Certification of Construction

Technical Guide 2024

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Electrical Installers Guide to Certification and the Scottish Building Standards

Technical Guidance for Certifiers of Construction (Electrical Installations to BS 7671)

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This guide may also be amended by SELECT and re-issued, due to amendments to the Scottish Building Standards or in the light of experience of its use.

April 2024

Technical Guide 2024
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Preface

The SELECT Certification of Construction Technical Guide was first published in 2005 and has subsequently been revised periodically to reflect changes to the mandatory Scottish Building Standards and associated guidance relevant to Certification of Construction (Electrical Installations to BS 7671).

The three most recent editions of the SELECT Technical Guide

The mandatory standards and associated guidance are published by the Scottish Government (Directorate for Local Government and Communities, Building Standards Division) in two Technical Handbooks (Domestic and Non-domestic).

This SELECT Technical Guide 2024 supersedes the 2023 edition and includes relevant additional and amended guidance incorporated in the Technical Handbooks in 2011, 2013 and 2023. These include the following:

- The introduction, from 1 May 2011, of new mandatory Standard 7.1 which requires that a statement of the level of sustainability achieved is affixed to a new dwelling or new non-domestic building;
- An extension to the scope of Standard 7.1 for new school buildings containing classrooms from 1 October 2013;
- The introduction, also from 1 October 2013, of guidance on the installation of carbon monoxide detection systems in dwellings and non-domestic residential buildings where a new or replacement combustion appliance is installed.

The opportunity has also been taken to update references to, and guidance included within, British and European Standards and other publications used in the preparation of this Technical Guide.

Introduction

The main purpose of this Technical Guide is to provide technical guidance for electrical installers who, in accordance with the Building (Scotland) Act 2003, are registered in a Scheme for Certification of Construction (Electrical Installations to BS 7671).

These installers, known as Approved Bodies, have a statutory duty to carry out the construction of electrical installations in accordance with the Standards required by the Building (Scotland) Regulations 2004.

Each Approved Body has at least one registered Approved Certifier of Construction (Electrical Installations), who is required to ensure that work carried out should meet the relevant parts of the above requirements before signing and submitting each Certificate of Construction.

Guidance on how to achieve the Standards set in the Building (Scotland) Regulations 2004 is given in the two Scottish Building Standards (SBS) Technical Handbooks (Domestic and Non-domestic). The arrangement of Sections 1 -7 within each handbook relate directly to the basic requirements for construction works of the Construction Products Regulation (as published by the European Commission) as follows:

Section 1 – Structure	(Mechanical resistance and stability)
Section 2 – Fire	(Safety in case of fire)
Section 3 – Environment	(Hygiene, health and the environment)
Section 4 – Safety	(Safety and accessibility in use)
Section 5 – Noise	(Protection against noise)
Section 6 – Energy	(Energy economy and heat retention)
Section 7 –Sustainability	(Sustainable use of natural resources)

Each of the seven Sections consists of an introduction and guidance on the individual Standards within each Section. Where any building contains both domestic and non-domestic use, it is a general principle that the more stringent of the two sets of recommendations should be used.

The requirements for electrical safety are given in Standards 4.5 and 4.6 of Section 4 in each Technical Handbook. There are however a number of other Standards within the above Sections that are of particular relevance to electrical installations, and this guide provides details of these together with appropriate methods of compliance.

This guide applies to any electrical installation within the scope of the Building (Scotland) Regulations, including work for which a warrant is not required (see Chapter 2 of this guide).

It should be noted that the normal method of compliance with the Building Regulations is to follow the recommendations in the SBS Technical Handbooks. The guidance in these handbooks is not however mandatory and compliance with the Regulations can be achieved by other methods. These Handbooks are available to view and download on the Scottish Building Standards Division (BSD) website (www.scotland.gov.uk/bsd).

1. Building Legislation

The following Building Regulations require to be observed during the construction of electrical installations within the scope of these Regulations.

Note - The [0]numbered terms in this guide are explained in Appendix B.

1.1 Regulation 8 Durability, Workmanship and Fitness of Materials

Materials, fittings and components used in the construction of a building must be suitable for their purpose, correctly used or applied and sufficiently durable taking account of normal maintenance practices. Construction products on the EU market covered by a harmonised European product standard should normally have CE marking. Electrical installation work carried out in accordance with BS 7671 (IET Wiring Regulations), in particular the requirements for Selection and Erection of Equipment, will satisfy the requirements of Regulation 8.

1.2 Regulation 9 Building Standards Applicable to Construction

Construction shall be undertaken so that the work complies with the requirements of Schedule 5 of Regulation 9 in the Building (Scotland) Regulations 2004. This requires compliance with the basic requirements for construction works given in the mandatory Building Standards, which buildings and works are expected to satisfy when they have been properly designed and built.

The Standards of particular relevance to electrical installations are listed in Table 1 below. Certifiers must consider compliance of the electrical installation with the Standards and any certificate issued must certify compliance with these Standards.

Table 1: Building Standards Covered by Certificates of Construction (Electrical Installations to BS 7671)

Section	[20]Domestic	Non-domestic
Structure	1.1	1.1
Fire	2.2 2.3 2.4 2.5 2.9 2.10 2.11.	2.1 2.2 2.3 2.4 2.5 2.9 2.10 2.11
Environment	3.10 3.11 3.13 3.14 3.17 3.20	3.10 3.12 3.14 3.17 3.20
Safety	4.1 4.2 4.3 4.5 4.6 4.8	4.2 4.3 4.5 4.7 4.8
Noise	5.1 5.2	5.1 5.2 (if relevant)
Energy	6.2 6.3 6.4 6.5 6.6 6.7 6.8. 6.11	6.2 6.3 6.4 6.5 6.6 6.7 6.8, 6.11
Sustainability	7.1. 7.2	7.1, 7.2

The Certifier of electrical installations is required only to consider the Standards in Table 1 above.

The relevant subjects covered by each of the above Building Standards are listed overleaf.

Structure

1.1 Prevention of collapse (Notches, holes and chases)

Fire

2.1 [1]Compartmentation (Fire stopping)
2.2 [2]Separation (Fire stopping)
2.3 Structural protection (Protecting load bearing structures)
2.4 Cavities (Fire stopping)
2.5 Internal linings ([6]Thermoplastic materials in light fittings)
2.9 Means of escape (Obstruction of [9]escape routes)
2.10 Escape lighting (Provision)
2.11 Communication of fire (Provision of fire detection and fire alarm systems)

Environment

3.10 Precipitation (Sealing of openings and service penetrations)
3.11 Facilities in [14]dwellings (Access and activity spaces)
3.12 Sanitary facilities (Accessible bathrooms and shower rooms)
3.13 Heating (Provision)
3.14 Ventilation (Provision)
3.17 Combustion appliances (Not affected by mechanical ventilation)
3.20 Combustion appliances (Provision of carbon monoxide detection)

Safety

4.1 Access to buildings
4.2 Access within buildings (Obstructions)
4.3 Stairs and ramps (Obstructions).
4.5 Electrical safety (Compliance with appropriate standards)
4.6 Electrical fixtures (Provision of lighting points and socket-outlets)
4.7 Aids to communication (Provision)
4.8 Danger from accidents (Positioning of equipment)

Noise

5.1 Transmission of noise (Maintaining noise prevention measures between attached [14]dwellings and between attached [16]residential buildings)
5.2 Transmission of noise (Maintaining noise prevention measures between rooms in [14]dwellings and common rooms and bedrooms in [16]residential buildings)

Energy

6.2 Building insulation envelope (Maintaining energy conservation measures)
6.3 Heating system (Provision of energy efficient control measures)
6.4 Insulation of pipes, ducts, vessels (Maintaining energy conservation measures)
6.5 Artificial and display lighting (Energy efficient provision and control)
6.6 Mechanical ventilation and air conditioning (Provision of energy efficient control measures)
6.7 Commissioning building services (To ensure optimum efficiency)
6.8 Written information (Provided to occupier of building)
6.11 Heating and Hot Water - direct emission heating system

Sustainability

7.1 Statement of sustainability (Sustainability labelling)
7.2 Electric Vehicle Charging

1.3 Regulation 10 Building Standards Applicable to Demolition

Demolition works – all service connections must be properly sealed including removing or making safe the supply of electric power servicing the building under demolition, and its site.

1.4 Regulation 11 Building Standards Applicable to the Provision of Services, Fittings and Equipment

Every service, fitting or item of equipment provided so as to serve a purpose of the regulations should be designed, installed and commissioned in such a way as to fulfil those purposes. Certificates must cover electrical installations as commissioned.

1.5 Regulation 12 Building Standards Applicable to Conversions

Conversions

Certain changes in occupation or use of buildings are defined as conversions and require a building warrant to be obtained before the work begins. Schedule 2 of Regulation 4 sets out changes in occupation or use which constitute a conversion; and is summarised (with examples) in Table 2 below.

Table 2: Changes in Occupation or Use of Buildings Which Constitute a Conversion

Changes in Occupation or Use of:	Conversion
A building	To create a [14]dwelling or [14]dwellings or a part thereof (e.g. an attic space as a room in a dwelling, or a hotel as a dwelling)
A building ancillary to a [14]dwelling	To increase the area of human occupation (e.g. a garage attached to a dwelling as a room)
A building	Which alters the number of [14]dwellings in the building (e.g. sub-division of a house into two flats)
A [20]domestic building	To any other type of building (e.g. a house as shared residential accommodation)
A [16]residential building	To any other type of building (e.g. a hotel as an office)
A [16]residential building	Which significantly alters the characteristics of persons or significantly increases the number of expected occupants of the building (e.g. a hotel as a residential care home)
A building	So that it becomes a [16]residential building (e.g. offices as a backpackers hostel)
An exempt building (in terms of Schedule 1 to Regulation 3)	To a building which is not so exempt (e.g. a railway signal box as a house)
A building	To allow public access where previously there was none (e.g. development of a retail outlet in a storage building)
A building	To accommodate parts into an area of different occupation where previously it was not so occupied (e.g. a single shop to provide for two different occupancies)

Building standards applicable to conversions

For work which constitutes a conversion it is recognised that it may not be reasonably practicable to fully comply with all the applicable Building Standards. Schedule 6 of Regulation 12 identifies the standards which have to be met in full and those which have to be met so far as is reasonably practicable and in no case worse than before the conversion. (Note: Standard 7.1, Sustainability, does not apply to conversions). The standards relevant to electrical installations are identified in Table 3 below.

