

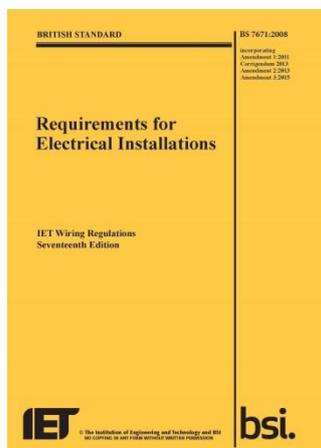
Winter 2014

Amendment 3 Toolkit

Amendment No. 3 is almost upon us, so here is an overview of what you can expect from the updated version of the Wiring Regulations and its associated publications.

BS 7671:2008+A3:2015 Requirements for Electrical Installations

Amendment No. 3 to BS 7671 Wiring Regulations will be published on 5 January 2015, and will come into effect on 1 July 2015. The new reference for the book will be 'BS 7671:2008+A3:2015'.



All new installations must comply with BS 7671:2008+A3:2015 from 1 July 2015.

In this update, a number of potentially life-saving changes have been proposed, which include, but are not limited to, changes to:

- consumer unit enclosures (to come into effect January 2016);
- wiring in escape routes;
- changes to earth fault loop impedances for all protective devices;
- the risk assessment approach for the omission of RCDs in non-domestic situations;
- updated EIC and EICR forms; and
- changes to definitions throughout the Wiring Regulations.

Who is this book for?

All users of the IET Wiring Regulations (i.e. those concerned with the design, installation and maintenance of electrical wiring in buildings) need to be aware of the coming changes in Amendment No. 3, including electricians, electrical contractors, consultants, local authorities, surveyors and architects.

As well as being essential for professional engineers, this book is a must-have for students at university and further education colleges.

Please note: Wiring Matters will be issuing a Special Edition in January 2015 covering the changes made by Amendment 3.

We have previously published guidance on the proposed changes. Please see our video about fire protection and our article about the proposed changes, published Spring 2014.

Guidance on the Wiring Regulations

All expert IET guidance is being fully updated to be aligned with Amendment No. 3. We have a host of excellent contributors to our guidance series, ensuring that you get the best brains explaining what you need to know and what is required of you. We detail our contributors [here](#).

The material goes through a rigorous process: one author is assigned to the title, and those updates are then assessed by a second technical author. In the case of Guidance Note 7, a special committee was formed to provide guidance.

On-Site Guide (BS 7671:2008 Wiring Regulations, incorporating Amendment No. 3)



The On-Site Guide is one of our best-selling books. It is the essential, quick-reference guide to BS 7671 and will be updated to incorporate the changes expected in Amendment No. 3 to BS 7671:2008, which include, but are not limited to, changes to:

- consumer units (to come into effect January 2016);
- wiring in escape routes;
- circuit-breakers used as functional switches; and
- changes to definitions throughout the Wiring Regulations.

Who is this book for?

This book is the side companion to the Wiring Regulations. It is an excellent source of guidance and its format makes it perfect for quick referencing. It is an invaluable resource for students studying wiring-related courses.

The Guidance Note series

These books are designed to provide more detailed guidance about specific areas of the Wiring Regulations.

Guidance Note 1: Selection & Erection, 7th Edition

Guidance Note 1: Selection & Erection provides clear guidance on how to apply the relevant sections of BS 7671. The expected updates in Amendment No. 3 will impact on day-to-day tasks, so it is important to have up-to-date guidance on these changes.

Amendment No. 3 changes include:

- consumer units (to come into effect January 2016);
- wiring in escape routes;
- changes to earth fault loop impedances for all protective devices; and
- changes to definitions throughout the Wiring Regulations.

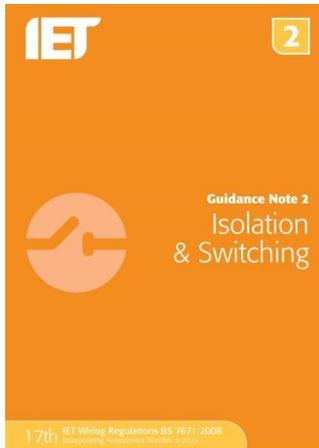
Please note, sections previously in Guidance Note 1 on Outdoor Lighting and ELV Lighting can now be found in Guidance Note 7 (5th Edition).

Who is this book for?

This book covers fundamental aspects of the Wiring Regulations, so specifiers, installers, testers, consulting engineers, electricians, inspectors and technicians will all find this a valuable resource.



Guidance Note 2: Isolation & Switching, 7th Edition



Guidance Note 2: Isolation & Switching is another essential guide and reference manual on these complex topics of the Wiring Regulations.

Amendment No. 3 changes include:

- isolation of outdoor lighting;
- circuit-breakers used as switches; and
- changes to definitions throughout the Wiring Regulations.

Who is this book for?

Like *Guidance Note 1*, this guide covers fundamental aspects of the Wiring Regulations, so specifiers, installers, inspectors and testers, consulting engineers, electricians, technicians and surveyors will all find this a valuable resource.

Guidance Note 3: Inspection & Testing, 7th Edition

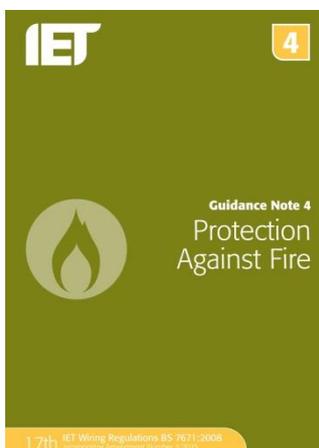
Amendment No. 3 makes changes to both EIC and EICR forms, so securing a copy of *Guidance Note 3: Inspection & Testing* should be a priority for all those carrying out inspection and testing on electrical installations.

Amendment No. 3 changes include:

- changes to earth fault loop impedances for all protective devices ;and
- earth electrode testing.

Who is this book for?

This book is needed by specifiers and those planning or carrying out the inspection and testing on electrical installations in accordance with the Wiring Regulations.



Guidance Note 4: Protection Against Fire, 7th Edition

Fire protection is something of a theme in Amendment No. 3, so *Guidance Note 4: Protection Against Fire* will be essential for anyone working in related areas. The changes made are expected to vastly improve the safety of contractors, consumers and the fire services. You can ensure the safety of yourself and others by following the new guidance.

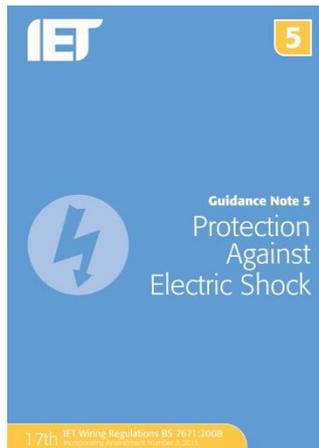
Amendment No. 3 changes include:

- wiring in escape routes;
- consumer units (to come into effect January 2016); and
- heating equipment.

Who is this book for?

This book is essential for everyone involved with fire safety in electrical installations, including consulting engineers, electricians, electrical installers, inspectors and technicians

Guidance Note 5: Protection Against Electric Shock, 7th Edition



Guidance Note 5: Protection Against Electric Shock is a valuable for specifiers, designers, contractors and inspectors in ensuring safety across all installations.

Amendment No. 3 introduces changes to earth fault loop impedances for all protective devices.

Who is this book for?

This book is for all those specifying, designing, installing or verifying electrical installations.

Guidance Note 6: Protection Against Overcurrent, 7th Edition

Guidance Note 6: Protection Against Overcurrent is a guide and reference manual on this important safety aspect of BS 7671. Make sure your work complies by ensuring you are up to date with the changes expected to the Wiring Regulations around heating equipment and fuses.

Who is this book for?

This book is relevant to all those involved with specifying, designing, installing or verifying electrical installations.

