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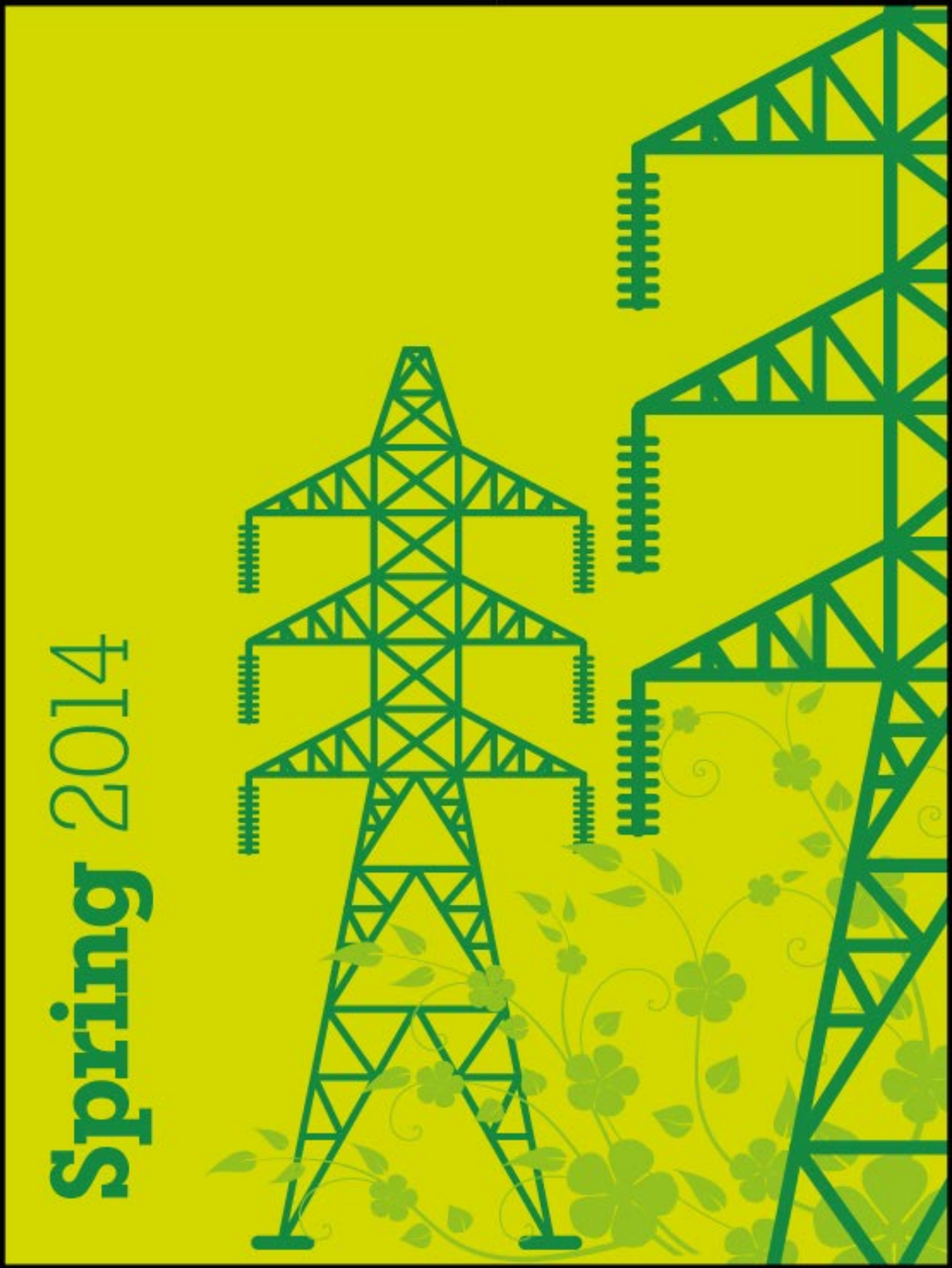

Spring 2014

WiringMatters

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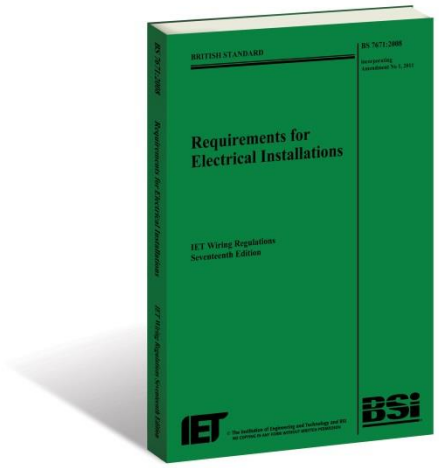
Amendment Number 3 of BS7671 2008 - how it might affect you

Geoff Cronshaw provides us with a look ahead at the proposals of Amendment 3 to BS 7671:2008 IET Wiring Regulations – and the resulting changes on the design, erection and verification of electrical installations.



Introduction

The National Wiring Regulations Committee, JPEL 64, will confirm changes to BS 7671:2008 by 1 November 2014. The Draft for Public Comment (DPC), which sets out the proposed changes, was made available for comment 14 December 2013 and 7 March 2014.
I outline the draft proposals below. It's important to note although I refer to the changes in the affirmative, they remain proposals (despite the comment period being closed) and not all of the proposals may be included in the final version of Amendment Number 3 - inclusion of proposals is at the discretion of JPEL 64.

Part 2 Definitions

Definitions will be expanded and modified. For example, the definition for 'skilled and instructed persons' will be changed. It was also decided that the definition for a 'competent person' should be removed, to avoid confusion, as it was considered that some overlap existed between the definition of 'skilled person' and 'competent person'.

It was proposed to modify the definition of 'skilled person' to align this definition with that of the IEV (International Electrotechnical Vocabulary). JPEL 64 also proposed to modify the definition of 'instructed person' for the same purpose.

These changes will be reflected throughout the wiring regulations. For example, Regulation 134.1.1 has been changed from:

> "Good workmanship by competent persons or persons under their supervision and proper materials shall be used in the erection of the electrical installation. Electrical equipment shall be installed in accordance with the instructions provided by the manufacturer of the equipment."

to:

> "Good workmanship by skilled (electrically) or instructed (electrically) persons and proper materials shall be used in the erection of the electrical installation. The installation of electrical equipment shall take account of manufacturers' instructions."
> Some new symbols have been included in the definitions.

Chapter 52 Selection and Erection of Wiring Cables

Cables concealed in a wall or partition

The Regulations for the selection and erection of wiring systems (impact) will be redrafted, with the removal of all references to “under the supervision of skilled and instructed persons”.

It will be a requirement that cables that are concealed in a wall or partition (at a depth of less than 50 mm) are protected by a 30 mA RCD for all installations if other methods of protection, including the use of cables with either an earthed metallic covering or mechanical protection, are not employed. This will apply to a cable, irrespective of the depth of that cable, in a partition where the construction of the partition includes metallic parts other than fixings.

The exception for cables that form part of a SELV or PELV circuit will be retained.

Section 557 Auxiliary Circuits

A new section, Section 557, covering auxiliary circuits for low voltage electrical installations will be included. Auxiliary circuits are defined as circuits for the transmission of signals intended for the detection, supervision or control of the functional status of a main circuit, such as circuits for control, signalling and measurement. Auxiliary circuits for fire and intruder alarms, traffic lights, etc (where specific standards exist) are excluded. This is a completely new section. The current requirements for auxiliary circuits in BS 7671 are given in Regulation 537.5.3 (extract below):

"537.5.3 A circuit shall be designed, arranged and protected to limit dangers resulting from a fault between the control circuit and other conductive parts liable to cause malfunction (eg inadvertent operation) of the controlled equipment."

