

BS 7909:2023+A1:2024



BSI Standards Publication

**Temporary electrical systems
for entertainment and related
purposes – Code of practice**

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Summary of pages

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 January 2023. It was prepared by Technical Committee CPW/4, *British Standards for imaging*. A list of organizations represented on this committee can be obtained on request to the committee manager.

Supersession

BS 7909:2023 superseded [BS 7909:2011](#), which was withdrawn.

BS 7909:2023+A1:2024 supersedes BS 7909:2023, which is withdrawn.

Relationship with other publications

This British Standard is intended to be read in conjunction with [BS 7671](#), and it expects temporary electrical systems to adhere to its fundamental principles.

Information about this document

This was a full revision, incorporating changes resulting from the changes made to [BS 7671:2018+A2:2022](#). Some changes were made to correct typographic issues, however substantive changes include:

- updates to the referenced standards with the latest editions as required and removed dated references to standards where not necessary;
- updated the information on use of RCDs in [Annex E](#);
- changed the terms “bypass” and “disable” in relation to the operation of RCDs to “override” to better reflect the technical meaning;
- greater emphasis has been placed on planning and provision of supplies for an event (see [4.4](#));
- a new Annex has been added to provide more background information on power quality symptoms and causes;
- the facility to override RCDs in FDU has been removed from [Annex B](#);
- the use of thermoplastic “SY” and “YY” cables has been clarified; and
- a new section with requirements for battery storage systems has been included.

Text introduced by or altered by Amendment No. 1 is indicated in the text by tags [A1](#) [A1](#).

Minor editorial corrections are not tagged.

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Users may substitute any of the recommendations in this British Standard with practices of equivalent or better outcome. Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

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Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

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0 Introduction

This British Standard deals with the creation and operation of temporary electrical distributions and systems. Although the target market is the events, entertainment and other related industries, the recommendations within this British Standard are also of value to those working in other industries where temporary electrical systems are deployed.

With temporary electrical systems, the range of electrical equipment involved is broad and is frequently supplied by a variety of specialist facilities and services providers under separate hire agreements.

The staff for such events bring a considerable range of skills; they might be employees of the facilities and services providers, or sole traders or freelance people hired under varied and separate agreements. Each event brings together different facilities and people and requires management arrangements to be in place and understood. [Clause 4](#) of this British Standard outlines the management arrangements and expects the appointment of a person responsible for the temporary electrical system(s) in use to be created for the event.

The person(s) responsible for the temporary electrical system needs to understand the equipment and procedures developed for such events as these differ considerably from those used for permanent installations. It is important to recognize these differences and the need for the safety guidance recommended. The electrical supplies required range from that available from a domestic socket-outlet, to significantly larger supplies obtained from direct connection to public or private electricity suppliers' systems or from mobile generating sets.

Considerations of portability limit the size and weight of units, and time and other constraints prevent the use of conventional fixing methods. Tight schedules, adverse environmental conditions and late changes of plan are routine problems. The reusable equipment developed for these circumstances is accepted as providing proper standards of safety if used correctly and this British Standard is intended to provide overall guidance for these circumstances.

There is a huge variety of events and activities in the entertainment and related industries, ranging from very simple to highly complex, that require the use of temporary electrical systems. The main body of the standard gives recommendations for all temporary electrical systems; [Clause 5](#) deals with the simpler temporary systems only.

The principal clauses each deal with a different aspect of work; many contain references to other clauses or [BS 7671](#) that have a direct bearing on the detail being considered.

1 Scope

This British Standard gives recommendations for the management, design, setting up and operation of temporary electrical systems using low voltage electricity, for the entertainment and similar or related industries. Mobile and transportable units with electrical installations that are used in these industries are also covered.

This British Standard gives recommendations for the provision of a safe and suitable temporary electrical system for an event and the duties and work to implement this.

NOTE 1 Each aspect of the work could be under the control of a different person responsible.

This British Standard gives guidance on matters of common interest to producers, production companies, event organizers and managers, freelancers, facilities and services hire companies, equipment hire companies, equipment manufacturers, electrical consultants, electrical installation contractors, distributors, suppliers of electricity, venues, local authorities and those responsible for safety.

The systems covered by this British Standard operate at low voltage, as defined in [BS 7671](#). Electricity at low voltage can be taken from an existing installed electrical system, the public supply, privately owned supplies or from mobile or portable generators.

NOTE 2 All equipment forming the temporary electrical system is expected to be delivered to site as pre-assembled units that have been tested and are known to be safe and suitable for use. This does not preclude the manufacture on site of simple units that might be necessary; though this is the exception and not the rule.

NOTE 3 It is expected that all electrical equipment, switchgear units, distribution units and cables used for work covered by this British Standard are manufactured to the appropriate product standards [e.g. BS EN 61439 (all parts)], and that the temporary electrical systems and their use are designed, set-up, supervised, operated and removed by suitably competent persons. It is also expected that responsibility for such temporary electrical systems is taken by a suitably competent person (referred to as the person responsible in this British Standard).

NOTE 4 In many situations temporary electrical distributions are intimately associated with mobile and transportable units. In such cases, see [BS 7671:2018+A2:2022](#) and in particular Section 717, for further information.

NOTE 5 This British Standard can be applied to temporary electrical distributions at exhibitions and fairgrounds; see [BS 7671:2018+A2:2022](#) and, in particular, Sections 711 and 740 respectively for specific information for these activities. Specialized documents related to exhibitions are published by the Association of Event Venues [1].

NOTE 6 Specialized documents related to theatres and places of entertainment are published by the Association of British Theatre Technicians [2].

NOTE 7 This British Standard does not offer guidance for hazardous locations where expert advice needs to be sought.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions, or limits the application, of this document¹⁾. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

[BS 546](#), Specification – Two pole and earthing-pin plugs, socket-outlets and socket-outlet adaptors

[BS 1363](#) (all parts), 13 A plugs, socket-outlets, adaptors and connection units

[BS 5266-1](#), Emergency lighting – Part 1: Code of practice for the emergency lighting of premises

[BS 5499-10](#), Guidance for the selection and use of safety signs and fire safety notices

[BS 5839](#) (all parts), Fire detection and fire alarm systems for buildings

[BS 7375](#), Distribution of electricity on construction and demolition sites – Code of practice

[BS 7430](#), Code of practice for protective earthing of electrical installations

[BS 7671:2018+A2:2022](#), Requirements for electrical installations – IET Wiring Regulations

[BS EN 12193](#), Light and lighting – Sports lighting

[BS EN 50172](#), Emergency escape lighting systems

[BS EN 505-2-12](#), Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) – Part 2-12: Cables for general applications – Cables with thermostatic PVC insulation for extensible leads

[BS EN 505-2-21](#), Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) – Part 2-21: Cables for general applications – Flexible cables with crosslinked elastomeric insulation

¹⁾ Documents that are referred to solely in an informative manner are listed in the Bibliography.

BS EN 60309 (all parts), *Plugs, socket-outlets and couplers for industrial purposes*

BS EN 60309-2:1999+A2:2012, (IEC 60309-2), *Plugs, socket-outlets and couplers for industrial purposes – Dimensional interchangeability requirements for pin and contact-tube accessories*

[BS EN 60529:1992+A2:2013](#), *Specification for degrees of protection provided by enclosures (IP code)*

[BS EN 60598-1](#), *Luminaires – Part 1: General requirements and tests*

BS EN 61439 (all parts), *Low-voltage switchgear and controlgear assemblies*

[BS EN 61984](#), *Connectors – Safety requirements and tests*

[BS EN IEC 60598-2-17](#), *Part 2-17: Luminaires – Particular requirements – Luminaires for stage lighting, television and film studios (outdoor and indoor)*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications*

Other publications

- [N1] INSTITUTION OF ENGINEERING AND TECHNOLOGY. *Guidance Note 6: Protection against overcurrent*. IET Publications.
- [N2] INSTITUTION OF ENGINEERING AND TECHNOLOGY. *Code of practice for in-service inspection and testing of electrical equipment*. IET Publications.
- [N3] INSTITUTION OF ENGINEERING AND TECHNOLOGY. *Guidance Note 3: Inspection and testing*. IET Publications.
- [N4] HEALTH AND SAFETY EXECUTIVE. *Maintaining portable electrical equipment*. HS(G) 107. Sudbury: HSE Books 2013.
- [N5] INSTITUTION OF ENGINEERING AND TECHNOLOGY. *Guidance Note 8: Earthing and bonding*. IET Publications.

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in [BS 7671:2018+A2:2022](#) and the following apply.