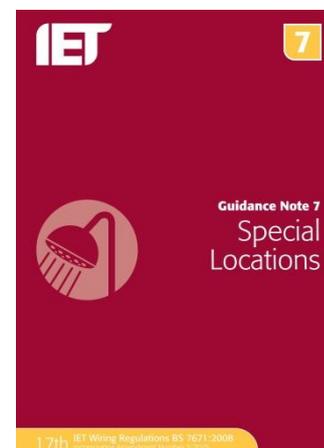


Guidance Note 7: Special Locations, 5th Edition

Guidance Note 7 Special Locations is one of the most extensively updated titles in the Guidance Note series. This will be an indispensable guide for anyone working with electrical installations in specific locations where guidance may vary, such as bathrooms, medical locations, etc.

Amendment No. 3 changes include:

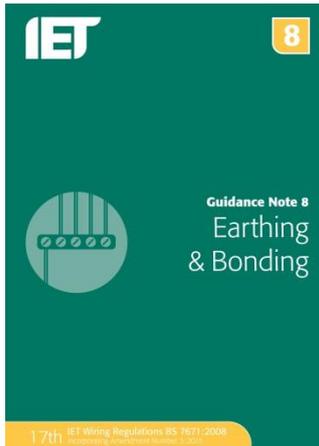
- cables in bathrooms;
- outdoor lighting;
- ELV lighting; and
- mobile and transportable units.



Who is this book for?

This book will be of value to anyone working with electrical installations in specific locations where guidance may vary. This includes consulting engineers, electricians, electrical installers, inspectors and technicians.

Guidance Note 8: Earthing & Bonding, 3rd Edition



Guidance Note 8: Earthing & Bonding has been updated to reflect changes made by Amendment Nos 2 (2013) and 3 (2015).

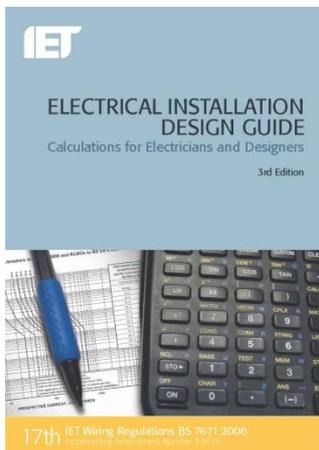
Amendment No. 3 changes includes the moving of Section 722 Electric Vehicle Charging Points from Guidance Note 7 to Guidance Note 8.

Who is this book for?

This book is necessary for all involved with specifying, designing, installing or verifying electrical installations, including consulting engineers, electricians, electrical installers, inspectors and technicians. It can also serve as a guide for surveyors.

Other guidance

Electrical Installation Design Guide: Calculations for Electricians and Designers (3rd Edition)



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 systems.

Amendment No. 3 changes include:

- definitions throughout the Wiring Regulations; and
- earth fault loop impedances for all protective devices.

Who is this book for?

Apprentices and trainees will find this book very helpful in carrying out the calculations necessary for a basic installation. In addition, consultants will find it useful to be able to check the calculations of their design packages.

Electrician's Guide to the Building Regulations (4th Edition)

Another of our big sellers, the *Electrician's Guide to the Building Regulations* will ensure that domestic installers comply not only with the requirements for electrical safety, but also with other relevant parts, including Fire Safety, Ventilation and Conservation of Energy.

Many of the changes in Amendment No. 3 of BS 7671:2008 are reflected in this essential guide to the Building Regulations. These are expected to include (but are not limited to):



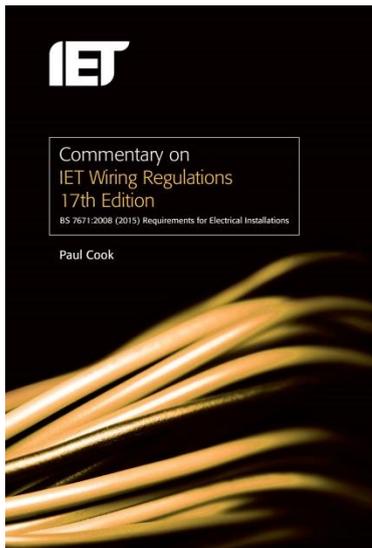
- changes to definitions throughout the Wiring Regulations;
- changes to earth fault loop impedances for all protective devices;
- consumer units (to come into effect January 2016);
- circuit-breakers used as functional switches;
- isolation of outdoor lighting;
- cables in bathrooms;
- outdoor lighting; and
- ELV lighting.

By following the new guidance, you can ensure that your work meets the new standards and improves safety for yourselves and that of homeowners.

Who is this book for?

This book is for all those involved with domestic electrical installations that need to comply with the Building Regulations of England, Scotland, Wales and Northern Ireland.

Commentary on IET Wiring Regulations 17th Edition (BS 7671:2008+A3:2015 Requirements for Electrical Installations)



This book is a complete guide to the IET Wiring Regulations and the important changes expected in Amendment No. 3 to BS 7671:2008.

Author Paul Cook provides comprehensive guidance on all aspects of electrical installation design, including the Electricity Safety Quality and Continuity Regulations. Derivations of the requirements are included along with the relevant formulas, data, installation design calculations, and examples.

The *Commentary* also includes guidance on related subjects, such as the prevention of electromagnetic interference, allowance for harmonic currents and the use of cable armouring.

Who is this book for?

This book is essential reading for consultants, electricians, installation designers and all those with a professional interest in the implementation and interpretation of the Wiring Regulations.

Further information

We're committed to making sure that everyone can access and understand the changes made. You can pre-order your copy of Amendment No. 3 and its associated publications on the IET website. All members will receive their 35% discount; all non-members will receive a 15% discount on pre-orders of all the above mentioned publications.

Look out for our Special Edition of Wiring Matters, which will be available in January to coincide with the launch of Amendment No. 3. We will be bringing you numerous exclusive articles from expert John Bradley on all matters Amendment No. 3.



Spotlights: the brains behind our BS 7671 books

For this issue's Spotlight, we feature the authors we have worked with in creating the BS 7671 Amendment 3 suite of books. We're proud that we have some of the very best brains behind our books, ensuring that our content has been produced to the highest technical standard possible. Many of our authors are heavily involved in JPEL 64, the joint committee for electrical installations in buildings that manages BS 7671.

See also: our guide to the books that have been updated by Amendment 3.

Mark Coles, Technical Regulations Manager

On-Site Guide

Mark Coles is the Technical Regulations Manager with the IET in the Standards and Compliance department – and might be a familiar face as he has appeared in many videos and TV programmes on behalf of the IET (the most recent being Fake Britain, to discuss the counterfeit IET books).

Mark served his apprenticeship as an electrician with the United Kingdom Atomic Energy Authority. He has worked on many projects including the decommissioning of Windscale Piles 1 & 2, decommissioning of the Advanced Gas Reactor (AGR), Cement Encapsulation Plant, commissioning of THORP (Thermal Oxide Reprocessing Plant) and the Auto-Sampling pneumatic transfer system at Sellafield, Cumbria.

He studied Electrical & Electronic Engineering at London South Bank University, and subsequently worked as Contracts and Project Manager in electrical contracting and then held the post of Operations Engineer with the NICEIC.

Currently, Mark is an appointed UK expert on protection against electric shock to international committee IEC TC 64 MT 9, IEC TC 64 JWG 32 and CENELEC TC 64 WG 9 and is Secretary to JPEL/64D, UK sub-committee dealing with external influences.

Geoff Cronshaw, Chief Electrical Engineer

Guidance Note 7: Special Locations

Geoff has already been featured in Wiring Matters, under the Spotlight article in the Spring issue. He joined the IET in 2001 and was made Chief Electrical Engineer in 2004. Prior to joining the IET Geoff spent over twenty years in electrical consultancy where he was responsible for designing a wide range of electrical installations in both the public and private sector. He is a Chartered engineer and a Fellow of the IET.

