

Written by the Technical Committee of the film and video industry's joint sector-based working group and produced by the Commission de la santé et de la sécurité du travail du Québec.



ASSOCIATION DES
PRODUCTEURS DE
FILMS ET DE
TELEVISION DU
QUÉBEC

Electrical installations

1. Lighting technicians must have a basic knowledge of electricity and understand the operation of electrical distribution systems. They are the only people permitted to energize and de-energize equipment and electrical installations.
2. Before and during any work on or near bare live components of installations, equipment or conductors, the power supply must be shut off and locked in the "off" position. Furthermore, a label indicating the reason why the power supply has been locked out must be affixed.

Sources of electrical power

3. The following voltages and distribution systems are used in Canada:
 - single-phase, three wire, 120/240 V;
 - three-phase, four wire, wye connection, 120/208 V;
 - three-phase, three wire, delta connection, 120/208 V;
 - 277/480 V, phase-to-ground and between phases, on a 480 V three-phase system;
 - 347/600 V, phase-to-ground and between phases, on a 600 V three-phase system.
4. Connection of production's temporary electrical installation to an existing electrical installation or to the public electrical distribution network must be done by an electrician under the supervision of a master electrician.

Generators

5. Generators must be grounded and equipped with an emergency cutoff device.
6. Generators must be operated and maintained by a qualified operator.
7. Visual and audible ground fault indicators must be easily accessible.
8. Generators must not be started or stopped while under load, except in emergencies.
9. When a generator is operating, it must be continuously monitored by the operator, who must always be ready to activate the emergency stop system.
10. The operator must check loads and phases at regular intervals and keep a log.

Electrical distribution network sources

11. Permission must be obtained from the utility company before making any connections to the public electrical distribution system.
12. Before allowing connection of the temporary distribution circuit to the distribution panel, the chief lighting technician must analyze the existing loads on the distribution panel and determine how much temporary load could be added.
13. The chief lighting technician must inform other electricity users whose equipment is powered from the panel that the power supplied to the equipment could be interrupted if the panel's main breaker is tripped by an overload. The chief lighting technician must determine what equipment must operate at all times in order to avoid endangering the people present (emergency exit lights, telephone system, elevators, etc.) and apply the necessary preventive measures.
14. Temporary load wiring and distribution accessories connected to a distribution panel must be secured in such a way that the weight of the cables does not subject the panel connections to excessive mechanical stresses.
15. When temporary cables cannot pass through the certified cable clamps installed on the side wall of a distribution panel, they must pass through the front opening in the panel. In this case, the covers cannot be reinstalled. Consequently, a screen made of insulating material must be installed, the danger of electrocution must be clearly indicated, and the name of the person in charge of the installation must be written on it. If the panel is in the electrical equipment room, a notice must be posted on each of the doors leading to this room.
16. When temporary distribution circuits are powered from two or more distribution panels, the circuits must be separated. Under no circumstances must a temporary distribution circuit be connected to a single main and powered from two or more distribution panels.

Definitions

Production's temporary electrical installation

All equipment, devices, conductors, connections, etc. required for production and connected to an existing electrical installation or to the public electrical distribution network.

Connection (tie in)

Connection between production's temporary installation and the existing electrical installation or the public electrical distribution network when no connector is planned.

Hookup

Connection by connectors of different components of production's temporary electrical installation.

Canadian Electrical Code

CSA C22.10, adopted by order in council, constituting the regulations governing permanent and temporary electrical installations in Québec.

Chief lighting technician

Head of the Lighting Department for film and video production. Is responsible for organizing production's entire temporary electrical installation and selecting the equipment and accessories used.

Assistant chief lighting technician (*best boy lighting technician*)

Under the direction of the chief lighting technician, is responsible for installing and supervising the assembly and disassembly of production's temporary electrical installation. In a major production, may supervise a team.

Lighting technician

Under the direction of the chief lighting technician or the assistant chief lighting technician, assembles and disassembles production's temporary electrical installation as well as installs lighting equipment or any other necessary electrical equipment, except for the connection to an existing electrical installation or to the distribution network. Is responsible for checking and performing load balancing.

Generator operator

Technician in charge of installing, starting, load balancing, monitoring and stopping an electrical generator.

Electrician

Technician with a journeyman license issued by the appropriate authority. Depending on the laws governing electrical installations, performs electrical installation work as well as connects production's temporary electrical installation to the public electrical distribution network or the existing electrical installation.

