NICEIC

SBSC
Scottish Building Standards Certification

The electrical installers' guide to the Building (Scotland) Regulations

2023 Edition

Certsure

Certsure LLP is a limited liability partnership between the Electrical Safety First and the Electrical Contractors' Association (ECA) registered in England and Wales. Its brands include NICEIC the UK's leading voluntary regulatory body for the electrical contracting industry, which has been assessing the electrical competence of electricians for over fifty years and currently maintains a roll of over 36,000 registered contractors.

Certsure products are delivered through the NICEIC brand. The products include, amongst others:

- The NICEIC Approved Contractor Scheme, a scheme for electrical contractors undertaking design, installation, commissioning and maintenance of electrical installations to *BS 7671*.
- The MCS Installer Scheme, developed to assess businesses installing microgeneration technology and is designed to protect the consumer.
- Green Technology schemes for energy saving improvements to dwellings and other buildings.

Electrical Safety First

Electrical Safety First (formerly the Electrical Safety Council) is an independent charity committed to reducing deaths and injuries through electrical accidents at home and at work.

Electrical Safety First is supported by all sectors of the electrical industry, approvals and research bodies, consumer interest organisations, the electricity distribution industry, professional institutes and institutions, regulatory bodies, trade and industry associations and federations, trade unions and local and central government.

Acknowledgements

NICEIC would like to thank the Scottish Government - Building Standards Division (BSD) and the Scottish Building Standards Hub for their support in producing the 2023 guide.

Scottish Government - Building Standards Division, Denholm House, Almondvale Business Park, Livingston, EH54 6GA

Email: buildingstandards@gov.scot

Published by:

Certsure LLP, Warwick House, Houghton Hall Park, Houghton Regis, Bedfordshire, LU5 5ZX.

ISBN: 978-1-83863-046-1

Website: www.certsure.com

Contents

Technical Standard: 1.0 Structure

Technical Standard: 2.0 Fire

Contents

NON-DOMESTIC TECHNICAL HANDBOOK

DOMESTIC TECHNICAL HANDBOOK

Contents

Contents

Contents

Contents

Annex

Contents

General

The following guide is aimed primarily at NICIEC registered electrical contractors and organisations, but is also applicable to others, who undertake electrical installations in Scotland. It provides guidance on achieving compliance with the mandatory functional standards of the *Building (Scotland) Regulations 2004*[1], as amended, which are applicable to the design installation and certification of electrical installation work in Scotland.

The purpose of the Scottish Building Regulations, as defined by the *Building (Scotland) Act 2003*, is to:

- Secure the health, safety, welfare and convenience of persons in or about buildings and of others who may be affected by buildings or matters connected with buildings.
- Further the conservation of fuel and power.
- Further the achievement of sustainable development, with respect to the design, construction, demolition and conversion of buildings and the provision of services, fittings and equipment in or in connection with buildings.

Prior to undertaking certain types of electrical installation work, legal permission in the form of a building warrant must be obtained by the relevant person; the owner, occupier or developer of the building. The relevant person is responsible for ensuring that any electrical installation work carried out under the warrant complies with the requirements of the *Building (Scotland) Regulations 2004*.

Exceptions to the warrant process are permitted for certain types of work as listed in Schedule 1 and 3 of the Scottish Building Regulations (refer to Annex 1 of this guide). However, irrespective of whether the electrical work is, or is not, subject to a building warrant all works within the scope of the Building Regulations are required to comply with the regulations.

Regulations from the *Building (Scotland) Regulations 2004* that are applicable to electrical installation work are contained in Annex 5 of this guide.

[1] *Unless otherwise stated, reference in this publication to the Building (Scotland) Regulations 2004 refers to the regulations, as amended.*

Scottish Building Standards

The current Scottish building standards system is operated by the Scottish Government Building Standards Division (BSD), formerly the Scottish Building Standards Agency (SBSA), and enforced by local authorities (that is the authority local to where the work is undertaken). The building standards department of the local authority is responsible for independently verifying that all building work subject to a warrant achieves compliance with the relevant requirements of the Building Regulations, and are therefore referred to as the Verifiers of the building standards system.

The role of the Verifier is to protect the public interest by providing an independent check of applications for building warrant to construct or demolish buildings, to provide services, fittings or equipment in buildings, or to convert buildings.

Scottish Ministers have appointed the 32 local authorities in Scotland to act as Verifiers for their own geographical areas.

Verifiers are appointed to verify that work complies with the Building (Scotland) Regulations 2004, both in terms of design and construction. The work of verification will usually be undertaken by their Building Standards Departments.

Applications for building warrants will be independently verified by "The Verifier" who must make reasonable enquiry to assess whether completion certificates should be accepted. They must accept certificates by registered Approved Certifiers of construction as conclusive of the matters certified.

Verifiers do not scrutinise certified matters and are only expected to check that the Approved Certifier and Approved Body were appropriately registered on the date the certificate was signed.

Although the Verifier is responsible for independently verifying, through reasonable inquiry, that all building work subject to a warrant achieves compliance with the relevant requirements.

It is ultimately the responsibility of the building owner to ensure compliance with Building Regulations.

For the latest information on Scottish building standards refer to:
www.gov.scot/Topics/Built-Environment/Building/Building-standards

The certification system

Where electrical installation work is subject to a building warrant, compliance with the *Building (Scotland) Regulations 2004* can be achieved using the option of certification. This system is based on the principle that electrically skilled professionals and tradespersons can be responsible for ensuring that electrical installation work complies with the Building Regulations, without the need for detailed scrutiny of designs or inspections by local authority Verifiers, provided they are employed by reputable organisations that operate a system of careful checking.

Certification is promoted by BSD as the recommended route to achieve compliance with the Building Regulations, delivered by Scheme Providers appointed by BSD using schemes approved under Section 7(2) of the *Building (Scotland) Act 2003*. Currently five certification schemes are in operation, covering electrical installations, building structures, energy, drainage, heating and plumbing.

To support the certification of building warrants, BSD operates and maintains an online certification register, containing the details of all Approved Schemes, Approved Bodies and Approved Certifiers of Construction. The register is an essential tool for Verifiers, allowing them to undertake validation checks on the electrical certificates submitted, whilst also providing a facility for the public to search for a registered firm.

The register can be accessed at: *www.certificationregister.co.uk*

The NICEIC scheme for the Certifier of Construction (Electrical installations to *BS 7671*)

Scheme Provider

NICEIC is approved by BSD, under Section 7 (2) of the *Building (Scotland) Act 2003*, to operate a registration scheme for Certifier of Construction (Electrical Installations to *BS 7671*). The scheme allows Approved Certifiers of Construction to certificate all aspects of electrical installation construction and commissioning work for compliance with the *Building (Scotland) Regulations 2004*.

As a condition of registration, the Approved Body must be a registered NICEIC Approved Contractor and be based in Scotland. The Approved Body must directly employ one or more Qualified Supervisors to act as Approved Certifiers Of Construction and assign a Certification Co-ordinator to the scheme.

Approved Certifier of Construction

An individual registered with the NICEIC Scheme who is employed or contracted by an NICEIC Approved Body may perform the functions of an Approved Certifier of Construction (Electrical Installations to *BS 7671*). The Certifier of Construction carries out appropriate inspection and testing during and on completion of the work, and completes a Certificate of Construction to certificate that electrical work has been undertaken in compliance with the *Building (Scotland) Regulations 2004*.

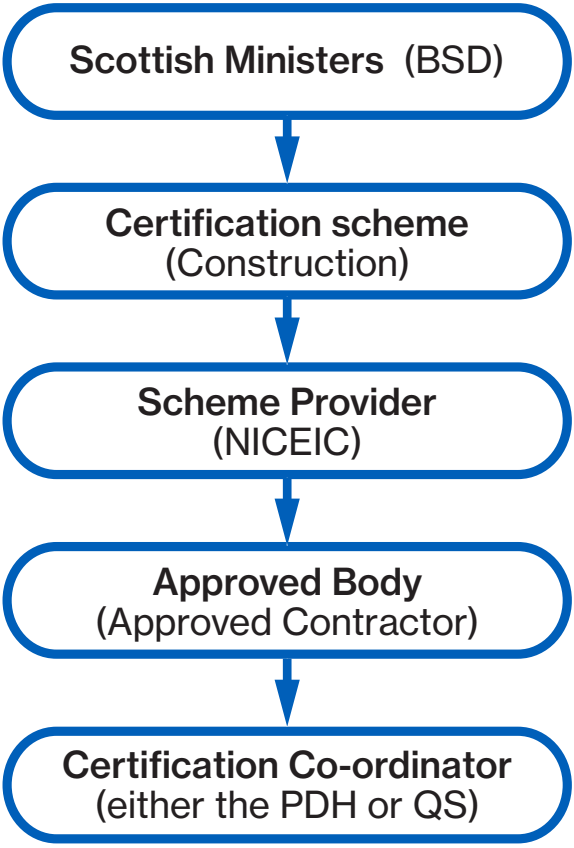
A Certificate of Construction is only valid when issued by an Approved Certifier of Construction, and an Approved Certifier of Construction can only certificate work when employed by an Approved Body. The Approved Certifier of Construction may only issue certificates that are countersigned by the Certification Co-ordinator of an Approved Body, and must keep a record of all the Certificates of Construction they issue.

It should be noted the NICEIC Certifier Of Construction scheme does not permit 3rd party certification.

Certification Co-ordinator

This is an individual responsible for countersigning certificates on behalf of an Approved Body. The Certification Co-ordinator acts as the contact point for the Approved Body and is responsible for maintaining the system of checking, insurance policies, access to documents, training and handling complaints.

NICEIC Scheme for the Certifier of Construction, approved under Section 7(2) of the Building (Scotland) Act 2003



Routes to achieve compliance with the Building Regulations in Scotland

An organisation not registered with a Scheme Provider is not precluded from carrying out construction work related to a building warrant. It is permitted for a Completion Certificate to be submitted to the Verifier (local authority) that is not supported by a Certificate of Construction. However, before a Completion Certificate that is not supported by a Certificate of Construction can be accepted by the Verifier, additional time may be required for verification of the work to take place.

The non-certified route to compliance

Using this route, the applicant or duly authorised agent submits the building warrant application. The Verifier (local authority) is responsible for checking the design and if satisfied granting permission for the work to commence. The applicant advises the Verifier when work commences, and the Verifier is then responsible for checking the work, during and on completion, for compliance with the Building Regulations. The Relevant Person (applicant or duly authorised agent) submits a Completion Certificate and awaits acceptance by the Verifier.

The certified route to compliance - The NICEIC Certifier of Construction Scheme

The NICEIC Certifier of Construction Scheme provides a certificated route for electrical installation work, subject to a building warrant, to achieve compliance with the Scottish Building Regulations. The process for achieving compliance is illustrated on the following page.

Note: *BSD issues a Certification Handbook and a Procedural Handbook which provide guidance on achieving compliance with the Scottish Building Regulations. These Handbooks can be downloaded from: https://www.gov.scot/search/?cat=sitesearch&q=certification+handbook*

The certificated route to compliance – The NICEIC Certifier of Construction Scheme

1: **The Building Warrant Applicant or Relevant Person** notifies the Verifier of the intention to use an Approved Certifier of Construction to certify the electrical installation under the scheme and in doing so is eligible for a discount on the warrant fee.

It should be noted that the discount is activated by completing part 18 of the building warrant application form. This is the only way to activate the relevant discount on the warrant fee, which should be applied when the application form is submitted, as it is a discount and not a refund.

2: **The NICEIC Approved Certifier of Construction** carries out and/or supervises the electrical installation work during and on completion to ensure compliance with the Building Regulations.

The Certificate Of Construction and Electrical Installation Certificate are completed via the NICEIC online certification system (NOCS). The checklist is downloaded from the NICEIC website.

The Certificate Of Construction and Electrical Installation Certificate are available as a combined certificate for convenience. The fully completed combined Certificate is then submitted to the person ordering the work, while the NICEIC Approved Certifier of Construction retains the Checklist and duplicate copies of the electrical certificates issued for auditing purposes.

Note 1: *Certificates should also be submitted for work pertaining to a fire detection and alarm system and/or an emergency lighting installation . It should be noted that this scheme does not encompass BS 5839 or BS 5266.*

Note 2: *If the person ordering the work is not the building owner they should pass all NICEIC Electrical Certificates (and where appropriate the relevant fire detection and emergency lighting certificates) to the building owner who should retain them.*

2a: **NICEIC** records the number of NICEIC Certificates of Construction issued and notifies BSD, periodically, of the numbers used.

3: **The Building Warrant Applicant or Relevant Person** submits the Completion Certificate of Construction to the Verifier.

4: **The Verifier** checks the validity of the Certifier of Construction and Approved Body using the BSD online Certification Register, and a valid Certificate of Construction is accepted as evidence of compliance with the Building Regulations, regarding the matters certified.

Work exempt from building warrant requirements and work not requiring a building warrant

Regulation 3 of the *Building (Scotland) Regulations 2004* states that:

'Regulations 8 to 12 shall not apply to any building or any services, fittings and equipment the whole of which falls into any one or more of the exempted types described in Schedule 1' (Exempted buildings and services, fittings and equipment). For information on Schedule 1 work refer to Annex 1 of this guide.

Regulation 5 states that:

'Any work which consists solely of a building or conversion, including the provision of services, fittings or equipment, of a kind specified in Schedule 3 (Descriptions of building and work including the provision of services, fittings and equipment, not requiring a warrant) shall meet the standards required by Regulations 8 to 12 but shall not, subject to the exceptions and conditions, require a warrant.' (Annexes 2 and 3 of this guide provide information on Schedule 3).

Schedule 3 to regulation 5 sets the descriptions of building work that do not require a warrant, nevertheless, work not requiring a warrant must still comply with the relevant requirements of the *Building (Scotland) Regulations 2004*. For this reason, BSD recognises the benefits of using an NICEIC Approved Contractor for work not requiring a building warrant.

In the case of specific like-for-like replacement of items, the work, service, fitting or equipment should be to a standard no worse than existed previously.

Renewable technology

A building warrant would not normally be necessary for the installation of a roof-mounted Photovoltaic (PV), or Solar Thermal, microgeneration system on a domestic property comprised of two-stories or less, unless the existing structure needed to be strengthened to accommodate the equipment loadings and fixings, such as the PV panels and brackets. However, for clarification as to whether a warrant is required, it is recommended the Local Authority is contacted at the design stage.

Photovoltaic (PV) system

Note: *This exemption is limited to type 1 Schedule 3 of the Building (Scotland) Regulations 2004, as amended, which covers houses with a storey height of not more than 4.5 m.*

To obtain financial incentives, such as Smart Export Guarantee (SEG) payments, renewable technology installations rated at under 50 kW (peak output) must be accredited through the Microgeneration Certification Scheme (MCS). This requires registration of both installer and the microgeneration products with an MCS accreditation body such as NICEIC (refer to Section 6 of this guide - Energy).

NICEIC MCS Contractor Scheme

Conversions

Regulation 4 of the *Building (Scotland) Regulations 2004* states that 'Changes in occupation or use of buildings set out in Schedule 2 (Conversions to which the Regulations apply) shall be conversions to the extent specified in regulation 12.'

Regulation 12 states that 'Conversion shall be carried out so that the building as converted complies with the relevant requirements of Schedule 6' (Building Standards applicable to conversions).

With reference to Schedule 2, examples that might be considered conversions subject to the requirements of the Regulations are listed in Annex 4 of this guide.

The Building (Scotland) Act 2003

Within Part 1 of the *Building (Scotland) Act 2003*, Section 4 deals with guidance documents for purposes of the Building Regulations and Section 5 covers compliance with guidance documents.

In accordance with Section 4 (1), BSD issues two Technical Handbooks on behalf of the Scottish Government; one covering **Domestic** buildings and the other one covering **Non-domestic** buildings.

The purpose of the Handbooks is to provide practical guidance on how to achieve compliance with mandatory requirements of the functional standards set out in the *Building (Scotland) Regulations 2004*.

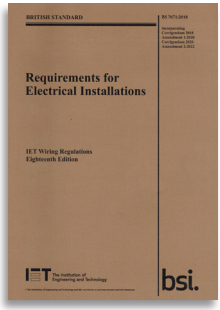
While the functional standards contained in the Technical Handbooks are mandatory the guidance for achieving compliance is not, and therefore failure to comply with the guidance will not render a person liable to civil or criminal proceedings. However, if the guidance is followed in full then this should be accepted by the Verifier as confirmation of compliance with the Building Regulations (Section 5 of the *Building (Scotland) Act 2003* refers). Alternative solutions may be used to achieve compliance with a particular standard(s), but in all cases it is for the Verifier to determine whether the standard has, or has not, been met.

It should be noted that whilst this guide covers the key recommendations of the standards relevant to electrical installations contained in the Technical Handbooks issued by BSD, it is not intended as a substitute for the Technical Handbooks, with which the electrical installer should reference appropriately.

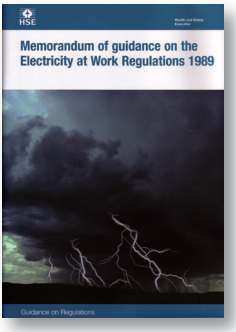
Furthermore, the work that a project involves may be subject to other statutory requirements, such as planning permission, water regulations and licensing. These are not specifically covered in this publication.

Note: *The Technical Handbooks can be viewed or downloaded from: https://www.gov.scot/collections/building-standards/#newpublication:technicalhandbooksforusefrom5june2023*

Requirements for Electrical Installations BS 7671



Throughout this guide reference is also made to relevant requirements contained within *BS 7671*, as amended, *Requirements for Electrical Installations*. The Health and Safety Executive consider that installations which conform to the standards laid down in *BS 7671*, as amended, are likely to achieve conformity with the relevant parts of: *The Electricity at Work Regulations 1989* (EWR 1989).



The EWR 1989, requires safe working practices to be followed, and guidance on achieving compliance with the regulations is contained in the Health and Safety Executive guidance documents HSR 25 – *Memorandum of Guidance on the Electricity at Work Regulations and* HSG 85 – *Electricity at Work: safe working practices*.

Guidance on meeting the requirements of the mandatory standards from Schedule 5 of Regulation 9 of the Building (Scotland) Regulations 2004

Regulation 9 of the Building (Scotland) Regulations 2004 requires construction to be carried out in compliance with the applicable requirements of Schedule 5.

However, not all mandatory standards are appropriate to the work of an electrical installer, so as shown in the following table, only those considered to be relevant to electrical installation work are considered. Including the relevant clause(s) of the Technical Handbooks to which the guidance relates, and where appropriate references to documents that provide further details on the particular aspects covered.

Where any building contains both domestic uses and non-domestic uses, the appropriate parts from each Technical Handbook will need to be used to ensure the standards are complied with in full.

Mandatory standards applicable to electrical installations

Mandatory Standard	Topic	Technical Handbook which is applicable
1. Structure		
1.1	Effects of notching, drilling, chasing, and the like	Domestic and non-domestic
2. Fire		
2.1	Compartmentation	Non-domestic only
2.2	Separation	Domestic and non-domestic
2.3	Structural protection	Domestic and non-domestic
2.4	Cavities	Domestic and non-domestic
2.5	Internal linings	Domestic and non-domestic
2.9	Escape	Domestic and non-domestic
2.10	Escape lighting	Domestic and non-domestic
2.11	Communication	Domestic and non-domestic
2.14	Fire and rescue service facilities	Domestic and non-domestic
2.15	Fire Suppression	Domestic and non-domestic
3. Environment		
3.3	Flooding and groundwater	Domestic and non-domestic
3.10	Precipitation	Domestic and non-domestic
3.11	Facilities in dwellings	Domestic (dwellings) only
3.13	Heating	Domestic (dwellings) only
3.14	Ventilation	Domestic and non-domestic
3.15	Condensation	Domestic (dwellings) only
3.17	Combustion appliances - safe operation	Domestic and non-domestic
3.20	Combustion appliances - removal of products of combustion	Domestic

Mandatory Standard	Topic	Technical Handbook which is applicable
4. Safety		
4.5	Electrical Safety	Domestic and non-domestic
4.6	Electrical fixtures	Domestic only
4.7	Aids to communication	Non-domestic only
4.8	Danger from accidents	Domestic and non-domestic
5. Noise		
5.1	Noise separation	Domestic and non-domestic
6. Energy		
6.1	Carbon dioxide emissions	Domestic and non-domestic
6.3	Heating system	Domestic and non-domestic
6.5	Artificial and display lighting	Non-domestic only
6.6	Mechanical ventilation and air conditioning	Non-domestic only
6.7	Commissioning building services	Domestic and non-domestic
6.8	Written information	Domestic and non-domestic
6.9	Energy Performance Certificates	Domestic and non-domestic
6.10	Metering	Non-domestic
7. Sustainability		
7.1	Sustainability	Domestic and non-domestic
7.2	Electric Vehicle Charging	Domestic and non-domestic

Note: *Other guidance documents, issued under Section 4(1) of the Building (Scotland) Act 2003, are made available on the BSD website, refer to: www.gov.scot/Topics/Built-Environment/Building/Building-standards/techbooks/techhandbooks*

Glossary of terms used in this guide

A full list of defined terms can be found in Appendix A of the Technical Handbooks.

Apartment – A room in a dwelling not used solely as a kitchen, store or utility room.

Approved Body – An organisation that employs at least one approved certifier, operates systems to check compliance with *Building (Scotland) Regulations 2004*, holds appropriate insurances, provides access for certifiers to keep up-to-date with regulations, codes, guidance and training.

Note: *In terms of NICEIC registration, an Approved Body would be a suitably certificated Approved Contractor.*

Building – Any structure or erection, whether temporary or permanent, other than a structure or erection consisting of, or ancillary to any:

a. public road (including any bridge on which the road is carried)

b. private road

c. sewer or water main which is, or is to be, vested in Scottish Water

d. aerodrome runway

e. railway line

f. large raised reservoir within the meaning of the *Reservoirs Act 1975*

g. wires and cables, their supports above ground and other apparatus used for telephonic or telegraphic communication.

Any references to a building include references to a prospective building. Any references to a building, structure or erection include references to a part of the building, structure or erection. In relation to the extension, alteration or conversion of a building, references to a building are to so much of the building as is comprised in the extension or the subject of the alteration or conversion.

Building Standards Division BSD – The Scottish Government's Building Standards Division – formerly the Scottish Building Standards Agency (SBSA).

Building Warrant – The legal permission to carry out building work, convert or demolish a building.

A warrant granted under Section 9 of the *Building (Scotland) Act 2003* is required for:

a. any work for:

   i) the construction or demolition of or

   ii) the provision of services, fittings or equipment in or in connection with

   iii) a building of a description to which building regulations apply

b. any conversion of a building.

Certification Co-ordinator – An individual registered as responsible for countersigning certificates on behalf of an Approved Body. The Certification Co-ordinator acts as the contact point for the Approved Body and is responsible for maintaining the system of checking, insurance policies, access to documents, training and handling complaints.

Note: *In terms of NICEIC registration, the role of Certification Co-ordinator would equate to a registered Principal Duty Holder.*

Compartment – A part of a building (which may contain one or more rooms, spaces or storeys and includes, where relevant, the space above the top storey of the compartment) constructed so as to prevent the spread of fire to or from another part of the same building; and compartmented and compartmentation should be construed accordingly.

Compartment floor and compartment wall – A floor or a wall with the fire resistance required to ensure compartmentation.

Completion certificate – Is needed to confirm that a building has been constructed, demolished or converted in accordance with the relevant Building Warrant and to comply with the Building Regulations. It is the responsibility of the relevant person (usually the owner, tenant or developer).

Conservatory – Building attached to a dwelling with a door and any other building elements dividing it thermally from that dwelling and having translucent glazing (including frames) forming not less than either:

a. 75% of its roof area and 50% of its external wall area, or

b. 95% of its roof area and 35% of its external wall area.

Construction Product Regulation – It is the UK Government intention to end recognition of the CE mark in GB on 30 June 2025. Current rules, which allow for continued recognition of the CE mark, will remain in place until legislation is laid to end recognition of the CE mark.

To use the UK mark (also known as the UKCA mark), businesses must ensure they are using a UK approved body for testing and certification for all products supplied to the GB market which are covered by a designated standard or conform to a UK technical assessment which has been issued for that product.

Curtilage – Land area within the same occupation.

Different occupation – In relation to two adjoining buildings or parts of one building, means occupation of those buildings by different persons.

Domestic building – A dwelling or dwellings and any common areas associated with the dwelling.

This may be sub-divided as follows:

A **house** is a dwelling on one or more storeys, either detached from or forming part of a building from all other parts of which it is divided vertically.

Example of 3 terraced houses (forming part of a building and divided vertically from one another)

A flat is a dwelling on one storey, forming part of a building from some other part of which it is divided horizontally, and includes a dwelling of which the main entrance door and associated hall are on a different storey from the remainder of the dwelling.

Example of a 3 storey block of flats, with the main entrance door and hall located on the ground floor

A maisonette – A dwelling on more than one storey, forming part of a building from some other part of which it is divided horizontally.

Dwelling – A unit of residential accommodation occupied (whether or not as a sole or main residence) by:

a. an individual or by individuals living together as a family, or

b. not more than six individuals living together as a single household (including a household where care is provided for residents).

Residential accommodation includes any surgeries, consulting rooms, offices or other accommodation, of a floor area not exceeding in the aggregate 50 m^2, forming part of a dwelling and used by an occupant of the dwelling in a professional or business capacity.

Fire-stop – A seal provided to close an imperfection of fit or design tolerance between elements, components or construction so as to restrict the passage of fire and smoke through that imperfection. Fire-stopping and fire-stopped should be construed accordingly.

Functional standards – The standards in the *Building (Scotland) Regulations 2004* (regulation 9, Schedule 5) that must be achieved as detailed.

High rise domestic building – A domestic building with any storey at a height of more than 18 metres above the ground.

Place of special fire risk – Any place within, or attached to, or on the roof of, a building in which there are installed one or more:

a. solid fuel appliances, with a total installed output rating more than 50 kW, other than kitchen appliances, or

b. oil or gas-fired appliances, with a total installed net input rating more than 70 kW, other than kitchen appliances and forced air convection or radiant heaters in buildings which are neither residential nor domestic, or

c. fixed internal combustion engines, including gas turbine engines, with a total output rating more than 45 kW, or

d. oil-immersed electricity transformers or switch gear apparatus with an oil capacity more than 250 litres and operating at a supply voltage more than 1000 volts, or

e. fuel oil storage tanks having a capacity of more than 90 litres, or

f. paint spray booths or rooms where cellulose or other flammable liquid spray is used.

Relevant Person – The relevant person in relation to completion certificates is defined in Section 17(10) of the *Building (Scotland) Act 2003* and can be summarised as:

a. the owner, tenant or developer who has done the building work or conversion themselves; or

b. the owner, tenant or developer who has employed a builder to do the work for them; or

c. the owner, where the tenant, developer or builder has not submitted the certificate when they should have done so.

Residential building – A building, other than a domestic building, having sleeping accommodation. Examples are hostels, halls of residence and hotels.

Residential care building – A building used, or to be used, for the provision of:

a. a care home service; or

b. a school care accommodation service,

Scheme – A certification scheme under the terms of Section 7(2) of the *Building (Scotland) Regulations 2004*. Schemes must be operated by an approved Scheme Provider and must be specific to certain aspects of design or construction. Schemes must not exclude any individual or firm on the basis of membership of a trade association.

Scheme Provider – An organisation that operates one or more schemes, to certificate compliance with Building (Scotland) Regulations for specified aspects of a project.

NICEIC is an approved Scheme Provider for Construction (Electrical Installations to *BS 7671*).

Sheltered housing complex – is defined as:

a. two or more dwellings in the same building; or

b. two or more dwellings on adjacent sites,

where those dwellings are, in each case, designed and constructed for the purpose of providing residential accommodation for people who receive, or who are to receive, a support service; and, for these purposes, 'support service' has the same meaning as in the *Regulation of Care (Scotland) Act 2001*.

Separating floor and separating wall – A floor or wall constructed to prevent the spread of fire between buildings or parts of a building in accordance with Section 2 (Fire) of the Domestic and Non-domestic Technical Handbooks.

Service opening – Any opening to accommodate a duct, pipe, conduit or cable (including fibre optics or similar tubing).

Stand-alone building – Is a building, other than a dwelling, but includes an ancillary building or a part of a building, that is either:

a. detached, or

b. thermally divided from the remainder of the main building and incorporates shut-down control of any heating or cooling system which is linked to any main system, and includes a conservatory.

Storey – That part of a building which is situated between the top of any floor being the lowest floor level within the storey and the top of the floor next above it being the highest floor level within the storey or, if there is no floor above it, between the top of the floor and the ceiling above it or, if there is no ceiling above it, the internal surface of the roof; and for this purpose a gallery or catwalk, or an openwork floor or storage racking, shall be considered to be part of the storey in which it is situated. Upper storey means any storey which is above the level of the ground storey.

Verifier – Appointed to verify that work complies with the *Building (Scotland) Regulations 2004*, both in terms of design and construction. Scottish Ministers have appointed the 32 local authorities in Scotland to act as verifiers for their own geographical areas. The work of verification will usually be undertaken by their building standards departments.

1.1 Effects of notching, drilling, chasing and the like (domestic and non-domestic)

Mandatory Standard 1.1 *– Every building must be designed and constructed in such a way that the loadings that are liable to act on it, taking into account the nature of the ground, will not lead to:*

a) the collapse of the whole or part of the building

b) deformations which would make the building unfit for its intended use, unsafe, or cause damage to other parts of the building or to fittings or to installed equipment, or

c) impairment of the stability of any part of another building.

Limits for holes and notches in a floor joist

Electrical installers often need to drill or notch joists for the passage of cables and their enclosures and when carrying out such work it is essential that the building structure is not weakened.

For guidance on small domestic buildings, not more than three storeys, BSD publishes *The Small Buildings Structural Guidance*[4] (SBSG). Clause 1.D.33 provides guidance regarding chases and clause 1.F.4 of the SBSG provides guidance on drilling and notching joists, which is based on the comprehensive guidance contained in the now withdrawn standard, *BS 5268-2: 2002 Structural use of timber. Code of practice for permissible stress, design, materials and workmanship*.

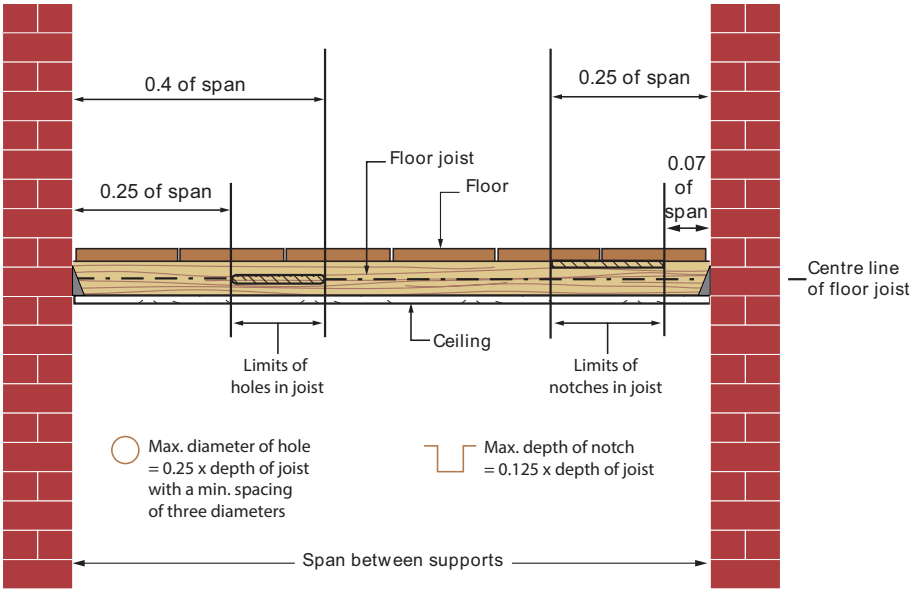
Note: *BS 5268-2: 2002 has been withdrawn and superseded by BS EN 1995-1-1: 2004 + A2: 2014 Eurocode 5. Design of timber structures. General — Common rules and rules for buildings.*

A list of structural Eurocodes and the corresponding British Standards to be withdrawn are contained in Annex 1A of the domestic Technical Handbook.

[4] The Small Buildings Structural Guidance can be downloaded from: www.gov.scot/Topics/Built-Environment/Building/Building-standards/publications.

Clause 1.F.4 of the SBSG provides guidance on drilling and notching simply supported floor and flat roof joists, which is based on the comprehensive guidance contained in *BS 5268-2: 2002**. Refer to detail A, B and C in the following pages.

Limits for holes and notches in a floor joist



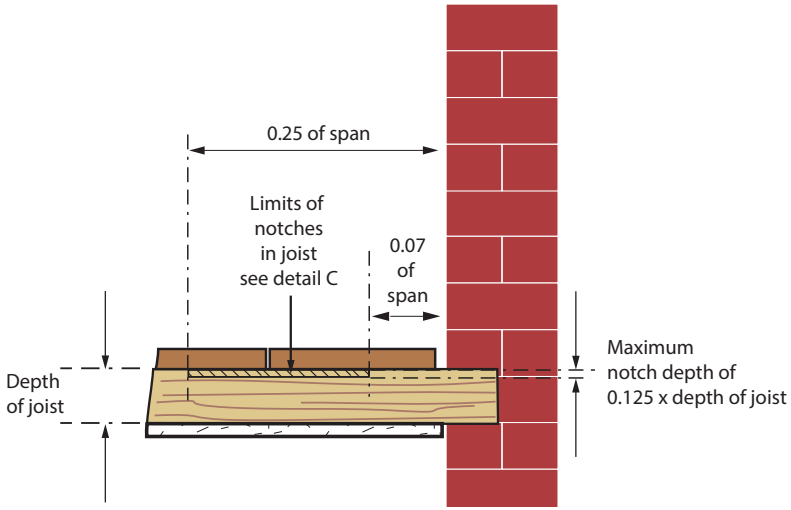
NOT TO SCALE

Note: *For further information on the structural performance of timbers, refer to the Timber Research and Development Association (www.trada.co.uk).*

Notches in simply supported floor and flat roof joists should be within the following limits:

- no deeper than 0.125 times the depth of a joist
- not closer to the support than 0.07 of the span
- not further away from the support than 0.25 times the span.

Limits of notches in a floor joist, detail A



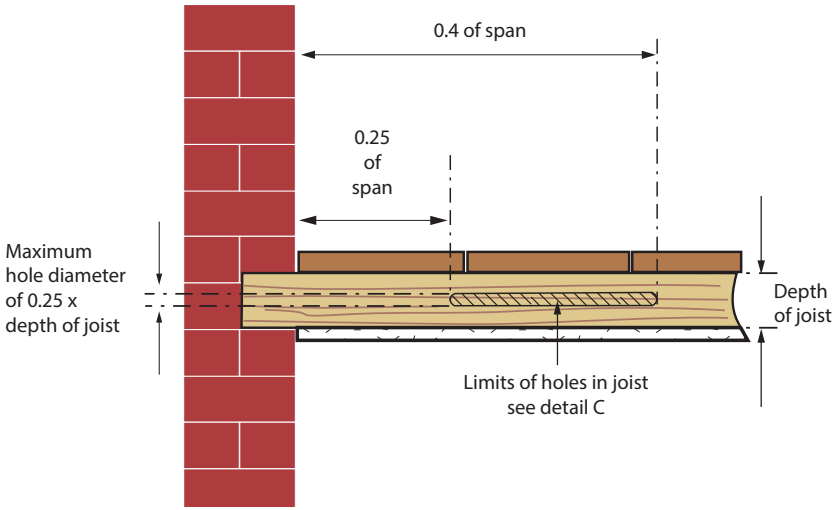
Holes should be within the following limits:

- no greater diameter than 0.25 times the depth of the joist
- made at the neutral axis (where the joist is under least tension, normally at the centre line of the joist depth)
- not less than 3 diameters (centre-to-centre) apart
- located between 0.25 and 0.4 times the span from the support.

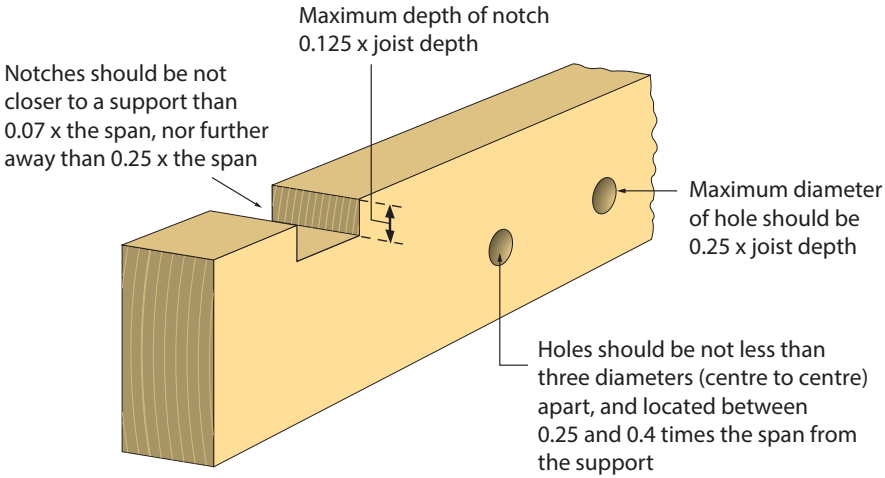
Holes and notches should not be made outside of the above limitations without the approval of a structural engineer.

Note: *Wherever possible, existing holes and notches should be re-used so that the cutting of new holes or notches is minimised.*

Limits of holes in a floor joist, detail B



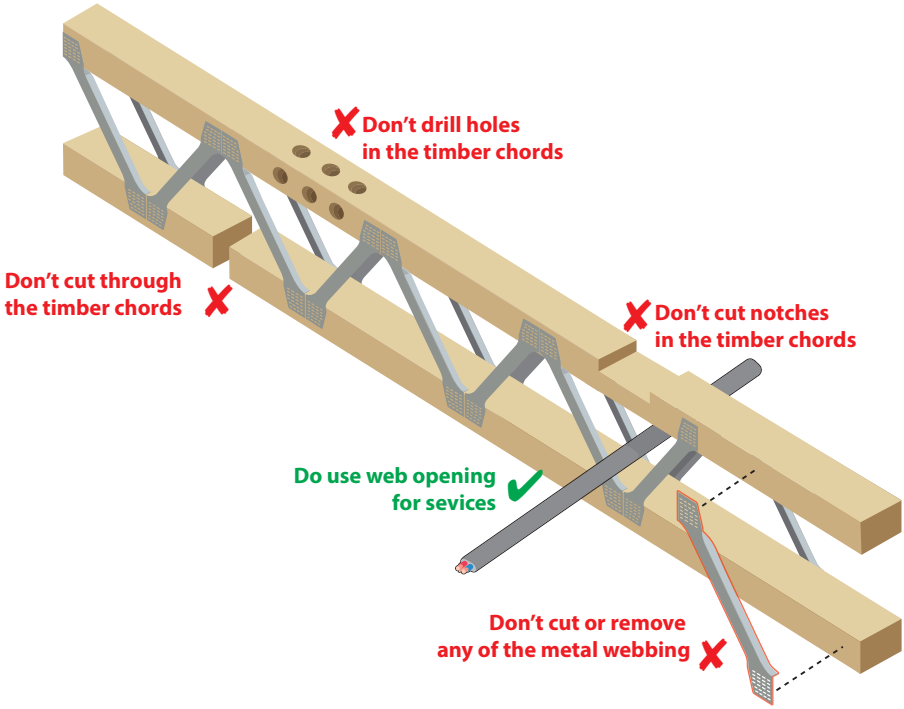
Holes and notches in a floor joist, detail C

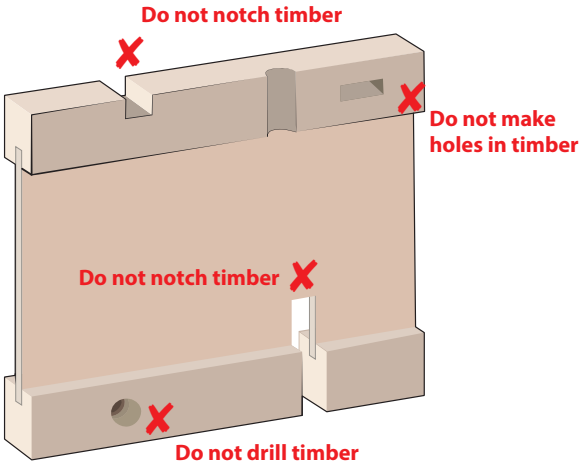


With the ever evolving modernization of construction materials and construction practices, it is now common to see various types of joists in use, other than traditional solid timber joists. These include Metal web joists, I joists or JJI joists and Glulam joists.

Drilling requirements differ, depending on the joist construction.

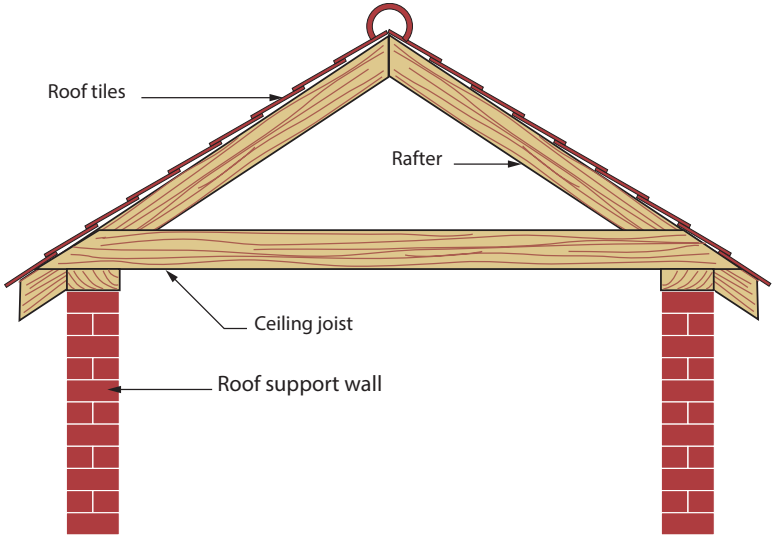
Some examples are shown below. However, manufacturers guidance should always be obtained.





Roof rafters

To prevent damage to the roof structure, no notches or holes should be cut or modifications made to any roof members (rafters, joists, ceiling ties, hangers, braces and the like) when carrying out any electrical installation work.



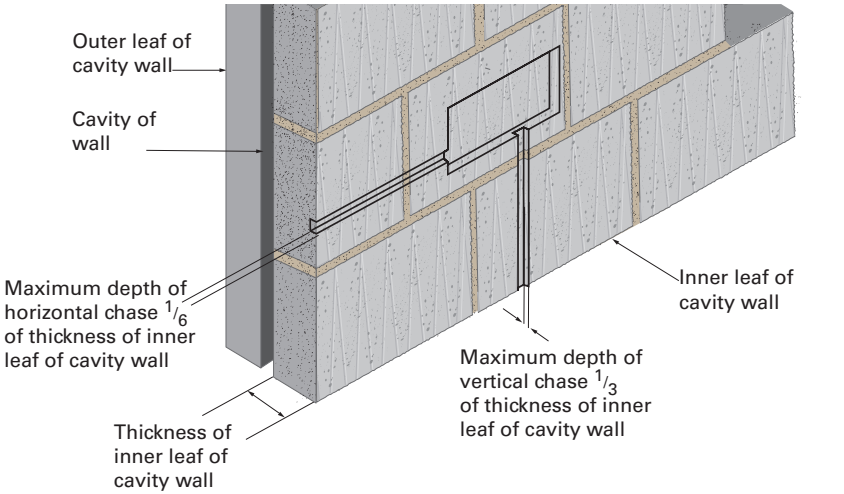
Note: Notches or holes should NOT be cut in roof rafters

NOT TO SCALE

Chases (raggles) in the leaf of a cavity wall

Examples of good practice as regards chases (raggles) in a structure are:

- where block masonry is less than 75 mm thick, no chases should be cut,
- where hollow blocks are used, a 15 mm depth of block material should be retained between the back of the chase and a void or voids within the block, and
- where chases are made on each side of a wall, the chases should be offset by a distance at least equal to the thickness of the wall.



