SUMMER 10 ISSUE 35

WIRINGMATTERS

The Institution of Engineering and Technology

A VIEW ON DIMMING

Disconnection of lighting circuits from dimming equipment

IET Electrical excellence

International standards
LVDC distribution and energy efficiency

Low-voltage update
Developments in low-voltage fuse standards

Significant changes
Update on electrical installations in Scotland

Electrotechnical Certification scheme
An in-depth look at the right card for your role

www.theiet.org/wiring

Order online 'til 8pm*
Collect in branch from 8am

Order your electrical goods on our website in the comfort of your own home (or on site) by **8pm** and we'll have them sat ready and waiting for you in branch from **8am** the following morning. Or we can deliver the next day – it's up to you! **Job's a good'un!**

* Participating branches only

neweysonline.co.uk

Newey & Eyre

Future developments in International Standards for electrical installations

LVDC Distribution and energy efficiency.

By Geoff Cronshaw

The IEE Wiring Regulations (BS 7671:2008) are based on European Standards, which in turn are usually based on international standards.

The UK participates in both European and international standards work. Two new areas of possible development within international standards are requirements for Low Voltage DC distribution and to integrate requirements for energy efficiency into IEC 60364.

The rationale for LVDC distribution

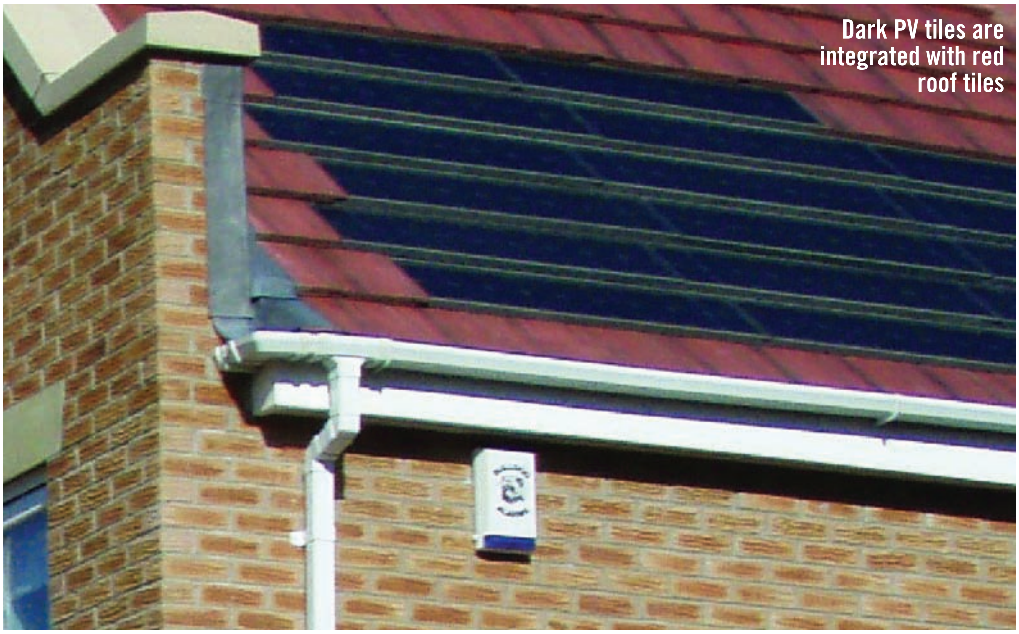
More and more electronic equipment is being introduced in buildings which use dc. There is also a wide range of micro generation technologies – including solar photovoltaic (PV) and wind turbines – being installed which generate dc. One of the main reasons for the proposal to introduce LVDC distribution in a building is to improve energy efficiency by reducing losses in the conversion of ac to dc for electronic loads and conversion of the dc output from micro generation to ac for mains distribution.

The challenges

There are a number of challenges when designing a LVDC installation. Persons involved in dc installations need to have the necessary expertise. Electrical equipment used on a dc installation must be suitable for direct voltage and direct current.

More and more homes are expected to be using micro-generation technology that generates dc in the future

IMAGES COURTESY OF DR SUNG, MK ELECTRIC AND JAMES DEVINE


Dark PV tiles are integrated with red roof tiles

Equipment approved to normal ac standards may not be suitable, especially switchgear. For example, the use of plugs and socket outlets for use on dc need careful selection depending on the current rating.

Given the nature of dc, additional requirements need to be taken into account when disconnecting a dc load by withdrawing a plug from a socket outlet. This is because an arc can occur when disconnecting a load, which is more difficult to extinguish compared with an ac load because there is no natural zero point on dc compared to ac. It is understood that one possibility being considered is to use a switched socket outlet with a plug that is interlocked with the socket outlet. The plug and socket outlet is then designed in such a way that the plug cannot be withdrawn from the socket outlet while the plug contacts carry current.

Arc quenching

Circuit breakers for overcurrent protection is another area that needs special consideration. The arc produced when disconnecting a fault on a dc installation is more difficult to extinguish. Designers of dc installations will need to liaise with manufacturers of equipment and exercise careful consideration when selecting a circuit breaker for use on dc to ensure that the circuit breaker has suitable arc-quenching capabilities and are suitable for the operating voltage.

Cables for use on dc again need special consideration. A cable is given a voltage rating which indicates the maximum circuit voltage for which it is designed, not necessarily the voltage at which it will be used. For example, a cable designated 600/1000V is suitable for a circuit operating at 600Vac phase to earth and 1000Vac phase to phase. This cable is traditionally used in areas where mechanical strength is required such as industrial installations. For light industrial circuits operating at 230/400Vac it would be normal to use cables at 450/750Vac, and for domestic circuits operating at 230/400Vac, cable rated at 300/500Vac would often be used. The traditional rating of the cable 300/500V is the ac rating of the cable. The dc rating of this cable for core to earth is 300×1.5 (450V dc max) and the core to core voltage is 500×1.5 (750V dc max). Therefore, designers of dc installations need to give careful consideration when selecting a cable for use on dc to ensure it is suitable for the operating voltage and are recommended to seek advice from the manufacturer.

Renewable sources of electricity

There are a wide range of microgeneration technologies including: solar photovoltaic (PV), wind turbines, small scale hydro and micro CHP (Combined heat and power). For example, in the UK, the 17th edition of the IEE Wiring Regulations (BS 7671:2008) introduced many new requirements to ensure the safe connection of low-voltage generating sets including small


Inverter unit installation

Roof mounted PV installation

scale embedded generators and solar photovoltaic (PV) power supply systems.

Section 712 of BS 7671:2008 is concerned with the safe installation of solar photovoltaic (PV) power-supply systems. The section does not apply to PV power supply systems which are intended for stand-alone operation. Section 712 contains requirements for protective measures comprising automatic disconnection of supply, double or reinforced insulation, or extra-low voltage provided by SELV or PELV. Also Protection against overcurrent and electromagnetic interference is catered for. Detailed requirements for the selection and erection of equipment are included covering compliance with standards, operational conditions, external influences, and accessibility. As you would expect, wiring systems, isolation, switching and control, earthing arrangements and labelling are also covered.

In addition, solar photovoltaic (PV) power supply systems are required to meet the (ESQCR) Electricity Safety, Quality and Continuity Regulations 2002 (as amended) as they are embedded generators. These are mandatory requirements. However, where the output does not exceed 16 A per line they are small scale embedded generators (SSEG) and are exempted from certain of the requirements provided that: (i) the equipment should be type tested and approved by a recognised body, (ii) the consumer's installation should comply with the requirements of BS 7671, (iii) the equipment

