

Code of practice for

Distribution of electricity on construction and building sites

Committees responsible for this British Standard

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ASTA Certification Services
Association of British Mining Equipment Companies
Association of Supervisory and Executive Engineers
British Gas plc
Department of Trade and Industry
ERA Technology Ltd.
Electrical Contractors' Association
Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
Electricity Supply Industry in England and Wales
Engineering Equipment and Materials Users' Association
GAMBICA (BEAMA Ltd.)
Health and Safety Executive
National Inspection Council Quality Assurance Ltd.

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Foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee. It revises the references in CP 1017 : 1969, which is withdrawn. There are no technical amendments.

This code represents a standard of good practice and takes the form of recommendations.

It has been assumed in the drafting of this code that the execution of its provisions will be entrusted to appropriately qualified and experienced people.

As a result of investigations made by the Electricity Council and the Building Research Station, representations were made to the British Standards Institution that the subject of electricity supplies on construction and building sites should be treated in British Standards.

It was decided to do the work in two stages. The first stage, which was the preparation of a British Standards specification for the distribution equipment, was completed with the publication of BS 4363 in October, 1968.

The second stage was the preparation of this code of practice which gives guidance on good practice in installations operating at low-voltages and includes recommendations with regard to testing and maintenance. The guidance given in the code relates to electricity supplies and distribution systems only and does not deal with the installation of current-using apparatus. Such apparatus should, however, comply with the regulations referred to in 1.1.2.

The use of a reduced voltage system operating at 110 V through a double-wound transformer is recommended as normal practice for portable and hand-held tools and lamps and for site lighting other than flood lighting. Supplies at 25 V or 50 V, also through double-wound transformers, are recommended for particularly hazardous situations.

For some construction installations, by reason of their siting in relation to the available electricity supply, it may be necessary to accept supplies at higher voltage. Supplies at 11 kV and 33 kV are not unknown in such circumstances but such parts of construction site installations are outside the scope of this code.

Similarly, high frequency tools are used to advantage in certain site work applications and for their connection to a supply source the installation of a frequency changer is required. The recommendations made in this code apply only to the input circuits to such frequency changers.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Section 1. General

1.1 Scope

1.1.1 Object

This code deals with the distribution of electricity for construction and building sites. It aims to provide, in one document, guidance on matters of common interest to builders, contractors, engineers and others concerned with the provision of electrical installation equipment suitable for the arduous duty imposed by construction site conditions.

Because of variations in local circumstances of construction sites the guidance afforded can only be given in general terms and will normally need to be supplemented in detail by the advice of an electrical engineer whose knowledge of the circumstances applying in the particular case will enable him to make the most effective choice.

High voltage incoming supplies are outside the scope of this code.

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

1.1.2 Regulations and recommendations

In Great Britain installations on construction sites are subject to the requirements of the 'Electricity at Work Regulations, 1989'¹⁾ and the memorandum of guidance¹⁾, administered by the Health and Safety Executive.

The Electricity at Work Regulations include requirements concerning precautions to be taken against contact with overhead lines and underground cables encountered on site. (See also Health and Safety Executive booklet HS(G)47¹⁾.)

The 'Regulations for electrical installations'²⁾ states the requirements for safety in the use of electricity in and around buildings generally. Section 604 of these regulations deals with installations on construction sites. The Health and Safety Executive also publish Guidance Note ES 24¹⁾ 'Electricity on Construction sites'.

Where welding equipment is installed and used guidance may be found in Health and Safety Executive Guidance Note PM 64¹⁾ and BS 638.

Guidance on earthing is given in British Standard CP 1013³⁾.

Information may also be obtained from the National Joint Council for the Building Industry.⁴⁾

1.2 Definitions

For the purposes of this British Standard the definitions given in BS 4727 and in the IEE Regulations for electrical installations apply, together with the following.

1.2.1 site

An area where a building operation or work of engineering construction is being undertaken.

NOTE. Such areas are subject to the requirements of the Electricity at Work Regulations, 1989.

1.2.2 alternating current (a.c.) supplies

All references throughout this British Standard to alternating current (a.c.) supplies relate to a frequency of 50 Hz unless otherwise stated. All references to alternating voltage and current relate to r.m.s. values unless otherwise stated.

1.3 Early notification of requirements

It is essential that when a mains supply is likely to be required the district office of the supply undertaking be informed as soon as a future building development is considered and certainly not later than the planning application stage. Discussions should also take place as soon as possible between the main contractor and those who will carry out the installation.

The supply undertaking will need to know precisely when and where the supply will be required, the maximum demand load in kilowatts (and the nature of the load) which will be required for building construction and the installed load, which is expected to be needed when the site is ultimately developed. The supply undertaking will also advise on these matters. Where the supply is given from a protective multiple earthed system there are special regulations concerning the earthing of the consumer's installation. The Electricity Board should be consulted as to the method of complying with these regulations.

