

SPECIAL LUMINAIRES IN ENTERTAINMENT INDUSTRY

1. Objective

The objective of this document is to establish safety guidelines for the maintenance and use of luminaires used in the motion picture, television, and entertainment industry which are difficult to approve under the requirements of CSA C22.2 No. 166 or SPE-1000, current versions of the standards, and which will allow a method of electrical acceptance. In its preparation, consideration has been given to the prevention of fire and shock hazards, as well as proper maintenance and operation.

Compliance with this guideline and proper maintenance will ensure for essentially safe operation.

This guideline is not intended as a design specification nor as a replacement for CSA C22.2 No. 166 Stage and Studio Luminaires or SPE-1000 Model Code for Field Evaluation of Electrical Equipment, current versions of the standards.

This equipment is to be used subject to the guidelines found in this document.

The ESA label identifies that luminaires are approved only when installed in accordance with this guideline, and shall be allowed to be used or rented when provisions of this guideline are followed.

This Guideline is intended to serve a very specific need of OHSA and is in no way intended to be used as a substitute for the Ontario Electrical Safety Code. Omission of any requirements presently in the OESC does not in any way affect the OESC, nor should these omitted requirements be considered unimportant. They are essential to the OESC and its intended application, that is, its use by those who design, install, and inspect electrical installations. This guideline on the other hand, is intended for use by employers, employees, and OHSA.

2. Scope

This guide applies to incandescent, fluorescent, and gas discharge luminaires, specifically for film & television 'set' lighting, suitable for use in dry locations, for operation at 750 volts or less, whose external surface temperature may exceed 90 degrees Celsius and which are to be installed and maintained in accordance with the rules in the Ontario Electrical Safety Authority Code.

Luminaires accepted under this document are for use only by authorized persons and must be used within the guidelines and attached work rules of this document.

Luminaires accepted under this document will be accepted before they are used in any location. Such locations will be inspected by an ESA inspector, as per OESC Rule 2-024(3):

Conditions for qualification:

- (a) manufactured before August 1, 2001, or

(b) where the type of luminaire is such that manufacture and approval to the normally applicable equipment standards (CSA C22.2 No. 166 Stage and Studio Luminaires or SPE-1000 Special Inspection, current versions of the standards) are impossible. This is limited to:

- Space Light;
- Skypan;
- Chicken Coop or
- M.I. Light.

If any manufacturer makes a particular luminaire type included in the above list that does meet CSA C22.2 No. 166 or SPE-1000, then all new luminaires of that type shall also meet CSA 166 or SPE-1000, current versions of the standards.

It is the user's responsibility to protect luminaires from adverse environments and to ensure the luminaires are not a heat, shock or fire hazard to people or property.

3. Definitions

Acceptable: to the Electrical Safety Authority (ESA)

Authorized Person: means a qualified person who, by the nature of their duties or occupation, is obliged to approach or handle electrical equipment; or, a person who, having been warned of the hazards involved, has been instructed or authorized to do so by someone having authority to give the instruction or authorization.

Chicken Coop: Fabricated from a metallic non-flammable enclosure. This luminaire is used as an overhead soft light. Often this luminaire is found with a black fabric drape hung around the bottom so as to direct light straight down.

Dry Location: a location not normally subject to dampness, but may include a location subject to temporary dampness, provided ventilation is adequate to prevent accumulation of moisture.

Identified:

- (a) When applied to a conductor means that the conductor has:
- (i) A white or natural grey covering; or
 - (ii) A raised longitudinal ridge or ridges on the surface of the extruded covering on certain flexible cords, either of which indicates that the conductor is either a grounded conductor or a neutral; and
- (b) When applied to other electrical equipment means that the terminals to which grounded or neutral conductors are to be connected have been distinguished for identification by being tinned, nickel plated, or otherwise suitably marked.

Luminaire: a lighting instrument consisting of a light source, socket, enclosure, electrical wiring and connector; and may include switches, reflectors, lenses, ballasts, supporting devices, and other apparatus for altering the quantity and quality of light emitted by the apparatus.

M.I. Light: Most commonly fabricated from aluminum square tubing. This luminaire is used as an overhead soft light. Sides are normally covered with a black shroud so as most of the light is directed straight down through a white drape.

Monitor: to observe or watch for purposes of control.

Qualified Person: means one familiar with the construction and operation of the apparatus and the hazards involved.