Vertical chases should not be deeper than ⅓ of the wall thickness or, in cavity walls, ⅓ of the thickness of the leaf, and horizontal chases should not be deeper than ⅙ of the thickness of the wall or leaf.

Note: *For domestic installations Clause 1.D.33 of the SBSG refers.*

Requirements of *BS 7671*

Regulation 527.1.2 requires wiring systems to be installed so that the general structural performance and fire safety of buildings are not reduced.

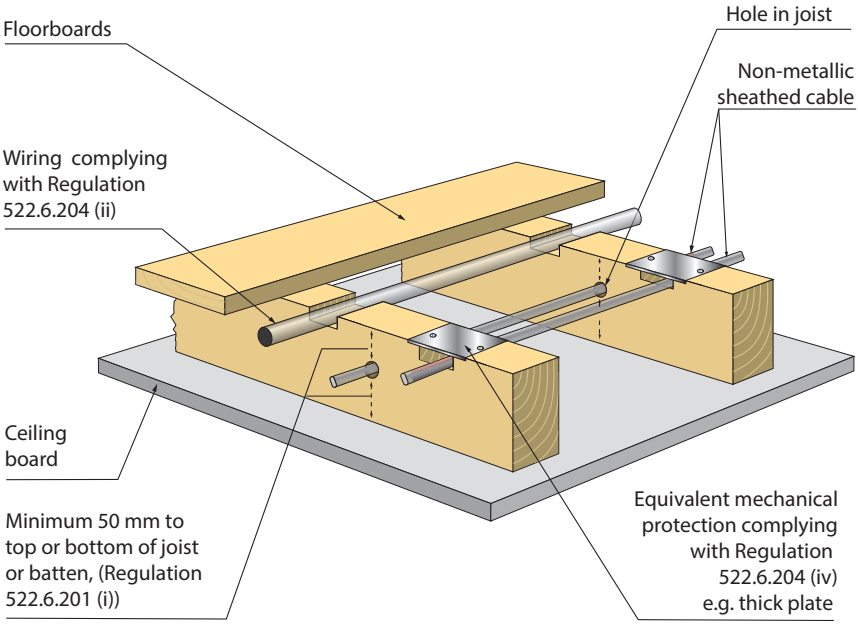
Section 522 of *BS 7671* contains requirements for the installation of cables and wiring systems. Regulation 522.6.201 requires that a cable installed under a floor or above a ceiling is routed so that it is not liable to be damaged by contact with the floor, the ceiling or any of their fixings. The regulation also requires that where a cable has to pass through a timber joist within a floor or ceiling construction, or through a ceiling batten, as shown in the following illustration, the cable must either:

1. be at least 50 mm measured vertically from the top, or bottom, of the joist or batten, or
2. comply with Regulation 522.6.204

(Compliance requires that a low voltage (230 V) cable is either installed in an earthed metallic conduit or ducting or is of a type having an earthed metallic sheath, otherwise the cable needs to be protected against mechanical damage.)

Cables in floor joists

Regulation 522.6.202 requires that where a cable is installed at a depth of less than 50 mm from the surface of a wall or partition, that has an internal construction which does not contain significant metal parts, then the cable should be installed in the prescribed zones (shown overleaf) and be provided with additional protection by means of an RCD as recognised in Regulation group 415. Alternatively, the cable and its installation may be a type conforming to the requirements of Regulation 522.6.204.



The position and size of holes and notches in joists etc is subject to the requirement of the Building Regulations

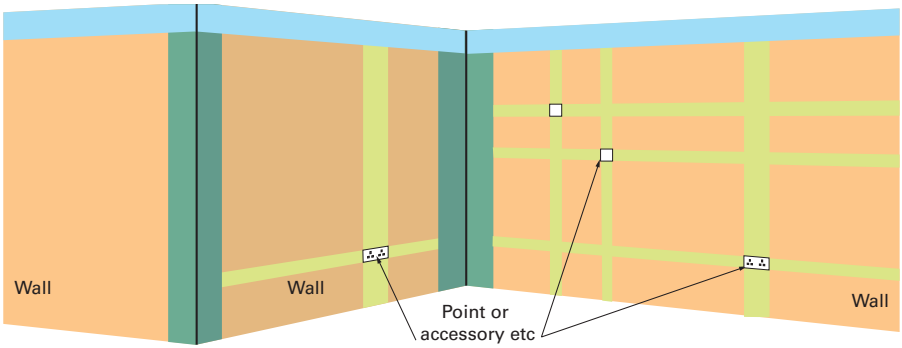
The zones detailed in Regulation 522.6.202

Where a cable is concealed within a wall or partition having an internal construction containing significant metal parts, Regulation 522.6.203 requires that irrespective of the depth of the cable from the surface of the wall or partition, the cable shall:

i) be provided with additional protection by means of an RCD having the characteristics specified in Regulation 415.1.1, or

ii) comply with requirements of Regulation 522.6.204.

In addition, for a cable installed at a depth of 50 mm or less from the surface of a wall or partition containing significant metal parts, the requirements of Regulation 522.6.202 are also applicable.



Zone within 150 mm of the top of the wall

Zone within 150 mm of an angle formed by adjoining walls or partitions

Zone either horizontally or vertically, to the point, accessory or switchgear on the surface of the wall or partition, to which the cable is connected

2.0.1 Background

Buildings should be designed and constructed to minimise the risk of fire, and if a fire does occur it should be sufficiently restricted to enable occupants to escape safely and fire-fighters to deal with the fire safely and effectively.

2.0.2 Aims

The guidance contained in Section 2 of the Technical Handbooks is intended to achieve the following objectives in the event of an outbreak of fire within buildings:

- protect life
- assist the fire and rescue services
- further the achievement of sustainable development

In view of the particular risks posed by certain types of buildings, such as residential care, hospitals and enclosed shopping centres, additional guidance is contained in Annexes 2.A, 2.B and 2.C, respectively, of the non-domestic Technical Handbook, and is intended to be applied in addition to the guidance provided for the Mandatory Standards 2.1 to 2.15.

Alternative approaches to those provided in the Technical Handbooks are acceptable and in some cases may be necessary, particularly, for buildings outside the scope of the Handbooks or those where evacuation presents particular security issues, such as prisons, detention centres or mental health premises. However, where an alternative approach or solution is used, it should, as a minimum, achieve the same level of safety as the guidance contained in the Technical Handbooks (Clause 2.0.7 refers).

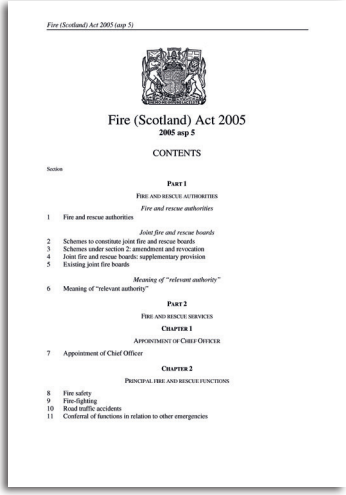
Guidance on fire safety engineering is contained within *BS 7974: Application of fire safety engineering principles to the design of buildings*.

Alternative approaches to fire safety will not always require the appointment of a fire engineer. In view of this, guidance is provided in the Scottish Building Standards Division (BSD) document: A Simplified Approach To Alternative Fire Safety Strategies, which can be downloaded from *www.scotland.gov.uk/bsd*

2.0.8 Relevant legislation

Fire (Scotland) Act 2005

For non-domestic buildings, Part 3 of the *Fire (Scotland) Act 2005*, as amended, requires a fire safety risk assessment to be carried out and continuously reviewed. For a domestic dwelling, a fire risk assessment as detailed in the *Fire (Scotland) Act 2005* is generally not necessary (Clause 78(2(a)) refers, but may be required for certain domestic buildings such as houses in multiple occupation (HMOs) or rented premises.


Fire (Scotland) Act 2005 (asp 5)

Fire (Scotland) Act 2005
2005 asp 5

CONTENTS

Section

PART 1
FIRE AND RESCUE AUTHORITIES
Fire and rescue authorities
1 Fire and rescue authorities
Joint fire and rescue boards
2 Schemes to constitute joint fire and rescue boards
3 Schemes under section 2: amendment and revocation
4 Joint fire and rescue boards: supplementary provision
5 Existing joint fire boards
Meaning of "relevant authority"
6 Meaning of "relevant authority"

PART 2
FIRE AND RESCUE SERVICES
CHAPTER 1
APPOINTMENT OF CHIEF OFFICER
7 Appointment of Chief Officer
CHAPTER 2
PRINCIPAL FIRE AND RESCUE FUNCTIONS
8 Fire safety
9 Fire-fighting
10 Road traffic accidents
11 Conferral of functions in relation to other emergencies

Landlords in the private rented sector are legally responsible for ensuring satisfactory detection and warning of fires is provided and maintained in accordance with the Repairing Standard (Section 13(5) of the *Housing (Scotland) Act 2006* refers).

Note: *For HMOs that are dwellings the guidance contained in the domestic Technical Handbook should be followed.*

A Fire Safety Design Summary (FSDS) should accompany a completion certificate relating to the construction of, or conversion to, a new non–domestic building including extensions to existing buildings. The purpose of the FSDS is to provide those responsible for the fire safety of the building (Responsible person) with information about the fire safety measures that have been incorporated into the building and the fire safety design assumptions that have been made (Regulation 41, of the *Building (Procedure) (Scotland) Regulations 2004*, as amended, refers).

Note: *For further details on the requirements of the Repairing Standard refer to: www.gov.scot/policies/private-renting/dispute-resolution*

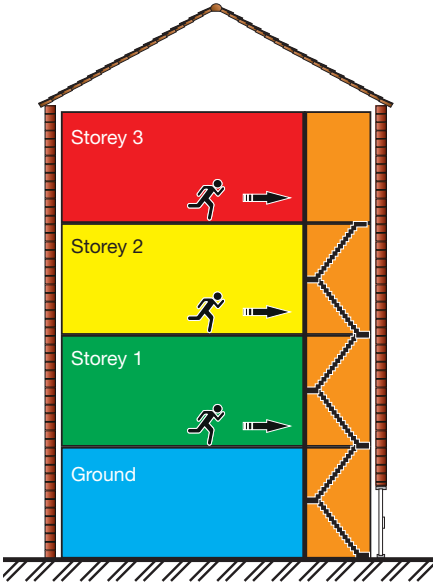
2.1 Compartmentation (non-domestic)

Mandatory Standard 2.1 *– Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, fire and smoke are inhibited from spreading beyond the compartment of origin until any occupants have had the time to leave that compartment and any fire containment measures have been initiated.*

2.1.0 Introduction

Dividing buildings into separate fire compartments helps to minimise the spread of fire by providing fire tight sections which form barriers to the products of combustion; smoke, heat and toxic gases. Restricting fire from spreading to other areas of the building not only protects occupants but also protects property. Therefore, it is essential that the integrity of elements forming part of a compartment such as walls, floors and ceilings, are not compromised during building works.

Example of a building divided into fire compartments



Guidance on the maximum area and minimum fire resistance of compartments for both single and multi-storey buildings is contained in Clause 2.1.1 of the non-domestic Technical Handbook (Tables 2.1 and 2.2 refer).

Information for establishing the resistance to fire of a building element or component is contained in Annex 2.D (non-domestic) and Annex 2.A (domestic) of the Technical Handbooks, and is based on the following classification of fire resistant durations, in minutes:

- Short duration - 30 mins
- Medium duration - 60 mins
- Long duration - 120 mins.

2.1.5 Residential buildings

In a residential building, every upper storey (storey above the ground floor) and every basement storey should form a separate compartment.

2.1.6 and 2.1.7 High rise buildings and basements

For high rise buildings, each floor at a storey height of 18 m above ground level should be a compartment floor, and in a building that has a basement storey, the floor of the ground storey should be a compartment floor.

Where the building has one basement and not more than two other storeys, the ground floor is not required to be a compartment as long as no storey has a floor area greater than 280 m^2.

Note: *Every basement storey having a depth exceeding 10 m should form a separate fire compartment.*

2.1.8 Places of special fire risk

Compartment walls enclosing a place of special fire risk should have a fire resistance of medium duration. A place of special fire risk is any place within in a building (or attached to it) having one or more of the following installed:

a. solid fuel appliances, with a total installed output rating more than 50 kW, other than kitchen appliances, or

b. oil or gas fired appliances, with a total installed net input rating more than 70 kW, other than kitchen appliances and forced air convection or radiant heaters in buildings which are neither residential nor domestic, or

c. fixed internal combustion engines, including gas turbine engines, with a total output rating more than 45 kW, or

d. oil-immersed electricity transformers or switch gear apparatus with an oil capacity more than 250 litres and operating at a supply voltage more than 1000 volts, or

e. fuel oil storage tanks having a capacity of more than 90 litres, or

f. paint spray booths or rooms where cellulose or other flammable liquid spray is used.

Note: *This guidance does not apply to a paint spray booth (or to a room where cellulose or other flammable liquid spray is used) where the floor area does not exceed 100 m², and the booth/room is constructed of prefabricated factory-made panels and satisfies the recommendations contained in the Health and Safety Executive Guidance Note PM25 Vehicle finishing units fire and explosion hazards.*

2.1.14 Openings and service penetrations

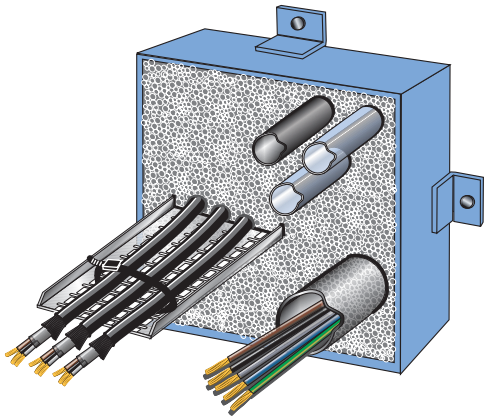
Openings and service penetrations in compartment walls and floors (including fire resisting ceilings) can pose a significant threat to the fire safety of a building, and as such should be kept to a minimum. Where such penetration is required, the compartment should be fire-stopped in a manner that provides, as a minimum, the same level of protection that was afforded by the un-perforated wall/floor.

For a service opening (other than a ventilating duct) this may be achieved by using:

- a casing which has at least the appropriate fire resistance from the outside, or
- a casing which has at least half the appropriate fire resistance from each side, or
- an automatic heat activated sealing device that will maintain the appropriate fire resistance in respect of the integrity for the wall or floor regardless of the opening size.

For external sealing, various types of fire-stopping solution can be used, including intumescent mastics, compounds, metal sleeves and fire-resistant sponge-filled multi-service boxes.

Example of a fire-resistant sponge-filled multi-service box



Fire-stopping may be necessary to close an imperfection of fit or design tolerance between construction elements and components, service openings and ventilation ducts.

Where services pass through a separating floor or wall, fire-stopping need not be provided for the following:

- a pipe or a cable with a bore, or diameter, not exceeding 40 mm, or
- up to four pipes or cables, having diameters not exceeding 40 mm, that are at least 40 mm apart and at least 100 mm from any other pipe, or
- more than four pipes or cables, having diameters not exceeding 40 mm, that are at least 100 mm apart.

Where differential movement is anticipated, either in normal use or during fire exposure, proprietary fire-stopping products may be used.

The following materials may also be considered appropriate for use: cement mortar; gypsum based plaster; cement or gypsum based vermiculite/perlite mixes; mineral fibre; crushed rock and blast furnace slag or ceramic based products (with or without resin binders).

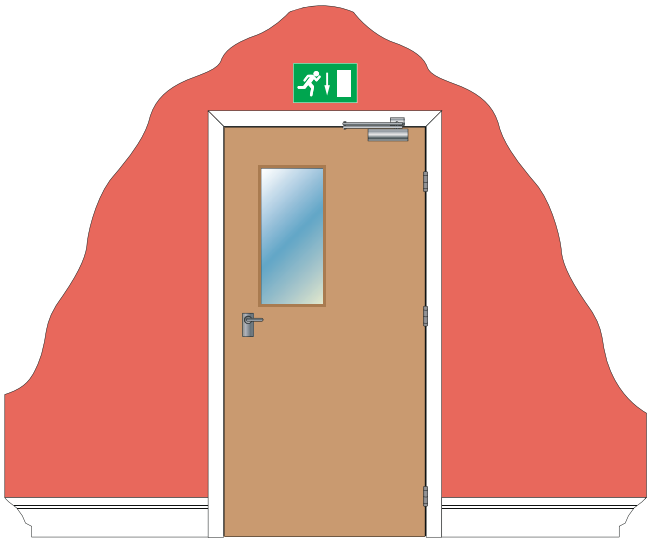
Note 1: *Although a product may carry a 'fire rating' this does not necessarily qualify it as a suitable fire-stopping product.*

Note 2: *Before any fire stopping product is applied, that will be in direct contact with cable insulation, it must be verified that the product is suitable for this application and that it will have no detrimental effects on the cables / won't cause degradation of the cable insulation.*

Guidance on establishing the resistance to fire of a building element or component is contained in the Technical Handbooks (Annex 2.D (non-domestic) and Annex 2.A (domestic) refer).

Self-closing fire doors

To prevent fire and smoke spreading from one compartment to another, a self-closing door (a fire door fitted to close automatically from any angle of swing) having a fire resistance duration equivalent to the compartment walls should be installed (Clause 2.1.14 of the Technical Handbook (non-domestic) refers).



A self-closing fire door may be fitted with an electrically operated hold-open device, as specified in *BS 5839-3: Fire detection and alarm systems for buildings. Specification for automatic release mechanisms for certain fire protection equipment*. However, where an electrically operated hold-open device is installed, it should de-activate on operation of the fire alarm.

The device should de-activate on operation of an automatic fire alarm system, designed and installed in accordance with *BS 5839-1*, or manual operation of a switch fitted at the door or loss of power to the hold-open device or switch.

Note: *A hold-open device should not be fitted to an emergency door, a protected door serving the only escape stair in the building (or the only escape stair serving part of the building) or a protected door serving a fire-fighting shaft.*

Requirements of *BS 7671*

Requirements regarding the selection and erection of wiring systems to minimise the spread of fire are contained in Section 527 of *BS 7671* and are divided into the following Regulation Groups:

Regulation Group 527.1 – Precautions within a fire-segregated compartment

This Regulation Group includes the following:

Regulation	Summary of the Requirement
527.1.2	That the installation of a wiring system does not reduce the structural performance or fire safety of the building.
527.1.4	Cables that pass between fire compartments should comply with the flame propagation requirements of *BS EN 60332-1-2*. Where they do not comply with *BS EN 60332-1-2*, they should be limited to short lengths for the connection of appliances.
527.1.5	No special precautions are required where a trunking or conduit is installed that complies with the resistance to flame propagation requirements identified in Regulation 527.1.5 (such as for example, a type complying with the *BS EN 50085* series or the *BS EN 61386* series).

Regulation Group 527.2 - Sealing of wiring system penetrations

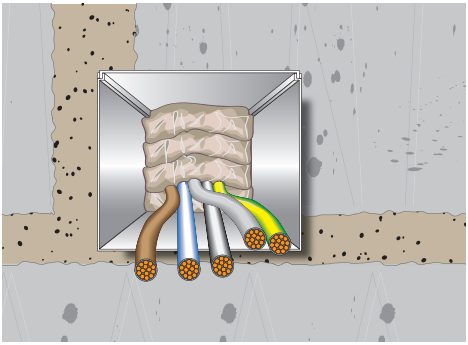
This Regulation Group includes the following:

Regulation	Summary of the Requirement
527.2.1	Openings around a wiring system, where it penetrates the building fabric, should be fire-stopped to a standard at least equivalent to the unperforated wall, floor, or other similar element.
527.2.1.1	Temporary sealing arrangements should be provided during erection, as appropriate.

Regulation	Summary of the Requirement
527.2.2	Where a wiring system penetrates a wall, floor, roof or similar, the wiring system should, in addition to any external fire-stopping, be sealed internally to the equivalent standard.
527.2.3	Internal sealing is not required for a non-flame propagating wiring system which has an internal cross-sectional area of less than 710 mm^2 (this includes conduits up to 32 mm^2) if it satisfies the test requirements of the regulation.

Regulation 527.2.4 requires that any sealing arrangement intended to satisfy the requirements of Regulations 527.2.1 or 527.2.1.1 should provide the same level of protection against external influences as the wiring system in which it is installed and additionally should satisfy the following requirements:

- be resistant to the products of combustion to the same extent as the elements of building construction which have been penetrated, and
- provide the same degree of protection from water penetration as that required for the building construction element in which it has been installed, and
- be compatible with the material of the wiring system with which it is in contact, and
- permit thermal movement of the wiring system without reduction of the sealing quality, and
- be of adequate mechanical stability to withstand the stresses which may arise through damage to the support of the wiring system due to fire.



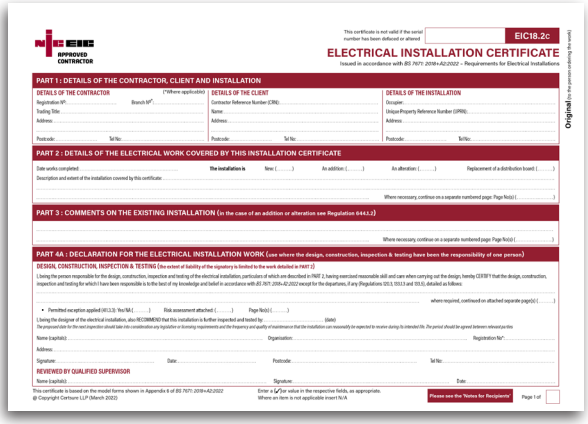
Internal sealing of wiring systems (Regulation 527.2.2)

With regard to alteration work, Regulation 527.2.1.2 requires any sealing that has been disturbed to be reinstated as soon as practicable. Reinstatement should use the same types of materials/components as were originally used. Mixing and matching of systems and components is not supported by manufacturers' fire test data. If the original seal cannot be identified or sourced, the whole seal should be replaced.

Confirmation of the presence of fire barriers, suitable seals and protection against thermal effects is specifically required on the schedule of inspections which forms an integral part of NICEIC Electrical Installation Certificates and Condition Reports.

NICEIC certificates and reports

i) Electrical Installation Certificate



ELECTRICAL INSTALLATION CERTIFICATE

EIC18.2c

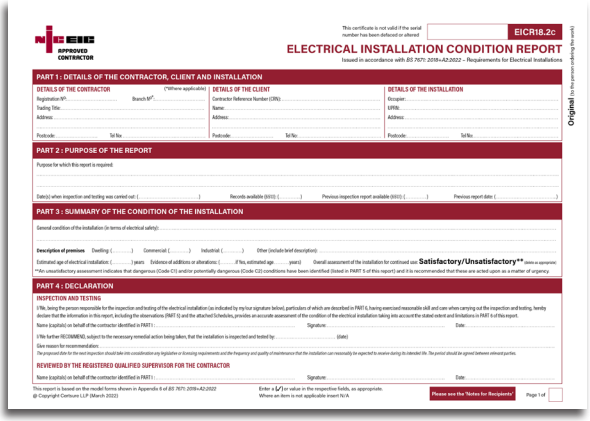
PART 1 : DETAILS OF THE CONTRACTOR, CLIENT AND INSTALLATION

PART 2 : DETAILS OF THE ELECTRICAL WORK COVERED BY THIS INSTALLATION CERTIFICATE

PART 3 : COMMENTS ON THE EXISTING INSTALLATION (in the case of an addition or alteration see Regulation 644.1.2)

PART 4A : DECLARATION FOR THE ELECTRICAL INSTALLATION WORK (see where the design, construction, inspection & testing have been the responsibility of one person)

ii) Electrical Installation Condition Report



ELECTRICAL INSTALLATION CONDITION REPORT

EICR18.2c

PART 1 : DETAILS OF THE CONTRACTOR, CLIENT AND INSTALLATION

PART 2 : PURPOSE OF THE REPORT

PART 3 : SUMMARY OF THE CONDITION OF THE INSTALLATION

PART 4 : DECLARATION

2.2 Separation (domestic and non-domestic)

Mandatory Standard 2.2 *– Every building, which is divided into more than one area of different occupation, must be designed and constructed in such a way that in the event of an outbreak of fire within the building, fire and smoke are inhibited from spreading beyond the area of occupation where the fire originated.*

2.2.0 Introduction

To minimise the risk of fire spreading, fire separation should be provided between dwellings or between dwellings and common spaces to form a complete barrier to the products of combustion (smoke, heat and toxic gases).

Buildings or parts of a building in different occupation pose particular problems in terms of fire safety, because one occupier usually does not have any control over the activities or working practices of their co-occupiers. In such circumstances, separating walls and separating floors restrict fire growth and thereby give adjoining occupiers more time to escape before they are threatened by fire or smoke.

Separating walls and separating floors should, as a minimum, have a fire resistance of medium duration, but a higher duration may be required in some cases such as, for example, in high rise buildings. For guidance on minimum fire durations refer to Tables 2.1 and 2.2 of the non-domestic Technical Handbook.

Note: *A high rise domestic building, is a domestic building with any storey at a height of more than 18 metres above the ground.*

2.2.6 & 2.2.4 Combustibility (domestic and non-domestic Technical Handbooks, respectively)

To reduce the risk of a fire starting within a combustible separating wall or a fire spreading rapidly on or within the wall construction:

- insulation material exposed in a cavity should be constructed from materials which are non-combustible or of a low risk classification,
- the internal wall linings should be constructed from materials which are non-combustible or of a low risk classification, and
- the wall should contain no pipes, wiring or other services.

Downlighters (recessed luminaires) installed in ceilings

Although no specific guidance on downlighters is contained in the Technical Handbooks, the integrity of a lining which provides the sole barrier for preventing the spread of smoke and heat into the cavity must be maintained. In view of this, it is recommended that downlighters recessed into ceilings which are intended to provide the fire barrier, such as the plasterboard ceilings in typical domestic premises, are of a type having integral fire protection.

For guidance on the installation of downlighters, and flush mounted accessories, within domestic premises, refer to the Electrical Safety First Best Practice Guide No 5: *Electrical installations and their impact on the fire performance of buildings: Part 1 - Domestic premises*, which can be downloaded from: *www.electricalsafetyfirst.org.uk*

Note: *For guidance on the fire protection of openings and service penetrations refer to 2.1.14 of this guide.*

2.3 Structural protection (domestic and non-domestic)

Mandatory Standard 2.3 *- Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, the load-bearing capacity of the building will continue to function until all occupants have escaped, or been assisted to escape, from the building and any fire containment measures have been initiated.*

2.3.0 Introduction

The purpose of structural fire protection is to minimise the risk to the occupants, some of whom may not evacuate the building immediately, and to reduce the risk to those engaged in fire-fighting or rescue operations.

2.3.4 Openings and service penetrations

In general, openings and service penetrations in elements of a structure need not be protected from fire unless there is a possibility of structural failure. Where a large opening or a large number of small openings are formed, it should be confirmed that the load bearing capacity of the element of the structure has not been compromised.

Refer to the guidance given in Mandatory Standard 1.1 of this guide.

Requirements of *BS 7671*

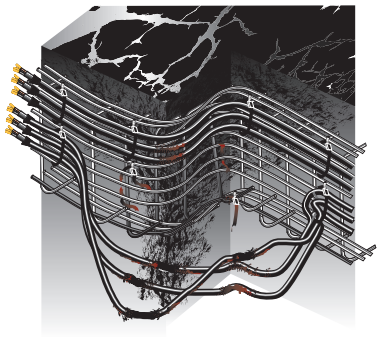
Regulation 527.1.2 of *BS 7671* requires the installation of wiring systems to be such that the general structural performance and fire safety of buildings are not reduced.

In particular, as a consequence of early failure of non-metallic cable supports and trunking in the conditions of fire, cables may fall and hang across doorways, corridors and staircases and in doing so obstruct both those escaping and those, such as fire and rescues services, entering the building.

To minimise the risk of cables falling and obstructing escape routes, Regulation 521.10.202 requires wiring systems in escape routes to have suitable fire-resistant supports or retention. In effect, this requirement prohibits the use of non-metallic supports such as plastic cable clips, ties, or trunking as the sole means of support for wiring systems in escape routes, and applies to all wiring systems including data and communications services.

Premature collapse of cables

Irrespective of the installation type (domestic or non-domestic) or size, the requirements of Regulation 521.10.202 apply wherever there is a risk of cables falling and hindering escape or fire-fighting activities.



2.4 Cavities (domestic and non-domestic)

Mandatory Standard 2.4 *– Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.*

2.4.0 Introduction

A cavity is a concealed space enclosed by elements of a building (including a suspended ceiling) or contained within a building element. A cavity includes a roof space, a service riser or any other space used to run services around a building, but does not include:

- a space within a chute, duct, pipe or conduit, or
- a circulation space, or
- a stair enclosure, or
- a lift well.

The surface(s) of a cavity includes the enclosing envelope including the insulation material but does not include cables, conduits or pipes.

For guidance on minimising the spread of fire and smoke refer to 2.1 of this guide.

2.5 Internal linings (domestic and non-domestic)

Mandatory Standard 2.5 *- Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, the development of fire and smoke from the surfaces of walls and ceilings within the area of origin is inhibited.*

2.5.4 Thermoplastic material

Thermoplastic materials can rapidly increase the fire growth rate and the smoke produced, therefore, the use of thermoplastic materials in ceilings, roof lights and lighting diffusers should be limited and should not be used in protected zones or fire-fighting shafts.

The types of thermoplastic materials referred to in Clause 2.5.4 of the Technical Handbooks are as follows:

- Rigid Thermal Plastic TP(a)
- Flexible Thermoplastic TP(a)
- Semi-rigid Thermoplastic TP(b)

Note: *A thermoplastic material is any synthetic material that has a softening point below 200 ºC when tested in accordance with BS EN ISO 306.*

2.5.7 Thermoplastic materials in light fittings with diffusers

The use of thermoplastic materials is permitted in light fittings with diffusers. Where the lighting diffuser forms an integral part of the ceiling it should be installed in accordance with the following recommendations:

Table 2.5 Thermoplastic rooflights and light fittings with diffusers

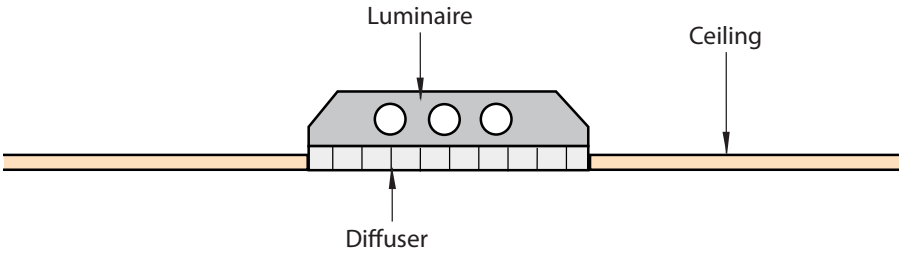
Classification of lower surface	Protected zone or fire-fighting shaft	Unprotected zone		Room		
	Any thermoplastic	TP(a) rigid	TP(a) flexible and TP(b)	TP(a) rigid	TP(a) flexible and TP(b)	TP(b)
Maximum area of each diffuser panel or rooflight (m^2)	Not advised	No limit	5 m^2	No limit	5 m^2	1 m^2
Maximum total area of diffuser panels or rooflights as a percentage of the floor area of the space in which the ceiling is located (%)	Not advised	No limit	15%	No limit	50%	50%

Classification of lower surface	Protected zone or fire-fighting shaft	Unprotected zone		Room		
	Any thermoplastic	TP(a) rigid	TP(a) flexible and TP(b)	TP(a) rigid	TP(a) flexible and TP(b)	TP(b)
Minimum separation distance between diffuser panels or rooflights (m)	Not advised	No limit	3 m	No limit	3 m	A distance equal to the largest plan dimension of the largest diffuser or rooflight

Notes:

1. Smaller panels can be grouped together provided that the overall size of the group and the space between any others, satisfies the dimensions shown in the following diagram on layout restrictions.
2. The minimum 3 m separation in the diagram overleaf (see 'Layout restrictions on thermoplastic rooflights and light fittings with diffusers') should be maintained between each 5 m^2 panel. In some cases therefore, it may not be possible to use the maximum percentage quoted.
3. TP(a) flexible is not recommended in rooflights.

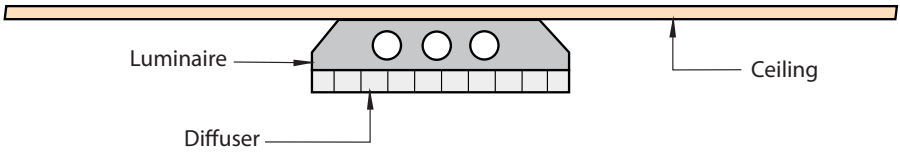
A lighting diffuser forming an integral part of the ceiling



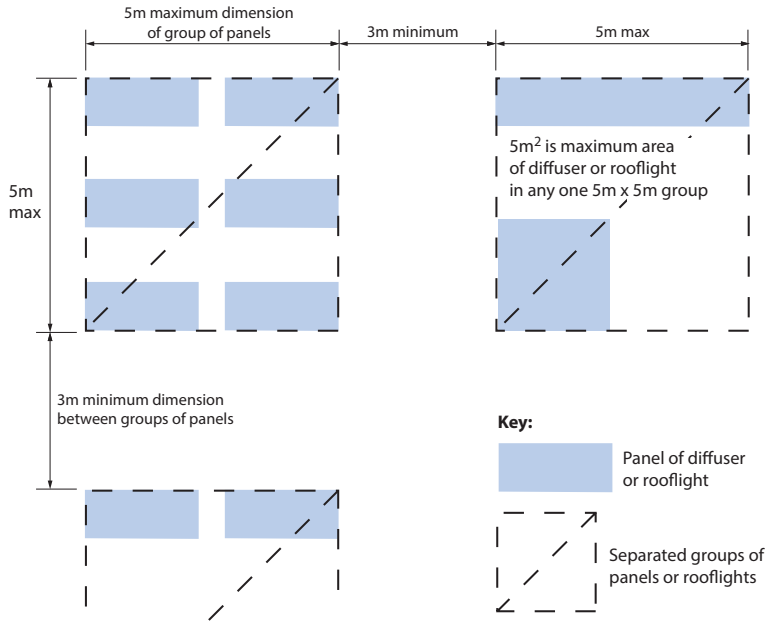
Where lighting diffusers form an integral part of a fire-resisting ceiling, which has been satisfactorily tested, the amount of thermoplastic material is unlimited.

Where light fittings with thermoplastic diffusers do not form an integral part of the ceiling, the amount of thermoplastic material is unlimited provided the lighting diffuser is designed to fall out of its mounting when softened by heat.

A lighting diffuser that does not form an integral part of the ceiling



Layout restrictions on thermoplastic rooflights and light fittings with diffusers



Note: *An illustration of the layout restrictions on small TP(b) rooflights and light fittings with diffusers is provided in Figure 2.2 of the Technical Handbooks.*

Requirements of *BS 7671*

General requirements for protection against fire caused by electrical equipment are contained in Section 421 and now include, under the third amendment of *BS 7671*, a requirement for consumer units and similar switchgear assemblies installed in domestic premises to be manufactured from non-combustible material or be enclosed in a cabinet constructed of non-combustible material (Regulation 421.1.201 refers). A ferrous metal such as steel is an example of a non-combustible material.

The requirement introduced in Regulation 421.1.201, is intended to ensure that if a source of ignition occurs within the enclosure of a consumer unit or switchgear assembly, such as arcing caused by a loose termination for example, it is contained within the non-combustible enclosure and prevented from spreading externally.

On 1st January 2016, it became a requirement for consumer units and similar switchgear assemblies installed in domestic premises to achieve compliance with Regulation 421.1.201.

2.9 Escape (domestic and non-domestic)

Mandatory Standard 2.9 *- Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, the occupants, once alerted to the outbreak of the fire, are provided with the opportunity to escape from the building, before being affected by fire or smoke.*

2.9.0 Introduction

Everyone within a building should be provided with at least one means of escape from the effects of fire and smoke, which offers a safe passage to a place of safety, generally, outside the building. The intention is that in the event of fire the occupants can escape safely from the building without the assistance of the fire and rescue service.

The guidance contained in the Technical Handbooks assumes that occupants can move or be moved to a place of safety. An escape route is defined, generally, as a route by which a person may reach a place of safety (refer to Appendix A of the Technical Handbooks)

Note: *For certain types of premises, such as licensed premises, additional fire safety measures may need to be applied.*

DOMESTIC TECHNICAL HANDBOOK

2.9.1 Escape within dwellings – general principles

The time required to escape a building depends on various factors such as, for example, the layout and size of the particular building. Therefore, the scope of the domestic guidance is limited as follows:

- to an area not exceeding 200 m^2 for an individual storey of a dwelling, and
- to those storeys at a depth of not more than 4.5 m below the adjacent ground level, and
- to those buildings with no storey at a height of more than 60 m (approximately 20 storeys) above the adjacent ground.

Table 2.3 of Clause 2.9.2 provides recommendations for Escape within houses (other than social housing dwellings). Table 2.4 of clause 2.9.2 provides recommendations for Escape within flats and maisonettes (other than social housing dwellings).

Note: *For guidance on travel distances, refer to Clause 2.9.3 of the non-domestic Technical Handbook.*

Although the occupants of dwellings are likely to be familiar with the building layout and the means of escape they may be sleeping, so a fire detection and alarm system should be provided to give the earliest possible warning of fire (refer to Standard 2.11 of this guide).

2.9.7 Escape within dwellings - open plan option with suppression and enhanced early warning

A dwelling having an open plan layout whereby the height of the highest storey is more than 4.5 m above the adjoining ground, and where the kitchen is remote from the exit door, should be provided with an automatic life safety fire suppression system, designed and installed in accordance with *BS 9251** and an enhanced early warning system designed and installed in accordance with *BS 5839-6* (Grade D Category LD1).

Note: *For shelter housing a Grade C system should be installed (Standard 2.11 refers).*

For guidance on automatic fire suppression systems refer to Standard 2.15 of the Technical Handbooks.

NON-DOMESTIC TECHNICAL HANDBOOK

2.9.0 Introduction

In certain circumstances, such as where the travel distance is excessive, a second means of escape should be provided so that occupants can turn away from the fire and make their escape in the other direction.

There may be up to four stages in the process of escape, such as escape from:

- The room of fire origin or escape from the fire where only one direction is possible.
- The compartment of fire origin or until the safety of a fire resisting wall is reached.
- The floor of fire origin to protected zones and escape stairs.
- The building to a place of safety at ground level.

Travel distance, is a measure of the distance that occupants have to travel to reach a protected door, measured along the escape route. Clause 2.9.3 of the non-domestic Technical Handbook provides recommended travel distances for various buildings based on their occupancy profile (Table 2.11 refers).

2.9.5 Head room

An escape route and circulation area should have clear head room of at least 2 m, which in a doorway may be reduced to not less than 1.9 m.

**For the purposes of satisfying Standard 2.9, the limit in the scope of BS 9251 - to buildings below 20 m in height - can be ignored.*

2.9.8 Escape route widths

The width of a passage used as a means of escape also affects the time it takes to escape. To allow occupants to escape safely, the unobstructed width of each individual escape route from a room or a storey should be at least 1.2 m.

Where there is stepped access only, the width may be reduced as follows:

- in buildings with not more than 225 occupants the minimum width may be reduced to 1.1 m, and
- in buildings with not more than 100 occupants the minimum width may be reduced to 1 m.

In view of Clauses 2.9.5 and 2.9.8, electrical installers should give consideration to the height of luminaires and suspended wiring systems, such as trunking and cable tray, and the positioning of electrical switchgear in corridors and stairways of industrial and commercial premises and the communal areas of domestic accommodation.

Note: *The aggregate unobstructed width (in mm) of any escape route from a room, or storey, should be at least: 5.3 x the occupancy capacity of the room or storey.*

2.9.21 Electric locking devices that unlock on electrical power being withdrawn

Locks on exits doors or locks on doors across escape routes present difficulties when assessing the need for security against the need to allow safe egress from a building in the event of a fire. Security measures however should not compromise the ability of the occupants to escape from a building in an emergency.

Electrically powered locks that unlock on loss of the electrical power, referred to as 'fail unlocked, electric locks' may be installed on exit doors and doors across escape routes in buildings which are inaccessible to the general public or, on any door accessible to the general public where the aggregate occupancy capacity of the rooms or storeys served by the door does not exceed 60 persons.

Staff in such areas will need to be trained both in the emergency procedures and in the use of the specific emergency devices fitted.

2.10 Escape lighting (domestic and non-domestic)

Mandatory Standard 2.10 *– Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, illumination is provided to assist in escape.*

2.10.0 Introduction

In accordance with the *Fire Safety (Scotland) Regulations 2006* emergency escape lighting and exit signage may be required in non-domestic buildings and common escape routes in buildings containing flats and maisonettes to assist safe evacuation.

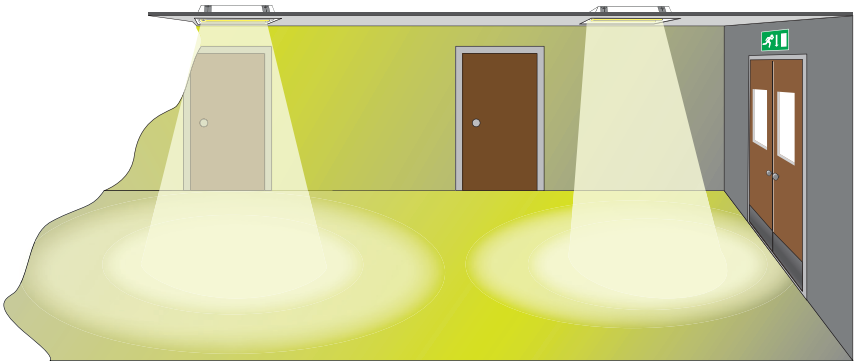
Note: *Escape lighting is not usually required in dwellings as the occupants are assumed to have a degree of familiarity with the building layout.*

2.10.1 Escape route lighting

An emergency escape lighting system should be installed to aid safe evacuation, otherwise every part of an escape route should have artificial lighting supplied by a fire protected circuit that provides a level of illumination not less than that recommended by *BS 5266-1: Code of practice for the emergency lighting of premises*.

A protected circuit is a circuit that originates at the main incoming switch or distribution board and whose conductors are protected against fire (Clause 2.10.2 of the domestic and non-domestic Technical Handbooks refer).

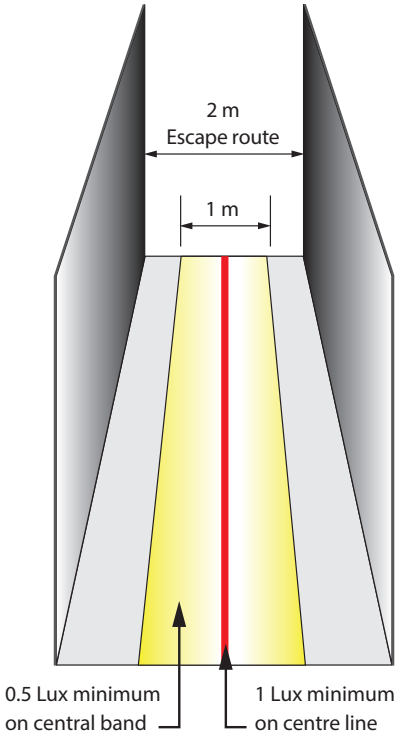
Escape route lighting



For escape routes up to 2 m wide, Clause 5.1.1 of *BS 5266-1* recommends that the horizontal illuminance on the floor along the centre line of an escape route should be at least 1 lux. Wider routes should be treated as a number of 2 m wide strips, or open area anti panic lighting should be provided.