Table 3: Conversions - Building Standards Relevant to Certification of Electrical Installations

	Building Standards compliance no worse than before and as close to full requirements as reasonably practicable		Full level of requirements for the part to be converted and to any other part of the original building affected	
Section	[20]Domestic	Non-domestic	[20]Domestic	Non-domestic
Structure	1.1	1.1	-	-
Fire	2.2 2.4	2.2 2.4	2.3 2.5 2.9 2.10 2.11	2.1 2.3 2.5 2.9 2.10 2.11
Environment	3.10	3.10	3.11 3.13 3.14 3.17 3.20	3.12 3.14 3.17 3.20
Safety	4.1 4.2 4.3 4.8	4.2 4.3 4.8	4.5 4.6	4.5 4.7
Noise	-	-	5.1 5.2	5.1 5.2 (if relevant)
Energy	6.2 6.3 6.4 6.5 6.6	6.2 6.3 6.4 6.5 6.6	6.7 6.8, 6.11	6.7 6.8, 6.11

For the above Standards, the level of compliance and decision as to what is reasonably practicable is at the discretion of the Certifier. The level of compliance may or may not be able to be determined from the building warrant. If a Certifier is asked to certify work in cases of change of use or occupation that constitutes a conversion, but for which no warrant has been obtained, they should not certify the work under the scheme.

2. Requirements for Building Warrants

Introduction

Whether or not electrical work can be certified under the scheme for Certification of Construction (Electrical Installations to BS 7671) and/or is subject to the building regulations will depend upon the type of building work carried out and the nature of the work activity.

a. Certain types of electrical work are subject to building regulations and require a building warrant. Such work can be certified under the Scheme for Certification of Construction.
b. Certain types of work are subject to building regulations but exempt from the need for a building warrant. Such work is currently outwith the scope of Certification of Construction and should not therefore be certified under the Scheme.
c. Certain buildings and work are not subject to building regulations or building warrant requirements and should not therefore be certified under the Scheme.

The information given in Sections 2.1 and 2.2 of this guide is based on Schedule 3 to Regulation 5 and indicates the building warrant requirements for electrical installation work in new and existing buildings covered by the building regulations.

Examples of buildings and services which are not subject to building regulations or building warrant requirements are given in Section 2.3 overleaf.

Note - The [0]numbered terms in this guide are explained in Appendix B.

2.1 Building Warrant Requirements for Electrical Work in New Buildings

Table 4 indicates the circumstances under which a building warrant is required for electrical work in new [20]domestic and non-[20]domestic buildings.

Table 4: Building Warrant Requirements for Electrical Work in New Buildings

Type of electrical work	New [20]domestic buildings ([26]house, [11]flat or [12]maisonette)	New non-[20]domestic buildings subject to certain exceptions (see 2.3)
Any electrical installation (except a circuit for telecommunication, alarm purposes or for transmission of sound, vision or data which operates at [19]extra-low voltage and which is not connected directly or indirectly to an electricity supply which operates at a voltage higher than the above).	Building warrant required	Building warrant required

References to new buildings also include, for example, extensions to existing buildings and most conservatories. Schedule 3 to Regulation 5 indicates that work which increases the floor area of a building requires a building warrant to be issued.

In such circumstances the full level of requirements of the relevant Building Standards are applicable for the extension or conservatory and any other part of the building affected by the work, e.g. interconnected [15]smoke alarms may require to be installed in parts of the existing building which form part of the [9]escape route.

2.2 Building Warrant Requirements for Electrical Work in Existing Buildings

The building warrant requirements for electrical work in existing [20]domestic buildings are given in Table 5 overleaf, whilst those for existing non-[20]domestic buildings are given in Table 6 on page 15.

The information given in Tables 5 and 6 has been produced by The Scottish Government Building Standards Division and Local Authority Building Standards Scotland (LABSS).

In the context of Tables 5 and 6, where it is indicated that a building warrant is 'Not Required' the work must still comply with the building regulations.

Boilers - large and small

In the context of Tables 5 and 6, a large boiler may be considered to be a combustion appliance as follows:

- A solid fuel appliance with an output rating more than 50 kW.
- An oil-firing appliance with an output rating more than 45 kW.
- A gas-fired appliance with a net input rating more than 70 kW.

2.3 Buildings and Work Not Subject to Building Regulations

Schedule 1 to Regulation 3 gives a description of buildings and services that are not subject to the Building Regulations. These are described under Types 1 to 21 in Schedule 1 to Regulation 3.
It should be noted however that electrical installation work carried out in such buildings may be subject to other legislation such as the Electricity at Work Regulations 1989. The relevant building Types in Schedule 1 are summarised as follows:

- Types 1 to 3 – Buildings or work controlled by other legislation e.g. Manufacture and Storage of Explosives Regulations, Nuclear Installations Act, Historic Buildings.
- Type 4 – Protective works e.g. building site works etc. where the public are in close proximity but are protected.
- Types 5 and 6 – Buildings not frequented by people e.g. detached buildings housing fixed plant only requiring intermittent visits.
- Types 7 and 8 – Agricultural and related buildings e.g. commercial greenhouses, small single [10]storey detached buildings used solely for this purpose.
- Types 9 to 12 – Buildings or work which is so specialised that the Building Regulations are not appropriate e.g. civil engineering work, mobile homes etc.
- Types 13 and 17 to 20 – Small single [10]storey buildings which do not contain flues, fixed combustion appliances or sanitary facilities. These would include conservatories and porches not exceeding 8 m^2 in area and greenhouses, car ports and covered areas not exceeding 30 m^2 in area.
- Types 14 to 16 – Temporary buildings not containing sleeping accommodation, such as contractors huts.

Table 5 Building Warrant Requirements for Electrical Work in Existing Domestic Buildings

Building (Scotland) Regulations 2004 Regulation 5, Schedule 3

Guidance on Electrical work not requiring a warrant

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	Required
Electrical fixtures, e.g. luminaires	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	Required
New Electric Vehicle Charging Point	1	Required	Not Required	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
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 as follows:
Type 1 – work to or in a house
Type 6 – work associated with a fixed combustion heating appliance
Types 11, 12 – work associated with sanitary facilities
Type 13 – work associated with the provision of an extract fan
Type 22 – an electrical installation operating at ELV
Type 24 – work associated with the replacement of fittings or equipment

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.

Table 6 Building Warrant Requirements for Electrical Work in Existing Non-domestic Buildings

Building (Scotland) Regulations 2004 Regulation 5, Schedule 3

Guidance on Electrical work not requiring a warrant

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 [2]	
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
New Electric Vehicle Charging Point	1	Required	Not 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
Wiring to artificial lighting	2	Not Required	Required	Required
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

Notes:

1. Building work type as referenced in schedule 3.
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 member 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.
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.
4. Subject to the Town and Country Planning (Control of Advertisement) (Scotland) Regulations 1984.

3. Basic Requirements for Construction Works and Associated Guidance

Electrical installers should observe the following requirements and guidance when undertaking the construction of an electrical installation which is within the scope of the Scottish Building Standards. Where any doubt exists regarding any of the following requirements or guidance the certifier should seek advice from the appropriate designer (structural engineer, architect, M & E consultant etc.) employed on the project.

3.1 Structure (Mechanical Resistance and Stability)

Note - The [0]numbered terms in this guide are explained in Appendix B.

3.1.1 Notches, Holes and Chases (Standard 1.1)

Drilling holes through timber or masonry, cutting chases (raggles) in masonry or penetrating any part of a structure for the installation of cables, containment systems and equipment should be carried out in a manner that does not impair structural integrity.

Points to note:

- Where there is any doubt about the structural integrity of any element of structure through which services are to pass or be accommodated the advice of a structural engineer should always be sought. This particularly applies to timber I beams.
- Existing holes and notches should only be used where appropriate.
- The detailed guidance given below is based on information taken from the Scottish Government Building Standards Division (BSD) website and is derived from a separate document entitled The Small Buildings Structural Guidance (SBSG). That document provides advice on notching and drilling of floor joists and flat roof joists etc. as follows:

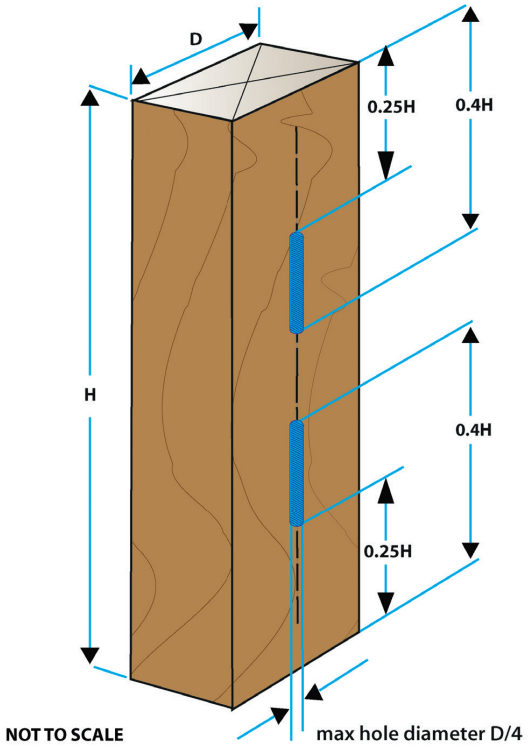
Detailed Guidance on Notches, Holes and Chases

Figure 3.1a Limits of holes in timber frame walls

- Holes should be drilled at the neutral axis (centreline);
- Holes should be at least 300 mm apart.

There should not be any notching of wall studs, *cripple studs or lintels.