Section 557 will cover issues such as:

- A.c. or d.c. auxiliary circuits;
- power supplies for auxiliary circuits, depending on the main circuit;
- auxiliary circuits supplied by an independent source;
- protection against overcurrent; types and sizes of cables for auxiliary circuits;
- special requirements for auxiliary circuits that are used for measurement;
- functional safety and EMC;
- the connection of the devices and protection against overcurrent where the auxiliary circuit is supplied from the main circuit via a transformer or rectifier; and
- circuits used for measurement, such as connection requirements for voltage and current transformers etc.

Section 717 Mobile and Transportable Units

In 2008 Section 717 was introduced, which provided requirements that were applicable to mobile or transportable units. These units may be self-propelled, towed or transportable containers or cabins, for example, technical and facilities vehicles for the entertainment industry, medical services, advertising, firefighting, workshops, offices, and transportable catering units.

There are many risks associated with such units, arising from:

- a loss of connection to earth because of temporary cable connections;
- the connection to different national and local electricity distribution networks;
- the impracticality of establishing an equipotential zone external to the unit;
- open-circuit faults of the PEN conductor of PME supplies, raising the potential of all metalwork (including that of the unit) to dangerous levels;
- shock from high functional currents flowing in protective conductors; and
- vibration while the vehicle or trailer is in motion, or while a transportable unit is being moved – causing faults within the unit installation.

Some of the current Requirements that aim to reduce these risks included:

- Regulation 717.411.1: automatic disconnection shall be by RCD.
- Regulation 717.411.3.1.2: accessible conductive parts of the unit to be connected through the main equipotential bonding to the main earth terminal within the unit.
- Regulation 717.514 (identification): type of supply, voltage rating of the unit, number of phases, on board earthing, and maximum power required by the unit.

Changes introduced by Amendment 3

Regulation 717.413 will be introduced, and is based on the latest CENELEC HD. The Regulation will require an insulation monitoring device to be installed so that automatic disconnection of the supply is provided in the case of a first fault or an RCD, and an earth electrode to be installed so that automatic disconnection is provided in the case of failure of the transformer to provide electrical separation.

Regulation 717.551.6 will be added, and will prohibit the interconnection of units with different power supply systems. It also prohibits the interconnection of different earthing systems unless special precautions have been taken, as set out by Regulation 542.1.3.3. This reinforces the general rules in Parts 1 to 6 of BS 7671.

Regulation 717.551.7.2 will be added, which will give additional requirements for installations where the generating set may operate in parallel with other sources. This also reinforces the general rules in Parts 1 to 6 of BS 7671.

Changes will be made to the figures that show examples of connections associated with the mobile or transportable units.

Sections 559, 714 and 715: luminaires and lighting installations

In 2008 additional requirements for general lighting were included for:

- protection against fire;
- connection of luminaires to the fixed wiring;
- fixing of the luminaires;
- through-wiring in a luminaire;
- control gear, for example, ballasts;
- compensation capacitors; and
- the need to give consideration to stroboscopic effects.

Amendment 3 will introduce a number of notable changes to align the BS 7671 requirements with the both latest IEC and CENELEC standards. Examples of these intended changes include:

- moving the requirements for outdoor lighting and extra-low voltage lighting installations from Section 559 to two new sections, Section 714 and Section 715;
- requirements for the type of devices that are to be used for the connection of luminaires to the supply and the protection of cables against heat and UV radiation effects within luminaires; and
- introduction of the requirements for protection against electric shock for display stand for luminaires.

Section 715 Extra-low Voltage Lighting

The particular requirements apply to installations that are supplied from sources with a maximum rated voltage of 50 V a.c. rms or 120 V d.c. BS 7671 already includes requirements for:

- protection against electric shock (SELV);
- protection against the risk of fire due to short circuit;
- types of wiring systems, including special requirements where bare conductors are used;
- the types of transformers and converters; and
- suspended systems.

Amendment 3 will make a number of notable changes to align the latest IEC requirements with CENELEC requirements, including:

- the types of wiring systems permitted;
- voltage drop in consumer's installations; and
- requirements for isolation, switching and control.

Section 714 Outdoor Lighting Installations

In 2008 some major changes to the requirements for outdoor lighting installations were introduced, covering requirements for:

- car parks;
- gardens;
- parks;
- places open to the public;
- illumination of monuments; and
- floodlighting.

These will be retained in Amendment 3, along with the recommendations for additional protection by a 30 mA RCD for telephone kiosks, bus shelters, advertising panels and town plans.

Amendment 3 will make only minor changes to outdoor lighting installations. One important change will be that individual circuits will be required to be isolated.

Chapter 41 Protection Against Electric Shock

References to 'ordinary persons' in Regulation 411.3.3 have now been removed. This Regulation will require, in accordance with Regulation 415.1, RCD protection for socket outlets up to 20 A (and for mobile equipment up to 32 A for use outdoors) for all installations.

There is, however, an exception for RCD protection (for socket outlets up to 20 A) for a specific labelled socket outlet or where a documented risk assessment determines that RCD protection is not necessary.

This means that socket outlets up to 20 A in all types of installations, including commercial, domestic and industrial, will need to be protected by a 30 mA RCD unless a risk assessment can determine that it's not necessary.

'Cmin' factor

Maximum earth fault loop impedances given in Tables 41.2, 41.3, 41.4 and 41.6 will be revised to take into account the Cmin factor given in CLC/TR50480:2011.

Cmin is the minimum voltage factor to take account of variations in voltage, depending on time and place, changing of transformer taps and other considerations. The notes to the

Tables will be changed to reflect maximum permitted operating temperature. In addition, Regulations 411.5.4 and 41.6.4 will include a Cmin factor.

Chapter 42 Protection Against Thermal Effects

Regulation 421.1.200 has been introduced and will require switchgear assemblies, including consumer units, to have their enclosure manufactured from non-combustible, or not readily combustible, material, or to be enclosed in a cabinet or enclosure that is constructed of non-combustible, or not readily combustible, material.

This new Regulation is being introduced to help to protect against fire that can result from the overheating of connections within consumer units. Overheating can arise from loose connections and connections that have not been made correctly, for example, the connection of a cable over the insulation.

Appendix 6 Model Forms for Certification and Reporting

Appendix 6 contains the electrical installation certificate, the minor works certificate and the electrical installation condition report (used for reporting on the condition of an existing electrical installation) as required by Part 6 of BS 7671.

Condition report

The condition report has a series of inspection schedules. The inspection schedules provide a detailed breakdown of the inspection that is required on each aspect of an installation so that the work is carried out in an organised and efficient manner. For example, the schedule for domestic and similar premises will include over 60 check points. Each item that is listed on the schedule as requiring checking will be accompanied with the relevant regulation number of BS 7671 for ease of reference. In addition, the form provides a facility to indicate the outcome of the inspection of each item with either a tick (acceptable condition), a code C1 or C2 (unacceptable condition), NV (not verified), Lim (limitation) or NA (not applicable).

Amendment 3 will make a small number of changes to the electrical installation condition report and associated notes, including a requirement to carry out an inspection within an accessible roof space where electrical equipment is present in that roof space.

Amendment 3 will make a significant change to the certification of new work: the schedule of inspections (for new work only) has been replaced by examples of items that require inspection during initial verifications (which must be appended to the electrical installation certificate).

More information

Important: this article does not include all of the changes that are expected in Amendment Number 3 to BS 7671, the 17th Edition of the IET Wiring Regulations. For more information refer to the DPC on the IET website.

Amendment 3 to BS 7671 – checklist

Please note: this is not an exhaustive list.

