
Cinematography

Part 7. Production and presentation

Section 7.5 Film and television location lighting

Subsection 7.5.1 Code of practice for distribution of a.c. electricity for location lighting

Cinématographie

Partie 7. Production et présentation

Section 7.5 Eclairage pour tournage de films et réalisation de programmes
de télévision à l'extérieur

Sous-section 7.5.1 Code de bonne pratique pour la distribution du courant
alternatif pour l'éclairage à l'extérieur

Kinematographie

Teil 7. Aufführung und Darstellung

Abschnitt 7.5 Beleuchtung für Film- und Fernsehaußenaufnahmen

Unterabschnitt 7.5.1 Richtlinie für die Verteilung von Wechselstrom für
Beleuchtung für Außenaufnahmen

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Foreword

As a result of investigations made by the British Broadcasting Corporation, the Association of Independent Television Contractors, Television Lighting Hire Companies, Television Lighting Manufacturers, the Electrical, Electronic and Plumbers' Trades Union and others, this code of practice has been drafted to give guidance on the installation and use of temporary mains voltage a.c. electrical lighting installations provided to meet the technical and artistic requirements of a film or

television camera system where any part of the temporary installation does not exceed 240 volts to earth or 415 volts between phases.
This code of practice is based on CP 1017 'Distribution of electricity on construction and building sites', but modified for location lighting practice where the distribution is normally only required for a few hours or days duration and often at short notice.

British Standard

Cinematography

Part 7. Production and presentation

Section 7.5 Film and television location lighting

Subsection 7.5.1 Code of practice for distribution of a.c. electricity for location lighting

1. Scope

1.1 General. The code deals with the temporary use and distribution of mains a.c. voltage electricity for film and television location lighting. It aims to bring together in one document guidance on matters of common interest to film and television producing companies, lighting hire companies, electrical installation contractors, electricity supply authorities, lighting equipment manufacturers, electricity supply equipment manufacturers, and authorities responsible for public safety.

Because of the variation in local circumstances of location lighting sites the guidance afforded can only be given in general terms and will normally need to be supplemented in detail by the advice of a suitably qualified person whose knowledge of the circumstances obtaining in the particular case will enable him to make the most effective choice.

1.2 Regulations and recommendations. The requirements of the Health and Safety at Work etc. Act 1974* have to be complied with. Pending the promulgation under this Act of the electrical regulations, the Electricity (Factories Act) Special Regulations, 1908 and 1944*, administered by the Health and Safety Executive, give the best advice now available. Official guidance on recommended means of compliance with these special regulations is given in Memorandum SHW 928*.

Other requirements, such as those of local authorities or fire services, may also apply to certain locations and have to be complied with.

The IEE 'Regulations for electrical equipment of buildings' (subsequently referred to as the IEE Regulations)† states the requirements for safety in the use of electricity in and around buildings generally.

Guidance on earthing is given in British Standard Code of practice CP 1013.

2. References

The titles of the standards publications referred to in this code of practice are listed on the inside back cover.

NOTE. Other British Standards considered to be of interest in the context of this code are listed in appendix D.

3. Definitions

For the purposes of this code of practice the following definitions apply. The definitions of other electrotechnical terms are to be found in BS 4727.

3.1 appliance. Any device which utilizes electricity for a particular purpose, excluding a luminaire or an independent motor.

3.2 bonded. Applied to metal parts to signify that they are connected together electrically so as to ensure that they are at common voltage.

3.3 cable coupler. A means of enabling the connection, at will, of two flexible cables. It consists of two parts:

a **connector** (see 3.6), and

a **plug** (see 3.20).

3.4 cable splitter unit (CSU). A unit which enables a main distribution cable to be directed into two outgoing circuits without further fusing.

3.5 circuit-breaker. A mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also of making, carrying for a specified time, and breaking currents under specified abnormal circuit conditions such as those of short-circuit.

NOTE. A circuit-breaker is usually intended to operate infrequently, although some types are suitable for frequent operation.

3.6 connector. A device, provided with contact tubes or blades which is integral with or intended to be attached to the flexible cable connected to the supply.

NOTE. In general, a connector has the same contact arrangement as a socket-outlet.

3.7 control centre (CC). A portable distribution unit accepting power from an intake switch unit and providing switch, contactor or dimmer control of a number of outgoing circuits.

3.8 dimmer. A device enabling the power supplied to an appliance or luminaire to be varied.

3.9 distribution unit. An assemblage of parts (fuses, circuit breakers, switches, etc.) arranged for the distribution of electrical energy to a number of outgoing circuits or other distribution units.

3.10 earthed. Effectively connected to the general mass of the Earth.

3.11 earth electrode. Any one or more conductive parts embedded in the ground for the purpose of making electrical contact with the general mass of the Earth.

NOTE. The use of public authority gas or water supply pipes as an earth electrode is not recognized in this code.

3.12 earth fault. A fault caused by a conductor being accidentally connected to earth or by the insulation resistance to earth falling below a specified value.