*cripple studs are the vertical members in a timber framed partition or wall either side of an opening, such as a door or window, to provide support for a lintel



Floor and flat roof joists

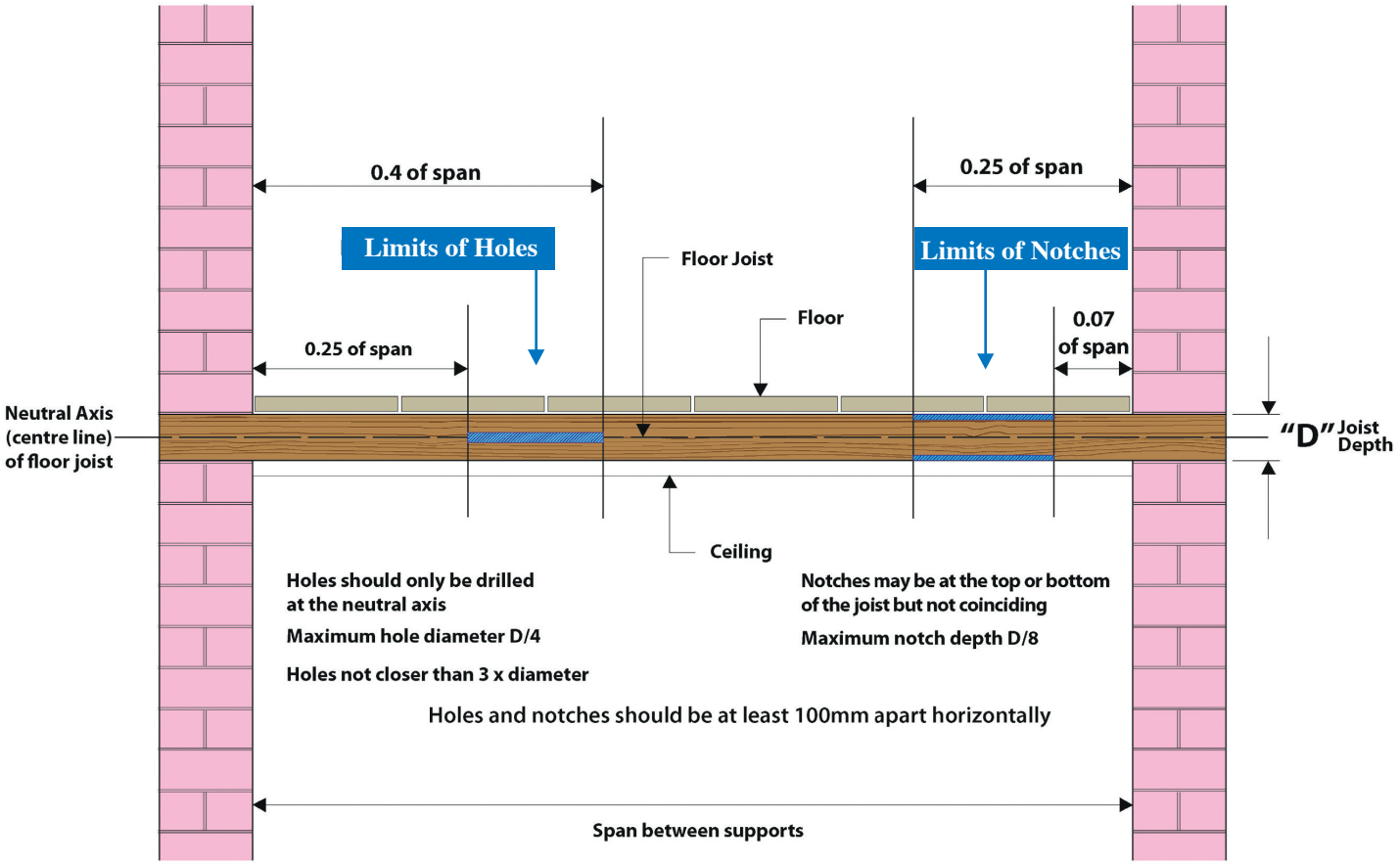
Notches and holes in simply supported floor and flat roof joists of depth D should be within the following limits:

a. holes should only be drilled at the neutral axis; and

b. notches and holes should be at least 100 mm apart horizontally; and

c. notches may be at the top or bottom of a joist but not coinciding.

Figure 3.1b Limits of holes and notches in floor and flat roof joists



NOT TO SCALE

Raised tie and collared roof members

Notches and holes should not be cut in rafters, ties, collars or hangers.

Trussed rafter members

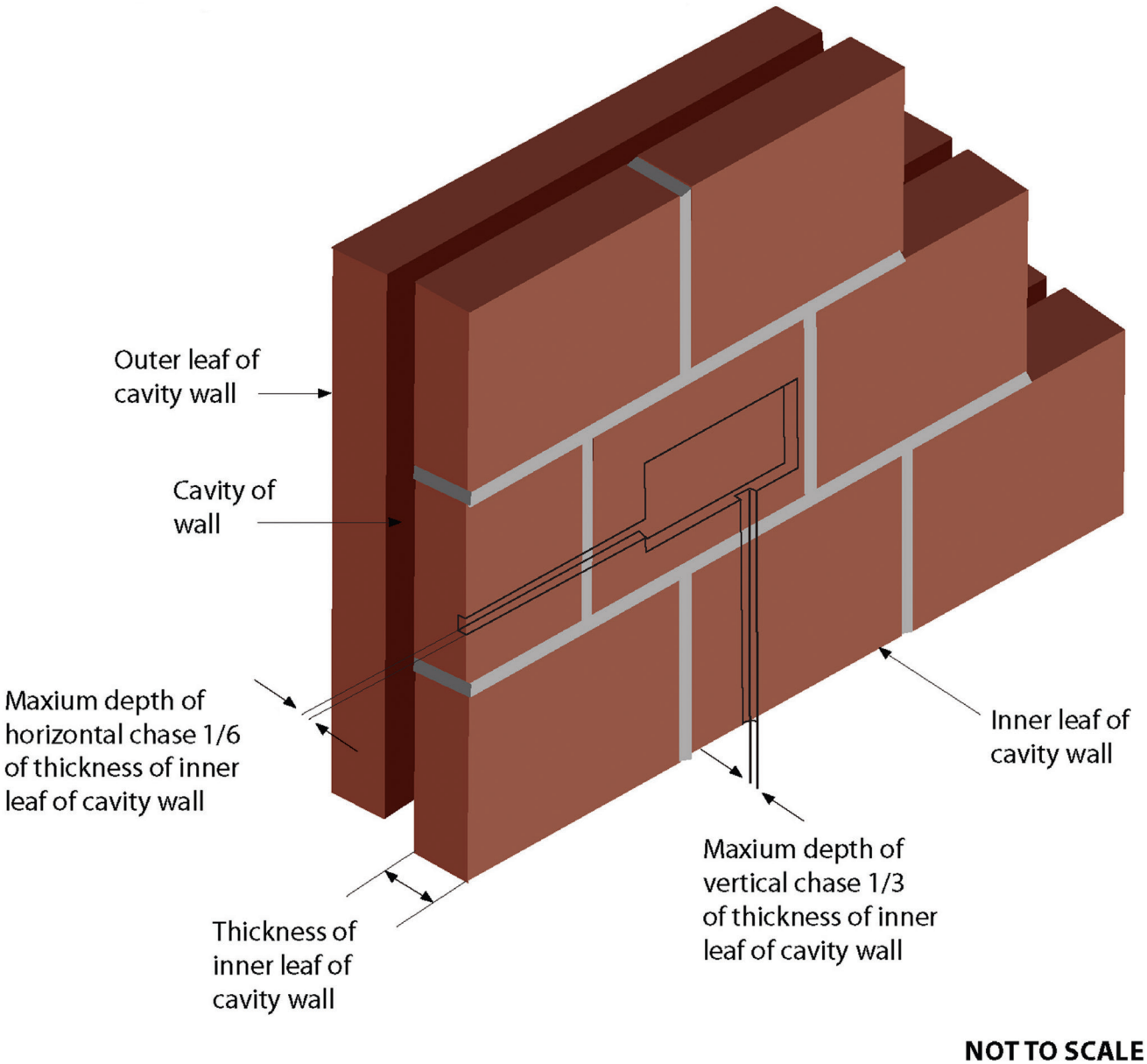
Members of trussed rafters should not be cut, trimmed, notched or otherwise altered.

Wall chases

Chases (raggles) should be within the following limits:

- Vertical chases should not be deeper than 1/3 of the wall thickness or, in cavity walls, 1/3 of the thickness of a leaf.
- Horizontal chases should not be deeper than 1/6 of the thickness of the wall or leaf.
- Chases should not impair the stability of a wall.
- Where hollow blocks are used, at least 15 mm thickness of block should be retained.
- Care should be taken that chases on solid partition walls are not back to back.
- See illustration below.

Figure 3.1c Limits of chases (raggles) in the leaf of a cavity wall



3.2 Fire (Safety in Case of Fire)

Note - The [0]numbered terms in this guide are explained in Appendix B.

3.2.1 Openings and Service Penetrations (Standards 2.1, 2.2, 2.3 and 2.4)

Cables, containment systems, ventilation ductwork or other items of equipment may penetrate [1]compartment walls or floors (normally provided in non-[20]domestic buildings to prevent fire spread) or [2]separating floors and walls (normally provided between [14]dwellings or between a [14]dwelling and another building or common [9]escape route).

[3]Cavity barriers (provided to prevent fire spread in cavities) may also be affected. For the purposes of this guidance, a cavity includes a roof space, a service riser or any other space used to run services around the building.

The above openings and penetrations require to be protected from the effects of fire. It is also essential during a fire that the load-bearing capacity of the building will continue to function until all occupants have escaped. The fire resistance durations of any elements of the structure such as the floors and ceilings should not be reduced by openings such as for recessed luminaires.

Points to note:

- Any of the openings referred to above should be [4]fire-stopped to inhibit the spread of smoke or fire and maintain the effectiveness of the elements of structure.
- Flush electrical accessories (or pipes, wires or other services) should not be installed in timber frame [2]separating walls.
- The walls and floors between an integral or adjoining garage are also considered to be [2]separating.
- The number of openings should be limited to as few and as small as possible.

Detailed Guidance on Openings and Service Penetrations

[4]Fire-stopping

As stated above, openings in fire resisting walls, floors and ceilings should be fire stopped to prevent the passage of heat, smoke and toxic gas.

Where minimal [22]differential movement is anticipated, either in normal use or during fire exposure, proprietary fire stopping materials such as [5]intumescent mastics may be used.
The following materials are also considered appropriate:

- Cement mortar.
- Gypsum based plaster.
- Cement or gypsum based vermiculite/perlite mixes.
- Mineral fibre.
- Crushed rock and blast furnace slag.
- Ceramic based products (with or without resin binders).

Where [22]differential movement is anticipated, proprietary sealants or sealing systems including [5]intumescent products tested for the appropriate fire resistance can be used. Materials used for fire stopping should be reinforced with, or supported by, non-combustible materials where the unsupported span is more than 100 mm and non-rigid materials are used, unless field tests show that the materials used are satisfactory. To avoid problems however, the number of holes and their sizes should be kept to a minimum.

Note: For wiring systems passing though walls and floors which require [4]fire-stopping, Regulation 527.2.3 of BS 7671 requires internal sealing of non-flame propagating conduits, trunkings etc. where the internal cross-sectional area is greater than 710 mm^2 (e.g. 50 mm x 38 mm or larger trunking). [5]Intumescent pillows are normally used for this purpose.