Geoff is Secretary of JPEL 64, the National Wiring Regulations Committee, and also Secretary of the National Ships Committee (JPEL/18). He is convenor of an International Maintenance Team responsible for developing world standards and a CENELEC Working Group responsible for developing European standards. He is regular contributor and Technical Editor to Wiring Matters.

Trevor Pickard, Electrical Engineering Consultant

Guidance Note 2: Isolation & Switching; Electrician's Guide to the Building Regulations

Trevor's interest in all things electrical emerged when he was quite young; he recalls always having some piece of electrical equipment in various stages of assembly to see how they operated, be it a battery powered model under construction, an electrical motor, or any number of items he could get his hands on.

Upon leaving school in 1966 he commenced work with an electricity distribution company, Midlands Electricity Board (MEB). After completing a five-year student apprenticeship, he held a series of engineering positions; as an operational engineer working 'at the coal face' then in Design, Safety, and Business Process Improvement and as Production Manager of a large urban based operational division. Further posts included General Manager of the Repair and Restoration department, and General Manager of the Primary Network department (33kV-132kV).

Trevor retired from his position as Contract Delivery Manager of the amalgamated Midlands and East Midlands distribution companies, Central Networks, in 2006. Since then, he has been working as an electrical consultant, providing management and engineering expertise to a wide portfolio of clients in fields such as electricity distribution and transmission, highway electrical systems, generation and rail track tool manufacturers.

It is fair to say that Trevor's interest in electrical engineering has extended beyond the '9-5 job' and that he has taken the opportunity to become actively involved in the writing of standards in the domestic, European and International arena with BSI, CENELEC and IEC. For many years he lectured for the IET on their various short courses and he has recently authored books in the City & Guilds Diploma in Electrical Installations series.

Howard J. Carey MIET LCGI Cert Ed.

Guidance Note 3: Inspection & Testing

Howard started his electrical career as an apprentice with a small electrical engineering company. His years at that company allowed him to become recognised as a time-served and qualified electrician. Howard currently holds a number of roles, including practicing as a consultant, lecturer, teacher, instructor, assessor and educational author. The consultancy relates to preventative maintenance and periodic inspection and testing, which keeps him in touch with the real world of electrical work, updating and enhancing all areas of his professional practice.

Howard lectured for the IET for twelve years, which, fortunately for us, he recalls as "a source of continuous education and personal development through which I increased my knowledge of regulations relating to design, installation, inspection and testing. As one of a small collection of lecturers, I was privileged to be part of a group at the forefront of educational needs and awareness, relating to BS7671."

Howard has also been involved in assessing for 25 years and finds that this is a skill in its own right, whether it is City & Guilds, EAL or industrial assessments for safe working practices, and his experiences from assessing help to progress his teaching methods.

As an author, Howard has recently been involved with City & Guild NVQ level 3 publications. His current educational tasks consist of presenting courses and assessing in tandem with



writing and course development. Good knowledge of the subject matter, precise planning and focussed preparation are his fundamental building blocks to ensure educational objectives are met. His personal aim? His express purpose is that? “I intend to progressively upgrade our methods of presentation to suit the required national standard assessment criteria and achieve learning outcomes.”

John Bradley BSc CEng FIET FCIBSE

Guidance Notes 1-8, Electricians Installation Design Guide

John's career in electrical installations began in 1965 when, at the age of 15, he became an apprentice electrician with national electrical contractors Lee Beesley, in Birmingham. He stayed with that company for seven years, gaining his JIB Electrician's Certificate and rising to become a contracts engineer, working on a range of project types, including industrial, commercial, healthcare and educational. He moved on into the world of consultancy, in which he worked for 21 years, designing and managing large, medium and small electrical installation projects, both in the UK and overseas, and progressing to become an Associate with R W Gregory and Partners. In 1994, John moved to NICEIC as the Inspecting Engineer for the area centred on Dudley in the Midlands. He progressed to become a Senior Engineer with NICEIC, working in the Standards Unit – with duties that included technical authorship and contributing to the development of the IET Wiring Regulations and the related European and International standards, and then to become the Principal Engineer of NICEIC (and subsequently of the Electrical Safety Council), a post which he held for 10 years. John retired from Certsure Plc (owner of the NICEIC and ELECSA brands) in April 2014, and is now both a self-employed consulting engineer and UK Standards Manager for Schneider Electric.

John was awarded his BSc Degree in Electrical Engineering in 1980 after studying for it on a part-time basis at Birmingham Polytechnic. His earlier technical qualifications, also gained on a part-time basis, include the City & Guilds B and C Certificates in Electrical Installation Work, City and Guilds Electrical Installation Technician's Certificate, City & Guilds Electrical Technicians Certificate, and the Higher National Certificate in Electrical Engineering.

John's career has included extensive experience in the design, construction, inspection and testing of electrical installations, in addition to the authorship of guidance publications on the IET Wiring Regulations (BS 7671). He serves on joint IET/BSI Committee JPEL/64, which is responsible for the technical content of the Wiring Regulations. He also serves and on a number of BSI committees relating to electrical installations, and on a number of CENELEC and IEC technical committees responsible for the content of the European and international standards that form the basis of much of the content of the Wiring Regulations.

Peter E Donnachie BSc CEng FIET

BS 7671 Requirements for Electrical Installations

On leaving school at sixteen years of age, Peter served a craft electrical apprenticeship, followed by two years as a draughtsman designing electrical and lighting installations (including the first floodlighting of the Marble Arch).

Peter then took a 4-year sandwich degree course at City University and, following graduation, spent many years in the design, specification, site supervision and, latterly, project management of a wide range of building and engineering schemes. These included radio and satellite communication stations and Crown courts.

Actively involved in various BSI, CIBSE and IEE technical committees during much of his working life, on publication of the 15th Edition IEE Wiring Regulations in 1981, Peter joined the lecturing team of the IEE Courses Unit. From then until 2008, during which time he was made a Fellow (1987), he wrote many of the courses for the IEE on the 15th and 16th Editions. Peter delivered close to 500 courses and seminars on these and on the Electricity at Work Regulations and electrical maintenance, both around the UK and overseas.

Peter has made a major contribution to the Wiring Regulations and related IEE/IET publications as a member of the JPEL/64 technical committee and as an author, editor and proof-reader.

Peter Tanner MIET LCGI

Guidance Note 3: Inspection & Testing

Peter started in the electrical industry while still at school, chasing walls for his brother-in-law for a bit of pocket-money. After a spell in the armed forces, he gained a place as a sponsored trainee on the CITB training scheme. His first and only work experience placement as part of that programme was with a computer installation company located over twenty miles away; Peter proved his dedication by cycling there every morning!

On completion of his apprenticeship, Peter worked for a short time as an intruder alarm installer, mainly in domestic dwellings. Following this, he began work with a company where he was involved in shop fitting and restaurant and pub refurbishments. It wasn't long before he was managing jobs and, through professional development, gaining further qualifications. He was later seconded to the Property Services Agency, designing major installations within some of the most well-known buildings in the UK.

A career-changing accident took him into teaching. Peter says that "seeing young trainees maturing into qualified electricians is a worthwhile experience. On many occasions I still see many of my old trainees when they attend further training and update courses and seeing their successes makes it all worthwhile."

Peter has been a Lead Consultant with City & Guilds for over twenty years and is passionate about using his vast experience in the industry to maintain the high standards the industry expects. With this aim in mind, he also represents City & Guilds on various Industry Committees.

Paul Cook, CEng FIET

Guidance Note 5 Protection Against Shock; Electrician's Guide to the Building Regulations; Commentary on IET Wiring Regulations

Paul started his career as an electricity supply distribution engineer with South Eastern Electricity Board, carrying out HV and LV distribution work. He transferred to Easter Electricity, becoming contracting manager for West Herts. He worked for London Electricity and the Electricity Council and, on privatisation of the Electricity boards, he joined the IEE (now IET) drafting most of the IET guidance on the wiring regulations and was secretary of the committee responsible for the wiring regulations (BS 7671).