Reference	Subject	Does it affect you?
Chapter 41 *Protection Against Shock*	Reference to ordinary persons in Regulation 411.3.3 has now been removed. Regulation 411.3.3 now requires RCD protection in accordance with Regulation 415.1 for socket outlets up to 20A (and for mobile equipment up to 32A for use outdoors) for all installations. However, there is an exception for RCD protection (for socket outlets up to 20A) for a specific labelled socket outlet or where a documented risk assessment determines that RCD protection is not necessary.	
	Regulations 411.5.4 and 41.6.4 now include a Cmin factor.	
	Maximum earth fault loop impedances given in Tables 41.2- 41.4 and 41.6 have been revised to take account of the Cmin factor given in CLC/TR50480:2011. Cmin is the minimum voltage factor to take account of voltage variations depending on time and place, changing of transformer taps and other considerations. Also the notes to the Tables have been changed in connection with maximum permitted operating temperature.	
Chapter 42 *Protection Against Thermal Effects*	The existing regulations have been modified slightly and a new Section – Protection against Overheating – has been added.	
	Regulation 421.1.200 has also been added. Regulation 421.1.200 requires switchgear assemblies including consumer units to have their enclosure manufactured from non-combustible or not readily combustible material or be enclosed in	

	a cabinet or enclosure constructed of non-combustible or not readily combustible material.	
Chapter 43 *Protection Against Overcurrent*	Minor editorial modifications.	
Chapter 44 *Protection Against Voltage Disturbances and Electromagnetic Disturbances*	Section 442, which deals with protection of low voltage installations against temporary over-voltages due to earth faults in the high voltage system and due to faults in the low voltage system, has been modified. Regulation 442.2.1 has been redrafted and Table 44.2 removed.	
Chapter 51 *Common Rules*	The requirements concerning compliance with Standards requires all equipment to be suitable for the nominal voltage and also requires certain information to be noted on the electrical installation certificate.	
	Section 512 now makes reference to the EMC directive and includes requirements for the designer of the fixed installation.	
	Minor modifications have been made to Sections 513 and 514.	
Chapter 52 *Selection and Erection of Wiring Systems*	A new Regulation (521.200) has been included giving requirements for the methods of support of wiring systems in escape routes.	
	The regulations concerning the selection and erection of wiring systems (impact) have been redrafted. Reference to “under the supervision of skilled and instructed persons” has been removed.	
	It is now required to protect cables concealed in a wall or partition (at a depth of less than 50 mm) by a 30 mA RCD for all installations if other methods of protection, including the use of cables with an earthed metallic covering or mechanical	

	protection, are not employed. This applies to a cable in a partition where the construction includes metallic parts other than fixings irrespective of the depth of the cable. There is still an exception for cables forming part of a SELV or PELV circuit.	
Chapter 53 *Protection, Isolation, Switching, Control and Monitoring*	Minor changes.	
Chapter 55 *Other Equipment*	Small changes have been made to Regulation 551.7.1 concerning low voltage generating sets.	
	A new Section 557 covering auxiliary circuits for low voltage electrical installations is included. Auxiliary circuits are circuits for the transmission of signals intended for the detection, supervision or control of the functional status of a main circuit such as circuits for control, signalling and measurement. Auxiliary circuits where specific Standards exist, for example, the construction of assembles of electrical equipment etc, are excluded. The new Section covers issues such as ac or dc auxiliary circuits; power supplies for auxiliary circuits dependent on the main circuit; auxiliary circuits supplied by an independent source; protection against overcurrent; and wiring systems. Special requirements for auxiliary circuits used for measurement are provided.	
	Section 559 Luminaires and Lighting Installations. Requirements for outdoor lighting and extra low voltage lighting installations have been moved to new Sections 714 and 715 respectively. A number of changes have been made to the requirements of Sections 559, 714 (Outdoor Lighting installations) and 715 (Extra Low Voltage Lighting Installations). For example, Section 715 includes	

	additional requirements for isolation, switching and control.	
Part 6 *Inspection and Testing*	Includes minor changes to Chapters 61- 63.	
Section 701 *Locations Containing a Bath or a Shower*	Regulation 701.411.3.3 now requires all low voltage circuits including circuits passing through the location to be RCD protected.	
Section 704 *Construction and Demolition Site Installations*	The previous exclusion of mining applications in Regulation 704.1.1 has been deleted.	
Section 711 *Exhibitions, Shows and Stands*	Reference to a skilled/competent person has been removed in Regulation 711.55.6.	
Section 712 *Solar Photovoltaic (PV) Power Supply Systems*	Includes minor changes including changes to the general schematic.	
Section 714 *Outdoor Lighting* & Section 715 *Extra Low Voltage Lighting Installations*	A number of changes have been made to the requirements in Sections 714 and 715. For example, Section 715 includes additional requirements for isolation, switching and control.	
Section 717 *Mobile or*	Introduces new Regulation 717.413 that gives requirements for electrical separation. Also,	

Transportable Units	Regulation 717.551.6 has been added, which prohibits units with different power supply systems and different earthing systems being interconnected. Changes have been made to the figures showing examples of connections associated with the mobile or transportable unit.	
Appendix 1	British Standards to which reference is made in the regulations now includes minor changes.	
Appendix 3	Time/current characteristics of overcurrent protective devices and RCDs, includes changes in connection with maximum earth fault loop impedance to take account of the Cmin factor given in CLC/TR50480:2011. Cmin is the minimum voltage factor that takes account of voltage variations depending on time and place, changing of transformer taps and other considerations. Also there have been changes to the Tables in connection with maximum operating time/current characteristics and a new Table for fuses to BS 88-2 fuse system E has been added.	
Appendix 4	Current-carrying capacity and voltage drop for cables includes a number of changes including modifications to Tables 4A3, 4C3, and 4F4A. Reference is now made to PD CLC/TR 50480 for calculating circuit impedances, fault currents and other parameters. Reference is also made to the national annex to PD CLC/TR 50480 giving calculation methods for example for cable resistance and reactance.	
Appendix 6	Model forms for certification and reporting. Schedule of inspections (for new work only) has been replaced by examples of items requiring inspection during initial verifications (which must be appended to the electrical installation certificate).	

	Also, some small changes have been made to the electrical installation condition report and associated notes including a requirement to carry out an inspection within an accessible roof space where electrical equipment is present.	
Appendix 14	Measurement of earth fault loop impedance. The equation for earth fault loop impedance has been changed to take account of the Cmin factor given in CLC/TR50480:2011.	
	Cmin is the minimum voltage factor to take account of voltage variations depending on time and place, changing of transformer taps and other considerations.	

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Introducing the IET Centres of Excellence – working together to raise the quality of learning

The IET has developed a recognition model for high quality training providers to deliver IET approved courses across the UK.

Since its creation in 1871, the IET has, over the course of its lifetime, built a reputation for electrical and engineering excellence. Given the industry concerns surrounding the quality of electrical training, the IET Centre of Excellence programme is both timely and necessary.

What is a Centre of Excellence?

In a nutshell, the Centre of Excellence programme allows high quality training providers to be recognised as such by the IET. A 'Centre of Excellence' will be able to use associated branding on agreed promotional materials and certificates. Centre of Excellence status is awarded to providers after a rigorous audit that covers all operational aspects of training delivery, such as financials, training facilities, quality of training materials, trainer development and the health and safety of learners.

What does this mean for the training provider?

Inspired excellence

The Centres of Excellence programme recognises that approved training providers, both public and private sector, have excellence at the core of their organisation. In order to certify this, the IET have created an independent and rigorous quality assurance model that seeks to identify examples of excellence across the whole company, with a focus on quality of training delivery and customer service. A successful training provider will have demonstrated that it has a base level of very robust working practices and can provide examples of excellence across the whole organisation.

Exemplary training delivery

A key element of the quality assurance is a number of observations of the training sessions throughout each calendar year, which seeks to ensure that excellence in training delivery is being maintained.

Updated and relevant course material

The IET will work with Centres of Excellence to ensure that, as changes are made to regulations and publications, associated courses are also updated - so training is constantly up to date.

The Centres of Excellence are also briefed on new publications prior to launch to ensure that new courses can be developed and made available when publications go on sale.