Figure 3.2a Wiring system passing through a wall requiring fire stopping

Figure 3.2b Intumescent pillow within non-flame propagating trunking

Both images courtesy of Intumescent Systems Ltd (www.envirograf.com)

Recessed downlighters - fire safety

In ceilings of timber frame buildings the ceiling lining is the sole means of preventing heat from a fire within the building from destroying the load bearing timbers of the floor or roof above. Care should therefore be taken when installing recessed downlighters in certain ceilings, as the luminaires may provide less fire protection than the plasterboard that has been removed to install the lights.

It is therefore essential that downlighters with integral or additional fire protection are installed in ceilings of timber frame buildings, particularly in ceilings of [2]separating floors or [1]compartment floors. Downlighters in ceilings of intermediate floors with rooms above, such as bedrooms, should also be of that type to allow occupants time to escape in the event of a fire.

The downlighters used should have fire resistance of at least 60 minutes for [2]separating or [1]compartment floors and 30 minutes for intermediate floors. The downlighters should have evidence of having been tested for fire performance when incorporated in a ceiling of the type into which they are to be installed, in accordance with BS 476 Part 21: 1987 or BS EN 1365-2. See also Section 3.5 (Noise) of this guide.

Ventilation systems - fire safety

The potential for ventilation systems to allow the spread of fire and smoke should be considered. A mechanical ventilation system may contribute to the spread of fire and smoke unless it is designed to shut down automatically or operate in a fire-mode if fire is detected. Ventilation ductwork passing through a separating or compartment wall or floor, or other fire resisting construction protecting escape routes, should be provided with either:

- Fire dampers; or
- Fire resisting enclosures; or
- Fire resisting ductwork.

Ventilation ductwork should be fire stopped in accordance with BS 5588: 1999 Fire precautions

in the design, construction and use of buildings – Part 9: Code of practice for ventilation and air conditioning ductwork. Section 6 of that standard provides guidance on design and construction including fire resisting enclosures, fire resisting ductwork and the use and activation of fire dampers. https://select.imiscloud.com/Memberservices/Brochures/SELECT_Smoke_Control.pdf

Note: BS 5588-9: 1999 was superseded on 31 October 2008 by BS 9999: 2008 was superseded on January 2017 Code of practice for fire safety in the design, management and use of buildings

3.2.2 [6]Thermoplastic Materials in Light Fittings (Standard 2.5)

The Building Standards have requirements in relation to the types of materials used to line walls and ceilings to inhibit the spread of fire.
Where [6]thermoplastic lighting diffusers are used which form part of a ceiling, such as in grid ceilings with recessed light fittings, these become part of the ceiling linings. The selection and installation of such diffusers should therefore be selected in accordance with Table7 below.

Where the lighting diffusers form an integral part of a fire-resisting ceiling that has been satisfactorily tested (to be confirmed by supplier), the amount of [6]thermoplastic material is unlimited.

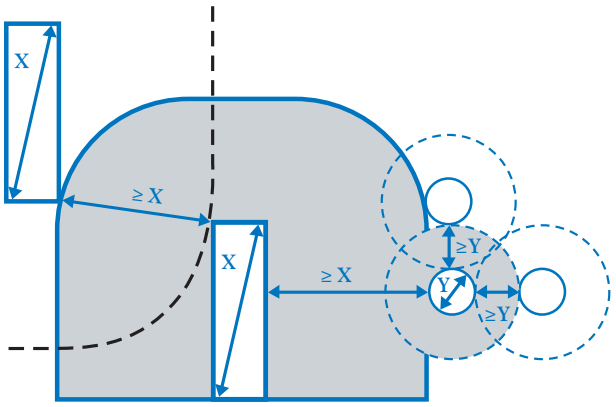
Note 1: [6]Thermoplastic materials means any synthetic material that has a softening point below 200^{0}C when tested in accordance with method A120 in BS EN ISO 306: 2004. [6]Thermoplastic materials can be further classified into three categories as follows:

- **TP(a) rigid** (solid sheet at least 3mm thick or multi-skinned rigid sheet as defined in the relevant standards).
- **TP(a) flexible** (not more than 1mm thick).
- **TP(b) semi-rigid** (between 1.5mm and 3mm thick).

Note 2: The use of surface mounted light fittings with [6]thermoplastic diffusers which do not form an integral part of a ceiling is unlimited, provided such diffusers are designed to fall out of their mountings when softened with heat.

Table 7: Limitations on Use of [6]Thermoplastic Light Fittings with Diffusers

	[7]Protected Zone or fire-fighting shaft	[8]Unprotected Zone and [24]protected enclosure		Room		
Classification of lower surface	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 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%
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 (see figure overleaf)



X = Maximum dimension of the largest diffuser

Y = Maximum dimension of the smallest diffuser

Layout restriction on TP(b) light fittings with diffusers no greater than 1 m^2

3.2.3 Escape Routes (Standard 2.9)

Every building must be designed and constructed in such a way that in the event of a fire the occupants can escape before being affected by fire or smoke.

The designated [9]escape routes should be identified on the plan of the building as this information is required for the building warrant in accordance with the SBS Procedural Handbook. It is essential that the Approved Certifier recognises the escape routes.

Points to note:

- Electrical equipment should not obstruct or adversely affect the height or width of [9]escape routes.
- Any electrical equipment such as a distribution board within a common [9]escape route should be enclosed in an appropriate fire resistant construction.
- Care should be taken in [27]apartments at a height of more than 4.5 m that distribution boards are mounted in cupboards with self-closing doors where they form an opening in the wall of a [24]protected enclosure i.e. halls, landings etc.
- Guidance is given on the use of electrically operated locks on exit doors in non-[20]domestic buildings.
- Section 3.2.5 of this guide includes information on the type of enhanced fire alarm system to be considered in certain [14]dwellings with extended travel distances and the corresponding impact on the time taken to escape in the event of a fire.

Detailed Guidance on Escape Routes

- For all buildings a minimum headroom of at least 2 m (1.9 m in doorways) must be maintained.
- The minimum width of corridors should also be considered with regard to access within buildings and is detailed in Section 3.4.1 of this guide.

[9]Escape routes – fire hazard rooms and services

Where distribution boards or any other ignition source are to be mounted in common [9]escape routes such as from [11]flats and [12]maisonettes they should be enclosed in a cupboard or other enclosure constructed to give medium (60 minutes) fire resistance duration.

Escape within [14]dwellings – [24]protected enclosures

[27]Apartments (rooms) located on a [10]storey at a height of more than 4.5 m above the ground (normally more than 2 storeys) should have direct access to [9]escape routes which are deemed to be [24]protected enclosures, which would include halls, landings and private stairs.

Doors into the rooms from these [24]protected enclosures other than a bath/shower room should be self closing. This however does not apply to a cupboard unless it contains an ignition source such as a boiler or distribution board.

Electrically operated locking devices
Electrically operated locking devices can be fitted to certain exit doors in [9]escape routes and exit doors provided they operate on a "fail safe" system i.e. power off to unlock.

These electric locks should not be installed on:

- A [29]protected door serving the only escape stair in a building (or the only escape stair serving part of a building); or
- A [29]protected door serving a fire-fighting shaft; or
- Any door which provides the only route of escape from the building or part of the building; or
- Any door accessible to the general public where the aggregate occupancy capacity of the rooms or [10]storeys served by the door exceeds 60 persons.

Electric locks should be programmed to fail to the unlocked position:

- On operation of the fire alarm system;
- On loss of power or system error;
- On activation of a manual door release unit to BS EN 54-11: 2001 (Type A), positioned at the door on the side approached by occupants making their escape or on both sides of the door where escape can be in either direction.

3.2.4 Escape Lighting (Standard 2.10)

All [9]escape routes require to be illuminated to aid the safe evacuation of a building in the event of a fire. This applies to [11]flats and [12]maisonettes and other buildings with common [9]escape routes. (See list under emergency lighting below).

Points to note:

- Escape lighting can utilise the normal lighting within a building but must be supplied from a [13]protected circuit;
- An emergency lighting system can be used as escape lighting and in some instances is a requirement.

Detailed Guidance on Escape Lighting

[9]Escape route lighting
Every part of an [9]escape route should have artificial lighting providing a level of illumination not less than that provided by emergency lighting. This may utilise the normal lighting within the building, but it should be supplied by a [13]protected circuit. Alternatively, emergency lighting can be installed.

[7]Protected zone
Where the artificial lighting serves a [7]protected zone, a [13]protected circuit should be installed that is separate from that supplying any other part of the [9]escape route, unless a system of emergency lighting is installed. Regardless of what system is employed, [9]escape routes should be capable of being illuminated at all material times when the building is in use.

Emergency lighting
In a building containing [11]flats and [12]maisonettes emergency lighting should be provided in the following areas:

- an underground car park including any[7]protected zone serving it, where less than 30% of the perimeter of the car park is open to the external air.
- a [7]protected zone or [8]unprotected zone serving a basement [10]storey.

- in high rise [20]domestic buildings where any [10]storey is over 18 metres above the ground every protected and [8]unprotected zone, i.e. [9]escape routes, should be provided with emergency lighting.

Emergency lighting should also be installed in non-[20]domestic buildings considered to be at a higher risk, such as in high rise buildings, buildings with basements or in rooms where the number of people is likely to exceed 60.

Emergency lighting should be installed in buildings or parts of a building considered to be at a higher risk such as:

- in a [7]protected zone and an [8]unprotected zone in a building with any [10]storey at a height of more than 18 m;
- in a room with an occupancy capacity of more than 60, or in the case of an [28]inner room, the combined occupancy capacity of the inner room plus the adjoining room (and any [7]protected zone or [8]unprotected zone serving these rooms) is more than 60;
- in an underground car park including any [7]protected zone or [8]unprotected zone serving it where less than 30% of the perimeter of the car park is open to the external air;
- in a [7]protected zone or [8]unprotected zone serving a basement [10]storey;
- in a place of special fire risk (other than one requiring access only for the purposes of maintenance) and any [7]protected zone or [8]unprotected zone serving it;
- in a [7]protected zone or [8]unprotected zone serving a [10]storey which has at least 2 storey exits in the following buildings:
  a) Entertainment, assembly, factory, shop, multi-[10]storey storage (Class 1), single-[10]storey storage (Class 1) with a floor area more than 500 $m^{2;}$
  b) a [7]protected zone or [8]unprotected zone serving a multi-[10]storey non-residential school;
  c) a [7]protected zone or [8]unprotected zone serving any [10]storey in a open sided car park.