NOTE Some of the definitions in this British Standard are simplified to assist the user.

3.1 activity

occasion or part of an event where a temporary electrical system is used

NOTE See [3.22](#) for a definition of event manager.

3.2 cable splitter unit (CSU)

unit that enables a temporary distribution cable to be split into two or more outgoing circuits without further circuit protection

NOTE See also [Annex B](#), [B.3](#).

3.3 carry-in

where relatively small amounts of equipment are carried into a location and set-up for use on a temporary basis

NOTE The equipment requires less than 6 kVA of power and is typically used for recording or editing of broadcast material. The expression “radio carry-in” describes a method of working in the radio industry; this method might apply to other areas of work.

3.4 central distribution unit (CDU)

portable distribution unit providing a means of functional switching, contactor control and/or protection of a number of outgoing circuits

NOTE 1 See also [Annex B, B.2](#).

NOTE 2 Central distribution units, intake switch units and final distribution units can be constructed as composite units in any combination. Central distribution units might include dimmers and other power-processing or controlling devices.

3.5 circuit protective conductor (CPC)

protective conductor connecting exposed-conductive-parts of equipment to the main earthing terminal

NOTE A CPC is included with the Line and Neutral conductors to all parts of a temporary distribution.

3.6 Class I construction

equipment in which protection against electric shock does not rely on basic insulation only, but which includes means for the connection of exposed-conductive-parts to the CPC in the temporary distribution

3.7 Class II construction

equipment in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions such as supplementary insulation are provided, there being no provision for the connection of exposed metalwork of the equipment to a protective conductor, and no reliance upon precautions to be taken in the temporary distribution

NOTE 1 See [BS EN 61140](#) with regard to Class II equipment.

NOTE 2 Class II appliances could incorporate means for maintaining the continuity of protective circuits, provided that such means are within the appliance and are insulated from conductive accessible parts by supplementary insulation. Class II equipment is identified by a double square symbol.

3.8 Class III construction

equipment in which protection against electric shock relies on a Separated Extra Low Voltage (SELV) supply and in which voltages higher than those of SELV are not generated

NOTE See [BS EN 61140](#) with regard to Class III equipment.

3.9 competence (competent person)

sufficient technical knowledge, relevant skills and practical experience for the nature and complexity of the duty to be undertaken and able to prevent danger and injury to themselves and others

NOTE In the context of this British Standard, competence is associated with the knowledge, skill and experience to deal with the electrical and/or related managerial matters that might arise at any time during the progress of the event. The environments in which temporary distributions are used are often subject to change, therefore a competent person is able to identify hazardous conditions and implement appropriate control measures. A competent person is aware of their limitations.

3.10 current using equipment

equipment which converts electrical energy into another form of energy

NOTE Examples include heat, motive power, light or signals, etc.

3.11 dimmer

device for varying the power supplied to a luminaire, thus varying the light output

3.12 disconnector

mechanical switching device which in the open position conforms to the requirements for isolation

NOTE 1 This is the preferred term for a device that used to be referred to as an isolator.

NOTE 2 Disconnectors are not designed to make or break load current.

3.13 distribution(s)

NOTE See 3.60, temporary electrical distributions.

3.14 distributor/distribution system operator (DSO)

organization that operates a network that distributes electricity to separate consumers

NOTE 1 Such organizations are referred to as “distributors” in the Electricity Safety, Quality and Continuity Regulations (ESQCR) [2] and the Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012 [3]. In this British Standard, DSO indicates “distributor” as used in ESQCR [2].

For example, an organization or person can be a DSO where they own an industrial site on which they provide and control the means of distributing electricity to a number of separate individual units on that site, or where they own a commercial or domestic premise, such as a shopping mall, block of offices or flats, which are occupied as separate individual units and to which they provide and control the means of distributing electricity to each unit.

In certain cases, those distributing electricity to consumers at events (e.g. to concessions) could also be classified as a DSO and subject to the requirements of ESQCR.

NOTE 2 When information about a main distribution to a consumer is needed, the Electricity Networks Association can provide maps and contact information (see <https://www.energynetworks.org/info/faqs/who-is-my-network-operator.html>) about the DSOs that serve Great Britain and Northern Ireland.

3.15 diversity

allowance made in calculation of system or circuit capacity that predicts that the maximum available load is not connected simultaneously

3.16 earthing arrangements

all electric connections and devices involved in the earthing of a system, an installation and equipment

NOTE Where a generator is used as the source of supply under certain circumstances, it might not be necessary to connect this source to the general mass of Earth (see 7.4.2.3 and C.5.2). In this case the earthing arrangement relates to the connections between the generator output, the generator’s earthing terminal, the generator’s chassis and the CPC of any connected distribution. Earthing arrangements that might be encountered when considering temporary electrical systems used at events are given in 3.16.1, 3.16.2, 3.16.3, 3.16.4, 3.16.5 and 3.16.6.

3.16.1 TN-C

system in which neutral and protective functions are combined in a single conductor throughout the system

NOTE The ESQCR [2] and the Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012 [3] prohibits the use of TN-C in a consumer’s installation.

3.16.2 TN-S

system having separate neutral and protective conductors throughout the system

3.16.3 TN-C-S

system in which neutral and protective functions are combined in a single conductor in the distributor's network and then separate in the consumer's part of the system

NOTE BS 7671:2018+A2:2022, Part 7, introduces measures concerned with the fact that the majority of installations that are TN-C-S in form are supplied from a protective multiple earth (PME) source and have a protective earth derived from the PME source (see 3.49). Within this British Standard, wherever TN-C-S supply is referred to, it is considered to have been obtained from a PME source and arranged in this way.

TN-C-S supplies in this form experience the greatest problems and potential safety issues in the event of a protective earth and neutral (PEN) failure in the main PME distribution. Situations exist where a TN-C-S supply has its protective earth connected to structural steel or concrete reinforcement that forms the building's foundations or to earth electrodes in intimate contact with the general mass of Earth. This situation is described in C.4.3.

3.16.4 TT

system having one point of the source of supply directly earthed, the exposed-conductive-parts of the installation being connected to earth electrodes electrically independent of the earth electrodes of the source

3.16.5 IT

system having no direct connection between live parts and Earth, the exposed-conductive-parts of the electrical installation being earthed

3.16.6 IN-S

system having separate neutral and protective conductors throughout the system and no intentional connection to Earth

3.17 electrical environment

geographical area in which an electrical system exists and its characteristics, wherever assessed, are substantially constant

NOTE The area outside a building, e.g. a garden, is considered to be a different electrical environment from that within the same building. The area within touching distance around a metal columned streetlight is an electrical environment. The area within a vehicle with an onboard generator is an electrical environment; the area within touching distance of this same vehicle is a different electrical environment from that within the vehicle and that around the streetlight (see also Annex C, C.2).

3.18 electromagnetic interference (EMI)

undesirable electrical and/or magnetic energy, which can be radiated, conducted or induced in a system, that causes interference with the normal operation of equipment

NOTE Matters of electromagnetic disturbance or EMI in permanent installations are dealt with in BS 7671:2018+A2:2022, Chapter 44, Section 444.

3.19 entertainment industry

all branches of theatre, opera, concerts, touring shows, music festivals, pop concerts, ballet, pageants, public or private spectacles or events, fashion shows, corporate and business events, sporting events, broadcast activities, news gathering, etc., staged as live performances for an immediate audience or for the production of film, television, video or sound recorded material

NOTE 1 Events such as county shows, jamborees and similar are also covered under this definition.

NOTE 2 Entertainment events might also be staged at fairgrounds and exhibitions and might be subject to additional specialist regulations.

3.20 equipotential bonding

electrical connection maintaining various exposed-conductive-parts and extraneous-conductive-parts at substantially the same potential

NOTE See also [3.48](#) for the definition of protective equipotential bonding.

3.21 event

occurrence that is an entertainment where temporary electrical systems are used

NOTE 1 Example events include sporting, commercial or business occasion, public or private festival or pageant.

NOTE 2 This also includes work that requires systems associated with the broadcasting or recording of the occurrence as educational, entertainment or newsworthy material (see also [3.1](#) and [3.20](#)).

3.22 event manager

individual who carries overall responsibility for the event, including all aspects of bringing together the staff, equipment and facilities required for the event and the safe and smooth running of the event, including its set-up, operation and removal

NOTE 1 In the context of this British Standard, the event manager's role specifically includes the appointment of a senior person responsible (SPR) to oversee any temporary electrical systems that might be required.

NOTE 2 The event manager can be a producer, promoter, event manager/organizer, news editor, project manager, production manager or other similar person.