Skypan: Used in lighting a large cyc. Washes light evenly across a large area. Available in 2K, 5K, and 10K. Looks like a large metal wok with a socket and a lamp in the centre. Most commonly used with a metal shroud (skirt) around the outside.

Space Light: this is a 6 lamp unit, typically 6 x 1000W, designed to be used with 3200 degrees K Quartz lamps (for example T-3 lamps such as FCM, FHM, etc.....). It is constructed so that all light passes indirectly through a diffusion shroud with a large unobstructed surface, to provide a very soft, virtually shadow free field of light. Most often used in conjunction with a black fabric drape around the outside.

4. Reference publications (current versions of the standards)

- Ontario Electrical Safety Code
- SPE-1000, Model Code for the Field Evaluation of Electrical Equipment
- C22.2 No. 0, General Requirements-Canadian Electrical Code, Part 2
- C22.2 No. 166, Stage & Studio Luminaires

5. Preface

This approval service is provided by the Electrical Safety Authority.

Equipment labeled under this program is accepted for use in Ontario and is not to be considered certified.

The object of this guide is the control of fire, shock, and heat hazards. Evaluation of equipment is limited to these safety considerations.

In this guide, control of hazards is recognized to occur in four ways:

- (1) By the use of acceptable installation methods.
- (2) Through the use of equipment that is inherently safe.
- (3) Safety through the use of appropriate signage.
- (4) Safety through application of work rules (attached to this document).

* An ESA inspector shall do the testing and labeling of the luminaires. As an alternative to testing, the ESA inspector may agree to accept submitted test data for the luminaires.

* The luminaires shall be inspected as part of the wiring installation each and every time they are being used.

6. Power supply cords

Power supply cords shall be suitable for the purpose, and be protected from physical damage. They shall be provided with strain relief where they enter into the enclosure, and where found worn or damaged, the cable and/or strain relief shall be replaced.

7. Internal wiring

- (a) Conductors shall be suitable for the purpose.
- (b) Terminations shall not be subject to injurious strain and shall be suitable for the application.
- (c) Openings through which conductors pass shall be bushed or shall have smooth surface.
- (d) Internal wiring ratings must exceed the temperatures as determined under test as per section 20.1 of this document.

8. Components

Components shall be suitable for their intended purpose, and in good working order.

9. Switches

- (a) A single-pole switch shall not be connected in an identified conductor.
- (b) On/off positions of switches shall be clearly marked.

10. Receptacles

- (a) Receptacles mounted on luminaires shall be of the grounding type or polarized.
- (b) A bonding jumper shall be connected between the receptacle grounding screw and the grounded metal of the luminaire.
- (c) Receptacles shall have suitable overcurrent protection.

11. Lampholders

Exposed current carrying surfaces of lampholders shall connect to the identified conductor, unless other precautions will prevent accidental contact with live surfaces, (i.e., the exposed top of a screw shell lampholder).

12. Overcurrent devices

An overcurrent device shall not be connected in an identified conductor, unless its operation opens all conductors of the circuit.

13. Cord connectors

- (a) Power supply cord connectors shall be approved.
- (b) Notwithstanding "a", non-approved connectors may be acceptable under limited circumstances such as 'head to ballast' wiring provided the connectors are suitable and correctly polarized.
- (c) Cord connectors for single-conductor cable shall be properly colour-coded.
- (d) Cord connectors for 2K luminaires shall be permitted to be 15 amp hospital grade.

14. Spacing

Bare live parts and non-current carrying metal parts shall be suitably spaced or otherwise insulated.

15. Grounding and bonding

- (a) The bonding conductor in the supply cable shall be suitably attached to the independent bonding terminal.
- (b) The bonding terminal shall be suitably connected to the metal enclosure of the luminaire or the other non-current carrying metal parts if the enclosure is non-metallic.

All exposed non-current carrying metal parts of luminaires that could become energized shall be in good electrical contact with each other for bonding purposes.

16. Strain relief

A device (or assembly) shall be in or on the enclosure, or a component assembly, so that mechanical strain on the supply cord, including rotation, will not be transmitted to terminals, splices, or interior wiring. Knots in supply cords or conductors are not acceptable as a method of strain relief.