Emergency lighting in places of entertainment such as, cinemas, bingo halls, ballrooms, dance halls and bowling alleys, should be in accordance with BS 5266-1:2016. Emergency lighting in any other building should be in accordance with BS 5266-1:2016 as read in association with BS EN 1838:2013 (BS 5266-7:1999).

In the case of a building with a smoke and heat exhaust ventilation system, the emergency lighting should be sited below the smoke curtains or installed so that it is not rendered ineffective by smoke filled reservoirs.

Note1: Class 1 storage is the storage of hazardous goods or materials including vehicles containing these goods (see factory buildings and storage buildings in Section 3.2.5 of this guide).

Note 2: Guidance for emergency lighting in [21]residential care buildings, hospitals and enclosed shopping centres are given in Annexes 2.A, 2.B and 2.C respectively in the SBS Technical Handbook (Non-domestic) Section 2 Fire.

3.2.5 Fire Detection and Fire Alarm Systems (Standard 2.11)

Fire detection and fire alarm systems are required in most buildings to ensure that the occupants of the building are alerted to the outbreak of fire.

Points to note

- For [20]domestic buildings the SBS Technical Handbook (Domestic) gives guidance on the fire detection and fire alarm system to be installed, based on the recommendations given in BS 5839-6:2019+A1:2020.
- For most [14]dwellings, including shared residential accommodation, but not sheltered housing complexes, the installation of an appropriate number of mains operated smoke and heat alarms will satisfy the requirements.
- [14]Dwellings with an individual [10]storey more than 200 m^2 are outside the scope of the SBS Technical Handbook (Domestic) and the need for additional measures such as an enhanced early warning system or other additional fire protection measures are required to be considered on a case by case basis. The use of enhanced early warning systems is included within the detailed guidance in this guide.
- [11]Flats at a [10]storey height of more than 4.5 m may also require an enhanced early warning system to allow occupants time for escape and this is also included in the detailed guidance.
- For non-[20]domestic buildings the SBS Technical Handbook (Non-domestic) gives recommendations on the fire detection and fire alarm system to be installed in various types of buildings based on the categories of systems given in BS 5839-1:2017.
- Special fire precautions are required for [21]residential care buildings, hospitals and enclosed shopping centres and specific guidance is given in Annexes 2.A, 2.B and 2.C respectively in the SBS Technical Handbook (Non-domestic).

Detailed Guidance on Fire Detection and Fire Alarm Systems in [20]Domestic Buildings

The SBS Technical Handbook (Domestic) gives recommendations on the fire detection and fire alarm systems to be installed in various types of [20]domestic buildings based on the Grades and Categories of systems given in BS 5839-6. The system **Grade** relates to the engineering aspects of the system, whereas the system **Category** relates to the level of protection afforded to occupants.

Brief descriptions of the Grades and Categories of systems identified in BS 5839-6 are given in Tables 8 and 9 overleaf.

Table 8: Grades of Fire Detection and Fire Alarm Systems in Domestic Buildings		
Grade	**Power Supply and Control and Indicating Equipment**	**Wiring**
A	A fire detection and fire alarm system,which incorporates control and indicating equipemnt conforming to BS EN54-2 and power supply equipment conforming to BS EN 54, and which is designed and installed in accordance with sections 1 to 4 of BS 839-1	Standard fire-resisting cables
C	A system of fire detectors and alarm sounders (which may be combined in the form of smoke alarms) connected to a common power supply, comprising the normal mains and a standby supply, with central control equipment	Cables in accordance with the relevant recommendations of BS 7671 which are suitable for the current and voltage of the circuits concerned
D1	A system of one or more mains powered detectors, each with a tamper-proof standby supply consisting of a battery or batteries	Any cable suitable for domestic wiring
D2	A system of one or more mains powered detectors, each with an integral standby supply consisting of a user-replaceable battery or batteries	Any cable suitable for domestic wiring
F1	A system of one or more battery-powered detectors powered by a tamper-proof primary battery or batteries	No cable battery only
F2	A system of one or more battrey-powered detectors powred by a user-reaplaceable primary battery or batteries	No cable battery only

Note: Interlinking of devices may take the form of wiring or utilise radio-linked systems.

Table 9: Categories of Fire Detection and Fire Alarm Systems in Domestic Buildings	
Category	**Number and Location of Detectors**
LD1	Detectors are installed in all circulation spaces that form part of the escape routes from the premises and in all rooms and areas in which fire might start, other than toilets, bathrooms and shower rooms
LD2	Detectors are installed in all circulation spaces that form part of the escape routes from the premises and in all specified rooms or areas that present a high fire risk to occupants
LD3	Detectors are installed in all circulation spaces that form part of the escape routes from the premises
PD1	Detectors are installed in all rooms and areas in which fire might start, other than toilets, bathrooms and shower rooms
PD2	Detectors are installed only in defined rooms or areas in which the risk to property is judged to warrant their provision

Note: An LD system is intended for the protection of **life** *in [20]domestic premises.*
A PD system is intended for the protection of a [20]domestic **property**.

[14]Dwellings with no [10]storey greater than 200 m^2

Living rooms and kitchens should be fitted with fire detectors because they are the most likely sources of fire in dwellings and result in the greatest number of fatalities and injuries in Scotland each year. Statistics also show that bedrooms and other rooms or spaces within a dwelling also contribute to the overall number of casualties and as a result the circulation spaces outside these rooms or spaces should be protected to give early warning of fire.

In order, therefore, to alert occupants to the outbreak of fire, a typical [14]dwelling should be provided with a BS 5839-6 Grade D fire detection and fire alarm system, comprising mains powered smoke and heat alarms each with an integral standby supply, as follows:

- At least one [15]smoke alarm installed in the principal habitable room (a room frequently used by the occupants of a [14]dwelling for general daytime living purposes); and
- At least one [15]smoke alarm in every circulation space on each storey such as hallways and landings; and
- At least one heat alarm installed in every kitchen
- At least one smoke alarm in every access room serving an [28]inner room to give occupants of the [28]inner room early warning. Where the access room is a kitchen, the type of detector should be carefully considered to reduce the likelihood of false alarms.

Note 1: Room means any enclosed part of a storey intended for human occupation or, where no part of any such storey is so enclosed, the whole of that storey, but excepting in either case any part used solely as a bathroom, shower room, washroom, toilet, stair or circulation area.

Note 2: The system described above is essentially a BS 5839-6 Grade D Category LD2 system.

In a building containing separate [11]flats or [12]maisonettes a common fire alarm and detection system that interlinks all [14]dwellings and common spaces is not recommended due to the risk of unwanted false alarms. In a sheltered housing complex, however, monitoring equipment is recommended due to the vulnerability of the occupants.

Choice of fire detectors

False alarms are common in [14]dwellings and may result in the occupants disabling the system. The most common causes of false alarms are fumes from cooking, tobacco smoke, dust, candles and steam from bathrooms or shower rooms and kitchens etc.

[15]Smoke alarms should conform to BS EN 14604:2005 and heat alarms to BS 5446-2:2003. To reduce the number of false alarms the choice of fire detector installed should be considered depending on their location. There are three main types of detector used in [14]dwellings, namely: **optical [15]smoke alarms, multi-sensor alarms** and **heat alarms.**

1) **Optical [15]smoke alarms** are responsive to fires producing dense smoke from slow smouldering furniture etc. and operate on the principle of a light beam detecting visible smoke in a chamber. These alarms do not respond to invisible smoke from kitchen fumes etc. Optical [15]smoke alarms are more likely to produce false alarms when exposed to steam, dense tobacco smoke or dust. The recommended uses for optical [15]smoke alarms are as follows:
   - Principal habitable rooms i.e. living rooms, family rooms (Note - where such a room is used by heavy smokers this could give rise to some false alarms from tobacco smoke);
   - Open plan areas such as a living room with a kitchen;
   - Hallways and stairwells adjacent to kitchens.

2) **Ionisation [15]smoke alarms** Ionisation [15]smoke alarms are now being phased out across the entire fire safety industry, from standalone domestic alarms to detectors in the largest commercial systems. This is due to the fact they use radioactive material in the sensor to detect the presence of smoke particles in the air, making them dangerous to manufacture, difficult and expensive to transport, they are an environmental hazard if not disposed of correctly. The technology of optical smoke [15]alarms has now advanced to the point that they are interchangeable. Optical [15]smoke alarms also are not deemed potentially hazardous like ionisation technology, due to not using radioactive materials.

3) **Multi-sensor alarms** are responsive to a wider range of fires than any of the other types of alarm mentioned above. Due to the unique type of sensor used they are less likely to give false alarms but are more expensive than the more common types of alarms. The sensor in this type of alarm also compensates for dust build-up thus reducing false alarms due to contamination. Multi-sensor alarms, however, are not recommended for kitchens as the sensor may become contaminated by fat or oil from frying. Multi-sensor alarms are normally used in [14]dwellings where a more sophisticated alarm system is appropriate and can be fitted in the following areas:

- Principal habitable rooms i.e. living rooms, family rooms;
- Open plan areas such as a living room with a kitchen;
- Hallways and stairwells;
- Bedrooms (where required).

4) **Heat alarms** are only responsive to heat, not smoke, and operate by responding to a rise in temperature of hot air from a fire in the immediate vicinity of the heat alarm. These detectors are unlikely to respond to fumes from cooking, steam etc. The recommended use for heat alarms is therefore as follows:

- Kitchens.

