



Additions and Alterations

by Mark Coles

BS 7671:2008, the 17th Edition of the IEE Wiring Regulations, contains specific requirements relating to additions and alterations to existing electrical installations. Whether adding an extra socket-outlet in a dwelling or undertaking a major reconfiguration of a large commercial building; in all cases the reconfigured aspect of the installation should comply with BS 7671:2008.

Scenario

Before we start, it is necessary to consider the following scenario which will be frequently cited throughout this article:

An existing ring-final circuit, supplying a number of socket-outlets on the first floor of a dwelling, is planned to be extended by the addition of one socket-outlet. The socket-outlet is to be located beside an existing socket-outlet, from which, the new addition will be incorporated into the ring-circuit. The existing circuit was installed to

BS 7671:2001(2004) and complies completely with that edition of the standard. No part of the circuit is protected by an RCD.

Some installers are of the opinion that when adding to an existing circuit, provided that the existing circuit meets the requirements of BS 7671:2001(2004), i.e. the 16th Edition, then the 17th Edition simply applies to the new addition. This article shows that in all cases, the 17th Edition is to be applied to the entire circuit worked on.

Introduction to BS 7671:2008

Let's look at the early pages of BS 7671:2008 as these opening paragraphs set the scene.

The first paragraph of the introduction to the 17th

Edition is very straightforward as it states the effective date of commencement; the second paragraph, however, is a little more cryptic:

Existing installations that have been installed in accordance with earlier editions of the Regulations may not comply with this edition in every respect. This does not necessarily mean that they are unsafe for continued use or require upgrading.

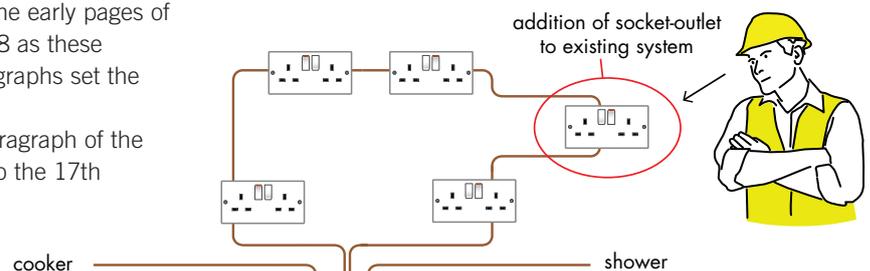
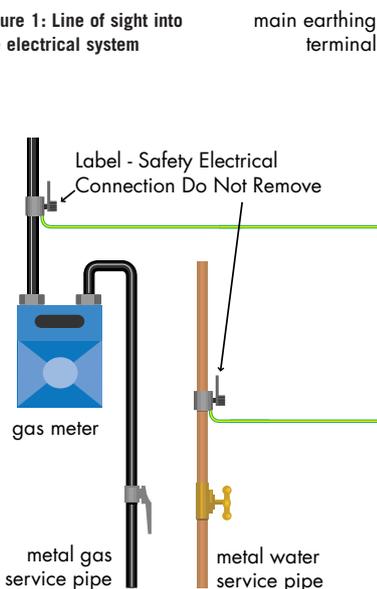
The intention of this paragraph is to acknowledge

inspection report has identified some issues of safety, which have been given a PIR code 1, for example, the owner/operator of the installation would need to make a decision on the best course of action. Note that a Code 1 recorded on a periodic inspection report requires urgent attention.

Note by the Health and Safety Executive

A note from The Health and Safety Executive (HSE) is included as BS 7671 and the

Figure 1: Line of sight into the electrical system



cooker shower

that electrical installations may have been installed to earlier versions of the Regulations, e.g. BS 7671:2001(2004) but there is no requirement to bring the installation up to the standard of the 17th Edition unless a periodic inspection report, for example, has highlighted safety issues or an alteration or addition is planned. If a periodic

IEE Wiring Regulations have been extensively referred to in HSE guidance over the years. It is pertinent to state that BS 7671 is not a statutory document and it is, therefore, not a legal requirement to follow the practices referred to within. The legal requirements are contained within the Electricity at Work Regulations 1989 (EWR) which includes a requirement that all systems are to be safe - from this requirement, BS 7671 provides the framework to which electrical installations should follow in order to meet the requirements of the law.