Since his 'retirement', he continues to work as a copywriter and consultant, principally for the IET. He continues as secretary of one of the technical panels. His latest publications are the Electricians guide to the Building Regulations and the Electrical Installation Design Guide. His

principle work is the IET Commentary on the Wiring Regulations, which he recommends to all, particularly design engineers and consultants.

Ian M Reeve BTech(Hons), Senior Engineer DMS MIET CEng

Production of BS 7671, related publications and systems

The first 20 years of Ian's career were spent with British Aerospace, initially as an undergraduate apprentice, then via Chief Production Engineer – Electronics & Assembly to Production and Engineering Manager – Electronics, including a year's secondment to Strategic Planning at BAe's HQ in London.

Ian joined the IEE with responsibility for running a course in Business and Manufacturing Management, which was eventually taken up by 80 colleges and universities throughout the UK. It was funded by the Department for Trade and Industry as part of its 'Managing into the 90's' programme, and so, as the century turned, Ian undertook a research project with the University of Westminster's multimedia unit in "How to present the IEE's Wiring Regulations in an electronic format". Ian then became responsible for the design, development and production of the IEE's Wiring Regulations on CD-ROM. He continued to work on that through six amendments of the Wiring Regulations and continues to work with other, related IET products.

Sub-standard cables

A major cable recall, affecting up to 40,000 homes and businesses, and costing an estimated A\$80 million (£43 million), has hit the headlines in Australia. The distributor is in liquidation, the owner has had criminal charges brought against her and the largest ever taskforce, comprised of 21 consumer agencies and regulatory bodies, has been assembled. These organisations have come together to source, destroy and replace around 2,500 miles of potentially hazardous cable across five states before it becomes a fire or electrocution threat.

The recalled cable was manufactured in China and imported by the Sydney-based company Infinity Cable Co Pty Ltd. It comprises many sizes and configurations of domestic mains power cables under 'Infinity' and 'Olsent' brands. Tests led by New South Wales Fair Trading found that the cables do not comply with the ageing requirements of the electrical safety standard, AS/NZS 5000: the plastic insulation and sheathing becomes brittle within a short period of time and cracks if disturbed, exposing the copper conductors and potentially causing electrical shocks, short circuits or fires.



During the period 2010 – 2013, the cable was sold in major hardware stores and electrical wholesalers across New South Wales, Victoria, Queensland, Western Australia and Tasmania, mainly to smaller electricians and other trades. This has left the sellers of the Infinity and Olsent-branded cable with the bill for the recall, which equates to millions of

dollars, and has left installers with the huge task of removing and replacing affected cable from domestic households and businesses.

“Recalls of this magnitude are rare but it serves as an important reminder of how we can all help to avoid similar incidents here in the UK,” says Dr Jeremy Hodge, chief executive of the British Approvals Service for Cables (BASEC).

In this case, when the cable was first supplied to hardware chains and electrical wholesalers, it came with papers saying that it met Australian standards. However, subsequent testing found that it did not.

Dr Hodge continued, “It is a common misunderstanding that a cable is compliant with standards just because the supplier claims this, by printing the standard number on the cable. Our message to wholesalers and electricians is: always look for markings on the cable to say it has been independently tested and approved.”

Cable marked with only a standard number should be treated with caution, as it is probable that nobody independent of the manufacturer has examined that cable. Having third-party certification of a product, with its rigorous independent audit and test regime coupled with continuous surveillance and random product testing, gives manufacturers a level of protection against problems emerging later. All BASEC-approved cables are regularly tested for ageing and many other properties. Consequently, when problems are found, this helps ensure swift and effective measures to reduce the impact. Unfortunately, it is often not until cables are installed, tested or used that a problem comes to light and by then it can be too late to avoid the enormous costs of rectifying the situation.”

Meanwhile, in the US and Canada, more than six million computer power cords have been recalled because the defective cabling used has the potential to overheat and cause a fire. In the US, the Consumer Product Safety Commission recalled the Chinese-made LS-15 a.c. power cords bought with Hewlett-Packard and Compaq laptops and docking stations between September 2010 and June 2012.

Further reading

In [Issue 37– the Winter issue, 2010](#), we covered the topic of sub-standard installation cables. Have you come across any instances of sub-standard cables? Let us know: wiringmatters@theiet.org.

Further information and assistance is available at www.basec.org.uk, technical@basec.org.uk, or contact BASEC directly on 01908 267300.

Specific advice

If you are an installer, we advise the following precautionary steps and actions to safeguard against the risk of installing cable that is sub-standard:

- prevention is better than cure - instruct your procurement department to buy approved cable – look for the BASEC mark, not just a standard number.
- seek advice early if a problem with the cable is discovered, for example, on system testing.
- contact BASEC for cable quality issues, and your trade body (such as ECA) or inspectorate (such as the NICEIC) for the installation aspects.



- keep records of the purchase (including reel ends with batch marking on, receipts from the wholesaler and any other sales records on your computer system) and a sample of the cable markings.

If you have scrap lengths, these can be sent to BASEC for checking and testing. Based on the test results, BASEC will then advise on the best course of action.

Lighting of religious buildings

David Holmes, an experienced lighter, spent two years visiting dozens of different types of places where religious assembly takes place, from the more familiar churches, synagogues and mosques to the more unusual, such as chapels in airports and hospices. In these buildings he looked not only at the typical features of the buildings but also discussed with those in charge how their spaces were used, the particular ways they performed their rituals and any particular sensitivities they had about people entering the spaces during the design process.

In this article, the [Society of Light and Lighting](#) (the SLL) gives us an overview of the different requirements for lighting religious buildings.

A place of worship is taken to be a building, or a particular room within a building, where people congregate to carry out prayer and activities relevant to their faith. As many gatherings take place at night as well as during the day, a system of artificial lighting is necessary.

Lighting in places of worship has four objectives:

- to enable participants in the religious activity or ceremony to see what they are doing;
- to enable the congregation or assembly to see what's happening around them;
- to contribute to the safety of everyone within the room or building; and
- to create a good visual environment.

It's important to apply the correct source of lighting so that a specified illuminance can be accurately achieved. The success of an installation should not be judged by light meters but through the eyes of those who have to perform the ceremonies as well as those who watch them. Similarly, efficiency should not be rated simply by the effectiveness of gathering all the lamp lumens and exclusively directing them onto the task plane, but rather by the ease with which the task can be seen and by the contribution of the lighting installation to making the environment more agreeable.

Types of bulbs

With the reducing price and increasing availability of good LED spot and floodlights, these should normally be considered as a first option. They provide a good low-energy option with a very long life, thus reducing the need for maintenance access to often high places. The wide availability of LEDs with different beam angles means that one family of fittings can provide light for many different purposes. Wide beams can be used for washes over vaulted ceilings, medium beams for lighting down over seating areas and narrow beams for picking out altars or features in the space. Most LED spotlights can come with integral dimming of many forms, from simple trailing edge mains dimming to DALI (digital addressable lighting interface) or DSI (digital serial interface). A dimming system allows simple changes in the feel of the space, from simple lighting for general access to higher levels for services, with special scenes reserved for weddings, festivals or concerts.

Lighting considerations

When considering the design, an installer should analyse the visual task that will be performed in the religious building and any possible lighting problems. For example, if members of a congregation or assembly tend to sit in one particular area this should be a focus of the design brief. Similarly, if certain parts of the service or ceremony appear better with the aid of daylight, try to understand why – and how this can be supported.



The theatrical performance of the ceremony and the appearance of the room or building should also be considered. For example, it's recommended that uniformity within a prayer or worship area can be lowered if a particular lighting effect is justified, perhaps by using a narrow beam spotlight over a font in a Christian church, to light the Koran in a mosque or the Scriptures in a synagogue.