3.23 exposed

likely to be affected by adverse environmental conditions

NOTE Environmental conditions include natural or man-made conditions, such as weather, moisture, humidity and dust.

3.24 extra low voltage

see voltage, nominal ([3.63](#))

3.25 facilities

constituent parts of an event that are needed so that the event can be mounted and run

NOTE 1 Such facilities involve electricity and might include staff (wet hire) or might be without staff (dry hire).

NOTE 2 Facilities or services include catering, hospitality, rest areas, welfare or first aid, toilets, wardrobe, make-up, staging, offices, workshops, trading units and similar. Facilities directly associated with the supply, distribution or use of electricity as a core part of the event are included, such as suppliers of generators, electrical distributions, television, radio, communications, public address and sound systems; lighting systems of all types and electrically operated lifting systems and stage machinery. Where appropriate, these are referred to specifically.

3.26 facilities providers

individuals or organizations that provide facilities or services to events

3.27 facilities vehicles

vehicles used by facilities providers to make the facilities or service offered available to the event

NOTE Such vehicles, including transportable units used by facilities providers, often have installed electrical systems supplied from a local or onboard generator or from the temporary distribution.

3.28 final distribution unit (FDU)

portable distribution unit supplied from a central distribution unit (CDU) or intake switch unit, providing sub-circuit protection and switching for a number of outgoing circuits

NOTE See [B.5](#).

3.29 freelance

person who is not permanently employed, but is engaged on a short-term or fixed-term employment to provide services in a personal capacity

3.30 indoor use

use limited to locations where protection against the effects of detrimental environmental conditions deleterious to insulation and electrical safety is ensured

3.31 ingress protection (IP) classification system

internationally agreed classification system that defines degrees of protection against solid objects, dust and liquids

NOTE See [BS EN 60529:1992+A2:2013](#).

3.32 installation

items not part of a temporary electrical system and permanently fixed in a position from which they are not intended to be removed

3.33 installed electrical system (installed system)

system that is permanently fixed in position and not intended to be removed

NOTE 1 Installed electrical systems are not covered by this British Standard. Such installations are part of the infrastructure of premises, buildings and mobile or transportable units, etc. covered by [BS 7671](#).

NOTE 2 Existing installed electrical systems might have been designed to earlier editions of [BS 7671](#). This does not necessarily mean that they are unsafe for use nor does it mean that they do not conform with the Electricity at Work Regulations 1989 [10].

3.34 instructed person

person adequately advised or supervised by a skilled person (as defined) to enable that person to perceive risks and to avoid hazards which electricity can create

3.35 intake switch unit (ISU)

switchgear designed for connection between the source of temporary supply and the remainder of the temporary electrical system providing means of isolation and switching

NOTE The ISU has one or more outgoing circuits (see [note to 3.4](#) and [Annex B, B.2](#)).

3.36 keyed single-pole connector (KSPC)

single-pole connectors that incorporate a key index device

NOTE 1 There are five different key arrangements that define a connector for duty as E, N, L1, L2 or L3.

NOTE 2 The moulded shell carries an alphanumeric marking related to its circuit duty. The shells are available in colours appropriate to circuit duty, but some variation in colour related to circuit duty exist so complete reliance on colour alone is unwise. The key indexing and alphanumeric marking is always correct to circuit duty no matter what shell colour is present. Several manufacturers produce KSPCs that follow the same logic and are interconnectable according to circuit position (see also [3.55](#), [7.3.4](#), [A.4](#) and [F.2.5.3](#)).

3.37 kilovolt ampere (kVA) and kilowatts (kW)

units that indicate the ability of a supply to provide energy or the amount of energy consumed by current-using equipment

NOTE kVA is the product of supply voltage and current flowing. kW is the useful power delivered. This takes into account any power factor present due to the current and voltage of the circuit being out of phase. In an AC electrical system, the useful power delivered is typically less than the product of supply voltage and current flowing. The kVA rating is preferred as its use in calculations result in a more accurate prediction of current flow.

3.38 load-side

part of a connector or system used to distribute electricity to a load (current-using equipment)

3.39 location

site where an event takes place that requires a temporary electrical system

NOTE A location might also be referred to as a site or venue.

3.40 low voltage

see voltage, nominal (3.63)

3.41 mobile and transportable units

vehicles, trailers, similar mobile units and transportable cabins and huts, etc., which have permanent electrical installations

NOTE This includes, but is not limited to, mobile or transportable units such as broadcast technical vehicles, catering units, wardrobe or make-up units, toilets, facilities vehicles, mobile or portable site offices, workshops, welfare, emergency, trading units, and transport units with installed low voltage electrical systems. (See BS 7671:2018+A2:2022, Section 717, see also 3.33, Note 2, and IET Guidance Note 7 [5].)

3.42 open-tails

cable assembly used to connect a temporary distribution to a source of supply that is typically in the form of a switched fuse

NOTE Open-tails are short lengths of single or multi core cable that are correctly terminated usually in a single-pole or multi-pole connector at one end. At the other end each bare conductor has a crimped ferule or lug to suit the termination at the switched fuse. The termination of bare conductors directly onto busbars constitutes an addition to the fixed installation (see 7.3.4.4 and BS 7671:2018+A2:2022, Regulation 132.16).

3.43 outdoor

unprotected environment where conditions deleterious to insulation and electrical safety are probable

3.44 override (RCD override)

electrical or electronic facility built into a distribution unit that temporarily overrides the normal action of a residual current device (RCD) or interconnected units acting as an RCD, but does not affect other protective functions of a device, such as overcurrent protection

NOTE This is also known as "bypass" or "disable" (both deprecated).

3.45 performance lighting

lighting equipment for the purpose of lighting the event or activity for the required artistic effect

NOTE Performance lighting is also known as production lighting.

3.46 person responsible (PR)

person who takes responsibility for temporary electrical system(s) used for an event or activity, reporting to the event manager. In the case of larger events where more than one person is responsible for parts of the electrical system, they will report to a senior person responsible (SPR) who will take overall responsibility of all the temporary electrical systems involved and reports to the event manager, see 3.9.

NOTE The competence of a person responsible needs to be sufficient and suitable for the complexity of the temporary electrical system and event involved, see 3.9.

3.47 power-processing

range of equipment, usually electronic, which is used to smooth, correct or manipulate electrical supplies to the equipment

NOTE This covers equipment such as uninterruptable power supplies (UPS), inverters, dimmers, variable speed motor controllers and switched mode power supplies.

3.48 protective equipotential bonding

electrical connection maintaining various exposed-conductive-parts and extraneous-conductive-parts at substantially the same potential for the purposes of safety

3.49 protective earth and neutral conductor (PEN)

conductor combining the functions of both protective conductor and neutral conductor

NOTE In the context of this British Standard a PEN conductor only exists as a conductor of a PME distribution that is part of a DSO's domain. The presence and performance of a PEN conductor as part of a PME distribution can have an effect on the design and use of a temporary system.

3.50 protective multiple earthing (PME)

earthing arrangement, found in TN-C-S systems, in which the supply neutral conductor is used to connect the earthing conductor of an installation within a premises with Earth

NOTE 1 Attention is drawn to the Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR) [2] and the Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012 [3] for details on PME.

NOTE 2 In the context of this British Standard, a PME arrangement only exists as a distribution that is part of a DSO's domain. The presence and/or use of a supply derived from a PME arrangement can have a significant effect on the design and use of a temporary system.

3.51 residual current device (RCD)

mechanical switching device or association of devices intended to cause the opening of the contacts when the residual current attains a given value under specified conditions

NOTE 1 See Annex E with regard to residual current devices.

NOTE 2 An RCD without integral overcurrent protection is defined as a residual current operated circuit-breaker (RCCB), and an RCD with integral overcurrent protection as a residual current operated circuit breaker with overcurrent protection (RCBO).

3.52 safety lighting

lighting provided to ensure the safety of all persons on the site in the absence of adequate illumination

NOTE Part of a safety lighting system classified as emergency lighting can be provided with independent power supplies and wiring to reduce the risk of danger resulting from failure of the main system.

3.53 seamless back-up generation

use of two or more compatible generators synchronized together and supplying a load so that the supply to the load is maintained if one of the generators failed

3.54 selectivity

design arrangements to ensure that the overcurrent protection or RCD nearest to a fault operates before another protective device

NOTE Correctly arranged selectivity ensures the appropriate protective devices operate. It is the overcurrent or residual current device immediately upstream of the cause of the problem that operates so that no other circuits are affected. See also Annex E, E.2.5 and E.3.3.

3.55 services

input to an event provided by hired personnel

NOTE See also [3.25](#).