Another object of the discussions is to identify and take the necessary precautions to avoid damage or accidental contact with existing overhead lines, underground cables and other services.

¹⁾ Published by and obtainable by post from H.M.S.O., PO BOX 276, London SW8 5ET.

²⁾ Published by and obtainable from the Institution of Electrical Engineers, Savoy Place, London WC2R 0BL.

³⁾ Currently under review.

⁴⁾ 18 Mansfield Street, London W1M 9FG.

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

- (a) If supply intended for the building could be made available for construction purposes in its final position, and if not, what would be involved in providing some other supply.
- (b) If, in view of a high maximum demand, a high voltage supply is necessary.
- (c) The metering and tariff arrangements.
- (d) The anticipated connection date.
- (e) Supply system detail.
- (f) If an earth will be provided by the supply undertaking.
- (g) The location of the main distribution point.
- (h) Precautions to be taken with regard to existing or proposed overhead lines (see 4.3), underground cables and other services.

Full recommendations are set out in a leaflet entitled 'Electricity supplies for building sites'¹⁾.

¹⁾ Obtainable from the Electricity Association, 30 Millbank, London SWP 4ED.

Section 2. Materials, appliances and components

2.1 British Standards

It is essential that site distribution units for electricity supplies should comply with BS 4363, these units being described briefly in appendix A.

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

Section 3. Design considerations

3.1 General

Electrical apparatus and wiring in site installations may be subject to extreme abuse and the use of equipment which will withstand the particularly adverse conditions is essential. The importance of correct circuit protection, earthing arrangements and frequent inspection and testing cannot be over-emphasized.

Distribution equipment in site installations should embody the following features.

- (a) Flexibility in application for repeated use on contract work, i.e. to allow easy substitution of components for specific duty as may be required from site to site. Examples of typical arrangements are given in appendix A.
- (b) Suitability for transport and storage.
- (c) Robustness in construction to resist damage.
- (d) Safety in use.

Site distribution units designed and manufactured in accordance with BS 4363 have these features.

The installation of this equipment on site should be such as to allow convenient access and to permit authorized and competent operatives to work on the apparatus contained within.

In the particular case of an installation likely to be exposed to flammable surroundings or an explosive atmosphere, special precautions are necessary and CP 1003 should be consulted.

3.2 Distribution voltages

High voltage incoming supplies are outside the scope of this code and this section is therefore limited to mains voltage and below. The requirements for the associated distribution and transformer units are given in BS 4363 for capacities up to 300 A. Above this capacity units would be designed to meet individual requirements but should be capable of interconnection with units of the BS 4363 type.

Where a mains supply is not available and use has to be made of portable a.c. generating sets, such equipment and its installation should be erected and maintained exactly as required for a system connected to a public supply. The metal frame of the generating set should be bonded to the metal work of the site distribution system.

If the rated voltage of the a.c. generator exceeds 55 V, the bonding mentioned above should be also to the star-point of a three-phase generator or to the mid-point of the windings of a single-phase generator.

The bonding should then be effectively earthed.

NOTE. When a single-phase generator has no accessible mid-point, the bonding is taken to the secondary winding of a centre-tapped transformer or to a centre-tapped inductor.

(a) Mains voltage

(1) *Three-phase*. 415 V four wire is the standard three-phase mains supply system voltage for construction sites.

(2) *Single-phase*. 240 V is the standard single-phase mains supply system voltage.

(b) Reduced voltage

(1) 110 V *three-phase*. The supply should be obtained from a double-wound transformer having the neutral point of its star-connected secondary winding earthed so that the nominal voltage of the sub-circuit to earth (which is the usual shock current path) is only $110/\sqrt{3}$ V, i.e. approximately 65 V.

(2) 110 V *single-phase*. The supply should be obtained from a double-wound transformer having the centre tap of the secondary winding earthed so that the nominal voltage of the sub-circuit to earth is only 55 V.

(3) 50 V *single-phase*. The supply should be obtained from a double-wound transformer having the centre tap of the secondary winding earthed so that the nominal voltage of the sub-circuit to earth is only 25 V.

(4) 25 V *single-phase*. The supply is obtained from a double-wound transformer.

3.3 Type of supply

The distribution voltages given in table 1 are recommended for typical applications found on construction sites.

Table 1. Distribution voltages for typical applications		
Application	Voltage	Phase
	V	
Fixed plant	415	Three
Movable plant fed via a trailing cable	415	Three
Installations in site buildings	240	Single
Fixed flood lighting	240	Single
Portable and hand-held tools	110	Three or single
Site lighting (other than flood lighting)	110	Single
Portable hand-lamps (general use)	110	Single
Portable hand-lamps (confined and damp situations)	50 or 25	Single