This also means that the Centres of Excellence will be able to provide up-to-date Continuous Professional Development (CPD) opportunities.

What does it mean to the trainee?

Relevant skills

This programme is essential if we are to ensure that individuals and companies have the very best possible skills to operate competently in a sector that is changing rapidly, and to satisfy the needs of a demanding customer base. Advances in technology and the integration of electrical equipment into sophisticated smart systems require electricians, technicians and engineers to keep their skills, knowledge and competencies up to date.

Confidence and return on investment

Because the IET is independent to the training providers and awarding bodies, purchasers of training can buy with confidence from a Centre of Excellence. Individuals can also be assured that the skills, knowledge and competence developed on a Centre of Excellence course will offer an excellent return on investment, and that course material has been updated in parallel with updates to regulations.

Ongoing excellence

The IET Centre of Excellence auditor also carries out random interviews with both learners and companies to ensure that the quality of provision is being maintained on an ongoing basis.

How can you recongise a Centre of Excellence provider?

Centres of Excellence will be promoted as the training providers of choice, through the Centres of Excellence website (www.theiet.org/excellence) and articles in publications such as *Wiring Matters*. The IET will also promote the Centres of Excellence at trade shows such as ELEX.

Look out for branding on the websites and publications of Centres of Excellence:

IET Centre of Excellence
The Institution of Engineering and Technology

How many Centres of Excellence are in operation?

So far, three training providers have passed our rigorous selection criteria and are leading the way in the Centre of Excellence programme. These are:

- Able Skills,
- Trade Skills 4U, and
- Group Horizon.

What does the future look like?

The IET is working to ensure that, in due course, the number of Centres of Excellence will increase to provide a UK-wide network. This approach will offer the opportunity for everybody to access excellent, independently quality assured training.

Tony Hicks is the Learning Development Manager at the IET and oversees the Centre of Excellence programme. For further information or any queries, please contact Tony on tonyhicks@theiet.org *or visit* www.theiet.org/excellence.

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A word from our Centres of Excellence

Group Horizons, one of the three first Centres of Excellence, enjoys the benefit of being endorsed by the IET after the rigorous auditing process:

"Group Horizon are very proud to have been accepted as an IET Centre of Excellence. Providing quality training to the highest of standards is at the forefront of everything we do and this endorsement from the IET is very important to both our company and everyone that we teach.

Working with the IET, one of the world's largest professional bodies helps raise the profile of our courses and allows us to reach a wider audience through their membership and business networks."

For further details, email info@grouphorizon.co.uk or telephone 0800 002 9805.

Carl Bennett, CEO of **Trade Skills 4U**, says:

"The IET is the very essence of high standards and quality. In becoming the UK's first Electrical Specialist IET Centre Of Excellence, we realised our customers would value the assurance the IET brings to our company and where we tread first others no doubt will follow."

For further details, email Sabarah Cursons, Commercial Director Sabarah.cursons@tradeskills4u.co.uk or telephone 01293 554018.

Angela Wright, Center Manager for **Able Skills Ltd**, has this to report from the Able Skills electrical team:

"We believe that having gained the Institution of Engineering and Technology accreditation for Centre of Excellence it provides a professional status that endorses our dedication, competence and passion for giving our learners the very best training experience. From the commercial aspect it is a high level bench-mark that differentiates us from the competition."

For further details, email Angela Wright on angela@ableskills.co.uk or telephone 01322 280202.

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The counterfeit issue: interview with Mark Coles

Mark Coles is the Technical Regulations Manager at the IET. He oversees the publication of BS 7671 and all of the related IET's guidance material.

The IET has recently been alerted to a number of counterfeit publications; Mark tells Wiring Matters all about it.

Q: Which publications are being forged?

We have been alarmed to discover that BS 7671, the On-Site Guide and Guidance Note 3 *Inspection and Testing* have been illegally copied. The books we've seen range in production quality but all have technical errors.

Q: How did the IET become aware of this?

The first alert came in the form of a call from Kent Trading Standards. A consignment of 845 counterfeit copies of BS 7671:2008(2011) The IET Wiring Regulations was intercepted by staff from the UK Border Agency at the Port of Dover as it made its way to the UK from Latvia.

Following that, we have had a steady stream of people contacting the IET by phone, email and letter who have bought copies of the On-Site Guide and tell us that "it looks different to my friend's copy" or "this table has information on 35 mm conduit"!

Q: Are any specific channels (for example, certain websites such as Amazon, etc) being used?

It seems to be unregulated routes to market, by that I mean those channels that allow anyone to sell anything, examples being eBay and Amazon Marketplace. That is not to say that people should not generally buy products from those websites.

Q: What is the scale of the problem – how many publications are involved?

At the moment it's impossible to quantify. We had hoped that with the seizure of the counterfeit copies of BS 7671 at Dover there would be no more fake copies on the market but we have been sent copies of BS 7671 with the same printing errors as those found in the books from the Dover haul, so, counterfeit copies of BS 7671:2008(2011) are out there and are being offered for sale.

Q: What are the risks attached to the fake copies?

There are a number of risks but the principal risk is that of the safety of the user of the electrical installation.

There are some cable sizes given in the counterfeit On-Site Guide that are far higher than those stated in the genuine version. Should an installer follow the guidance in the counterfeit book, they would be seriously undersizing a cable, which could lead to overheating and even fire.

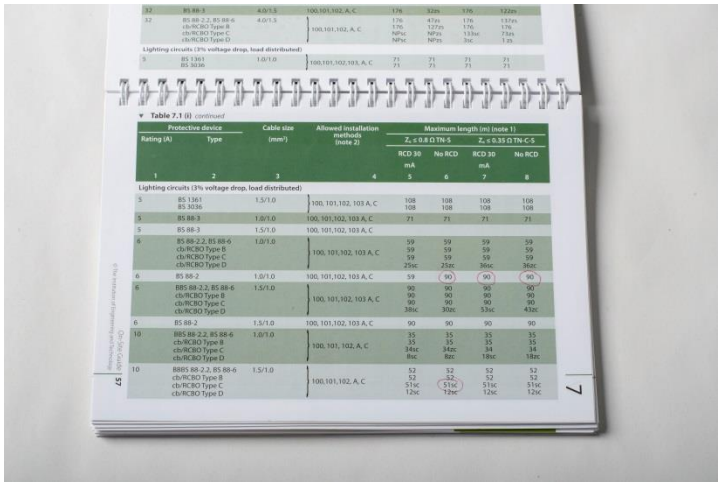

Table 7.1 (i) continued

Protective device Rating (A)	Type	Cable size (mm²)	Allowed installation methods (note 2)	Maximum length (m) (note 1) $Z_s \leq 0.8\ \Omega$ TN-S RCD 30 mA	$Z_s \leq 0.8\ \Omega$ TN-S No RCD	$Z_s \leq 0.35\ \Omega$ TN-C-S RCD 30 mA	$Z_s \leq 0.35\ \Omega$ TN-C-S No RCD
1	2	3	4	5	6	7	8
Lighting circuits (3% voltage drop, load distributed)							
5	BS 1361 BS 3036	1.5/1.0	100, 101, 102, 103 A, C	108 108	108 108	108 108	108 108
5	BS 88-3	1.0/1.0	100, 101, 102, 103 A, C	71	71	71	71
5	BS 88-3	1.5/1.0	100, 101, 102, 103 A, C				
6	BS 88-2.2, BS 88-6 cb/RCBO Type B cb/RCBO Type C cb/RCBO Type D	1.0/1.0	100, 101, 102, 103 A, C	59 59 59 25sc	59 59 59 25sc	59 59 59 36sc	59 59 59 36sc
6	BS 88-2	1.0/1.0	100, 101, 102, 103 A, C	59	90	90	90
6	BS 88-2.2, BS 88-6 cb/RCBO Type B cb/RCBO Type C cb/RCBO Type D	1.5/1.0	100, 101, 102, 103 A, C	90 90 90 38sc	90 90 90 30sc	90 90 90 53sc	90 90 90 43sc
6	BS 88-2	1.5/1.0	100, 101, 102, 103 A, C	90	90	90	90
10	BS 88-2.2, BS 88-6 cb/RCBO Type B cb/RCBO Type C cb/RCBO Type D	1.0/1.0	100, 101, 102, A, C	35 35 34sc 8sc	35 35 34sc 8sc	35 35 34 18sc	35 35 34 18sc
10	BBS 88-2.2, BS 88-6 cb/RCBO Type B cb/RCBO Type C cb/RCBO Type D	1.5/1.0	100, 101, 102, A, C	52 52 51sc 12sc	52 52 51sc 12sc	52 52 51sc 12sc	52 52 51sc 12sc

Conversely, in a counterfeit version of BS 7671:2008(2011) we have obtained, Table 4D1A states that the current-carrying-capacity of a cable is 26 amps, whilst the genuine version of the book gives this value as 36 amps. In this case, an oversized cable would be chosen, which is not a safety issue but certainly increases the cost of the installation.