In addition, Clause 4.2.1 of *BS EN 1838-1: Lighting applications - emergency lighting* also requires at least 1 lux to be provided along the centre line of escape routes. As the following illustration shows, the central band of the escape route (consisting of not less than half the width of the route) should be illuminated to at least 50 % of that value.

Minimum values of illuminance along escape routes



Note: *Some occupants, such as the elderly or those with impaired vision, can require more time to perceive objects and adapt to changes of illuminance, so the level of illuminance provided along the escape route(s) may need to be higher than the minimum values specified in BS 5266-1 and BS EN 1838.*

2.10.3 Emergency lighting

Emergency lighting is designed to operate automatically in the event of a local and general power failure, and should be installed according to the building risk assessment. Emergency lighting should be installed in buildings considered to be at higher risk, such as in high rise buildings, buildings with basements or in rooms where the number of people is likely to exceed 60.

In buildings containing flats or maisonettes emergency lighting should be provided in the following areas:

- underground car parks including any protected zone serving it, where less than 30 % of the perimeter of the car park is open to the external air, and
- a protected or unprotected zone serving a basement storey, or a protected or unprotected zone in a high rise domestic building.

Lobbies, protected zones and associated escape routes in high rise domestic buildings should be provided with emergency lighting.

Note: *For buildings considered to be at increased risk, refer to Clause 2.10.3 of the non-domestic Technical Handbook.*

Emergency lighting should be installed in accordance with the relevant requirements and recommendations of the following emergency lighting standards:

- *BS 5266-1: Emergency lighting Part 1: Code of practice for the emergency lighting of premises*, and
- *BS EN 1838: Lighting applications. Emergency lighting*, and
- *BS EN 50172 (BS 5266-8) Emergency escape lighting systems*.

NICEIC publication, *Snags and Solutions Part 4: Emergency Lighting* to *BS 5266* series (4th Edition), provides guidance on the design, installation, inspection, testing, of emergency lighting systems.

Annex 2.A.4 - Additional guidance for escape lighting in residential care buildings

This guidance recommends that **emergency** escape lighting is installed in:

- a room with an occupancy capacity of more than ten and any protected zone or unprotected zone serving such a room,
- a protected zone or unprotected zone serving a storey which has two exits, other than a storey in a building not more than two storeys high with a combined floor area of not more than 300 m^2 and an occupancy capacity of not more than ten, and
- a protected zone or unprotected zone in a single stair building of two storeys or more and occupancy of ten or more.

Annex 2.B.4 - Additional guidance for escape lighting in hospitals

Essential lighting circuits should be installed throughout a hospital and designed to provide not less than 30 % of the normal lighting level. In an area where a 15 second response time would be considered hazardous, (such as a stairway), emergency lighting should be provided by battery back-up giving a response time of not more than 0.5 seconds.

Note: *Separate distribution boards or cabinets should be used for essential and non-essential circuits.*

Annex 2.C.4 - Additional guidance for escape lighting in enclosed shopping centres with malls

An enclosed shopping centre should be provided with emergency lighting in all mall areas and all zones, protected and unprotected.

Note: *Emergency lighting should be installed so that it is not rendered ineffective by smoke filled reservoirs.*

Certification of emergency lighting systems

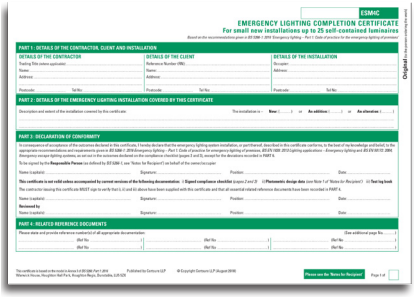
On completion of emergency lighting installation work a certificate should be issued to the client confirming that the particular aspects of the installation, such as the design, construction and verification comply with the relevant requirements and recommendations of *BS 5266-1* and the associated emergency lighting standards listed previously under Clause 2.10.3 of this guide. For such purposes, NICEIC supplies a multiple (four-part) Emergency Lighting Completion Certificate (ELCC).

For smaller emergency lighting installations a simpler alternative to the multiple ELCC may be used. The NICEIC *Emergency Lighting Completion Certificate For small installations and verification of existing installations*, based on the model form in Annex G of *BS 5266-1*, is designed as a single signature certificate for the initial certification of a new emergency lighting installation or for new work associated with an alteration or addition to an existing system, in circumstances where both:

- the design, construction and inspection and testing of the small emergency lighting installation is the sole responsibility of the person/organisation issuing the certificate, and
- the new installation is small, that is comprised of no more than 25 emergency luminaires.

The NICEIC Emergency Lighting Completion Certificate For small installations and verification of existing installations

Where the aspects of design, construction and verification are undertaken by different contractors/parties or where the new emergency lighting installation includes more than 25 emergency luminaires the multiple ELCC should be used.


ESMC

EMERGENCY LIGHTING COMPLETION CERTIFICATE
For small new installations up to 25 self-contained luminaires

PART 1: DETAILS OF THE CONTRACTOR, CLIENT AND INSTALLATION

DETAILS OF THE CONTRACTOR

DETAILS OF THE CLIENT

DETAILS OF THE INSTALLATION

PART 2: DETAILS OF THE EMERGENCY LIGHTING INSTALLATION COVERED BY THIS CERTIFICATE

PART 3: DECLARATION OF CONFORMITY

PART 4: RELATED REFERENCE DOCUMENTS

Please see the Notes for Recipient

Note: *The NICEIC Emergency Lighting Completion Certificate For small installations and verification of existing installations may also be used, as the title suggests, for assessing an existing emergency lighting installation, irrespective of the number of emergency luminaires, for compliance with current emergency lighting standards.*

Requirements of *BS 7671*

Electrical installation work associated with an emergency lighting installation, including an alteration or addition to an existing system, should be certified in accordance with *BS 7671* using a separate Electrical Installation Certificate or Minor Electrical Installation Works Certificate, as appropriate (Regulations 644.1 and 644.4.201 of *BS 7671* refer).

2.11 Communication (domestic and non-domestic)

Mandatory Standard 2.11 *- Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, the occupants are alerted to the outbreak of fire.*

DOMESTIC TECHNICAL HANDBOOK

2.11.1 Fire detection and fire alarm systems

For the purpose of alerting occupants to the outbreak of fire all dwellings should have a Grade D system installed in accordance with *BS 5839-6*[5], comprised of at least the following:

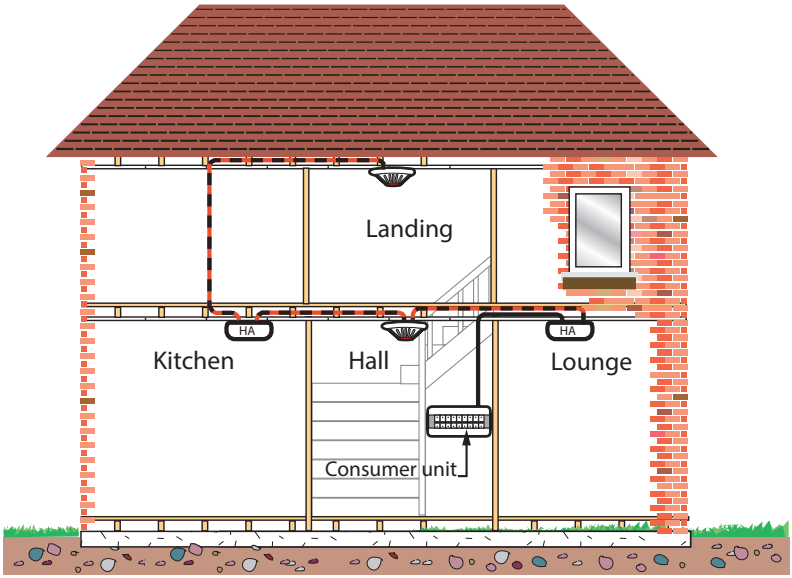
- one heat alarm installed in every kitchen,
- one smoke alarm installed in the principal habitable room,
- one smoke alarm in every circulation space on each storey, such as hallways and landings,
- one smoke alarm in every access room serving an inner room, and
- consideration should also be given to vulnerable areas which may require fire detection e.g., a roof space containing an inverter for a solar PV installation.

An Inner room is a room, other than a kitchen in a dwelling, which does not have a direct access to an exit or direct access to an enclosed circulation area having an exit. Where the inner room has a height of more than 4.5 m the guidance given in Clause 2.9.7 should be followed.

[5] *BS 5839-6: Fire detection and fire alarm systems for buildings, Code of practice for design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises.*

Note: *A principal habitable room is a room that is used frequently by the occupants of a dwelling for general daytime living purposes.*

An example of a Grade D, Category LD2 for a two-storey dwelling having no floor greater than 200 m²



* Interconnection provided, so that all devices give a warning if a fire is detected (see Clause 13.2(c) of *BS 5839-6*)

Note: *Where a dwelling has an individual storey with a floor area exceeding 200 m², a fire safety risk assessment should be undertaken to determine the appropriate measures and system required.*

Owing to the risk of unwanted (false) alarm common areas and dwellings in buildings containing flats or maisonettes should not be interlinked although for sheltered accommodation monitoring equipment should be provided (Clause 2.11.8 refers).

2.11.2 Choice of fire detector

The type of detector chosen should take into account the risk of unwanted (false) alarms. General guidance on the use of different types of detector is summarised in the following table (Clauses 2.11.3 to 2.11.6 of the domestic Technical Handbook refers).

Types of detectors

Type	Standard	Brief summary of recommended use
Optical smoke detector	*BS EN 14604*	Less sensitive to cooking fumes so recommended in spaces near kitchens.
Ionisation smoke detector	*BS EN 14604*	Less sensitive to steam so recommended in spaces near bathrooms/shower rooms.
Heat detector	*BS 5446-2*	Less sensitive to rapidly fluctuating ambient temperatures so recommended in kitchens.

A multi-sensor fire detector may also be used. Such devices, through combining the characteristics of different types of detector can help to reduce unwanted alarms.

Note: *A heat alarm is not designed to provide warning of the presence of smoke and so should not be used instead of a smoke alarm to prevent unwanted alarm.*

Carbon monoxide fire detectors

Carbon monoxide (CO) detectors to *BS EN 54-26* may be installed in any room of a dwelling other than a kitchen. They are sensitive to smouldering fires, and generally respond to most fires faster than heat detectors, and are more resistant to environmental influences such dust, steam and cigarette smoke.

However, CO detectors have an anticipated working life of approximately seven years (due to the sensor element requiring replacement), so as expressed in Clause 10.2 (e) of *BS 5839-6* CO fire detectors, or multi-sensor detectors incorporating a carbon monoxide sensor, should not be used unless:

- CO detectors are incorporated within a Grade A, B or C system and there is a high likelihood that the system will be subject to periodic maintenance by a competent person at periods not exceeding 12 months, or
- a fault warning is given to indicate the need to replace the electrochemical cell of the detector before it reaches the end of its anticipated life.

Note: *Carbon monoxide detectors designed to detect fire should not be confused with other types, such as carbon monoxide warning detectors to BS EN 50291, as amended, which are designed to detect the escape of carbon monoxide from faulty or inadequately ventilated appliances (refer to Section 3, Clause 20.20, of this guide).*

Detailed guidance on detectors is contained in Section 10 of *BS 5839-6*.

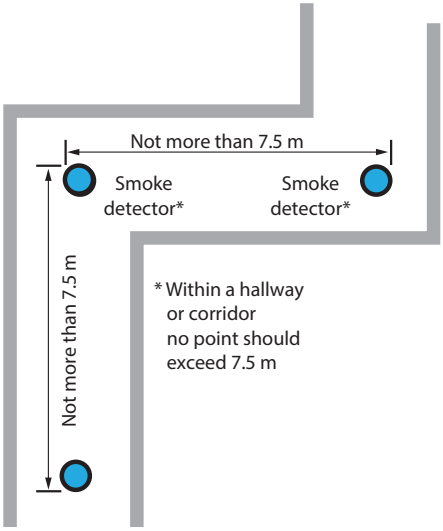
2.11.7 Siting of fire detectors

Smoke alarms should be ceiling mounted and sited at least 300 mm from any wall or light fittings, but not directly above heaters or air-conditioning vents, and should be located in circulation spaces not more than:

- 7 m from the door to a living room or kitchen,
- 3 m from every bedroom door, and
- in circulation spaces more than 7.5 m long, no point within the circulation space should be more than 7.5 m from the nearest smoke alarm.

A smoke alarm located in an access room (which could include a stair and landing), serving an inner room should be not more than 3 m from the door of the inner room.

Note: *All dimensions should be measured horizontally.*



Detectors should be positioned so that they are accessible for maintenance and testing purposes, and should not be sited above staircases or in any other location that may be difficult or unsafe to access.

Incorrectly sited detector – risk of fall from stretching

2.11.8 Grade of fire detection and fire alarm system

At least a Grade D fire detection and fire alarm system should be installed in every dwelling in accordance with *BS 5839-6*. However, any smoke alarm in a dwelling forming part of residential accommodation with a warden or supervisor should have a connection to a central monitoring unit so that in the event of a fire the warden/supervisor can identify the dwelling concerned. As a result, a Grade C system, installed in accordance with *BS 5839-6*, is recommended for every dwelling of a sheltered housing complex.

BS 5839-6 Code of practice for design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises.

The NICEIC publication, *Snags and Solutions 5: Domestic fire detection and fire alarm systems to BS 5839*, provides guidance on the design, installation, inspection, testing, commissioning and maintenance of fire alarm systems within domestic and similar premises.

2.11.9 Wiring and power

A smoke alarm or heat alarm should be permanently connected to a circuit, with the mains supply taking the form of either:

- an independent circuit at the dwelling's main distribution board, in which case no other electrical equipment should be connected to this circuit (other than a dedicated monitoring device installed to indicate failure of the mains supply to the smoke alarms), or
- an individually (electrically) protected and regularly used local lighting circuit.

Note: *The standby supply for smoke alarms and heat alarms should be sufficient to power the device in the quiescent mode for at least 72 hours and provide a warning for a further 4 minutes or a fault warning for at least 24 hours.*

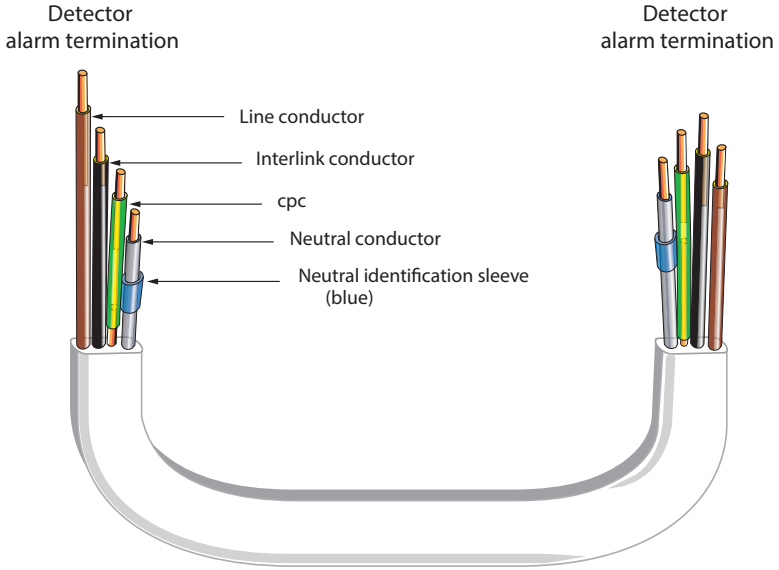
Interconnection

Smoke alarms and heat alarms installed in dwellings should be interconnected in accordance with *BS 5839-6*, so that the operation of any one of them causes operation of the alarm signal in all of them.

As recommended by Clause 16.5(c) of *BS 5839-6* to avoid the possibility of confusion, any interlinking conductor operating at extra-low voltage, as is usually the case, should be readily distinguishable from those, such as the power supply, operating at 230 V AC.

Identification is normally achieved by colour coding the conductors according to Table 51 of *BS 7671*.

Identification of interlink conductors



Note: *Cables that are used to supply and interconnect the smoke alarm system in a typical dwelling (that is a dwelling with no floor area exceeding 200 m²) are not required to be fire-resistant.*

2.11.10 Radio linked systems

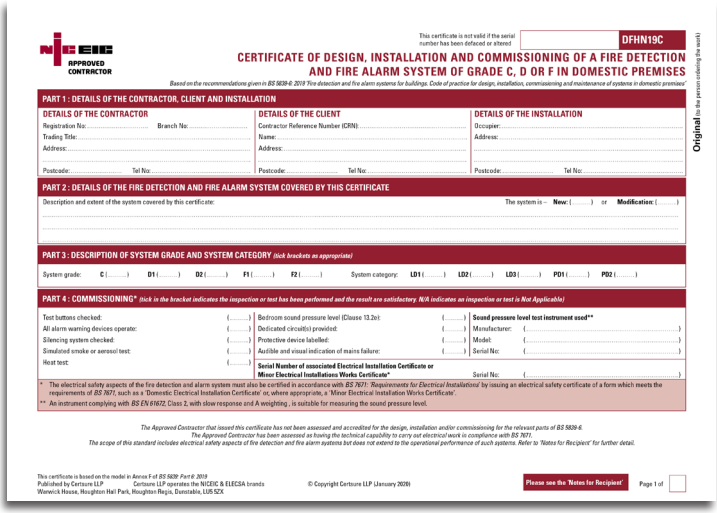
Interconnection of the components of a Grade D system may be achieved by the use of radio-links rather than cables (Clause 21 of *BS 5839-6* provides guidance).

Certification of fire detection and alarm systems

A certificate should be issued on completion of a fire detection and fire alarm system, or for new work associated with an alteration or addition to an existing system, to provide formal assurance that the system complies with the recommendations of *BS 5839-6* and *BS 5839-1*, as applicable.

The certificate issued to the client must be appropriate for the type of building and Grade of fire alarm system. For such purposes, NICEIC provides a multiple form of certification for a Grade A system, and provides a single certificate to cover a Grade C, D or F in domestic premises.

Certificate of Design, Installation and Commissioning of a Fire Detection and Fire Alarm System of Grade C, D or F in Domestic Premises



This certificate is not valid if the serial number has been defaced or altered DFHN19C

APPROVED CONTRACTOR

CERTIFICATE OF DESIGN, INSTALLATION AND COMMISSIONING OF A FIRE DETECTION AND FIRE ALARM SYSTEM OF GRADE C, D OR F IN DOMESTIC PREMISES

Based on the recommendations given in BS 5839-6: 2019 'Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in domestic premises'

Original (to the person ordering the work)

PART 1 : DETAILS OF THE CONTRACTOR, CLIENT AND INSTALLATION

DETAILS OF THE CONTRACTOR	DETAILS OF THE CLIENT	DETAILS OF THE INSTALLATION
Registration No:..... Branch No:.....	Contractor Reference Number (CRN):.....	Occupier:.....
Trading Title:.....	Name:.....	Address:.....
Address:.....	Address:.....	
Postcode:..... Tel No:.....	Postcode:..... Tel No:.....	Postcode:..... Tel No:.....

PART 2 : DETAILS OF THE FIRE DETECTION AND FIRE ALARM SYSTEM COVERED BY THIS CERTIFICATE

Description and extent of the system covered by this certificate: The system is – **New:** (.....) or **Modification:** (.....)

PART 3 : DESCRIPTION OF SYSTEM GRADE AND SYSTEM CATEGORY *(tick brackets as appropriate)*

System grade: **C** (.....) **D1** (.....) **D2** (.....) **F1** (.....) **F2** (.....) System category: **LD1** (.....) **LD2** (.....) **LD3** (.....) **PD1** (.....) **PD2** (.....)

PART 4 : COMMISSIONING* *(tick in the bracket indicates the inspection or test has been performed and the result are satisfactory. N/A indicates an inspection or test is Not Applicable)*

Test buttons checked:	(.....)	Bedroom sound pressure level (Clause 13.2c):	(.....)	**Sound pressure level test instrument used****	
All alarm warning devices operate:	(.....)	Dedicated circuit(s) provided:	(.....)	Manufacturer:	(.....)
Silencing system checked:	(.....)	Protective device labelled:	(.....)	Model:	(.....)
Simulated smoke or aerosol test:	(.....)	Audible and visual indication of mains failure:	(.....)	Serial No:	(.....)
Heat test:	(.....)	**Serial Number of associated Electrical Installation Certificate or Minor Electrical Installations Works Certificate***		Serial No:	(.....)

* The electrical safety aspects of the fire detection and alarm system must also be certified in accordance with *BS 7671: 'Requirements for Electrical Installations'* by issuing an electrical safety certificate of a form which meets the requirements of *BS 7671*, such as a 'Domestic Electrical Installation Certificate' or, where appropriate, a 'Minor Electrical Installation Works Certificate'.

** An instrument complying with *BS EN 61672*, Class 2, with slow response and A weighting , is suitable for measuring the sound pressure level.

The Approved Contractor that issued this certificate has not been assessed and accredited for the design, installation and/or commissioning for the relevant parts of BS 5839-6.
The Approved Contractor has been assessed as having the technical capability to carry out electrical work in compliance with BS 7671.
The scope of this standard includes electrical safety aspects of fire detection and fire alarm systems but does not extend to the operational performance of such systems. Refer to 'Notes for Recipient' for further detail.

This certificate is based on the model in Annex F of *BS 5839: Part 6: 2019*
Published by Certsure LLP Certsure LLP operates the NICEIC & ELECSA brands
Warwick House, Houghton Hall Park, Houghton Regis, Dunstable, LU5 5ZX

Please see the 'Notes for Recipient' Page 1 of

Additional requirements for rented and owned homes

Under new regulations, since 1st February 2022 every home in Scotland must meet the 'Tolerable Standard'.

Legislation recently passed and since 1st February 2022 all homeowners in Scotland must meet the new standards for fire and smoke detection regardless of the property tenure.

The standards introduced, already applied to all private rented sector homes.

Through the: *Housing (Scotland) Act 1987 (Tolerable Standard) (Extension of Criteria) Order 2019*, allowance has been made to permit tamper proof long-life lithium battery alarms to be Installed or mains-operated alarms with battery backup.

Regardless of the type installed all smoke and heat detectors must be interlinked.

From the implementation date, in **all properties** there must be:

- A smoke alarm installed in the room used most for general daytime living, such as the living room or lounge;
- A smoke alarm for every hallway and landing on each storey of the property;
- A heat alarm in every kitchen;

All smoke and heat alarms must be ceiling mounted and interlinked throughout the property.

Homeowners who do not comply could be subject to comments about the properties non-compliance on any home report or receive an order from the relevant Local Authority requesting they bring the property up to standard.

It is important to note, where work is carried out that is subject to a Building Warrant, the less stringent tolerable standard requirements are superseded by the more stringent requirements of the Building (Scotland) Regulations 2004.

Careful planning is required to ensure work carried out meets the correct standard in full.

NON-DOMESTIC TECHNICAL HANDBOOK

2.11.0 Introduction

Early warning of a fire increases the probability of achieving safe evacuation of buildings by assisting owners and occupiers of buildings to implement their fire safety policy and emergency fire action plan.

In a small single storey, non-residential, building the means of raising the alarm could be as simple as a warning call from the person discovering the fire, but in more complex buildings a sophisticated fire detection and fire alarm system may be required and should always be based on the particular fire risk assessment.

Note: *A fire risk assessment is a requirement of the Fire (Scotland) Act 2005 (Section 78 of the Act refers).*

It is important to note that as a consequence of poor, design, installation or maintenance of automatic fire detection and alarm systems, around 97 % of all automatic calls received by the fire and rescue service result in unnecessary attendance due to unwanted (false) alarms.

Guidance on how to assess and reduce the risks of unwanted alarm is provided in: *BS 5839-1: Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises*.

Alternative approaches to those provided in the Technical Handbooks may be used, and in buildings of a complex design may be the only practical solution to achieving compliance with the functional standards (Clause 2.0.7 of the non-domestic Technical Handbook refers). However, irrespective of the measures used to achieve compliance, those responsible for the safety of the building should be made aware of the importance of maintaining the system to ensure it operates effectively.

To support the person responsible for the safety of the premises (Responsible person) a Fire Safety Design Summary (FSDS) should accompany a completion certificate relating to the construction of, or conversion to, a new non–domestic building, including extensions to existing buildings.

Note: *The Fire Safety Design Summary (FSDS) form can be downloaded from www.gov.scot*

2.11.3 Categories of fire detection and fire alarm system

At the design stage it is important to take into account the building evacuation factors, in order to specify the alarm category. Life safety fire alarm systems installed in a building will be one or more of the following categories.

Category L systems are automatic fire alarm systems installed for the protection of life, incorporating detectors, sounders and manual call points installed in the building. Category L fire alarm systems are sub-divided from the most stringent L1 to the least stringent requirement L5.

Category M is a standalone manual fire alarm system that includes manual call points and sounders at specific locations in the building. Automatic detection is not part of the system. Nevertheless Category M systems should be installed in conjunction with L1, L2, L3, L4, L5 and voice alarm systems.

2.11.4, 2.11.5 & 2.11.12 Residential care buildings, hospitals and enclosed shopping centres

These buildings present increased risks, so an automatic fire detection and alarm system designed and installed in accordance with *BS 5839-1* should be installed in every residential care building, hospital and enclosed shopping centre.

Specific guidance is provided in the Annex of the Technical Handbook (non-domestic) as follows:

- Annex 2.A - Residential care buildings
- Annex 2.B - Hospitals
- Annex 2.C - Enclosed shopping centres

2.11.6 Shared residential accommodation

As a minimum recommendation, a Category LD2 (Grade D) system should be installed in shared residential accommodation that is designed to provide sleeping accommodation for not more than 10 persons, entered from open air at ground level and having no sleeping accommodation at a storey height of more than 7.5 m.

2.11.7 Residential buildings (other than residential care buildings and hospitals)

In residential buildings, such as hotels and boarding houses, occupants are at increased risk should fire occur because they are more likely to be unfamiliar with the accommodation or escape routes.

Although a Category L2 system is likely to be appropriate for the majority of sleeping accommodation premises, it is important that the choice of system category is based on a risk assessment of the particular circumstances.

2.11.8 Entertainment buildings and assembly buildings

The category will be dependent on the use of the building, whether it is cinema, restaurant or nightclub, so a fire safety risk assessment should be carried out at the design stage to determine the appropriate category.

The following is a guide only.

As a minimum where there are:

- more than 300 occupants then a Category L1 system should be installed.
- no more than 300 occupants, but more than 100, then at least a Category L2 system should be installed.
- no more than 100 occupants, but more than 60, then at least a Category L3 system should be installed.
- no more than 60, then at least a Category M system should be installed.

2.11.9 Offices and shops

In offices, the occupants should be alert and familiar with the building layout, so a manually operated Category M system that can be heard throughout the building when operated from a manual call point may be all that is required.

In shops, the occupants may not be familiar with the layout and so, as a minimum, Category M, L3 or L4 systems should be installed as follows:

- for buildings having more than 300 occupants, or having different occupation a Category L3 system.
- for buildings having not more than 300 occupants but more than 100 a Category L4 system.
- for buildings having not more than 100 occupants a Category M system.

2.14 Fire and rescue service facilities (domestic and non-domestic)

Mandatory Standard 2.14 *– Every building must be designed and constructed in such a way that facilities are provided to assist fire-fighting or rescue operations.*

2.14.0 Introduction

Facilities including smoke clearance plant and equipment may need to be provided to assist fire service personnel to rescue persons or fight fire.

2.14.6 Heat and smoke control

Ventilation of escape stairs, protected lobbies and common access corridors is an important measure to assist fire service personnel whilst fire-fighting and for smoke clearance purposes after the fire has been extinguished. The efficiency of the ventilators is dependant upon the prevailing wind conditions and it is important that fire service personnel can control the opening and closing of the ventilators.

For escape and fire-fighting stairs, a ventilator of at least 1 m^2 should be provided at the top of every stairway, or a ventilator of 0.5 m^2 at each storey (installed on an external wall), or alternatively smoke shafts designed to BRE, 2002 - *Smoke shafts protecting fire-fighting shafts*[6], should be provided.

For fire-fighting lobbies, unless excluded by Cause 2.14.2, a ventilator of at least 1 m^2 should be provided at each storey (on an external wall), or smoke shafts designed to BRE, 2002 should be provided.

With the agreement of the fire and rescue service, a natural or mechanical smoke ventilation system used to satisfy Standard 2.9 may also be used to satisfy Standard 2.14.

2.15 Automatic fire suppression systems

Every building must be designed and constructed in such a way that, in the event of an outbreak of fire within the building, fire growth will be inhibited by the operation of an automatic fire suppression system.

This standard applies only to a building which:

a. is an enclosed shopping centre

b. is a residential care building

c. [left blank on purpose]

d. forms the whole or part of a sheltered housing complex

e. is a school building other than a building forming part of an existing school or an extension to a school building where it is not reasonably practicable to install an automatic fire suppression system in that building or extension

f. is a building containing a flat or maisonette

g. is a social housing dwelling, or

h. is a shared multi-occupancy residential building.

[6] *Smoke shafts protecting fire-fighting shafts: their performance and design (BRE, 2002).*

2.15.0 Introduction

Automatic fire suppression systems help control the intensity and size of a fire, suppress it and in some cases may even extinguish it. It can provide occupants, including vulnerable occupants, with the additional time necessary to escape following the outbreak of fire.

The primary role of the suppression system may be for life safety or property protection.

Life safety

Automatic fire suppression systems installed in domestic premises are primarily designed for life safety purposes. Successful activation can provide occupants, including vulnerable occupants, with additional time to escape following the outbreak of fire. The added benefit of automatic fire suppression in domestic buildings means that the damage and disruption caused by fire is greatly reduced.

Automatic fire suppression systems react to heat therefore, the greatest protection is afforded to those occupants outwith the room of fire origin. Automatic suppression may provide some benefit to occupants in the room of fire origin where for example the fire growth is fast and the temperatures allow the sprinkler system to open early in the development phase of the fire. The spray pattern delivered from the heads should control fire spread, reduce temperatures and dilute the smoke. In some cases, the fire might be extinguished if the fire is not shielded from the sprinkler spray.

A smaller fire means that the fire and rescue service will be able to bring the fire under control and extinguish it much more quickly.

Property protection

Concerns about fire have traditionally centred on life protection rather than asset protection. A primary objective of the building standards system however is to 'further the achievement of sustainable development'.

The sustainability of communities could be served by the protection against both deliberate and accidental fires in buildings such as schools that serve as social assets and components of the local economic network. There is on average 152 fires in Scottish schools each year that result in significant costs in terms of the damage and disruption they cause.

For the purposes of this standard a school is a building in which primary and or secondary education is given

The ABI have produced guidance 'ABI Study: Post Grenfell Research on Residential Sprinkler Systems' on issues to be considered to improve performance and in the procurement of residential and domestic sprinklers which is available on the ABI website.

Although primarily addressing the use of automatic sprinklers, much of the guidance is also applicable to other types of automatic fire suppression systems.

Automatic life safety fire suppression systems are required in 3 categories of domestic building:

- dwellings which form part of a sheltered housing complex,
- buildings containing flats and maisonettes, and
- social housing dwellings.

Conversions

in the case of conversions, as specified in regulation 4, the building as converted shall meet the requirement of this standard (Regulation 12, Schedule 6).

2.15.1 Automatic fire suppression systems

The term automatic life safety fire suppression system includes sprinkler systems but provides the opportunity for designers to propose other systems which may be just as effective.

The key characteristics of the system are:

- it must be automatic and not require people to initiate its activation
- it must be designed primarily to protect lives, rather than property, which means it should be fitted with faster responding sprinkler heads, and
- it must be a fire suppression system, one designed specifically to deal with fires rather than other hazards.

Concealed or recessed pattern sprinkler heads may be used in the system design. However, there is a risk that the heads are rendered ineffective or operate less efficiently by the application of any decorative ceiling finish. Therefore, consideration should be given to labelling of the heads with words to the effect of 'DO NOT PAINT'.

Alternative suppression systems in a domestic property

The applicant and the verifier should satisfy themselves that the alternative system has been designed, tested and approved for use in domestic and residential buildings and are fit for their intended purpose (see Section 0).

Watermist systems, for example, are bespoke to individual manufacturers and may be sensitive to small design changes. Therefore, a watermist system should be designed and installed in accordance with *BS 8458: 2015* and the nozzles should comply with *BS 8663-1: 2019* (provided the building is within the scope of the standards).

Fire performance tests are critical as *BS 8458* relies on this data to determine the system design. Watermist specialists should provide Declarations of Conformity:

- at design stage (initial notice)
- at final stage (all details and changes declared), and
- for nozzle manufacturers, successful *BS 8458* and *BS 8663* fire tests.

Portable personal protection systems are not considered suitable means of satisfying the requirements of Standard 2.15. They may, however, be beneficial in some unique situations in existing dwellings to assist in the protection of vulnerable occupants. Alternative approaches in a particular case may or may not be compensated by an automatic fire suppression system.

2.15.2 Sheltered housing complexes

A sheltered housing complex is a purpose built complex comprising of 2 or more dwellings e.g. houses, flats and maisonettes, where the occupants are likely to receive a support service due to the nature of their vulnerability or need e.g. age, infirmity, disability, illness, mental disorder or are dependent on alcohol or drugs. Such occupants are likely to react slowly to the fire alarm (see Standard 2.11) and the suppression system may provide the additional time necessary to make a safe escape.

Therefore, a sheltered housing complex should have an automatic life safety fire suppression system designed and installed in accordance with *BS 9251: 2014.*

2.15.3 Buildings containing flats and maisonettes

Research and fire statistics shows that occupants in flats and maisonettes would benefit from automatic fire suppression systems. Whilst fire statistics also show that fire spread beyond the dwelling of origin is a rare occurrence, fire dynamics suggest that any outbreak of fire through an external window or door opening is more likely to spread vertically than horizontally. Therefore, in order to protect occupants and to contain a fire in buildings containing flats and maisonettes, every flat and maisonette and any ancillary room should be provided with an automatic fire suppression system.

A fire sprinkler system in a flat or maisonette should be designed and installed in accordance with *BS 9251: 2014.*

2.15.4 Fire prevalence in social housing

Social Housing Dwellings Statistics indicate that there is a greater prevalence of fires in social housing dwellings, In order to help contain a fire and to protect occupants, every house, flat and maisonette that is a social housing dwelling should be fitted with an automatic fire suppression system.

A fire sprinkler system in a social housing dwelling should be designed and installed in accordance with *BS 9251: 2014*.

2.15.5 Within a non-domestic property

Life safety systems

Where a system is installed for life safety purposes (other than in residential care buildings) as well as property protection, the additional recommendations for a life safety system are contained in the LPC Rules for Automatic Sprinkler Installations 2009 incorporating *BS EN 12845: 2015*.

The suppression system should cover the entire building including roof voids where necessary.

Compensatory feature

Automatic fire suppression may also be chosen by the designer as part of the escape strategy or as a compensatory feature where the recommendations in this handbook have been varied in some way. Where a system is installed as a compensatory feature the additional recommendations for a life safety system contained in the LPC Rules for Automatic Sprinkler Installations should be applied.

Alternative suppression systems

There are many alternative or innovative fire suppression systems available, including systems utilising gaseous, mist or fog systems. The applicant and the verifiers should satisfy themselves that the suppression system has been designed, tested and approved for use in non-domestic buildings based on the particular hazard and are fit for their intended purpose (see Section 0).

Annexes

Due to the special fire precautions within residential care buildings, hospitals, and enclosed shopping centres, additional guidance is grouped in the annexes.

However it is important to remember that the guidance in the annexes is in addition and supplementary to the guidance to Standard 2.1 to 2.15.

For additional guidance on:

- residential care buildings, see annex 2.A
- hospitals, see annex 2.B
- enclosed shopping centres, see annex 2.C.

Annexes referenced above and further information on other building types and requirements can be found within The Scottish Building Standards Technical Handbook (Non-Domestic) Section 2.15.

3.3 Flooding and groundwater

Mandatory Standard – Standard 3.3

Every building must be designed and constructed in such a way that there will not be a threat to the building or the health of the occupants as a result of flooding and the accumulation of groundwater.

3.3.0 Introduction

Flooding can be diverse, often site specific and brought about by a range of factors including heavy rain, raised groundwater levels, increased rain water run-off and blocked or surcharged drainage systems.

It is also generally recognised that climate change may play a major role in increasing the risk of flooding in the future, for example, local pluvial (rainfall) flooding from more frequent short intense rain storms.

The effects of flooding on a building can include significant damage to materials, services and structure. Contamination could result where waste water drainage is present in the floodwater. Where there is a risk that flooding can affect a building it is important that any proposed construction is designed to be more resistant or resilient.

Pressure for land development may mean that development may be given planning approval on land subject to some risk of flooding.

Where development is to take place on land assessed by the planning authority as having a flood risk, advice should be sought from sources such as the local planning authority, the Scottish Environment Protection Agency (SEPA) and those responsible for coastal defences. Further guidance may be obtained from the 'Scottish Planning Policy SPP.

The Scottish Environment Protection Agency (SEPA) provides flood risk information on their indicative river and coastal interactive flood maps on their website: *http://www.sepa.org.uk/*

When near surface level groundwater is present on a building site there is the potential for construction activity to affect it or for the groundwater to pose a hazard to any new buildings. To reduce the risk to buildings from groundwater, subsoil drainage of a site may be necessary to protect against penetration of groundwater through a building and damage to the building fabric.

Any existing drains that will be affected by the construction of a building should also continue to function properly and guidance is provided under Standard 3.5.

Conversions - in the case of conversions, as specified in regulation 4, the building as converted shall meet the requirements of this standard in so far as is reasonably practicable, and in no case be worse than before the conversion (Regulation 12, Schedule 6).

3.3.2 Flood risk assessment

Any identified site specific risk of flooding to a building or its occupants should be assessed to allow sustainable design mitigation. Building site flood risk assessments should be an integral part of the design and construction process with the appraisal also considering the effects that the development may have on adjoining ground.

'Planning and Building Standards Advice on Flooding' (PAN 69) sets out flood risk and probability assessment procedures including the need for drainage assessments to demonstrate a neutral or better effect on sites where flooding is an issue. For site specific flood risk assessments the CIRIA document 'Development and Flood Risk – guidance for the construction industry' (C624) 2004 provides detailed guidance on carrying out flood risk assessment and suggests design considerations for developers.

Although no specific guidance is included in the Technical Handbooks regarding electrical installations in areas at risk of flooding, the UK document, Preparing for Floods, contains the following recommendations to minimise the damage to electrical installations in new and refurbished properties in areas at risk of flooding:

- Raising the meter and consumer unit to a height above the expected flood level (subject to approval by the electrical distributor, unless private).
- Raising the height of socket-outlets (and other accessories commonly installed at low level such as cooker-outlet plates).
- Installing wiring serving ground floor circuits in the first floor void with drops descending to individual accessories.
- Installing wiring in plastic conduit as opposed to plastering cables directly into walls, and providing drainage at low points in conduits where water is likely to collect in the event of flooding.

Note: *The installation of conduit is also likely to reduce the amount of rewiring work required following a flood.*

3.10 Precipitation (domestic and non-domestic)

Mandatory Standard 3.10 *- Every building must be designed and constructed in such a way that there will not be a threat to the building or the health of the occupants as a result of moisture from precipitation penetrating to the inner face of the building.*

Persons carrying out electrical installation work should take reasonable steps to minimise any detrimental effects that may occur as a result of bridging between the outer surface and the inner surface of buildings. For such reasons, cables should not be routed in external cavity walls and holes passing from the interior to the exterior of the building, such as those used for the installation of cables, containment and extract fans, should be suitably sealed (refer to Clause 2.1.4 of this guide - Openings and service penetrations).

3.11 Facilities in dwellings (domestic)

Mandatory Standard 3.11 *- Every building must be designed and constructed in such a way that:*

a) the size of any apartment or kitchen will provide a level of amenity that ensures the welfare and convenience of all occupants and visitors, and

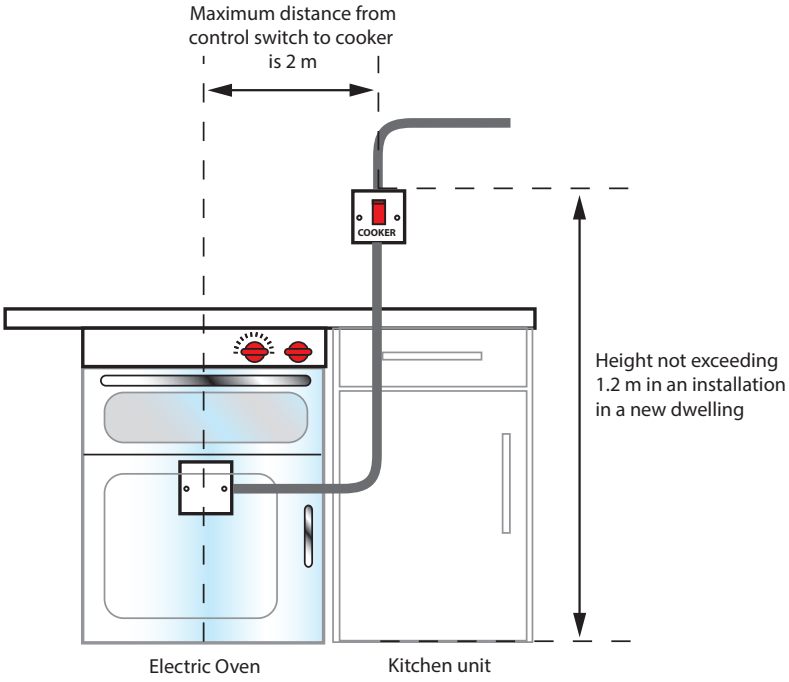
b) an accessible space is provided to allow for the safe, convenient and sustainable drying of washing.

Note: *This standard applies to a dwelling only.*

3.11.3 Kitchens

Where a solid fuel cooker is not installed, a space for a gas, electric or oil cooker shall be provided, which is of sufficient size to include any piping, cables or other apparatus required to enable the appliance to be used.

Note: *Sufficient space (1 m activity space) should be provided to allow a cooker to be accessed and used safely (Figure 3.30 of the domestic Technical Handbook refers).*



Requirements of *BS 7671*

Regulation 537.3.2 requires a means of switching off the power to the cooker to be provided, so as to facilitate mechanical repair or cleaning. Although no specific distance is stated in *BS 7671*, for ease of access the cooker control switch should be positioned locally to the cooker, as a guide, within 2 m.

3.13 Heating (domestic)

Mandatory Standard 3.13 *- Every building must be designed and constructed in such a way that it can be heated and maintain heat at temperature levels that will not be a threat to the health of the occupants.*

Note: *This standard applies to dwellings only.*

3.13.1 Heating recommendations

Every dwelling should have some form of fixed heating system, or some means of heating that is capable of maintaining a temperature of 21 °C in at least 1 apartment (room) and 18 °C elsewhere, when the outside temperature is minus 1 °C. This does not apply to temperatures in storage rooms having a floor area not exceeding 4 m^2. Section 5.3 of the domestic Building Services Compliance Guide contains additional guidance.

Note: *Heating systems should be energy efficient, refer to Section 6 – Energy.*

3.13.2 Alternative heating systems

Alternative heating systems may involve a holistic design approach to the dwelling and can include the use of natural sources of available energy such as the sun, wind and the geothermal capacity of the earth. Passive design, such as use of the orientation of glazing for solar gain and of the building mass to store heat with controlled heat release may only need minor supplementation from a lower output fixed heating system.

Active heating systems, such as heat pumps that extract heat from ground, air, water or geo-thermal sources, can limit emissions of carbon dioxide and reduce the use of fossil fuels.

Complementary systems can also be used, to heat water using solar energy or generate electricity using solar or wind power.

Where there are elderly or infirm occupants in a dwelling the capability of the heating system to maintain an apartment at a temperature higher than 21 ºC is a sensible precaution.

Since it is not possible to determine the occupants at design stage the heating system should be designed with the capability of being easily upgraded at a later date.