17. Enclosures

- (a) Enclosures shall be sufficiently durable and rigid to withstand the stresses of normal use.
- (b) Non-metal enclosures shall pass the flame test. (as per Section 20.2)
- (c) Metallic parts shall be protected from corrosion.
- (d) Luminaires without enclosures, where there is possibility of contact with single insulated conductors, or bare live parts, shall be mounted sufficiently out of reach so as to prevent contact. Such luminaires must be labeled "**Danger Live Parts.**"

17.1 Openings in enclosures

- (a) Openings shall be located or baffled to prevent accidental contact with bare live parts.
- (b) If contact with bare live parts is possible, such luminaires must be labeled "**Danger live parts**".

18. Mounting and supporting luminaires

Supports shall have the strength to withstand any mechanical loads associated with normal use.

19. Marking

Luminaires shall be marked in a permanent and legible manner with the following information:

- The manufacturer or rebuilder's name, trademarks, or symbol:
- A model or serial number:
- Input rating in amps or watts:
- Rated voltage: and
- Rated frequency, except for incandescent loads.

- Lamp type & maximum watts
- **“To be used by authorized personnel only”**
- If any exterior part of a luminaire exceeds 90 degrees Celsius, the following notice must be conspicuously placed on the luminaire:
 - o DANGER INTENSE HEAT
 - o MAINTAIN A SAFE DISTANCE FROM PEOPLE AND *PROPERTY*.
 - o ENERGIZED LUMINAIRES *MUST* BE MONITORED BY AN AUTHORIZED PERSON
- The letters shall be at least 1/8” high (where practicable).
- The effects of temperature shall be considered in the placement of markings.
- Source of supply (this should detail the # or #'s of sources of supply i.e. number of cords: for example, 2 X 3000 watt, or 1 X 6000 watt, or 6 X 1000 watt)

20. Tests

20.1 Temperature test

- (a) Luminaires shall be positioned to produce the highest temperature.
- (b) Light reducing devices shall be adjusted to produce the highest temperature in the luminaire.
- (c) Luminaires shall be tested using intended types and sizes of lamps.
- (d) Temperature measurements must be taken after temperature has stabilized for 1 hour.

20.2 Flame test

The tip of the flame from a paper match, a wooden match, or a butane lighter shall be applied to the material under evaluation for not less than 15 seconds, at a vulnerable spot such as an edge or reinforcing rib. The material shall not burn for more than 5 seconds after removal of the flame.

20.3 Dielectric test

- (a) For equipment rated 250 volts and less, 1000 ac volts shall be applied for 1 minute between live parts and exposed non-current carrying metal parts. The material shall not break down during the test.
- (b) For equipment rated over 250 volts, 1000 ac volts plus 2x rated voltage shall be applied for 1 minute between live parts and exposed non-current carrying metal parts. The material shall not break down during the test.
- (c) Alternatively, an ac test voltage 20% higher may be applied for 1 second.

20.4 Supporting Device Test

Equipment supporting devices shall be capable of supporting for 1 hour a steady pull of six times the total mass of the equipment supported, applied vertically regardless of actual loading conditions.

21. Routine Maintenance of Approved Luminaires

When replacing like for like components i.e. same ratings, plug for a plug a log must be maintained and will be made available to an ESA Inspector upon request. The log should consist of the following data:

- (1) Serial number of the ESA label.
- (2) Type of equipment.
- (3) Type of work done.

- (4) Date.
- (5) Name of person doing the maintenance.

22. Work procedure for using or maintaining Luminaires

Intent

The work rules are for the use of authorized persons who are using/monitoring or maintaining the designated luminaires.

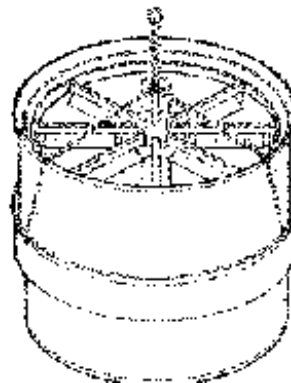
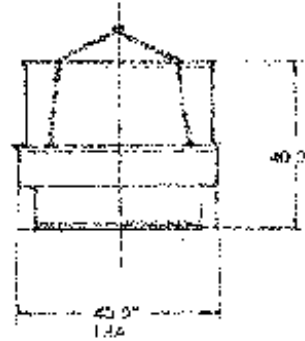
Work Rules