3.13 final distribution unit (FDU). A portable distribution unit accepting 240 V single phase power from a control centre and providing switch or dimmer control to a number of outgoing circuits.

*Obtainable from H.M. Stationery Office.

†Published by the Institution of Electrical Engineers, Savoy Place, London WC1.

3.14 intake switch unit (ISU). Switchgear designed for connection between the source of temporary supply and the remainder of the location lighting installation. It accommodates one incoming circuit usually 415 V, three-phase, and one or more outgoing circuits.

3.15 isolation (disconnection). Cutting off the supply from all or from a section of the installation by separating the installation or section from every source of electrical energy so as to ensure the safety of persons carrying out work on parts which would otherwise be live parts.

3.16 isolator. A mechanical switching device which is capable of opening and closing a circuit when either negligible current is broken or made, or when no significant change in voltage across the terminals of each of the poles of the isolator occurs. It is also capable of carrying currents under normal circuit conditions and of carrying for a specified time currents under abnormal conditions such as those of a short-circuit.

3.17 location lighting. Electric lighting equipment especially transported to, and temporarily installed at a site for the prime purpose of meeting the technical and artistic requirements of a film or television production.

3.18 luminaire. Apparatus which distributes, filters or transforms the light from one or more lamps and which includes all parts necessary for supporting, fixing and protecting the lamps, but not the lamps themselves, and, where necessary, circuit auxiliaries together with means for connecting them to the supply.

3.19 overcurrent. A current of a magnitude exceeding the normal maximum value.

3.20 plug. A device intended for connection to a flexible cord or flexible cable which can be engaged manually with a socket-outlet or cable coupler connector or adapter and which has current-carrying contact pins which may be exposed when not engaged.

3.21 portable equipment. Equipment designed for transportation between locations or sites.

3.22 site. A location other than a studio where a television or film production is taking place.

3.23 socket outlet. A device with protected current-carrying contacts intended to be mounted in a fixed position and permanently connected to the fixed wiring of the installation or unit on which it is mounted to enable the connection to it of a flexible cord or flexible cable by means of a plug.

3.24 user. The organization responsible for the film or television activities on the site and specifying the location lighting requirements.

4. Early notification of requirements

When a temporarily installed mains supply is likely to be required, as soon as outline details are known, it is essential that the user should inform the district office of the supply authority or others responsible for permanent installation from which the supply is to be taken. The supply undertaking will need to know precisely when and where the supply will be required, the maximum demand load in kilowatts and the type of intake unit to be used, i.e. number of phases, maximum current rating per phase, connection provision, fault capacity, special protective devices and earthing. Arrangements to allocate

responsibility for the safe connection and disconnection of the supply and for the attendance of staff needed to guarantee speedy repair of faults should also be discussed.

Where the supply is given from a protective multiple earthed system there are special regulations concerning the earthing of the consumers' installation. The Electricity Board should be consulted as to the method of complying with these regulations.

Another object of discussion is to identify and take the necessary precautions to avoid damage to or accidental contact with existing overhead lines, underground cables or other services. Useful guidance is given in publications entitled, 'Recommendations on the avoidance of danger from underground cables' issued by the National Joint Utilities Group*, and 'Guidance note GS6 (April 1977) – Avoidance of danger from overhead electric lines' issued by the Health and Safety Executive.†

The matters to be discussed in the preliminary negotiations with the supply undertaking may be summarized as follows.

- (a) The most suitable position(s) for the supply.
- (b) Metering and tariff arrangement.
- (c) Preference for single-phase or three-phase supply.
- (d) Anticipated connection and disconnection dates.
- (e) Method of connecting the supply to the user's equipment.
- (f) Responsibility and procedure for safe connection and disconnection.
- (g) Earthing provision.
- (h) Maintenance and standby responsibilities.
- (i) Precautions to be taken by the user and contractor(s).

Discussions should also take place as soon as possible between the user and those who will carry out the installation. Where a mains supply is to be taken from existing capacity similar arrangements should be made with the owner of the supply. A suitable pro-forma for the user to complete is shown at appendix A.

5. Materials, appliances and components

Site distribution units for electricity supplies should comply with BS 5550 : Subsection 7.5.2, these units being briefly described in appendix B of this code.

All materials, appliances and components should conform to the appropriate British Standard and a list of British Standards applying to items likely to be of interest is given in appendix D.

6. Design considerations

6.1 General. Electrical apparatus and wiring for location lighting installation may be subject to extreme abuse and the use of equipment which will withstand particularly adverse conditions is essential. The importance of correct circuit protection, earthing arrangements and frequent inspection and testing cannot be over emphasized.

Distribution equipment for location lighting installations should embody the following features.

- (a) Flexibility in application for repeated use on locations, i.e. to allow easy substitution of components

*NJUG Publication No. 1 May 1979, obtainable from the Electricity Council, 30 Millbank, London SW1P 4RD.

†Obtainable from H.M. Stationery Office.