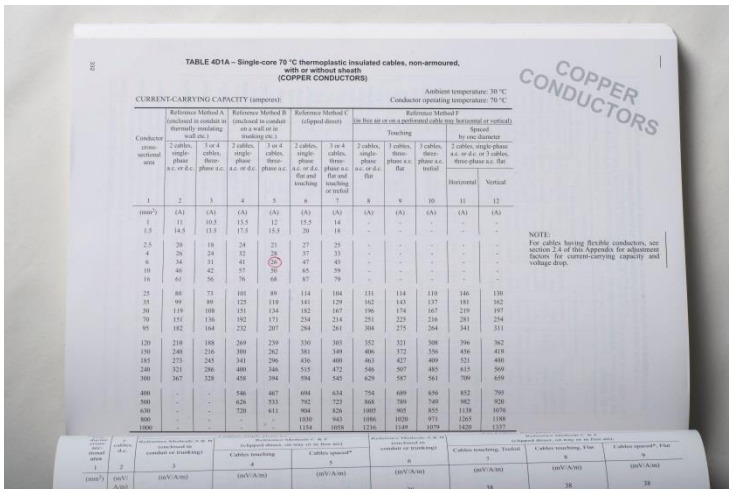

TABLE 4D1A – Single-core 70 °C thermoplastic insulated cables, non-armoured, with or without sheath (COPPER CONDUCTORS)

CURRENT-CARRYING CAPACITY (amperes): Ambient temperature: 30 °C; Conductor operating temperature: 70 °C

Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.) 2 cables, single-phase a.c. or d.c.	Reference Method A 3 or 4 cables, three-phase a.c.	Reference Method B (enclosed in conduit on a wall or in trunking etc.) 2 cables, single-phase a.c. or d.c.	Reference Method B 3 or 4 cables, three-phase a.c.	Reference Method C (clipped direct) 2 cables, single-phase a.c. or d.c. flat and touching	Reference Method C 3 or 4 cables, three-phase a.c. flat and touching or trefoil	Reference Method F (in free air or on a perforated cable tray horizontal or vertical) Touching 2 cables, single-phase a.c. or d.c. flat	Reference Method F Touching 3 cables, three-phase a.c. flat	Reference Method F Touching 3 cables, three-phase a.c. trefoil	Reference Method F Spaced by one diameter 2 cables, single-phase a.c. or d.c. or 3 cables, three-phase a.c. flat: Horizontal	Reference Method F Spaced by one diameter 2 cables, single-phase a.c. or d.c. or 3 cables, three-phase a.c. flat: Vertical
1	2	3	4	5	6	7	8	9	10	11	12
(mm²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
1	11	10.5	13.5	12	15.5	14	-	-	-	-	-
1.5	14.5	13.5	17.5	15.5	20	18	-	-	-	-	-
2.5	20	18	24	21	27	25	-	-	-	-	-
4	26	24	32	28	37	33	-	-	-	-	-
6	34	31	41	36	47	43	-	-	-	-	-
10	46	42	57	50	65	59	-	-	-	-	-
16	61	56	76	68	87	79	-	-	-	-	-
25	80	73	101	89	114	104	131	114	110	146	130
35	99	89	125	110	141	129	162	143	137	181	162
50	119	108	151	134	182	167	196	174	167	219	197
70	151	136	192	171	234	214	251	225	216	281	254
95	182	164	232	207	284	261	304	275	264	341	311
120	210	188	269	239	330	303	352	321	308	396	362
150	240	216	300	262	381	349	406	372	356	456	419
185	273	245	341	296	436	400	463	427	409	521	480
240	321	286	400	346	515	472	546	507	485	615	569
300	367	328	458	394	594	545	629	587	561	709	659
400	-	-	546	467	694	634	754	689	656	852	795
500	-	-	626	533	792	723	868	789	749	982	920
630	-	-	720	611	904	826	1005	905	855	1138	1070
800	-	-	-	-	1030	943	1086	1020	971	1265	1188
1000	-	-	-	-	1154	1058	1236	1149	1079	1420	1337

NOTE: For cables having flexible conductors, see section 2.4 of this Appendix for adjustment factors for current-carrying capacity and voltage drop.

Buyers may think that they are getting a bargain by purchasing a counterfeit copy of an IET publication, however, in such cases where pages are missing or printed information has been corrupted, the picture is not complete, which could lead to errors and dangerous practices.

In short, producing and purchasing of fake publications is compromising the safety of the electrical industry and is putting people at risk of fire, serious injury or even death.

From our perspective at the IET, we are a charity and we take pride in reinvesting profits into developing new publications and disseminating vital industry information. Lost revenue means a lower level of reinvestment going back into publications and supporting the industry at large.

Q: Who is most at risk?

To actually quantify it, the person most at risk is the homeowner.

Q: Are there any ways we can recognise a fake copy?

There are examples as stated earlier but it's becoming increasingly hard. Technology is making it easier to copy and replicate publications but what appears to be the major failing is the optical character recognition stage in the scanning process. This is where, for example, the scanning software interprets an eight as a zero, or a six as a five.

[Editor's note: we've included images of errors in books and also showcase errors in our video.]

Q: What is the IET doing about getting these books taken out of circulation, or shutting down retailers?

The IET has instructed its solicitor to issue cease and desist orders to sellers of counterfeit products and will pursue those who ignore the instruction.

Q: What is the IET doing about preventing more of this happening in future?

We are currently looking at methods of hallmarking printed publications to make it tougher to duplicate. Anti-copying paper is another method which the publishing industry is using. Similarly, electronic versions of the IET's products will be encrypted to prohibit copying and watermarks will be automatically included when printing from the IET's Wiring Regulations Digital platform.

Q: Is the IET also working with other organisations to prevent this occurring?

The IET has been working with the HSE, NICEIC and The Electrical Safety Council to name but a few. The industry recognises as a whole that counterfeit products, be they circuit-breakers or guidance publications, can be incredibly dangerous.

Q: What can the purchaser do to protect themselves and how do they know whether the copy they have bought is genuine?

This, of course, is very difficult. The only true way a purchaser can protect themselves is to buy from an IET preferred seller – you can see the list of preferred sellers at http://electrical.theiet.org/genuine-suppliers.cfm.

More information

We have two videos: one about the consequences of using counterfeit material, and one about how to avoid purchasing counterfeit material, as well as a flickr account showcasing images of counterfeit material.

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A short interview with Jack Day

We interview the student, Jack Day, who initially brought the counterfeit matter to the attention of the IET, about how counterfeit books could affect his studies.

Q: What made you buy the On-Site Guide from that particular seller?

It was by chance. The feedback left by other buyers was good, there was one negative comment left but, overall, the feedback was better than that left for other sellers. The book wasn't any cheaper from this seller.