The choice of fire detectors in a typical dwelling is illustrated in figure 3.2c

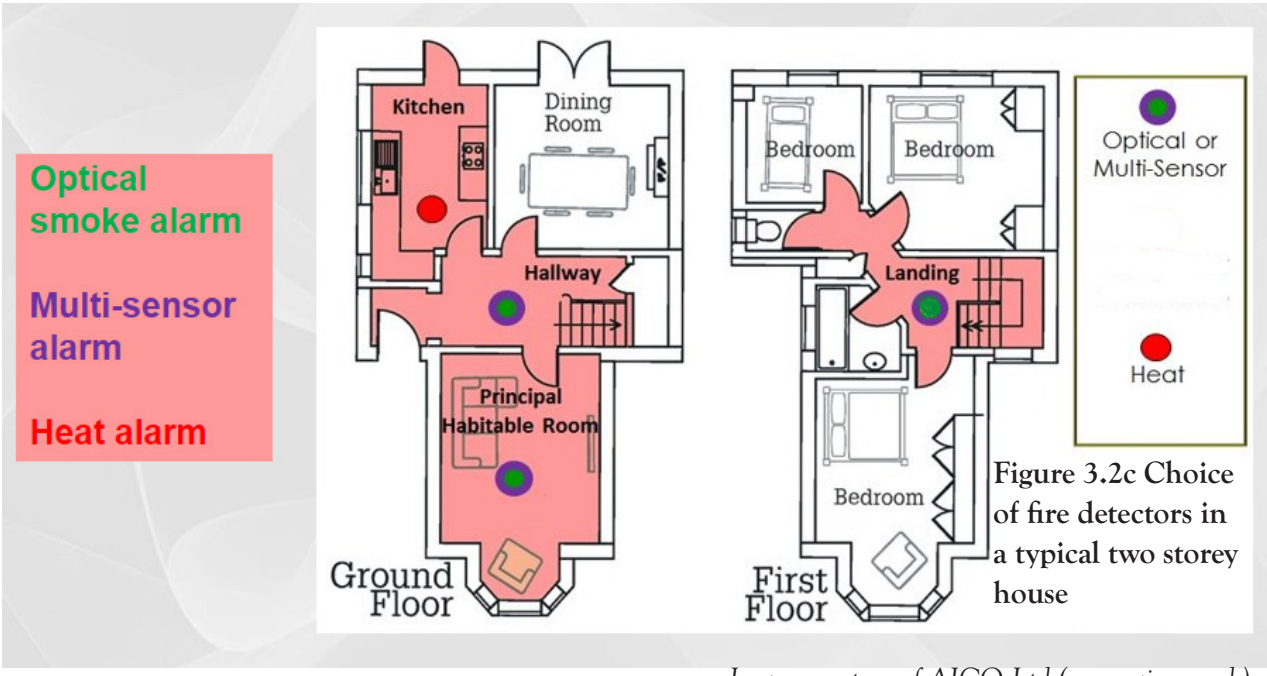


Figure 3.2c Choice of fire detectors in a typical two storey house

Image courtesy of AICO Ltd (www.aico.co.uk)

Siting of fire detectors

Smoke and heat alarms include an integral sounder and are required by the relevant product standard to produce a sound output of 85 dB(A) at 3 m. Allowing for sound attenuation through a domestic door, a sound level of between 55 to 65 dB(A) can be expected at the bed-head in each bedroom from a detector on the landing which should be sufficient to rouse the occupants.

Smoke from a fire is normally hot enough to rise and form a layer below the ceiling. Where, however, a room or hallway is very long the smoke might cool to such an extent that it loses buoyancy and spreads along the floor, preventing the smoke reaching the alarm. It should also be noted that smoke might not reach a [15]smoke alarm mounted close to a wall. These alarms should also be positioned away from equipment producing warm air movement or dust, to avoid false alarms. It is therefore essential that fire detectors are positioned to ensure the system operates correctly and

that audibility levels are sufficient to alert the occupants of a [14]dwelling to a fire. Smoke and heat alarms should therefore be ceiling mounted and located as follows:

- in circulation spaces not more than 7 m from a door to a living room or kitchen; and
- in circulation spaces not more than 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 [15]smoke alarm;
- in the principal habitable room(s) no point in the room should be more than 7.5 m from the nearest [15]smoke alarm; and
- a smoke alarm located in an access room (which could include a stair and landing) serving an [28]inner room should be not more than 3 m from the door of the [28]inner room.
- no point in the kitchen should be more than 5.3 m from the nearest heat detector; and in addition
- for [15]smoke alarms they should be mounted such that their sensitive elements are between 25 mm and 600 mm below the ceiling, at least 300 mm away from any wall or light fitting and not directly above heaters, air conditioning outlets or ventilators that might draw dust etc. into the [15]smoke alarm; and
- in the case of heat alarms, they should be mounted such that their sensitive elements are between 25 mm and 150 mm below the ceiling.

Wiring arrangement for a Grade D system

Smoke and heat alarms should be mains operated with a standby supply and should be permanently wired to a circuit which should take the form of either:

- an independent circuit at the 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 alarms); or
- a separately electrically protected regularly used local lighting circuit.

Note: The above does not apply to radio-linked detectors where the interconnection between detectors is radio communication rather than wiring.

The standby supply may take the form of a primary battery, secondary (re-chargeable) battery or a capacitor.The capacity of the standby supply should be sufficient to power the alarm in the quiescent mode for at least 72 hours whilst giving an audible or visible warning of power supply failure, after which there should remain sufficient capacity to provide a warning for a further 4 minutes or, in the absence of a fire, a fault warning for at least 24 hours.

All smoke and heat alarms in a [14]dwelling should be interconnected so that the detection of a fire in any alarm operates the alarm signal in all of them. Cables used for interconnections should comply with the relevant parts of BS 7671.

The system should be installed in accordance with the manufacturer's written instructions including any limitation on the number of smoke and heat alarms which may be interconnected. Radio-linked interconnections between hard wired [15]smoke alarms may be used for a Grade D system and details of such systems are given in Clause 21 of BS 5839-6.

[14]Dwellings with open plan layout

Guidance on the means of escape from open plan [14]dwellings is given under Building Standard 2.9 Escape, and is applicable where the top [10]storey height is more than 4.5 m above the ground (normally more than two [10]storeys) and in addition the kitchen is remote from the exit door.
In this situation an automatic life safety fire suppression (sprinkler) system and an enhanced early warning system should be installed to protect the occupants.
The fire suppression system should be designed and installed in accordance with BS 9251:2021 and the enhanced early warning system is recomended to be a Grade D Category LD1 fire detection and fire alarm system.

[11]Flats and [12]maisonettes
For [11]flats and [12]maisonettes at a [10]storey height of more than 4.5 m up to 60 m above the ground (i.e. 3 storeys up to 20 storeys) additional safety measures may be used to allow occupants time to escape in the event of a fire. The additional measures that can be used include escape windows, [24]protected enclosures, or enhanced early warning systems. Where an enhanced fire detection and fire alarm system is to be used a Grade D Category LD1 system is recommended in association with a fire suppression (sprinkler) system to BS 9251:2021.

Note: [11]Flats and [12]maisonettes at a [10]storey height of more than 60 m above the ground are outwith the scope of the SBS Technical Handbook (Domestic).

Shared residential accommodation
Shared residential accommodation 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 [10]storey height of more than 7.5 m. At least a BS 5839-6 Grade D Category LD2 system should be installed in this type of accommodation.

Sheltered housing complexes
The requirements for sheltered housing fire detection and fire alarm systems are also given in the SBS Technical Handbook (Domestic) but require special consideration due to the diverse range of support required by the occupants of these complexes. Any fire alarm signal should be transmitted to a remote monitoring service or to a warden who can assist with evacuation if necessary, or call for assistance.
In order to achieve this principle a Grade C system should be installed in every [14]dwelling in the complex which comprises central control equipment in accordance with BS 5839-6; and

- one or more mains powered [15]smoke alarm and one or more mains powered heat alarm with an integral standby supply; or
- point fire detectors and separate sounders.

[14]Dwellings with a [10]storey greater than 200 m^2

The area of an individual [10]storey within a [14]dwelling has an impact on the time occupants have available to escape from a fire originating in the [14]dwelling. A [14]dwelling with an individual [10]storey more than 200 m^2 is outside the scope of Section 2 of the SBS Technical Handbook (Domestic).
In such cases an alternative approach to fire safety may be applicable with consideration given to additional measures such as fire suppression, enhanced early warning (automatic fire detection), additional exits etc.

Where automatic fire detection in these larger [14]dwellings is used as the principal safety measure the following may be applicable, based on the guidance given in BS 5839-6:2019+A1:2020 for single-family [14]dwellings with one or more floors greater than 200 m^2 in area:

Bungalow, [11]flat or other single-storey unit	Grade D Category LD2 system
[12]Maisonette or two[10]storey [26]house	Grade A Category LD2 system
Three (or more) [10]storey [26]house	Grade A Category LD2 system with detectors sited in accordance with the requirements of BS 5839-1 for a Category L2 system

Detailed Guidance on Fire Detection and Fire Alarm Systems in Non-[20]Domestic Buildings

It is important to be aware that there is other legislation apart from Building Regulations which impose duties of care on those responsible for non-[20]domestic buildings, particularly where staff are employed or members of the public have access. This may also apply to [20]domestic buildings where care services are provided.

Part 3 of the Fire (Scotland) Act 2005 places duties on employers and persons in control of most non-domestic premises in Scotland to ensure the safety of employees and others in respect of harm caused by fire in the workplace. More specific requirements in relation to fire safety are also given in the Fire Safety (Scotland) Regulations 2006 which are made under the 2005 Act.

Persons with obligations under the above Act and Regulations are required to carry out fire safety risk assessments for the purpose of identifying risks to the safety of persons in the premises and implement fire safety measures as necessary. This would include for most buildings a suitable fire detection and fire alarm system. It should be noted that Section 70 of the Fire (Scotland) Act 2005 restricts the application of Part 1 of the Health and Safety at Work etc Act in relation to general fire safety in non-[20]domestic buildings. In most instances, therefore, the 2005 Act takes precedence over the Health and Safety at Work etc Act.

The first step in designing a suitable fire detection and fire alarm system for a building should be consultation with those having responsibilities under fire safety legislation for the building. The guidance given in the SBS Technical Handbook (Non-domestic) can be used to identify a suitable system for the building during the consultation process based on the BS 5839-1 Categories .

Category L systems

Category L systems are automatic fire detection and fire alarm systems installed for the protection of life, incorporating detectors, sounders and manual call points. These systems are sub-divided from the most stringent L1 system to the least stringent L5 system, depending on the detector coverage required in the building:

- **L1 systems** – detectors are installed throughout the building to offer the earliest possible warning of fire and achieve the longest possible time to escape. Automatic detectors should be installed in all rooms and areas of the building, but not in stairway lobbies, toilet lobbies, toilets, shower rooms, bathrooms or small cupboards less than 1 m^2. Detectors within [9]escape routes should be smoke detectors or a mixture of smoke and combustion gas detectors.
- **L2 systems** – detectors are installed in the building to give warning before [9]escape routes are impassable owing to the presence of fire, smoke or toxic gases, but with enhanced coverage in specified areas of the building. The rooms or areas protected should comply with the recommendations for an L3 system given below and in addition suitable detectors should be installed in rooms with a high risk of fire.