There is reference in the note by the HSE, rather like the one seen previously in the introduction, which refers to older installations:

Existing installations may have been designed and installed to conform to the standards set by earlier editions of BS 7671 or the IEE Wiring Regulations. This does not mean that they will fail to achieve conformity with the relevant parts of the Electricity at Work Regulations 1989.

Again, the intent is to make it known that an installation which was not installed to the 17th Edition may not be unsafe and may be suitable for continued use and, hence, does not mean that they will fail to achieve conformity with the relevant parts of the Electricity at Work Regulations 1989

The Regulations

The requirements for additions and alterations in BS 7671:2008 are given in a number of Regulations, each will be examined in this article.

The very first Regulation, 110.1, from the Scope of BS 7671 states that the Regulations have requirements for:

(xx) additions and alterations to installations and also parts of the existing installation affected by an addition or alteration

Note the words "... parts of the existing installation affected by an addition or alteration" in part (xx) of the Regulation. When a circuit is extended, the new addition alters the characteristics of the existing circuit/installation to some extent, i.e. the increased load or the resulting earth fault loop impedance.

The next entry is a key Regulation, 131.8 - Additions and alterations to an installation:

131.8 *No addition or alteration, temporary or permanent, shall be made to an existing installation, unless it has been ascertained that the rating and the condition of any existing equipment, including that of the distributor, will be adequate for the altered*

circumstances. Furthermore, the earthing and bonding arrangements, if necessary for the protective measure applied for the safety of the addition or alteration, shall be adequate.

The Regulation requires that if you plan to make any changes, the existing installation must be in such a condition which will be suitable for the intended alteration. As is stated, this includes:

- the equipment belonging to the distributor - e.g. the condition and size of the supply cable, the District Network Operator's (DNO) cutout (sometimes referred to as the "head"), metering equipment, supply and meter-tails
- distribution equipment - switchboard, consumer unit, etc., and
- the earthing and bonding arrangements.

If any part of the installation intended to be altered is not suitable it must be brought up to standard - the standard being BS 7671:2008. Where equipment belonging to the distributor or metering company is not suitable for the altered circumstance, i.e. the tails are undersized or the equipment is damaged with exposed live parts, the installer must ensure that the equipment is in a safe condition before undertaking the installation work. In most cases, it will be necessary to arrange for the distributor and/or metering company to attend site and make the changes; this type of work will usually incur a charge.

Consider the scenario given at the beginning of this article. Upon completion of the work, the installer would take responsibility for his "line of sight" into the installation (see figure 1), i.e. the circuit worked on, the condition of the consumer unit, the earthing and bonding arrangements, the sizing of the

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meter-tails and the incoming supply. The installer would not take responsibility for any other circuit within the installation that they have not worked on, however, the electrical installation certificate has a facility for comments on the existing installation. The installer should record any unsafe conditions or practices and, hence, bring them to the client's attention; this requirement can be found in Regulation 633.2:

633.2 *The contractor or other person responsible for the new work, or a person authorized to act on their behalf, shall record on the Electrical Installation Certificate or the Minor Electrical Installation Works Certificate, any defects found, so far as is reasonably practicable, in the existing installation.*



Other requirements of BS 7671 when carrying out additions or alterations

Identification

514.1.2 *As far as is reasonably practicable, wiring shall be so arranged or*

marked that it can be identified for inspection, testing, repair or alteration of the installation.

This is a very clear requirement. Usually, conductors are identifiable by colour or alpha-numeric markings; Regulation 514.3.1 refers. Often, in installations of dwellings, the blue conductor, which is usually neutral, is used as a switch-wire on a lighting circuit, it is, therefore, very important to identify this conductor as a line conductor and not leave it blue where it would be expected to be neutral.

514.14.1 *If wiring additions or alterations are made to an installation such that some of the wiring complies with Regulation 514.4 but there is also wiring to previous versions of these Regulations, a warning notice shall be affixed at or near the appropriate distribution board with the wording above right.*

This requirement first appeared in amendment No.2 of BS 7671:2001 in 2004 following the adoption of the harmonized cable core colours from the CENELEC HD 308-S2:2001.

Sealing of wiring systems or penetrations

527.2.3 *During alteration work, sealing which has been disturbed shall be reinstated as soon as practicable.*

This Regulation requires that the resealing of penetrations through walls, etc., is re-established as soon as practicable to stop the spread of fire.