It is common in places of worship for tasks to occur on different planes: horizontal, vertical and anywhere in between. It is recommended that illuminance is produced on the plane in which the task will be performed. A common failing of lighting in Christian churches is the provision of low illuminances on the vertical plane. The usual causes are the use of narrow distribution luminaires, the choice of luminaire by lay people or insufficient numbers of luminaires. Illuminance on the vertical plane in buildings with high ceilings is much more sensitive to changes in spacing between luminaires than is illuminance on the horizontal plane. It is therefore possible to have conditions in which the illuminance on the horizontal plane meets the illuminance recommendations but the illuminance on the vertical plane is much reduced and markedly non-uniform. Typically, the best approach to avoid this problem is to use luminaires with a wide distribution, at a reduced spacing. Higher room surface reflectances can also be beneficial, although it is appreciated that this particular aspect cannot always be controlled by the lighting designer.

In addition to lighting the task area, the volume of space occupied by any people should be lit. This particular light is required to light objects, reveal texture and improve the appearance of people within the space. The terms 'mean cylindrical illuminance', 'modelling' and 'directional lighting' describe the lighting conditions. Good visual communication and recognition of objects within a space are essential within any religious building. This is achieved by providing adequate mean cylindrical illuminance (E_z) in the space.

Obstructions

Where architectural features can add much to the atmosphere of a religious building, unfortunately, from a lighting perspective, they are commonly the cause of extensive obstruction to the distribution of light from the lighting installation. Large vertical stone pillars, wooden cross beams, heaters and banners are all examples. If obstruction and consequent shadowing are thought likely to be a problem special care should be made when designing the installation. A number of approaches can be used to reduce such problems:

- if the obstruction is by overhead cross beams, etc., the possibility of positioning the lighting below the obstruction should be considered.
- if there are a few large obstructions in the space, such as stone pillars, a suitable approach is to check that all parts of the space are lit by at least two luminaires, either roof mounted or via floodlights mounted on the walls or the pillars themselves. This approach, together with high surface reflectances in the interior, should eliminate any patches of low illuminance.
- often, the spacing between luminaires can be reduced, the amount of reduction being greater the larger the size and number of obstructions and the lower the reflectances of the obstructions. Typically, a one-third reduction in the maximum spacing to mounting height ratio may be required.

Maintenance

Several factors need to be considered when it comes to maintenance:

- lighting installations start to deteriorate from the moment they are first switched on.
- the light output from lamps reduces with increasing hours of use.
- the light emitted from luminaires will diminish as the luminaires become increasingly dirty.
- the inter-reflected light in an interior will reduce as the interior becomes dirty.

To maintain the light output of a lighting installation, it's necessary to carry out maintenance of the installation. The first requirement of such maintenance is ease of access. This is something that should always be considered when designing an installation. In a church or mosque with a high ceiling it may be best to mount the luminaires on vertical surfaces such as pillars, instead of suspended from the high ceiling. In so doing, luminaires can usually be positioned to allow for easier maintenance, while still taking the lighting requirements into consideration. Selecting suitable intervals for cleaning the luminaire and for the lamp replacement, together with the best method of carrying out this work, should all be considered when designing the installation.

Energy consumption

A designer must consider energy consumption and running costs. Two aspects of the installation determine the energy cost: the installed power of the installation and the number of hours the installation is used.

Installed power is determined by the choice of light source and luminaire, the proportions of the interior and the reflectance of the interior surfaces. Legislation pertaining to energy conservation in England and Wales is governed by the Building Regulations, with particular reference to Part L: *Conservation of fuel and power*. Similar legislation applies in Scotland and Northern Ireland.

When lighting places of worship, the basic requirement is that all general areas should be illuminated by light sources that have a minimum efficacy of 60 lumens per circuit watt. Many places of worship are only used for a few hours each week and therefore full-life economics must be considered when choosing a lighting system. An elaborate and expensive array of luminaires may be impressive to the public at large, but if a payback period is being considered and calculations show this to be in excess of 20 years, the validity of the decision must be studied carefully.

Over recent decades, due to low weekly usage in churches, there was a trend towards the use of tungsten halogen lamps for general lighting in cheap exterior floodlights. With current legislation and the need to carefully consider a building's energy consumption, the use of high-wattage tungsten halogen lamps is no longer a viable option. However, it is increasingly easy to provide luminaires that match the environment aesthetically (even in listed buildings) while using efficient light sources such as modern LED types.

Emergency lighting

Emergency lighting may be required in places of worship wherever there is deemed to be a risk to the safety, health or welfare of staff and the public, should the normal lighting fail. For

all buildings, a hazard exists if people have to evacuate the building in darkness, so emergency lighting must be provided to allow people to safely and quickly leave the building.

Listed buildings

Many religious buildings will be of architectural or historical interest and may be listed. If they are, planning consent or listed building consent may be needed before works can be carried out. In any case the integrity of the building must be maintained and the fabric of the building respected when choosing locations of lights, how they are fixed to the structure and the routing and fixing of cables to them. There will often be restrictions on drilling through or fixing into listed buildings and clear guidance should be sought before commencing work.

Example: St John's Church, Cirencester. (Lighting design by Lighting Design & Technology)

The Catharine chapel has slim LED lighting strips concealed on ledges high up on each side to provide soft uplighting of the magnificent fan vaulting. The spotlights are mounted on brackets that are fixed over the ledge so that no fixing damages the historic main wall. The spotlights provide emphasis on to the altar and provides lighting for both the seating area and for the areas of revealed wall paintings. The wiring is run along the high-level ledges to conceal them from view and each spotlight or LED strip can be separately dimmed via a DALI control system, so that the balance of uplight to downlight or from altar to seating area can be changed to suit the use of the space.



The spotlights in the Lady Chapel are concealed behind the wooden down-stands from the ceiling so that they cannot be seen from most positions in the pews. As well as lighting the

pews and altar area, additional spotlights with specific beam angles give emphasis to the monuments at the side of the space and to certain carved features on the wooden ceiling. These can be individually dimmed down via the control system.



For more information:

If you'll be lighting a religious building, the SLL's Lighting [Guide 13: Lighting of Places of Worship](#) is worth reading. David Holmes used his detailed knowledge to draft a description of each religion and their practices as well as guidance on how best to light each type of space. He then agreed the wording of these with the authorities of each religion before drafting them into a single guide to the lighting of places of worship. The guide is intended as an introduction to the subject for lighting engineers, installers and users alike – and the descriptions of the religious building itself is really helpful for understanding the space you'll be working in.

The guide also includes up-to-date legislation where relevant and incorporates best practice principles throughout. Individual characteristics have been aligned to BSEN 12464 Part 1:2011 where possible, including the introduction of a distinction between task area and surrounding areas, and the subsequent recommendation of uniformity for those areas. Indeed, uniformity has been given far more importance throughout the Guide, with recommended minimum values in the tables appertaining to each particular application.

See also: our interview with David Haddon-Reece, chartered electrical engineer specialising in religious buildings.

Wiring churches: the engineer's perspective

David Haddon-Reece has been involved with the designing and installing of lighting in churches for 20 years.

Now retired, he still consults as a Lighting and Electrics Advisor to the York Diocesan Advisory Committee for the Care of Churches (Church of England). He is both a Chartered Electrical Engineer registered as an Approved Contractor (NAPIT), and an Affiliate member of ILP, which keeps his Advice up to date.

He is also a Reader – a Licensed Lay Minister – in the Church of England and a church organist.

Here, he shares his experience of working in religious buildings.

What are the top 3 considerations an installer or designer should bear in mind when wiring an architecturally delicate building, such as listed religious buildings?

- Ensure the electrical system conforms to BS7671, has an adequate main supply, and uses appropriate wiring for the building conditions. Any BASEC-approved cable type is acceptable providing it is installed according to BS7671 and by an approved contractor (an insurance requirement).

Low-smoke, zero-halogen sheathing/serving is highly desirable. As cable runs are usually long and often at considerable height, designers must take due account of voltage drop, possible cable heating effects, and maintenance inaccessibility.

Switching and control systems must respect the flexibility of the lighting scheme and possible future extensions.