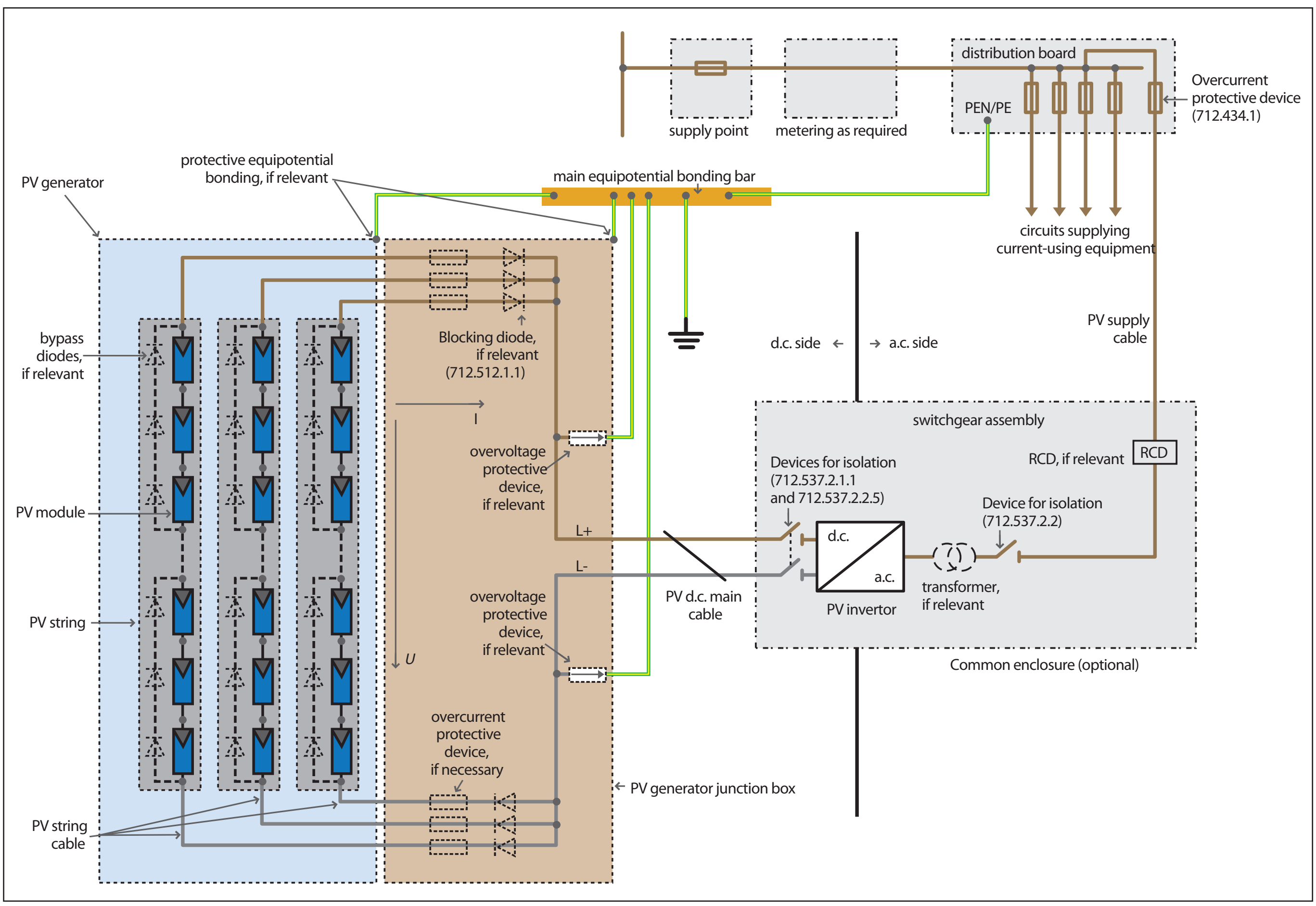


Diagram of a PV Generator, showing the inverter unit converting DC to AC. From IEE Wiring Regulations (BS 7671 2008)

must disconnect itself from the distributor's network in the event of a network fault, and (iv) the distributor must be advised of the installation before or at the time of commissioning.

Diagram of PV generator

As can be seen from the diagram taken from the IEE Wiring Regulations (BS 7671:2008), a PV system is a collection of PV cells known as a PV string, which form a PV array and in turn forms the PV generator that turn sunlight directly into electrical energy. The diagram shows the dc output from one array to the PV inverter which converts the dc output of the PV cells to ac for mains distribution. As mentioned previously, one of the main reasons for the proposal to introduce LVDC distribution in a building is to improve energy efficiency by reducing losses in the conversion of the dc output from micro generation to ac for mains distribution.

Low-voltage electrical installations and electrical energy efficiency

Background

It is hoped that the proposal to integrate energy efficency requirements into IEC 60364 will help accelerate the deployment of suitable energy-saving technology, and therefore help to reduce $C0_2$ emissions.

Electrical energy efficiency

IEC 60364 is an international safety standard for electrical installations, therefore any proposals regarding energy efficiency must not jeopardise safety.

It is expected that any proposals to integrate requirements for energy efficiency in IEC 60364 will cover all kinds of electrical installations (residential, small, Medium and large buildings and industrial sites).

Basic concepts

Electrical energy efficiency is intended to obtain the highest possible service from an electrical installation from the lowest energy consumption. In order to make improvements we need to be able to measure the amount of electrical energy consumed and monitor and control energy effectively.

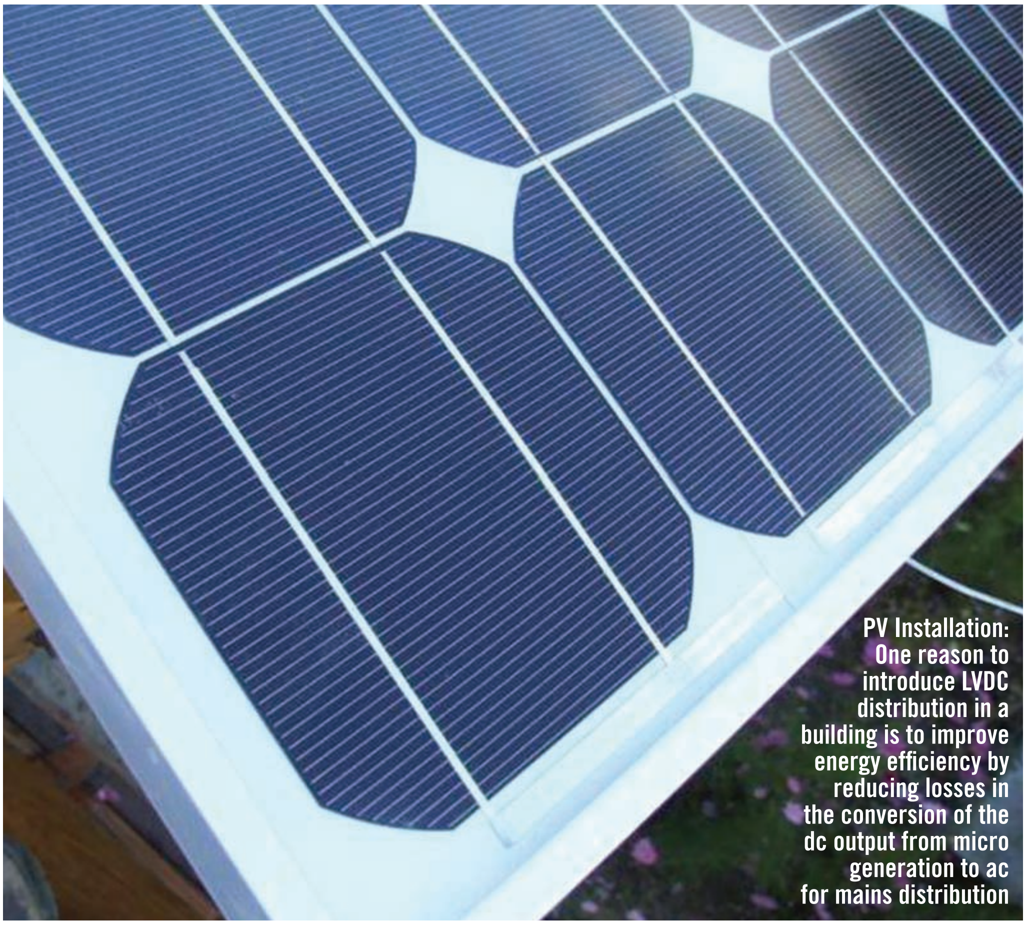
For example in the UK the department of energy and climate change are planning to start a roll-out programme to introduce smart electricity meters into consumers' homes starting in 2012, which is expected to run through until 2020 with the aim of helping customers to reduce their energy bills.

The smart meter will give customers information on energy consumed via a visual display and be capable of sending metering information to the energy supplier regarding the electricity consumed by the customer without the need for a meter reader. This should put an end to estimated bills. It will also allow the consumer to sell energy back to the energy

Lighting control sensors provding occupancy and light level detection supplier where the customer has a microgenerator installed such as a wind turbine or solar panels.

A smart meter is an electricity energy meter that incorporates a communications unit. The meter will measure the energy consumed and also measure any energy exported to the electricity network (where the consumer has micogeneration, such as a wind turbine or solar panels). The big difference is that the smart meter does not require a meter reader to visit the premises to read the meter.

It is understood that smart meters could use a number of communication options such as wireless, or data wire, or power line transmission (PLT), or mobile phone technology to transmit the meter-reading data to the energy supplier. It is not clear at this stage which option will be used. A smart meter may also be capable of controlling the consumers' load in the future by sending signals to consumer appliances to switch off at peak times, etc. It is also expected that the smart meter will be capable of providing flexible tariffs. It is expected that energy suppliers will be responsible for the installation of the smart meters.


PV Installation: One reason to introduce LVDC distribution in a building is to improve energy efficiency by reducing losses in the conversion of the dc output from micro generation to ac for mains distribution

Development of concepts

In the UK, BEAMA have identified technologies that can contribute to the UK carbon reduction targets. For example, lighting controls for residential buildings, lighting controls for commercial, public and industrial buildings, power factor correction, heating control upgrades in existing housing, pump and fan control with variable speed drives etc.

Lighting controls for residential buildings are easy-to-install devices which are able to detect the presence of people and only switch on lights when required.

Lighting controls eliminate wasted energy and save energy simply by switching lights off when not required. Lighting controls for commercial, public and industrial buildings are again easy-to-install devices that are able to automatically switch off lights when no occupants are detected or there are suitable levels of natural light.

Power-factor correction technology is used mainly on commercial and industrial installations to restore the power factor to as close to unity as is economically viable. Low power factors are caused by reactive power demand of inductive loads such as induction motors and fluorescent lights.

A poor power factor reduces the effective capacity of the electrical supply, since the more reactive power that is carried the less useful power can be carried, also causes losses at transformers, and can cause excessive voltage drops in the supply network and may reduce the life expectancy of electrical equipment.
For this reason electricity tariffs encourage the user to maintain a high power factor (nearly unity) in their electrical installation
by penalising a low power factor.