Q: How did you discover it was a fake copy?

At college, we were calculating the number of cables permitted in conduit. I got the answer wrong and couldn't understand why as I'd followed the book. In the following discussion I found out that the information in the On-Site Guide I'd bought was wrong - Table E4 listed a 35 mm conduit but 35 mm conduit doesn't exist! My friend sitting next to me got the answer wrong too as he'd bought his On-Site Guide from the same seller as me.

Q: What do you think the implications are when buying fake wiring regulations books?

If I didn't know the book was fake, I could wire a house and, because I was using incorrect information, the installation could be dangerous, it could start a fire and kill someone. As we've just found out, I could go to prison if I'd injured someone, even though it was the book that was wrong and not me. Also, I would probably fail all my tests!

Q: What has this experience made you think about where you buy your books from in future?

I will always buy my books from recognised sellers in future. You need to know that the information you're using is correct, otherwise, anything can happen.

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Counterfeiting – the IET's policy

The IET are working with worldwide customs authorities and various law enforcement agencies based in countries such as China and India to stop the shipment of counterfeit goods, preventing their sale and distribution.

Please let us know if you see any suspicious looking IET products and we will, where appropriate, take legal action to prevent counterfeiting. We want to protect our customers so we're working hard to track down websites and online auctions that we believe are selling counterfeit IET products.

Whilst we would like to help the victims of counterfeiting, we're not able to reimburse money used to purchase infringing goods since such goods were not bought from us nor do we assist with the resolution of disputes, including assistance with PayPal or credit card refunds. However, by finding counterfeiters and taking legal action against them, we're doing our part since many people do not understand the global ramifications of counterfeiting, or the cycle of abuse they are supporting when purchasing counterfeit goods. Counterfeiters are criminals who impact on the economy by not paying taxes, and exploit consumers, businesses and their workers alike so any information regarding counterfeiting is extremely valuable to us.

Contact Us

If you have any information on a counterfeit seller of IET products, please contact us. Although we cannot comment on products that are not purchased directly from us or issue letters of authentication, any information about counterfeiting is extremely valuable to us.

WiringMatters
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LED lighting: from accent to everywhere

Consumer expectations for good lighting have become commonplace today, and we often take good lighting for granted. For instance, we expect to have our roads and pathways well illuminated, and the notion of councils switching off street lights can open up much debate about fears of safety, or how efficiently emergency services can respond in the dark.

But in the current economic climate, the expense of maintaining street lights can quickly come under review by local councils who wish to save money and meet energy savings criteria. However, switching off seems a less than ideal solution, which prompts the question: is there a better alternative?

This is where LED lighting may well come to the fore. Advances in light-emitting diode (LED) lighting systems in recent years have driven the technology from indicator to illumination applications, and it is fast moving from novelty use in accent and decorative lighting (think tangled Christmas lights) to becoming the light source of choice for most lighting applications.

Why? Firstly, because LED lighting is so flexible in use. With increasing light output and system efficacy, coupled with a wide range of shapes, sizes and form factors suitable to various optics and light distribution solutions, LED lighting is becoming an adaptable choice for the lighting of structures and street scenes and the provision of general and task lighting in buildings.

Secondly, LED lighting that is properly specified and installed can have a host of benefits relative to counterpart technologies in terms of reliability, safety, longevity and maintenance. In particular, it can be switched on and off (or dimmed) frequently without its lifespan being reduced. It can also lead to reduced lighting pollution for external applications.

The installation of LED lighting is becoming to be perceived as a priority for many local authorities, with examples of the mass deployment of LED lighting systems already featuring in the news:

- In July 2012, Birmingham City Council celebrated the success story of installing 10,000 LED columns, with estimated savings in the cost of energy of £3 million annually with up to a 60 per cent cut in related carbon emissions: http://birminghamnewsroom.com/2012/07/city-is-shining-thanks-to-10000-eco-friendly-leds/.

- In December 2013, a ground-breaking project was committed to, to update street lights in London – proving that history, when it comes to street illumination, is still being made: http://www.localgov.co.uk/London-commits-to-historic-street-light-investment/35132.

- As part of Sheffield's planned street improvement programme (the Streets Ahead scheme), 58,000 LED lighting columns are due to be installed: http://www.lighting.co.uk/wrtl-wins-sheffield-led-street-lighting-contract/8635418.article.

- After winning £24 million in the Future Cities competition, Glasgow will be showcasing how UK cities can make the most of new technologies by integrating LED lighting with smart city systems, pairing remote sensors that track traffic and footfall with improved lighting control: http://www.glasgow.gov.uk/index.aspx?articleid=9647.

While capital cost has previously been a barrier to the deployment of LED lighting systems, component costs are coming down and available product ranges are growing as the market

matures. LED lighting is expected to dominate street and commercial lighting in the coming years, with domestic applications following shortly thereafter, perhaps as soon as 2020. However, as with all new technologies, the transition to LED lighting is not without serious considerations.

When applying LED lighting systems, it is crucial that care is taken over the appropriate design, specification, installation and maintenance to ensure that all key considerations have been identified, checked and effectively managed. Given that this is a relatively new market, there is still great variation in LED lighting product quality, and some products can be inconsistently or misleadingly labelled, leading to difficulty in comparing systems' performance. LED lighting systems can have reduced performance in higher temperature environments, so designers and installers should ensure that the LED junction temperature is kept within the specified operating tolerances. The application of LED lighting systems in both new and retrofit situations can also present compatibility issues, particularly between LED lamps, drivers and lighting controls or dimming, where the latter are used.

As a result, the first challenge for those wishing to install LED lighting may be where to start – the technology is growing at so rapid a pace, and a clear understanding is required to really make the most of an LED lighting system. It is therefore crucial that alongside this growth in technology there is a growth in the skills base of installers and maintainers and increased designer and specifier awareness of the range of options that LED lighting systems can provide.

LED lighting is arguably the lighting solution of the future, but for now it remains important to properly manage the challenges presented in the application of this new technology.

Further information:

The IET have developed the *Code of Practice for the Application of LED Lighting Systems* to address the performance, safety and longevity issues of LED lighting installations using a systems approach to practitioner considerations, such as lighting design, physical installation, electrical design and installation, commissioning, inspection and maintenance. The Code of Practice will be essential reading for anyone involved in designing, specifying, installing or maintaining interior or exterior LED lighting systems. For more information, please click visit http://www.theiet.org/resources/standards/led-cop.cfm.

In addition, **the IET Built Environment Sector Summit: Lighting** (9th April, Central London) will provide practitioners with an update on key developments in the lighting applications market, including such topics as:

- standards, regulation and compliance (eg the new Part L to the Building Regulations);
- advances in how buildings and environments can be lit;
- how advanced lighting can be technically achieved and controlled;
- delivery energy efficient lighting schemes; and
- a Q&A panel on new and retrofit lighting applications.

Attendees will receive a copy of the *Code of Practice for the Application of LED Lighting Systems* as part of their delegate experience. For more information, please see http://www.theiet.org/events/2014/194624.cfm.

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INSPECTION AND TESTING OF ELECTRICAL INSTALLATIONS: RESIDUAL CURRENT DEVICES

[The basis of this article was first published in Wiring Matters in issue 15, Summer 2005 and reflected the requirements of the then current BS 7671:2001(2004). The Regulations have since been revised and amended a number of times so, due to many requests, a revisit was seen as necessary.]

The IET receives many enquiries relating to the inspection and testing of electrical installations and the applicable requirements of BS 7671:2008(2013). The queries vary greatly and cover all aspects of inspection and testing, from the initial verification process of domestic installations to the periodic inspection of major industrial installations.

1. What is an RCD and what does it do?

A residual current device (RCD) is defined in BS 7671:2008(2013) as:

'A 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.'

An RCD is a protective device used to automatically disconnect the electrical supply when an imbalance is detected between live conductors. In the case of a single-phase circuit, the device monitors the difference in currents between the line and neutral conductors.