Temporary electrical distribution

17. Connection must not be done in the rain or in a humid location.
18. If connections or interventions are to be done in very humid conditions, non-conducting protective equipment that is clean and adapted must be worn; amongst other things, footwear with rubber soles, rubber gloves and insulating mats must be used.
19. All electrical distribution circuits must be independently grounded without neutral return.
20. Connectors and cables must be marked using the colour code in the *Canadian Electrical Code*, namely:
 - Red, black and blue: Line
 - White: Neutral
 - Green: Ground

It is important not to confuse this colour code with the one used to designate wire length.
21. When single-wire cables are used, coloured adhesive tape must be affixed at both ends of each cable before they are connected to identify them according to the colour code.
22. Personnel in charge of electrical installations must know the rated loads for each type of cable, adapter or junction box used on the set.
23. All power cables must be protected in order to avoid damage. Cables located in traffic areas must be inserted in cable mats for temporary coverage. Their presence must be indicated by signs. They must be put away when not in use.
24. The rated voltage and rated current must be indicated on all junction boxes.
25. Any component of a *T splitter* or any other device that is not being used must be sealed or closed with a cover to prevent accidental contact.
26. When connecting production's temporary installation on the set, a fuse or breaker box providing adequate interrupt capacity for the type of cable and connected load must be installed between the power source and the installation.
27. Insulating materials must be used to ensure that junction boxes and cable connections never come in contact with water or damp surfaces.

28. If electrical equipment or conductors cannot be disconnected from their power supply, i.e., disconnecting a live branch connection, a temporary circuit must be installed according to the following steps:
- Disconnect load (de-energize, shut off)
 - Connect ground
 - Connect neutral
 - Connect lines
 - Connect load (energize, turn on)

Repeat these steps in reverse order to disconnect the temporary installation.

29. Never repair or modify energized equipment unless it cannot be completely disconnected from the power supply. In this case, appropriate protective equipment must be used: insulated pliers, rubber gloves, boots, mats or any other type of approved insulation. This equipment must always be kept in good condition.

Lighting equipment

30. Lighting equipment and all other electrical accessories must be certified or approved by the Service d'inspection électrique (electrical inspection department) of the Régie du bâtiment du Québec.
31. Lighting equipment that is connected to the electrical distribution network must be approved according to the *Canadian Electrical Code* or accepted by the Régie du bâtiment du Québec.
32. Scaffolding or any other metal structures used to support distribution or lighting circuits must be grounded.
33. The entire production crew must be aware that discharge lamps such as fluorescent tubes and high-intensity halogen (HMI) lamps operate at high voltage and that arc lamps (such as HMI lamps) emit much more ultraviolet (UV) radiation than tungsten filament lamps. Eye and skin protection is therefore required when working near these lamps.
34. Any person using these sources of lighting must understand ballasts and must ensure that the protective devices are in good condition.
35. Open face spotlights must be equipped with protection against bulb explosion.
36. Cables or safety chains must be used for installing all suspended equipment.
37. In the event of a power or lighting failure, backup lighting must be planned.

Transportation and handling

38. Before beginning to move spotlights, allow sufficient time for them to cool down. When transporting, handling or moving hot spotlights, other protective equipment such as gloves or eyeglasses must be worn in addition to protective footwear.
39. If ladders or stepladders are used, they must be made of materials that do not conduct electricity, such as wood or fiberglass (for more information on the safety rules for ladders, stepladders and scaffolding, see guidelines 6 and 6.1).

Operation

40. Before reusing equipment, cables or boxes that have been repaired on the film set, rigorous dielectric, continuity or polarity testing must be performed. If rented equipment is involved, clearly indicate what repairs have been done so that the rental company can verify that these repairs have been done properly.
41. Lighting equipment and supports must be properly anchored and ballasted to prevent them from falling.
42. In rainy or wet conditions, lighting equipment such as halogen or similar types of lamps must be covered in order to prevent the rain or moisture from entering them or from penetrating the ballast. Ensure that no one goes near the light source since humidity increases the conductivity of air and therefore the possibility of arcing.
43. When work is carried out on, near, or under water, the safety coordinator must ensure that all potentially hazardous equipment is turned off and padlocked. Only low-voltage electrical sources may be used in or near water, unless a clearance of at least one and one half times the height of the tripod supporting the source is provided. Lighting systems and electrical wires must be kept away from water as much as possible. Any equipment of 220 V or less must be protected by a circuit equipped with a class A or type A breaker.
44. Ballast and spotlights must be grounded.
45. Before turning on a halogen lamp or a light source of the same type, the lighting technician must ensure that no one is in contact with the equipment, the support or the ballast. The lamp must be turned on off-camera.
46. Lighting equipment must be turned off and disconnected from the power source prior to handling, bulb replacement or repair.

Laser light sources

47. Laser light sources must be used by a skilled technician in accordance with the ANSI Z136.1 1993 standard.
48. Never look directly at a laser light source since this could cause serious eye damage. Depending on the intensity of the laser beam, personnel must have appropriate protective eyeglasses available and warning signs must be posted in areas where the laser beams could be hazardous.
49. To obtain further information on the use and related risks of laser light sources, consult the specialist technician.

References

Canadian Electrical Code and Québec modifications,
C22.10-1996.

List of organizations responsible for approving equipment

Canadian Standards Association (CSA).

Underwriters' Laboratories of Canada (ULC).

Canadian Gas Association (CGA).

The Service d'inspection électrique of the Régie du bâtiment du Québec.

Warnock Hersey Professional Services Ltd.

Note. – The information contained in this guideline is not exhaustive and does not replace current standards, laws and regulations.