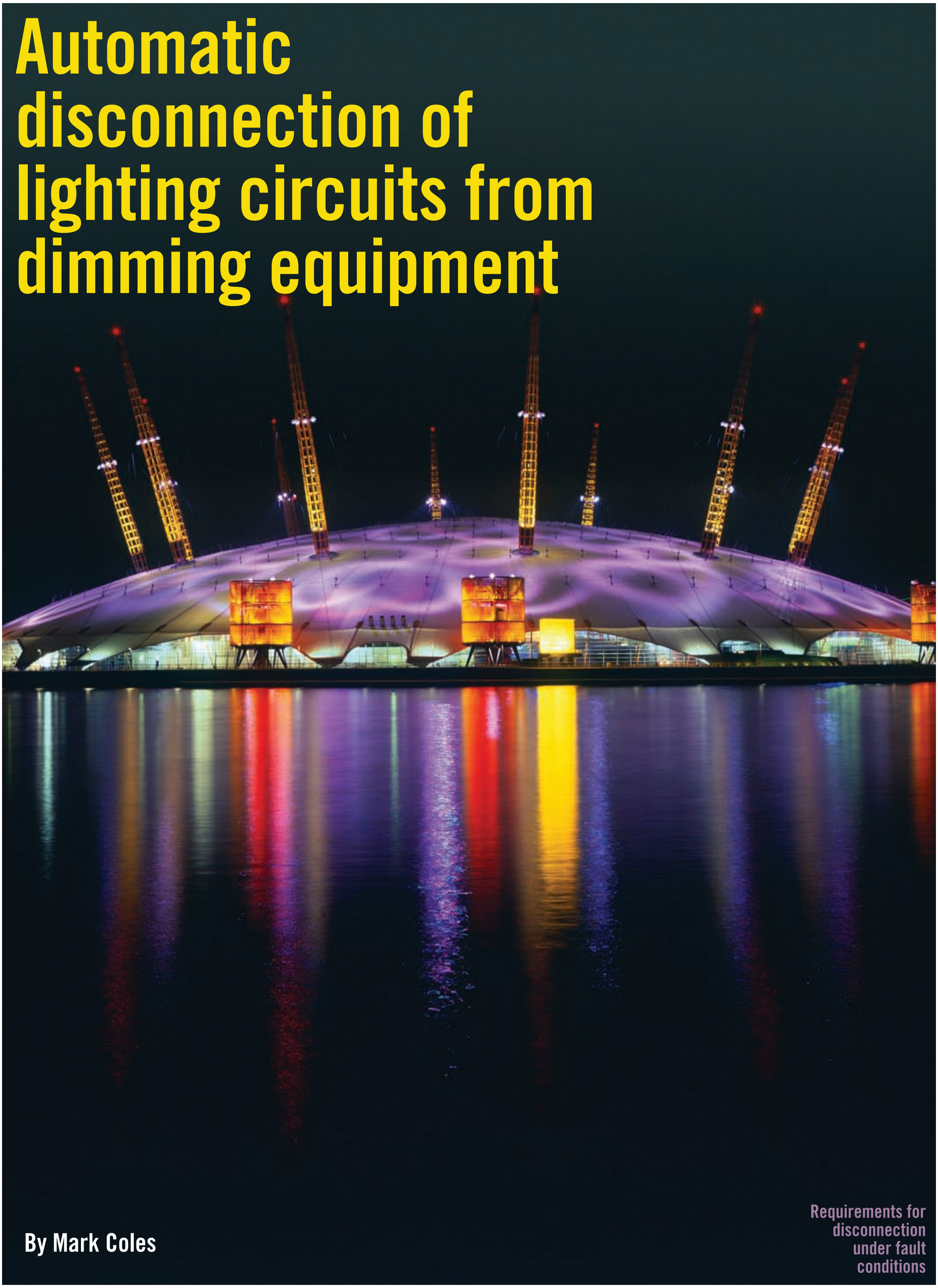
There are a number of ways in which power factor correction can be provided. The most common way that this can be achieved is by the installation of power factor correction capacitors. These can be installed in bulk at the supply position or at the point of usage on motors for example.

Persons involved in this type of work are recommended to seek advice from specialists on the most economic system for a given installation.

Note

It is important to point out that this article is only intended as a brief overview of issues that are being considered at a very early stage and therefore may not become international standards.

Automatic disconnection of lighting circuits from dimming equipment



By Mark Coles

Requirements for disconnection under fault conditions

Introduction

With the inclusion of dimming or control equipment within a lighting circuit, values of earth fault loop impedance at different parts of the circuit may be affected by the variation of the electrical supply to the load and the inclusion of electronic circuitry. With the variation of electrical supply, the load will see a differing voltage, in magnitude and/or waveform, depending on the type of dimmer or where the dimming control is set at any point in time, i.e. between 0-100%; 0 being in the off state and 100% being full-on. At any point between, a supply will be available at the load. Should a fault occur, the circuit would need to disconnect. This article looks at dimming equipment and the requirements of BS 7671:2008.

Standards and types of dimming equipment

There are very few national standards for dimming equipment, the key reason being that each theatrical production or fixed installation will differ from others which will lead to bespoke designs for that project only. Also, as technology advances, it is difficult for the standardisation process to keep up with recent developments. Primarily, equipment must meet the requirements of the Electrical Equipment (Safety) Regulations 1994 – which implement the Low Voltage Directive. Dimmer equipment would certainly fall within the scope of these Regulations where the fundamental requirement is for the equipment to be safe.

One British Standard – BS 5518:1977 Specification for Electronic variable control switches (dimmer switches) for tungsten filament lighting (withdrawn in 1999) was suitable for the one application but had limited life once low-energy luminaires became more prolific.

There are, of course, standards to which most equipment should adhere, such as:

- BS EN 61000 suite – Electromagnetic compatibility (EMC) which BS 7671 references in Section 332 and Chapter 44
- EN 60335–1:2002 - Household and similar electrical appliances – Safety – Part 1: General requirements
- EN 55015:2006 – Limits and methods of measuring of radio disturbance characteristics of electrical lighting and similar equipment.

The Electromagnetic Compatibility (EMC) Regulations 2005 place a statutory requirement on designers and constructors to design/construct electrical equipment and systems so that they do not cause excessive electromagnetic interference (emissions) and are not unduly affected by electromagnetic interference from other electrical equipment or systems. Harmonic production and interference, electrostatic discharges, mains-borne signals, etc. are all types of EM interference to be considered.

Dimming equipment can vary from simple dimmer switches, used in domestic situations, to large, multi-way dimming units utilising ethernet protocols used in theatrical productions, scene setting in rooms or the illumination of buildings. Large dimmer units can often appear like distribution boards where each outgoing way is protected by a fuse or circuit-breaker with RCDs used to protect the entire board or installed to protect individual outgoing circuits.

The requirements of BS 7671:2008

1. Equipment

Regulation 511.1 of BS 7671:2008 requires that all equipment complies with the relevant requirements of the applicable British Standard, or Harmonised Standard, appropriate to the intended use of the equipment. Where equipment is not manufactured to a recognised standard, as highlighted earlier in this article, Regulation 511.2 requires that such equipment offers the same degree of safety as that afforded by compliance with the Regulations; this is also recognised in Chapter 12.

Fundamentally, the Regulations do not apply to electrical appliances but, as the dimming equipment is controlling outgoing circuits – that can be considered as part of the electrical installation – it would be necessary to make reference to this instance as a departure from BS 7671 in the Electrical Installation Certificate; Regulation 120.3 requires the designer to follow technical requirements intended to ensure that electrical installations conforms to the fundamental principles of Chapter 13 and states:

Any intended departure from these Parts requires special consideration by the designer of the installation and shall be noted on the Electrical Installation Certificate specified in Part 6. The resulting degree of safety of the installation shall be not less than that obtained by compliance with the Regulations.

Therefore, the Regulations are not a barrier to non-standard equipment but designers must ensure the equipment used is just as safe as equipment made to recognised standards.

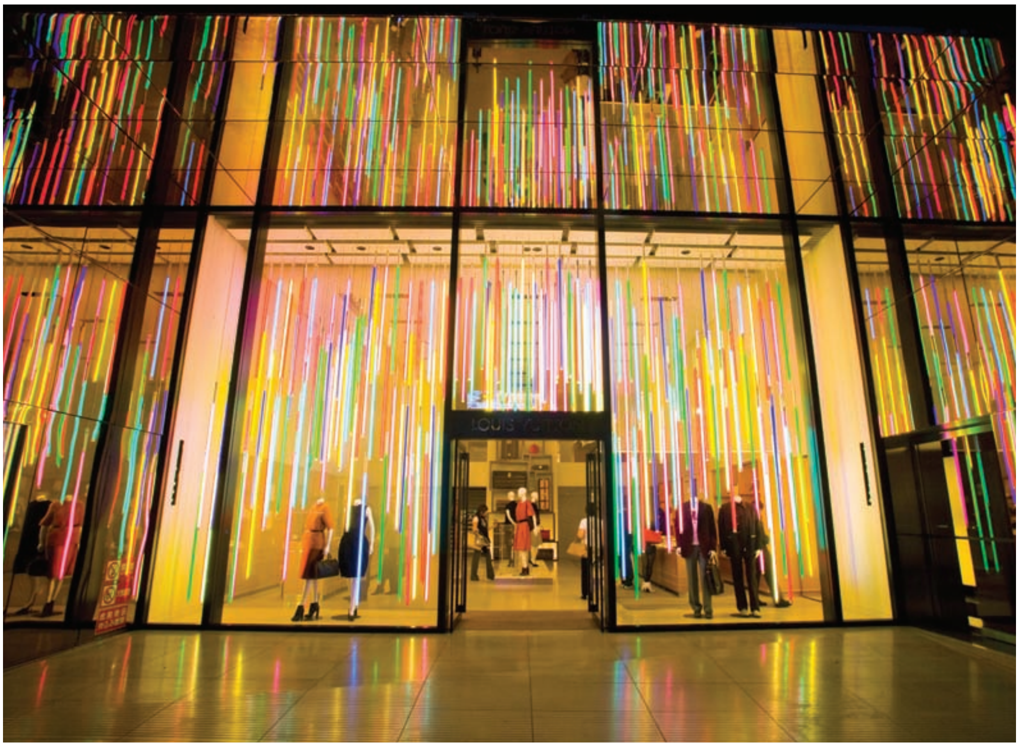
Regulation 515.1 requires that there be no harmful effect between electrical and other installations. The best approach, where practicable, is to arrange that the installations are kept separated. Elevated temperatures from hot-running dimmer units in hot environments need to be considered and such sources of heat kept separate from susceptible parts of the building fabric or theatrical properties.

