.).
  
- Specify all wording of UL or other label(s) on product.
  
- Specify the age of the product, the date of purchase, or how long the consumer owned the product.
  
- List manufacturer name, brand name and model/series number.
  
- Specify product history e.g., previous problems, alterations, or modifications, repairs (include dates(s), type of repair(s) and by whom repaired).
  
- Indicate how long the product was in use immediately before the incident on that day.
  
- If a permanent lighting equipment, determine whether the fixture was installed when the house was built, a replacement for older fixture, or added after the house was built, and who installed it.
  
- If part of outdoor lighting, indicate weather conditions (such as temperature, humidity, and presence of any precipitation) at the time of the incident.
  
- Good photographs of the product will be very helpful.

### D. Description of Injured Persons

Indicate the age and sex of all injured person(s). Indicate the severity of each injury (death, hospitalization, treated and released). Also indicate whether any competence

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reducing factors such as impaired vision, physical handicaps, medication, alcohol/drugs, etc. existed at the time of the incident.

### E. Description of environment

The following information will be relevant for *fixed* lighting equipment :

- Describe installation of fixture, the type of ceiling, wall or furniture surface and ventilation.
- If fixture was surface mounted, indicate whether the junction box (a metal or plastic box that encloses the connection of two or more wires) was above or below ceiling level or within wall space.
- Specify if there was any type of thermal insulation over, near, or surrounding the fixture. If yes, describe type and distance from fixture.
- Specify when the insulation was installed.
- If either recessed or surface-mounted fixture, specify if the electrical junction box was framed-in or contained a barrier to provide separation from any insulation.
- Describe the location of on-off switch.

The following information will be relevant for *all* lighting equipment:

- Specify wire size, material, and voltage of electrical circuit.
- Specify size, type, and manufacturer of circuit protection (fuse or circuit breaker).
- Specify if branch overcurrent protective device operated to shut off the current in the circuit at time of incident.
- If a shock incident, indicate if a ground fault circuit interrupter (GFCI) was present on the branch circuit or outlet, and whether it shut off the current at the time of the incident. If GFCI did not shut off the current, indicate its age, manufacturer, model number, etc. of GFCI.

### F. Other

- Specify if product was repaired or replaced after the incident.

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- Talk to repairman about failure cause.
- In fire incidents, indicate first material to ignite, if observed. Indicate the presence of any flammable objects in the vicinity.
- For fire incidents, specify estimated property damage (if known) including fire spread and dollar loss. Indicate the dwelling type, floor and room of incident.
- For fire incidents, indicate if smoke detectors were present. Did they help in recognition of the fire? Indicate if water sprinklers were present.

### **III. Instruction for Photographing and/or Diagramming Incident Scene and Factors Related to the Incident Sequence**

- A diagram or photograph of installation is particularly useful. Good photographs of the product and/or the incident scene are always helpful.

### **IV. Instruction for Obtaining Samples and Documents Related to Investigation**

- Collect sample if available, keeping the sample as undisturbed as possible; if sample is unavailable, describe similar products at incident site. Record observation of their appearance related to the failed unit.

- When collecting sample, collect the entire fixture, including the bulb(s) and the shade. If it appears that the incident may have occurred at the junction box, collect the entire junction box plus 1 or 2 feet of the branch wiring without disturbing the connection inside the junction box. If it is a plug-in type of fixture and it appears that the incident occurred at the receptacle, collect the receptacle as well.

If the power is turned on at the incident scene, an electrician should disassemble the sample. If the power is off, it is up to the investigator to decide how comfortable he/she feels about disassembling the sample without disturbing it too much. If unsure, it is always better to seek the help of an electrician.

- Specify if fire service was summoned and obtain copies of any fire, repair, or insurance company reports that are available. Also obtain any/all photos taken by the fire service or insurance company.

- Include copies of any installation instructions or product information inserts.