- Install cables and fittings with sensitive regard to the architecture, as visually unobtrusive as possible and with minimum physical intervention with the fabric. In the Church of England, the inspecting architect usually has final choice of wiring routes and finish – sheath colour, painting-out, or other concealments.
- Obtain full permission from the relevant church authority. In Anglican churches, this means a Chancellor's Faculty (see below), whether or not the building is listed.

What has been the most challenging project you've worked on?

All projects offer challenge. A memorable example is St Michael and All Angels, Garton on the Wolds, East Riding, where almost every square inch of the interior is decorated: the walls with nineteenth century paintings of Biblical scenes, and roof timbers with painted patterning. For visitor/tourist viewing the walls needed diffuse lighting (triggered by person-sensors) to avoid 'veiling' reflections (glare); wall-washing was unacceptable as it would highlight surface irregularity; while for worship, congregational task lighting needed strong directed illumination.

As the wall paintings had been cleaned and conserved with a Pevsner Memorial Trust grant in 1986-91, several national heritage bodies were watching the project. The successful solution, in 2011, was to retain the old frosted globular 'schoolroom' shades, lamped with warm compact fluorescent lamps, insufficient by themselves for task lighting but suitable to

diffuse-light the wall-paintings, supplemented with high-mounted metal halide and tungsten halogen spotlamps for worship and concerts (today we would use LED spotlamps.)

What has been your biggest achievement?

Garton-on-the-Wolds, mentioned above, was a gratifying success. Sometimes, however, the greatest satisfaction is to see a small, low-funded church improved almost beyond recognition with new lighting which enlivens its worship; and by upgrading an ancient wiring system, to satisfy legislation and bring peace of mind.

A recent modern example of an LED lighting scheme with flexible controls, entirely suited to its historic environment and worship, is the Chapel at Bishopthorpe Palace. My part was simply to guide the choice of lighting style; excellent designers (Concord Havells-Sylvania) and contractors did the rest.

How does an installer or designer ensure that permission has been granted for the wiring of an architecturally delicate building?

Before work starts, the relevant church council must seek permission, supported by technical advice from designers and contractors. Each denomination has its own rules. The **Ecclesiastical Exemption (Listed Buildings and Conservation Areas) Order 2010** is especially relevant. It exempts five denominations in England (Church of England, Roman Catholic, Methodist, Baptist, and United Reformed) from Listed Building Consent in buildings 'for the time being used for ecclesiastical purposes'.

In the Church of England this operates through the **Faculty Jurisdiction Rules 2103**. A Faculty is the Church's permission to proceed with some aspect of work, including lighting and electrics. Administered by the Diocesan Chancellor (a judge with his or her own Consistory Court, an institution founded in the reign of William I and still active), it applies to listed and non-listed churches.

A church council or other applicant makes Petition (equivalent to Planning Application) to the Chancellor, who, if he or she, guided by the Diocesan Advisory Committee, considers it appropriate, will issue a Faculty to proceed.

Although there can be heavy penalties for contravention, including fines and restitution orders, the Advisory process offers petitioners a wealth of free expert guidance on church matters.

What are your top tips for minding costs on such a project?

- From the start, follow expert advice. This focuses the project and reduces the risk of expensive mistakes or subsequent alteration.
- Prepare a thorough audit of current and future needs for wiring and lighting, including:
 - maximum projected electrical use, and hence intake capacity;
 - access for maintenance and system expansion; and
 - convenient lighting control positions, and sufficient power outlets.
- Design the scheme completely before applying for permission.

- Choose the highest specification your funds can manage. Investment in quality will pay off both in performance and a longer service life with lower maintenance.

Can you give examples of lighting or wiring of religious buildings that you've seen that you thought could be significantly improved upon (without naming and shaming!)?

Many, alas. Church councils are conservative, and often financially poor, contrary to general public opinion. Lighting and wiring are usually low priority 'Cinderella' aspects, so equipment tends to be kept in use far longer than it should be.

Some churches still have their original wiring, perhaps from the 1930s, more or less in working order, and upgrade is very satisfying. For instance, until 2007, St Matthew's church (Listed Grade II), Grosmont, North Yorkshire, had original lead-sheathed wiring, ancient cast-steel switch-fuses, and even two wirewound stage dimmers. After total rewiring and effective relighting, a rare bespoke 1930s glazed mahogany cabinet containing porcelain fuses and Bakelite switches was kept as an historical display object.

Apart from the desirability of new technology, causes for upgrading include:

- old mineral-insulated cable (ie no silicone impregnation) chemically attacked by masonry salts with subsequent low insulation resistance;
- rodent-attacked cable sheaths;
- well-meaning but unauthorised amateur additions;
- failure of voltage operated circuit breakers through corrosion or loosening of the earth circuit (circuit protective conductor), or even its disconnection (on occasions, strimmed away from earth electrodes in churchyards!).

All need improvement. The fundamental lesson, sometimes hard to put across, is that, irrespective of Listed status, special architecture, or religious purpose, the installation must satisfy the Electricity at Work Regulations 1989 by conforming with the Wiring Regulations, BS7671.



Grosmont St Matthew before rewiring. Picture courtesy of D Haddon-Reece.



Grosmont St Matthew after rewiring. Picture courtesy of D Haddon-Reece.

When designing the lighting for a church, what is the biggest priority in terms of satisfying the client and the congregation?

To create lighting that will enhance worship, enliven and beautify the architecture, and quite simply help people see better.

We should not forget that as service providers, places of worship come within the Disability Discrimination Act 2005. Although the DDA has not yet been legally tested in respect of lighting (and deciding a test level will be very difficult) we should create an acceptable basic lighting level throughout, adding increased light where necessary to create a liturgical focus – by accent lighting on the altar, pulpit, lectern and font, for instance. CIBSE's lux level guidance is often used.

How have technical advancements, such as LED lighting, changed the way installations are designed?

Very positively. Superseded general service tungsten lamps, and high wattage tungsten halogen lamps (often 300 or 500 watts), have no alternative except low energy replacement. LED lighting is increasingly being installed. Manufacturers have responded with high quality spot- and flood-lamps and a number of firms offer computer-aided design. Designers and church authorities are taking care, however, not to admit 'sports-pitch' or general-purpose wide-angle floodlighting with poor colour rendering and the risk of dazzle.

Have you seen a reduction in your energy bills with moving to low energy lighting?

Yes. When compact fluorescent lamps (cfls) became available, simple arithmetic showed the kilowatt-hour advantage of replacing, say, high wattage tungsten halogen lamps with low energy types. Prompted also by environmental considerations, some churches rushed to install cfls, but their poor colour rendering and loss of luminous output in cold surroundings often disappointed. Another option is metal halide lighting, but long strike/restrike times are disadvantageous, and the colour rendering can be harsh in an intimate historic environment.

Reduced running costs of low energy lighting are welcome, increasingly through LED schemes, and it is becoming easier to convince church councils that long lamp life and low maintenance will eventually offset high purchase and installation costs, especially where a concomitant wiring upgrade is involved.

References:

General: CIBSE guidance notes.

ChurchCare (Church of England), Guidance Note: Electrical Wiring Installations in Churches, 2013.

ChurchCare (Church of England), Guidance Note: Lighting in Churches, 2014
Peter Jay and Bill Crawforth, Church Lighting, Church House Publishing 2001. ISBN 0-7151-7584-X.

David Haddon-Reece, Lessons to be Learned in Churches, Competent Person (NAPIT) Issue 6, 2011.

Electricians fined after falsely issuing NAPIT certificates

Two Newbury electricians have been prosecuted for carrying out uncertified work and falsely claiming registration with NAPIT.

On 8th September 2014, Jamie Warren and Aaron Howe, who traded as 'Bright Sparks Electrical', each pleaded guilty to falsely implying NAPIT membership and failing to provide a Trading Standards Officer with information. They were fined nearly £3,000 in total under the Consumer Protection from Unfair Trading Regulations 2008.