3.56 set-up

process of creating a temporary electrical distribution or system

NOTE 1 Also known as setting-up.

NOTE 2 Within the industry this might also be referred to as “rigging”, “installing”, “fit-up”, “get-in” or similar expressions.

3.57 single-pole connectors

high current connectors where each individual connector carries only one conductor of the circuit

NOTE 1 These are used as connectors for circuit conductors where the current exceeds 125 A. The preferred type is the KSPC, although there are other types known as BAC and CamLok, which are not keyed. These different types of connector are not inter-connectable across types (see also [3.36](#) and [7.3.4](#)).

NOTE 2 BAC single-pole connectors exist in 150 A and 400 A types. In use BAC connectors are arranged so that the supply-side connector has the appearance of a male contact with an insulating tip that conforms to [BS EN 60529](#), IPXXB finger test. The load-side connector has the appearance of a female contact, which is open and does not conform to IPXXB. BAC connectors have rubber-based black outer shells. They can be used in any conductor of a circuit; they need to be marked for circuit duty when incorporated into a temporary distribution. BAC connectors are manufactured to BS 5550-7.5.4 (see also [7.3.4](#)).

NOTE 3 CamLok single-pole connectors are used up to 400 A. In use CamLok connectors are arranged so that the supply-side connector has the appearance of a female contact which is open and does not conform to [BS EN 60529](#), IPXXB finger test. The load-side connector has the appearance of a male contact and does not have an insulating tip and does not conform to IPXXB. CamLok connectors have rubber-based outer shells that exist in a variety of colours. It cannot be guaranteed that the correct colour for circuit duty is available; therefore, care is needed when using CamLok connectors in a temporary distribution. Some CamLok connectors are used in the UK. Equipment brought into the UK by foreign touring shows often use CamLok single-pole connectors (see also [7.3.4](#)).

3.58 skilled person

person who possesses, as appropriate to the nature of the electrical work to be undertaken, adequate education, training and practical skills, and who is able to perceive risks and avoid hazards which electricity can create

3.59 supply-side

part of a connector or system used as a source of electricity

3.60 temporary electrical distribution

switchgear, distribution units, dimmers and similar equipment, protective devices, cables, connectors and metering equipment, etc. that form the means of supplying electricity to all parts of an event and which is erected for an event and removed after the event is finished

NOTE 1 Also referred to as temporary distribution.

NOTE 2 There can be a main distribution and several sub-distributions or several independent distributions provided by separate facilities providers.

3.61 temporary electrical system

all switchgear, generators, distributions units, dimmers and similar equipment, cabling, connectors, protection, and measuring devices and current-using equipment, including mobile and transportable units that are erected for an event and which will be removed after the event is finished

NOTE 1 Also referred to as temporary system.

NOTE 2 There can be a main system and several sub-systems connected or several independent systems provided by one or more facilities provider.

NOTE 3 Some examples of temporary systems are given in Annex D, Figure D.1, Figure D.2 and Figure D.3.

3.62 venue

premises specifically adapted for the hosting of events of all sizes

NOTE 1 Examples include theatres, concert halls, sports stadia, show grounds, exhibition halls, arenas and similar.

NOTE 2 Sometimes referred to as a location or site.

3.63 voltage, nominal

voltage by which an installation (or part of an installation) is designated

NOTE The following ranges of nominal voltage (rms values for AC) are defined:

- *Extra-low. Not exceeding 50 V AC or 120 V ripple-free DC, whether between conductors or to Earth.*
- *Low. Exceeding extra-low voltage but not exceeding 1 000 V AC or 1 500 V DC between conductors, or 600 V AC or 900 V DC between conductors and Earth.*
- *High. Normally exceeding low voltage.*

3.64 $Z (Z_e, Z_s)$

impedance between the low voltage system and an earthing arrangement

NOTE Z_e is that impedance measured at the source of supply for the temporary system. Z_s is that impedance measured at a socket-outlet in the temporary system for the connection of equipment.

4 Management of an event and supply of equipment for temporary electrical systems

4.1 Management of the event

Every event or activity should have someone with overall responsibility for the management and safe execution of the work necessary to create and run that event or activity.

NOTE 1 Depending upon the nature of the event or activity, this person might be a producer, news editor, event manager/organizer, promoter, project manager, production manager or other similar person. This person is referred to as an event manager for the purposes of this British Standard; see 3.23.

The event manager should verify that electrical safety measures and the distribution(s) is correctly implemented and maintained for the duration of the event. For smaller events this could be achieved by effective coordination of suppliers and contractors, or where the size of the event or technical requirements requires suitable electrical skill, a suitable person should be appointed to manage electrical safety. This SPR should have sufficient and suitable competence to deal with the size and complexity of the work involved, which can vary considerably, see 4.3.

NOTE 2 Regardless of the size or complexity of the work, health and safety legislation applies, particularly the Management of Health and Safety at Work Regulations 1999 [6], the Provision and Use of Work Equipment Regulations 1998 [7] and the Electricity at Work Regulations [4]. Events require many different facilities, services and

people to safely function together in an environment that is often owned or occupied by others who might not be directly associated with the event. It is of fundamental importance that the event manager and all persons responsible understand the need for co-operation and co-ordination between all parties associated with the event at the premises involved, see the Management of Health and Safety at Work Regulations 1999, Regulations 11 and 12 [6].

NOTE 3 The Construction (Design and Management) Regulations 2015 [18] apply to the events and entertainment industry and have specific requirements for clients, designers and contractors. The HSE has published industry specific guidance for the application of the Regulations, available at: <https://www.hse.gov.uk/entertainment/cdm-2015/index.htm>

4.2 Outlining the parameters of the event

The event manager should provide an outline of the type, size and aims of the event, where and when it is to be held and how it is to be managed.

NOTE 1 An event might require single or multiple, separate temporary electrical systems of varying complexity with more than one electrical environment.

The outline of the event should provide this information and also the responsibilities of others working directly with the design, provision, setting-up or use of distribution or current-using equipment.

The anticipated number and size of supplies and how they are to be provided, used and managed should be discussed at an early stage with the senior person responsible (SPR). This discussion should also include the requirements for energy efficiency, as well as the resilience of the supply, identifying emergencies that might arise and how they are to be dealt with.

NOTE 2 The complexity increases with the number of electrical environments, each with its electrical supply and associated temporary system supplying the units and facilities related to that sector of the event. In reality, environments typically overlap each other. The different temporary systems come close together and earthed signal cables might be connected between electrical equipment from different electrical environments. These situations mean that protective bonding between temporary systems and electrical environments is required.

The person responsible for the electrical system should be sufficiently competent to understand and manage its use.

NOTE 3 Examples are found in [Annex D](#), [Figure D.1](#), [Figure D.2](#) and [Figure D.3](#) with the related commentary.

4.3 Responsibility for the temporary electrical system(s)

The senior person responsible should have sufficient and suitable competence to verify the safety in all respects of temporary electrical system(s) in all conditions that can reasonably be predicted to occur.

Where large or multiple temporary electrical systems are involved, splitting the work into manageable parts or sub-systems should be taken into account, with each part or sub-system having a separate person responsible (PR) for the temporary electrical system involved, who should report to the senior person responsible (see [3.45](#), [5.1](#), [5.2](#), [6.1](#), [7.1.1](#), [8.1](#), [8.2](#) and [9.2](#)). Each separate person responsible should have sufficient and suitable competence to enable them to verify the safe use of the temporary system(s) they are responsible for.

Every person responsible should know and understand the requirements of the event or activity and the extent of their own responsibility (see also [Clause 5](#) and [6.1](#)).

NOTE 1 The small/simple form of temporary electrical system is typically (but not exclusively) supplied from a single installed electrical system using 13 A or 16 A connectors, where the total power used does not exceed 6 kVA.

NOTE 2 The large/complex forms of temporary electrical systems include all those that do not clearly fall within that described in Note 1. Systems, small or large, that are not simple might include those:

- a) with supplies obtained from multiple installed sources, electrical energy storage systems (EESS), hybrid systems, other generators or combinations thereof;*
- b) used in complex ways, including supplying mobile or transportable units;*
- c) used at locations that involve other electrical environments; and*
- d) used in association with various permanent or temporary structures.*

The range of large/complex work is considerable and might involve one or more interrelated electrical systems and multiple separate temporary systems. The work can involve a significant number of electrical crews and crew members. There can also be issues related to the location, environment, weather, or other people who might be affected by the use of electricity (see [Clause 6](#)).