- **L3 systems** – detectors are installed so as to give a warning of fire at an early enough stage to enable all occupants, other than possibly those in the room of fire origin, to escape safely before [9]escape routes are impassable owing to the presence of fire, smoke or toxic gases. Smoke detectors, or a mixture of smoke and combustion gas detectors should be provided in all escape stairways, corridors and any other area that forms part of the common [9]escape routes. In addition heat, smoke, combustion gas or multi-sensor detectors should be installed in rooms that open onto [9]escape routes, except that rooms opening onto corridors of less than four metres in length need not be protected, provided fire resisting construction, including doors, separates these corridors from any other section of the [9]escape routes.
- **L4 systems** – detectors are installed in those parts of [9]escape routes comprising of circulation areas and spaces, such as corridors and stairways. Smoke detectors, or a mixture of smoke and combustion gas detectors should be provided in all escape stairways, corridors and any other area that forms part of the common [9]escape routes.
- **L5 systems** – detectors and sounders are installed in specified locations where the system is designed to satisfy a specific fire safety objective (other than that of a category L1, L2, L3 or L4 system). Any specification or proposal should clearly identify the rooms or areas that are to be protected.

Category M systems

These systems are standalone manual fire alarm systems that include manual call points with sounders at specific locations in a building. Automatic detection is not part of the system. Category M systems should however be installed in conjunction with the L1 to L5 systems described above.

Voice alarms

In complex and multi-use buildings the installation of voice alarms can be used, particularly where a building is designed for phased evacuation or where the occupants might not rapidly respond to a warning of fire. A voice alarm system should comply with BS 5839-8:2013.

Hold open devices for self-closing fire doors

Where hold open devices are fitted to self-closing fire doors in [1]compartment walls these devices should normally de-activate on the operation of the fire alarm system to ensure that the doors close to limit the spread of smoke etc. in the event of a fire in the building. The device should also de-activate on the loss of power and in addition a manual switch should be provided adjacent to the door.

Guidance on Fire detection and Fire Alarm Systems for Specific Types of Non-[20]domestic Buildings

Additional guidance is provided in the SBS Technical Handbook (Non-[20]domestic) on the choice of fire alarm systems for [16]residential buildings, hospitals, enclosed shopping centres, buildings used for entertainment and assembly, offices and shops, educational buildings, factories and storage facilities, transportation terminals and other smaller non-[16]residential buildings.

[21]Residential care buildings, hospitals and enclosed shopping centres

Special fire precautions are required for [21]residential care buildings, hospitals and enclosed shopping centres and specific guidance is given in Annexes 2.A, 2.B and 2.C respectively in the SBS Technical Handbook (Non-domestic). With respect to fire alarm systems, the installation of Category L1 systems are part of the recommendations.

[16]Residential buildings (other than [21]residential care buildings and hospitals)

For buildings such as hotels and boarding [26]houses where occupants may be asleep, the threat posed by fire is much greater than in buildings where people are normally awake and alert. A Category L2 system is likely to be appropriate in premises with sleeping accommodation. It is however, important that the choice of system is based on a risk assessment. In order to minimise false alarms a variation from a Category L1 system regards the siting of smoke or carbon monoxide fire detectors in bedrooms may be justified. Detectors are typically installed in most other rooms and few areas should be left unprotected.

Entertainment buildings and assembly buildings

The occupants in such buildings will normally be alert but could be unfamiliar with the building, nevertheless they should be able to respond to an outbreak of fire in their immediate area. Certain events, such as pop concerts, will require a greater degree of control than for other events with similar audience numbers such as a play performed in a large theatre.

A Category L1, L2, L3 or M system should be installed in these types of buildings. The Category will depend upon on the use of the building, for example whether it is a cinema, restaurant or nightclub. An assessment should be carried out to determine the appropriate Category. The following can be used as a guide.

Where there are:

- More than 300 occupants a Category L1 system should be installed;
- No more than 300 occupants but more than 100 at least a Category L2 system should be installed;
- No more than 100 occupants but more than 60 at least a Category L3 system should be installed; and
- No more than 60 occupants at least a Category M system should be installed.

Offices and shops

In **shops** the occupants will normally be alert but could be unfamiliar with the premises but they should, however, be able to respond to an outbreak of fire in their immediate area. In department stores with restaurants or cafeteria a phased evacuation can be used where fire safety measures are provided to facilitate this strategy. A Category M, L3 or L4 system should be installed.

In shops where there are:

- More than 300 occupants then a Category L3 system should be installed;
- Where the building is in different occupation a Category L3 system should be installed;
- Not more than 300 occupants but more than 100 at least a Category L4 system should be installed; and
- Not more than 100 occupants at least a Category M system should be installed.

In **offices** the occupants will normally be alert and familiar with the building and are unlikely to be so engaged with the task in hand that they initially fail to perceive, or respond to an outbreak of fire in their immediate area. In these circumstances, 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.

Educational buildings
Many educational buildings are also a community resource and serve a variety of functions. It is therefore important that the choice of system Category is based on a risk assessment of the particular circumstances.

An example would be where a country school could consist of one large classroom with 14 pupils and a teacher, where the warning is understood, and can be heard throughout the building.
More complex educational buildings may contain different uses such as large assembly areas, auditoriums or administration centres. In such cases, the guidance under the relevant building types should be followed.
In educational buildings with more than 60 occupants therefore, at least a Category M, L3, L4 or L5 system should be installed depending on an assessment at the design stage.

Factory buildings and storage buildings
In factory buildings (Class 1), factory buildings (Class 2), storage buildings (Class 1) and storage buildings (Class 2) the occupants will normally be alert and familiar with the building. The numbers of persons in the building are also liable to be low but can vary, for example in a large area ([1]compartment) with production lines such as clothes manufacture there may be a larger number of occupants.

Due to the varied nature of use, some buildings may, for example, contain hazardous or dangerous materials or processes with the potential for fire or explosion, posing risks to persons in the building. Such factors should be part of the fire risk assessment to ensure that fire safety measures are provided to safeguard occupants who are so engaged with the task in hand that they may initially fail to perceive or respond to an outbreak of fire in their immediate area.

Normally a Category M system should be installed, however occupants could work alone in remote areas of the building and this should be considered when determining the Category of system to be installed. Depending upon the assessment at the design stage a Category M, L1, L2, L3, L4 or L5 system should be installed.

It should be noted that a Class 1 factory is a building where manufacture, processing, repairing, cleaning etc. of a range of specified substances takes place. A Class 2 factory is a building where Class 1 does not apply, but includes buildings used for the generation or supplying of power or the slaughtering of livestock.

Class 1 storage is the storage of hazardous goods or materials including vehicles containing these goods. Class 2 storage is any storage other than Class 1 including car parks. Detailed definitions are given in the SBS Technical Handbook (Non-domestic).

Transportation terminals
These buildings may be small single-[10]storey or large complex buildings which include mixed occupancy use such as airports, where the Category of alarm system will normally form part of a fire engineering solution. Excluding large complex buildings and depending upon the risk assessment at the design stage, a Category M, L4 or L5 system should be installed.

Other non-residential buildings

In small single-storey buildings where the occupant number is not more than 10 and the floor area is such that everyone can see each other, a shouted warning 'FIRE' by a person discovering the fire could be all that is required. In assessing the situation, it must be determined that the warning can be heard and understood throughout the building or compartment including those in remote locations such as toilets.

Further Fire Safety Guidance

A series of sector specific guides providing fire safety guidance for those with responsibilities under Part 3 of the Fire (Scotland) Act 2005 is freely available from the Scottish Government at www.scotland.gov.uk/Topics/Justice/public-safety/Fire-Rescue/Firelaw. These guides will be useful for those involved in the installation of fire detection and fire alarm systems in non-domestic premises. They also provide guidance on other fire safety related issues including escape lighting.

3.3 Environment (Hygiene, Health and the Environment)

Note - The [0]numbered terms in this guide are explained in Appendix B.

3.3.1 Service Penetrations to External Walls (Standard 3.10)

Cables or containment systems may penetrate the building structure (e.g. main supplies, supplies to outbuildings, outside lights etc.) and provide a passage for moisture.

Points to note:

- Cables and containment systems should be appropriately sealed to prevent water penetration through the structure.
- Care should be taken not to puncture vapour barriers in timber frame and other buildings.

3.3.2 Facilities in [14]Dwellings (Standard 3.11)

At least one [27]apartment on the principal living level of a [14]dwelling should have unobstructed access, at least 800 mm wide, to the controls of any heating appliance.

A kitchen in a [14]dwelling should be provided with a space for a cooker, which should accommodate piping, cables etc. to allow it to operate. A cooker in a [14]dwelling should have an activity space extending at least one metre in front of an oven, other than a microwave oven.

3.3.3 Sanitary Facilities (Standard 3.12)

Sanitary accommodation, such as a toilet, bathroom, shower room or changing facility, which is accessible to wheelchair users in non-[20]domestic buildings, should be fitted with an assistance alarm. The alarm shall be capable of being operated or reset when using a sanitary facility or from floor level. The alarm should have an audible tone, distinguishable from any fire alarm, together with a visual indicator, both within the sanitary accommodation and outside in a location that will alert building occupants to the call.

3.3.4 Heating of [14]Dwellings (Standard 3.13)

Every [14]dwelling should have some form of fixed heating system, or alternative that is capable of:

- Maintaining a temperature of 21°C in at least one [27]apartment and 18°C elsewhere, when the outside temperature is minus 1°C.
- Where there are elderly or infirm occupants in a [14]dwelling it is a sensible precaution to have the capability to maintain an [27]apartment at a higher temperature than 21°C.
- Store rooms with a floor area not more than 4 m^2 do not require to be heated.

Alternative heating systems such a solar panels, heat pumps, wind power etc. can be used and may only need to be supplemented by a lower fixed heating and/or water heating system.

3.3.5 Ventilation (Standards 3.14 and 3.17)

Every building should have provision for ventilation either by natural or mechanical means or a combination of both.

Points to note:

- In addition to the above, domestic kitchens, utility rooms, bath/shower rooms and areas designated for drying washing require mechanical extraction, if there is no [23]passive stack ventilation system.
- Non-[20]domestic buildings with domestic sized rooms also require mechanical extraction as above.
- Certifiers should be aware that ventilation fans in rooms with [17]open-flued appliances may affect the discharge of combustion products.
- Where mechanical extraction is used in a garage having a floor area of at least 30 m^2, guidance on the recommended extraction rates are given in the SBS Technical Handbook (Non-domestic) clauses 3.14.8 and 3.14.9. Such ventilation may be provided to protect building users from the harmful effects of toxic emissions from vehicle exhausts.
- Detailed guidance on extraction rates is given below. Although installation practice and methods of control are not requirements of the standards, guidance on these subjects is also included.
- So that contaminants do not exceed acceptable levels and thereby endanger the health of 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 frequently results in occupants not being aware of the need to open ventilators or windows, particularly in bedrooms.