If an existing heating system is to be upgraded to provide higher temperatures the boiler size may not need to be replaced, provided it was correctly sized originally. The upgrading may necessitate the replacement of some pipes and radiator in one or two rooms and accessibility will need to be considered.

Such modification could result in a small increase in the recovery time of the hot water supply for bathing and washing.

3.14 Ventilation

Mandatory Standard – Standard 3.14

Every building must be designed and constructed in such a way that ventilation is provided so that the air quality inside the building is not a threat to the building or the health of the occupants.

3.14.0 Introduction

Ventilation of a dwelling is required to maintain air quality and so contribute to the health and comfort of the occupants. Without ventilation it is possible that carbon dioxide, water vapour, organic impurities, smoking, fumes and gases could reduce the air quality by humidity, dust and odours and also reduce the percentage of oxygen in the air to make the building less comfortable to work or live in.

So that contaminants do not exceed acceptable levels and thereby endanger the health of the occupants, it is important that dwellings are adequately ventilated. Research has shown that occupants of dwellings are, for the most part, unaware of the standard of air quality within their homes. The lack of recognition of poor air quality has frequently resulted in occupants not being aware of the need to open ventilators or windows, particularly in bedrooms.

Well-designed ventilation has many benefits, not least financial and environmental, although it is also recognised that inside air quality can only be as good as outside air quality and in some cases filtration may be necessary.

It is becoming more common, due in the main to improved insulation standards and reduced levels of fabric infiltration, to specify continuous mechanical systems to provide the ventilation solution for the building.

Ventilation can also have a significant effect on energy consumption and performance and so thorough assessment of provisions for both ventilation and energy performance, should be made, as uninformed choices may significantly affect both indoor air quality or the energy efficiency of the building (see Section 6, Energy).

Ventilation should not adversely affect comfort and, where necessary, designers might wish to consider security issues and protection against rain penetration prevalent in naturally ventilated buildings when windows are partially open to provide background ventilation.

The impact of reducing air infiltration - improved insulation and 'tighter' construction of buildings will reduce the infiltration and the level of natural air change.

Unless ventilation is maintained, this can increase the risk of poorer indoor air quality and issues such as condensation and mould growth. Conversely, leaky buildings can be draughty and uncomfortable. Sealing up air leaks improves comfort and saves energy whilst proper ventilation keeps the indoor air pleasant and healthy.

If poor attention to detail occurs air leakage can account for a substantial part of the heating costs. Energy savings from building 'tighter' could make significant savings on energy bills. There is a common perception that 'tight' construction promotes indoor air pollution.

However both 'tight' and 'leaky' buildings can have air quality problems. Though air leaks can dilute indoor pollutants, there is no control over how much leakage occurs, when it occurs or where it comes from.

Occupants should have the opportunity to dry washing other than by a tumble dryer which uses a considerable amount of energy. Drying of washing internally can generate large quantities of moisture that should be removed at source to limit any adverse impact on the building or its occupants.

In addition to the clauses below, further guidance on aspects of ventilation installations, including controls, installation and commissioning of systems is provided with Annex 3.A – 'Domestic Ventilation Guide'.

Conversions - in the case of conversions, as specified in Regulation 4, the building as converted shall meet the requirement of this standard (Regulation 12, Schedule 6).

3.14.1 Non-Domestic

Ventilation generally

A building should have provision for ventilation by either:

- natural means, or
- mechanical means, or
- a combination of natural and mechanical means (mixed-mode).

Ventilation is the process of supplying outdoor air to an enclosed space and removing stale air from the space. It can manage the indoor air quality by both diluting the indoor air with less contaminated outdoor air and removing the indoor contaminants with the exhaust air.

Ventilation should have the capacity to:

- provide outside air to maintain indoor air quality sufficient for human respiration
- remove excess water vapour from areas where it is produced in sufficient quantities in order to reduce the likelihood of creating conditions that support the germination and growth of mould, harmful bacteria, pathogens and allergies
- remove pollutants that are a hazard to health from areas where they are produced in significant quantities
- rapidly dilute pollutant odours, where necessary.

Additional ventilation provision - this guidance relates to the provision of air for human respiration and is in addition to, and should be kept separate from, any air supply needed for the smoke ventilation of escape routes in the case of fire (Section 2, Fire) and for the safe operation of combustion appliances (see Standards 3.21 and 3.22).

There is no need to ventilate:

- a store room used only for storage that requires a controlled temperature
- a room with a floor area of not more than 4 m^2. This is not intended to include a domestic sized kitchen or utility room where ventilation should be in accordance with the recommendations in the table in clause 3.14.5.

Ventilation should be to the outside air. However clause 3.14.3 explains where trickle ventilators may be installed other than to the external air.

Calculation of volume - for ventilation purposes, a storey should be taken as the total floor area of all floors within that storey, including the floor area of any gallery or openwork floor. Where an air change rate is recommended, the volume of the space to be ventilated may be required. The volume of any space is the internal cubic capacity of the space. Any volume more than 3 metres above any floor level in that space may be disregarded

3.14.1 (Domestic)

Ventilation generally

Ventilation is the process of supplying outdoor air to an enclosed space and removing stale air from the space. It can manage the indoor air quality by both diluting the indoor air with less contaminated outdoor air and removing the indoor contaminants with the exhaust air.

Ventilation should have the capacity to:

- provide outside air to maintain indoor air quality sufficient for human respiration
- remove excess water vapour from areas where it is produced in sufficient quantities in order to reduce the likelihood of creating conditions that support the germination and growth of mould, harmful bacteria, pathogens and allergies
- remove pollutants that are a hazard to health from areas where they are produced in significant quantities
- rapidly dilute pollutant odours, where necessary.

Ventilation should be to the outside air. However, clauses 3.14.4. 3.14.5 and 3.14.11 explain where ventilators and background ventilators may be installed other than to the external air.

Additional ventilation provision

This guidance relates to the provision of air for human respiration and is in addition to, and should be kept separate from, any air supply needed for the smoke ventilation of escape routes in the case of fire (Section 2, Fire) and for the safe operation of combustion appliances (see Standards 3.21 and 3.22).

Provision of ventilation will also assist in removing heat from a building in the summer months, reducing the risk of summertime overheating (see standard 3.28).

Small rooms

There is no need to ventilate a room with a floor area of not more than 4 m2. This is not intended to include a domestic sized kitchen or utility room where ventilation should be in accordance with the recommendations in clause 3.14.2.

Calculation of volume

For ventilation purposes, a storey should be taken as the total floor area of all floors within that storey, including the floor area of any gallery or openwork floor.

Where an air change rate is recommended, the volume of the space to be ventilated may be required. The volume of any space is the internal cubic capacity of the space.

Any volume more than 3 metres above any floor level in that space may be disregarded.

3.14.2 (Non-Domestic) Natural ventilation

All buildings leak air to a greater or lesser extent. However the movement of uncontrolled infiltrating air through the fabric of a building can cause draughts and can have a significant adverse effect on the energy efficiency of the building as a whole. By improving building techniques it is possible to reduce this infiltrating air to lower levels that can improve energy efficiency (see Section 6 Energy).

Some building techniques may have little effect on air leakage and so allow the uncontrolled infiltrating air to be taken into account in the building's ventilation provision.

By building with techniques designed to reduce air leakage there will need to be a reciprocal increase in the designed ventilation provision to make up for the lower levels of infiltrating air where the designer intends to use low fabric insulation rates of less than 5 $m^3/h/m^2$ in the energy assessment (see Section 6 Energy).

The areas of trickle ventilation shown may not suffice to maintain air quality and therefore an alternative ventilation solution should be adopted.

Natural ventilation of a room or building should be provided in accordance with the following recommendations:

a. for a room, by the provision of a ventilator with an opening area of at least 1/30th of the floor area of the room it serves, and a trickle ventilator with an opening area of at least 4,000 mm^2, if the area of the room is not more than 10 m^2, or a trickle ventilator with an opening area of 400 mm^2 for each square metre of room area, if the area of the room is more than 10 m^2, or

b. for a room in a building constructed with an infiltration rate of 5 to 10 $m^3/h/m^2$ at 50 Pa, by the provision of a ventilator with an opening area of at least 1/30th of the floor area of the room it serves, and a trickle ventilator with an opening of at least 10,000 mm^2 if the room is not more than 10 m^2, or a trickle ventilator with an opening area of at least 10,000 mm^2 plus an additional 600 mm^2 for each square metre of room area if the room is more than 10 m^2.

c. for a toilet, mechanical extract in accordance with the table to clause 3.14.5.

d. for any other building, by following the guidance in: Section 3 of *BS 5925: 1991* (1995), or CIBSE Guide A: 2015, Design data, section A4, Air infiltration and natural ventilation, or CIBSE AM10: Natural Ventilation in Non-Domestic Buildings (2005) Applications Manual AM10: 2005.

The options in sub-clause (d) provide more flexible solutions but may require complex calculations.

Wet areas - where a building is naturally ventilated, all moisture producing areas such, as bathrooms and shower rooms, should have the additional facility for removing such moisture before it can damage the building. Additional mechanical ventilation to such areas should be provided in accordance with the table to clause 3.14.5.

3.14.2 (Domestic) Ventilation of dwellings

Ventilation is delivered via three components:

- supply air
- extraction
- purge ventilation

Under normal conditions, indoor air quality is provided for by the supply and extraction elements. Purge ventilation is essential for removal of higher levels of pollutants on an intermittent or occasional basis and can also assist in the cooling of the dwelling during the summer months.

Choice of ventilation solution

Infiltration (air movement through building fabric) is considered as a component of overall ventilation. Accordingly, the provision of intended ventilation should be made to reflect the level of fortuitous ventilation occurring through building fabric. Guidance to this standard sets out three forms of supply and extract ventilation:

1. Natural ventilation (with intermittent mechanical extract) – see clause 3.14.4.
2. Continuous mechanical extract – see clause 3.14.5.
3. Continuous mechanical supply and extract clause – see clause 3.14.6.

Provisions are recommended on the basis of the design and confirmed infiltration rate for dwelling are as follows:

Table 3.5a – Ventilation solutions for design infiltration levels

Ventilation type	Suitable for infiltration rate:
Natural ventilation (with intermittent mechanical extraction)	≥ 5 $m^3/(h.m^2)$@50Pa
Continuous mechanical extract ventilation	≥ 3 $m^3/(h.m^2)$@50Pa
Continuous mechanical supply & extract ventilation	Any

Note: *The designer may choose to provide evidence of the suitability of another option for any of the above categories.*

Supply air

Supply air for the dwelling should be delivered through either background ventilators (options 1 & 2) or continuous supply fans (option 3).

The minimum whole dwelling ventilation rate for the supply of air to the habitable rooms in a dwelling should meet both of the criteria given in table 3.5b for ventilation, by number of apartments and by overall dwelling floor area.

Table 3.5b – Minimum whole dwelling ventilation rate

Number of apartments	1[1]	2	3	4	5
Minimum ventilation rate – litres/second[2]	13	19	25	31	37
Minimum ventilation rate – by floor area[3]. 0.31 l/s per m^2 of internal floor area					

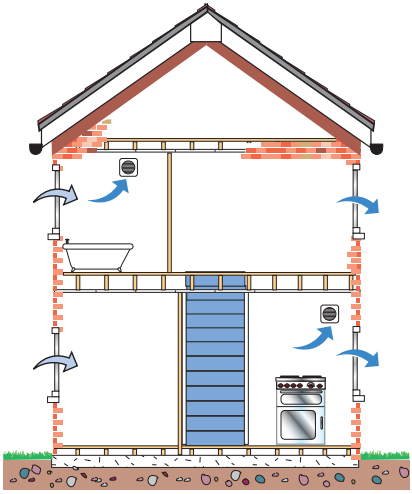
Notes:

1. Where the dwelling has only one habitable room (principal apartment), a minimum ventilation rate of 13 litres per second is assigned.
2. For each additional apartment, add 6 litres per second to the values above.
3. The minimum ventilation rate 0.3 litres per second per m^2 of internal floor area. (This includes all floors, e.g. for a two-storey building add the ground and first floor areas).

Background ventilator area

For the purpose of performance, the recommended areas for background ventilation (see clauses 3.14.4 & 3.14.5) should be achieved by the use of ventilators that are sized by the equivalent area, as determined using *BS EN 13141-1:2019*. When determining the equivalent area, the whole ventilator installation, including the external grille or canopy, should be considered as a single unit. Background ventilators should have the equivalent area marked where it will be easily visible from inside the dwelling when installed, to aid verification.

Background ventilators and intermittent extract fans



Trickle ventilators (Non-Domestic)

A trickle ventilator, sometimes called 'background ventilation', is a small ventilation opening, mostly provided in the head of a window frame, but not always, and is normally provided with a controllable shutter.

They should be provided in naturally ventilated areas to allow fine control of air movement. A permanent ventilator is not recommended since occupants like control over their environment and uncontrollable ventilators are usually permanently sealed to prevent draughts.

The trickle ventilator should be so positioned that a part of it is at least 1.75 m above floor level. This will allow at least some movement of air within the building and reduce stratification.

Although ventilation should normally be to the external air, a trickle ventilator serving a bathroom or shower room may open into an area that does not generate moisture, such as a bedroom or hallway, provided the room is fitted with a trickle ventilator in accordance with the guidance in clause 3.14.2.

A trickle ventilator should be provided in an area containing mechanical extraction to provide replacement air and ensure efficient operation when doors are closed. This will prevent moist air being pulled from other 'wet areas'. Pulling moist air from other parts of a building will reduce the further apart the wet rooms are located. The trickle ventilator should be independent of the mechanical extract so that replacement air can be provided when the extract fan is operating. The location of the trickle ventilator and the extract fan should be located to prevent short-circuiting of the air.

3.14.3 (Domestic) Provision for purge ventilation

Provision of purge ventilation enables occupants to remove higher concentrations of pollutants or water vapour from occasional activities that give rise to such increases. It can also assist in the cooling of a dwelling in the summer months.

A system for purge ventilation is required in each habitable room (apartment).

The recommended ventilator opening areas in Table 3.6 opposite are set to give reasonable assurance that purge ventilation is capable of providing air change of at least of four air changes per hour per room directly to outside.

Purge ventilation can be delivered through either openings (e.g. windows or doors) or by a mechanical extract system with a suitable high extract rate. The latter may be more common if there are environmental issues such as noise or pollution which make it more desirable to provide occasional higher levels of ventilation via a mechanical extract system.

Where purge ventilation in a habitable room is delivered through openings in that room, the minimum opening areas in Table 3.6 should be achieved. These are based on BS 5925:1991, and assumes all of the following:

- single-sided ventilation
- an urban environment
- a wind speed of 2.1 metres per second
- a temperature difference of 3 °C between the air inside and outside of the building.

Depending on the dwelling design or the external climate, it may be possible in other circumstances to achieve 4 air changes per hour with smaller openings. If smaller openings than Table 3.6 are specified, this should be supported by evidence from an appropriately qualified person competent in such matters.

Table 3.6 – Purge ventilation openings to apartments

Opening type	Minimum total area of opening
Hinged or pivot windows with an opening angle of 15 to 30 degrees	1/10 of floor area of room
External doors; Opening sash windows; Hinged or pivot windows with an opening angle of greater than 30 degrees	1/20 of floor area of room
Note: Hinged or pivot windows with an opening angle of less than 15 degrees are not suitable for purge ventilation. Reference to opening angles relates to the presence of a permanent restriction to a greater opening angle. To reduce the effects of stratification of the air in a room, some part of the window(s) should be at least 1.75 m above floor level.	

3.14.4 (Domestic) Natural ventilation (with intermittent mechanical extract)

It is recommended that natural ventilation with intermittent extract only be considered in dwellings where low or very low fabric infiltration is not present or planned. This would be where the infiltration rate is 5 $m^3/(h.m^2)$@50 Pa and above.

Note also that, for dwellings with a single aspect or an internal kitchen, the guidance below may not suffice to provide sufficient ventilation and further advice should be sought from the designers or an alternate solution proposed.

Natural ventilation relies upon a combination of fortuitous ventilation and background ventilation to drive air movement. This is assisted by the intermittent use of mechanical extract ventilation to remove air from rooms where activities will generate water vapour e.g. kitchens, utility rooms, bathrooms and sanitary accommodation.

Table 3.7a – Minimum equivalent area of background ventilators for natural ventilation

Room	Area of background ventilation
Apartment	12,000 mm^2
Kitchen or utility room	10,000 mm^2
Toilet, bathroom or shower room	10,000 mm^2

Additional information:

1. Where the background ventilator is ducted, the recommended areas in the table should be doubled to account for flow resistance within the ductwork.
2. The overall provision of background ventilation in a dwelling may be provided at an average of 11,000 mm^2 per room with a minimum of 11,000 mm^2 for each apartment.
3. To reduce the effects of stratification of the air in a room, some part of the background ventilator should be at least 1.75 m above floor level.
4. Further advice on the location of background ventilators can be found in Annex 3 A.

Extract ventilation

Intermittent mechanical extract fans should be fitted in each room where activities will generate water vapour e.g. kitchens, utility rooms, spaces for drying washing, bathrooms and sanitary accommodation.

Extract rates should be as set out in Table 3.7b

Table 3.7b – Minimum extract rates for intermittent extract ventilation systems

Room [1] [2]	Intermittent extract rate [3]
Kitchen, extract above hob/cooker	30 litres per second
Kitchen, extract located elsewhere	60 litres per second
Utility room	30 litres per second
Bathroom or shower room	15 litres per second
Designated drying area (see 3.14.9)	15 litres per second
Sanitary accommodation (Toilet) [4]	6 litres per second

Additional information:

5. Where a room has both extract fan and background ventilators, these should be a minimum of 0.5 m apart (within and outside the dwelling) to reduce the risk of 'short circuiting' ventilation.
6. Refer to guidance to Standard 3.17 and OFTEC Technical Book 3 where an extract fan is fitted in a building containing an open-flued combustion appliance.
7. In design of a system, where exhaust air terminals are in a location exposed to prevailing winds, measures should be taken to minimise the adverse effect of wind on the extract rate. This may include relocation of extract terminals to another location or the use of constant volume flow rate units.
8. For a toilet (WC & WHB) provision of purge ventilation in accordance with clause 3.14.3 is an alternative to intermittent mechanical extract.

It is noted that passive stack ventilation (PSV) can be used as an alternative to intermittent mechanical extract in wet rooms. A passive stack ventilation system should be installed in accordance with the recommendations set out in BRE Information Paper BRE IP 13/94, noting that such systems are most suited for use in dwellings with a height of not more than 4 storeys as the stack effect will diminish as the air cools.

Work on existing buildings

Where infiltration rates in a dwelling exceed 10 $m^3/h/m^2$ @ 50 Pa, which may often be the case in existing buildings, the size of background ventilation may be reduced to 8000 mm^2 for apartments and 4000 mm^2 for all other rooms.

Alternatively, the overall provision of background ventilation in a dwelling may be provided at an average of 6000 mm^2 per room, with a minimum provision of 4000 mm^2 in each apartment.

3.14.5 (Domestic) Continuous mechanical extract ventilation

For new dwellings with building fabric which has low infiltration, ventilation by a continuous mechanical extract system (see below) or continuous mechanical supply and extract system (see clause 3.14.6) is recommended.

'Low infiltration' is defined as a design intent of not less than 3 $m^3/(h.m^2)$@ 50Pa and less than 5 $m^3/(h.m^2)$@50 Pa, which is realised on construction.

A continuous mechanical extract ventilation system should provide for ventilation of the whole dwelling and may be delivered either by a central extract fan system, by individual extract fans or a combination of these solutions.

Where continuous mechanical extract ventilation is used, background ventilators should provide a minimum equivalent area of 4,000 mm^2 for each apartment in the dwelling.

Background ventilators should not be installed in a room with continuous mechanical extract, to avoid short circuiting of ventilation pathways. However, where a kitchen is within the same space as an apartment (e.g. living room/dining room), specialist design advice should be sought.

Where the background ventilator is ducted, the recommended area above should be doubled to account for flow resistance within the ductwork.

To reduce the effects of stratification of the air in a room, some part of the background ventilator should be at least 1.75 m above floor level.

Extract ventilation

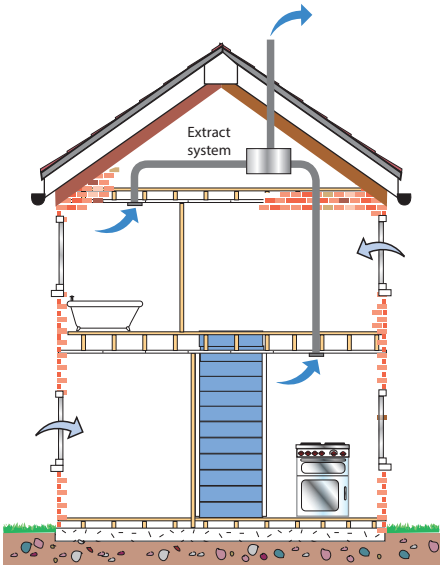
Continuous mechanical extract fans should be fitted in each room where activities will generate water vapour ('wet rooms') - kitchens, utility rooms, spaces for drying washing, bathrooms, shower rooms and sanitary accommodation. Minimum room extract rates should be as set out in Table 3.8.

Table 3.8 – Minimum extract rates for continuous extract ventilation systems

Room [1]	High/boost rate [2]	Continuous extract rate [2]
Kitchen	13 litres per second	The total combined rate of continuous mechanical extract ventilation should not be less than the minimum whole dwelling ventilation rate for the dwelling as set out in Table 3.5b in Clause 3.14.2
Utility room	8 litres per second	
Bathroom or shower room	8 litres per second	
Designated drying area (see 3.14.9)[3]	8 litres per second	
Sanitary accommodation (Toilet)	6 litres per second	

Additional information:

1. Refer to guidance to Standard 3.17 and OFTEC Technical Book 3 where an extract fan is fitted in a building containing an open-flued combustion appliance.
2. In design of a system, where exhaust air terminals are in a location exposed to prevailing winds, measures should be taken to minimise the adverse effect of wind on the extract rate. This may include relocation of extract terminals to another location or the use of constant volume flow rate units.
3. Extract in a designated drying area which is not also another of the rooms described above may operate only on an intermittent basis, controlled by a humidistat – see clause 3.14.9. In such cases, it is excluded from the whole dwelling continuous ventilation rate calculation.



Continuous mechanical extract

3.14.5 (Non-Domestic) Mechanical ventilation

A mechanical ventilation or air conditioning system should be designed, installed and commissioned to perform in a way that is not be detrimental to the health of the occupants of a building and when necessary should be easily accessible for regular maintenance.

Mechanical extract should be provided in rooms where the cubic space per occupant is not more than 3 m^3, and where the rooms have low ceilings and are occupied by large numbers of people.

Mechanical ventilation should be provided in accordance with the following:

- compliance with guidance in *BS 5720: 1979*, or
- compliance with the guidance in CIBSE Guide B: 2016, Installation and equipment data, section B2, Ventilation and air-conditioning (requirements), or

- for occupiable rooms, where a mechanical air supply is provided at a rate of at least 8 litres/second of fresh air per occupant, based on sedentary occupants and the absence of other requirements such as the removal of moisture, or
- for domestic-sized rooms where moisture is produced, such as kitchens, bathrooms and sanitary accommodation, rapid ventilation and trickle ventilation should be provided in accordance with the guidance in Table 3.9.

Table 3.9 – Mechanical ventilation of domestic-sized kitchens, bathrooms & toilets

Space	Ventilation provision [2]	Trickle ventilation > 10 $m^3/h/m^2$	Trickle ventilation 5 - 10 $m^3/h/m^2$
Kitchen	either: a). mechanical extraction capable of at least 30 litres/sec (intermittent) above a hob [2]; or b). mechanical extraction capable of at least 60 litres/sec (intermittent) if elsewhere [3]	4,000 mm^2	10,000 mm^2
Utility room or washroom	mechanical extraction capable of at least 30 litres/sec (intermittent) above a hob [3]	4,000 mm^2	10,000 mm^2
Bathroom or shower room (with or without a WC)	mechanical extraction capable of at least 15 litres/sec (intermittent)	4,000 mm^2	10,000 mm^2
Toilet	mechanical extraction capable of at least 3 air changes per hour	4,000 mm^2	10,000 mm^2

Additional information:

1. The trickle ventilation rates recommended relate to the infiltration rate of the building fabric which can be used in SBEM calculations (see Section 6 Energy).
2. Where the building infiltration rate is designed to be less than 5 $m^3/h/m^2$ the trickle vent rates in the above table might not be sufficient to maintain air quality and an alternative solution should be adopted.
3. Long duct runs, flexible ducting and bends can seriously reduce fan performance and should be carefully considered during design to ensure recommended air flows are achieved.
4. Refer to guidance to Standard 3.17 and OFTEC Technical Book 3 where an extract fan is fitted in a building containing an open-flued combustion appliance. Extract rates should be reduced.

(Non Domestic) Continuous mechanical ventilation - for smaller, domestic sized developments, a mechanical ventilation system in accordance with the guidance on such systems under standard 3.14 in the Domestic Technical Handbook may be appropriate.

Where a mechanical ventilation system gathers extracts into a common duct for discharge to an outlet, no connection to the system should be made between any exhaust fan and the outlet. Mechanical ventilation should be to the outside air. However it may be via a duct or heat exchanger.

Care should be taken when installing mechanical extract systems where there is an open flued combustion appliance in the same room or close by. Guidance is given in clause 3.17.8, extract fans.

3.14.6 (Domestic) Continuous mechanical supply and extract ventilation

For new dwellings with building fabric which has very low infiltration, ventilation by a continuous mechanical supply and extract system is recommended. Such systems can also be used for any level of building infiltration. 'Very low infiltration' is defined as a design intent of less than 3 $m^3/(h.m^2)$@50Pa which is realised on construction.

Such systems will normally include heat recovery – MVHR (mechanical ventilation with heat recovery). To avoid unintended air pathways, background ventilators should not be installed with mechanical supply and extract ventilation systems.

Supply ventilation

Each apartment should have mechanical supply ventilation, with supply terminals located and directed to avoid draughts. The total supply air flow should meet the minimum whole dwelling ventilation rate set out in Table 3.5b in clause 3.14.2 and be distributed proportionately to the volume of each habitable room.

Extract ventilation

Each wet room should have mechanical extract ventilation which can provide a high/boost rate as set out in Table 3.8 in clause 3.14.5. The continuous rate of the extract ventilation system should provide minimum whole dwelling ventilation rate set out in Table 3.5b in Clause 3.14.2.

Combustion appliances

Note that specialist advice must be sought if considering installation of an open-flued appliance within a dwelling with continuous mechanical supply and extract ventilation to identify and provide assurance on supply of air for combustion.

3.14.7 (Non-Domestic) Ventilation of sanitary accommodation

Any area containing sanitary facilities should be well ventilated, so that offensive odours do not linger. Measures should be taken to prevent odours entering other rooms. This may be achieved by, for example, providing a ventilated area between the sanitary accommodation and the other room.

Alternatively it may be possible to achieve it by mechanical ventilation or, if the sanitary accommodation is well sealed from a workroom and has a door with an automatic closer, by good natural ventilation.

However no room containing sanitary facilities should communicate directly with a room for the preparation or consumption of food. This does not apply to places of lawful detention, such as integral sanitation in prison cells.

Requirements of *BS 7671*

Wiring systems, including those relating to the installation of electrically actuated mechanical ventilation systems, should be selected and installed so that they provide adequate protection against the external influences likely to be present.

Section 522 of *BS 7671* contains requirements for providing protection against particular external influences such as, among others, water, temperature and mechanical stresses.

Additionally, where electrical installation work is carried out in a special location (or forms part of a special installation) the requirements of Section 522 should be modified by the particular requirements of the relevant section of Part 7 of *BS 7671*.

Consequently, where work is undertaken in a room containing a bath or shower, in addition to the relevant requirements of Section 522, the particular requirements of Section 701 regarding ingress protection (IP) ratings, the siting of equipment and accessories in zones and other specific measures should be applied.

Note: *A classification and codification of external influences is provided in Appendix 5 of BS 7671.*

Requirements for control circuits, such as those installed to control heating and ventilation systems, are contained in Section 557 of *BS 7671* – Auxillary circuits.

3.14.7 (Domestic) Ventilation awareness in dwellings

Carbon dioxide (CO_2) is present in the external air we breathe at concentration levels of around 400 parts per million and is not harmful to health at low concentration levels. However, as people release CO_2 into the air when they exhale, increased levels of CO_2 in occupied buildings can occur. This is generally accepted as being a reasonable indication that ventilation action is necessary.

CO_2 monitoring equipment

A CO_2 monitor should be provided in the apartment expected to be the main or principal bedroom in a dwelling. This should raise occupant awareness of CO_2 levels (and therefore other pollutants) present in their homes and of the need for them to take proactive measures to increase the ventilation. Guidance on the operation of the monitoring equipment, including options for improving ventilation when indicated as necessary by the monitor, should be provided to the occupant.

For more detailed information on the provision of guidance to occupants, reference should be made to sections 3.A.9 & 3.A.10 of Annex 3A – 'Domestic Ventilation Guide'.

The installed monitoring equipment for CO_2 should be mains operated and may take the form of a self-contained monitor/detector or a separate monitor and detector head. The monitor should have an easily understood visual indicator and be capable of logging data to allow the occupant to gain information on CO_2 levels for at least the preceding 24 hour period. If it has an audible alarm, it should be capable of being permanently deactivated.

CO_2 monitoring equipment should be capable of recording and displaying readings within a range of at least 0 – 5,000 parts per million.

The equipment should also be capable of logging data at no more than 15 minute intervals, over a 24 hour period.

Where carbon dioxide monitors/detectors are within the scope of either or both:

- European Directive 2014/35/EU – Low Voltage Directive (LVD), and/or
- European Directive 2014/53/EU – Radio Equipment

they should be constructed to fully comply with all applicable safety aspects of the Directive(s) as implemented through UK regulations.

A carbon dioxide detector head requires a flow of air over it to operate correctly, therefore, it should not be located in an area that is likely to restrict the free movement of air.

Unless otherwise indicated by the manufacturer, a carbon dioxide detector head should not be sited:

- **if ceiling mounted, within 300 mm of any wall**
- **if wall mounted, within 150 mm of the ceiling or a junction with another wall**
- **where it can be obstructed (for example by curtains, blinds or furniture)**
- **next to a door or window, or next to an air vent or similar ventilation opening.**

Unless otherwise indicated by the manufacturer, a carbon dioxide monitor, with or without an integral detector, should be mounted between 1.4 m and 1.6 m above floor level. A carbon dioxide detector head (or monitor if integrated) should not be sited within 1 m of the expected location of a bed-head.

Where a separate detector head and monitor is installed, the monitor may be located other than in the room containing the detector head, for example, the hallway. This may be desirable if more than one detector head is installed.

3.14.8 (Non-Domestic) Ventilation of small garages

The principal reason for ventilating garages is to protect the building users from the harmful effects of toxic emissions from vehicle exhausts. Where a garage is attached to a building, designers may wish to consider making the separating construction as air tight as possible.

Where there is a communicating door, a lobby arrangement could be considered.

Garages of less than 30 m^2 do not require the ventilation to be designed. It is expected that a degree of fortuitous ventilation is created by the imperfect fit of 'up and over' doors or pass doors. With such garages, it is inadvisable for designers to attempt to achieve an airtight construction.

A garage with a floor area of at least 30 m^2 but not more than 60 m^2 used for the parking of motor vehicles should have provision for natural or mechanical ventilation.

Ventilation should be in accordance with the following guidance:

- where the garage is naturally ventilated, by providing at least 2 permanent ventilators, each with an open area of at least 1/3000th of the floor area they serve, positioned to encourage through ventilation with one of the permanent ventilators being not more than 600 mm above floor level, or
- where the garage is mechanically ventilated, by providing a system:
  a. capable of continuous operation, designed to provide at least 2 air changes per hour, and
  b. independent of any other ventilation system, and
  c. constructed so that two-thirds of the exhaust air is extracted from outlets not more than 600 mm above floor level.

3.14.9 (Non-Domestic) Ventilation of large garages

A garage with a floor area more than 60 m² for the parking of motor vehicles should have provision for natural or mechanical ventilation on every storey.

Ventilation should be in accordance with the following guidance:

a. Section 3 requirements of CIBSE Guide B2: 2001, Ventilation and air conditioning:
   - to give carbon monoxide concentrations of not more than 30 parts per million averaged over an 8 hour period, and
   - to restrict peak concentrations of carbon monoxide at areas of traffic concentrations such as ramps and exits to not more than 90 parts per million for periods not exceeding 15 minutes, or

b. Section 4 of the Association for Petroleum and Explosive Administration's "Code of practice for ground floor, multi-storey and underground car parks" and CIBSE Guide B, 1986, Section B2, or

c. By providing openings in the walls on every storey of at least 1/20th of the floor area of that storey with at least half of such area in opposite walls to promote extract ventilation, if the garage is naturally ventilated, or

d. By providing mechanical ventilation system capable of at least 6 air changes per hour and at least 10 air changes per hour where traffic concentrations occur, or

e. Where it is a combined natural/mechanical ventilation system, by providing:

openings in the wall on every storey of at least 1/40th of the floor area of the storey with at least half of such area in opposite walls, and a mechanical system capable of at least 3 air changes per hour.

3.14.10 (Non-Domestic) Commissioning and written information

Commissioning of mechanical elements of an installed ventilation system should be undertaken in accordance with CIBSE Commissioning Code M. Commissioning of ductwork should reference DW 143 for ductwork air leakage testing, DW 144 for metal ductwork and DW 154 for plastic ductwork, published by the Building Engineering Services Association (BESA).

Correct use and maintenance of the ventilation systems will assist in delivering the designed ventilation to the dwelling whilst minimising energy use and environmental problems such as noise and thermal discomfort. To assist in this, the following information should be provided and made available to the occupants of the building, as relevant to the installed system.

- a design statement that sets out the key characteristics of the system along with nontechnical information on how and when the system should be used;
- manufacturer's contact details;
- instructions on how to use background ventilators for background ventilation;
- location of, and setting of, automatic controls and management systems;
- location and use of user controls - on/off and boost settings for mechanical ventilation systems;
- instructions on how and when cleaning and maintenance should be carried out,
- including air filter replacement; if there are no filters on extract terminals, how ducts can be accessed for cleaning and Instructions on how to recalibrate or check sensors and their location;
- advice on the use of and interpretation of results from any installed air quality monitoring sensors.
- design flow rates; adjustment of outdoor air rate for any recirculating systems present.

- operation, maintenance and safety of any specialist system installed (e.g. infection control).
- manufacturer's literature that may include information such as a spare parts list, means of obtaining spare parts, guarantees etc.
- A copy of the commissioning and testing report for the mechanical elements of the ventilation system

3.14.8 (Domestic) Commissioning and written information

Commissioning of mechanical elements of an installed ventilation system should be undertaken as set out for the relevant system in sections 3.A.5 to 3.A.7 of Annex 3.A - 'Domestic Ventilation Guide'.

Correct use and maintenance of the ventilation systems will assist in delivering the designed ventilation to the dwelling whilst minimising energy use and environmental problems such as noise and thermal discomfort. To assist in this, the following information should be provided and made available to the occupant(s) of the dwelling, as relevant to the installed system.

- a design statement that sets out the key characteristics of the system along with nontechnical information on how and when the system should be used;
- manufacturer's contact details;
- instructions on how to use background ventilators for background ventilation; location of, and setting of, automatic controls (e.g. humidity and timer controls); location and use of on/off and boost settings for mechanical ventilation systems;
- Instructions on how and when cleaning and maintenance should be carried out, including air filter replacement; location of air filters; if there are no filters on extract terminals, how ducts can be accessed for cleaning and recommendations on how and when cleaning should be under taken;
- instructions on how to recalibrate or check sensors and their location; and manufacturer's literature that may include information such as a spare parts list, means of obtaining spare parts, guarantees etc.
- A copy of the commissioning and testing report for the mechanical elements of the ventilation system.

Information on the type of system installed and on how to operate it effectively should also be provided, written in non-technical language, in a section on ventilation within the Quick Start Guide required under standard 6.8.

3.14.10 (Domestic) Ventilation of areas designated for drying of washing

Where clothes are dried naturally indoors large quantities of moisture can be released and this will need to be removed before it can damage the building.

Normally a utility room or bathroom is used and mechanical extract is the usual method of removing moisture.

Where a space other than a wet room already provided with mechanical extract is designated, that space should be provided with mechanical extraction capable of at least 15 l/s intermittent operation. The extract fan serving a designated space should be connected through a humidistat set to activate when relative humidity is above a set value of between 50% and 65%.

Guidance to Standard 3.11 gives information on the space recommended for the drying of washing.

3.17.8 (Domestic) Extract fans

Extract fans lower the pressure in a dwelling and may cause the spillage of combustion products from open-flued appliances. This can occur even if the appliance and the fan are in different rooms.

Ceiling fans produce currents and hence local depressurisation that can also cause the spillage of flue gases. The presence of some fans may be obvious, such as those on view in kitchens, but others may be less obvious. Fans installed in appliances such as tumble dryers or other open-flued combustion appliances can also contribute to depressurisation.

Fans may also be provided to draw radon gas out of the under building.

In dwellings where it is intended to install open-flued combustion appliances and extract fans, the combustion appliances should be able to operate safely whether or not the fans are running.

The installation of extract fans should be in accordance with the guidance below, and should be tested to show that combustion appliances operate safely whether or not fans are running:

- for solid fuel appliances, extract ventilation should not generally be installed in the same room or alternatively seek further guidance from HETAS. However in certain cases, such as large rooms where there is free flowing replacement air, a fan may be fitted provided a satisfactory spillage test is carried out in accordance with BRE Information Paper IP 7/94
- for oil-firing appliances, limit fan capacities as described in OFTEC Technical Book 3 and then carry out flue draught interference tests as described in Book 3 or *BS 5410: Part 1: 1997*
- for a gas-fired appliance, where a kitchen contains an open-flued appliance, the extract rate of the fan should not exceed 20 litres/second.

To check for safe operation of the appliance(s) see recommendations in clause 5.3.2.3 of *BS 5440: Part 1: 2000*.

3.20 Combustion appliances – removal of products of combustion (domestic and non-domestic)

Mandatory Standard 3.20 *- Every building must be designed and constructed in such a way that the products of combustion are carried safely to the external air without harm to the health of any person through leakage, spillage, or exhaust nor permit the re-entry of dangerous gases from the combustion process of fuels into the building.*

3.20.20 Carbon monoxide detection

Carbon monoxide (CO) is a colourless, odourless, and tasteless gas. Low levels of CO gas can be present in the atmosphere, however, it is highly toxic and dangerous to humans and animals in higher quantities. The gas is produced in high levels from appliances where incomplete combustion of a carbon based fuel occurs.

Incomplete combustion could occur in appliance installations that are defective, lack proper maintenance or have inadequate provision for combustion air.

In order to alert occupants to the presence of levels of carbon monoxide which may be harmful to people, a detection system should be installed in all dwellings where:

- a new or replacement fixed combustion appliance (excluding an appliance used solely for cooking) is installed in the dwelling, or
- a new or replacement fixed combustion appliance is installed in an inter-connected space, for example, an integral garage.

Carbon monoxide detectors should comply with *BS EN 50291-1:2010* and be powered by a battery designed to operate for the working life of the detector.

The detector should incorporate a warning device to alert the users when its working life is due to expire.

Hard wired mains operated carbon monoxide detectors complying with *BS EN 50291-1:2010* (Type A) with fixed wiring (not plug in types) may be used as an alternative, provided they are fitted with a sensor failure warning device.

Where carbon monoxide detectors are within the scope of either or both:

- European Directive 2006/95/EC – Low Voltage Directive, and/or
- European Directive 1999/5/EC – Radio and Telecommunication Terminal Equipment Directive

they should be constructed to fully comply with all applicable safety aspects of the Directive(s) should be followed.

4.5 Electrical safety (domestic and non-domestic)

Mandatory Standard 4.5 *- Every building must be designed and constructed in such a way that the electrical installation does not:*

a) threaten the health and safety of people in, and around, the building, and

b) become a source of fire.

4.5.0 Introduction

As a consequence of defective electrical installations, occupants may be exposed to injury from fire, electric shock, burns and similar, so the intention of this standard is to ensure that fixed electrical installations are installed safely and properly maintained.

The fixed electrical installation includes the electrical wiring, associated components and fittings, and all permanently secured equipment, but excludes portable equipment and appliances.

Note: *Where a conversion is carried out it should meet the requirement of this standard.*

4.5.1 Electrical installations

An electrical installation, whether designed to operate at either extra-low or low voltage should be designed, installed, inspected and tested in accordance with *BS 7671*, as amended (Clauses 4.5.1 and 4.5.2 of the Technical Handbooks refer).

The NICEIC Certifier of Construction Scheme (electrical installations to *BS 7671*) is authorised by the Scottish Government to certificate electrical installation work for compliance with the Scottish Building Regulations.

When electrical installation work is carried out by an NICEIC certificated business, in addition to an NICEIC Electrical Installation Certificate, a Certificate of Construction is also issued to confirm compliance with the Scottish Building Regulations (refer to Section 1 of this guide).

BS 7671 - Fundamental principles

The fundamental principles of *BS 7671*, set out in the requirements contained in Chapter 13, are to protect persons, property and livestock from dangers that may arise when electrical installations are used (Regulation 131.1).

Such dangers can arise as a result of, for example:

- fault currents,
- arcing,
- excessive temperatures, or
- mechanical movement of electrically actuated equipment.

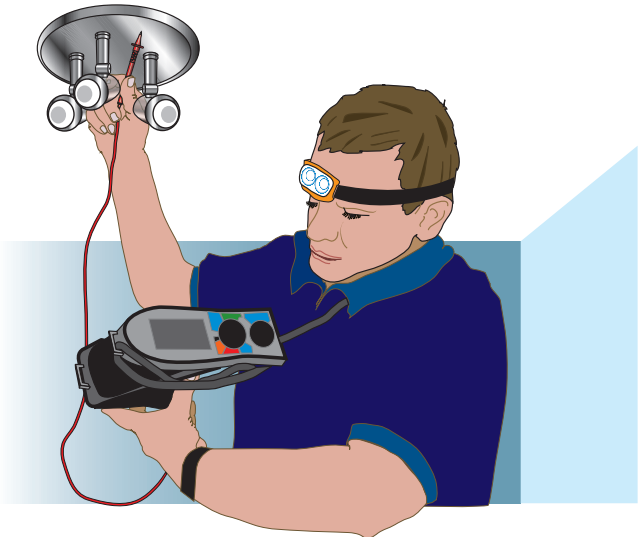
To ensure electrical installations are safe for use, they should be designed by skilled persons (Regulation 132.1) and installed by skilled[7] or instructed persons, using good workmanship and proper materials (Regulation 134.1.1). The Installed electrical equipment should comply with the appropriate British or Harmonised standard, or an appropriate international standard, and manufacturers' instructions should be taken into account (Regulations 133.1.1 and 134.1.1 refer).

As required by Regulations 134.2 and 135.1, initial verification and periodic inspection and testing of electrical installations should be carried out in accordance with Part 6 of *BS 7671*.

[7] *Skilled person and instructed person are defined in Part 2 of BS 7671, as amended.*

Part 6 of *BS 7671* - Inspection, testing and certification

Regulation 641.1 requires that every installation is inspected and tested before being put into service to verify the requirements of *BS 7671* have been met. The verification should be completed by skilled persons competent in such work (Regulation 641.6). In the case of an alteration or an addition to an existing installation, the work should comply with the requirements of *BS 7671* and not impair the safety of the existing installation (Regulation 641.5).



To confirm that electrical installation work complies with the current requirements of *BS 7671* a correctly compiled Electrical Installation Certificate including schedules of the inspection and test results should be provided to the person ordering the work (Regulation 641.1 and 641.3 refer). For an addition or alteration to an existing circuit a Minor Electrical Installation Works Certificate may be used.

Examples of NICEIC certificates are contained in Annex 6 and 7 of this guide, respectively.