Regulation 515.2 requires that where equipment carrying current of different types or at different voltages is grouped in a common assembly (such as a switchboard, a cubicle or a control desk or box), all the equipment belonging to any one type of current or any one voltage shall be effectively segregated wherever necessary to avoid mutual detrimental influence.

It is necessary to keep Band I and Band II circuits separate, often by different wiring systems or segregating by the use of multi-compartment trunking but, where this cannot be avoided, Regulation 528.1 requires that every cable or conductor is insulated for the highest voltage present or each conductor of a multicore cable is insulated for the highest voltage present in the cable.

In relation to the segregation of Band I and Band II circuits, The Lighting Industry Federation (LIF) has issued the following information in their Technical Statement No.21:

Keep mains & HF cables separated



Bespoke lighting design in a retail environment

When installing dimming or control systems the mains wiring and ELV control wiring must be mains (500V) insulated, must be segregated in separate screened and earthed channels/conduits and must not be positioned parallel to each other within the luminaire due to the risk of radiated electrical interference. The exception to this is to use an electromagnetic compatible bus system i.e. one that is non-corruptible and that does not emit interference, with 500V insulation sleeving that can then be run adjacent to the mains voltage wiring. External wiring leading to the luminaire can be adjacent for up to 5 metres (i.e. switch lines) but otherwise must be separated permanently by at least 50mm.

Regulation 559.6.2.3 states that where groups of luminaires are divided between the three line conductors of a three-phase system with only one common neutral conductor, at least one device shall be provided with that simultaneously disconnects all line conductors, such as a multi-pole circuit-breaker.

2. Protection against electric shock

The fundamental rule of protection against electric shock, according to BS EN 61140, is that hazardous-live-parts shall not be accessible and accessible conductive parts shall not be hazardous-live, either in use without a fault or in single-fault conditions. According to 4.2 of BS EN 61140, protection under normal conditions is provided by basic protective provisions and protection under single-fault conditions is provided by fault protective provisions. Alternatively, protection against electric shock is provided by an enhanced protective provision which provides protection in use without a fault and under single-fault conditions.

Regulation 411.3.2.1 requires that when a fault of negligible impedance occurs between the line conductor and an exposed-conductive-part or a protective conductor in the circuit or equipment, the protective device should operate in the required time. Table 41.1 of Regulation 411.3.2.2 requires a disconnection time of 0.4 s on a final circuit not exceeding 32 A where supplied by a TN system at a nominal voltage of 230 v; the table shows other disconnection times depending on the nominal voltage or earthing arrangements of the system. Should the final circuit be in excess of 32 A, Regulation 411.3.2.3 permits a disconnection time of 5 s where supplied by a TN system at a nominal voltage of 230 v.

As highlighted earlier, where a dimmer control is set somewhere between 0-100%, the voltage and waveform appearing at the load may be somewhat different to that of the 50 Hz sine wave at 230 v nominal supplied to the controller. As no product standard for dimming equipment exists, it is uncertain how dimming units will react under fault conditions.

Where disconnection will not occur in the required time, Regulation 411.3.2.5 states that the output voltage of the source is reduced to 50 V a.c. or 120 V d.c. or less in that required time. In this case, supplementary equipotential bonding shall be installed where appropriate. Also in such cases consideration shall be given to disconnection as required for reasons other than electric shock, such as overheating of cables and other equipment. As a fundamental requirement, this is also recognised in Regulation 410.3.7.

Consider the following as an example - an outgoing circuit from a dimmer control unit is protected by a BS 1361 fuse rated at 15 amps. The table, figure 3.1, is extracted from BS 7671:2008 and shows the time/current characteristics of fuses to BS 1361. In the diagram, the red lines show that disconnection is assured within 0.4 s where the fault current is at a minimum of 70 amps.

The purple lines show that any fault current of less than 70 amps will result in a disconnection time in excess of 0.4 s. As can be seen, 30 amps flowing for 400 seconds on a 15 A rated circuit would result in dangerous overheating of the equipment. This is the reason that Regulation 411.3.2.5 requires that the output voltage of the source is reduced to 50 V a.c. or 120 V d.c. or less within the stated disconnection time.

BS 7909:2008 Code of practice for temporary electrical systems for entertainment and related purposes also makes reference to this situation in clause 7.10 and states that designers should take account of the characteristics for all electronic units used for control and power-processing when designing sub-circuit overcurrent protection and earth fault disconnection.

The standard continues by stating that in practice, such devices should be supplied by the manufacturer/supplier with integral fuse or circuit-breaker protection suitable for normal conditions of use. The manufacturer/supplier should be consulted to obtain the characteristics of the protective devices used. Interpretation of the measured values of earth fault loop impedance requires knowledge of the nature and characteristics of the source of supply. Caution needs to be observed when verifying systems incorporating power-processing equipment such as UPS, inverters or similar electronic control devices.

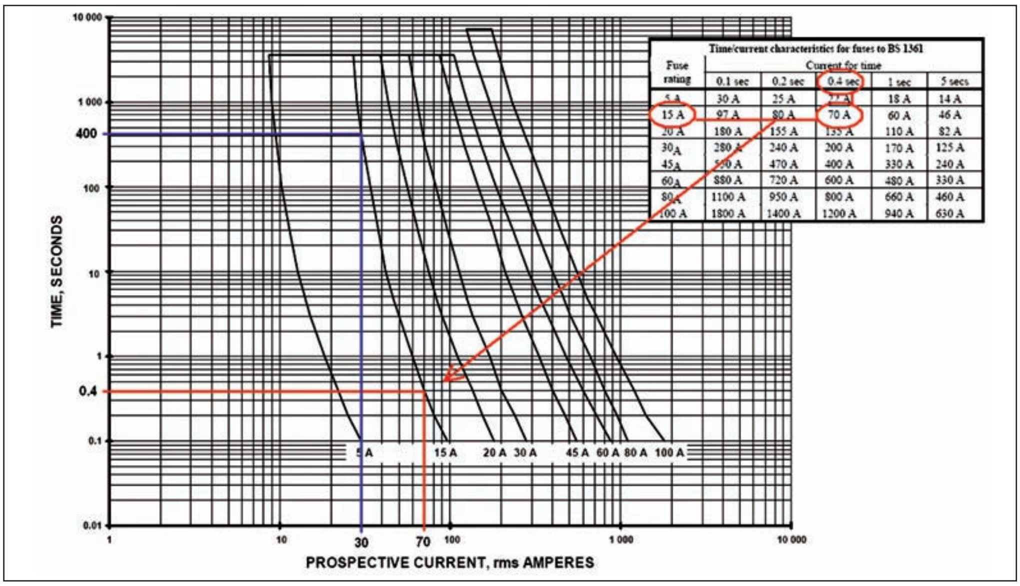


Fig 3.1 from BS 7671:2008

3. Residual current devices

Where RCDs are used with dimming equipment, information from the manufacturer may be required before the correct RCD can be selected by the designer. As no single standard exists, it would be generally unknown how the dimming equipment would affect the electrical installation as different types of semi-

Bespoke lighting design at the Beijing Olympic stadium

conductor switching devices can introduce unwanted signals on the electrical supply.

For the majority of applications, type AC devices are suitable, with type A being used where special circumstances exist. Type B devices are manufactured and tested to IEC 60755, which is a Technical Report, with no BS or BS EN equivalent. There is no requirement for the use of type A RCDs in BS 7671 but type B may be required in a solar photovoltaic (PV) system.

Type A devices are important due to the wide range of electronic equipment available now which may produce a protective conductor current with a pulsating d.c. component and harmonic currents. These RCDs may utilize electronic circuitry or low remanence core material to more closely match the predetermined current/time trip characteristics allowed by the standards to achieve the most suitable performance characteristics.

Type 'AC' RCDs will provide protection against a.c. earth fault currents

Type 'A' RCDs will provide protection against a.c. earth fault currents that contain pulsating d.c. components

Type 'B' RCDs will provide protection against d.c earth fault currents

BS 7909 offers guidance on the use of RCDs in clause 7.6 – RCDs in temporary systems. The standard states that every final circuit should be protected by an RCD with a rated residual operating current (IΔn) not exceeding 30 mA and recommends that no more than six final circuits are protected by a single RCD.

4. Testing

BS 7671 requires that all circuits are inspected and tested prior to being put into service; see Regulation 610.1. The testing sequence is given in Section 612 of BS 761 and will not be reiterated here but there are a number of points worth highlighting.

When undertaking insulation resistance testing, Table 61 shall be applied, e.g. test voltage of 500 v d.c. with a minimum insulation resistance measurement of 1 MΩ, when verifying insulation resistance between non-earthed protective conductors and Earth. Where equipment is likely to influence the verification test, or be damaged, such equipment shall be disconnected before carrying out the insulation resistance test. Where it is not reasonably practicable to disconnect such equipment, the test voltage for the particular circuit may be reduced to 250 V d.c. but the insulation resistance shall have a value of at least 1 MΩ.

Regulation 612.3.3 recognises that where the circuit includes electronic devices which are likely to influence the results or be damaged during the test, a measurement between the live conductors connected together and the earthing arrangement only can be made.

Conclusion

In the event of a fault of negligible impedance, protective devices in all lighting circuits should disconnect the fault within the required time or supplementary provisions are applied to achieve the same degree of safety. The use of non-standard equipment is not a barrier to electrical installation design but the designer must ensure that the level of safety is not compromised.