4.4 Early planning

Early in the planning of the event, the event manager and the senior person responsible should agree (see [3.45](#), [5.2](#), [5.3](#), [6.1](#), [6.2](#), [6.4](#) and [6.5](#)) the following:

- a) arrangements for procuring equipment;
- b) arrangements for providing any crew required;
- c) arrangement for provision of the power supply(s) required; and
- d) interaction with other parties related to the provision of power and the temporary electrical system.

4.5 Provision of equipment

4.5.1 Supply of equipment for events

COMMENTARY ON 4.5.1

It is a frequent requirement that temporary electrical systems are set-up for use with the minimum of delay and that it is possible for changes to be made easily and safely and the temporary system removed rapidly. The recommendations in this British Standard aim to achieve this effectively and safely.

The following conditions should be met in order to permit a simplified inspection and testing routine for temporary electrical systems set-up for events:

- a) equipment should be supplied in the form of tested complete stock items that can be plugged together at the location to form the temporary electrical system required;
- b) equipment should be delivered to the event in a safe and serviceable condition and within a valid period, having passed a formal inspection and test;

NOTE 1 Guidance on appropriate testing and inspection can be found in the IET Code of Practice for In-Service Inspection and Testing [N2].

- c) evidence should be provided to show that the equipment has passed the formal inspection and test; the evidence should indicate when the re-test is due;

NOTE 2 This evidence might comprise supplier process records, coloured cable ties (which are not confused with other colour coding), tested labels or a declaration from the supplier of the equipment.

- d) equipment should be suitable for use in the manner for which it was manufactured;

- e) mobile and transportable units with an electrical installation should be within a valid period having passed a formal inspection and test. The inspections and tests should be carried out in accordance with BS 7671:2018+A2:2022, Part 6 (see also 3.33, Note 2). The Electrical Installation Certificate (EIC) and/or most recent Electrical Installation Condition Report (EICR) should be available and also the mobile or transportable unit should be provided with evidence that these formal inspections and tests are valid; and
- f) crew assembling the equipment have been trained to conduct basic user checks on equipment when assembling the temporary system.

If the conditions in a) to e) are not fulfilled, the equipment should be subjected to a formal inspection and test before use.

The name of the owner or supplier should be shown on the equipment.

4.5.2 Responsibilities of owners or suppliers of equipment

COMMENTARY ON 4.5.2

The equipment provided can be owned by a person or organization employed on the event or by one or more others who supply the equipment under a hire agreement or contract for use at the event.

The supplier of the equipment might provide specialist labour to set-up and operate the equipment. Such labour needs to be suitably competent for the work involved, whether they are permanently employed or freelance.

The owners or suppliers of equipment should verify that the conditions contained in 4.5.1 are met as failure to meet these conditions causes additional formal inspection and testing to be carried out on site, causing unnecessary delay.

NOTE Suppliers of work equipment are subject to the requirements of Section 6 of the Health and Safety at Work etc. Act 1979 [19] and the Part 4 of the Supply of Goods and Services Act 1982 [20].

Where owners or suppliers provide specialist labour to set-up or operate the equipment, the owners or suppliers should verify that any such labour provided understand their duty at the event and are competent to undertake the work involved.

5 Small/simple events and activities requiring up to 6 kVA

COMMENTARY ON CLAUSE 5

The following processes are applicable to small/simple events and activities that have temporary electrical systems typically, but not exclusively, using a maximum of 6 kVA from a single-phase supply installed and used within a building. The supply would usually, but not exclusively, be derived from 13 A or 16 A socket outlets.

Examples of simple activities include small photographic shoots, small TV interviews and documentary work, radio carry-ins, temporary locally set-up editing facilities, small conferences, small theatrical performances and similar.

5.1 General

Events and activities requiring small/simple temporary electrical systems should involve a small number of people. The environment and nature of the small/simple system should be such that it may be managed by an instructed person on their own.

NOTE 1 The instruction may take the form of detailed method statements or work instructions.

Where practicable, Class II insulated equipment should be used to reduce the risk of electrical shock.

NOTE 2 It is possible that certain separate parts of a larger event might fall within the scope of a simple activity covered by this clause, in which case the person responsible would be directed by the senior person responsible for all the temporary electrical systems of the larger event.

5.2 Person responsible

The person responsible for the small/simple temporary electrical system should have sufficient and suitable competence to manage the system involved. If the work is outside their known competence, they should state this and not accept the work.

The person responsible should understand their responsibilities and that a risk assessment should be carried out, including a site survey, where necessary. The person responsible should have the following information:

- a) the date, time and location of the event;
- b) details of local and environmental conditions that might be encountered;
- c) the number of people who might be involved or affected by the temporary system, including performers, crew and public, etc;
- d) whether animals are involved;
- e) where electrical supplies are to be obtained from; and
- f) how much equipment is needed and how it is procured.

If a problem arises with the temporary electrical system or the installed electrical system at a location, the person responsible should have quick and effective access to assistance from an electrically skilled person who has sufficient and suitable competence to deal with the problem (see [Clause 4](#) and [5.1](#), [Note 2](#)).

5.3 Planning the small/simple temporary electrical system

Where necessary, while planning the system, a diagram to show how it is set-up should be prepared, including a list of the equipment required.

NOTE 1 This assists in determining exactly what is needed, the power required and the ease with which the system can be managed or changed.

Once it is agreed what is required for the system, the following should be carried out:

- a) prior agreement should be sought on whether the owners or occupiers of the location are prepared to supply the power required. In the cases where the owners or occupier supply electricity, agreements should be reached to determine which sockets and other electrical equipment is used. All relevant test information along with a diagram (if required) of the temporary system should be made available at all times;

NOTE 2 Owners or occupiers can insist that evidence is provided to verify that the temporary electrical system being set-up is safe and suitable.

NOTE 3 It is advisable to agree with the location owner or occupier what state the installed electrical system is to be left in upon completion of the event.

- b) it should be ascertained what electrical equipment is currently in use at the location. There should not be unwanted interaction between the temporary system and the permanently installed equipment and one should not compromise the operation of the other;
- c) check that the source of supply is safe and suitable to use; this should include, as a minimum, a visual inspection of the socket outlets to be used, a polarity check and an assessment of earth fault loop impedance. If the source fails the visual inspection, polarity or earth loop impedance checks, it should not be used;

NOTE 4 There are plug-in devices commercially available that check polarity and earth fault loop impedance (see [G.1](#) and [G.2](#)).

- d) the location of the protective device(s) for the source of supply used should be established and that access should be possible at all times in case of urgent need; and
- e) the owner or occupier of the location should provide evidence that the installed electrical system(s) are safe for use.

NOTE 5 Owners or occupiers can provide a copy of an EICR to fulfil this requirement. In such cases, the EICR is not to have any Codes C1, C2 or F1 affecting the parts of the system to be used. If it does, evidence that the necessary remedial works have been done needs to be supplied.

5.4 Risk assessments

Risk assessments relating to the particular use of electricity for the event should be undertaken by the person responsible for the temporary electrical system. These should be given to the event manager at a sufficiently early time to allow risks that have been identified to be resolved, either by removing the risk or minimizing and controlling it.

Risks should be constantly monitored, re-assessed and acted upon as the event or activity develops.

5.5 Supplying and checking equipment

Equipment should be supplied in a safe and serviceable condition (see 4.5.2).

The person responsible for the temporary electrical system should verify that the equipment selected for use:

- a) has evidence of being within a valid period after passing a formal inspection and test;
- b) is safe, serviceable and suitable for the purpose and conditions that exist; and
- c) is visually inspected for damage before use.

Equipment failing any of the above checks should not be used.

5.6 Setting-up a small/simple temporary electrical system

The temporary system should be protected by an RCD with a rated residual operating current ($I_{\Delta n}$) not exceeding 30 mA. The RCD should be placed at the connection to the socket-outlet from which the supply is derived so that all circuits supplied from this source have additional protection.

The test or “T” button on the RCD should be pressed with the electricity supply switched on. The RCD should operate and switch off the supply. If the RCD does not operate, the cause should be investigated. If the RCD is part of the temporary system, it should be removed and replaced immediately. If the RCD is part of the fixed installation, such as a socket-outlet with a built in RCD, or another temporary installation belonging to another party, it should be replaced immediately by the owner of that system. If this is not possible, an in-line RCD should be connected at the source of the temporary system.

When the temporary distribution has been set-up, the following should be checked (see G.1 and G.2):

- a) each circuit is set-up as planned;
- b) each socket-outlet of the temporary distribution has the correct polarity and acceptable earth fault loop impedance;
- c) the equipment that requires a supply has been connected and is switched on one at a time;
- d) the connected equipment functions correctly;
- e) any instructions have been given to those who are using the temporary electrical system or are affected by its use;
- f) cabling and equipment placed overhead is protected from premature collapse in the event of a fire; and
- g) cabling is routed, secured and protected to minimize the risk of damage and trip hazards.