The NICEIC online certification system

In addition to printed pads and computer print-outs of certificates and forms, NICEIC also provides an online certification service known as the 'NOCS'.

This service allows certificates and reports as well as the new combined Certificate of Construction and Electrical Installation Certificate to be issued on-site, in the office or at home using a PC, Tablet or Smartphone, and securely stores and archives records in the Cloud. For information about online certification refer to *www.niceiconline.com*

Periodic inspection and testing

Having been certified and put into service all electrical installations should be inspected and tested at appropriate intervals to verify they remain safe for continued use. Periodic inspection provides feedback on the condition of the electrical installation to those responsible for the safety of the installation, especially on the remedial work, if any, required.

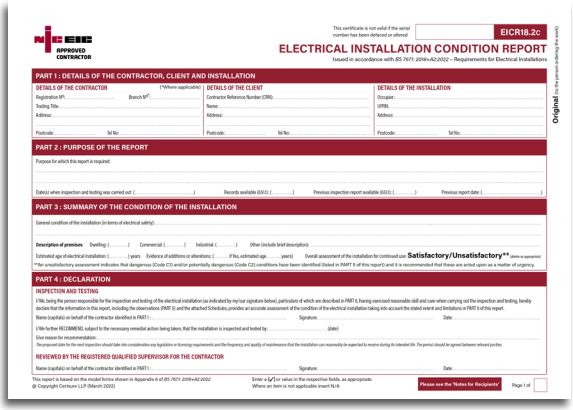
Periodic inspection should be undertaken by skilled person(s) competent in such work, and on completion of the inspection an Electrical Installation Condition Report (EICR), including schedules of inspection and test results, should be issued to the person ordering the inspection (Regulations 651.5 and 653.6 refer).

The interval between periodic inspection and testing should be a matter of engineering judgement exercised by the skilled person responsible for the periodic inspection and test (Regulation 652.1 refers).

NICEIC recommends that a newly installed electrical installation in a domestic premises is inspected and tested at an interval not exceeding 10 years, or on change of occupancy (whichever is sooner), after which the interval should be determined by the Inspector, based on the condition of the installation, and must be recorded on the Report. For a domestic installation this period is unlikely to exceed five years.

However, for certain types of premises, such as houses of multiple occupancy (HMOs) and privately rented houses, there is a legal obligation for periodic inspection to be undertaken within a specified time period.

NICEIC Electrical Installation Condition Report



EICR18.2c

ELECTRICAL INSTALLATION CONDITION REPORT

PART 1 : DETAILS OF THE CONTRACTOR, CLIENT AND INSTALLATION

PART 2 : PURPOSE OF THE REPORT

PART 3 : SUMMARY OF THE CONDITION OF THE INSTALLATION

PART 4 : DECLARATION

Private rental properties

The landlord of a privately rented property in Scotland is legally responsible for ensuring that the property meets the Repairing Standard of Section 13 of the *Housing (Scotland) Act 2006*, at the start and throughout the tenancy.

The Repairing Standard, is the statutory minimum standard for private rented housing in Scotland, and applies to the fixed electrical installation, including electrical fixtures and fittings, and any electrical appliances provided by the landlord. As a result of amendments[8] to the *Housing (Scotland) Act 2006*, from 1st December 2015, landlords of privately rented properties, such as houses and flats, will be required to:

- have an electrical safety inspection carried out at their rented property at least once every five years by a competent person(s) and retain the report for a minimum of six years, and
- provide a copy of the most recent electrical safety report to the tenant before the tenancy begins, and subsequently provide copies of any electrical safety reports carried out during the tenancy (Section 19(A) of the Act refers), and
- have regard for the statutory guidance on the electrical safety inspection issued by Scottish Minsters, under Sections 13(4A) and 19B(4) of the *Housing (Scotland) Act 2006 - Scottish Government Statutory Guidance on Electrical Installations and Appliances in Private Rented Property*.

[8] *The amendments inserted into Section 13 and 19 of the 2006 Housing (Scotland) Act can be referenced under Section 23 of the Housing (Scotland) Act 2010.*

In accordance with the Scottish Government statutory guidance, the electrical safety inspection on a private rented property is comprised of two separate elements: an Electrical Installation Condition Report (EICR) on the safety of the electrical installation, fixtures and fittings, and a portable appliance test (PAT) on appliances provided by the landlord.

Consequently, from 1st December 2015, when an EICR is completed for such a property it should have a PAT testing record attached (item 41 of the statutory guidance refers).

In accordance with Annex A of the statutory guidance for rented properties, the landlord must ensure that periodic inspection and testing is undertaken by persons competent in such work. Consequently, where the landlord intends to employ a contractor that is not registered with an accredited body, such as NICEIC, they should use the Checklist provided in Annex A to confirm evidence of competency.

Note: *Smoke alarms should be included in the electrical safety inspection (Section 13(1f) of the Repairing Standard refers).*

Annex 9 of this publication, provides further details on the statutory guidance and good practices recommended in the: *Scottish Government Statutory Guidance on Electrical Installations and Appliances in Private Rented Property*.

The statutory guidance can be downloaded from the following website: *www.gov.scot*

The NICEIC produces publications which provide practical advice and guidance on the inspection and testing of electrical installations, completion of electrical certificates and reports, and Portable Appliance Testing (PAT).

For information on periodic inspection and testing, PAT and a range of other training courses that NICEIC offers refer to: *www.shop.niceic.com/training*

Houses of multiple occupancy (HMOs)

A HMO is a property that is shared by three or more tenants who aren't members of the same family, and includes houses, flats, bedsits and other types of residential accommodation such as hostels and student halls of residence. Accommodation within a building that is separate but has shared toilet, personal washing or cooking facilities is taken to form part of a single HMO.

In addition to the Repairing Standard, a HMO is required to satisfy other standards, such as the Tolerable standard, of the *Housing (Scotland) Act 2006*.

To ensure HMOs are managed properly and meet all the required safety standards, the landlord must obtain a licence from the local authority. Previously, mandatory HMO licensing operated under the *Civic Government (Scotland) Act 1982*, but is now incorporated under Part 5 of the *Housing (Scotland) Act 2006*. One important change that has been introduced under Part 5 is that local authorities are required to take account of the statutory guidance issued by Scottish Ministers: *Licensing of houses in multiple occupation: Statutory guidance for Scottish local authorities*.

In accordance with Part 4 of the statutory guidance, local authorities should be satisfied that appropriate and up-to-date documentation is available for each HMO, which shows that the electrical system and any appliances provided by the owner have been inspected and tested by competent persons and declared safe for use (item 4.10.7 refers).

Licensing of houses in multiple occupation: Statutory guidance for Scottish local authorities,can be downloaded from: *https://www.gov.scot/publications/licensing-multiple-occupied-housing-statutory-guidance-for-scottish-local-authorities/*

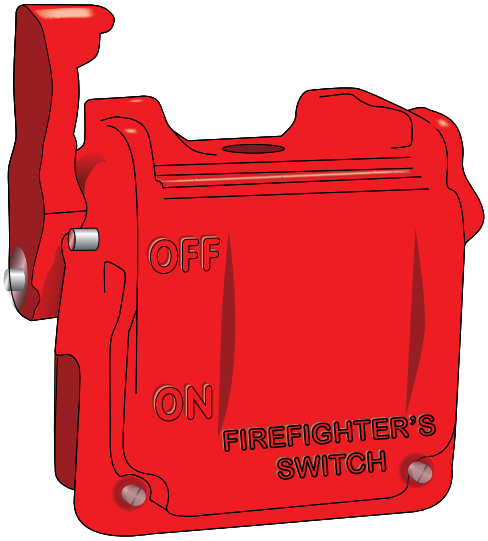
Note: *Every HMO must have adequate fire precautions, including provision for detection and giving warning in case of fire, and escape from the building (Section 2 of this guide refers).*

4.5.3 Installations operating above low voltage

To avoid the risk of harm, any circuit which is designed to operate at a voltage higher than low voltage should be provided with a cut-off switch for use in emergency in accordance with the recommendations of *BS 7671*, as amended.

A firefighter's switch, in a conspicuous position, should be provided in the low voltage side of any circuit supplying exterior electrical installations or internal discharge lighting installations (including luminous tube signage) operating at a voltage exceeding low voltage.

Firefighter's switch



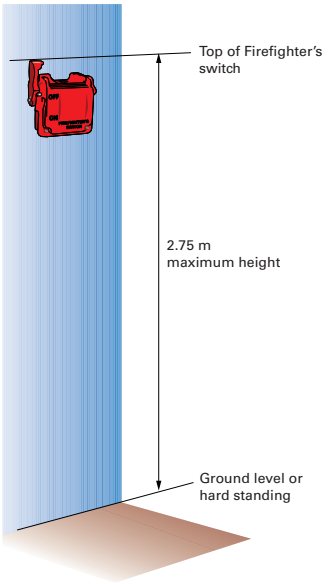
Note: *Low voltage is a voltage exceeding extra-low but not exceeding 1000 V AC or 1500 V DC measured between conductors or 600 V AC or 900 V DC measured between conductors and Earth.*

Requirements of *BS 7671*

Requirements for firefighter's switches are contained in Section 537.4 of *BS 7671*. Regulations 537.4.2.1 states that it is preferred to have a single firefighter's switch controlling every exterior installation operating at a voltage exceeding low voltage within a single premises and similarly, it is preferred to have a single firefighter's switch controlling every internal discharge lighting installation operating at a voltage exceeding low voltage within a single premises. Furthermore, where both interior and exterior discharge lighting installations exist within a single premises they should be controlled separately.

Note: *Regulation 537.4.2 does not include a portable discharge lighting luminaire or a sign having a rating not exceeding 100 W (fed from a socket-outlet).*

Regulation 537.4.2.2 gives specific requirements for the siting of firefighter's switches and associated advisory notices, which may be summarised as follows:



- For an exterior installation, the switch should be mounted outside the building and its function, either on account of its position or by the posting of appropriate notices at both the installation and switch, should be clear.
- For an interior installation, the switch should be in the main entrance to the building, unless an alternative position is agreed with the local fire authority.

The switch should be placed in a conspicuous position, reasonably accessible to firefighter's, and mounted at a height not more than 2.75 m above the ground or other surface immediately below the switch, unless an alternative position is agreed with the local fire authority. Where more than one switch is installed on any one building, each switch should be clearly marked to aid identification of the installation, or part installation, it controls.

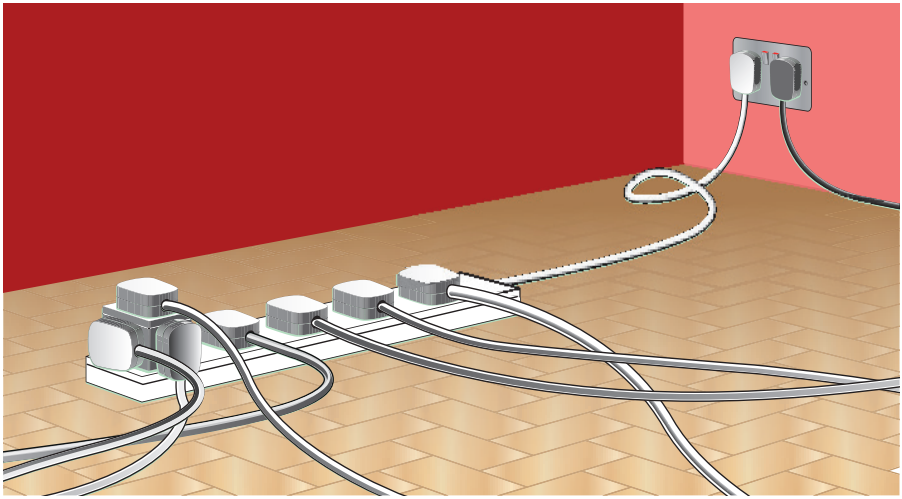
Note: *Requirements regarding the actual switch are contained in Regulation 537.4.4.*

4.6 Electrical fixtures (domestic only)

Mandatory Standard 4.6 *- Every building must be designed and constructed in such a way that electric lighting points and socket outlets are provided to ensure the health, safety and convenience of occupants and visitors.*

4.6.0 Introduction

The provision of lighting and power should be appropriate for the building and its occupants. In particular, providing an adequate number of socket-outlets in buildings not only reduces the risk of any individual socket-outlet being overloaded, but also reduces the need to use extension leads.

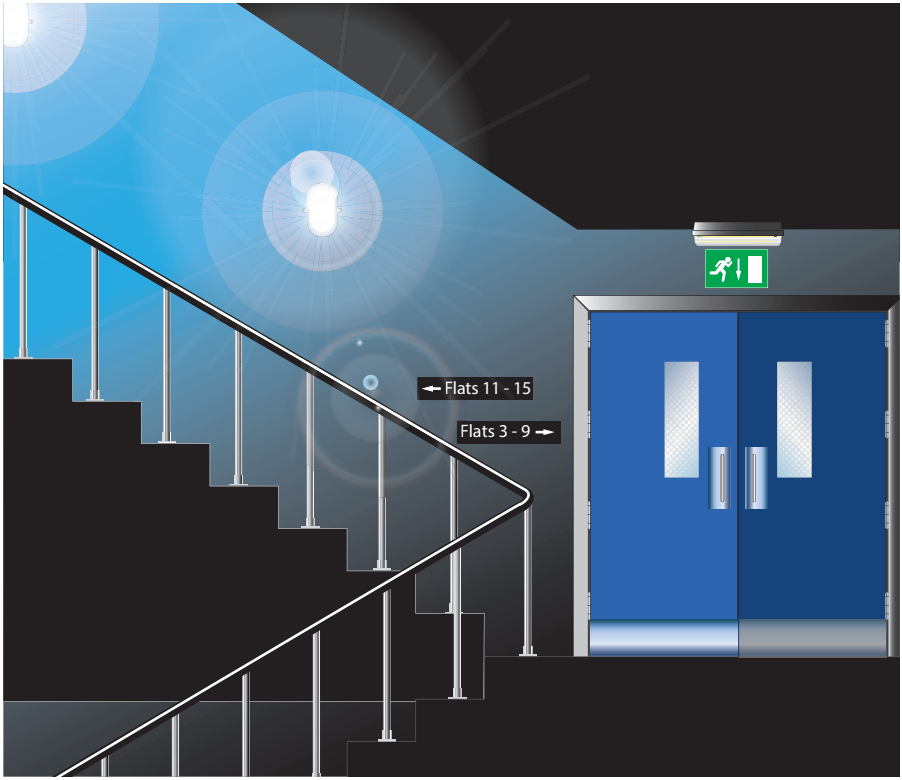


4.6.1 Lighting

A dwelling should have at least one electric lighting point in every circulation space, kitchen, bathroom, toilet and other space having a floor area of 2 m^2 or more. Whilst, lighting serving a stairway, should be provided with control switching arrangements at, or nearby, each storey.

4.6.2 Lighting in common areas of domestic buildings

Artificial lighting should be provided in common areas of buildings to minimise the risk of slips, trips and falls and prevent collisions with obstacles. A minimum uniform lighting level of 100 lux, at floor level, should be provided on stairways and landings, and at least 50 lux should be provided in other circulation areas.



Note: *Such lighting should operate automatically during the hours of darkness.*

So that light switches in common access corridors or stairways or other communal areas are accessible, and operable by disabled people, switches should be positioned between 900 mm and 1200 mm above floor level (Clause 4.8.5 refers).

4.6.3 Door entry systems

A door entry system should be installed at the principal means of access to a communal building, positioned between 0.9 m and 1.2 m above floor level. The system should include a remote door release, intercom at the point of entry and a call unit within each dwelling served by that entrance.

A door entry unit positioned at a common entrance should include an inductive coupler compatible with the 'T' setting on a personal hearing aid, and a visual indicator to show that a call has been received.

4.6.4 Socket-outlets

To minimise the fire, shock and trip hazards associated with the use of multi-way adaptors and extension leads, the following number of 13 A socket-outlets should be provided, as a minimum, in a dwelling:

- four socket-outlets within each apartment (room), and
- six socket-outlets within the kitchen, at least three of which should be situated above the worktop level in addition to any socket-outlets provided for floor-standing white goods or built-in appliances, and
- an additional four socket-outlets anywhere in the dwelling, including at least one within each circulation area of each level or storey.

Note: *Single or twin socket-outlets may be installed to give the recommended number of outlets in each space.*

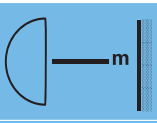
Requirements of *BS 7671*

Section 559 covers luminaires and lighting installations intended to be part the fixed installation. Among the requirements regarding connection to the fixed wiring, Regulation 559.5.1.207 requires that such lighting installations should be appropriately controlled. An explanation of symbols that are used in luminaires, controlgear and for the installation of luminaires is provided in Table 55.3.

Outdoor lighting* and extra-low voltage lighting installations are classified as special installations in *BS 7671*, so requirements for these installations are contained in Section 714 and Section 715, respectively.

**Except temporary festoon lighting, or luminaires fixed to the outside of the building and supplied from the fixed internal installation.*

Examples of symbols contained in Table 55.3

Luminaire with limited surface temperature (*BS EN 60598-2-24*)		Minimum distances from lighted objects (m) (*BS EN 60598* series)	
Recessed luminaire not suitable for direct mounting on normally flammable surfaces		Luminaire for use with high pressure sodium lamps that require an external ignitor (*BS EN 60598* series)	
Surface mounted luminaire not suitable for direct mounting on normally flammable surfaces		Short-circuit proof (both inherently and non-inherently) safety isolating transformer (*BS EN 61347-1*)	
Rated maximum ambient temperature (*BS EN 60598* series)	ta.....°C	Electronic convector for an extra-low voltage lighting installation	

Section 553 contains requirements for accessories including plugs and socket-outlets. Table 55.1 contains the type, rating and standard for various types of plugs and socket-outlets used for low voltage circuits.

4.7 Aids to communication (non-domestic)

Mandatory Standard 4.7 *- Every building must be designed and constructed in such a way that it is provided with aids to assist those with a hearing impairment.*

4.7.0 Introduction

The intention of this standard is to assist people with a hearing impediment in communication where this is made more difficult by physical conditions or layout within a building.

4.7.1 Hearing enhancement systems

People with hearing impairment should be able to access facilities and participate fully in activities such as conferences, meetings and entertainments.

Hearing enhancement systems such as induction loop, infrared or radio transmission should be provided in the following locations:

- any auditorium or other space, with fixed seating, where an audience or spectators will be present, and
- any room with a floor area more than 60 m^2 that is intended to include uses such as meetings, lectures, classes or presentations, and
- any location where a person is separated from a vendor or service provider by a physical barrier such as a glazed screen, and
- the principal reception desk, public counter or information point in any building to which the public have access. In larger buildings, with multiple entrances, there may be a number of these in different locations.

The installation of such a system should enhance sound communicated to the user, whether received directly through a personal hearing aid, or through additional equipment supplied as part of the system. It should preserve the characteristics of the source whilst suppressing reverberation and extraneous noise and should not be affected by environmental interference such as from lighting or other electrical installations.

General advice on provision and installation of listening equipment and selection of systems is available from the Royal National Institute for Deaf People website: *www.actiononhearingloss.org.uk*

4.8 Danger from accidents (domestic and non-domestic)

Mandatory Standard 4.8 *- Every building must be designed and constructed in such a way that:*

a) people in and around the building are protected from injury that could result from fixed glazing, projections or moving elements on the building

b) fixed glazing in the building is not vulnerable to breakage where there is the possibility of impact by people in and around the building

c) both faces of a window and rooflight in a building are capable of being cleaned such that there will not be a threat to the cleaner from a fall resulting in severe injury

d) a safe and secure means of access is provided to a roof (applies to non-domestic buildings only) and

e) manual controls for ventilation and for electrical fixtures can be operated safely.

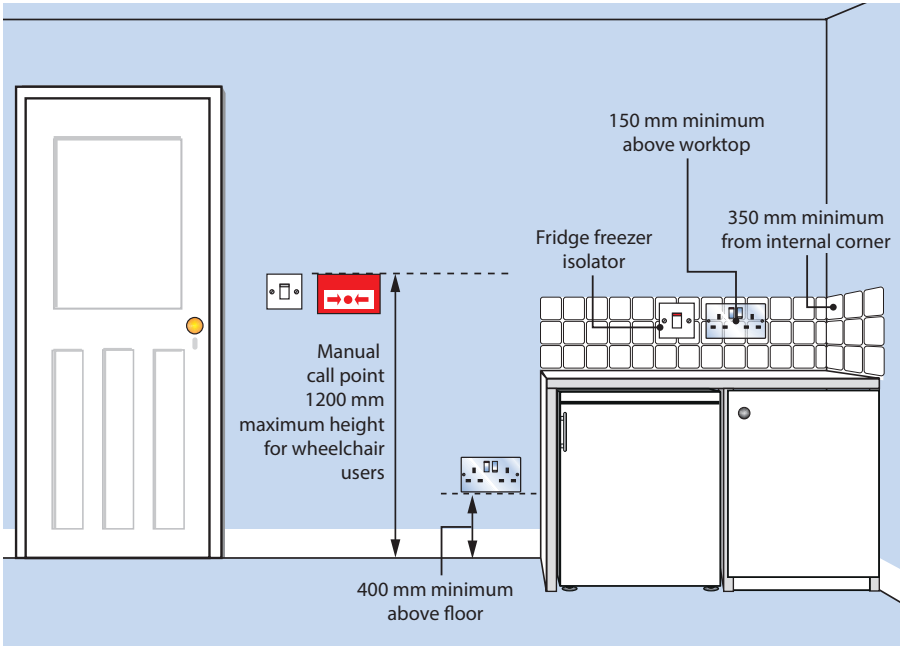
4.8.5 Access to manual controls

To ensure safe and convenient use electrical socket-outlets, switches, and other outlets and controls (including fire alarm call points and timer controls or programmers) should be located at least 350 mm from any internal corner, projecting wall or similar obstruction, and positioned at the following heights:

- light switches should be positioned at a height of between 900 mm and 1100 mm above floor level, and
- standard switched or unswitched socket-outlets and outlets for other services such as telephone or television should be positioned at least 400 mm above floor level.

Fixtures should be at least 150 mm above the projecting surface of an obstruction, such as a worktop. Where socket-outlets are concealed, such as to the rear of white goods in a kitchen, separate switching should be provided in an accessible position to allow appliances to be isolated before general maintenance or cleaning is undertaken.

Mounting heights



Note: *Electrical accessories and controls should not be sited at more than 1.2 m above floor level (unless the need for a higher location can be demonstrated).*

This section of the Technical Handbooks is specifically aimed at providing protection against the transmission of sound between attached buildings, or the walls and floors of differently occupied areas of the same building and certain rooms in dwellings.

Those undertaking electrical work, particularly the installation of recessed downlighters, should ensure such work is carried out in a manner that does not adversely affect the sound insulation properties of building structures.

Note: *Where electrical equipment, such as downlighters, are recessed into ceilings it can reduce the fire integrity of the building structure. Therefore, reference should also be made to the guidance given in Section 2.2 (Fire) of this publication, regarding the penetration of separating and compartment floors/walls.*

5.1 Noise separation (domestic and non-domestic)

Mandatory Standard 5.1 *- Every building, which is divided into more than one area of different occupation, must be designed and constructed in such a way to limit the transmission of source noise from normal domestic type activities, between such areas, to a level that will not threaten the health of, or cause inconvenience to the building occupants.*

Note: *This standard only applies to a building in different occupation incorporating; attached dwellings or attached residential buildings, or a roof, walkway or access deck located directly above an area that is either a dwelling or a residential building.*

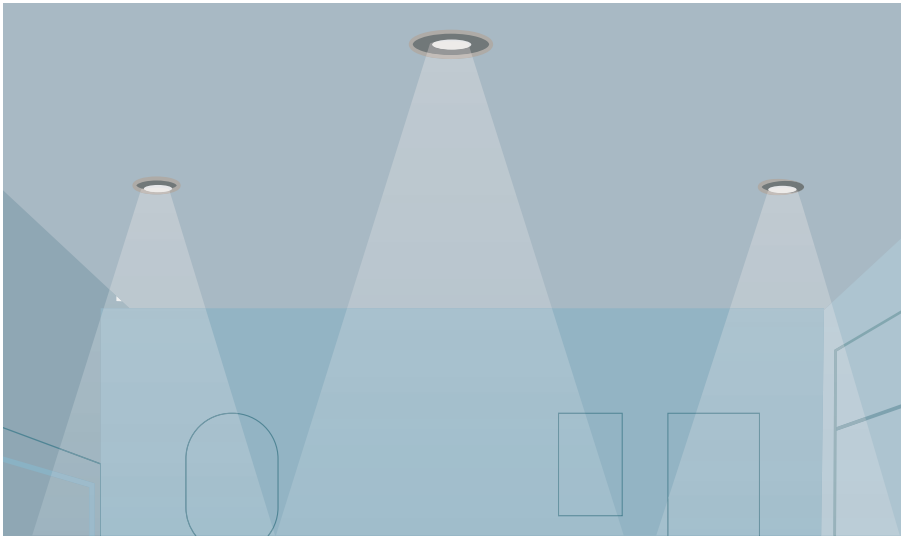
5.1.3 Example constructions

Example constructions have been developed to support the Technical Handbooks and are available on the BSD website: *www.gov.scot*

Section 3, (Clause 3.e) of the BSD guidance document: *Example Constructions and Generic Internal Constructions*, recommends that downlighters should:

- be at centres of not less than 0.75 m,
- have openings no greater than 100 mm diameter or 100 mm x 100 mm, and
- be installed at no more than one downlighter per 2 m^2 of total ceiling area in each room.

Downlighters (recessed lighting)



Downlighters installed at a greater density than one per 2 m^2 should be supported by test evidence undertaken in accordance with Annex B6 of *Example Constructions and Generic Internal Constructions*.

Note: *For guidance on the installation of downlighters, and flush mounted accessories, within domestic premises, refer to the Electrical Safety First Best Practice Guide No 5: Electrical installations and their impact on the fire performance of buildings: Part 1 - Domestic premises, which can be downloaded from www.electricalsafetyfirst.org.uk*

5.1.7 Noise from services

Services, in particular air conditioning units and ventilation systems, have the potential to transmit noise. Therefore, no service pipes or ducts should pass through a separating wall between a dwelling and a common stairway, common passage or service enclosure unless the pipes and ducts are protected as recommended in Section 2 (*Fire*) of the Technical Handbooks.

In any separating floor being built to one of the specified constructions, no openings should be formed, apart from openings for service ducts, pipes, or chimneys which are protected as recommended by Section 2 *Fire* and Section 3 *Environment*, and are enclosed above and below the floor as described in the notes on floor penetrations for each of the recommended floor constructions.

Requirements of *BS 7671*

Materials used to prevent or minimise sound transmission will, in many cases also be good insulators. Regulation 523.9 states that where a cable is to be installed in a space where thermal insulation is likely to be placed, the cable should where possible be fixed in a position such that it will not be covered by the insulation. Where this is not possible, it may be necessary to increase the cross-sectional area of the cable as appropriate.

Where a thermoplastic insulated and sheathed flat cable with protective conductor (twin and earth cable) is installed in a thermally insulated wall or above a thermally insulated ceiling with the cable being directly in contact with a thermally conductive surface on one side, the cable should be taken as being installed to Reference Methods 100 to 103. The appropriate columns within the table 4D5 given in Appendix 4 of *BS 7671* should be employed with reference to current-carrying capacity.

Cables installed in a thermally insulated wall

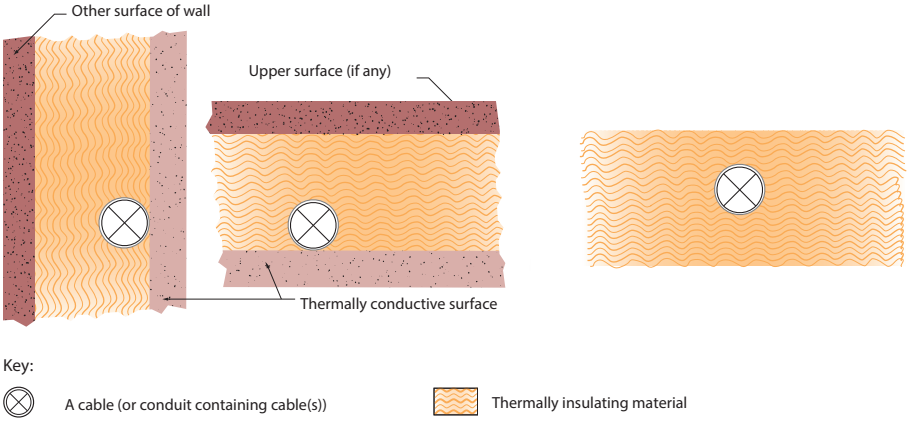
Where a cable is totally surrounded by thermal insulation for less than 0.5 m the current carrying capacity of the cable shall be reduced depending on the cross-sectional area of the cable (csa), length surrounded by the insulation and the thermal properties of the installation. Item 2.6 of Appendix 4 within *BS 7671* contains rating factors that may be applied to cables having conductors of csa up to 10 mm^2.

Where a cable is likely to be totally surrounded by thermally insulating material for more than 0.5 m, its current-carrying capacity should be taken, in the absence of more precise information as 0.5 times the current-carrying capacity of that cable if installed clipped direct (Reference Method C).

Cable surrounded by thermal insulation

(a) A cable in a thermally insulating wall or above a thermally insulating ceiling, and in contact with a thermally conductive surface on one side

(b) A cable totally surrounded by thermally insulating material



6.0.1 Introduction

Within Scottish building regulations, improvements in energy standards have been made over many years including the introduction, in 2007, of emissions targets for new buildings and further stepped improvement in 2010 and 2015.

Earlier review of standards was informed by the recommendations of The Sullivan Report (2007) and its subsequent Update Report, published in 2013.

The Climate Change (Scotland) Act 2009 (The 2009 Act), which originally received Royal Assent on 4 August 2009, remains a key commitment of the Scottish Government and is the most far-reaching environmental legislation considered by the Scottish Parliament during the first ten years of devolution.

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 (The 2019 Act), which amends The 2009 Act, sets targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045 at the latest, with interim targets for reductions of at least 75% by 2030 and 90% by 2040.

Scotland's target of net-zero emissions by 2045, five years ahead of the rest of the UK, is firmly based on what the independent Committee on Climate Change (CCC) advise is the limit of what can currently be achieved.

The levels of all of Scotland's targets are regularly reviewed following advice from the CCC.

The Climate Change Plan was updated in December 2020 which reflects the increased ambition of The 2019 Act. This update maintains the commitment to investigate the potential for further, significant improvement on 2015 energy standards and also how building regulations can support the achievement of these targets and other emissions and energy policy outcomes, including the decarbonisation of heat agenda.

Building on the policies and actions set out in the 2020 Climate Change Plan update, the 2021 Heat in Buildings Strategy sets out a pathway to zero emissions buildings by 2045 and details a series of near-term actions to set a clear path towards this, as well as a range of further, longer-term commitments to accelerate and further scale the transformation of the nation's building stock.

Heating and powering buildings currently accounts for 40% of the UK's total energy usage, a figure which must be both significantly reduced and delivered through a transition to low and zero emissions heating systems if Scotland is to achieve it's goal of net zero by 2040.

2024 New build heat standard

As part of the Heat in Buildings Strategy, the Scottish Government is committed to ensuring that, from 2024, new buildings must use heating systems which produce zero direct emissions at the point of use.

A scoping consultation on proposals was undertaken from December 2020 to March 2021 which set out our high-level vision for the new Standard.

This focused upon regulation of new buildings to meet the commitment set out in the 2019 programme for Government to require new buildings to use renewable or low carbon heat.

As of June 2022, The Scottish Government is currently developing more detailed proposals for further consultation on this issue.

Provisions within these energy standards are framed in the context of the anticipated exclusion of 'direct emissions heating systems' from new buildings in the very near future. Specific provisions which support the New Build Heat Standards are noted in the list of changes in clause 6.0.12.

6.0.2 Aims

Review for 2022 considered the technical, commercial, and wider policy implications of improvements to energy standards and offered proposals, as part of broader action by the Scottish Government on climate change, to further the ambition of becoming a net- zero society by 2045.

The intention of Section 6 is to ensure that effective measures for the conservation of fuel and power are incorporated within dwellings and buildings consisting of dwellings. In addition to limiting energy demand, by addressing the performance of the building fabric and fixed building services, a delivered energy and carbon dioxide emissions standard obliges a designer of new dwellings to consider building design in a holistic way.

Improvements set out within this section will result in a greater need to consider the benefits which very good levels of insulation, high efficiency heating solutions and effective use of on-site generation of heat or power can offer towards meeting standards.

With the stated ambition of moving away from direct emission heating systems, the standards are focused on measures which are effective in reducing the total delivered energy needed at a building.

A new energy target for new homes is introduced in recognition of the refocusing of emphasis as our Heat in Buildings Strategy continues to be implemented.

Ongoing parallel work seeks to improve compliance with building regulations and, accordingly providing more assurance that designed energy performance is achieved. That and these new standards will increase assurance that, for new homes and new building work, use of energy and fuel costs arising from such use are both minimized.

The standards and guidance given in this section are intended to achieve an improvement, for new homes, reducing emissions by approximately 32% and for non-domestic properties by approximately 20% compared to the previous 2015 standards. However, nothing here prevents a building from being designed and constructed to be even more energy efficient in its construction or make greater use of non-direct emissions heating systems or effective sources of on- site generation of heat or power.

6.0.3 General guidance

This section addresses the energy use and associated greenhouse emissions energy performance of all domestic buildings (houses, flats and maisonettes) non-domestic buildings including factories, offices, shops, warehousing, hotels, hospitals, residential buildings, buildings used for assembly and entertainment and ancillary buildings.

In respect of dwellings, all parts of a building intended to form part of the dwelling should be within an insulation envelope.

This section should be read in conjunction with all the guidance to the Building (Scotland) Regulations 2004 but in particular Section 3: Environment has a close affiliation with energy efficiency, regarding:

- heating of buildings
- ventilation of buildings
- condensation
- natural lighting
- combustion air and cooling air for combustion appliances
- drying facilities
- storage of woody biomass
- overheating.

Other than where qualified in the limitations to individual functional standards, the standards and guidance within this section apply, irrespective of the intended lifespan or the potential to relocate a building:

- to dwellings
- to ancillary and subsidiary accommodation to dwellings (some of which may be standalone buildings), that are to be heated (excepting heating rated at a maximum of 25 W/m^2 floor area, installed solely for the purpose of frost protection)
- to stand-alone buildings that are heated (see paragraph below), and
- to work on existing buildings (see paragraph below).

Heated stand-alone buildings include not only detached buildings, but also thermally divided parts of buildings with separate heating shut-down controls.

Stand-alone buildings that are less than 50 m^2 in floor area are not subject to overall energy or emissions targets set under standard 6.1 or energy certification on construction under standard 6.9.

However, they must still comply with Standards 6.2 to 6.8 & 6.10 (6.10 not being applicable to domestic buildings).

The guidance to Standard 6.2 recommends that the insulation envelope of such a building should achieve the level of performance applicable to any new building or extension.

Work on existing buildings

As for other standards within Scottish building regulations, the energy standards apply to conversions and also work on existing buildings, such as extensions, conservatories, alterations, fit-outs and replacement work.

However, in some situations, individual standards may not apply or guidance on compliance with the standards may differ for such work. The latter is usually to recognise constraints that arise when working with existing buildings.

It is advisable, in the first instance, to check the functional standard as sometimes a limitation removes certain classes of this type of work.

Where not excepted by a limitation to a standard, the provisions of the standard will apply in full to the new work on the existing building, other than where proposed works are wholly categorised as a conversion, where the standard in question may be met as far as is reasonably practicable. This is identified in the introduction to the guidance supporting each standard.

6.0.12 Latest changes

The 2023 edition of Section 6 incorporates a number of changes whilst also introducing the use of SAP 10 for compliance calculations and EPC production for new dwellings.

Section 6 also incorporates a number of changes for new non-domestic properties including the use of SBEM v.6 for compliance calculations and EPC production.

The majority of these changes relate to improvement in specified performance to deliver the intended 20% (non-domestic) or 32% (domestic) aggregate reduction in carbon dioxide emissions on the 2015 standards and to support the planned implementation of the 2024 New Build Heat Standard.

A fuller summary of changes can be found on the Technical Handbooks page of the Building Standards Division section of the Scottish Government website.

The key changes that have been made to the standards and guidance from 1 February 2023 include:

- Standard 6.1 amended to introduce a new energy target for new buildings.

- Standard 6.1 amended to apply requirements to reduce carbon dioxide emission only to new buildings using direct emissions heating systems. Note: definition of 'direct emission heating system" introduced under regulation 2.
- Clause 6.1.1 – explanation of new energy target and exemption from TER for non-direct emission heating systems. Confirmation of application of SAP 10 as the current version of the UK assessment methodology. (Domestic)
- Clause 6.1.1 –Confirmation of application of SBEM v.6 as the current version of the UK assessment methodology. (Non-Domestic)
- Clause 6.1.2 – Amendment to the notional buildings used to set compliance targets.

Three variations on the notional building, applied based upon use of electric heat pump, heat network connection or any other heating solution.

- Clause 6.1.3 – explanation of revised treatment of the export component of on-site generation of power and of the amended approach to compliance for dwellings connected to a heat network.

Note: *'Simplified approach' to compliance with standard 6.1 (build to notional building specification, no SAP compliance calculation needed) is now removed as an option.*

- Clause 6.2.1 – Area-weighted average U-values for elements of fabric improved; one set of values now apply to all building work.
- Option of demonstrating compliance of new buildings via 'space heating demand limit' set out.
- Clause 6.2.5 – airtightness testing now undertaken on each new dwelling. No exception for high infiltration dwellings. Test methodology refers to CIBSE TM 23.
- Clause 6.2.6 – reference now made to fabric values in clause 6.2.1 for conversion of heated and unheated buildings. A robust demonstration of 'reasonably practicable' solutions is sought.
- Clause 6.2.8 – reference now made to fabric values in clause 6.2.1 for extensions.
- Clause 6.2.10 – reference now made to fabric values in clause 6.2.1 for alterations.
- Clause 6.2.11 – reference now made to fabric values in clause 6.2.1 for conservatories.

- Clause 6.2.12 – reference now made to fabric values in clause 6.2.1 for stand-alone buildings.
- Clause 6.3.0 – Reference made to provision of 'direct emissions heating systems' in the context of standards 6.1 and 6.8.
- Clause 6.3.1 – Reference now made to the 2022 Domestic Building Services Compliance Guide and updated minimum standards for systems, appliances and controls.
- Clause 6.4.1 – Reference now made to the 2022 Domestic Building Services Compliance Guide and updated minimum standards for systems, appliances and controls.
- Clause 6.5.1 – Reference now made to the 2022 Domestic Building Services Compliance Guide and updated minimum standards for systems, appliances and controls.
- Clause 6.6.1 – assessment of overheating risk now references provisions set out in standard 3.28 for dwellings.
- Clause 6.6.2 – Reference now made to the 2022 Domestic Building Services Compliance Guide and updated minimum standards for systems, appliances and controls.
- Standard 6.7 amended to include 'control systems' and commissioning extended to address effective operation of installed services.
- Clause 6.7.2 added on provision of a commissioning plan at design stage.
- Clause 6.7.3 added on provision of a commissioning report on completion of construction.
- Clause 6.8.2 updated to include information on avoiding overheating risk within the quick start guide.
- Clause 6.8.3 added setting out provisions for information to support retrofit of direct emission heating systems.
- Previous Annex 6.A now deleted. Other annexes renumbered.
- Annex 6.A – Examples updated to reflect changes to guidance to standard 6.2.
- Annex 6.B – introductory text simplified.

6.0.13 Certification

Scottish Ministers can, under Section 7 of the Building (Scotland) Act 2003, approve schemes for the certification of design or construction for compliance with the mandatory functional standards.

Such schemes are approved on the basis that the procedures adopted by the scheme will take account of the need to co-ordinate the work of various designers and specialist contractors.

Individuals approved to provide certification services under the scheme are assessed to ensure that they have the qualifications, skills and experience required to certify compliance for the work covered by the scope of the scheme.

Checking procedures adopted by Approved Certifiers will deliver design or installation reliability in accordance with legislation.

The Certification of Design (Section 6 - Energy) for Domestic Buildings scheme has been approved by Scottish Ministers to confirm compliance with Section 6.

Details are available on the certification pages of the Building Standards Division website.

6.1 Energy demand and carbon dioxide emissions

Mandatory Standard – Standard 6.1

Every building must be designed and constructed in such a way that:

a. the energy performance is calculated in accordance with a methodology of calculation approved under regulation 7(a) of the Energy Performance of Buildings (Scotland) Regulations 2008;

b. the energy performance of the building is capable of reducing carbon dioxide emissions;

c. it is a nearly zero-energy building; and

d. it is capable of reducing the energy demand of the building.

Limitation

This standard does not apply to:

a. alterations and extensions to buildings, other than:

   i) alterations and extensions to stand-alone buildings having an area less than 50 square metres that would increase the area to 50 square metres or more

   ii) extensions to non-domestic buildings where the extension will have an area which is both greater than 100 square metres and greater than 25% of the area of the existing building, and

   iii) alterations to buildings involving the fit-out of the building shell which is the subject of a continuing requirement

b. conversions of buildings

c. non-domestic buildings and buildings that are ancillary to a dwelling that are stand-alone having an area less than 50 square metres

d. buildings, which will not be heated or cooled, other than by heating provided solely for the purpose of frost protection

e. limited life buildings which have an intended life of less than 2 years.

f. standard 6.1(b) only applies in respect of a building which is heated or cooled, or in which hot water is made available, by means of a direct emissions heating system.

6.1.0 Introduction

Standard 6.1 focuses on the reduction of energy demand and associated greenhouse gas emissions arising from the use of heating, hot water, lighting, ventilation and cooling systems in a new building or large extensions.

The guidance which supports this standard sets a target for overall energy and emission performance in buildings by use of a calculation methodology which assesses performance at a building level, considering a wide range of parameters which influence energy use.

This means that, for new dwellings, a designer is obliged to consider energy performance as a complete package rather than looking only at individual elements such as insulation or heat generator efficiency - a 'whole dwelling approach' to energy, which offers a significant degree of design flexibility.

Technical Standard: 6.0 Energy

For the majority of new buildings, Standard 6.1 has the greatest influence on design for energy performance, setting two challenging performance targets for both energy and building emissions which must both be met.

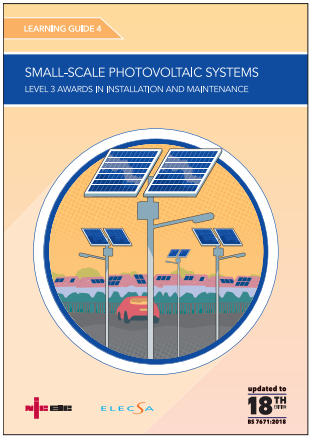
Standards 6.2 to 6.6 and 6.10 (non-domestic) recommend minimum performance levels to be achieved for individual elements or systems within a building. To achieve compliance with Standard 6.1, it will be necessary to improve upon some or all of these minimum levels or incorporate additional energy efficiency measures, such as generation of renewable heat or power to offset energy demand.

The aim of this standard is to reduce CO_2 emissions produced by the use of heating, lighting, and ventilation in new dwellings and large extensions. In view of this, designers should consider energy performance as a complete package rather than looking only at individual elements such as insulation or boiler efficiency, and give consideration to integrating low carbon equipment (LCE), such as photovoltaic, solar water heating or combined heat and power and heat pumps, within their designs.

Requirements of *BS 7671*

Requirements for the connection of a low voltage generating set to operate in parallel with the distributor's public electricity supply are contained under Regulation Group 551.7. However, a solar photovoltaic (PV) supply system is classed as a special installation (installation of increased risk) and so the general requirements will need to be modified or supplemented by the particular requirements contained in Section 712 of *BS 7671* – Solar Photovoltaic (PV) Power Supply Systems.