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### Data Record Sheet for Electrical Lighting Products

1. Task no: \_\_\_\_\_ 2. Hazard type: Fire / Smoke / Electric Shock
3. Product codes:
4. Portability of product: Portable (e.g. lamps, nightlight, work light)  
Permanent (mounted on walls, ceilings, furniture, or appliances)

If *portable* product was involved, answer items a. through i. below:

- a. Type of product: table, desk, or floor lamp / nightlight / trouble or work light / other(specify)
- b. Type of bulb: incandescent / fluorescent / halogen / high-pressure sodium bulb/mercury bulb / metal halide bulb / other (specify)  
watts \_\_\_\_\_ amps \_\_\_\_\_ volts \_\_\_\_\_
- c. Switch: yes \_\_\_\_\_ no \_\_\_\_\_ Location?
- d. Type of plug: 2-pronged (polarized or non-polarized) / 3-pronged / adapter attached / other (specify)
- f. Primary source of failure: bulb / fixture / cord / extension cord / plug
- g. How failure occurred?
- h. Rating of power-supply cord: wire gauge \_\_\_\_\_ AWG  
voltage \_\_\_\_\_
- i. If extension cord was used i. length of extension cord \_\_\_\_\_  
ii. rating of cord: \_\_\_\_\_ AWG  
\_\_\_\_\_ volts

If *permanent* or *fixed* lighting product was involved, then answer items a. through f. below:

- a. Type of product: i. hanging / mounted /other (specify)  
ii. on wall / ceiling / furniture / appliance / other (specify)  
iii. recessed / surface mounted

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b. Type of bulb: incandescent / fluorescent / halogen / high-pressure sodium bulb/mercury bulb / metal halide bulb / other (specify)  
watts\_\_\_\_\_ amps\_\_\_\_\_ volts\_\_\_\_\_

c. Type of switch: (.e.g. on-off / dimmer / touch)  
watts\_\_\_\_\_ voltage\_\_\_\_\_ amps\_\_\_\_\_

If applicable, cord and plug information

d. If applicable, information on home wiring: wire gauge\_\_\_\_\_AWG  
voltage\_\_\_\_\_volts

e. Primary source of failure: bulb / fixture / switch / connections / wiring

f. How failure occurred:

The rest of the information will be relevant for all lighting products.

5. Manufacturer

6. Brand or model

7. Age of product

8. Product obtained new or used (if applicable)

9. UL or any other listings certifications

10. Time in use just prior to accident

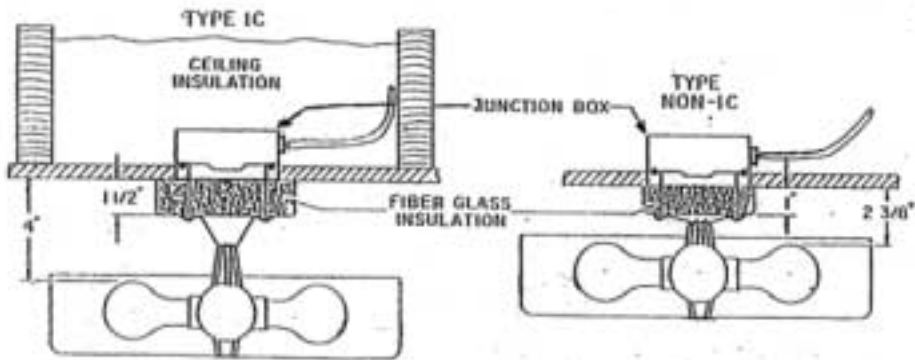
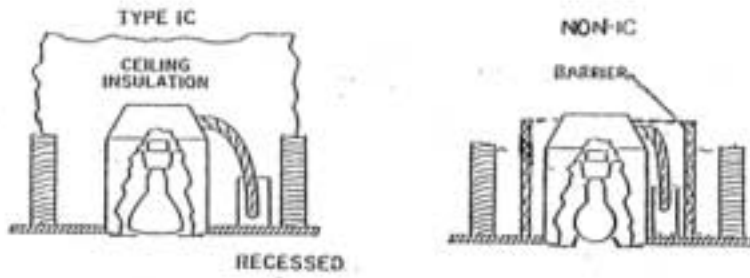
11. At the time of incident: switches on / off? circuit -breaker tripped?

12. Previous problem history?

13. Product previously repaired?



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**SURFACE MOUNTED**  
**RECESSED AND SURFACE MOUNTED,**  
**CEILING LIGHT FIXTURE INSTALLATION**