The event or activity should only proceed when the temporary electrical system has passed all the required checks and is confirmed as safe for use. Equipment found to be faulty at inspection or during use should be removed from service and labelled as faulty with an indication of the problem.

If at any time the installed electrical supply fails or in some way shows that it is unsafe or not suitable for use, work should be stopped and the conditions re-assessed. If there are indications that the system is unsafe for use, the advice of a suitably electrically skilled person should be sought (see 5.10).

5.7 Changes to the system

If changes to the temporary electrical system are required, the relevant circuits should be isolated and the following actions carried out under the direction of the person responsible:

- a) disconnect the parts of the distribution where changes are to be made;
- b) visually inspect new equipment needed prior to connection;
- c) re-assess the risks and apply corrective actions, if required (see 5.4 and 5.5);
- d) set-up in the new arrangement;
- e) check it is safe to reconnect the temporary electrical system to the supply; and
- f) power should be restored and the system tested as required and confirmed as functioning correctly before work is resumed.

5.8 Leaving the system unattended

5.8.1 General

If at any time the temporary electrical system is to be left unattended, the person responsible should determine whether the supply should be isolated and the system secured against use by unauthorized persons. The temporary system should be re-checked to verify that it is safe before re-energizing.

5.8.2 Person responsible leaving the system

If the person responsible for the temporary electrical system leaves the location while the system is still in use or energized, a suitable deputy should be appointed. The deputy should have sufficient and suitable competence to control the use of the system in the form that it is in.

NOTE It is advisable that the appointed deputy is able to contact the person responsible in case of need.

5.9 Removing the system

When the event or activity has been completed, the temporary electrical system should be dismantled in a safe manner. Equipment should be packed for return to the supplier and faulty equipment labelled and notified to the supplier.

5.10 Problems with the installed electrical system

If the installed electrical system at a location has been found to be unsafe, the owners or occupiers should be made aware of the problem and a recommendation made that the electrical system be inspected by a suitably competent person.

If there are electrical problems with the installed system at the location caused by the people and/or work associated with the event, appropriate correction of these should be agreed. The person responsible for the temporary electrical system should arrange for the problems to be investigated by a suitably competent person and an agreed arrangement for correction of the problems put into action [see 5.3a)].

6 Large/complex events and activities requiring in excess of 6 kVA

6.1 Responsibility

6.1.1 Person responsible

COMMENTARY ON 6.1.1

A senior person responsible has overall responsibility for all of the temporary electrical system(s). The size and complexity of the event might require the work to be split into smaller parts or sub-systems, with a separate person taking responsibility for each part or sub-system and answering to the senior person responsible (see 4.3).

The person taking responsibility for large/complex temporary electrical systems should be trained and experienced in all aspects of the control and use of temporary electrical systems and competent to perform the work required (see Clause 4 and 9.2).

NOTE Persons responsible for temporary electrical systems need suitable competence and might be crew chiefs, chief electricians, gaffers, best boys, production electricians, engineering managers, sound supervisors, unit managers, communications engineers, project managers, site managers, technical managers, lighting directors, lighting designers or directors of photography.

If the size and complexity of an event requires the work to be split into smaller parts or sub-systems, a senior person responsible should be appointed. The senior person responsible should have the skills to manage and control the crew and all aspects of the work undertaken. The role should include responsibility for all people and equipment involved and any effect that the temporary electrical system(s) might have on others. The person taking responsibility for large/complex temporary electrical systems should know and understand the following:

- a) the date, time and location of the event;
- b) details of local and environmental conditions that might be encountered;
- c) the extent of the work under their control and its requirements, including a site survey, where necessary;
- d) the competence of those under their control;
- e) the number of people who might be involved or affected by the temporary system(s), including performers, crew and public;
- f) whether animals might be involved;
- g) the amount of power required and how the supply is to be obtained;
- h) the electrical issues that might affect mobile or transportable units with electrical installations;
- i) the equipment needed and how it is to be provided;
- j) that if at any time an SPR or PR is absent from site, a suitably competent person with the knowledge and ability to manage the activities being carried out should be appointed as a deputy; and
- k) the procedures for dealing with emergencies.

6.1.2 Allocation of responsibility

Where a temporary electrical system(s) is split into smaller parts or sub-systems, the senior person responsible should assign the design, provision, distribution, co-ordination and control of the system at the location to suitably competent people.

All parties should agree on the allocation of responsibilities.

A person should not accept any duty they know to be outside of their competence.

The senior person responsible, any other person(s) responsible and the event manager should agree which of the following are included as part of their duties:

- a) retaining records, drawings, agreements, etc. that might be needed for the temporary electrical system;
- b) arranging for the electrical supplies required;
- c) checking the safety and suitability of the electrical supplies;
- d) designing the temporary electrical system(s) involved;
- e) selecting and obtaining the equipment required;
- f) verifying that the equipment required is safe and fit for purpose;
- g) assessing and controlling the risks affecting temporary electrical system(s) throughout the event and providing risk assessments, as required (see 6.3);
- h) setting-up and testing the temporary electrical system(s);
- i) controlling the operation of the system and changes that might be needed; and
- j) removing the temporary electrical system(s) and restoring the location to a condition that was agreed with the owners or occupiers before the event or activity.

6.1.3 Principle responsibilities

6.1.3.1 General

The principle responsibilities given in 6.1.3.2, 6.1.3.3, 6.1.3.4, 6.1.3.5 and 6.1.3.6 should be undertaken either separately or in combination.

The principle responsibilities in this clause may be undertaken either separately or in combination under the direction of the senior person responsible.

6.1.3.2 System design

Designs for large/complex temporary electrical systems should include:

- a) analysis of the production requirements, including the foreseeable duration of the event;
- b) investigation and assessment of expected site conditions;
- c) taking into account the electrical characteristics of the supply;
- d) consultation with relevant authorities and experts;
- e) calculation of electrical details to verify safety and suitability;
- f) calculation of weight and loading details, as required for structural design and erection purposes;
- g) provision of lists of equipment required;
- h) specification of non-standard set-up procedures;
- i) specification of system tests, test methods and limiting parameters, including those required for emergency backup systems; and
- j) guidance on foreseeable emergency procedures.

6.1.3.3 Site work

Site work should include:

- a) assessment of actual site conditions, including electrical environments;
- b) understanding the design specifications and special requirements;
- c) liaison with other parties on site;

- d) provision of supplies and temporary distributions for the set-up and removal processes [see also [6.1.3.6b](#)]);
- e) proper application of standard erection and removal procedures;
- f) provision of satisfactory workmanship; and
- g) co-operation with persons responsible for testing and operating the temporary electrical system.

6.1.3.4 Inspection, testing and certification

The verification and testing procedures for large/complex temporary electrical systems should include:

- a) relevant inspection and testing, including re-inspection and retesting, as necessary;
- b) special safety checks required by the design specification;
- c) recording of test results and evaluation of safety implications;
- d) initiating required remedial action(s);
- e) provision of appropriate written certification that the system is safe for use; and
- f) testing the emergency, safety and back-up systems.

6.1.3.5 Operation

The operation of a large/complex temporary electrical system should include:

- a) energizing and controlling the system to the event requirements within the design limitations;
- b) provision of competent staff to keep the temporary system in good condition;
- c) prevention of tampering and damage to the temporary system, by performers, other technical and non-technical personnel, and members of the public;
- d) dealing with unforeseen production requirements safely;
- e) dealing with emergencies, including operational checks of emergency, safety and backup systems; and
- f) ensuring that temporary electrical systems remain safe when not in active use, whether energized or not.

6.1.3.6 Removal of equipment

The safe removal of equipment should include:

- a) co-operation with others to produce a work plan;
- b) provision of supplies required for the removal process [see [6.1.3.3d](#)]);
- c) notifying when circuits have been isolated so that disconnection and removal can proceed in accordance with the work plan;
- d) safe isolation and removal of all temporary cables and switchgear, etc. from the site;
- e) inspection of equipment that is to be re-used, under the same agreement, at another site without return to the supplier;
- f) setting aside and marking suspect or faulty equipment for repair and retesting;
- g) restoration of all alterations and modifications to the location in accordance with an agreed standard; and
- h) notifying the location owner or occupier that the site and all permanent installations have been left safe.