Verification

610.4 *For an addition or alteration to an existing installation, it shall be verified*

CAUTION

This installation has wiring colours to two versions of BS 7671. Great care should be taken before undertaking extension, alteration or repair that all conductors are correctly identified

that the addition or alteration complies with the Regulations and does not impair the safety of the existing installation.

Once an addition or alteration has been made to an installation, it should be verified for compliance with the Regulations prior to certification and subsequent handing over to the client for use.

Departures from the Regulations

BS 7671 permits *intended* departures from the Regulations but the requirements are very specific and two conditions would be acceptable.

The first condition:

120.3 *Any intended departure from these Parts (1 to 7 of the Regulations) requires special consideration by the designer of the installation and shall be noted on the Electrical Installation Certificate specified in Part 6. The resulting degree of safety of the installation shall be not less than that obtained by compliance with the Regulations.*

In Regulation 120.3, the key words are "*The resulting degree of safety of the installation shall be not less than that obtained by compliance with the Regulations*".

Consider the scenario posed earlier where a socket-outlet is to be added to an existing ring

circuit in a dwelling. The existing circuit does not currently have an RCD rated at 30 mA providing additional protection as required by Regulation 411.3.3.

If it is decided that additional protection by use of an RCD rated at 30 mA is not to be provided then some other method, equal in terms of safety to protection against electric shock by additional protection, should be adopted to ensure that the resulting degree of safety of the installation shall be not less than that obtained by compliance with the Regulations.

Regulation 410.3.3 gives four methods of protection against electric shock which are generally permitted:

- (i) Automatic disconnection of supply (Section 411)
- (ii) Double or reinforced insulation (Section 412)
- (iii) Electrical separation for the supply to one item of current-using equipment (Section 413)
- (iv) Extra-low voltage (SELV and PELV) (Section 414).

Beyond the implementation of automatic disconnection of supply with additional protection by use of an RCD rated at 30 mA, given in (i) of Regulation 410.3.3 and Regulation 411.3.3, it is very unlikely that any of the other three generally permitted measures with an enhancement will be suitable in the posed scenario.



The second condition:

120.4 New materials and inventions *Where the use of a new material or invention leads to departures from the Regulations, the resulting degree of safety of the installation shall be not less than that obtained by compliance with the Regulations. Such use is to be noted on the Electrical Installation Certificate specified in Part 6.*

Regulation 120.4 permits the use of a new methodology or item of equipment that may not have been manufactured to a British or other standard, again, the requirement is that *"the resulting degree of safety of the installation shall be not less than that obtained by compliance with the Regulations"*.

Consider again the scenario posed earlier. If the installer decides to leave the existing installation as it is and provide additional protection by means of an RCD rated at 30 mA to the new circuitry/socket-outlet

then this will not comply with the 17th Edition. This may be an intended departure from the Regulations but does not meet the criteria for departures so, therefore, will not comply with BS 7671:2008.

Certification

When making alterations to an existing circuit, the person responsible for the construction element of the works is required to issue a certificate for the work undertaken, usually a Minor Electrical Installation Works Certificate but it is also acceptable to issue an Electrical Installation Certificate. Note that a Periodic Inspection Report is a Form, not a certificate and is not suitable for electrical installation work as it does not certify anything.

The following Regulations have requirements for certification:

134.2.1 *During erection and on completion of an installation or an addition or alteration to an installation,*

and before it is put into service, appropriate inspection and testing shall be carried out by competent persons to verify that the requirements of this Standard have been met. Appropriate certification shall be issued in accordance with Section 631.

633.1 *The requirements of Sections 631 and 632 for the issue of an Electrical Installation Certificate or a Minor Electrical Installation Works Certificate shall apply to all the work of the additions or alterations.*

The model forms of certification can be seen in Appendix 6 of BS 7671:2008 and can also be downloaded from the IET's website.

Note that the model forms of certification permit the declaration of conformity to one version of the Regulations, i.e. BS 7671:2008. The forms are not intended to cover two versions of BS 7671, i.e. the existing part of the circuit is installed to BS 7671:2001(2004) and the new addition is

installed to BS 7671:2008. Therefore, upon completion of the installation and the certificate is issued, one certificate will be issued and this certificate will be to the requirements of the 17th Edition.