Live event lighting

Further reading

BS 7671:2008 Requirements for Electrical Installations, 17th Edition of the IEE Wiring Regulations
IET Guidance Note 1 - Selection and Erection
BS 7909:2008 Code of practice for temporary electrical systems for entertainment and related purposes
The Lighting Industry Federation (LIF) Technical Statement No.21
Electrical Equipment (Safety) Regulations 1994

Thanks

James Eade – E-mech
Ken Morton – HSE
Dave Roberts – Dave Roberts Associates
JB Toby – Avolites
The Lighting Industry Federation

Electrical Panels Update

By Mark Coles

Following up from Wiring Matters Winter 09 Issue 33, we provide a brief update to the latest standards in the area of Electrical Panels

Electrical panels come in many shapes and sizes and have many applications. Consider a simple empty box which is then firmly fixed to the ground or building structure, adapted to enclose electrical equipment and terminations to perform a particular function – the empty box becomes an electrical panel and issues relating to electrical safety are to be considered.

Standards and the standardisation process

The article on Electrical Panels, published in *Wiring Matters* Winter 09 Issue 33, gave information on factory built panels with forms of separation and extracted information from BS EN 60439-1:1999; this standard, which was amended in 2004, is due to be withdrawn on 1 November 2014.

BS EN 61439-1:2009 is the UK implementation of EN 61439-1:2009 which was derived by CENELEC from IEC 61439-1:2009 and, together with BS EN 61439-2:2009, supersedes BS EN 60439-1:1999.

Manufacturers, therefore, have a period of overlap where products already designed using the 1999 version of BS EN 60439-1 can still be produced until the date at which the older standard must be withdrawn; this date is 1 November 2014. The interim period allows manufacturers to redesign products and retool factories to ensure that, from 1 November 2014, all relevant products will conform with the new version of the EN only. It is quite acceptable for manufacturers to sell older stock, complying with the older standard, up to 1 November 2014.

References and further information

To search for standards, the following links may aid:

IEC

www.iec.ch
Available to all, use search facility top right of page, the Scope and Contents pages of most standards can be viewed.

CENELEC

www.cenelec.eu

BSI

Where an organisation currently holds BSI membership – https://bsol.bsigroup.com/
For non-BSI members, registration required – https://shop.bsigroup.com/en/Login/

BS EN 60439-1:1999 +A1 2004 Low-voltage switchgear and controlgear assemblies. Type-tested and partially type-tested assemblies
BS EN 61439-1:2009 Low-voltage switchgear and controlgear assemblies – Part 1: General rules
BS EN 61439-2:2009Low-voltage switchgear and controlgear assemblies – Part 2: Power switchgear and controlgear assemblies
BEAMA Guide to verification of low voltage power switchgear and control gear – www.beama.org.uk/UserFiles/file/publications/installation/BAVG.pdf

GUIDE TO ELECTRICAL INSTALLATION WORK IN SCOTLAND

Detailing significant changes to the regulation of electrical installation work in Scotland.

By Newell McGuiness
Managing Director of SELECT

Electricity has the potential to cause fire, injury and death. To prevent these risks, it is important that electrical installations are safe and properly installed by trained and competent electricians.

The Technical Standard in the UK for electrical installation work is BS 7671 – Requirements for Electrical installations (often referred to as the 17th edition of the IEE Wiring Regulations).

IET members should, however, be aware that significant changes to the regulation of electrical installation work were recently introduced in Scotland.

What has Changed?

In May 2005, a new system was brought in to enforce the Building Regulations in Scotland. It aims to improve the standard of building work and includes regulations for electrical installations.

Under the new system, any electrical work carried out under a building warrant will either have to be certified by a registered installer (known formally as an 'Approved Certifier') or be checked by the local authority.

What is Certification?

The provision of a Certificate of Construction (Electrical Installations to BS 7671) is a means by which an Approved Certifier confirms work complies with Building Regulations. Approved Certifiers are qualified and experienced professional electricians who are members of a scheme approved by Scottish Ministers. In Scotland, two organisations are approved by the Scottish Government to run a Scheme. They are SELECT (formerly known as the Electrical Contractors' Association of Scotland) and NICEIC Group Ltd.

IET members may have been more familiar with NICEIC and indeed may have included a recommendation in their documentation that electrical inspections should only be carried out by members of that inspection organisation. If IET members wish to continue to suggest electrical inspections they are advised to note that two bodies can now legally undertake this work.

How can the new Building Standards System help?

Having electrical installation work certified by an approved certifier provides benefits:

- Where the work is being carried out under a building warrant, the person procuring the work will receive a discount from the building warrant application fee where they use an Approved Certifier and advise their intention at the warrant application stage.
- Quicker acceptance of completion certificates by local authorities. Certified electrical installations are not inspected by the local authority at completion.
- Approved Certifiers are able to provide a quality service and ensure compliance of work with building regulations.
- A firm employing at least one Approved Certifier must meet additional criteria to be appointed as an Approved Body.
- Approved Bodies must hold adequate insurance cover for any project to be certified.
- Members of a certification scheme have their work inspected by the Scheme Provider.
- Construction professionals and tradesmen must have met high levels of qualifications and experience to be accepted into certification schemes.
- Scheme Members are subject to an independent complaints procedure.

Information and Contacts

For further information about certification and the new system of building standards in Scotland contact:

The Scottish Government
Building Standards
DivisionDenholm House
LIVINGSTON
West Lothian EH54 6GA
Tel: 01506 600400
www.sbsc.gov.uk

Details from the Scheme providers at:

SELECT
The Walled Garden
Bush Estate
Midlothian EH26 0SB
Tel: 0131 445 5577
www.select.org.uk

NICEIC Group Ltd
Warwick House
Houghton Hall Park
Houghton Regis
Dunstable LU5 5ZX
Tel: 01582 531000
www.niceic.com

The ECS and you

An in-depth look at the Electrotechnical Certification Scheme (ECS)

By Steve Brawley, CEO of the Joint Industry Board for the Electrical Contracting Industry

The last issue of *Wiring Matters* provided an overview of the Construction Skills Certification Scheme and affiliates such as the Electrotechnical Certification Scheme (ECS), which is specifically for the electrical industry. As legislation and restrictions around construction site access become tighter, the need to own the right competence card for your occupation is paramount.

The ECS was the first craft skills accreditation service in British industry, independently developed and unique in its time. Back in 1993, admission to the scheme was restricted to anyone who could demonstrate competence equivalent to the standards of a National Vocational Qualification (NVQ) at Level 3, whatever their specialism.

Today, the ECS is administered by the Joint Industry Board and the Scottish Joint Industry Board and became affiliated to CSCS when it was first introduced in 1995. The scheme now offers all electrotechnical operatives the opportunity to receive their own card. It also provides cards for those who can demonstrate management skills in the sector, a 'site visitor' designation for non-electrical personnel and the designation 'ECS related discipline' for electrotechnical trades not covered by NVQ/SVQs.

Applicants need to prove they have the required level of health and safety awareness. This may involve having a qualification that provides an exemption, but if not applicants must take a test to demonstrate a basic awareness of H&S issues.

From June 2010, ECS cards issued in England, Northern Ireland and Wales will have a new look, and a new website at www.ecscard.org.uk.

IET links

Following a partnership agreement between the IET and ECS to promote competence and encourage professionalism, existing skilled (gold) and managerial (platinum) card holders can gain a fast track to membership of the Institution. Gold card holders can apply for TMIET membership and platinum card holders can apply for MIET membership.

Also, holders of ECS gold or platinum cards who are members of the IET can have their membership shown by requesting an ECS card with the IET logo printed on the front.

More information

Visit www.ecscard.org.uk, or telephone 0844 847 5098 in England, Northern Ireland and Wales, or 0131 445 9216 in Scotland. An online application form is available at www.theiet.org/ecscard

Overview of card types

Gold card – skilled craft operative	Available for skilled operatives with an NVQ/SVQ level 3 in an electrical discipline.
Apprentices	Apprentices undertaking an Advanced Apprenticeship in any electrical or electronic discipline can obtain an ECS card that has a white background containing 'Apprentice' within a red stripe.
Trainees	All other trainees who are not on an Advanced Apprenticeship scheme can apply for a similar white ECS card depicting 'Trainee' across a red stripe.
Ancillary operatives	If operatives do not meet the technical or vocational standards to quality for a skilled ECS card (and are not apprentices or trainees), the scheme provides a white card with a brown stripe.
Managers	Platinum cards are available for Site Managers at NVQ/SVQ level 4 and by Contracts Managers at NVQ/SVQ level 5. Managers can hold both a management card and a skilled craft card if they qualify under both criteria.
ECS related discipline	A plain white card carrying the designation 'ECS Related Discipline' has been introduced for a number of specialised electrotechnical occupations that do not currently have industry NVQs.
Site visitor	Any person employed by an electrically-biased organisation, who is not eligible for any other ECS card, but requires regular access to construction sites can apply for a Site Visitor card.
Qualified supervisor	To obtain the Qualified Supervisor endorsement the cardholder must be employed by an organisation certificated to the Electrotechnical Assessment Scheme (EAS) or enrolled on the NICEIC Approved Contractors Scheme and recorded as a Qualified Supervisor within the terms of certification or enrolment.
Data comms	The Data Communication industry now has its own range of disciplines included within the ECS. A full range of cards covering craftsperson, apprentices, managers and trainees is available.
Fire & security	The British Security Industry Association and the British Fire Protection and Security Association have produced a range of disciplines specific to the fire and security industries for inclusion within the ECS, covering craftsperson, manager, apprentice, trainee and site visitor.
Highway electrical	ECS Highway Electrical cards are issued in conjunction with the Association of Signals, Lighting & other Highway Electrical Contractors and are available in three different sectors: public lighting, permanent traffic control equipment and road traffic signs.