The NICEIC solar PV learning guide provides guidance on the installation of solar photovoltaic microgeneration systems (those having an output not exceeding 16 A).



The NICEIC MCS Contractor is approved to register installers in the following areas:

- Solar Thermal Hot Water
- Heat Pumps
- Solar PV
- Biomass
- Micro and Small Wind Turbines

The NICEIC MCS Contractor covers design installation and testing of environmental technology installation work associated within dwellings.

Note: *MCS standards exceed the recommended minimum standards contained in the BSCGs.*

Nearly zero energy buildings

Initially introduced in response to a European Directive, “nearly zero-energy building” means a building that has a very high energy performance, as determined in accordance with the methodology cited in this standard, where the ‘nearly zero’ or very low amount of energy required by the building should be covered, to a very significant extent, by energy from renewable sources, produced on site or nearby.

Review of standards in 2023 is the first improvement since this provision was introduced into regulation as part of standard 6.1 in March 2016. Standards now set, via the approved methodology and supporting guidance, should result in buildings with very low energy demand at levels which are more widely associated with the concept of ‘nearly zero’.

In this context, “energy from renewable sources” means energy from renewable non-fossil sources, namely wind, solar, aero-thermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.

In this context, current and ongoing decarbonisation of grid electricity is also now considered to contribute as a renewable source, as noted in the draft Heat in Buildings Strategy.

High-efficiency alternative systems

For all new buildings, it remains the case that the technical, environmental and economic feasibility of high-efficiency alternative systems (such as decentralised energy supply systems using renewable energy, co-generation, district or block heating/cooling and heat pumps are considered and taken into account in developing proposals.

Further information on this process is provided in Annex 6.B -'Consideration of High-Efficiency Alternative Systems in New Buildings'.

Direct emissions heating systems

It is proposed that, from 2024, all new buildings will no longer use 'direct emissions heating systems'.

"Direct emission heating system", in relation to a building, means a system (other than a heat network) by which the building is heated or is cooled, or by which hot water is made available in the building, which uses thermal energy produced by a source of production which:

a. is located within the building, or curtilage of the building, and

b. during normal operation produces greenhouse gas emissions at the point of production of that thermal energy".

In advance of this change, from 2023, all new buildings heated or cooled without use of direct emissions heating systems (requiring combustion of fossil or bio-fuels at an individual building level) do not require to undertake a target emissions calculation under standard 6.1.

Where the heat demand in a new dwelling is met using direct emissions heating systems, information must be provided to detail how a non-direct emission heat source can be retrofitted to the building. This should be both part of the building warrant application and be provided to the building owner as part of the written information required under standard 6.8.

Conversions

In the case of conversions as specified in regulation 4, this standard does not apply.

Section 4 (Electric heating) of the *Domestic BSCG* provides guidance on fixed electric heating systems in dwellings for both new and existing buildings.

Recommended minimum standards for electric boilers serving wet central heating systems to meet the relevant energy efficiency requirements of the Scottish Building Regulations are contained in Tables 16, 17, 18 and 19 of Section 4.

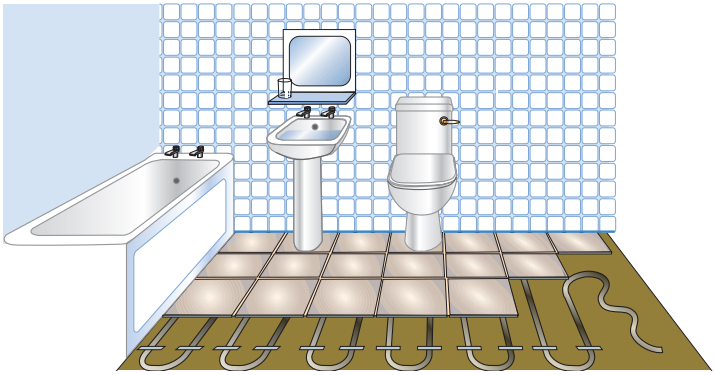
Minimum standards recommended for the control of primary and secondary electric heating systems, other than those served by electric boilers, are shown opposite (Table 20 of Section 4 refers).

Note: *For guidance on the specification and control of electric heat pumps, refer to Section 9 of the Domestic BSCG.*

Solar water heating: inherently energy efficient, having low or zero carbon dioxide emissions and minimal running costs. Guidance on the specification of indirect solar water heating for dwellings is provided in Section 11 of the *Domestic BSCG*.

Electric floor heating: guidance on the specification of floor heating systems in new dwellings is provided in Section 7 of the *Domestic BSCG*, which recommends that electric floor heating systems are designed and installed in accordance with Section 753 of *BS 7671*, as amended (Table 31(1c) refers.

Section 7 provides recommended minimum standards for construction and control of electric floor heating systems. For under-tile electric floor heating systems programmable room thermostats with a manual override feature are recommended, as a minimum, to allow space temperature to be controlled and floor void temperature to be limited in each area for safety and comfort.



Minimum standards recommended for the control of primary and secondary electric heating systems, other than those served by electric boilers

Type of electric heating system	Control type	Minimum standard
Warm air systems	Time and temperature control, either integral to the heater or external	a). a time switch/programmer and room thermostat, or b). a programmable room thermostat.
	Zone control	Dwellings with a total floor not exceeding 150 m^2 should have at least two space heating zones with independent temperature control, one of which is assigned to the living area. Dwellings with a total floor exceeding 150 m^2 should have at least two space heating zones with independent temperature and time control. Time control may be provided using: a). multiple heating zone programmers, or b). a single multi-channel programmer, or c). programmable room thermostats, or d). separate timers to each circuit, or e). a combination of (c) and (d). In single-storey, open-plan dwellings in which the living area is greater that 70% of the total floor area, sub-zoning of temperature control is not appropriate.
Panel heaters	Local time and temperature control	a). Time control provided by a programmable time switch integrated into the appliance or a separate time switch. b). Individual temperature control provided by: • integral thermostats, or • separate room thermostats or programmable room thermostats. *Note: Panel heater systems provide instantaneous heat.*

Continued.

Type of electric heating system	Control type	Minimum standard
Storage heaters	Charge control	Automatic control of input charge should be provided (based on the ability to detect the internal temperature and adjust the charging of the heater accordingly).
	Temperature control	Manual controls for adjusting the rate of heat release from the appliance such as adjustable damper or some other thermostatically-controlled means.

Non-Domestic

6.1.1 Simplified Building Energy Model (SBEM)

The Simplified Building Energy Model (SBEM) is a calculation tool which forms part of the UK National Calculation Methodology and is the methodology of calculation for non-domestic buildings approved under standard 6.1(a) for use in calculation energy demand and greenhouse gas emissions for new buildings. Version 6 of SBEM is implemented for the 2022 energy standards.

SBEM has a basic user interface, iSBEM, which includes Scottish compliance parameters for use with this guidance and a more detailed NCM Modelling Guide for Scotland, also available on the National Calculation Methodology website.

Other tools may be used with the methodology (such as dynamic simulation modelling), particularly where the building is considered to be a complex design. A list of approved calculation tools can be found on the 'Approved Energy Assessment Software' page of the Building Standards Division website.

The guidance given here is written in terms of the SBEM calculation tool but the principles and procedures also apply to other calculation tools. Designers should be familiar with the NCM and their chosen software tool and be able to explain the input and calculation process in the context of the information submitted as part of the building warrant.

6.1.2 Summary of procedure

To comply with the requirements of Standard 6.1, designers should demonstrate that the calculated greenhouse gas emissions (Building Emissions Rate or BER) and delivered energy demand (Building Delivered Energy Rate or BDER) for the 'actual' building do not exceed targets which are calculated for a 'notional' building.

A specification is implemented within calculation software which will determine a Target Emissions Rate (TER) and Target Delivered Energy Rate (TDER).

Greenhouse gas emissions are calculated and reported in kilograms of carbon dioxide (equivalent) per square metre of floor area per annum. $Kg.CO_2e/m^2/yr$.

Delivered energy demand is calculated and reported in kilowatt hours per square metre of floor area per annum. $kWh/m^2/yr$.

Outline of process

In broad terms, for both targets, the calculation process is described below:

The data defining the actual building is input into an approved software tool and the notional building is generated automatically by applying the National Calculation Methodology (NCM) for Scotland.

The notional building has the same size, shape, orientation, conditioning strategy and zone activities as the actual building.

The Target Rates (TER/TDER) for the actual building are generated automatically, with SBEM applying prescribed fabric and services specifications to the notional building (see clause 6.1.4).

These are applied to the individual building zones that make up the notional building.

Values are assigned automatically based upon both the activity and the conditioning strategy for each zone of the actual building, as input by the designer.

Application of these specifications defines a 'concurrent notional building', i.e. one from which calculated values of performance is deemed to meet the requirements of this standard.

These two calculated values are the emissions and delivered energy targets which the actual building must not exceed.

The Building Emission and Delivered Energy Rates (BER/BDER) are generated by applying the designer's chosen fabric and services specifications for the actual building on a zone-by-zone basis within the NCM for Scotland.

In determining this specification, the fabric and services specifications for the actual building should meet or improve upon the minimum levels identified in guidance to Standards 6.2 to 6.6.

If, following full specification of the actual building, the BER and BDER are both not more than the TER and TDER, then compliance with this standard is achieved.

If one or both of the BER or BDER is more than the relevant target, then the designer should review and improve the construction and building services data in the actual building and determine what further measures would be most appropriate to reduce the calculated totals so that they do not exceed the target values.

For additional provisions which apply to 'limited life' modular buildings, see Annex 6.B.

Exemption from TER/BER calculation

Where there is no heat or cooling supplied to a new building from 'direct emissions heating systems' and all such sources are fuelled by electricity or thermal energy from a heat network, Standard 6.1c does not apply and the Target and Building Emission Rate calculation need not be undertaken.

The operation of the building is deemed to produce 'zero direct emissions'. For such buildings, compliance with Standard 6.1 will be demonstrated by meeting the Target Delivered Energy Rate (TDER).

6.1.3 The 'Notional' building and SBEM calculation tool

The 'notional' building is created once the design of the actual building has reached the stage where layout, dimensions, site orientation, fuel choice, building services strategy, etc. are known.

At all stages, the conventions in the iSBEM User guide should be read in conjunction with the specific guidance for Scotland given in these clauses.

SBEM has much of the input data already embedded in the calculation tool. When 'Scottish building regulations' is selected as the ‘purpose of analysis’ within SBEM, Scottish weather data and the embedded values within the calculation tool are applied to the 'notional' building.

The software will automatically generate the 'notional' building from the information provided for the actual building.

In the interests of transparency, key information on the specification used to create the 'notional' building (whether user defined or embedded in SBEM calculation tool) is summarised in the following clauses.

Further information, including a full definition of the notional building and explanation of the assessment process is given in the 2022 'National Calculation Methodology (NCM) Modelling Guide for Scotland'.

6.1.4 Fabric and fixed building services specification for ‘notional’ building

The fabric and services specification of the notional building are assigned on a zone-by-zone basis.

There is one specification but certain elements are varied based upon the choice of main heating fuel and system for the actual building, as determined by the designer.

The specification assigned to the notional building for space and water heating and assignment of PV differs between electric heat pump solutions, heat network and all other fuel solutions.

The following table outlines the standard notional building zone specifications for fabric and fixed building services, depending on the zone conditioning strategy.

Some elements are further varied based upon the activity type defined for each zone within SBEM.

The full definition of the notional building and explanation of the assessment process is given in the 2022 'National Calculation Methodology (NCM) Modelling Guide for Scotland'.

Measures to calculate target rates for the 'notional building'

The measures identified in the tables below are set to deliver, on aggregate, a reduction in emissions of more than 16% over application of the 2015 standards. Whilst a building can be constructed using these packages of measures, it is stressed that the following specifications are provided solely for the purpose of setting the targets

(TER/TDER) for the ‘notional’ building.

Designers will find more cost-effective and relevant solution when considering the nature of the new building they propose.

Table 6.1. 'Notional' building – fabric and fixed building services values for TER/TDER

Element	Specification
Roof (U-value, W/m².k)	0.11
Wall (U-value, W/m².k)	0.15
Floor (U-value, W/m².k)	0.13
Window (U-value, W/m².k) Pedestrian Doors	1.2 (10% FF) g-Value 50%, light transmittance 77%
Rooflight (U-value, W/m².k)	1.9 (15% FF) g-Value 52%, light transmittance 57%
Vehicle access and similar large doors	1.3
High usage doors	1.9
Thermal capacity of element	Refer to NCM Modelling guide for details
Thermal bridging – Junctions	Refer to NCM Modelling guide for details
Air permeability[1](m³/(hr.m²)@50Pa)	4
Lighting Efficiency (Luminaire lumens/ Circuit watt)	95
Occupancy control (Yes/No)	Yes
Daylight control (Yes/No)	Yes
Space Heating – Refer to NCM Modelling guide for further details	Electric heat pump (SCoP 300% @ 55 °C) if actual building uses electric heat pump. Otherwise natural gas boiler (93%) or heat network[1]
Water Heating – Refer to NCM Modelling guide for further details	Electric heat pump (SCoP 270% @ 55 °C) if actual building uses electric heat pump. Otherwise natural gas boiler (93%) or heat network[1] Point-of-use electric (100%) for low DHW demand zones
Central Ventilation (SFP, W/l/s)	1.8
Terminal Unit (SFP, W/l/s)	0.3
Cooling (SEER) (where present)	6.4
Heat recovery (% efficiency)	76%
Variable speed control of fans, pumps and circulators (including sensors)	Yes
Photovoltaic Panels [2] [3]	kWp value based on GIA/foundation area

Table Notes:

1. Building extents with heat supplied from a heat network are assessed against the same network characteristics for both the notional and the actual building – see clause 6.1.6.
2. The contribution of on-site electrical generation (kWp) is equal to the lesser sum of either '15% x GIA x 0.2 kWp/m^2' or '30% x foundation area x 0.2 kWp/m^2'.
3. Assignment of PV to the notional building is reduced proportionately with the percentage of space heating demand met by an electric heat pump. The assigned value of this generation element is also limited by excluding any assessed export component. Refer to the 2022 'National Calculation Methodology (NCM) Modelling Guide for Scotland' for more information.

6.1.5 User defined information for 'notional' building

The following information should be input and should reflect the design of the actual building:

- size and shape, internal layout and dimensions (see clause 6.0.12)
- activity type and fixed building services for each building zone (and therefore the same activity type parameter values)
- orientation - the 'notional' and actual building have the same orientation areas of building envelope elements
- construction build-up of elements to complement U-values embedded in the SBEM calculation tool.

The following assertions are applied within the NCM when calculating the carbon dioxide emissions or delivered energy rates for the 'notional' building:

the heating fuel(s) specified for the actual building are applied to the 'notional' building on the basis of 'electric heat pump in actual = electric heat pump in notional' and 'any other solution in actual = natural gas boiler in notional'.

Note: *This also applies for space or water heating for a heat network actual building, which is compared to a mains gas notional building the amount of glazing in the notional building is not the same as in the actual building. It is assigned on a zone-by-zone basis as a percentage of the external wall and roof based upon the glazing type for that activity within the NCM activity database. Information on this is set out in the NCM Modelling guide.*

Any services not covered by Section 6 are not assessed (for example emergency escape lighting and specialist process lighting).

Thermal bridge heat loss is based upon the same geometry as for the actual building.

Low carbon equipment element of the TER/TDER (generation of power)

The 'notional' building includes an element of on-site generation of power represented, as a proxy, by the inclusion of a roof mounted photovoltaic array, expressed as a fixed percentage of the (conditioned) gross internal area of the building, capped at a maximum area based upon building footprint.

This is included to assist in reducing the overall delivered energy total for the building and associated emissions.

This PV element is applied only to that portion of the building where space heating demand is not met by an electric heat pump in the actual building. This is in recognition of the higher efficiency of heat pump solutions which will reduce the delivered energy total.

Accordingly, a building where space heating demand is met 100% by electric heat pump will have no assigned PV in the notional building calculation.

The incorporation of LCE within design proposals, is encouraged where this is considered an appropriate and cost-effective part of the overall building solution and the generating capacity can be shown to be utilised on site.

Noting that, from 2022, the calculation of notional and actual building will assess the contribution of on-site generation of power and this will be capped to the amount of generated energy that is assessed as not exported from the building.

Where the calculated generating capacity exceeds that which is assessed as utilised on site, this excess will be reported to the designer. This capping is intended to provide assurance on the extent that such generation at a building is effective in reducing the delivered energy total for the building.

6.1.6 Calculating the building carbon dioxide emission rate (BER) and building delivered energy rate (BDER)

The BER and BDER are calculated by using the values and efficiencies input by the designer in the SBEM calculation tool. There are, however, provisions that limit the flexibility of design. These are:

- backstop measures given in the guidance to Standards 6.2 to 6.6, and
- when display windows are present in the actual building, they are not copied across into the 'notional' building.

As noted in clause 6.1.5, the capacity of on-site generation to offset energy demand is limited to that which can be demonstrated to be used at the building, discounting any exported component.

The first of these measures is intended to limit energy demand, particularly where LCE may offset rather than reduce energy consumption.

The second allows the provision of display glazing but requires designers to compensate for the additional heat loss from such elements by improving specification of other elements of the actual building.

The third seeks to increase assurance that energy produced on site is used on site.

As noted in clause 6.1.2, where no heating or cooling is supplied to a new building from 'direct emissions heating systems', the Target and Building Emission Rate calculation need not be undertaken.

Demonstrating compliance for buildings with a supplied heat connection

Where a Heat Network is proposed for space and/or water heating in the Actual building, to maintain parity with other non-heat pump solutions the Notional building will apply natural gas for space heating and a natural gas/direct electric solution for high/low demand water heating.

This recognises that supplied heat can be utilised with 100% efficiency at the building, with adjustment only needed to recognise any standing losses from heat interface units where not contributing usefully to reduce the heating demand at the building.

This enables the designer to propose a supplied heat solution to an energy efficient new building without the need to further compensate for the characteristics of the connected network.

The improvement of the characteristics of heat from heat networks will be addressed through separate regulations made under The Heat Networks (Scotland) Act 2021.

Emissions and primary energy conversion factors for heat networks should be calculated to take account of the annual average performance of the whole system, including all distribution and heat generating characteristics and should be provided for the connecting network, from an assured source, by the network provider.

For network heat generation sources, the values in Table 19d of the NCM Modelling Guide should be used. Whilst these factors are used to calculate emissions and primary energy totals for the Actual building for EPC purposes, they are no longer applied as part of the process of demonstrating compliance with standard 6.1 for new buildings where all heating demand is met from a heat network.

6.1.7 Adjustment of BER/BDER

Certain management features offer improved energy efficiency in practice, while others have this potential if appropriate action is taken. Where these management features are provided in the proposed building, the BER/BDER can be reduced by an amount equal to the product of the percentages given in the table below and the emissions and energy demand for the system(s) to which the feature is applied:

Table 6.2 Adjustment Factors

Feature	Adjustment Factor
Central power factor correction to achieve a power factor of at least 0.9	0.010
Central power factor correction to achieve a power factor of at least 0.95	0.025
Automatic monitoring and targeting (AMT) with alarms for out-of-range values	0.050

BER example: If the total emissions in a gas heated building were 60 kg/m^2/annum and 20kg/m^2/annum are due to electrical energy consumption without power factor correction, the provision of correction equipment to achieve a power factor (pf) of 0.95 would enable the BER to be reduced by 20 x 0.025 = 0.5kg/m^2/annum.

The revised BER would then be 59.5 kg/m^2/annum. Credit can only be taken where the feature is applied.

6.1.8 Shell and fit-out buildings

Where, rather than making a staged warrant application, a new building shell and fit-out are the subject of separate building warrant applications, the final specification of building systems may not be known. However it remains important to ensure that such a building, if intended to be heated or cooled (other than by heating provided solely for the purpose of frost protection) will still be constructed to limit carbon dioxide emissions.

In such cases, the calculation methodology should still be used to show that the building shell, as proposed, can comply with Standard 6.1.

This should be done by identifying an example specification for any uninstalled services needed for occupation and use of the building and using this in the calculation.

This specification should:

- be compatible with the intended building end use and servicing strategy.
- Assessment should be based upon the most energy intensive solution associated with the proposed building use (e.g. that a shell building for commercial/office will be air conditioned), and
- recognise the available utilities provided to the site.

A comparison to demonstrate compliance with the emissions and delivered energy targets can then be carried out. In specifying the building shell, designers are encouraged to take a robust approach to fabric elements but the maximum values for such elements are the same for a shell building as for any other new building.

Note: *Under the 2015 standards, more challenging fabric values were set for shell building to offer greater flexibility in fit-out specification. This is no longer the case.*

Setting improved fabric values is encouraged but is at the discretion of the applicant.

Whilst the NCM will assess shell and fit-out installations on a zone-by-zone basis, full details of the example specification, identifying uninstalled services, shall form part of information with the building warrant and should identify, in particular, any installed low carbon equipment proposed to meet the Target Rates.

This will provide information to any party considering subsequent fit-out work on the expected level of performance of remaining building services needed to demonstrate compliance of the finished building prior to occupation.

Use of continuing requirement

Where Standard 6.1 applies to a building, the verifier should issue a continuing requirement with a building warrant for the shell building. This will provide assurance that the subsequent fit-out, whether subject to a building warrant or not, demonstrates that the building, once completed, continues to comply with Standard 6.1 by not exceeding either TER or TDER.

In demonstrating this on fit-out, the same edition of the NCM used for the shell building calculation may be used for the BER/TDER calculation for the final building.

Deferral of EPC production until fit-out

The continuing requirement should also require the production, under Standard 6.9, of an Energy Performance Certificate on completion of the final building.

This must be produced using the edition of the NCM which is current at the time works are completed.

Where this is specified in the continuing requirement, no EPC is needed on completion of the shell building. Such a document is of little relevance at that point as it relates to a building which cannot yet be occupied and has building services which are, in whole or in part, illustrative rather than installed.

Dependent upon the final specification of the building, additional provisions may be needed to meet the emissions and delivered energy standard at building fit-out phase.

Accordingly, those involved in the further development of a shell building are advised to consider early assessment of the building, as constructed, to determine the extent to which such provisions may be needed at fit-out.

Similarly, when considering either separate building warrants for shell and fit-out or a single, staged warrant, an early assessment of the implications each route may have on the design and specification of the initial building is recommended.

Domestic

6.1.1 Dwellings

Objective 1

The calculated greenhouse gas emissions for the proposed dwelling (the Dwelling Emissions Rate (DER) measured in kilograms of carbon dioxide (equivalent) per square metre of floor area per annum, kg.CO_2e/m^2/yr) should be less than or equal to the Target Emissions Rate (TER) calculated for a 'notional dwelling' of the same size and shape.

Objective 2

The calculated delivered energy demand for the proposed dwelling (the Dwelling Delivered Energy Rating (DDER) measured in kilowatt hours per square metre per year, kWh/m^2/yr) should be less than or equal to the Target Delivered Energy Rate (TDER) calculated for a 'notional dwelling' of the same size and shape.

Summary of procedure

In order to establish the Target Emissions Rate (TER) and the Target Delivered Energy Rate (TDER) for the 'notional dwelling' (i.e. a dwelling of the same size, shape and 'living area fraction' as the proposed dwelling), the dimensions and 'living area fraction' of the proposed dwelling and a set of standard values are input into the methodology (see clause 6.1.2).

To calculate the Dwelling Emissions Rate (DER) and Dwelling Delivered Energy Rate (DDER) for the proposed dwelling, a second calculation is carried out where the specification for the dwelling proposed by the applicant are input into the methodology.

Exemption from TER/DER calculation

Where there is no heat or cooling supplied to a new dwelling from 'direct emissions heating systems' and all such sources are fuelled by electricity or thermal energy from a heat network, Standard 6.1(b) does not apply and the Target and Dwelling Emission Rate calculation need not be undertaken.

The operation of the building is deemed to produce 'zero direct emissions'. Compliance with Standard 6.1 will still be demonstrated by the building meeting the Target Delivered Energy Rate (TDER).

Standard Assessment Procedure (SAP)

The Government's Standard Assessment Procedure for Energy Rating of Dwellings (SAP 10) is the calculation tool which forms part of the UK National Calculation Methodology and is the methodology for the calculation of energy and emissions performance of new dwellings approved under standard 6.1(a). At all stages, the conventions associated with the SAP document should be read in conjunction with the specific guidance given in the clauses to this section.

Designers should be familiar with the SAP methodology and their chosen software tool and be able to explain the input and calculation process in the context of the information submitted as part of the building warrant.

Some new dwellings may incorporate surgeries, consulting rooms, offices or other accommodation of a floor area not exceeding 50 m² in aggregate, used by an occupant of the dwelling in a professional or business capacity. Where this occurs, the accommodation should be considered as a part of the dwelling.

6.1.2 Setting the target emissions and delivered energy rates

To set the target emissions and delivered energy rates, (i.e. the level that should not be exceeded, the TER/TDER), refer to the table to this clause. The targets set are based on a specification linked to the choice of main heating type fuel.

This specification is applied within the methodology to define a 'notional dwelling' having the same size, shape (including floor, roof, exposed wall areas and storey heights) and 'living area fraction' as the proposed dwelling. These terms are explained in SAP 10.

Where the dwelling is to be served by an electric heat pump, one specification is defined.

For any other heat solution at the building, a second (mains gas) specification is defined.

This is to provide a degree of equitability in performance outcomes for the heat pump systems that generally operate with a very high energy efficiency.

Further adjustments are made to the second specification where the dwelling is supplied from a heat network, with the same heat network characteristics applied to both notional and actual building.

Software vendors providing BRE approved SAP 10 software will incorporate a function that, with purpose of assessment 'Scotland' selected, automatically generates the target rates once the choice of heating solution to the actual building, together with the 'notional dwelling' dimensions and 'living area fraction' have been input into the software.

Measures to calculate target rates for the 'notional dwelling'

The measures identified in the tables below are set to deliver, on aggregate, a 32% reduction in emissions over application of the 2015 standards.

Whilst a dwelling can be constructed using these packages of measures, it is stressed that the specifications are provided solely for the purpose of setting the targets (TER/TDER) for the 'notional' dwelling.

Designers will find more cost-effective and relevant solution when considering the nature of the new home they propose.

Accordingly, it is not necessary that values or elements present in these tables form part of the proposed dwelling. Designers are free to develop cost-effective and appropriate solutions which meet the TER and TDER, subject to meeting or improving upon the minimum levels identified in guidance to Standards 6.2 to 6.6.

Low carbon equipment element of the TER/TDER (generation of power)

The mains gas and heat network specification for the 'notional' building includes an element of low carbon equipment (LCE) represented, as a proxy, by the inclusion of roof mounted photovoltaic panels, expressed as a fixed percentage of the building gross internal area.

This is included to assist in reducing the overall delivered energy total for the building and, accordingly, the associated emissions (where calculated).

This PV element is applied only to that portion of the actual building where space heating demand is not met by an electric heat pump. This is in recognition of the higher efficiency of heat pump solutions which will already significantly reduce the delivered energy total.

Accordingly, a building where heat demand is met 100% by an electric heat pump will have no assigned PV in the notional building calculation.

The incorporation of LCE within design proposals, is encouraged where this is considered an appropriate and cost-effective part of the overall building solution and the generating capacity can be shown to be utilised on site.

From 2022, the calculation of notional and actual building will no longer include any component of generated power which is identified by SAP 10 as exported from the building. This change in approach seeks to reinforce the need for design choices to be effective in reducing the total delivered energy needed at a building, to the benefit of those using the building.

Table 6.1. Notional building specification – fabric and fixed building services values for TER/TDER

Element	Specification
Openings (windows, doors, etc) 1	Same as actual dwelling up to a maximum total area of openings of 25% of total floor area. If the total area of openings exceeds 25% of the total floor area, reduce to 25%
Walls	0.15 W/m^{2}K
Party walls	0.0 W/m^{2}K
Floors	0.12 W/m^{2}K
Roofs	0.09 W/m^{2}K
Doors	1.2 W/m^{2}K
Windows 2	U = 1.2 W/m^{2}K Frame factor 0.7, Solar energy transmittance 0.63, Light transmittance 0.80
Roof windows	U = 1.2 W/m^{2}K Overshading factor 1.0, Other parameters as for windows
Rooflights 3	U = 1.7 W/m^{2}K Overshading factor 1.0, Other parameters as for windows
Thermal mass	Same as actual dwelling
Number of sheltered sides	Same as actual dwelling (but must not exceed 2)
Allowance for thermal bridging 4	Assigned y-value of 0.05
Ventilation system	Continuous mechanical extract ventilation
Air permeability	5 m^3/(h.m^2)@50Pa
Chimney/open flues	None
Extract fans/points	Number of extract fans/points the same as the actual building

Element	Specification		
Main heating fuel (space and water) [6]	Heat pump (electric)	All other solutions	Heat Networks [8]
Heating system	Air Source Heat Pump, 250% (SPF as modelled in SAP) Boiler and radiators (large); Design flow temperature of 55 °C	Combi or system boiler (as actual building) SEDBUK2009 = 89.5% Room-sealed, fan-assisted flue. Modulating burner control Boiler and radiators (large); central heating pump 2013 or later, in heated space Design temperature of 55 °C	As actual dwelling (from existing heat network) Heating output – design flow temperature of 55 °C HIU data if for PCDB entry 400001 - direct 400002 - indirect
Heating system controls	Time and temperature zone control	Time and temperature zone control, interlock, ErP Class V controls, delayed start	charging system linked to use of heating, programmer and TRVs
Hot water systems	As space heating source		
Shower and baths	Number of showers and baths same as actual dwelling. If shower(s) specified, shower flow rate(s) to be 8 l/min. Shower(s) supplied by main water heating system (not instantaneous electric shower)		

Continued

Element	Specification		
Main heating fuel (space and water) [6]	Heat pump (electric)	All other solutions	Heat Networks [8]
Waste water heat recovery	None	All showers connected to WWHR Recovery efficiency: House = 55%, Flat = 36% Utilisation of 0.98, waste water fraction 0.9	None
Hot water cylinder	If present in actual building. Volume as actual building; subject to minimum volume of 150 litre		None
Hot water cylinder	If cylinder present. Declared heat loss factor = 0.85 x (0.2 + 0.051 $V^{2/3}$) kWh/day where V is the volume of the cylinder in litres. Cylinder thermostat; cylinder in heated space		None
Primary water heating losses	Fully insulated primary pipework; Separate time control for space and water heating		None
Secondary heating	None		
Electrical Supply	Standard Tariff		
Lighting	Fixed lighting capacity (lm) = 185 x total floor area; Efficacy of all fixed lighting = 80 lm/W		

Element	Specification	
Main heating fuel (space and water) [6]	Heat pump (electric)	Other
PV system [7]	None	Houses - kWp = 0.4 x ground floor area (m^2) / 6.5 Flats - kWp = 0.4 x dwelling floor area (m^2) / (6.5 x number of storeys in block)

Table Notes:

1. If there is a need to reduce the area of openings in the notional building to 25%:
   a). Include all opaque and semi-glazed doors with the same areas as the actual dwelling (excluding any doors not in exposed elements, e.g. entrance door to a flat from a heated corridor)
   b). Reduce area of all windows and roof windows/rooflights by a factor equal to [25% of total floor area less area of doors included in (a) above] divided by [total area of windows and roof windows/rooflights in actual dwelling].
2. Orientation same as actual dwelling. Over shading - average if actual dwelling has very little or average overshading; same as actual dwelling if greater overshading.
3. U-values for rooflights is already calculated on the horizontal plane.
4. For the purposes of setting the TER/TDER, a y-value of 0.05 is identified. Note that for DER/DDER, this element of calculation must have the additional heat loss element (Htb) calculated from lengths of junctions and individual psi values.
5. Three specifications are applied:
   a). if space heating is proposed via an electric heat pump, the notional building has a heat pump solution;
   b). if any other heating solution is proposed, the notional building has a mains gas boiler solution (except see 6 below) and assignment of both photovoltaics and wastewater heat recovery. Where more than one fuel is used to heat different parts of the building the calculation will assign each specification based upon the proportion of each solution present by heated floor area.
6. Where heating is provided via a Heat Network connection, the notional building space and water heating efficiency is moderated downward to match the net efficiency of 'any other heating solution' (gas boiler). This is to provide assurance that the efficiency of a supplied heat solution is represented in the same way as the efficiency of other (nonheat pump) fuel solutions in the actual building.
7. The cited PV element of the specification is calculated on the basis of a panel specification of 6.5 m^2/kWp. For purpose of calculating the benefit of the PV element in TER/TDER reporting, the contribution will be capped to the amount of generated energy that is assessed as not being exported from the dwelling, following the methodology set out in Appendix M1 of SAP 10. The same assessment will be applied to the DER/DDER calculation – see clause 6.1.3.

6.1.3 Calculating Dwelling Emissions Rate and Dwelling Delivered

Energy rates

The second calculation established the Dwelling Emissions Rate (DER) and Dwelling Delivered Energy Rate (DDER) for the proposed dwelling.

To do this the actual specification values proposed for the dwelling should be used in the methodology i.e. the U-values, air infiltration, heating system, etc.

As noted in clause 6.1.2, where no heating or cooling is supplied to a new dwelling from 'direct emissions heating systems', the Target and Dwelling Emission Rate calculation need not be undertaken.

All values input should be dwelling-specific values and be for the location and orientation of the individual dwelling, as proposed.

No standardised or default assumptions should be included.

Before determining these values for input into the methodology, reference should be made to:

- the maximum space heating demand or U-values identified in guidance to Standard 6.2, and
- guidance on systems and equipment referenced in guidance to Standards 6.3 to 6.6 and
- the Domestic Building Services Compliance Guide for Scotland.

On-site generation of power – export limitation

As with the notional building calculation, the calculation of the performance of the actual building will assess the contribution of on-site generation of power and this will be capped to the amount of generated energy that is assessed as not exported from the dwelling, following the methodology set out in Appendix M1 of SAP 10. Where the calculated generating capacity exceeds that which is assessed as utilised on site, this excess will be reported to the designer.

This capping is intended to provide assurance on the extent that such generation at a building is effective in reducing the delivered energy total for the dwelling.

Demonstrating compliance for buildings with a supplied heat connection

Compliance with standard 6.1 for a building supplied with heat from an external network source will be demonstrated by the application of the heat network characteristics to both the actual building and the notional building (as noted in clause 6.1.2).

This recognises that supplied heat can be utilised with 100% efficiency at the building, with adjustment only needed to recognise any standing losses from heat interface units where not contributing usefully to reduce the heating demand at the building.

Application of the same characteristics to both notional and actual building enables the designer to propose a supplied heat solution to an energy efficient new dwelling without the need to further compensate for the characteristics of the connected network.

The improvement of the characteristics of heat from heat networks will be addressed through separate regulation made under The Heat Networks (Scotland) Act 2021.

Emissions and primary energy conversion factors for heat networks should be calculated to take account of the annual average performance of the whole system, including all distribution and heat generating characteristics and should be provided for the connecting network, from an assured source, by the network provider or from information registered in the SAP Product Characteristic Database.

For network heat generation sources, the values in Table 12 of SAP 10 should be used.

Whilst these factors are used to calculate emissions and primary energy totals for the actual dwelling, they are no longer applied as part of the process of demonstrating compliance with standard 6.1 for new dwellings where all heating demand is met from a heat network.

6.1.4 Buildings with multiple dwellings

Where a building contains more than one dwelling (such as a block of flats or terrace of houses) the average emissions and delivered energy rate for the proposed block or terrace (DER and DDER) may be compared to the average target CO2 emissions and delivered energy rate (TER and TDER) for the 'notional block or terrace'.

The average rates for the block or terrace is the floor-area-weighted average for all the individual dwelling rates, i.e.:

{(emissions1 x floor area1) + (emissions2 x floor area2) + (emissions3 x floor area3) + ...)} ÷ {(floor area1 + floor area2 + floor area3) + ...}

The average Target Delivered Energy Rate should also be calculated using the formula above, replacing emissions total with energy totals.

The degree of flexibility which is provided by averaging out building emissions and delivered energy should be used carefully. It is not intended that one or more dwellings are super insulated (in a building consisting of dwellings) so that another may be constructed with a high percentage of glazing.

Designers should note that the option to use the 'space heating demand target' approach for building fabric described in clause 6.2.1 is applied at an individual dwelling level and may not be averaged across a block or terrace.

6.1.5 Heated common areas in buildings with multiple dwellings

Where the heated common areas in a domestic building are less than 50 m^2 in total these rooms or areas may be treated as a small stand-alone building and are not therefore subject to Standard 6.1.

Where subject to Standard 6.1, communal rooms or other areas in blocks of dwellings (which are exclusively associated with the dwellings) should be assessed either by:

a. a SBEM calculation using the methodology and guidance to Standard 6.1 for non-domestic buildings, or

b. ensuring that the glazing does not exceed 25% of the total communal floor area of the building; and the actual building fabric and services specification is equal to or better than that given for the applicable notional dwelling specification set out in clause 6.1.2

Note that an Energy Performance Certificate (EPC) will still be required, on completion of such areas, to meet Standard 6.9.

6.1.6 Conservatories and stand-alone buildings

Conservatories of less than 50 m^2 in area are stand-alone buildings, thermally separated from the dwelling. A new dwelling to which one is attached should be assessed as if there was no conservatory present.

For conservatories and other ancillary stand-alone buildings of 50 m^2 or more subject to Standard 6.1, a SBEM calculation using the methodology and guidance to Standard 6.1 for non-domestic buildings should be provided, applying the standards set for domestic buildings in all other respects.

6.3 Heating system

Mandatory Standard – Standard 6.3

Every building must be designed and constructed in such a way that the heating and hot water service systems installed are energy efficient and are capable of being controlled to achieve optimum energy efficiency

Limitation

This standard does not apply to:

a. buildings which do not use fuel or power for controlling the temperature of the internal environment, or

b. heating provided solely for the purpose of frost protection.

6.3.0 Introduction

In the design of buildings, the energy efficiency of the heating plant is an important part of the package of measures which contributes to the building's overall energy and carbon dioxide emissions.

In practice the backstop levels given in this guidance for appliance efficiencies and controls will normally be exceeded to achieve compliance with Standard 6.1 for new buildings.

The notional dwelling standard specifications already indicate this (refer to clause 6.1.2).

This guidance refers to main heating systems for dwellings. Both the primary heating and secondary heating systems are taken account of in SAP 10.

Good control of space heating is essential for conservation of energy in non-domestic buildings, as without it, the potential of energy efficient heating plant cannot be realised.

Generally the system should have sufficient zone, time and temperature controls to ensure that the heating system only provides the desired temperature when the building is occupied. Such operating controls can be overridden however when heating is needed to protect the building's structure, services or contents from frost or condensation damage.

There are efficiency issues which go beyond the guidance to the standard. These include:

- a heating system boiler should be correctly sized to ensure energy efficiency where future heating capacity may be required consideration should be given to providing additional space for extra plant. The pipe-work or ductwork should be configured to allow for the future loading, and
- other efficiency targets which may be appropriate for a system, to achieve improved performance under the requirements of government climate change and energy saving schemes.

Direct emissions heating systems

It is proposed that, from 2024, all new buildings will no longer be heated with 'direct emission heating systems'. In advance of this change, where the heat demand in a new building is met using direct emissions heating systems, information must be provided to detail how a non-direct emission heat source can be retrofitted to the building.

Such information is necessary to support a simple and cost-effective transition from such heat solutions in the future. This information should be both part of the building warrant application and be provided to the building owner as part of the written information required under standard 6.8.

Conversions

in the case of conversions, as specified in regulation 4, the building as converted shall meet the requirements of this standard in so far as is reasonably practicable, and in no case be worse than before the conversion (Regulation 12, Schedule 6).

6.3.1 Performance of fixed heating systems in new and existing buildings

The minimum performance of, space heating and hot water systems, heating appliances and controls is set out in both the Domestic Building Services Compliance Guide for Scotland and the Non-Domestic Building Services Compliance Guide for Scotland.

The documents replicate guidance published in support of building standards elsewhere in the UK and supports standardisation of the specification and expected performance of fixed building services throughout the UK.

The guidance applies to new systems and replacement, in whole or in part, of existing systems. It also addresses improvement work to existing systems as a consequence of replacing components.

Historic, listed or traditional buildings

In many cases heating system improvements to historic, listed or traditional buildings will be more feasible than other energy efficiency measures such as improving wall insulation.

Where this is the case, systems which go beyond these minimum backstop levels may help offset the deficiency in other areas of energy efficiency and carbon dioxide emissions.

Conservatories

As a conservatory which is heated will be inefficient in energy terms, the general guidance to occupiers is that they should be heated as little as possible. In view of the fact that heating is often desired particularly at the start and end of the heating season, any conservatory with heating installed should have controls that regulate it from the rest of the dwelling e.g. a thermostatic radiator valve (TRV) to each radiator.

6.5 Artificial and display lighting

Mandatory Standard – Standard 6.5

Every building must be designed and constructed in such a way that the artificial or display lighting installed is energy efficient and is capable of being controlled to achieve optimum energy efficiency.

Limitation

This standard does not apply to:

a. process and emergency lighting components in a building, or

b. alterations in dwellings or a building ancillary to a dwelling.

6.5.0 Introduction

Artificial lighting can account for a substantial proportion of the electricity used within a building. Appropriate lighting design (including use of natural daylight) can reduce energy demand, CO_2 emissions and running costs, and also reduce internal heat gains and lessen any need for mechanical cooling.

A limit for energy use arising from fixed lighting is included in the notional building specification for new dwellings under standard 6.1. Lighting in all buildings should be provided to meet the needs of occupants based upon the activities undertaken in different areas of the dwelling.

There are issues which go beyond the guidance that designers may wish to consider:

- when designing a lighting system consideration should be given to the advances in lighting technology, particularly with light emitting diodes technology (LED), and
- the system design should accommodate future upgrading with minimal disruption to the building fabric and services.

Conversions

in the case of conversions, as specified in regulation 4, the building as converted shall meet the requirements of this standard in so far as is reasonably practicable, and in no case be worse than before the conversion (Regulation 12, Schedule 6).

For the purposes of reducing CO_2 emissions and operating costs, lighting designs should incorporate a combination of natural lighting and low energy artificial lighting, such as LED lighting. Furthermore, consideration should be given to providing lighting systems that will cause minimal disruption to the building fabric and services should any future upgrading be required.

LED lighting – GU10 lamp

Note: *Lighting schemes consisting solely of GLS tungsten filament lamps or tungsten halogen lamps will not satisfy this standard.*

To meet the energy efficiency requirements of Standard 6.5, any fixed lighting should be designed to achieve lighting levels appropriate to the activity in the space, based on the Chartered Institution of Building Services Engineers' SLL Lighting Handbook or an equivalent design guide, as detailed in section 13.3 of the Domestic BSCG.

Fixed internal lighting

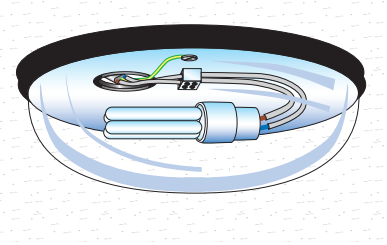
As detailed in section 13.3 of the Domestic BSCG, all internal light fittings to have minimum luminous efficacy of 75 lamp lumens per circuit watt.

Local controls for separate control of each space or zone – controls may be automatic, manual or a combination of both.

Circuit-watt – is the power consumed in lighting circuits by lamps and, where applicable, their associated control gear (including transformers and drivers) and power factor correction equipment.

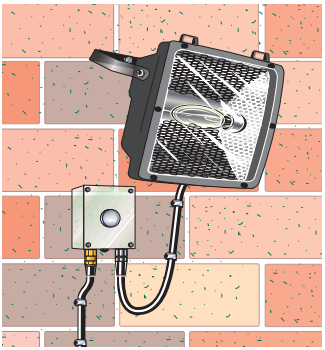
The installed light fittings may be either:

- dedicated fittings which have separate control gear and take only low energy lamps (for example, pin based lamps), or
- standard fittings supplied with low energy lamps with integrated control gear (for example, bayonet or Edison screw base lamps).