6.2 Electrical supply

6.2.1 Supplies required

COMMENTARY ON 6.2.1

Supply can be obtained by connection to an installed supply at a location, from a generator or from a DSO.

Electrical requirements as outlined in [BS 7671:2018+A2:2022](#), Regulations **132** et seq. and Chapter **31**, should be discussed and agreed between the senior person responsible, the event manager and the supply providers early in the planning.

The supply requirements should include the following details:

- a) the maximum demand in kVA;
- b) the number of phases, current per phase, power factor and harmonic content for the anticipated load (see [Annex I](#));
- c) the earthing arrangements of all supplies that might be used for the event, or be involved with the event via earthed signal cables, or the planned or casual interconnection of protective conductors;

NOTE It is important to know whether the supplies to be used are TN-S, TN-C-S or TT and whether the main earthing terminal at a location is connected to earth rods, tapes, mats or conductive structural reinforcement forming the foundations. This information might affect the design and operation of the temporary system (see [Annex C](#)).

- d) the seamless back-up requirements where generators are used;
- e) the earthing arrangements for generators (see [Annex C](#));
- f) the overcurrent and residual current protection at the supply;
- g) the prospective short circuit current rating;
- h) the earth fault loop impedance at the supply terminals;
- i) the connection and disconnection dates;
- j) the metering, tariff or charges;
- k) the most suitable positions for connection to the supply;
- l) the method of connecting the temporary electrical system to the supply;
- m) the responsibility and procedure for safe connection, operation and disconnection;
- n) the precautions to be taken by the users and/or the suppliers;
- o) the maintenance and standby arrangements;
- p) the possibility of the temporary electrical system extending into other electrical environments;
- q) the mechanical protection of temporary connections and cables; and
- r) the existence of hazardous environments [see [6.3e](#)) and [8.12](#)].

The results of these agreements should be recorded and provided for those designing, setting-up, testing and operating the temporary electrical system.

6.2.2 Electrical supplies from installed sources

COMMENTARY ON 6.2.5

Many venues such as exhibition halls, sports stadia, theatres, and similar premises have permanent connection points to supply electricity for temporary systems as part of the offered facilities.

If a venue plans to provide permanent connection points to electrical supplies for a temporary electrical system(s), the supply should be arranged in an accessible manner to enable the connection of temporary distributions (see [Annex F](#) for details).

6.3 Risk assessments

The person responsible for the temporary electrical system should prepare a risk assessment, to be given to the event manager, which covers the provision, setting-up, operation and removal of the system. The results of the risk assessment should be communicated to all relevant people and incorporated into the planning and design of the temporary electrical system.

All significant hazards related to the temporary electrical system and its use should be taken into account, including the following:

- a) weather conditions, including the possibility of lightning;
- b) the effects that lighting might have on nearby transport routes including aircraft;
- c) time of day;
- d) the presence of the general public, including children, people with special needs or animals;
- e) hazardous environments, such as mines, petroleum installations, processes producing flammable dust or explosive materials (see [8.12](#));
- f) the presence of overhead or underground power cables or other utilities;
- g) the presence of water;
- h) the length of time the temporary electrical system is due to exist;
- i) possible mutual EMI effects between the temporary electrical system and permanent electrical installations;
- j) medical areas and locations (see [8.13](#) and [C.4.5](#));
- k) movement of vehicles;
- l) agricultural locations; and
- m) interaction of electrical environments resulting from the use of generators, installed supplies, sources of renewable energy, such as photovoltaic panels and sources other than 230/400 V at 50 Hz.

There should be a continuous assessment of risks that might occur or change as the event develops. Hazards should be removed or minimized and controlled and the event manager kept informed.

6.4 Equipment

6.4.1 General

Equipment should be delivered to the location in a safe and serviceable condition with evidence of valid formal inspection and test, which should be checked and verified before the equipment is used (see [4.5](#), [8.4](#) and [9.4](#)).

6.4.2 Specialist equipment

Where specialist equipment is accompanied by a technician, operator or crew, they should be fully advised of their responsibilities in relation to the temporary electrical system and their duties within the event as a whole.

6.4.3 Specific electrical requirements

Where equipment with unusual or specific electrical characteristics are used, the requirements of the equipment and its supplies should be discussed with the equipment providers prior to the design of a temporary system.

NOTE Such equipment can include variable speed lifting equipment, high power discharge lighting, mobile or transportable units and broadcast technical vehicles. [BS 7671:2018+A2:2022](#), Section **717**, deals with aspects of mobile and transportable units.

6.5 Crew

Regardless of the process used for selecting crew to staff the temporary electrical system, details of the work involved should be discussed and agreed between the event manager, senior person responsible and person(s) responsible, where applicable.

Crew members might have varying skills and experience, therefore the person(s) responsible should determine the competence and suitability of potential crew members before accepting them.

7 Design and instructions for temporary electrical systems

7.1 Design

7.1.1 General

The design of each temporary electrical system should meet the requirements of the event and take account of the supplies to be used and the conditions present at the location, including physical and environmental conditions and potentially hazardous sites.

As power quality is an important issue, the electrical equipment to be used at events (such as switching power supplies) should be taken into account in the planning stage as this can place a significant strain on the electrical distribution, as well as the performance of the protective devices.

The person designing the temporary electrical system should verify that all requirements are properly met and recorded. The design details and any special requirements, including tests should be provided to the person responsible for the temporary electrical system.

NOTE 1 Any intended departure from this British Standard requires special consideration by the designer and is to be noted in the Completion Certificates. The resulting degree of safety of the temporary system is not to be less than that obtained by conformity to this British Standard (see [Annex G](#)).

The temporary electrical distribution should conform to the relevant requirements of [BS 7671](#), including energy efficient measures prescribed in Part 8, as required.

NOTE 2 Further information on energy efficiency in temporary systems is available from <http://www.powerful-thinking.org.uk>

The equipment forming the temporary distribution should conform to [Annex A](#).

NOTE 3 For typical features that might be encountered within distribution, see [Annex B](#).

Effective site communications should be determined as a part of the planning and design process.

7.1.2 Principles of the temporary distribution

The circuit conductors used in all parts of the temporary distribution, including those within ISUs, CDU, FDUs and similar distribution or control units, should be arranged so that the conductors forming Line, Neutral and CPC at any particular circuit position all have the same cross-sectional area.

NOTE 1 This allows for typically available, flexible cables and connectors to be used and the various distribution units that might be designed and built for use in temporary distributions to have a consistent and predictable current rating. The use of undersized or oversized conductors at any particular circuit position removes this consistency and understanding.

Wherever three-phase and neutral overcurrent protective devices are used they should be four-pole devices interlocked so that all poles open together. There should be overcurrent sensing on all four conductors.

NOTE 2 This is to take account of the probability that there is likely to be a neutral current that is greater than any phase current due to harmonics and lack of phase balance in temporary distributions covered in this British Standard.

7.2 Electrical supplies

7.2.1 Source of supply

The source of supply should be verified as safe and suitable for use. The earthing arrangements of the supply should be identified so that the design can take account of particular requirements that might be necessary (see [Annex C](#)).

The owner or operator of installed supplies should provide the most recent EICR document (or, for new installations, an electrical installation or minor works certificate) which should be checked by the person responsible.

The responsible person should be able to access the source of supply at all times.

NOTE 1 The supply should be capable of being isolated in the event of an emergency.

The protective measures at the source of supply and the rating of the cabling to the ISU should be compatible and conform to [BS 7671](#) (see also [3.33](#), [Note 2](#), and [7.3.4.4](#)).

NOTE 2 For further information on RCDs at the source of supply, see [7.6](#) and [Annex E](#).

Where the source of supply does not have suitable overcurrent protection for the cable feeding the first ISU, the ISU should be positioned so that the length of this cable does not exceed 3 m and is adequately protected from mechanical damage. Where suitable protection is provided, longer runs of cable could be used and the design should take these factors into account (see [8.8.2](#)).

If low voltage supplies other than 230/400 V or 50 Hz are required, they should be supplied by a transformer, inverter or separate generator.

7.2.2 Generators as a source of supply

COMMENTARY ON 7.2.2

Mobile or static generators can be used if a permanent electrical installation is inadequate or unavailable, or if there are operational advantages to run from an independent electrical supply.

Generators can be used to supply all or part of the power required and are available at 230 V single-phase or 400 V three-phase and neutral operating at 50 Hz. A generator is defined in [BS 7671:2018+A2:2022](#) and includes static converters and photovoltaic systems.

If operation outside of these parameters is required, this should be discussed with the generator supplier.