Note that the term 'live' conductor includes both the line and neutral conductors.

In a healthy circuit, where there is no fault current flowing to earth or protective conductor current, the sum of the currents in the line and neutral conductors is zero. If a line-to-earth fault develops, a portion of the line conductor current will, therefore, not return through the neutral conductor. The device monitors this difference, operates and disconnects the circuit when the residual current reaches a preset limit, the residual operating current ($I\Delta n$).

RCDs are used to provide protection against the specific dangers that may arise in electrical installations, including:

- fault protection;
- additional protection; and
- protection against fire.

An RCD does not provide protection against overcurrent. Overcurrent protection is provided by a fuse or a circuit-breaker. However, combined RCD and circuit-breakers are available and are designated RCBOs.

2. Types of RCDs

'RCD' is the generic term for a device that operates when the residual current in the circuit reaches a predetermined value. The following table, Figure 1, indicates the different types of RCD available, a description of each device and examples of how the device is used:

Figure 1 Types of RCD

	Type of RCD	Description	Installed/used
RCCB	Residual current operated circuit-breaker without integral overcurrent protection	Device that operates when the residual current attains a given value under specific conditions	Consumer units Distribution boards
RCBO	Residual current operated circuit-breaker (RCCB) with integral overcurrent protection	Device that operates when the residual current attains a given value under specific conditions and incorporates overcurrent protection	Consumer units Distribution boards
CBR	Circuit-breaker incorporating residual current protection	Overcurrent protective device incorporating residual current protection.	Distribution boards in larger installations
SRCD	Socket-outlet incorporating an RCD	A socket-outlet or fused connection unit incorporating a built-in RCD.	Often installed to provide additional protection for users of the socket-outlet when it may not be advantageous to protect the entire circuit with an RCD
PRCD	Portable residual current device	A PRCD is a device that provides RCD protection for any item of equipment supplied from a socket-outlet.	Plugged into an existing socket-outlet. PRCDs are not part of the fixed installation
SRCBO	Socket-outlet incorporating an RCBO	Socket-outlet or fused connection unit incorporating an RCBO	Often installed to provide additional protection for users of the socket-outlet when it may not be advantageous to protect the entire circuit with an RCD

2.1 Older installations with ELCBs

Historically, two basic types of earth leakage circuit-breakers (ELCB) were recognised by the Regulations; the familiar current-operated type and the earlier voltage-operated type.

The voltage-operated type ceased to be recognised by the Regulations in 1981 and, today, only the current-operated type is recognised. The voltage operated device can be distinguished by its two separate earthing terminals – one for the connection of the earthing

conductor of the installation and the other for a connection to a means of earthing. Such devices were often used on installations forming part of a TT system where the means of earthing was an earth electrode. The major drawback with the voltage-operated earth leakage circuit-breaker is that a parallel earth path can disable the device. There is a move within standardisation circles (BSI Committee PEL/23/1) to resurrect the principle of the voltage operated ELCB for use in Electric Vehicle charging installations - the principle being that, should a potential appear between points within the installation, i.e. true earth and the vehicle, the device would operate and disconnect; see Regulation 722.411.4.1(iii) of BS 7671:2008(2013).

2.2 Recognised devices

RCDs intended for use in the UK are manufactured to European Standards and can be identified by their BS EN numbers – BS indicates that the standard is recognised in the UK and EN stands for Euro-Norm. The following list identifies the applicable confirmed and current standards:

- BS 7071:1992(1998)
  Specification for portable residual current devices.

- BS 7288:1990(1998)
  Specification for socket-outlets incorporating residual current devices (SRCDs).

- BS EN 61008-1:2012
  Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs).

- BS EN 61009-1:2012
  Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs).

Note that BS 4293:1983(1993) Specification for residual current-operated circuit-breakers has been withdrawn and superseded by BS EN 61008-1:2012.

2.3 Characteristics of RCDs

RCDs are defined by a series of three main electrical characteristics:

- The rating of the device in amperes, I.
- The rated residual operating current of the protective device in amperes, IΔn.
- Whether the device operates instantaneously or incorporates an intentional time delay to permit discrimination. Such devices are called ‘S’ or Selective.

Devices are manufactured with different values of rated current and rated residual operating current but in this article we will consider the rated residual operating current of the protective device, IΔn.

3. Applications

The correct device must be selected for the particular application. Choosing the wrong device could have serious consequences and could result in electric shock or fire. The list in Figure 2 gives examples of particular applications of RCDs and includes references to the relevant Regulations in BS 7671:2008(2013).

Fig.2 Examples of particular applications of RCDs

RCD, IΔn	Application	Regulation
10 mA	A very sensitive device, sometimes used to protect socket-outlets of laboratory benches in schools	415.1.1
30 mA	Mobile equipment used outdoors must be protected by an RCD with a rated residual operating current not exceeding 30 mA	411.3.3(ii) 514.1.1
	In locations containing a bath or shower, all circuits of the location must be protected by the use of one or more RCDs not exceeding 30 mA. Note that the requirement is "of the location"; in reality, this means serving or passing through the bathroom and is not limited to circuits within the zones.	701.411.3.3
	Socket-outlets for use by ordinary persons for general use.	411.3.3(i)
100 mA	Where an RCD is installed because the earth fault loop impedance is too high for fault protection, i.e. disconnection time cannot be met by the overcurrent protective device	411.5.3
300 mA	Fire protection purposes in agricultural and horticultural premises	705.422.7
Adjustable ≤2000 mA	Devices with a residual operating current of 2 A or more are sometimes used in specific industrial, distribution applications or temporary supply supplies for entertainment related purposes. Advice must be sought from the designer. Any adjustment method or mechanism should not be accessible to ordinary, non-skilled or non-instructed persons	531-02-10 531.2.10

3.1 Unwanted operation

Unwanted operation of RCDs can occur when a protective conductor current causes the RCD to operate under non-fault conditions, i.e. the accumulative of protective conductor currents developed by the switch-mode power supplies of computers, e.g. too many computers on one circuit. An RCD must be so selected and the electrical circuits so subdivided that any protective conductor current that may be expected to occur during normal operation of the connected load(s) will be unlikely to cause unnecessary operation of the device (see Regulation 531.2.4). Such operation can occur on circuits with heating elements of cooking appliances etc., where elements can absorb a small amount of moisture through imperfect seals when cold. When energised, this moisture provides a conductive path for current to flow and could operate the RCD. The moisture dries out as the element heats up. Although not precluded in BS 7671, it is not a requirement to use an RCD on such circuits but the requirements of the Regulations would still have to be met, i.e. cables in walls, Regulation 522.6.101.

3.2 Discrimination

Where two or more RCDs are connected in series, discrimination must be provided, if necessary, to prevent danger (see Regulation 531.2.9). During a fault, discrimination will be achieved when the device upstream and electrically nearest to the fault operates and does not affect other, further upstream, devices. Discrimination will be achieved when 'S' (Selective) types are used in conjunction with downstream general type RCDs. The 'S' type has a built-in time delay and provides discrimination by simply ignoring the fault for a set period of time, allowing more sensitive downstream devices to operate and remove the fault. S-type RCDs or RCDs with a rated residual operating current, IΔn, in excess of 30 mA must not be used to provide additional protection.

4. Labelling

Regulation 514.12.2, states the notice that shall be fixed in a prominent position at or near the origin of the installation, where an installation requires a residual current device:

5. Testing

RCDs must be tested; the requirements are stated in the following Regulations:

- The effectiveness of the RCD must be verified by a test simulating an appropriate fault condition and independent of any test facility, or test button, incorporated in the device (see Regulation 612.13.1).

- Where an RCD with a rated residual operating current, IΔn, not exceeding 30 mA is used to provide additional protection, the operating time must not exceed 40 ms at a residual current of 5 IΔn (see Regulation 415.1.1).