- for specific duty as may be required from site to site.
- (b) Suitability for transport, storage and handling.
- (c) Robustness in construction to resist damage.
- (d) Suitability for use in a variety of weather conditions.
- (e) Safety in use.

All switchgear, distribution equipment, etc. that is not to be reserved for exclusive interior use should be of a type approved for outdoor use or protected by suitable covers or enclosures when used out of doors. Socket outlets, plugs and cable couplers not reserved for exclusive interior use should be of the splash proof type or protected by suitable covers.

Location lighting distribution units designed and manufactured in accordance with BS 5550 : Subsection 7.5.2 have these features.

The installation of this equipment is described in 7.3.

6.2 Distribution voltages

6.2.1 Mains voltage

(a) *Three-phase.* 415 V 4 wire a.c. is the standard three-phase mains supply system voltage for location lighting.

(b) *Single-phase.* 240 V a.c. is the standard single-phase mains supply system voltage for location lighting.

6.2.2 Generators. Where a mains supply is not available and use has to be made of a fixed or portable a.c. generating set, the distribution system should be connected, installed and maintained exactly as for a system connected to a public supply. Whenever possible* the metal frame of the generating set should be bonded to the building metalwork and earth point of the permanent site distribution system. In unpaved areas earth electrodes of the driven rod type (earthspikes) should be used. The metal frame of the generating set should also be bonded to the star point of a three-phase generator or the 'neutral' pole of a single phase generator.

6.3 Types of supply. The following distribution voltages are recommended for typical applications found on location lighting sites.

- (a) Intake units: 415 V three-phase OR
240 V single-phase
- (b) Control centres: 415 V three-phase OR
240 V single-phase
- (c) Secondary distribution boxes: 240 V single-phase
- (d) Luminaires: 240 V single-phase

6.4 Protection of circuits

6.4.1 General. Appropriate protection should be provided for all main and sub-circuits against overcurrent and earth faults and the protective apparatus should be capable of interrupting, without damage, any short circuit that may occur. To this end consideration should always be given to the fault level of the supply.

6.4.2 Discrimination. The rating of fuses and circuit-breakers used for this purpose should be co-ordinated so as to afford discrimination in operation where necessary, as follows.

- (a) *Between fuses and circuit-breakers.* Where cartridge fuses are used for protection of circuit-breakers, or where cartridge fuses are used for protection of main circuits and circuit-breakers for protection of

sub-circuits derived therefrom, the cartridge fuse should, in the event of a current in excess of the associated circuit-breakers' rupturing capacity, operate before the circuit-breaker.

- (b) *Between circuit-breakers.* Where circuit-breakers are used for the protection of a main circuit and of the sub-circuits derived therefrom discrimination should be achieved by selecting appropriate circuit-breakers.

NOTE. More detailed notes on discrimination are given in appendix J of BS 88 : Part 1 : 1975; appendix B of BS 3871 : Part 1 : 1965; and appendix D of BS 4752 : Part 1 : 1977.

6.4.3 Lightning protection. In special circumstances protection against lightning on location lighting sites may be necessary. These sites will, normally, be outdoors and some examples are as follows.

- (a) *Metal scaffolding and similar structures.* Where metal scaffolding is used for supporting luminaires or current carrying conductors, it should be efficiently bonded to earth. A simple method of bonding such structures consists of running a strip of metal other than aluminium, 20 mm x 3 mm in size, underneath and in contact with the base plates carrying the vertical members of the scaffolding and earthing it at intervals not exceeding 30 m.

- (b) *Tall metal masts, towers, cranes and revolving and travelling structures.* Masts and their guy wires, floodlighting towers and other similar structures of metallic construction should be bonded to earth. Mobile towers, portable cranes and similar structures mounted on vehicles with pneumatic tyres should have their frames bonded to earth. Where this is not possible a limited degree of protection against lightning damage can be provided by the use of drag chains or tyres of conducting rubber such as are provided for dissipating static electricity.

- (c) *Tents, marquees and other temporary structures.* Where large temporary structures of this type are used consideration should be given to their protection against lightning. In general such structures are manufactured from non-metallic materials and the simplest form of protection will usually consist of one or more horizontal air terminations suspended above them and connected solidly to earth. A non-metallic extension of the vertical supports provided for such structures may, if convenient and practicable, be used for supporting a system of horizontal air terminations but a clearance of not less than 1.5 m should be maintained between the conductor and the fabric of the enclosure. Down conductors should be arranged outside the structure and be connected to earthing rods.

In all cases the earth electrode should be inaccessible as there is the possibility that a dangerous potential may arise in the vicinity of the earth electrode.

More detailed information on protection against lightning may be obtained from CP 326.

6.4.4 Earthing. The installation should be earthed by providing a path of low enough impedance to enable the overcurrent device protecting the installation to operate in a short space of time in one of the following ways:

- (a) connection to the supply authority's earthing terminal, having obtained their permission to use their terminal,

*Earthing the metalwork of a mobile generator is a requirement in premises subject to the Factories Act 1961. See the Electricity (Factories Act) Special Regulations 1908 and 1944, Regulation 13.