- (1) When in use, luminaires whose external surface temperature exceeds 90 degrees Celsius, shall be monitored by a person, who shall:
 - (a) be authorized by the persons responsible for the luminaires and who shall ensure that people and property are kept at a safe distance from the luminaires; and
 - (b) ensure that if the luminaires are not monitored they are de-energized; and
 - (c) in the case of hand-held luminaires, the person using the luminaire shall be responsible for its safe use.
- (2) Companies who repair luminaires for the entertainment industry shall be recognized by the Electrical Safety Authority
- (3) There shall be at least one company authorized person per shift during maintenance operations of the type in Rule 2.
- (4) All persons who do electrical work on luminaires shall be qualified.
- (5) The persons mentioned in Rule 3 shall provide guidance and assistance as electrical work is being done.
- (6) Replacement of lamps in luminaires shall only be done by qualified persons. Anyone who replaces lamps in luminaires whose surface temperature exceeds 90 degrees Celsius shall wait a minimum of 5 minutes after the luminaire is de-energized before changing the lamp.
- (7) Anyone who handles high pressure lamps (eg. high pressure Xenon - high pressure sodium etc.....) shall wear protective clothing of a type specified by the manufacturer.
- (8) Structures used to support luminaires shall possess the stability and strength necessary to minimize the possibility of the support tipping over in normal use.
- (9) Wiring between luminaires and other equipment shall comply with the Ontario Electrical Safety Code (current version).
- (10) Dry location luminaires shall be suitably protected from inclement weather
- (11) Exposed lamps shall be protected from damage by use of a suitable guard/enclosure, or by position or location of the luminaire.
- (12) Exposed tungsten-halogen lamps shall be used in a manner to minimize the hazard to persons or property, should a lamp shatter.
- (13) Combustible lampshades or other devices placed in a beam of light shall be a sufficient distance from the lamp so as not to be a fire hazard. Alternatively, such devices shall be made of or shall be protected by non-combustible material.
- (14) Openings located in the bottom of luminaires and through which molten or flaming matter might pass shall be closed or restricted to prevent such passing or shall be monitored in accordance with work Rule 1.
- (15) Persons who repair and rebuild luminaires and who may clean enclosures by sandblasting or other means shall be permitted to have acceptance labels placed on removable plates.
 - (a) After the repair, rebuild, or cleaning, the plate shall be reattached to the luminaire from which it was removed.
 - (b) The rebuilt luminaire shall be similar, in mechanical and electrical detail, to its predecessor.

- (c) If there are substantial changes to the luminaire, it shall be re-approved.
 - (d) Instances of label removal and replacement shall be recorded and maintained in an acceptable manner.
 - (e) Electrical work associated with label removal and reapplication shall be performed as per work Rule 3.
- (16) Luminaires without enclosures shall be disconnected from power supply before handling.



SPACELIGHT



Specifications:

The unit is a 6-1000w Space Light, designed to be used with 3200 degree K Quartz lamps. It is constructed so that all light passes indirectly through a diffusion shroud with a large unobstructed surface, to provide a very soft, virtually shadow free field of light. Most often used in conjunction with a black fabric drape around the outside (shown in drawing not photo).

Lamps: FDF, FDN, EFG, FCM,
FHM, etc.....

Rating: 120/240 Volts A.C. or D.C.

16.7 Amps Max per circuit

Cable: 3 feet of 3 #10 SEW leads, sheathed, tails/circuit.

Socket: Two compressible contacts per lamp

Weight: 11 Kg, 27.5 Lbs.



SKYPAN

Specifications: Used in lighting a large cyc. Washes light evenly across a large area. Available in 2K, 5K, & 10K. Looks like a large metal wok with a socket and lamp in the centre. Most commonly used with a metal shroud around outside.

Lamps: CYX 2K
DPY 5K
DTY 10K



CHICKEN COOP



Specifications: Fabricated from a metallic non flammable enclosure. This fixture is used as an overhead softlight. Often this fixture is found with a black fabric drape hung around the bottom so as to direct light straight down.

Rating: 120/240 Volts A.C. or D.C.
12.5 Amps Max per circuit
Cable: 3 feet high heat cable, 12/3
Socket: mogul base

Also available as a 4000W HMI

**M.I. LITE**

Specifications: Most commonly fabricated from aluminum square tubing. This fixture is used as an overhead soft light. Sides are normally covered with a black shroud so as most of the light is directed straight down through a white drape.

Rating:	120/240 Volts A.C. or D.C. Amps Max. per circuit
Lamps:	FDF, EDN, EFG, FCM FHM, etc.....
Cable:	Min 14/3 high heat cable