Tests are made on the load side of the RCD between the line conductor of the protected circuit and the associated cpc. Any load or appliances should be disconnected prior to testing.

5.1 Range of tests

Whilst the following tests are not a specific requirement of BS 7671:2008(2013), it is recommended that they are carried out:

Device	Instrument test current setting	Satisfactory result
General purpose RCDs to BS 4293 and RCD protected socket-outlets to BS 7288	50 % of operating current	Device should not operate
	100% of operating current	Device should operate in less than 200 ms Where the RCD incorporates an intentional time delay it should trip within a time range from 50 % of the rated time delay plus 200 ms' to 100 % of the rated time delay plus 200 ms
General purpose RCCBs to BS EN 61008 or RCBOs to BS EN 61009	50 % of operating current	Device should not operate
	100% of operating current	Device should operate in less than 300 ms unless it is of 'Type S' (or selective) which incorporates an intentional time delay. In this case, it should trip within a time range from 130 ms to 500 ms
Devices providing additional protection IΔn ≤ 30 mA	Test current at 5 IΔn The maximum test time must not exceed 40 ms, unless the protective conductor potential does not exceed 50 V. (The instrument supplier will advise on compliance).	Device should operate in less than 40 ms.

5.2 Integral test device

An integral test device is incorporated in each RCD. This device enables the mechanical parts of the RCD to be verified by pressing the button marked ‘T’ or ‘Test’.

6. Test instrument

The test instrument used to test RCDs should be capable of applying the full range of test current to an in-service accuracy, as given in BS EN 61557-6. This in-service reading accuracy will include the effects of voltage variations around the nominal voltage of the tester. To check RCD operation and to minimise danger during the test, the test current should be applied for no longer than 2s. Instruments conforming to BS EN 61557-6 will fulfil the above requirements.

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Spotlight: Geoff Cronshaw

Geoff Cronshaw is the Chief Electrical Engineer and the Secretary of JPEL 64, the National Wiring Regulations Committee. We are therefore very lucky to have him contribute some of his time to Wiring Matters as the Technical Advisor and author – this month, he writes about the impact of Amendment 3 to BS 7671.

What is your background?

I started my apprenticeship with W H Smith (Blackburn Ltd), working my way up over ten years with the company to Assistant Contracts Engineer. From there I continued to progress in my engineering career, with some notable highlights along the way, culminating in working for Cumbria County Council as Principal Electrical Engineer. In December 2001 I joined the IET and became Chief Electrical Engineer in 2004, so I have now been here for a lucky thirteen years!

What have been your career highlights?

I've enjoyed getting into the regulation side of engineering, and as Secretary of JPEL 64 was heavily involved and responsible for the sign-off of the 17th Edition of the IEE Wiring Regulations (BS 7671:2008) – a process I found very rewarding. However, I've also been fortunate enough to travel in my role and communicate the importance of BS 7671 and IEC 60364 to a wider audience; for example, in May 2011 I delivered a presentation in Beijing at an International Electrotechnical Commission (IEC) event.

I get very involved in the logistical side of standard-setting and, since 2003, I've been Chairman of both the International (MT 2) and the European Working Groups (WG 2), whose responsibilities are to develop IEC and CENELEC Standards.

[*Author note: in December 2011, Geoff was awarded the prestigious IEC 1906 award in recognition of his contribution to the International Working Group.*]

However, I've also been fortunate to be involved in designing public buildings where health and safety to the general public have been critical – including projects at Manchester airport. Contributing to such socially important building sites is tremendously rewarding.

You sound incredibly busy and very involved in a heavy load of logistics, travel and liaising between important standard-setting bodies. What inspires you to be so driven?

I enjoy all aspects of my work, in particular discussing technical areas of installations with other engineers around the world and solving difficult problems.

Where do you think the next fifty years of electrical engineering will take us?

There are some exciting new developments in the electrical standards industry. Energy efficiency is becoming more important in the design of installations, in particular, the development of the smart installation to interface with the smart grid and manage renewable sources of electricity and technologies used for storing energy.

What is your advice for electricians entering the trade today?

This is a fascinating and rewarding career. There is always something new to learn. There are a wide variety of electrical installations from a small dwelling to a heavy industrial plant for the electrician to work on, which can make for a satisfying career.

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BEC International Standards Professional Workshop – 1 April 2014, Birmingham

The BEC International Standards Professional workshop, hosted by the IET, is a free one-day event that will show how individuals and companies alike can profit from helping to create and improve standards. Improvements in standards can lead to a range of benefits, such as an in increase competitive advantage, faster product development and more efficient interaction between technicals and professionals.

Why are standards important?

Standards are indispensable: they promote an improved quality of life and contribute to health and safety. With world electricity consumption predicted to double between now and 2030, electricity production will need to increase dramatically - and energy efficiency will continue to be an important issue. The better international standards, the more they can help to increase electrical energy efficiency and reduce threats from climate change.

However, despite these challenges and the clear need for skilled people in these areas, demographic trends in the developed world suggest a decline in the number of people working in the electrotechnology and standardisation fields. In fact, the chief executive of Iberdrola, the Spanish energy group that owns ScottishPower, has said that 80 per cent of ScottishPower's engineers are due to retire over the next fifteen years - and that this was typical across the UK power industry.

What we're doing about it

The International Technical Committee (IEC) has established the International Standards Professionals Programme, designed to encourage engineers to participate in improving standards and conforming to assessment activities. A key feature of this programme is a series of annual one-day workshops. The IET is fully supportive of this IEC initiative and has helped to fund the attendance of young UK professionals in Seattle, Melbourne, Oslo and New Delhi. Working with a number of organisations, the IET has also created the International Standards Professional Workshop.

What will the workshop cover?

This workshop will provide an opportunity for all professionals, young and mature, to learn how standards can boost their careers and give their company a competitive advantage.

One exciting feature will be the selection of two candidates to attend the next IEC workshop in Tokyo (all expenses paid). IET member Peter Ridge, who went to the IEC workshop in Seattle, described it as a "wonderful experience". He found the organisation "warm and welcoming and very excited about the new Young Professionals Programme".

The workshop is free to attend. For further information, including an agenda for the workshop, see www.theiet.org/ispw.

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Forthcoming events: what's on, when

BEC Young Professionals Event – 1 April, Birmingham

This free one-day event will show how individuals and companies alike can profit from helping to create and improve standards. Improvements in standards can lead to a range of benefits, such as an in increase competitive advantage, faster product development and more efficient interaction between technicians and professionals.

Who should attend this event?

Have a look at our feature on this prestigious and important event. Essentially, the event is aimed at professionals, young and mature, who wish to learn how standards can boost their careers and give their company a competitive advantage.

One exciting feature will be the selection of two candidates to attend the next IEC workshop in Tokyo (all expenses paid).

For full information about this event, please see the website.

Electrical Safety Management – 3 April, Manchester Conference Centre

About the event

Electrical incidents continue to be the cause of a number of deaths in the workplace each year. This event provides:

- a comprehensive overview of the fundamentals of electrical safety; and
- a systematic set of principles for assessing and managing electrical safety in any business and across all sectors of industry and the public sector.

All delegates will receive a copy of the IET's *Code of Practice for Electrical Safety Management*, which is included in the price of the event.

Who should attend this event?

The event is aimed at those working in manufacturing, construction and service industries, including: production managers, electrical engineers, electricians and electrical fitters, health and safety officers, facilities managers and construction project managers and site managers For full information about this event, please see the website.

IET Built Environment Sector Summit: Lighting – 8 April, London

About the event

The event addresses key developments in lighting standards/regulations, advances in the application of LED lighting systems and retrofit challenges.

Who should attend this event?

The event is aimed at designers/specifiers, facilities managers/asset owners and installers/maintainers.

A networking lunch will also be provided.

For full details, please see the website.