Warren and Howe had advised a client on a new consumer unit with a residual current device, had installed that consumer unit, and had provided their customer with a NAPIT Electrical Certificate for Installations and Modifications and an Electrical Test Sheet. The client followed this up with NAPIT, who confirmed that neither men nor Bright Sparks Electrical were registered, leaving the customer with no option but to pay another electrician to verify the work.

The prosecution occurred as a result of an investigation undertaken by West Berkshire Council's Trading Standards Service team.

Commenting on the case, David Cowburn, Managing Director of NAPIT Registration, said: "We welcome the prosecution of the two men and work closely with Trading Standards organisations to help stamp out uncertified work within our industry. The dangers of using unregistered installers cannot be overstated; it could cost unsuspecting householders a lot more than just to repair potential unsafe installations.

Here at NAPIT, we are working tirelessly to raise awareness of electrical safety and Part P of the Building Regulations to the general public and strongly urge competent, registered installers to do likewise. If we all work together to improve the standards within our industry, prosecutions like this could become a distant memory."

Any person that requires further advice or wishes to report a Trading Standards related matter should contact the Citizens Advice Consumer Line on 08454 040506. For more information about NAPIT visit www.napit.org.uk.



NAPIT Responds to Call for Rethink of Third Party Certification Scheme

In 2013, amendments to Part P of the Building Regulations created provisions for a new scheme, the 'Third Party Certification Scheme', to be introduced that would allow suitably qualified and registered individuals to check the domestic electrical work undertaken by others and to certify its compliance with the Building Regulations.

This Third Party Certification Scheme has sparked significant industry debate and some are still opposed to the idea. However, when given the opportunity by the Department of Communities and Local Government (DCLG) to operate it, NAPIT took the decision to opt in in order to help design the scheme and ensure that it was both robust and fit for purpose.

Nevertheless, as with all new initiatives, myths and misconceptions still surround the Third Party Certification Scheme.

The role of registered installers

One misconception is that the scheme will undermine registered installers. NAPIT initially had similar concerns but, noting that this work is already performed by Building Control Officers, and after working with the Institution of Engineering and Technology (IET) and DCLG, we have been able to put safeguards in place to prevent this from occurring.

These safeguards include the use of a specifically designed Third Party Certifier's Electrical Installation Report, which must be submitted for auditing after every job. The report requires certifiers to know about the installation in advance and to carry out inspections throughout the installation process, including at first and second fix and at final testing and certification.



Safeguarding safety

Another common criticism is that the Third Party Certification Scheme would undermine safety. This couldn't be further from the truth. Third Party Certifiers must have a Level 3 NVQ in electrical installation and a current Level 3 qualification in inspection and testing. They must also have been assessed in inspection work, and will be regularly assessed to ensure their competence remains. NAPIT will inspect Certifiers through a combination of employer and individual inspection and there are strict controls in place to ensure that they cannot delegate to, or supervise another, operative. This means that the scheme is more robust than using either Building Control or, indeed, the qualified supervisor model used by some scheme

operators to assess the competence of electrical enterprises. Also, it requires the certifier to carry out far more hands-on inspection and testing that is often carried out by many supervisors on unqualified or under-qualified workers.



In response to the recent call for a re-think over Third Party Certification, David Cowburn, Managing Director of NAPIT Registration, said: “The introduction of Third Party Certification effectively recognises that electricians can do the work of Building Control. It is important to stress that it is not a new approach but an adjustment on who can carry out the check. Done properly, it in no way weakens Part P or undermines registered installers’ work. If anything, it complements the work of competent, registered electricians, providing greater levels of supervision to those who chose to carry out electrical work themselves and gives us an opportunity to communicate with them about the disadvantages of the approach and the additional benefits that would accrue if they did choose to employ registered installers.”

The table below shows how the Third Party Certification Scheme compares with existing routes for demonstrating compliance with the Building Regulations, highlighting the scheme’s role as an alternative to certification via Building Control.

Route to certification	Who installs?	Who inspects?	Who completes the BS7671 Certification?	Who produces the Building Regulations Compliance Certificate	How is Electrical Competence Verified?
Self-certification	Registered installer	Registered installer	Registered Installer (EIC)	Registered Installer via their scheme	Via a Government Approved Competent Person Scheme
LA Building Control - inspection	Unregistered Installer*	LABC	No one	LABC	Internally by Building Control
LA Building Control –	Unregistered Installer*	Unregistered Installer*	Unregistered Installer*	LABC	It is not

acceptance of EIC			(EIC)		
LA Building Control - use of an inspector	Unregistered Installer*	Sub-contract inspector	Sub-contract Inspector (EICR)	LABC	Internally by Building Control
Approved inspector (private BC)	Unregistered Installer*	Approved inspector	No one	Approved Inspector	It is not
Third party certifier	Unregistered Installer*	Registered certifier	Registered certifier	Registered certifier via their scheme	Via a Government Approved Competent Person Scheme

Fig 1: Routes to Building Regulations Certification

- * An unregistered Installer can be someone operating an electrical installation business without being registered on a Competent Person Scheme, or someone carrying out electrical work privately, such as DIY. They may or may not be qualified.

Section 701 - Locations containing a bath or shower

The IET's technical helpline often receives queries about Section 701 of the Wiring Regulations – Locations containing a bath or shower. In this article, Chief Engineer Geoff Cronshaw looks at some of the key requirements and frequently asked questions.

Scope

The particular requirements of this section apply to the electrical installations in locations containing a fixed bath (bath tub, birthing pool) or shower, and to the surrounding zones as described in the Wiring Regulations. The Wiring Regulations do not apply to emergency facilities, for example emergency showers used in industrial areas or laboratories.

The 17th Edition, published in 2008, introduced a number of amendments. These included changes to the zonal system, RCD protection on all bathroom circuits, and 230 V socket outlets permitted 3 m horizontally from the boundary of zone 1; supplementary equipotential bonding may be omitted subject to the Wiring Regulations being met.

The zonal system

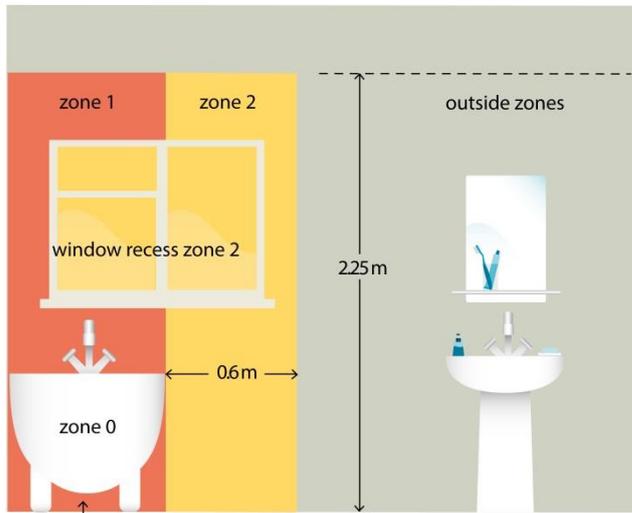
The Regulations state:

Horizontal or inclined ceilings, walls with or without windows, doors, floors and fixed partitions may be taken into account where these effectively limit the extent of locations containing a bath or shower as well as their zones.