Fixed external lighting

Fixed external lighting, is lighting that is fixed to an external surface of the dwelling and supplied from the occupier's electrical system, except lighting in common areas of blocks of flats and in other communal routes.



6.5.1 Fixed lighting

Guidance on the efficiency of fixed internal and external lighting is given in section 13 of the Domestic Building Services Compliance Guide for Scotland.

The document replicates guidance published in support of building standards elsewhere in the UK and supports standardisation of the specification and expected performance of fixed building services throughout the UK.

The guidance applies to new systems and replacement, in whole or in part, of existing systems. It also addresses improvement work to existing systems as a consequence of replacing components.

Guidance for fixed internal and external lighting in non-domestic buildings is given in Section 12 of the Non-domestic BSCG.

The guidance contained in Section 12 covers interior and display lighting. 12.3 of the BSCG states Lighting should be designed to achieve lighting levels appropriate to the activity in the space, based on the CIBSE's SLL Lighting Handbook or an equivalent design guide. An alternative method is to satisfy the Lighting Energy Numerical Indicator (LENI) calculation method described in Section 12.4.

As recommended by Table 42, artificial lighting should be designed to satisfy the following minimum standards of efficacy (averaged over the whole area of the applicable type of space in the building):

General lighting in office, industrial and storage spaces should have an initial value of not less than 60 luminaire lumens per circuit-watt, which should be reduced, as shown in Table 42, according to the controls employed.

General lighting in other types of space should have an average initial efficacy of not less than 60 lamp lumens per circuit-watt.

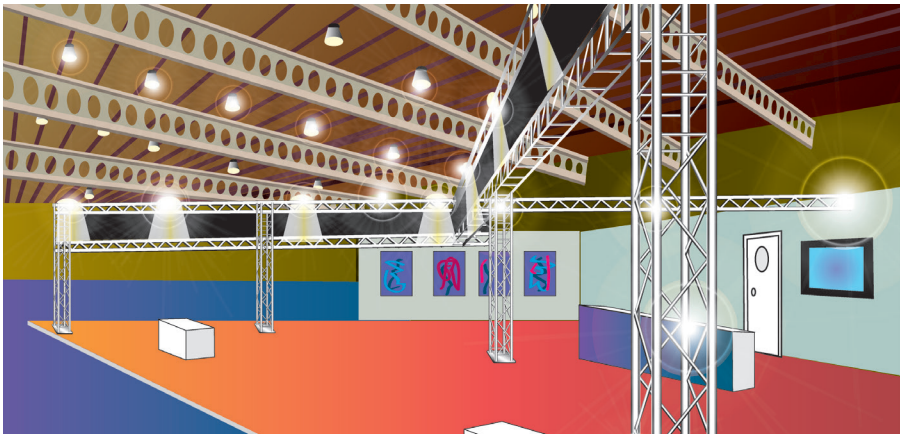
Display lighting should have an average initial efficacy of not less than 22 lamp lumens per circuit-watt.

Luminaire lumens per circuit-watt - is the (lamp lumens x light output ratio (LOR)) summed for all the luminaires.

Lamps lumens per circuit-watt - is the total lamp lumens summed for all luminaires in the relevant areas of the building, divided by the total circuit-watts for all the luminaires.

Note: *Lighting should be metered to record energy consumption (Table 43 refers).*

For guidance on the control of fixed light fittings and lamps provided for corridors, stairs and other circulation areas refer to Standard 4.6 of this publication.



Requirements of *BS 7671*

Section 559 contains requirements for the selection and erection of luminaires and lighting installations and includes, among others, the following:

Regulation 559.5.1.207 requires lighting installations to be appropriately controlled.

Regulation 559.5.2 contains requirements to provide an adequate means of fixing luminaires.

Regulation 559.8 contains requirements for protection against electric shock for circuits supplying display stands.

Table 55.3 provides an explanation of symbols to BS EN 60598 series regarding the luminaire and associated controlgear and the installation of the luminaire.

Note: *Particular requirements for outdoor lighting and extra-low voltage lighting are contained in Part 7 of BS 7671 – Special installations or locations, in Sections 714 and 715 respectively.*

Common areas of domestic buildings

Lighting levels and controls to enable the safe use of lighting in common areas such as corridors, stairs and other circulation areas, are identified in clause 4.6.2 within Section 4.

6.6 Mechanical ventilation and air conditioning

Mandatory Standard – Standard 6.6

Every building must be designed and constructed in such a way that:

a. the form and fabric of the building minimises the use of mechanical ventilating or cooling systems for cooling purposes, and

b. ventilating and cooling systems installed are energy efficient and are capable of being controlled to achieve optimum energy efficiency.

Limitation

This standard does not apply to buildings which do not use fuel or power for ventilating or cooling the internal environment.

6.6.0 Introduction

Domestic Installations

It is not desirable that dwellings or buildings consisting of dwellings have air-conditioning systems or use mechanical ventilation systems for cooling purposes, as this leads to increased energy use and higher greenhouse gas emissions.

In view of this, guidance is intended to promote designs that avoid the need for such systems in dwellings, including an assessment of summertime overheating risk set out in standard 3.28 and advice to standard 3.14 on ventilation in certain dwelling types with limited facility for cross ventilation.

However, where such systems are installed, which should generally only be a consideration when working with existing buildings, a performance specification to limit energy use is set out.

With the drive to reduce greenhouse gas emissions and limit energy demand in buildings, the need arises to consider efficient use of mechanical systems, including ventilation.

Accordingly, guidance is now offered on power consumption and controls of such systems and on the efficiency of systems that incorporate heat recovery.

Non-Domestic Installations

Mechanical ventilation is an energy intensive process and air conditioning is even more so. When considering the installation of mechanical ventilation (not including refrigeration) and air conditioning (including heating and cooling elements) (MVAC), attention should therefore be given to the following to mitigate the level of active cooling:

- form and fabric of the building energy efficiency of the equipment, and control of the equipment.

For new buildings the zone by zone approach explained in the guidance to Standard 6.1 allows designers the flexibility to assign cooling only to those zones of an otherwise heated only building, where heating and cooling is required, therefore reducing the overall energy use and carbon dioxide emissions of the building.

The designer should consider strategies appropriate for the building geometry (which could include a combination of solar shading, natural ventilation controls and daylight controls). Particular attention should be paid to limiting solar gains by ensuring that areas of the external building fabric which are susceptible to solar gain have appropriate areas of solar shading.

A ventilation strategy that incorporates night cooling and the thermal mass of a building should also be considered.

Free cooling should be optimised in order to minimise the need for mechanical ventilation and air conditioning.

When the external air temperature is higher than the space temperature the system design should allow the provision of a minimum level of fresh air.

Enthalpy control should also be considered to improve free cooling.

Should natural ventilation fail to achieve the required occupied period temperature, the designer could consider mixed-mode ventilation.

A mixed-mode building integrates the use of air conditioning when and where it is necessary, with use of natural ventilation whenever it is feasible or desirable, to maximise occupant comfort whilst reducing energy use (compared to 'year round' use of air conditioning).

Conversions

in the case of conversions, as specified in regulation 4, the building as converted shall meet the requirement of this standard in so far as is reasonably practicable, and in no case be worse than before the conversion (Regulation 12, Schedule 6).

6.6.2 Efficiency of mechanical ventilation and air conditioning systems in new and existing buildings

Guidance on the efficiency of mechanical ventilation and air conditioning systems is given in sections 10 and 11 of the Domestic Building Services Compliance Guide for Scotland and in the Non-Domestic Building Services Compliance Guide for Scotland.

The document replicates guidance published in support of building standards elsewhere in the UK and supports standardisation of the specification and expected performance of fixed building services throughout the UK. The guidance applies to new systems and replacement, in whole or in part, of existing systems.

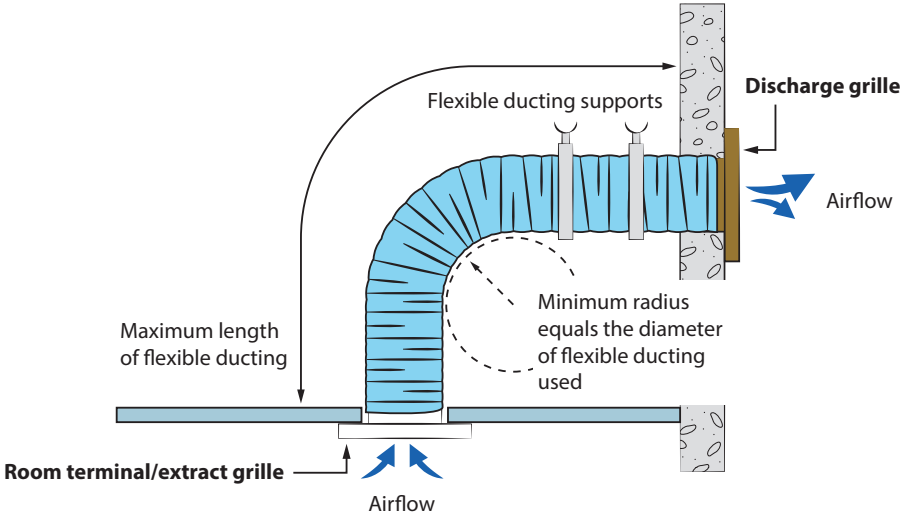
It also addresses improvement work to existing systems as a consequence of replacing components.

Clause 6.6.3 provides information on situations not addressed in that document.

6.6.3 Design and installation of ductwork

The design and installation of ductwork design can have a significant effect on the effectiveness of a ventilation system. Further guidance on basic good practice in installation and commissioning of ventilation systems can be found in guidance to Standard 3.14 and Annex 3.A.

Installation of flexible duct



6.7 Commissioning building services

Mandatory Standard

Every building must be designed and constructed in such a way that energy supply systems, control systems and building services which use fuel or power for heating, lighting, ventilating and cooling the internal environment and heating the water, are commissioned to achieve effective operation and optimum energy efficiency.

Limitation

This standard does not apply to:

a. major power plants serving the National Grid

b. the process and emergency lighting components of a building

c. heating provided solely for the purpose of frost protection, or

d. energy supply systems used solely for industrial and commercial processes, leisure use and emergency use within a building.

6.7.0 Introduction

Commissioning in terms of this section means, raising the building services systems covered by this guidance from a level of static completion to full working order and achieving the levels of energy efficiency that the component manufacturers expect from their product(s).

Commissioning however, should also be carried out with a view to enabling the safe operation of the installation.

Although there is no requirement within Section 6 for minimum efficiency levels of either, building-integrated or localised energy supply systems (e.g. diesel generators, micro wind turbines or photovoltaic arrays), there is a need for commissioning to be carried out to enable efficient use, unless they are exempt under schedule 1, regulation 3.

Power plants

which serve a number of buildings (e.g. housing estates / industrial estates) and only export surplus electricity to the National Grid will also need to be commissioned, unless exempt in terms of schedule 1, regulation 3.

Conversions

in the case of conversions, as specified in regulation 4, the building as converted shall meet the requirement of this standard (regulation 12, schedule 6).

6.7.1 Inspection and commissioning

All heating, hot water service, ventilating or cooling systems, control systems and any decentralised equipment for power generation in a dwelling or other area of a building consisting of dwellings should be inspected and commissioned in accordance with manufacturers' instructions to enable optimum energy efficiency.

Guidance and supplementary information to assist the commissioning of installed building services is given in the Domestic Building Services Compliance Guide for Scotland.

The document is intended to support standardisation of the specification and expected performance of fixed building services throughout the UK.

The guidance applies to new and replacement systems and components.

A building services installation in a non-domestic building should be inspected and commissioned in accordance with manufacturers' instructions to enable optimum energy efficiency. The building and services should have facilities such as test points, inspection hatches and measuring devices to enable inspection, testing and commissioning to be carried out.

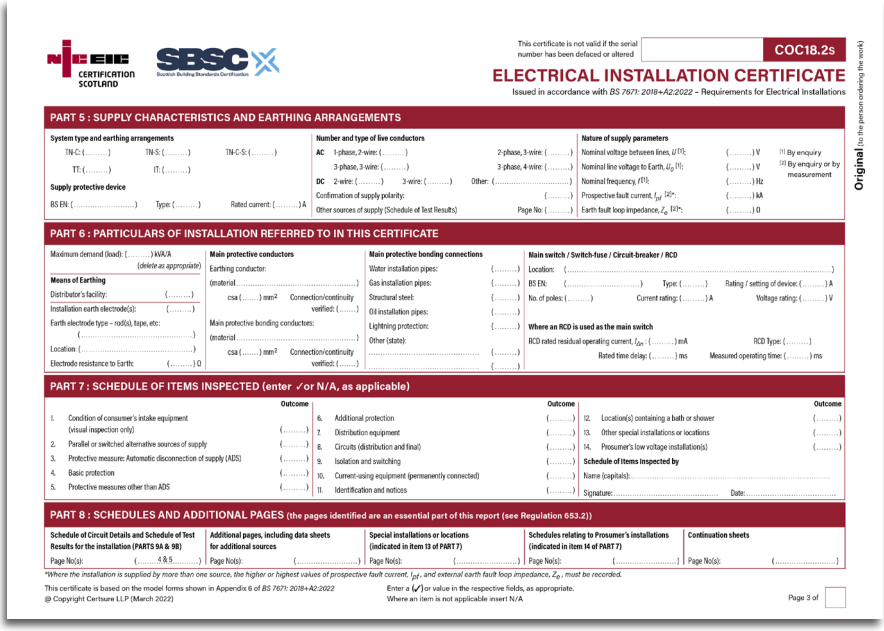
Requirements of *BS 7671*

Part 6 of *BS 7671* contains requirements for inspection and testing electrical installation work (refer to Section 2.4 Safety – of this publication).

Regulation 641.1 requires that the installed work is fully inspected before testing is undertaken, and the part of the installation being inspected is disconnected from the supply.

Regulation 642.2 requires confirmation that the installed electrical equipment complies with the relevant British or Harmonised Standard, and is selected and installed in accordance with *BS 7671* (including manufacturers' instructions) and is not damaged or defective.

NICEIC certificates (and report forms) contain schedules of items to be inspected, which must be completed and signed.



NICEIC CERTIFICATION SCOTLAND — SBSC Scottish Building Standards Certification

This certificate is not valid if the serial number has been defaced or altered

COC18.2s

ELECTRICAL INSTALLATION CERTIFICATE

Issued in accordance with *BS 7671: 2018+A2:2022* – Requirements for Electrical Installations

Original (to the person ordering the work)

PART 5 : SUPPLY CHARACTERISTICS AND EARTHING ARRANGEMENTS

System type and earthing arrangements
TN-C: (.....) TN-S: (.....) TN-C-S: (.....)
TT: (.....) IT: (.....)
Supply protective device
BS EN: (.....) Type: (.....) Rated current: (.....) A

Number and type of live conductors
AC 1-phase, 2-wire: (.....) 2-phase, 3-wire: (.....)
3-phase, 3-wire: (.....) 3-phase, 4 wire: (.....)
DC 2-wire: (.....) 3-wire: (.....) Other: (.....)
Confirmation of supply polarity: (.....)
Other sources of supply (Schedule of Test Results) Page No: (.....)

Nature of supply parameters
Nominal voltage between lines, U [1]: (.....) V
Nominal line voltage to Earth, U_0 [1]: (.....) V
Nominal frequency, f [1]: (.....) Hz
Prospective fault current, I_{pf} [2]*: (.....) kA
Earth fault loop impedance, Z_e [2]*: (.....) Ω
[1] By enquiry
[2] By enquiry or by measurement

PART 6 : PARTICULARS OF INSTALLATION REFERRED TO IN THIS CERTIFICATE

Maximum demand (load): (.....) kVA/A (*delete as appropriate*)
Means of Earthing
Distributor's facility: (.....)
Installation earth electrode(s): (.....)
Earth electrode type – rod(s), tape, etc: (.....)
Location: (.....)
Electrode resistance to Earth: (.....) Ω

Main protective conductors
Earthing conductor:
(material.....)
csa (.....) mm² Connection/continuity verified: (.....)
Main protective bonding conductors:
(material.....)
csa (.....) mm² Connection/continuity verified: (.....)

Main protective bonding connections
Water installation pipes: (.....)
Gas installation pipes: (.....)
Structural steel: (.....)
Oil installation pipes: (.....)
Lightning protection: (.....)
Other (state): (.....)
(.....)

Main switch / Switch-fuse / Circuit-breaker / RCD
Location: (.....)
BS EN: (.....) Type: (.....) Rating / setting of device: (.....) A
No. of poles: (.....) Current rating: (.....) A Voltage rating: (.....) V
Where an RCD is used as the main switch
RCD rated residual operating current, $I_{\Delta n}$: (.....) mA RCD Type: (.....)
Rated time delay: (.....) ms Measured operating time: (.....) ms

PART 7 : SCHEDULE OF ITEMS INSPECTED (enter ✓or N/A, as applicable)

	Outcome		Outcome		Outcome
1. Condition of consumer's intake equipment (visual inspection only)	(.....)	6. Additional protection	(.....)	12. Location(s) containing a bath or shower	(.....)
2. Parallel or switched alternative sources of supply	(.....)	7. Distribution equipment	(.....)	13. Other special installations or locations	(.....)
3. Protective measure: Automatic disconnection of supply (ADS)	(.....)	8. Circuits (distribution and final)	(.....)	14. Prosumer's low voltage installation(s)	(.....)
4. Basic protection	(.....)	9. Isolation and switching	(.....)	**Schedule of items inspected by**	
5. Protective measures other than ADS	(.....)	10. Current-using equipment (permanently connected)	(.....)	Name (capitals):	
		11. Identification and notices	(.....)	Signature: Date:	

PART 8 : SCHEDULES AND ADDITIONAL PAGES (the pages identified are an essential part of this report (see Regulation 653.2))

Schedule of Circuit Details and Schedule of Test Results for the installation (PARTS 9A & 9B)	Additional pages, including data sheets for additional sources	Special installations or locations (indicated in item 13 of PART 7)	Schedules relating to Prosumer's installations (indicated in item 14 of PART 7)	Continuation sheets
Page No(s): (.....4 & 5.....)	Page No(s): (.....)	Page No(s): (.....)	Page No(s): (.....)	Page No(s): (.....)

*Where the installation is supplied by more than one source, the higher or highest values of prospective fault current, I_{pf}, and external earth fault loop impedance, Z_e, must be recorded.

This certificate is based on the model forms shown in Appendix 6 of *BS 7671: 2018+A2:2022*

Enter a (✓) or value in the respective fields, as appropriate.
Where an item is not applicable insert N/A

Page 3 of

The commissioning report should include meters and the metering system as a separate item.

One way that can be considered as following the guidance would be to use the CIBSE Commissioning Codes (*http://www.cibse.org/*) and BSRIA Commissioning Guides (*http://www.bsria.co.uk/*).

6.7.2 Commissioning plan at design stage

A schedule of proposed building systems should be provided as part of the building warrant application, setting out the following:

- the systems to test and the nature of commissioning tests applied;
- a schedule of commissioning tests and who will undertake them; and
- the documentation which will be provided as an output from commissioning.

6.7.3 Commissioning report on completion of construction

On completion of building works, a document setting out the commissioning undertaken, including any changes made to the original design, should be provided to the verifier.

This should record the actions taken to complete the design stage commissioning plan, confirming all services listed were commissioned and present the output from the commissioning work, confirming successful commissioning and operation of systems in accordance with the specified design intent.

Any issues encountered and actions taken to rectify them should also be recorded.

A copy of this commissioning report should be appended to the information provided under standard 6.8.

6.8 Written information

Mandatory Standard

The occupiers of a building must be provided with written information by the owner:

a. on the operation and maintenance of the building services and energy supply systems; and

b. where any air-conditioning system in the building is subject to regulation 17, stating a time-based interval for inspection of the system.

Limitation

This standard does not apply to:

a. major power plants serving the National Grid

b. buildings which do not use fuel or power for heating, lighting, ventilating and cooling the internal environment and heating the water supply services

c. the process and emergency lighting components of a building

d. heating provided solely for the purpose of frost protection

e. lighting systems in a domestic building, or

f. energy supply systems used solely for industrial and commercial processes, leisure use and emergency use within a building.

6.8.0 Introduction

Correct use and maintenance of building services equipment is essential if the benefits of enhanced energy efficiency are to be realised from such equipment. The intention of this standard is to make the information that will help achieve this available to the occupier of the building.

Although there is no requirement within Section 6 for minimum efficiency levels of either, building-integrated or localised energy supply systems (e.g. diesel generators, micro wind turbines or photovoltaic arrays), there is a need for user and maintenance instructions to enable efficient use, unless they are exempt under schedule 1, regulation 3.

Power plants which serve a number of buildings (e.g. housing estates / industrial estates) and only export surplus electricity to the National Grid will also need to have user and maintenance instructions, unless exempt in terms of schedule 1, regulation 3.

From 2024, new buildings will be required to no longer use 'direct emissions heating systems'.

There is a similar intent for the for deployment of low and zero emissions heat within our existing building stock.

To assist building owners understand what this will entail, information should be provided which sets out such future replacement work where a new building has a direct emission heating source.

For most buildings, it is expected that information on the practical implementation of such an option at the point of initial construction would be developed as part of considering the use of 'high- efficiency alternative systems'.

Conversions

In the case of conversions, as specified in regulation 4, the building as converted shall meet the requirement of this standard (regulation 12, schedule 6).

6.8.1 Written information

Written information should be made available for the use of the occupier on the operation and maintenance of the heating, ventilation, cooling and hot water service system, any additional low carbon equipment installations and any decentralised equipment for power generation to encourage optimum energy efficiency.

If an air conditioning system is installed in a dwelling the guidance to regulation 17 should be followed.

In non-domestic buildings, A logbook should be provided and contain information about all aspects of energy system operation and maintenance to enable the building user to optimise the use of fuel.

This should include detailed information on building services plant and controls.

CIBSE Technical Memorandum 31 (TM31) (*http://www.cibse.org/*) provides guidance on the presentation of a logbook, and the logbook information should be presented in this or a similar manner.

For relevant residential buildings, a copy of the information noted in guidance to standard 3.28 on mitigating measures to reduce overheating within the building.

6.8.2 Quick start guide

In addition to comprehensive information provided under clause 6.8.1, a quick start guide, identifying all installed building services, the location of controls and identifying how systems should be used for optimum efficiency should be provided for each new dwelling.

Further information and an example of such a guide can be found within Section 7 (Sustainability) – refer to Annex 7.B.

The quick start guide should include a copy of the information noted in guidance to standard 3.28 on mitigating measures to reduce overheating within the building.

6.8.3 Information to enable future retrofit of zero direct emissions heating

Where a new building is constructed with a direct emission heating system which meets all or part of heating or cooling needs, the occupier shall be provided with information that sets out the process and work involved to deliver the future installation of a non- direct emissions heat source, simply and without disruption beyond the immediate vicinity of the current heat source.

In this respect, where the current heat source is a combustion appliance (boiler), information on a zero direct emission replacement heat source shall include a solution in addition to any information on the direct replacement of the combustion appliance with an electric boiler.

The information provided shall include, but not be limited to:

- A specification which defines or would enable selection of a new heat source based upon the current calculated space heating and hot water demand and heat distribution system.
- Confirmation of the location of any elements needed in addition to the new heat source to enable its operation and that these have been provided for in the initial design and layout of the dwelling.
- Confirmation of the designed and installed heat distribution system and its compatibility with the proposed alternative heat source, without physical modification, and the required operational characteristics of the new heat source in this respect.
- Other information sufficient to enable a quotation for such a replacement heat source to be sought from an installer.
- Written advice on the impact of the suggested replacement heat source on the energy and emission performance of the building and the comparative running costs for heating and hot water (this may be drawn from SAP data).

This information shall be appended to the Quick Start Guide noted in clause 6.8.2 under the title 'Retrofit of your existing heating system to 'zero direct emissions' heat".

6.8.4 Work on existing buildings

Where alterations are carried out to building services on a piecemeal basis, the alterations may not result in optimum energy efficiency being attained for the whole system.

In this case a list of recommendations which would improve the overall energy efficiency of the system should be provided.

On completion of the extension or alteration to the building services system within non-domestic properties, the commissioning information should be updated in the logbooks.

6.9 Energy performance certificates

Mandatory Standard

Every building must be designed and constructed in such a way that:

a. an energy performance certificate for the building is affixed to the building; and

b. the energy performance certificate is displayed in a prominent place within the building.

Limitation

a. This standard does not apply to:

- buildings which do not use fuel or power for controlling the temperature of the internal environment
- non-domestic buildings and buildings that are ancillary to a dwelling that are stand alone having an area less than 50 square metres
- conversions, alterations and extensions to buildings other than:

  i) alterations and extensions to stand-alone buildings having an area less than 50 square metres that would increase the area to 50 square metres or more, and

  ii) alterations to buildings involving the fit-out of the building shell which is the subject of a continuing requirement, or

  iii) limited life buildings which have an intended life of less than 2 years.

b. Standard 6.9(b) only applies to buildings:

- with a floor area of more than 250 square metres
- into which members of the public have an express or implied licence to enter, and
- which are visited by members of the public on at least a weekly basis.

6.9.0 Introduction

A requirement for the production of an Energy Performance Certificate (EPC) on completion of most new buildings was introduce in response to Article 12 of the EU Energy Performance of Buildings Directive in 2007.

EPCs provide an established means of reporting on building energy performance and are an essential element in our ongoing Heat in Buildings Strategy, with review of their format and application programmed over the coming years.

Standard 6.9 ensures the continued presence of such information for buyers and tenants by also making EPCs fixtures within new buildings.

EPCs must be produced in an independent manner and be carried out by qualified/ accredited experts. Since January 2013, EPCs must be produced by members of an Approved Organisation.

Scottish Ministers have appointed a number of Approved Organisations (AO) to deliver certification services, with each AO following an Operating Framework which is published on the Scottish Government website.

Information on this framework and Approved Organisations can be found at: *http://www.scotland.gov.uk/epc*

All EPCs produced for new dwellings are lodge on the Scottish EPC Register.

Scottish Ministers have directed local authorities to apply Standard 6.9 (a) to existing buildings using Section 25 (2) of the Building (Scotland) Act 2003.

The direction limits the description of the buildings to which this standard applies to those that are being sold or rented out, in support of duties imposed by The Energy Performance of Buildings (Scotland) Regulations 2008.

Definitions

In application of this standard 'energy performance certificate' has the same meaning as given in The Energy Performance of Buildings (Scotland) Regulations 2008.

Conversions

In the case of conversions, as specified in regulation 4 Standard 6.9 does not apply.

6.9.1 Calculating the carbon dioxide emissions for a certificate

For any new building subject to this standard, the information needed to generate an Energy Performance Certificate is present in the compliance calculation undertaken in support of standard 6.1.

For the purpose of establishing a rating for the energy performance certificate for a new dwelling, the values and specifications used to obtain building warrant (as varied by any subsequent amendments to warrant) should be adopted.

The information should represent the completed dwelling, as built, and should therefore include no default assumptions or standardised elements.

Note that the calculation undertaken for an EPC differs from that used to demonstrate compliance with standard 6.1 (on-site generation of power is fully reported and heat network characteristics are applied).

Non-domestic use within dwellings

Accommodation up to 50 m^2 used by an occupant of a dwelling in their professional or business capacity should be considered as a part of the dwelling and such accommodation certified as such.

6.9.2 Information to be provided for buildings

Domestic

The energy performance certificate must display the following information:

- the postal address of the building for which the certificate is issued
- a unique reference number
- the date of the assessment
- the date of the certificate

- the dwelling type
- the type of assessment used for certification
- the conditioned floor area of the building
- the main heating and fuel type
- a primary energy indicator
- the current and potential energy efficiency rating expressed on seven band scale representing the following bands of running costs; A, B, C, D, E, F and G, where A = excellent and G = very poor
- the current and potential environmental impact rating expressed on a seven band scale representing the following bands of carbon dioxide emissions; A, B, C, D, E, F and G, where A = excellent and G = very poor
- a list of the top applicable recommendations for cost-effective improvements
- a statement indicating that more detailed information on the recommendations made in the EPC is contained in the recommendations report, and
- a statement to the effect that the EPC must be affixed to the building and not to be removed unless it is replaced with an updated version.

The recommendations report, which must accompany the EPC, but which does not have to be affixed to the building, includes the following additional information:

- a summary of the energy performance related features of the dwelling estimated energy costs (based upon standard use patterns), and
- a list of all improvements identified for the dwelling and further information on each measure.
- Cost-effective improvements - there are cost-effective, low-cost, energy efficiency improvements that can be made to most dwellings (when no other work is proposed) such as upgrade insulation in an accessible roof space or fit low energy lamps throughout the dwelling.

Measures presented on the certificate and recommendations report must meet Scottish building regulations, relevant to the individual dwelling and should be technically feasible.

The recommendations report may give additional advice on protected energy costs and improvements that are cost-effective only when additional work is being carried out e.g. providing insulation when replacing flat roof coverings.

Some experts providing certificates may wish to add extra value and give additional advice to their clients. All of this is welcome, but in every case, such information should be clearly explained in the addendum section of the recommendations report and be accompanied by advice on relevant warrants and building regulations.

Sources of further energy saving advice and funding options are also noted in the recommendations report.

Non-Domestic

The energy performance certificate must display the following information:

- the postal address of the building for which the certificate is issued
- a unique reference number (other than for an EPC produced in support of a building warrant applied for before 9 January 2013)
- the date of the assessment
- the date of the certificate
- the building type
- the calculation tool used for certification
- the conditioned floor area of the building
- a primary energy indicator
- the current and potential building energy performance rating expressed on a seven band scale representing the following bands of carbon dioxide emissions; A, B, C, D, E, F and G, where A = excellent and G = very poor
- the approximate current CO_2 emissions expressed in kg of CO_2 per m^2 of floor area per annum
- the approximate current energy use expressed in kWh per m2 of floor area per annum

- the building energy performance rating of the building if built to building regulations current at the date of issue
- a statement indicating that more detailed information on the recommendations made in the EPC is contained in the recommendations report, and
- a statement to the effect that the EPC must be affixed to the building and not to be removed unless it is replaced with an updated version.

The recommendations report, which must accompany the EPC, but which does not have to be affixed to the building or displayed, includes the following additional information:

- further information on recommended improvement measures and sources of further advice
- the main type of heating and fuel
- the type of electricity generation
- whether or not there is any form of building integrated renewable energy generation
- the type of ventilation system, and
- the name and contact details of the party who carried out the assessment and (if applicable) Approved Organisation membership number.

Cost-effective improvement

There are limited cost-effective, energy-efficiency improvements that can be made to the fabric of a building (when no other work is proposed) such as upgrade insulation in an accessible roof space. However there are several low cost measures that can be done to the building services. Examples are:

- fitting low energy lamps throughout the building
- installing lighting management systems
- insulating pipe-valves, and
- fitting variable speed motor control for fans and pumps.

Measures presented on the certificate and recommendations report must meet Scottish building regulations, be relevant to the individual building and be technically feasible.

Additional advice

The recommendations report may give additional advice on projected energy costs and improvements that are cost-effective only when additional work is being carried out e.g. providing insulation when replacing flat roof coverings.

Assessors may also wish to identify improvements with longer payback periods and are either aspirational (e.g. photovoltaics) or enhanced management and control features (e.g. automatic monitoring and targeting with alarms for out of range values).

Sources of further energy saving advice and funding options are also noted in the recommendations report.

6.9.3 Location of an energy performance certificate

Public buildings over 250 m^2

New buildings with an area over 250 m^2 occupied by public authorities and by institutions providing public services to a large number of persons and therefore frequently visited by these persons, must have an energy performance certificate displayed in a prominent place.

A suitable location would be an area of wall which is clearly visible to the public in the main entrance lobby or reception.

The public buildings referred to in the paragraph above are described and characterized by meeting all of the following criteria:

a. the area of the building is over 250 m^2
b. the building is occupied by public authorities or provides public services to a large number of persons
c. the building is frequently visited, at least weekly, by members of the general public

d. the public have a right of access to the building or the parts thereof providing services directly to the public, and

e. public funding, even in part, is used in the operation of the building, or in the general upkeep of the building or in funding costs of staff employed therein.

Examples of such buildings are:

- colleges (further education, higher education), universities
- community centres
- concert halls, theatres
- crematoria
- day centres
- education centres, schools (nursery, primary, secondary, special)
- exhibition halls (multi-function centres)
- headquarters' buildings (of local authorities such as district councils, health & social services trusts and boards, education and library boards, etc.) where the public have an unqualified right of access (for example to attend council meetings, parliamentary meetings or other events to which the public have access)
- health centres, hospitals
- hostels, halls of residence
- law courts
- leisure centres, swimming pools, sports pavilions
- libraries, museums, art galleries
- offices (passport office, motor tax office, benefits office, etc.) having a public counter and providing services directly to the public
- outdoor centres
- passenger terminals (rail, bus, sea, and air)
- police stations (with a public counter)

- residential care buildings
- visitor centres
- youth centres.

The above list is not comprehensive, but indicates the type of buildings which should display an energy performance certificate.

Buildings over 250 m^2 frequently visited by the Public

Where a new building, other than a public building, has a floor area of more than 250 square metres, members of the public have an express or implied licence to enter and it is so visited on at least a weekly basis, the EPC produced on completion must be displayed as for a public building (noted above).

The types of buildings which would fall into this category include:

- Supermarkets
- Banks
- Sports clubs
- Shopping centres

The requirement for owners and occupiers of existing buildings to display of an EPC is now addressed under regulation 9 of the Energy Performance of Buildings (Scotland) Regulations 2008, as amended. This was introduced through The Energy Performance of Buildings (Scotland) Amendment (No.2) Regulation 2012

Other building types

For all other buildings, the energy performance certificate should be indelibly marked and located in a position that is readily accessible, protected from weather and not easily obscured.

A suitable location could be in a cupboard containing the gas or electricity meter

6.9.4 Conservatories and other stand-alone buildings

For conservatories and for other ancillary stand-alone buildings of less than 50 m^2 floor area, an energy performance certificate need not be provided.

For those buildings of a floor area of 50 m² or more, the guidance in the Non-domestic Technical Handbook should be followed and an additional certificate supplementing the one for the dwelling should be provided.

6.10 Metering

Mandatory Standard

Every building must be designed and constructed in such a way that each building or part of a building designed for different occupation is fitted with fuel and power meters.

Limitation

This standard does not apply to:

a. domestic buildings

b. district or block heating systems where each part of the building designed for different occupation is fitted with heat meters, or

c. heating fired by solid fuel or biomass.

6.10.0 Introduction

This standard does not apply to domestic buildings as fuel providers e.g. gas companies, provide meters to dwellings to enable correct charging for fuel used by the customer

To enable building operators to measure and manage energy use within a building effectively, a building should be fitted with meters to allow the use of fuel and power to be monitored.

Areas of further good practice in this respect, which building operators can consider include:

as part of any metering strategy adopted within larger buildings, consideration can be given to the benefits the facility for automatic meter reading and data collection can offer where solid mineral fuel or biomass is used, recording the volume of fuel used and calorific value can assist in assessing performance.

Conversions

In the case of conversions, as specified in regulation 4, the building as converted shall meet the requirement of this standard (regulation 12, schedule 6).

6.10.1 Metering

All buildings should be fitted with meters to record fuel and power use. These should be located where they can be easily accessed by the building operator.

Information provided under Standard 6.8 should enable building occupiers to be familiar with the metering installation and the locations of meters.

Each area divided by separating walls and separating floors and designed for different occupation, including common areas, should be provided with fuel and power meters to measure energy use in each area.

Where multiple buildings or fire separated units are served on a site by a communal heating appliance, metering shall be installed both at the communal heating appliance and heat meters at the individual buildings served.

Where a combined heat and power installation is present, metering should be provided which measures the hours run, electricity generated, and the fuel supplied to the unit.

CIBSE Technical Memorandum 39 (TM39) 'Building energy metering' provides guidance on preparing a metering strategy.

6.10.2 Sub-metering

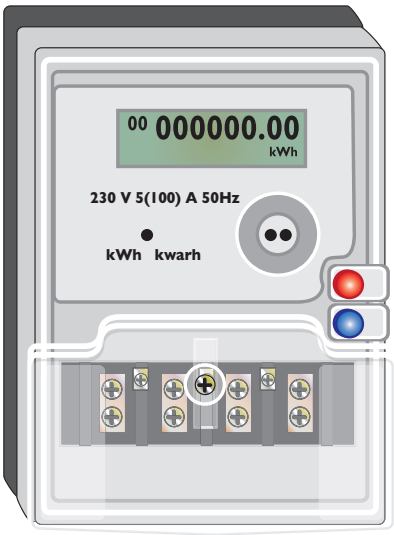
In all but the simplest buildings, information on the use of fuel and power, broken down into various end uses, will assist building operators in assessing and improving energy efficiency.

To enable this, sub-metering should be provided to allow monitoring of fuel and power consumption to the various end-uses (heating, lighting etc).

The extent to which sub-metering will be beneficial will vary with the size and complexity of fixed building services within the building. Installation of sub-metering should be based upon guidance on the development and implementation of a metering strategy within CIBSE TM 39 - 'building energy metering' (2009).

A metering strategy should consider the cost, practicality, and value of the information gained by detailed metering against potential future energy savings.

A document setting out that strategy should form part of the building warrant application and a document recording the implementation and application of the strategy be provided as part of the written information required under standard 6.8.



Low carbon equipment

As part of any strategy, meters should be provided to enable the performance of LCE systems to be separately monitored.

6.10.3 Metering and sub-metering in existing buildings

Where the creation of two or more units in different occupation occurs, each unit should have metering installed. The guidance in the clauses 6.10.1 and 6.10.2 should be applied.

If a new fuel type or new boiler (where none existed previously) is installed, metering should be installed, where not already present.

7.0.1 Introduction

Sustainable development has been defined as meeting "the needs of the present without compromising the ability of future generations to meet their own needs" by the Brundtland Commission of the United Nations in 1983. It follows that the process of sustainable development and the quality of 'sustainability' to aspire to within the built environment should account for:

Social, economic and environmental factors the potential for long-term maintenance of human well-being in and around buildings, the well-being of the natural world and the responsible use of natural resources, without destroying the ecological balance of the area where these resources originate or are processed, and the ability for the built environment to be maintained.

The Building (Scotland) Act 2003 allows Scottish Ministers to regulate for the purpose of furthering the achievement of sustainable development.

In Scotland, sustainability is embedded into the building regulations for all new buildings, rather than reference being made to new buildings achieving levels within a voluntary system.

Since 2005, progress has been made by strengthening the standards on, for example, energy efficiency and accessibility for all new buildings so they are comparable with the best in Europe.

Whilst the standards within Sections 1 - 6 of the 2023 Technical Handbooks deliver a level of sustainability in a number of areas such as energy efficiency, surface water drainage and sound insulation, there is always the possibility of going beyond the minimum standard.

Developers may wish to gain recognition for building to higher standards.

Additionally, organisations such as planning authorities or funding bodies may choose to make constructing to a higher level of sustainability a condition of approval or funding.

Defining higher standards to measure sustainability will enable higher quality buildings to be created and for such benefits to be formally recognised.

Technical Standard: 7.0 Sustainability

The introduction of Section 7 is a means of encouraging the design and construction of all new buildings within a broader context of sustainable development.

Within Section 7, specific further provisions applicable to development which are not otherwise addressed within sections 1 to 6, such as measures which support our transition towards more sustainable forms of transport, can broaden the scope of useful action delivered by these standards.

We will cover this further, later in this section.

Standard 7.1 Every building must be designed and constructed in such a way that:

a. with regard to a dwelling or school building containing classrooms, a level of sustainability specified by the Scottish Ministers in respect of carbon dioxide emissions, resource use, building flexibility, adaptability and occupant well-being is achieved

b. with regard to a non-domestic building other than a school building containing classrooms, a level of sustainability specified by the Scottish Ministers in respect of carbon dioxide emissions is achieved, and

c. a statement of the level of sustainability achieved is affixed to the dwelling or non-domestic building.

Limitation

This standard does not apply to:

a. alterations and extensions to buildings

b. conversions of buildings

c. buildings that are ancillary to a dwelling that are stand-alone having an area less than 50 square metres

d. buildings which will not be heated or cooled other than by heating provided solely for the purpose of frost protection

e. buildings intended to have a life not exceeding the period specified in regulation 6, or

f. conservatories.

7.1.0 Statement of sustainability (sustainability label)

The statement of sustainability (sustainability label, or SL) that includes the level of sustainability achieved must be fixed to the building prior to completion. The sustainability label should be indelibly marked and located in a position that is readily accessible, protected from weather and not easily obscured. A suitable location could be in an internal cupboard containing a utility meter or the owner may choose to display the label in a more prominent location.

An example of an approved label with the overall level achieved on the left hand side and the levels achieved in each of the individual aspects of sustainability on the right hand side is given in Annex E.

A program to generate such a label that is specific to a building can be accessed here: *http://www.s7sust.co.uk/*

7.1.1 Levels of sustainability

The specified level of sustainability for a dwelling should be selected from the following:

- Bronze or Bronze Active
- Silver or Silver Active
- Gold

The aim is for balance in the setting of upper levels because sustainability is considered in the round rather than focusing on issues of energy or carbon emissions.

Reaching upper levels should be a valid target for any new development, regardless of size or location. Generally, levels have been set to avoid individual aspects that could upset applications which might otherwise meet all of the other aspects of sustainability.

The first optional upper level 'Silver' offers substantial benefits in a range of sustainability aspects which should be achievable by a sector of the mainstream market. The second optional upper level 'gold' is a more demanding target, initially aimed at those intent on pursuing best practice.

Buildings that exceed a gold sustainability level are also welcomed.

A third upper level called 'platinum' has been reserved for further recognition within the building standards system.

At present, only the aspect of carbon dioxide emissions has been defined for this level.

Buildings that exceed Bronze, Bronze Active, Silver, Silver Active or Gold levels by achieving a higher level criteria in one or more of the aspects are welcome.

This additional achievement will be reflected on the sustainability label.

However the achievement of the next upper level will only be recognised once all aspects of that particular level have been included.

The award of an overall upper level depends upon meeting all aspects, rather than allowing trade-offs to achieve a score, reinforcing the fact that sustainable outcomes rely on holistic integrated design.

The specified levels of sustainability in clauses 7.1.2 to 7.1.7, are sets of measures that are transparent to all including verifiers, planners, funding bodies, owners and tenants. To meet this standard, it should not be necessary to secure expert evaluation beyond that already used in the design to demonstrate compliance with the standards in Sections 1 to 6.

The standards within Sections 1-6 of the Technical Handbooks deliver a level of sustainability in a number of areas particularly energy efficiency, levels of sustainability, Silver or Gold, can be achieved by meeting the required level in the following aspects:

1. CO_2 emissions
2. Energy for space heating
3. Energy for water heating
4. Water use efficiency.
5. Optimizing performance
6. Flexibility and adaptability
7. Well-being and security
8. Material use and waste.

Sample of sustainability label

The label should be located in an accessible position such as a meter cupboard (Clause 7.1.0 of the Technical Handbooks refer).

Note: *A Bronze Active label shows that in addition to achieving the standards set out in Sections 1-6 of the Technical Handbooks, the building also includes low or zero carbon technology such as photovoltaic panels or heat pumps to satisfy Standard 6.1.*

For detailed information on the levels of sustainability and the individual requirements to obtain each level, please refer to section 7.1 - Scottish Building Standards Technical Handbooks.

7.2 Electric Vehicle Charging

Every building must be designed and constructed in such a way that provision for the charging of electric vehicles is made where car parking spaces are located within the building or the curtilage of the building.

Limitation

This standard does not apply to:

a. a non-domestic building where ten or fewer car parking spaces are present within the building or the curtilage of the building,

b. alteration to, or extension of a building, other than major renovation works.

7.2.0 Introduction

Whilst building regulations do not require the provision of car parking spaces, they do set out provisions which are applicable where provision for parking is made as part of the development of a building.