NOTE 1 For a large/complex temporary electrical system, or where a seamless back-up is required, two or more generators can be paralleled through suitable synchronizing and protective switchgear. In special circumstances, interconnection with the public or a private network or a private installed supply can be arranged. Specific discussion and agreement with the DSO (i.e. the network operator) or private supplier is necessary. Attention is drawn to the ESQCR [\[2\]](#) and the Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012 [\[3\]](#) and [BS 7671:2018+A2:2022](#), Section [551](#).

Where a generator is used, the way the supply is earthed (see [7.4.2](#) and [Annex C](#)) should be taken into account. The earthing arrangements of existing electrical installations should not be used to provide a connection with Earth for temporary generators unless the means of earthing is verified and likely to be reliable for the duration of the event.

NOTE 2 This does not preclude the need to connect electrical environments.

For parallel sources, fault and overcurrent protection should determine the maximum currents likely to arise for all combinations of supply.

7.2.3 Responsibility for connection to a supply

COMMENTARY ON 7.2.3

Connection to the source of supply can be via suitable connectors of the appropriate rating, cables terminated at a switched fuse or directly to busbars (see also 7.3.4).

Agreement should be reached between the owner of the source of supply and the person responsible for the temporary electrical system as to who makes the connection and tests that are required for the temporary system before connection.

NOTE The event as a whole can have more than one connection to a permanently installed source or connections to two or more different installed sources or generators or any combination of these.

Line or Neutral conductors from different supplies should not be interconnected unless specifically designed to do so through an appropriate electrical interface, such as a generator synchronization panel. The interconnection between protective conductors from different supplies or earthed signal cables between equipment fed from different supplies (see 7.4, Annex C and Annex D) should be taken into account.

Connection to exposed conductors should only be carried out with the circuit disconnected from the source of supply and secured so that it cannot be accidentally re-energized.

7.3 Cables and connectors

7.3.1 General

All cables for temporary distributions should be terminated with connectors of rating no more than that of the cable current carrying capacity, as quoted by the manufacturer (for single-pole connectors see 7.3.4.2, Note 2). The protective device for any circuit should always have a rating suitable for the cable, connectors and equipment it is intended to protect.

Where direct connections to busbars or switchgear are required, open-tails should be used only if correctly terminated in an appropriate connector to supply the distribution that follows. In this case the open-tails should be correctly coloured and bear the correct alphanumeric markings to reduce the chance of misconnection to the source of supply.

The cables used for temporary distributions should have neutral and protective conductors of the same cross-sectional area as each of the Line conductors.

The temporary distribution should be designed so that the required voltage drop and disconnection times are met. Therefore, the selection of cable ratings and the protective devices should take account of:

- a) all environmental conditions likely to be present;
- b) grouping, enclosure or routing of cables that might give rise to excessive increases in conductor temperature;
- c) the loads that are likely to be connected; and
- d) the length of cable run.

Estimation of maximum loads should also take into account the:

- 1) likelihood of significant lack of phase balance;
- 2) presence of harmonics causing increased neutral current in polyphase distributions;
- 3) likelihood that neutral current might exceed the Line current as a result of 1) and 2); and
- 4) possibility of the connection of additional current using equipment.

NOTE 1 The rating of cables in three-phase systems that have high neutral currents due to harmonics is covered in BS 7671:2018+A2:2022, Regulations 523.6.3 and 524.2.2 and in Appendix 4, 5.5. Poor phase balance combined with high harmonic content can lead to excessive neutral current (see 7.1.2, A.1 and Annex I).

Multiple cables electrically connected in parallel should not be used to achieve increased delivery of energy.

NOTE 2 Strict requirements for overcurrent protection when using parallel cables are given in BS 7671:2018+A2:2022, 434.4 and 523.7; further information is given in IET Guidance Note 6: Protection against overcurrent [N1].

Where single-pole connectors and cables are used, the cables should be kept close together to minimize EMI effects (see 8.8.1).

NOTE 3 Matters of electromagnetic disturbance or EMI in permanent installations are dealt with in BS 7671:2018+A2:2022, Chapter 44, Section 444.

7.3.2 Identification of conductors and single-pole connectors

Conductors and/or single-pole connectors should be clearly marked and coloured at terminations in accordance with Table 1, as appropriate.

Table 1 — Marking of conductors and single-pole connectors

	Earth	Neutral	Line 1	Line 2	Line 3
Alphanumeric mark	E	N	L1	L2	L3
Colour	Conductor:	Blue	Brown	Black	Grey
	Green/Yellow				
	Connector: Green				
Before 31 March 2006 ^{A)}	Conductor:	Black	Red	Yellow	Blue
	Green/Yellow				
	Connector: Green				

^{A)} These outdated colours are still in use in some places.

NOTE Some flexible cables have conductors marked green/yellow, blue, brown, black. In these cables it is important to correctly identify L2 and L3.

Single-pole connectors should be keyed according to purpose to remove the risk of misconnection. If the single-pole connectors do not have a keyed index, they should be clearly marked and coloured (see 7.3.4).

Open tails and terminals should be correctly connected at a switched fuse or busbars as these could show outdated colours.

The coding or colouring for the temporary distributions should be in accordance with BS 7671:2018+A2:2022, Table 51.

NOTE The comparison of old colours to new colours is shown in Table 1.

Colours alone should not be used on cables to denote ownership or length, as they are easily confused with circuit function. Ownership and length should be shown using text or symbols.

7.3.3 Cables

All cables for the temporary distribution should be multicore except for circuits above 125 A where single-core cables are usually provided for portability (see A.4 for further details of single-core cables).

NOTE 1 Cables with armour protection are not usually necessary if appropriate measures for mechanical protection have been taken.

Cables should be flexible and of suitable conductor size and mechanical strength for their intended duty as follows:

- a) cables for use indoors only should be PVC insulated and sheathed in accordance with [BS EN 50525-2-12](#) (H05VV-F or equivalent) or rubber insulated and sheathed to [BS EN 50525-2-21](#) (H05RN-F or equivalent), with a voltage designation of not less than 300/500 V (ordinary duty flexible, as defined in [BS EN 50565-1](#)); and
- b) cables for use outdoors and in general use should be rubber insulated and sheathed in accordance with [BS EN 50525-2-21](#) (H07RN-F or equivalent), with a voltage designation of not less than 450/750 V (heavy duty flexible, as defined in [BS EN 50525-2-21](#)) and resistant to abrasion and water.

NOTE 2 Thermoplastic cables are not designed for general use outdoors. For example, cables known as “arctic blue”, are thermoplastic and are not suitable for use outdoors. Cables referred to as “YY” or “SY” do not necessarily conform to the appropriate Harmonized European or British Standards. See [BS 7671:2018+A2:2022](#) Regulation 511. PVC/PVC cables are to be referred to by their European harmonized code designation (for example H05VV-F), or the original UK national code (for example 3183Y). This doesn’t preclude the use of thermoplastic cables in outdoor situations where additional mechanical protection has been provided, e.g. by armour, containment or location.

Yellow “arctic” thermoplastic cables conforming to [BS 6004](#) should only be used in any environment to distribute Reduced Low Voltage (RLV) supplies.

A simple visual inspection of a connector-cable combination might not provide clear evidence of its current rating; only cables carrying the cross-sectional area (CSA) information on their sheath should be used. If this information is not present, the CSA should be marked on the cable.

Only cables where the specification can be verified should be used.

All multicore cables used for temporary distribution should have line, neutral and CPC conductors present and correctly terminated throughout the entire distribution. Cables or connectors of different ratings should only be connected through a distribution unit providing suitable overcurrent protection for all the downstream cables.

Identification of conductors should conform to [BS 7671:2018+A2:2022](#), Table 51.

Any cables liable to come into contact with high temperature luminaires should conform to the requirements of [BS EN IEC 60598-2-17](#).

7.3.4 Connectors

7.3.4.1 General

With the exception of some high current circuits (typically over 600 A) or the connection of open-tails to a source of supply, all temporary electrical connections on site should be made using plugs, sockets and cable couplers appropriate for the current and voltage and prevailing site conditions in accordance with [Table 2](#).

Connectors not given in [Table 2](#) should conform to [BS EN 61984](#).

Plugs, sockets and connectors conforming to [BS EN 60309-2](#) should be used in accordance with the recognized voltage colour code and mandatory keyway positions.

The choice of connectors for any use should not permit the interconnection of circuits that are not compatible. Care should be exercised with connectors brought into the UK by touring shows and productions from other countries, as the detailed circuit functions of these can be different to those used in the UK.

In higher current distributions where lug connections are used, the connection should be made in accordance with [BS 7671](#) (see also [7.3.4.4](#)).