FREE Estimating Software & Catalogue DVD

Electrika is supported by the UK's leading brands to bring you:

- 140,000 updated Trade Prices
- 1000's PDF Catalogues & Technical Docs
- Professional quality Estimating package
- Built-in Ordering & Job Costing
- Add your own Specials
- Create your own Local Databases
- Regular price updates

Visit www.electrika.com to register for your Free DVD

Electrika Ltd

T: 0161 945 5124 E: info@electrika.com

www.electrika.com

NEW 17TH EDITION SOFTWARE HAS UNIQUE FEATURES

Seaward has expanded its PowerPlus PC software for the fast and efficient production of 17th edition electrical test certification.

The new software allows data from different testers to be merged onto one certificate and enables the cloning of test certificates for similar electrical installations.

By enhancing the transfer of test data between the PowerPlus 1557 tester and main PC records, the new software considerably improves the working efficiency of contractors.

Seaward Electronic Ltd. Bracken Hill, South West Industrial Estate, Peterlee, County Durham, SR8 2SW Tel. (0191) 586 3511 Fax. (0191) 586 0227 E. sales@seaward.co.uk

www.seaward.co.uk

neweysonline.co.uk

Win big with Neweys Online 'Summer of Football'

Order on www.neweysonline.co.uk before 12th July and you'll get the chance to play their fantastic 'Spot the Ball' game and win £50. Plus, for every order you'll get an entry into a prize draw to win a 50" Plasma TV – spend over £50 and you'll get a free football too!

www.neweysonline.co.uk

Focus SB's new Ambassador mobile phone charging station features a special phone holder to keep the charging lead tidy and hidden from view, and reducing the potential trip hazard. The Ambassador is fits a standard Wandsworth two gang 13 amp socket, and can be easily mounted to the wall, either behind the existing flat plate or in place of it.

Focus SB,
Napier Road,
Castleham Industrial Estate,
St Leonards-on-Sea,
East Sussex
TN38 9NY
Tel: 01424 858060

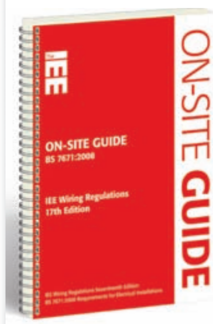
sales@focus-sb.co.uk

Megger opportunity to end the recession

The "Business in a Box" is a new and innovative product line which has been specifically developed to make it as easy as possible for electrical contractors to generate extra income. Find out more by attending a MeggerTalks! event in your area.

To book your place call Rosa on 01304 502 236 or visit http://www.megger.com/uk/events

www.megger.com



On-Site Guide

The On-Site Guide is intended to enable the competent electrician to deal with small installations (up to 100 A, 3-phase). It includes simple circuit calculations and provides essential information in a convenient, easy-to-use form, avoiding the need for detailed calculations. Buy your copy at www.theiet.org/osg

Institution of Engineering and Technology
Michael Faraday House
Six Hills Way, Stevenage. SG1 2AY
T: +44 (0)1438 313311

www.theiet.org/osg

NAPIT

As a domestic and commercial installer

Did you know with NAPIT you can notify domestic, commercial, industrial AND inspection work all within the cost of your annual membership fee at no extra cost?

Join NAPIT for just £480.00 + VAT or transfer your membership for £340.00 + VAT saving you the inspection fee!

NAPIT
4th Floor, Mill 3, Pleasley Vale Business Park
Mansfield, Nottinghamshire. NG19 8RL
T: 0845 543 0330 E: info@napit.org.uk

www.napit.org.uk

In-Company electrical training

The IET runs in-company electrical training courses which are carefully tailored to best suit your company's requirements. Reduce staff time away from the workplace and eliminate travel and accommodation costs by having courses run on your premises. Contact us to discuss your requirements on 01438 767289 or email coursesreg@theiet.org

The IET
T: 01438 767289
E: coursesreg@theiet.org

City & Guilds

www.theiet.org/courses

For details on how to feature your product contact **Danielle Smith** on **01438 767224**

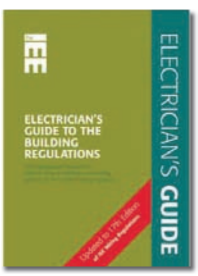
The Institution prepares regulations for the safety of electrical installations for buildings, the IEE Wiring Regulations (BS 7671), which has now become the standard for the UK and many other countries. It has also prepared the Code of Practice for Installation of Electrical and Electronic Equipment In Ships (BS 8450) and recommends, internationally, the requirements for Mobile and Fixed Offshore Installations. The Institution provides guidance on the application of BS 7671 through publicationsfocused on the various activities from design of the installation through to final test and certification with further guidance formaintenance. This includes a series of eight Guidance Notes, two Codes of Practice and model forms for use in wiring installations.

REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

BS 7671:2008 (IEE Wiring Regulations, 17th Edition)

The Wiring Regulations are the national standard to which all domestic and industrial wiring must conform. Substantial changes have been incorporated in BS 7671:2008 to align with European documents.
Essential for all electricians, electrical contractors and their managers, installation designers, and students in further education and professional training.

- Paperback 389 pages
- Published 2008
- ISBN 978-0-86341-844-0
- Order book PWR1700B
- **£75**



ELECTRICIAN'S GUIDE TO THE BUILDING REGULATIONS

Part P, 2nd Edition

Updated to align with the 17th Edition of the IEE Wiring Regulations, it also includes a new chapter on requirements for Scotland.

- Paperback 234 pages
- Published 2008
- ISBN 978-0-86341-862-4
- Order book PWGP170B
- **£22**

ON-SITE GUIDE

BS 7671:2008

The On-Site Guide is intended to enable the competent electrician to deal with small installations (up to 100 A, 3-phase). It provides essential information in an easy-to-use form, avoiding the need for detailed calculations.

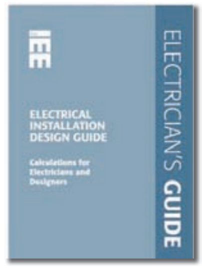
- Paperback 180 pages
- Published 2008
- ISBN 978-0-86341-854-9
- Order book PWGO170B
- **£22**

ELECTRICIAN'S GUIDE TO EMERGENCY LIGHTING

P Cook

The Electrician's Guide to Emergency Lighting provides guidance on electrical installations in buildings.
This publication is concerned with emergency lighting and in particular emergency escape lighting and must be read in conjunction with the legislation: Approved Document B and the British Standards, in particular BS 5266.

- Paperback 88 pages
- Published 2009
- ISBN 978-0-86341-551-7
- Order book PWR05020
- **£22**

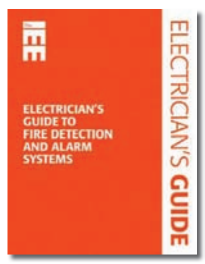


ELECTRICAL INSTALLATION DESIGN GUIDE

Calculations for Electricians and Designers

This book provides step-by-step guidance on the design of electrical installations, from domestic installation final circuit design to fault level calculations for LV/large LV systems. Apprentices and trainees will find it very helpful in carrying out the calculations necessary for a basic installation. It has also been prepared to provide a design sequence, calculations and data for a complete design to be carried out.

- Paperback 186 pages
- Published 2008
- ISBN 978-0-86341-550-0
- Order book PWR05030
- **£22**



ELECTRICIAN'S GUIDE TO FIRE DETECTION AND ALARM SYSTEMS

P Cook

This is one of a number of publications prepared by the IET to provide guidance on electrical installations in buildings.
This publication is concerned with fire detection and fire alarm systems and must be read in conjunction with the legislation, Approved Document B and the British Standards, in particular BS 5839-1 and 5839-6.

- Paperback 100 pages
- Published 2010
- ISBN 978-1-84919-130-2
- Order book PWR05130
- **£22**

For full information and contents, please visit www.theiet.org/wiringbooks

IET Wiring Regulations

17th Edition

BS 7671:2008
Amendment No 1
Draft for Public Comment

A DPC showing the changes, together with details about how to send in your comments, can be found at **www.theiet.org/wiringregs.**
The actual Amendment has an expected publication date of July 2011.
DPC available from 14th June 2010.

- **Paperback 210 pages**
- **Order book PWR05080**
- **£40**

BEST SELLING WIRING REGULATIONS BOOK SERIES

GUIDANCE NOTE 1

Selection & Erection of Equipment, 5th Edition
Order book PWG1170B

This Guidance Note enlarges upon and simplifies relevant requirements of BS 7671:2008. It includes detailed coverage of mechanical maintenance, emergency switching, functional switching in easy-toread text.
It also includes illustrations in full colour.

- Paperback 216 pages
- Published 2009
- ISBN 978-0-86341-855-6
- Order book PWG1170B
- **£30**

GUIDANCE NOTE 2

Isolation & Switching, 5th Edition

This Guidance Note enlarges upon and simplifies relevant requirements of BS 7671:2008. It includes detailed coverageof mechanical maintenance, emergency switching, functional switching in easy-toread text.
It also includes illustrations in full colour.

- Paperback 74 pages
- Published 2009
- ISBN 978-0-86341-856-3
- Order book PWG2170B
- **£25**

GUIDANCE NOTE 3

Inspection & Testing, 5th Edition

Suitable for the City & Guilds 2391 Certificate in Inspection, Testing and Certification, this Guidance Note is concerned principally with Inspection and Testing. It has been updated to align with the IEE Wiring Regulations 17th Edition (BS 7671:2008). It includes detailed coverage of initial verification, periodic inspection and test instruments.

- Paperback 128 pages
- Published 2008
- ISBN 978-0-86341-857-0
- Order book PWG3170B
- **£25**

GUIDANCE NOTE 4

Protection Against Fire, 5th Edition

This Guidance Note enlarges upon and simplifies relevant requirements of BS 7671:2008.
It includes detailed coverage of thermal effects, locations with increased risk, cable selection and safety service in easy-to- read text. It also includes full-colour illustrations.