This includes a proportion of accessible spaces and means of access from parking spaces to the entrance of a building (see standard 4.1).

Scottish Government policy on sustainable transport remains that use of active travel and public transport should be promoted first and foremost.

However, it is recognised that there will be situations where use of a private vehicle, most likely a car, will be required and car ownership will continue.

In recognition of the intent to move away from the ownership and use of internal combustion engine vehicles towards electric vehicles, the provision of charge point sockets and enabling infrastructure as part of new building work will support a more sustainable approach to development, providing facilities which simplify the transition to electric vehicles for building residents, occupiers, visitors and other users.

It is anticipated that a large number of electric vehicle drivers will choose to charge their vehicles at home. It is therefore now a requirement for all new homes, where external car parking is provided, to have access to a charge point socket.

It is considered that, where a property has more than one vehicle, one charge point socket is sufficient for normal usage of these vehicles.

There is also a demand for electric vehicle charging in non-domestic locations.

This is most likely to be from those without the ability to install domestic charge points for their own use, or those that have travelled some distance and require to charge their vehicle prior to their return journey. It is therefore useful for all new buildings where car parking is provided to have access to charge point sockets.

The installation of a proprietary electric vehicle charging point socket, not a standard electrical outlet, will facilitate safe and efficient recharging of vehicles.

The provision of electrical infrastructure will also ‘future proof’ parking spaces in response to the growing uptake of electric vehicles.

Installers of electric vehicle charge points should be aware of the need to notify the electricity Distribution Network Operator of the intent to undertake such an installation to an existing electrical supply or when applying for a new electrical supply. Further guidance on this can be found within section 11 of the IET EV Charging Code Of Practice.

ENA guidance on DNO cut out types and ratings can be accessed here: *https://www.energynetworks.org/industry-hub/resource-library/low-carbon-technologies-cut-out-rating-guidance-to-electric-vehicle-or-heat-pump-installers.pdf*

Conversions

In the case of conversions, as specified in regulation 4, every conversion which alters the number of dwellings, or the number of building units, in the building, or which changes the occupation or use of:

a. a residential building to any other type of building, or

b. a building so that it becomes a residential building

shall meet the requirements of this standard (regulation 12, schedule 6).

7.2.1 Charge point provision to new dwellings (including creation of one or more dwellings by conversion)

Single dwellings

Where parking, other than a covered car park, is provided within the curtilage of a dwelling, a minimum of one electric vehicle charge point socket with an output rating of not less than 7 kW should be provided adjacent to the parking space.

Installation should be cost-effective. This is explained under 'installation cost cap'.

Other domestic buildings.

Where car parking is provided within the curtilage of a domestic building comprising more than one dwelling, enabling infrastructure (see clause 7.2.6) should be provided to each parking space within the curtilage of the development site.

An electric vehicle charge point socket with an output rating of not less than 7 kW should be provided per dwelling, subject to the following:

- An electrical vehicle charge point need not be installed to car parking spaces located within a covered car park, which should be excluded from the provisions below.
- The total number of parking spaces with access to a charge point socket should be the lower of the total number of dwellings or the total number of parking spaces provided within the curtilage of the development site.
- Where there are more parking spaces than dwellings, any accessible parking spaces (see clause 4.1.1) not already provided with access to an electric vehicle charge point socket with an output rating of not less than 7 kW should be provided with such a facility to at least one in every four (or part thereof) of such parking spaces.
- Installation should be cost-effective. This is explained under 'installation cost cap'.

In this respect, 'covered car park' is car parking located within the footprint of a building e.g. a single dwelling garage or roof-top, open-sided, enclosed or underground car park.

Examples

1. In a development of 7 houses, each with independent access from a roadway and off-street parking which can accommodate one or more vehicles.

   Each dwelling would be provided with access to at least one EV charging point socket adjacent to the parking space. In this example 7 individual sockets would be installed.

2. A development of 25 flats in a single building with shared parking facilities which contain 35 parking spaces, two of which are accessible parking spaces.

   None are within a covered car park.

   In this example, 26 parking spaces would require access to a charge point socket (one socket per dwelling plus one socket per 4 accessible parking spaces). The remaining 9 spaces would be provided only with enabling infrastructure.

Installation cost cap.

For the purpose of this standard, it is deemed cost-effective to install electric vehicle charging point sockets where the additional cost of providing the associated electrical supply to the development site does not exceed an average of £2,000 (excluding VAT) per charge point socket.

Where this cost cap is exceeded, enabling infrastructure to each parking space should be installed to the extents described above.

Where it is identified that the cost of a full installation would exceed the cost cap, the applicant should provide at least two written quotations, including one from the Distribution Network Operator (DNO), for the cost of electrical supply to the development site.

Each quotation should confirm:

a. the overall connection costs for electrical supply to the development both without and with electric vehicle charge point sockets, confirming the average cost per charge point socket for a full implementation; and

b. A statement from the provider confirming the maximum number of charge point sockets which can be supported at an additional supply cost not exceeding an average of £2,000 (excluding VAT) per charge point socket.

Installation of charge point sockets should be undertaken to the extent confirmed by this statement.

Charge point provision to new non-domestic buildings (including those undergoing conversion).

Where more than 10 car parking spaces are provided within the curtilage of a non-domestic building, enabling infrastructure for charge points should be provided to at least 50% of parking spaces.

Electric vehicle charge points with an output rating of not less than 7 kW per socket in simultaneous use should also be installed such that not less than 1 in 10 parking spaces (or part thereof) have access to an electric vehicle charge point socket, subject to the following:

a. An electrical vehicle charge point need not be installed to car parking spaces located within a covered car park.

b. Any accessible parking spaces (see clause 4.1.1) not already provided with access to an electric vehicle charge point socket with an output rating of not less than 7 kW should be provided with such a facility to the same extent as standard parking spaces.

In this respect, 'covered car park' is car parking located within the footprint of a building.

For example a roof-top, open-sided, enclosed or underground car park

7.2.2 Provision to domestic buildings undergoing major renovation works

For the purpose of this standard, 'major renovation works' means works for the renovation of a building where ten or more car parking spaces are present within the building or the curtilage of the building and where:

a. more than 25% of the surface area of the building envelope undergoes renovation, and

b. the works include works to car parking spaces, or the electrical infrastructure of the building or of the car parking spaces.

In this context, 'building envelope' means walls, floor, roof, windows, doors, roof windows and roof-lights.

Note: *The following provisions do not apply where the main purpose of the work to the building envelope is to improve the fire safety of the building. Such work is considered to be remediation rather than renovation.*

Where a domestic building is subject to 'major renovation works', enabling infrastructure (see clause 7.2.6) should be provided to each parking space within the curtilage of the development site and an electric vehicle charge point socket with an output rating of not less than 7 kW should be provided per dwelling, subject to the following:

a. An electrical vehicle charge point need not be installed to car parking spaces located within a covered car park, which should be excluded from the provisions below.

b. The total number of parking spaces with access to a charge point socket should be the lower of the total number of dwellings or the total number of parking spaces provided within the curtilage of the development site.

c. Where there are more parking spaces than dwellings, any accessible parking spaces (see clause 4.1.1) not already provided with access to an electric vehicle charge point socket with an output rating of not less than 7 kW should be provided with such a facility to at least one in every four (or part thereof) of such parking spaces.

Electric vehicle charge point sockets should be part of an installation where there is capacity within the existing electrical supply to the building, post-renovation.

Installation should be cost-effective. This is explained under 'defined cost limit' below.

In this respect, 'covered car park' is car parking located within the footprint of a building.

For example a single dwelling garage or roof-top, open-sided, enclosed or underground car park.

Provision to non-domestic buildings undergoing major renovation

For the purpose of this standard, 'major renovation works' means works for the renovation of a building where ten or more car parking spaces are present within the building or the curtilage of the building and where:

a. more than 25% of the surface area of the building envelope undergoes renovation, and

b. the works include works to car parking spaces, or the electrical infrastructure of the building or of the car parking spaces.

In this context, 'building envelope' means walls, floor, roof, windows, doors, roof windows and roof-lights.

Note: *The following provisions do not apply where the main purpose of the work to the building envelope is to improve the fire safety of the building.*

Such work is considered to be remediation rather than renovation.

Where more than 10 car parking spaces are present or provided within the curtilage of a non-domestic building subject to 'major renovation works', enabling infrastructure for charge points (see clause 7.2.6) should be provided to at least 50% of parking spaces and electric vehicle charge points with an output rating of not less than 7 kW per socket in simultaneous use should also be installed such that not less than 1 in 10 parking spaces (or part thereof) has access to a socket, subject to the following:

a. An electrical vehicle charge point socket need not be installed to car parking spaces located within a covered car park, which should be excluded from the provisions below.

b. Any accessible parking spaces (see clause 4.1.1) not already provided with access to an electric vehicle charge point socket with an output rating of not less than 7 kW should be provided with such a facility to the same extent as standard parking spaces.

Installation should be cost-effective. This is explained under 'defined cost limit' below. In this respect, 'covered car park' is car parking located within the footprint of a building.

For example a roof-top, open-sided, enclosed or underground car park

Defined cost limit in domestic locations

For the purpose of this standard, installation is deemed cost-effective where the cost of providing the installation does not exceed 7% of the total capital cost of the major renovation works. This defined cost limit includes the provision of enabling infrastructure, charge point sockets and other equipment needed for the operation of installed charge point sockets. The cost set out should be the cost of materials and labour, excluding VAT.

Calculation of the percentage of project costs should compare the cost of the electric vehicle charge point sockets, cable routes and other equipment to the total cost of the major renovation including those additional works.

The cost should exclude land or property costs, statutory fees or any other development costs.

Where it is determined that electric vehicle charge point sockets can be installed without the need to upgrade the building electrical supply, this should form part of the installation.

The developer may then determine the preferred extent of installation of enabling infrastructure and charge point sockets without exceeding the defined cost limit.

Defined cost limit in non-domestic locations

For the purpose of this standard, it is deemed cost-effective where the cost of providing the installation does not exceed 7% of the total capital cost of the major renovation works.

This defined cost limit includes the provision of enabling infrastructure, charge point sockets and other equipment needed for the operation of installed charge point sockets.

It also includes the cost of any associated upgrade to the capacity of the existing building electrical supply needed to enable installation of charge point sockets.

The cost set out should be the cost of materials and labour, excluding VAT.

Calculation of the percentage of project costs should compare the cost of the electric vehicle charge point sockets, cable routes and any upgraded electrical supply compared to the total cost of the major renovation including those additional works.

The cost should exclude land or property costs, statutory fees or any other development costs.

Where it is confirmed that an upgrade to the building electricity supply is needed to support the installation of charge point sockets, the applicant should provide at least two written cost quotations, including one from the Distribution Network Operator (DNO), for the cost of electrical supply to the renovated building.

Each quotation should confirm the overall additional costs for electrical supply relating specifically to the additional load demand from additional electric vehicle charge point sockets.

This cost should be added to those set out above. The developer may then determine the preferred extent of installation of enabling infrastructure and charge point sockets without exceeding the defined cost limit.

7.2.3 Mixed development

Where work is undertaken to form both domestic and non-domestic buildings, the assignment of car parking within the curtilage of the site to each category of building should be set out in the building warrant application.

Provisions from the Domestic and Non-domestic Technical Handbooks for electric vehicle charging should then be applied accordingly.

7.2.4 Location of charge points

Charge points should be located outwith any surfaces used as an access route and should not present an obstruction to pedestrians, cyclists or vehicles.

Location of charge points should enable charging to take place without charging cables crossing or otherwise obstructing pedestrian, cycle or vehicle routes, including drop kerbs between road and pedestrian surfaces.

Charge points should be positioned in relation to parking spaces to minimise the risk of accidental damage, for example, from vehicles projecting over kerbs.

Where a protective barrier is provided, this should not impede the use of the charge point.

Where a charge point serves more than one parking space it should be provided with one charge point socket per parking space (with each socket able to deliver a minimum of 7 kW simultaneously) and should enable safe and convenient use of all outlets at the same time.

To enable installation, maintenance and ease of use:

a. Floor mounted charge points should be installed so that there is not less than 1500 mm between the sides, and 500 mm between the rear, of the charge point enclosure and any adjacent wall or similar obstruction.

b. Wall mounted charge points should be installed so that there is not less than 800 mm between the charge point enclosure and any adjacent wall or similar obstruction.

Charge points should be installed with the lower edge of the charge point enclosure between 700 mm and 1000 mm from floor level.

Additional guidance on delivering accessible charge points is provided within *PAS 1899:2022 – 'Electric vehicles – Accessible charging – Specification*'.

Installations should meet the requirements of *BS 7671* and the IET's 'Code of Practice: Electric Vehicle Charging Equipment Installation'.

Careful consideration must also be given to the positioning of EV charging equipment, by both the designer and installer, to minimize any potential risk relating to the installation and use of EV charging equipment, as far as is reasonably practicable to do so.

Additional information can be accessed here:

RC59 FIRE SAFETY WHEN CHARGING ELECTRIC VEHICLES

https://www.thefpa.co.uk/advice-and-guidance/free-documents?=%20Medium-sized%20Businesses,%20MAINTENANCE%20CHECKLISTS%20-%20APPENDIX%20TEMPLATE%20FORMS,%20CONTROL%20OF%20DUST%20EXPLOSIONS&q=RC59%20FIRE%20SAFETY%20WHEN%20CHARGING%20ELECTRIC%20VEHICLES

7.2.5 Specification of electric vehicle charge points

Electrical vehicle charge points should be designed and installed to the standards set out under *BS EN 61851 – 'Electric vehicle conductive charging system'*.

Installed charge points should:

a. Have charge point sockets with a nominal rated output of not less than 7 kW.

   A charge point with multiple sockets should be capable of providing this output from each socket simultaneously;

b. Be fitted with a universal socket (also known as an untethered electric vehicle charge point);

c. Be fitted with an indicator to show the equipment's charging status that uses lights, or a visual display; and

d. Be a minimum of a Mode 3 specialised system for electric vehicle charging running from a dedicated circuit, or equivalent, as defined in *BS EN IEC 61851-1*.

Installations should meet the requirements of *BS 7671* and the IET's 'Code of Practice: Electric Vehicle Charging Equipment Installation'.

7.2.6 Enabling infrastructure and future charge points

Duct installations should be provided from a suitable electricity supply at the building or elsewhere within the development site to the installation position for each charge point and future charge point location.

The design of the installation should identify and make provision for any intermediate switchgear or other control apparatus needed to manage the distribution of the electrical supply to each charge point or future charge point location.

Installations should meet the requirements of *BS 7671* and the IET's 'Code of Practice: Electric Vehicle Charging Equipment Installation'.

The size, specification and bend radius of all cable ducts should be based upon the confirmed type of cabling needed to meet the required power supply at outlets.

Underground cable duct installations should meet *BS EN 61386-24 –'Conduit systems for cable management - Particular requirements. Conduit systems buried underground'*. All cable ducts should meet the positioning and colour-coding standards in the National Joint Utilities Group '*Guidelines on the Positioning and Colour Coding of Underground Utilities*' *Apparatus*'.

The point where a cable duct enters a building should be sealed to prevent water ingress and attack by vermin, and to comply with all relevant Building Regulations requirements.

Where a charge point is not fitted as part of initial work, enabling infrastructure should be provided to the extents noted in clauses 7.2 1 & 7.2.2.

This should enable the installation of charge points and any intermediate control equipment without the need for additional builder work other than at the equipment installation points.

The termination points of cable ducts should be located to provide adequate space for future installation and ongoing maintenance of a charge point, as noted in clause 7.2.4.

Termination points for future connections should be weather sealed but clearly identified and accessible.

Location of future charge points should be identified by durable, weatherproof signage, with text not less than 25 mm high noting “Dedicated position for electric vehicle charge point”.

7.2.7 Information on the installation and operation of charge points

Written information on the installation of a charge point should be provided as part of the ‘quick start’ documentation for each dwelling produced under standard 6.8.

Where installed to serve a single dwelling or connected to the electrical supply of a single dwelling, this should include information on the charge point, the socket itself, the connection of the charge point back to the building electrical supply and means of isolation and a summary of how to use the facility.

A copy of the commissioning information for the charge point(s) and any associated control equipment and manufacturer’s literature on installed products should also be provided.

Where otherwise installed within a communal car park, information on the location of all installed ductwork and equipment should be provided, also identifying all enabling infrastructure which will support the addition of charge points in the future.

A copy of the commissioning information for the charge point(s) and any associated control equipment and manufacturer’s literature on installed products should also be provided.

Did you know that NICEIC offer training on the installation of EV Charging which covers:

The requirements of *BS 7671* with particular focus on Section 722 ‘Electric vehicle Charging Installations’ and the IET Code of Practice for Electric Vehicles Charging Equipment Installation.

An overview and signposting to the latest government grants and funding strategies will also be provided. There's never been a better time to get involved.

Further information on available training can be accessed here: *https://niceic.com/for-the-trades/develop-your-skills/training/*

Annex 1 - Exempted buildings and services, fittings and equipment (Regulation 3, Schedule 1 of the Building (Scotland) Regulations 2004 refers)

There is no need for a Building Warrant and standards do not apply to such classes other than the exceptions as stated in the following table.

Electrical work associated with any of the building types or works (listed in the following table) other than the exceptions listed does not require a warrant and is not required to meet regulations 8 to 12 of the Scottish Building Regulations. Reference must also be made to Regulation 5, Schedule 3 of the *Building (Scotland) Regulations 2004* (see Annexes 2 and 3 of this guide) for further exemptions from the need for a Building Warrant.

WARNING: Notwithstanding this exemption from a warrant and compliance with the building regulations, *BS 7671* applies to all electrical installations. The responsibility for ensuring compliance with this British Standard lays with the building owner and/or his/her electrical designer and electrical installer.

Buildings or work controlled by other legislation (types 1-3)	
1. Any building in which explosives are manufactured or stored under a licence granted under the *Explosives Regulations 2014* where the whole building is used for that manufacture or storage. 2. Where only a part of a building is used for the manufacture or storage of explosives under a licence granted under the *Explosive Regulations 2014*, that part of the building where the licence specifies that that manufacture or storage may take place.	Except - sub-paragraphs (1) and (2) do not include any building or, as the case may be, any part of a building as is referred to in, respectively, sub-paragraph or (2) in relation to which – a). no minimum separation distance is required to be maintained by virtue of regulation 27(2)(a) or (3) of the *Explosives Regulations 2014*, or b). a minimum separation distance of 0 metres is prescribed by virtue of regulation 27(1) of, and Schedule 5 to the *Explosive Regulations 2014* and the requirement for the assent of the local authority under regulation 13(3) of those Regulations did not apply by virtue of regulation 13(4)(a) of those Regulations.

2. A building erected on a site which is subject to licensing under the *Nuclear Installations Act 1965*.	Except - A dwelling, residential building, office, canteen or visitor centre.
3. A building included in the schedule of monuments maintained under Section 1 of the *Ancient Monuments and Archaeological Areas Act 1979*.	Except - A dwelling or residential building.
Protective Works (type 4)	
4. Protective works subject to control by regulation 13.	
Buildings or work not frequented by people (types 5-8)	
5. A building into which people cannot or do not normally go.	Except - a). A building within 6 metres or the equivalent of its height (whichever is the less) of the boundary. b). A wall or fence. c). A tank, cable, sewer, drain or other pipe above or below ground for which there is a requirement in these Regulations.
6. Detached fixed plant or machinery or a detached building housing only fixed plant or machinery, the only normal visits to which are intermittent visits to inspect or maintain the fixed plant or machinery.	Except - A building within 1 metre of a boundary.

Agricultural and related buildings (types 7 & 8)	
7. An agricultural greenhouse or other building of mainly translucent material used mainly for commercial growing of plants.	Except - A building used to any extent for retailing (including storage of goods for retailing) or exhibiting.
8. A single-storey detached building used for any other form of agriculture, fish farming or forestry.	Except - a). A building used to any extent for retailing (including storage for retailing) or exhibiting. b). A building exceeding 280 square metres in area. c). A building within 6 metres or the equivalent of its height (whichever is the less) of a boundary. d). A dwelling, residential building, office, canteen or visitor centre. e). A dungstead or farm effluent tank.
Works of civil engineering construction (type 9)	
9. A work of civil engineering construction, including a dock, wharf, harbour, pier, quay, sea defence work, lighthouse, embankment, river work, dam, bridge, tunnel, filter station or bed, inland navigation, reservoir, water works, pipe line, sewage treatment works, works provided to meet a requirement gas holder or main, electricity supply line and supports, any bridge embankment or other support to railway lines and any signalling or power lines and supports, and a fire practice tower.	Except - a). A bridge or tunnel forming part of an escape route or an access route provided to meet a requirement of these regulations. b). A private sewage treatment works provided to meet a requirement of these regulations.

Buildings of a specialised nature (type 10-12)	
10. A building essential for the operation of a railway including a locomotive or carriage shed, or for the operation of any other work of civil engineering contained in type 9 and erected within the curtilage of such a railway or work.	Except - a). A signalling and control centre for a railway or dock. b). A building to which the public is admitted, not being a building exempted by type 11 of this Schedule. c). A dwelling, residential building, office, canteen, or warehouse.
11. Single-storey detached road or rail passenger shelter or a telephone kiosk which in so far as it is glazed complies with the requirements of regulation 9 and paragraph 4.8 of Schedule 5.	Except - a). A building having a floor area exceeding 30 square metres. b). A building containing a fixed combustion appliance installation.
12. A caravan or mobile home within the meaning of the Caravan Sites and Control of Development Act 1969[7], or a tent, van or shed within the meaning of Section 73 of the Public Health (Scotland) Act 1897.	Except - Any wastewater disposal system serving a building of this type.
Small buildings (type 13)	
13. A detached single-storey building having an area not exceeding 8 square metres.	Except - a). A dwelling or residential building. b). A building ancillary to and within the curtilage of a dwelling. c). A building within 1 metre of a boundary. d). A building containing a fixed combustion appliance installation or sanitary facility. e). A wall or fence.

Construction and development buildings (type 14 & 15)	
14. A building used only by people engaged in the construction, demolition or repair of any building or structure during the course of that work.	Except - A building containing sleeping accommodation.
15. A building used in connection with the letting or sale of any building under construction until such time as the letting or sale of all related buildings is complete.	Except - A building containing sleeping accommodation.
Temporary buildings (type 16)	
16. A building which, during any period of 12 months, is either erected or used on a site - a). for a period not exceeding 28 consecutive days; b). or for a number of days not exceeding 60, and any alterations to such buildings.	
Buildings ancillary to houses (types 17-19)	
17. A detached single-storey building ancillary to and within the curtilage of a house.	Except - a). A building exceeding 8 square metres in area b). A building within 1 metre of the house unless it is at least 1 metre from any boundary. c). A building containing sleeping accommodation. d). A building containing a flue, a fixed combustion appliance installation or sanitary facility. e). A wall or fence.

18. A single-storey building attached to an existing house, which is ancillary to the house and consists of a **conservatory** or **porch** which insofar as it is glazed complies with the requirements of regulation 9 and paragraph 4.8 of Schedule 5.	Except - a). A building exceeding 8 square metres in area. b). A building containing a flue, a fixed combustion appliance installation or sanitary facility. c). A building within 1 metre of a boundary.
19. Any single-storey building which is detached, or is attached to an existing house and which is ancillary tot eh house and consists of a **greenhouse**, **carport** or **covered area**.	Except - a). A building exceeding 30 square metres in area. b). A building containing a flue, a fixed combustion appliance installation or sanitary facility.
Buildings ancillary to flats or maisonettes (type 20)	
20. A detached single-storey building ancillary to and within the curtilage of a flat or maisonette.	Except - a). A building exceeding 8 square metres in area. b). A building within 3 metres of the flat or maisonette or within 3 metres of any other part of the building containing the flat or maisonette. c). A building containing a flue, a fixed combustion appliance installation or sanitary facility. d). A wall or fence. e). A swimming pool deeper than 1.2 m.
Paved areas (type 21)	
21. A paved area or hardstanding.	Except - a). A paved area or hardstanding exceeding 50 square metres in area. b). A paved area forming part of an access to meet a requirement of these regulations.

Annex 2 – Guidance on electrical work not requiring a warrant - Domestic buildings

This table is reproduced with kind permission of BSD - for the latest information visit *www.gov.scot*

Note: *Although exempt from the warrant the work listed still needs to comply with the Building Regulations.*

DOMESTIC BUILDINGS	WORK TO EXISTING BUILDINGS			
WORK ACTIVITY	Type [1]	Flat	House (up to 2 storeys)	House (3 storeys & above)
Repairs and replacement				
Re-wiring [2]	24	**required**	**not required**	**not required**
Electrical fixtures, e.g. luminaries	24	**not required**	**not required**	**not required**
New work				
Electrical work affected by demolition or alteration of the roof, external walls or elements of structure	1	**required**	**required**	**required**
Electrical work adversely affecting a separating wall, e.g. recessed sockets	1	**required**	**required**	**required**
New power socket-outlets	1	**required**	**not required**	**not required**
Mains operated fire alarm system	1	**required**	**not required**	**required**
Electrical work to automatic opening ventilators (including auto-detection)	1	**required**	**not required**	**required**
Electrically operated locks	1	**required**	**not required**	**required**
Wiring to artificial lighting	1	**required**	**not required**	**required**

DOMESTIC BUILDINGS	WORK TO EXISTING BUILDINGS			
Wiring to emergency lighting	1	**required**	**not required**	**required**
Electrical work associated with sprinkler system	1	**required**	**not required**	**required**
Electrical work associated with new boiler (large)	1	**required**	**not required**	**required**
Electrical work associated with new boiler (small)	6	**not required**	**not required**	**not required**
Electrical work associated with new shower	11, 12	**not required**	**not required**	**not required**
Electrical work associated with new extract fan	13	**not required**	**not required**	**not required**
Extra-low voltage installations	22	**not required**	**not required**	**not required**

Note 1: Building work type as referenced in Schedule 3.

Note 2: A building warrant is not required for rewiring where it is a repair or replacement works to a level equal to the installation (or part thereof) being repaired or replaced.

Annex 3 – Guidance on electrical work not requiring a warrant - Non-domestic buildings

This table is reproduced with kind permission of the BSD - for the latest information visit *www.gov.scot*

Note: *Although exempt from the warrant the work listed still needs to comply with the Building Regulations.*

NON-DOMESTIC BUILDINGS	WORK TO EXISTING BUILDINGS			
WORK ACTIVITY	non-residential buildings with a storey, or creating a storey, not more than 7.5 m			other non-domestic buildings
	type [1]	no public access	public access	
Repairs and replacement				
Re-wiring [3]	24	**not required**	**required**	**required**
New work				
Electrical work affected by demolition or alteration of the roof, external walls or elements of structure	2	**required**	**required**	**required**
Electrical work adversely affecting a separating wall, e.g. recessed sockets	2	**required**	**required**	**required**
Electrical work adversely affecting a loadbearing wall	2	**required**	**required**	**required**
New power socket-outlets	2	**not required**	**required**	**required**
Automatic fire detection system	2	**not required**	**required**	**required**
Electrical work to automatic opening ventilators	2	**not required**	**required**	**required**
Electrical work to automatic fire dampers	2	**not required**	**required**	**required**
Electrically operated locks	2	**not required**	**required**	**required**

NON-DOMESTIC BUILDINGS	WORK TO EXISTING BUILDINGS			
WORK ACTIVITY	non-residential buildings with a storey, or creating a storey, not more than 7.5 m			other non-domestic buildings
	type [1]	no public access	public access	
Wiring to emergency lighting	2	**not required**	**required**	**required**
Outdoor luminous tube signs [4]	2	**not required**	**not required**	**not required**
Electrical work associated with new boiler (large)	2	**not required**	**required**	**required**
Electrical work associated with new boiler (small)	6	**not required**	**not required**	**not required**
Electrical work associated with new shower	11, 12	**not required**	**not required**	**not required**
Electrical work associated with new extract fan	13	**not required**	**not required**	**not required**
Extra low voltage installations	22	**not required**	**not required**	**not required**

Note 1: Building work type as referenced in Schedule 3.

Note 2: Non-residential buildings to which the public does not have access may include:

- Existing offices
- Existing storage buildings
- Existing industrial buildings e.g. factories and workshops
- Existing assembly and entertainment buildings not open to the public e.g. some educational buildings and private members clubs

Non-residential buildings to which the public has access may include:

- Existing assembly and entertainment buildings open to the public e.g. community schools, pubs and clubs.

Note 3: A building warrant is not required for rewiring where it is a repair or replacement works to a level equal to the installation (or part thereof) being repaired or replaced.

Note 4: Subject to the Town and Country Planning (Control of Advertisement) (Scotland) Regulations 1984.

Annex 4 - Conversions

With reference to Schedule 2 of the *Building (Scotland) Regulations 2004*, the following listed items are examples that might be considered conversions subject to the requirements of the regulations, changes in the occupation or use of a building:

a. to create a dwelling, dwellings or a part thereof, such as barn or warehouse conversions, or indeed changing an attic space into a room

b. ancillary to a dwelling to increase the area of human occupation, such as changing a garage into a room

c. which alters the number of dwellings in the building, such as the sub-division of a large property into flats or indeed turning attached properties into a single dwelling

d. a domestic building into any other type of building, such as changing a house into shop with storage space above

e. a residential building to any other type of building, such as changing a hotel into a block of flats

f. a residential building which would involve a significant alteration of the characteristics of the persons who occupy, or who will occupy the building, or which significantly increase the number of people occupying, or expected to occupy, the building, such as the use of a hotel as a residential care home

g. a building so that it becomes a residential building, such as the conversion of office space into a hostel

h. an exempt building to a building that is not so exempt, such as converting a light house into a dwelling or indeed into a visitor centre or similar open to the public

i. a building to allow access to the public where previously there was none, such as the conversion of a farm building into a shop

j. a building to accommodate parts in different occupation where previously it was not so occupied, such as the use of a single shop for use by two different businesses.

Annex 5 – The Building (Scotland) Regulations 2004 (applicable to electrical installation work)

The following regulations from the *Building (Scotland) Regulations 2004* are applicable to electrical installation work:

Regulation 8 Fitness and durability of materials and workmanship

1. 'Work to every building designed, constructed and provided with services, fittings and equipment to meet a requirement of regulations 9 to 12 must be carried out in a technically proper and workmanlike manner, and the materials used must be durable and fit for their intended purpose.'
2. All materials, services, fittings and equipment used to comply with a requirement of regulations 9 to 12 must, so far as reasonably practicable, be sufficiently accessible to enable any necessary maintenance or repair work to be carried out.'

Regulation 9 Standards applicable to construction

'Construction shall be carried out so that the work complies with the applicable requirements of Schedule 5.' (Building Standards applicable to design and construction.)

Relevant mandatory standards from Schedule 5 along with guidance are listed in Section 1 (Guidance on meeting the requirements of the mandatory standards from Schedule 5 of regulation 9 of the *Building (Scotland) Regulations 2004*).

Regulation 10 Standards applicable to demolition

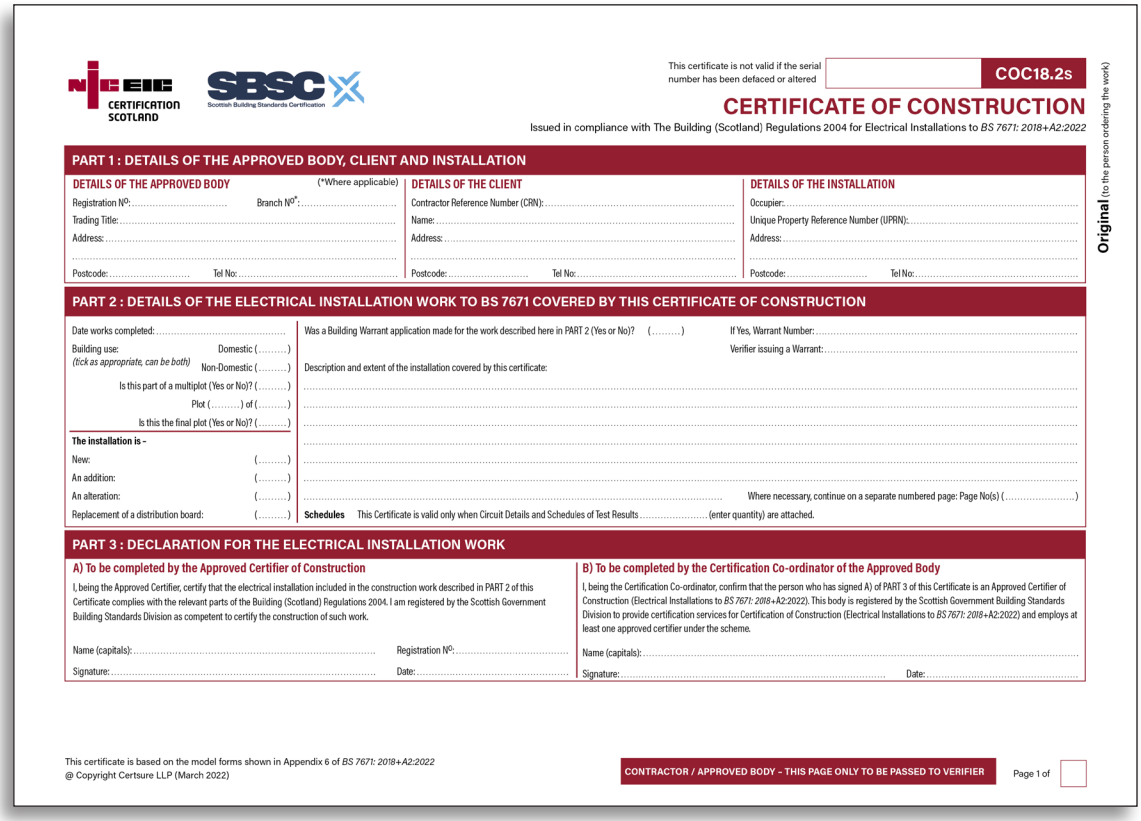
1. 'Every building to be demolished must be demolished in such a way that all service connections to the building are properly closed off and any neighbouring building is left stable and watertight.'
2. 'When demolition work has been completed and, where no further work is to commence immediately, the person who carried out that work shall ensure that the site is –
    a. immediately graded and cleared; or
    b. provided with such fences, protective barriers or hoardings as will prevent access thereto.'

Regulation 11 Standards applicable to provision of services, fitting or equipment

'Every service, fitting or piece of equipment provided so as to serve a purpose of the regulations shall be so provided in such a way as to further those purposes.'

Regulation 12 (refer to Conversions - Annex 4)

Annex 6 – Sample NICEIC Certification Scotland Certificate of Construction



NICEIC CERTIFICATION SCOTLAND

SBSC Scottish Building Standards Certification

This certificate is not valid if the serial number has been defaced or altered

COC18.2s

CERTIFICATE OF CONSTRUCTION

Issued in compliance with The Building (Scotland) Regulations 2004 for Electrical Installations to *BS 7671: 2018+A2:2022*

Original (to the person ordering the work)

PART 1 : DETAILS OF THE APPROVED BODY, CLIENT AND INSTALLATION

DETAILS OF THE APPROVED BODY (*Where applicable)

Registration No: ..... Branch No*: .....

Trading Title: .....

Address: .....

.....

Postcode: ..... Tel No: .....

DETAILS OF THE CLIENT

Contractor Reference Number (CRN): .....

Name: .....

Address: .....

.....

Postcode: ..... Tel No: .....

DETAILS OF THE INSTALLATION

Occupier: .....

Unique Property Reference Number (UPRN): .....

Address: .....

.....

Postcode: ..... Tel No: .....

PART 2 : DETAILS OF THE ELECTRICAL INSTALLATION WORK TO BS 7671 COVERED BY THIS CERTIFICATE OF CONSTRUCTION

Date works completed: .....

Building use: Domestic (.....)

(tick as appropriate, can be both) Non-Domestic (.....)

Is this part of a multiplot (Yes or No)? (.....)

Plot (.....) of (.....)

Is this the final plot (Yes or No)? (.....)

The installation is -

New: (.....)

An addition: (.....)

An alteration: (.....)

Replacement of a distribution board: (.....)

Was a Building Warrant application made for the work described here in PART 2 (Yes or No)? (.....)

If Yes, Warrant Number: .....

Verifier issuing a Warrant: .....

Description and extent of the installation covered by this certificate:

.....

.....

.....

.....

.....

.....

Where necessary, continue on a separate numbered page: Page No(s) (.....)

Schedules This Certificate is valid only when Circuit Details and Schedules of Test Results .....(enter quantity) are attached.

PART 3 : DECLARATION FOR THE ELECTRICAL INSTALLATION WORK

A) To be completed by the Approved Certifier of Construction

I, being the Approved Certifier, certify that the electrical installation included in the construction work described in PART 2 of this Certificate complies with the relevant parts of the Building (Scotland) Regulations 2004. I am registered by the Scottish Government Building Standards Division as competent to certify the construction of such work.

Name (capitals): ..... Registration No: .....

Signature: ..... Date: .....

B) To be completed by the Certification Co-ordinator of the Approved Body

I, being the Certification Co-ordinator, confirm that the person who has signed A) of PART 3 of this Certificate is an Approved Certifier of Construction (Electrical Installations to *BS 7671: 2018+A2:2022*). This body is registered by the Scottish Government Building Standards Division to provide certification services for Certification of Construction (Electrical Installations to *BS 7671: 2018+A2:2022*) and employs at least one approved certifier under the scheme.

Name (capitals): .....

Signature: ..... Date: .....

This certificate is based on the model forms shown in Appendix 6 of *BS 7671: 2018+A2:2022*

@ Copyright Certsure LLP (March 2022)

CONTRACTOR / APPROVED BODY - THIS PAGE ONLY TO BE PASSED TO VERIFIER

Page 1 of

Annex 7 - Summary of the Scottish Government statutory guidance on private rented properties

The following information is a summary of the key points contained in the *Scottish Government Statutory Guidance on Electrical Installations and Appliances in Private Rented Property*.

Private landlords in Scotland are required by law to ensure that a rented house achieves compliance with the Repairing Standard. This includes, amongst other requirements, ensuring the electrical safety of such properties is maintained through regular electrical safety inspections by competent persons.

Purpose of electrical safety inspection

The purpose of an electrical safety inspection is to:

- confirm, so far as reasonably practicable that the electrical installation, including electrical fixtures and fittings, and appliances supplied by the landlord are safe for continued service, and
- identify any work relating to the electrical installation, or the appliances provided, that is required to ensure they are safe for continued service.

The electrical safety inspection

The safety inspection has two separate elements:

- An Electrical Installation Condition Report (EICR) on the safety of the electrical installation.
- A Portable Appliance Test (PAT) - on those appliances provided by the landlord for use by the tenant.

Any electrical installation, accessories or equipment which fails to pass the electrical safety inspection must be replaced or repaired immediately to comply with the Repairing Standard.

Note: *An appliance that was purchased new less than one year before the date of the test does not require to be included in that PAT test.*

Electrical Installation Condition Report EICR

The landlord is responsible for ensuring the person completing an EICR is competent to undertake the work. In Scotland, this will usually mean a person registered with an Approved Body to carry out such work, such as NICEIC. Where the person is not registered with an Approved Body the landlord should use the Checklist provided in Annex A of the statutory guidance to obtain evidence of their competency.

The EICR must cover the electrical installation wiring and fixed electrical equipment including:

- consumer unit(s)
- accessories (switches and socket-outlets)
- light fittings
- fixed electrical heating equipment (e.g. storage or panel heaters)
- boilers and other heat producing equipment
- hard-wired smoke and fire detectors.

Any tenant under a new tenancy must be provided with a copy of an EICR before the tenancy commences. However, an Electrical Installation Certificate may be provided in place of an EICR, provided that the date of next inspection indicated on the certificate has not elapsed.

An EICR is acceptable, whether or not information on appliances is included, as long as the remedial work required for safety issues identified as Code 1 or Code 2 items on the Report, have been addressed.

Guidance on periodic inspection is contained in: The Electrical Safety First's Best Practice Guide no 4[9].

[9] *Electrical installation condition reporting: Classification Codes for domestic and similar electrical installations (ESF Best Practice Guide no. 4), www.electricalsafetyfirst.org.uk/professional-resources*

Portable Appliance Testing

The duty to carry out electrical safety inspections only applies to those appliances provided by the landlord for the tenants use.

Portable electrical appliances are items that can be moved, while either connected or disconnected from an electrical supply. They are generally connected via a plug, but a freestanding appliance, such as a cooker or gas boiler, should be tested even if it is permanently connected to the supply. All appliances not checked as part of the EICR, such as those integrated into kitchen units, should be PAT tested. Including items such as:

- electrical white goods (such as refrigerators and washing machines),
- electrical brown goods (such as televisions and DVD players),
- electric fires that are not fixed in place,
- kitchen appliances, such as toasters and kettles,
- hand held electrical equipment, such as hairdryers.

The PAT testing must be completed by a competent person, this means either:

- a skilled person (electrically) as defined in *BS 7671*, or
- a person who has completed appropriate PAT training.

Frequency of the electrical safety inspection

An electrical safety inspection must be carried out:

- before a tenancy starts, and
- during the tenancy, at intervals of no more than 5 years from the date of the previous inspection.

Note: *Intervals of less than 5 years are not precluded and may be required by the Inspector. A PAT test must be carried out annually on rented accommodation.*

Unless specified, the electrical safety inspection does not have to be completed immediately before a new tenancy begins or every time a new tenancy starts, as long as an inspection has been carried out in the period of 5 years before the tenancy starts.

The date for retesting appliances is usually set during the PAT test and will usually be more frequent than five years. Where a PAT is not carried out at the same time as the EICR the Inspector should confirm that there is a record of appliance testing and the re-test date has not elapsed.

Copy of inspection

The landlord must receive and keep a copy of the EICR and PAT record for six years. A copy of the most recent EICR and PAT record must be given to the tenant before their tenancy starts. If an inspection is carried out during a tenancy a copy relating to that inspection must be given to the tenant.

Good Practice

In addition to the statutory guidance, it is recommended that a visual electrical safety check is carried out annually in a rented property. The purpose of the safety inspection is to check for signs of overheating, loose fixings, damaged or missing parts that may present a risk of injury or fire.

The visual checks should include:

- consumer units
- accessories light switches and socket-outlets
- visible cables
- electrical appliances for signs of damage and deterioration and to confirm that plugs and cables are secure.

For such purposes, the NICEIC Domestic Visual Condition Report may be used by NICEIC Approved Contractors.

Alternatively, Electrical Safety First provide a Landlords Interim Checklist which may be used by the landlord, or the landlords representative, to undertake a visual safety check on their rented premises. The checklist can be downloaded from *www.electricalsafetyfirst*

Appliances should be checked for a CE Mark, which is product manufacturer's claim that it meets all the requirements of European Union legislation. (Landlords should register appliances so that they receive notice should the appliance become subject to a recall by the manufacturer - *www.registermyappliance.org.uk*).

In addition, the operation of the following safety devices should be confirmed by pressing the integral test button:

- Residual Current Devices (quarterly check)
- Smoke or heat detectors
- Carbon monoxide detectors

For details on the provision of CO detectors refer to the: Scottish Government Statutory Guidance for the provision of CO alarms in private rented housing *https://www.gov.scot/publications/repairing-standard/#:~:text=To%20comply%20with%20the%20repairing%20standard%2C%20private%20landlords,carbon%20monoxide%20alarms%20in%20the%20private%20rented%20sector*.

More information about the Repairing Standard and the other elements that need to be met is available in the Advice Pack for Private Landlords. The Advice Pack is available online at *https://www.gov.scot/publications/repairing-standard/#:~:text=To%20comply%20with%20the%20repairing%20standard%2C%20private%20landlords,carbon%20monoxide%20alarms%20in%20the%20private%20rented%20sector*

For details on inspection and testing courses and PAT training refer to: *https://niceic.com/for-the-trades/develop-your-skills/training/*

Certsure LLP
Warwick House, Houghton Hall Park, Houghton Regis, Bedfordshire,
LU5 5ZX