Further, it is worth noting that a standard is a framework or plan, to which, when followed, provides the ability to reiterate a process or method and not redesign all elements from scratch each time.

The legal requirements

As stated earlier, BS 7671 is not a statutory document and it is not a legal requirement to follow the practices referred to within. Primarily, there are two pieces of legislation to consider. The first being the Electricity at Work regulations, the second being the Building Regulations. The EWR applies to those undertaking electrical work as part of their job; the Building Regulations apply to those undertaking electrical work as part of their job and to those carrying out DIY work.

The Electricity at Work regulations 1989

The EWR states that all systems are to be safe so as to prevent danger and prevent the risk of injury. The Memorandum to the Electricity at Work Regulations 1989, HS(R)25, records that the IEE Wiring Regulations is widely recognised and accepted in the UK and compliance with them is likely to achieve compliance with relevant aspects of the 1989 Regulations in point 7 of the introduction. Further, point 9 states that installations to which the IEE Wiring Regulations are relevant may have been installed in accordance with an earlier edition, now superseded but then current. That, in itself, would not mean that the installation would fail to comply with the 1989 Regulations.

Installers often find that their client refuses to pay for any remedial work required to bring existing elements of installation up to standard. The installer should always evaluate the existing situation by carrying out a periodic inspection of the installation prior to starting work so that any irregularities can be brought to the attention of the client. If the client refuses to pay for upgrades then the installer simply doesn't take on the job. The issuing of disclaimers by installers, stating that the client was made aware of shortfalls in the existing installation, is no way around the law. If someone is injured due to negligent practice, a covering letter will not prevent prosecution.

The Building Regulations

The Building Regulations, England and Wales, generally requires that installations, e.g. electrical (Part P), ventilation (Part F), accessibility (Part M)

must be no worse in terms of the level of compliance with other applicable parts of Schedule 1 to the Building Regulations than before the work was undertaken. There is a similar requirement in the Scottish Building Standards Handbooks which requires that *"any service fitting or equipment is to be a standard no worse than at present"*. Approved Document P states that *"a way of complying is to follow the technical rules of BS 7671 or an equivalent standard"*. Note that the use of the words "equivalent standard" permits a theoretical alternative as BS 7671 is not a statutory document. Currently in the UK no other electrical installation standard exists. Bear in mind that BS 7671 is based on the technical intent of HD 60364, which in turn was developed from IEC 60364 – therefore, they are not equivalent standards.

Conclusion

When carrying out additions or alterations to existing electrical installations, the reconfigured aspect of the electrical installation should comply with BS 7671:2008. The installer does not simply take responsibility for the newly installed or reconfigured element of the installation but all parts of the circuit(s) worked on - including the need to comment on the continued suitability or otherwise of the equipment belonging to the distributor - this includes the condition of the metering equipment, supply and meter-tails, distribution equipment and the earthing and bonding arrangements. If the client does not want to pay for upgrades to existing equipment, this does not absolve the installer from responsibility, nor does a disclaimer. If the installer

undertakes a risk assessment of the situation and decides that it is not necessary to bring the existing element of the installation up to the current standard, then a certificate stating that the installation complies with BS 7671:2008 cannot be issued as the installation clearly does not comply with the 17th Edition. Listing departures on the certificate will only meet the requirements of the Regulations if the resulting degree of safety of the installation shall be not less than that obtained by compliance with the Regulations.

Further information and reading

The following publications have either been cited in this article or they will be an aid to further research:

- BS 7671:2008 Requirements for Electrical Installations, IEE Wiring Regulations, 17th Edition
- Electricity at Work regulations 1989 - www.opsi.gov.uk/si/si1989/Uksi_19890635_en_1.htm
- Electricity at Work regulations (Northern Ireland) 1991 - www.ulster.ac.uk/health+safety/policy_audit/policy/PDFS/3.10.pdf
- Approved Document P - www.planningportal.gov.uk/uploads/br/BR_PDF_AD_P_2006.pdf
- Scottish Building Standards technical handbooks - <http://www.sbsa.gov.uk/>
- Model forms for certification and reporting from the IET's website - www.theiet.org/publishing/wiring-regulations/forms/

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