- Paperback 104 pages
- Published 2009
- ISBN 978-0-86341-858-7
- Order book PWG4170B
- **£25**

GUIDANCE NOTE 5

Protection Against Electric Shock, 5th Edition

This Guidance Note enlarges upon and simplifies relevant requirements of BS 7671:2008.
It includes detailed coverage of the protective measures against electric shock. It also includes full-colour illustrations.

- Paperback 115 pages
- Published 2009
- ISBN 978-0-86341-859-4
- Order book PWG5170B
- **£25**

GUIDANCE NOTE 6

Protection Against Overcurrent, 5th Edition

This Guidance Note enlarges upon and simplifies relevant requirements of BS 7671:2008. It includes guidance on protection of conductors in parallel against overcurrent and includes an overview of the new appendix 4 of BS 7671:2008.

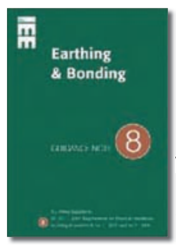
- Paperback 113 pages
- Published 2009
- ISBN 978-0-86341-860-0
- Order book PWG6170B
- **£25**

GUIDANCE NOTE 7

Special Locations, 3rd Edition

This Guidance Note enlarges upon and simplifies relevant requirements of BS 7671:2008. It includes detailed coverage of new special locations covered in the IEE Wiring Regulations 17th Edition in easy-toread text. It also includes full colour illustrations.

- Paperback 142 pages
- Published 2009
- ISBN 978-0-86341-861-7
- Order book PWG7170B
- **£25**



GUIDANCE NOTE 8

Earthing and Bonding 1st Edition

This Guidance Note is principally concerned with aspects of earthing and bonding This title is in the process of being updated and the electronic update will be available to download soon.

- Paperback 168 pages
- Published 2007
- ISBN 978-0-86341-616-3
- Order book PWRG0241
- **£25**

For full information and contents, please visit www.theiet.org/wiringbooks

Order Form

Electrical **excellence**

How to order

BY PHONE
+44 (0)1438 767328
BY FAX
+44 (0)1438 767375
BY EMAIL
sales@theiet.org
BY POST
The Institution of Engineering and Technology
PO Box 96
Stevenage
SG1 2SD, UK
Over the Web
www.theiet.org/books

* Postage/Handling: postage within the UK is £3.50 for any number of titles. Outside UK (Europe) add £5.00 for first title and £2.00 for each additional book. Rest of World add £7.50 for the first book and £2.00 for each additional book. Books will be sent via airmail. Courier rates are available on request, please call +44 (0)1438 767328 or email sales@theiet.org for rates

** To qualify for discounts, member orders must be placed directly with the IET.

GUARANTEED RIGHT OF RETURN:
If at all unsatisfied, you may return book(s) in new condition within 30 days for a full refund. Please include a copy of the invoice.

DATA PROTECTION
The information that you provide to the IET will be used to ensure we provide you with products and services that best meet your needs. This may include the promotion of specific IET products and services by post and/or electronic means. By providing us with your email address and/or mobile telephone number you agree that we may contact you by electronic means. You can change this preference at any time by visiting www.theiet.org/my

Details

Name:

Job Title:

Company/Institution:

Address:

Postcode: Country:

Tel: Fax:

Email:

Membership No (if Institution member):

Payment methods

☐ by **cheque** made payable to the Institution of Engineering and Technology

☐ by **credit/debit card**

☐ Visa ☐ Mastercard ☐ American Express ☐ Maestro Issue No:______________

Valid from: ☐☐ ☐☐ Expiry date: ☐☐ ☐☐ Card security code: ☐☐☐☐
(3 or 4 digits on reverse of card)

Card No: ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Signature____Date______________________
(Orders not valid unless signed)

Cardholder Name:

Cardholder Address:

Town: Postcode:

Country:

By official **company purchase order** (please attach copy)
EU VAT number:________________________________

Ordering information

Quantity	Book No.	Title/Author	Price (£)
		Subtotal	
		- Member discount **	
		+ Postage/Handling*	
		+ VAT (if applicable)	
		Total	

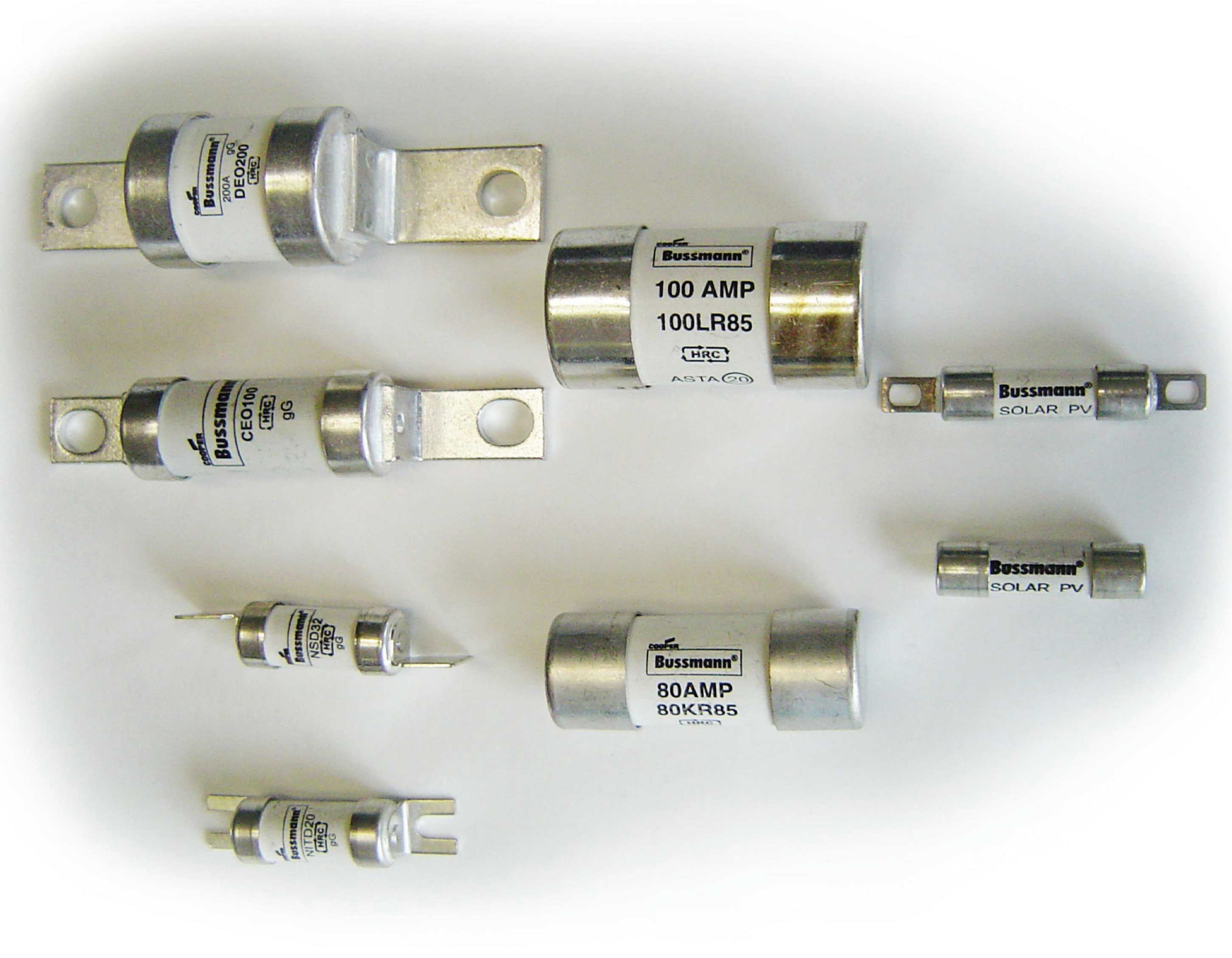
The Institution of Engineering and Technology is registered as a charity in England & Wales (no 211014) and Scotland (no SC038698)

Developments of Low-Voltage Fuse Standards

Referenced in BS 7671:2008

By Paul Bicheno

The UK national committee for the development of BS 7671 (JPEL/64) currently has a programme to develop amendment 1 of BS 7671:2008. As part of this programme it has been highlighted that there has been some developments in the low-voltage fuse standards that are included in the requirements of BS 7671:2008. This article will briefly describe the relevant developments in low voltage fuse standards, how these affect what is published in BS 7671:2008 and finally an insight into future developments of fuse standards.