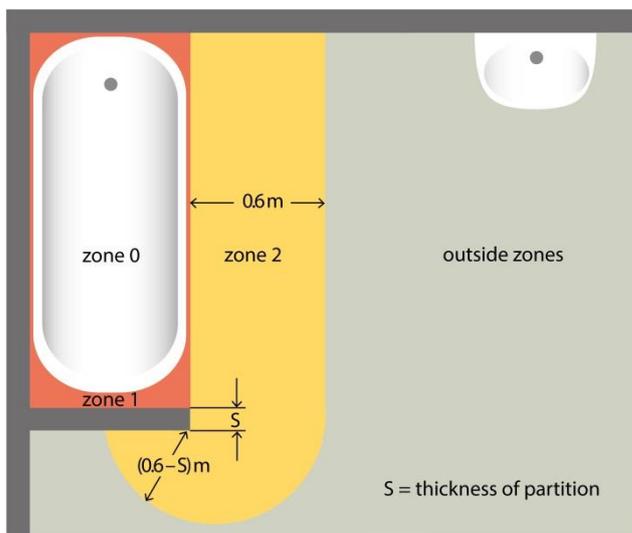
Zones 0, 1 and 2 provide a very practical method of specifying requirements (for example, for the protection of equipment against the ingress of water and protection against electric shock, etc) in a specific and unambiguous way. Equipment is either in a zone or outside a zone and this can be easily determined by measurement.

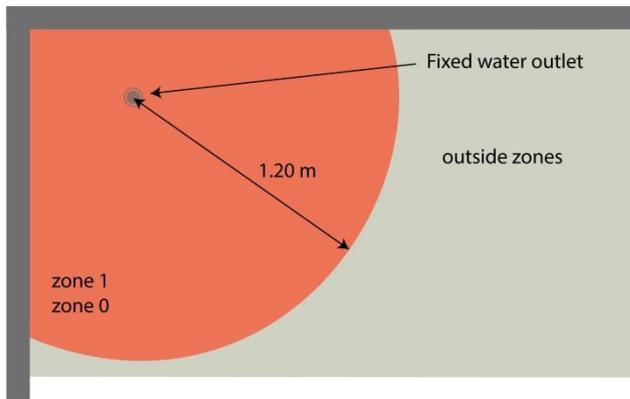
The height of zone 1 and zone 2 are limited either by the horizontal plane corresponding to the highest fixed shower head or water outlet, or the horizontal plane lying 2.25 m above the finished floor level, whichever is higher.

- Zone 1 is limited by the vertical surface circumscribing the bath tub or shower basin.
- Zone 1 is extended for showers without a basin for a fixed water outlet to a distance of 1.20 m from the centre point of the water outlet.
- Zone 2 is limited by the vertical surface at the boundary of zone 1 and the parallel vertical surface at a distance of 0.6M from the zone 1 border.



The space under the bath is:
Zone 1 if accessible without the use of a tool
Outside the zones if accessible only with the use of a tool





RCD Protection

Regulation 701.411.3.3 requires that additional protection shall be provided for all circuits of the location by the use of one or more RCDs having the characteristics specified in Regulation 415.1.1. This was a significant change introduced by the 17th Edition. This means that all circuits, including lighting, electric showers, heated towel rails, etc. require RCD protection not exceeding 30 mA.

230 V socket outlets

The 17th Edition introduced another important change: Regulation 701.512.3 permits 230 V socket outlets to be installed in a room containing a bath or shower, providing they are installed 3m horizontally from the boundary of zone 1.

Supplementary equipotential bonding

The 17th Edition introduced a significant change for supplementary equipotential bonding. Regulation 701.415.2 states that, where the location containing a bath or shower is in a building with a protective equipotential bonding system in accordance with Regulation 411.3.1.2, supplementary equipotential bonding may be omitted where all of the following conditions are met:

- (i) all final circuits of the location comply with the requirements for automatic disconnection in accordance with 411.3.2;
- (ii) all final circuits of the location have additional protection by means of an RCD in accordance with 701.411.3.3; and
- (iii) all extraneous-conductive-parts of the location are effectively connected to the protective equipotential bonding in accordance with 411.3.1.2.

This means that the designer needs to make an assessment that all extraneous-conductive-parts of the location are effectively connected to the protective equipotential bonding, in accordance with 411.3.1.2.

External influences

Any wiring system or equipment selected and installed must be suitable for its location and able to operate satisfactorily without deterioration during its working life. The presence of water can occur in several ways (for example, splashing, steam/humidity, condensation) and

at each location where it is expected to be present its effects must be considered and suitable protection must be provided.

Consequently, Section 701 requires that electrical equipment in zones 1 and 2 shall have a degree of protection of at least IPX4.

Electrical equipment exposed to water jets (for example, for cleaning purposes), shall have a degree of protection of at least IPX5. Section 701 does not specify any additional ingress protection requirements beyond zone 2. This means that accessories, such as switches and fused connection units, can be installed beyond zone 2, subject to the requirements of Regulation 512.2 (external influences).

Current-using equipment

Regulation 701.55 restricts the type of fixed and permanently connected current-using equipment that can be installed in zone 1. Washing machines and tumble dryers may be installed in a bathroom provided they are:

- supplied from a switched fused flex outlet installed outside the zones (socket outlets are only allowed 3 m horizontally from the boundary of zone 1);
- protected by a 30 mA RCD; and
- permitted for such installation by the manufacturer.

Shaver supply units

The minimum degree of protection for equipment installed in zones 1 and 2 is IPX4, or IPX5 where water jets are likely to be used for cleaning purposes. An exception to this requirement is a shaver supply unit complying with BS EN 61558-2-5 which, although it does not meet the requirements of IP4X, is permitted in zone 2 but must be located where direct spray from showers is unlikely. This type of shaver supply unit is the only type that is permitted in a bathroom or shower room.

Frequently asked questions

Extractor fans

Are 230 V extractor fans permitted in zones 1 and 2 of a room containing a bath or shower?

Yes, a suitable 230 V extractor fan may be installed both in zones 1 and 2, and outside the zones. If an extractor fan is installed in zone 1 or 2 it must be protected against the ingress of moisture to at least IPX4 and be suitable according to manufacturer's instructions. Regulation 701.512.2 requires that equipment exposed to water jets (for example, for cleaning purposes), shall have a degree of protection of at least IPX5.

An extractor fan supplied from a lighting circuit for a bathroom without a window should have its own means of isolation, as otherwise replacement or maintenance of the fan would have to be carried out in the dark. An isolation switch for a fan with an overrun facility will need to be triple-pole (switch wire, line and neutral), and must be installed outside zones 0, 1 and 2.

Socket outlets

Are 230 V socket outlets permitted in a room containing a bath or shower?



Yes, 230 V 13 A socket outlets are allowed, but only if they are at least 3 m horizontally from the boundary of zone 1.

Plate switches

Are 230 V lighting switches (plate switches) permitted in a room containing a bath or shower?

Yes, a plate switch is allowed outside the zones of a bathroom. A switch should be at least 0.6 m from the edge of the bath or shower (outside the zones) and must be suitable for the location. The cords of cord-operated switches are allowed in zones 1 and 2 and are recommended for bathrooms and shower rooms to account for the humidity and condensation that could occur.

Luminaires (light fittings)

Are 230 V light fittings permitted above a shower or bath (zone 1) in a room containing a bath or shower?

Yes, 230 V fittings may be installed above a shower or bath but they must be at least IPX4, i.e. enclosed and water protected. If installed more than 0.6 m from the edge of a shower basin or bath (outside the zones) no special fitting is required but the luminaire must be of a suitable design for the conditions.

Equipment installed in the zones

Check that manufacturer's instructions confirm that the equipment is suitable for use in the relevant zone before installation in addition to checking the IP rating.

More information

For more information please refer to the 17th Edition of the Wiring Regulations (BS 7671:2008) (2013). Also, help is at hand, in the form of a new edition of IET Guidance Note 7 (Special Locations), which will take into account the proposed Amendment 3 of BS 7671:2008. The new edition of BS 7671 and the associated titles will be available from January.

Electric vehicle charging: videos

Wiring Matters brings you an overview of electric vehicle charging. In [Part 1](#), we discuss general requirements and domestic charging of electric vehicles, and we continue in Part 2 with standalone charging and protection against mechanical and environmental [damage](#). This video does not take into account any changes made by Amendment 3 to the Wiring Regulations BS 7671:2008.

Pre-order your copy of the Code of Practice for Electric Vehicle Charging Equipment Installation 2nd Edition from <http://www.theiet.org/resources/standards/ev-cop.cfm>.