Images courtesy of Cooper Bussmann (UK) Ltd

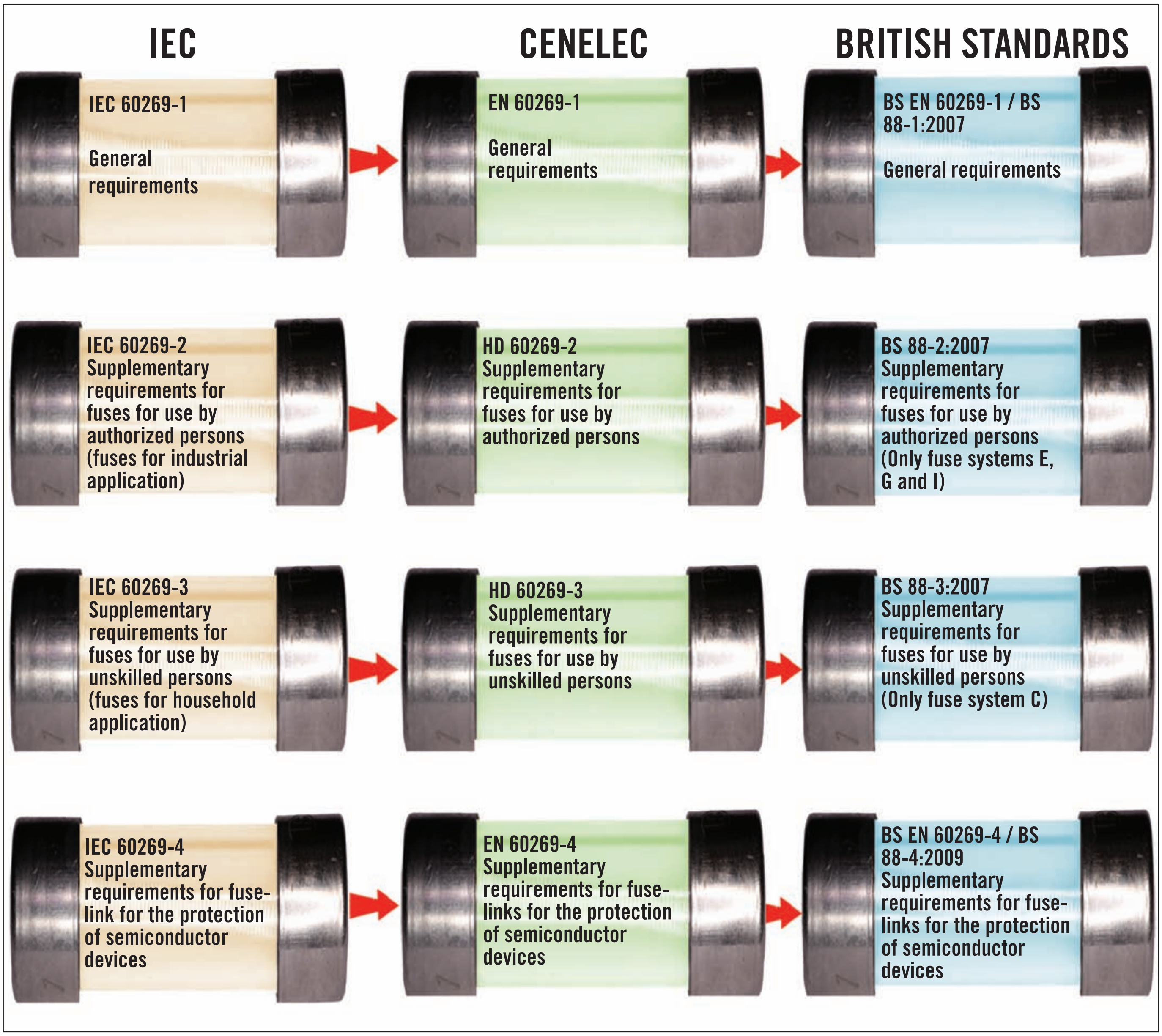


Figure 1 – Alignment of 60269 series low voltage fuse standards

The International Electrotechnical Commission (IEC) has restructured the IEC 60269 series of low-voltage fuse standards so that there are now only four parts to the series instead of seven. The European technical committee CENELEC has aligned to the IEC 60269 standards. Finally, the UK has adopted the CENELEC standards, but only includes the specific fuse systems used in the UK. This alignment is summarised in figure 1. As a consequence of this alignment the UK has now withdrawn a number of low-voltage fuse standards on 1 March this year (2010) that is summarised in table 1. A main point to highlight from figure 1 and table 1 is that UK standard BS 88-2:2007 includes supplementary requirements for fuses for use by authorised persons, typically industrial applications, specific to fuse types E (bolted type), G (clip in) and I (wedge tightening). These fuse systems were covered by the existing standards BS

BS EN 60269-1: 1999	General Requirements
BS EN 60269-2:1995	Common industrial fuse requirements
BS EN 60269-3:1995	Fuses for domestic applications
BS EN 60269-4:1996	Semiconductor protection fuses
BS EN 60269-4-1:2002	Examples of types of semiconductor protection fuses
BS 88-2.2:1988	Industrial fuse systems
BS 88-6:1988	Fuses for domestic applications
BS 88-5: 1988	Fuse-links for use in a.c. electricity supply networks
BS 1361:1971	Cartridge fuses for a.c. circuits in domestic premises

Note 1: BS 88-2.2, BS 88-5 and BS 88-6 have been incorporated into BS 88-2:2007 as fuse systems G (clip in), I (wedge tightening) and E (bolted) respectively
Note 2: BS 1361 has been incorporated into BS 88-3:2007

Table 1 – BS and BS EN fuse standards withdrawn on 1st March 2010

Figure 2 – BS 88-2 (bolted) fuse system E

88-2.2:1988, BS 88-6:1988 and BS 88-5:1988 respectively. However, the requirements of these fuses have been incorporated into BS 88-2:2007 and are now withdrawn.

As three standards have been incorporated into a single standard, reference will have now have to be made to either BS 88-2 fuse system E (bolted), BS 88-2 fuse system G (clip in) or BS 88-2 fuse system I (wedge tightening). A second point to highlight is that UK standard BS 88-3:2007 includes supplementary requirements for fuses for use by unskilled persons, typically household applications, to fuse system C (BS cylindrical fuse system). This fuse system was covered by the existing standard BS 1361:1971 – however, the requirements have been incorporated into BS 88-3:2007 and is now withdrawn. A BS 1361 fuse should now be referenced as BS 88-3 fuse system C. Examples of the various fuse systems are shown in figures 2, 3 and 4.

Finally, Table 2 shows that the UK standalone low-voltage fuse standards BS 646, BS 1362 and BS 3036 remain current.

Impact on BS 7671:2008

There are a number of areas in BS 7671:2008 that reference various low-voltage fuse standards. The developments already discussed will have an impact in what is published in BS 7671:2008; therefore, it is worth highlighting these areas that will require updating. In Chapter 41, the tables 41.2 and 41.4 both have reference to BS 88-2.2, BS 88-6 and BS 1361. Therefore, the tables will need to reflect the appropriate change. For example, Tables 41.2(a)/41.4(a) could become 'General purpose (gG) fuses to BS 88-2 – Fuse systems E (bolted) and G (clip in)' and Tables 41.2(b)/41.4(b) could become 'Fuses to BS 88-3 – Fuse system C'. Regulation group 411.8 deals with reduced low-voltage systems and gives maximum earth fault loop impedance values in Table 41.6, which includes values for typical BS 88-2.2 and BS 88-6 fuses.

Chapter 43 has requirements in Regulation 432.4 for the time/current characteristics of an overcurrent protective device to comply with one of a number of fuse standards. This includes BS 88-2.2, BS 88-6 and BS 1361. Regulations 433.1.2 and 433.1.5 both include reference to these fuses for coordination between conductor and overload protective device when providing protection against overload current. In Chapter 53, Regulation 533.1 lists a number of standards that a

BS 646:1958	Cartridge fuse-links (rated up to 5 A) for a.c. and d.c service
BS 1362: 1973	General purpose fuse-links for domestic purposes
BS 3036: 1958	Semi-enclosed electric fuses (ratings up to 100 A 240 volts to earth)

Table 2 – Standalone BS fuse standards referenced in BS 7671:2008 that remain current

Figure 3 – BS 88-2 (clip in) fuse system G

Figure 4 – BS 88-3 fuse system C (BS cylindrical fuse system)

Figure 5 – Solar photovoltaic fuses

device for protection against overcurrent needs to comply with, which includes fuses to BS 88-2.2, BS 88-6 and BS 1361. Section 537 deals with Isolation and switching, where Table 53.2 includes guidance on how appropriate a device is for isolation, emergency switching and functional switching. This has reference to a 'BS 88' fuse. It is worth highlighting that this table does not currently include guidance on a BS 1361 fuse.

Appendix 1 provides a list of British Standards to which reference is made in the Regulations, therefore the appropriate BS/BS EN number will require amendment to reflect the appropriate status. Appendix 3 includes information on the time/ current characteristics of overcurrent protective devices, including fuses to BS 88-2.2, BS 88-6 and BS 1361. Appendix 8 provides information on busbar trunking and powertrack systems where protection against overload current includes reference to a 'BS 88' fuse.

Therefore, the low-voltage fuse standards that are likely to be referenced in various Regulations and Appendices in a future amendment of BS 7671:2008 are;

- BS EN 60269-1:2007 / BS 88-1:2007
- BS 88-2:2007
- BS 88-3:2007
- BS 646:1958
- BS 1362:1973
- BS 3036:1958

Future developments of fuse standards

There are currently two developments related to fuses that are worth highlighting. The first is IEC TR 60269-5 Guidance for the application of low voltage fuses. This is an application guide that combines existing guidance on coordination between fuses and contactors / motor starters and guidance on low-voltage fuses. This is due for publication in 2011. A second development is IEC 60269-6 Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems. As the title suggests there will eventually be a specific standard for photovoltaic fuses. This is likely to be published as an International standard towards the end of 2010. This is planned to be published as European standard EN 60269-6 and will eventually adopted in the UK as a dual referenced standard BS EN 60269-6 / BS 88-6, probably in early 2011. Although it is not likely to affect what is published in BS 7671:2008 at the moment, this standard will eventually be relevant to the requirements for Section 712, therefore anyone working with photovoltaic systems should be aware of the standard for fuse-links for these types of systems. Examples of photovoltaic fuses are shown in figure 5.

Additional information

Low-voltage fuse standards are the responsibility of BSI technical committee PEL/32. Committees can be contacted via customer services bservices@bsigroup.com.

The status of British Standards can be checked via the BSI site http://shop.bsigroup.com/ and searching for the required standard.

The CENELEC committee responsible for low-voltage fuse standards is technical committee CLC/SR 32B.

The status of CENELEC standards can be searched via the following site www.cenelec.eu/Cenelec/Homepage.htm

The IEC committee responsible for low voltage fuse standards is technical committee IEC/TC 32B. The status of IEC standards can be searched via the site www.iec.ch/ using the standards and development page or TC dashboard page.

The British Electrotechnical & Allied Manufacturers Association (BEAMA) has fuse experts represented on technical committees. The BEAMA website address is www.beama.org.uk