Detailed Guidance on Ventilation

Ventilation extraction rates for intermittent extraction fans

An installation consisting of intermittent extract fans is not suitable for a dwelling with an air-tightness of less than 5 $m^3/hr/m^2$ @ 50 Pa.

Where mechanical extraction is to be fitted in [20]domestic premises or non-domestic premises with similar sized kitchens, bathrooms etc. the following extraction rates are applicable:

- In kitchens, mechanical extraction of at least 30 litres/sec (intermittent) above a hob, or 60 litres/sec (intermittent) if elsewhere.
- In utility rooms, mechanical extraction of at least 30 litres/sec (intermittent).
- In bathrooms/shower-rooms with or without a WC, mechanical extraction of at least 15 litres/sec (intermittent).
- In toilets, either a ventilator with an opening area of at least 1/30th of the floor area, or mechanical extraction of at least 3 air changes per hour.
- In areas designated for drying washing (other than a utility room or bathroom/shower room) mechanical extraction of at least 15 litres/sec (intermittent) with humidistat control.

Note 1: Where a kitchen contains a gas-fired, [17]open-flued appliance the extract rate of the fan should not exceed 20 litres/sec.

Note 2: In accordance with Standard 6.6.3, intermittent extract ventilation should be energy efficient, having a specific fan power (SFP) not greater than 0.5 Watts/litre/second.

Additional guidance on domestic ventilation installation practice

BSD publication Domestic Ventilation (2nd Edition 2017) describes some of the systems that may be used to ventilate new and existing dwellings, giving performance requirements and practical installation guidance to assist in delivering an efficient system of ventilation.

This includes guidance on 23 passive stack ventilation, intermittent extract fans, decentralised mechanical extract ventilation (dMEV), continuously operating balanced supply and extract ventilation (with or without heat recovery) and continuously operating extract ventilation.

The 2nd edition also provides guidance on the provision of CO_2 monitoring equipment in dwellings (where required) and a proforma for the information to be passed to the home occupier on the use and interpretation of the data provided by such equipment. The revised domestic ventilation guidance is freely available at http://www.gov.scot/Topics/Built-Environment/Building/Building-standards/techbooks

The guidance also highlights key issues that can affect the performance of ventilation systems such as the installation of ductwork, including illustrations of good and bad practice in the installation of flexible ducting – see figure 3.3a.

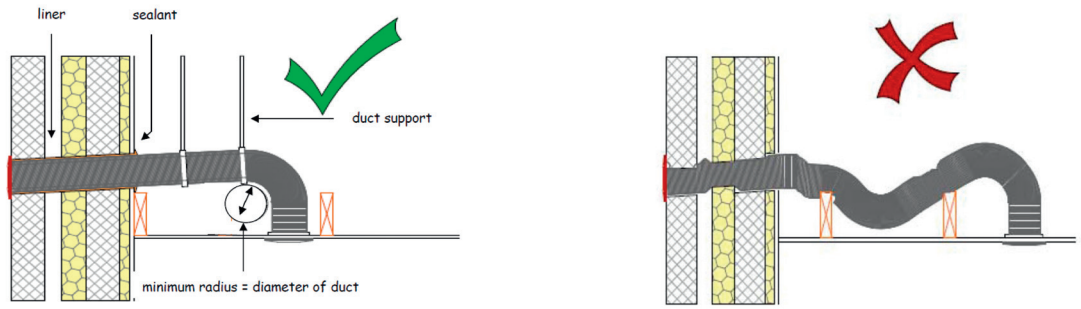


Figure 3.3a Good and bad practice in the installation of flexible ducting

Use of decentralised mechanical extract ventilation

Decentralised mechanical extract ventilation (dMEV) is a single-room mechanical ventilator that operates continuously at a low extraction rate with a humidity controlled, and/or manually operated, boost facility. A dMEV can be located in a wet room (i.e. bathroom, shower room, kitchen, utility room or a room containing an area designated for drying of washing) in place of a manually operated mechanical extract ventilator.

Such dMEVs are suitable for use in more airtight dwellings, that is, those constructed to an infiltration rate of between 3 and 5 $m^3/hr/m^2$ @ 50 Pa. They may also be used as an alternative to switchable single room extract fans in less airtight dwellings. When installed in all wet rooms in a dwelling, they bring many of the advantages of a whole house ventilation system but at a much reduced capital and maintenance cost. However, there will be additional on-going running costs over switchable units.

A dMEV should be designed, installed and commissioned to provide minimum continuous and boost extraction rates as follows:

- Kitchen — 6 litres/sec with 13 litres/sec boost
- Utility room — 4 litres/sec with 8 litres/sec boost
- Bathroom or shower room (with or without a WC) — 4 litres/sec with 8 litres/sec boost
- Toilet — 3 litres/sec with 6 litres/sec boost
- Designated drying area — 4 litres/sec with 8 litres/sec boost

Control of extract fans

Fans can be switched manually or automatically via a humidistat control. Humidistat control is not however recommended for rooms containing a WC as odours may not be removed.

For bathrooms/shower rooms with a WC the following is recommended:

1) In bathrooms/shower rooms without a window, the fan usually has a run-on timer fitted and these fans should be controlled with the light switch. A separate means of switching off for mechanical maintenance should also be provided to isolate both the switch wire and permanent live supply. This type of switch is normally located adjacent to the fan. It should however be noted that Section 701 of BS 7671 only permits the installation of such a switch outwith the bathroom zones.
2) In bathrooms/shower rooms with a window, a fan with a run-on timer is not normally used, however separate control from the light is recommended. For most bathrooms a two gang switch with one of the switches controlling the fan will suffice. This switch should be located outwith the bathroom zones, normally outside the bathroom adjacent to the door. To comply with Regulation 537.3.1.2 of BS 7671 a means of switching off for mechanical maintenance located as 1) above is also recommended, particularly where the functional switch for the fan is outwith the control of the person carrying out such maintenance. Such a switch should be situated in a location that will not encourage its use as an 'on-off switch' by the occupants.

Ventilation awareness in low air infiltration dwellings

Carbon dioxide (CO_2) is present in the external air we breathe at concentration levels of around 400 parts per million (ppm) 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 and is generally accepted as being a reasonable indication that ventilation action is necessary.

CO_2 monitoring equipment should be provided in the apartment expected to be the main or principal bedroom in a dwelling where infiltration air rates are less than 15 $m^3/hr/m^2$ @ 50 Pa. This should raise occupant awareness of CO_2 levels (and therefore other pollutants) present in their homes and 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.

The installed monitoring equipment for CO_2 should be permanently fixed and mains operated. This 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 the detector/monitor has an audible alarm this should be capable of being permanently deactivated. The monitoring equipment should be capable of recording and displaying readings within a range of at least 0 – 5,000 ppm and logging data at no more than 15 minute intervals over a 24 hour period.

A CO_2 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 CO_2 detector head should <u>not</u> 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 door or window, or an air vent or similar ventilation opening.

Unless otherwise indicated by the manufacturer, a CO_2 monitor, with or without an integral detector, should be mounted between 1.4 m and 1.6 m above floor level. A CO_2 detector head (or monitor if integrated) should not be sited within 1 m of the expected location of the 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, e.g. the hallway. This may be desirable if more than one detector head is installed.

Important Note: The above guidance regarding **carbon dioxide (CO_2)**, monitoring should not be confused with the requirements for **carbon monoxide (CO) detection** given in Section 3.3.6 of the course notes.

3.3.6 Carbon Monoxide Detection (Standard 3.20)

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. CO 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.

Points to note:

- The provision of a CO detection system should not be regarded as a substitute for the correct installation and regular servicing of a combustion appliance.
- For [14]dwellings and smaller non-[20]domestic [16]residential premises (e.g. guest houses) the SBS Technical Handbook (Domestic) gives guidance on the CO detection system to be installed.
- For other non-[20]domestic residential buildings the SBS Technical Handbook (Non-domestic) gives guidance on the CO detection system to be installed.

Detailed Guidance on Carbon Monoxide Detection

CO detection in [14]dwellings

In order to alert occupants to the presence of levels of CO which may be harmful to people, a detection system should be installed in all [14]dwellings where:

- A new or replacement fixed combustion appliance (excluding an appliance used solely for cooking) is installed in the premises; or
- A new or replacement fixed combustion appliance is installed in an inter-connected space, e.g. an integral garage.

CO detectors in [14]dwellings should comply with BS EN 50291-1:2010 now superseded to 2018 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 users when its working life is due to expire. Hard wired mains operated CO detectors complying with BS EN 50291-1:2010 now superseded to 2018 (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.

CO detection in non-[20]domestic [16]residential buildings

In order to alert sleeping occupants to the presence of levels of CO which may be harmful to people, a detection/alarm system should be installed in all non-[20]domestic [16]residential buildings where a new or replacement fixed combustion appliance is installed.

In smaller non-[20]domestic [16]residential premises, for example guest houses, the guidance provided above for [14]dwellings may be followed.

CO detector/alarm systems installed within other non-[20]domestic [16]residential buildings should be suitable for use in a commercial environment and should be permanently installed. They may be self-contained detector and alarm units powered by a battery designed to operate for the working life of the detector or they may be hard wired mains operated, either with a built-in sounder or connected to a central control panel. The detector should incorporate a warning device to alert the users when the working life of the detector is due to expire or, if mains operated, fitted with a sensor failure warning device.

Number of CO detectors

A CO detection system to alert occupants to the presence of CO should consist of at least:

- One CO detector in every space containing a fixed combustion appliance (excluding an appliance used solely for cooking); and
- One CO detector to provide early warning to high risk accommodation, that is, a bedroom or principal habitable room, where a flue passes through these rooms.

Siting of CO detectors

Unless otherwise indicated by the manufacturer, CO detectors should be either:

- Ceiling mounted and positioned at least 300mm from any wall; or
- Wall mounted and positioned at least 150mm below the ceiling and higher than any door or window in the room.

Note: BS EN 50292 recommends that a detector located in a room not containing a fixed combustion appliance, e.g. a bedroom, should be positioned relatively close to the breathing zone of the occupants.

CO detectors in the space containing a fixed combustion appliance should be sited between 1 metre and 3 metres from the appliance.

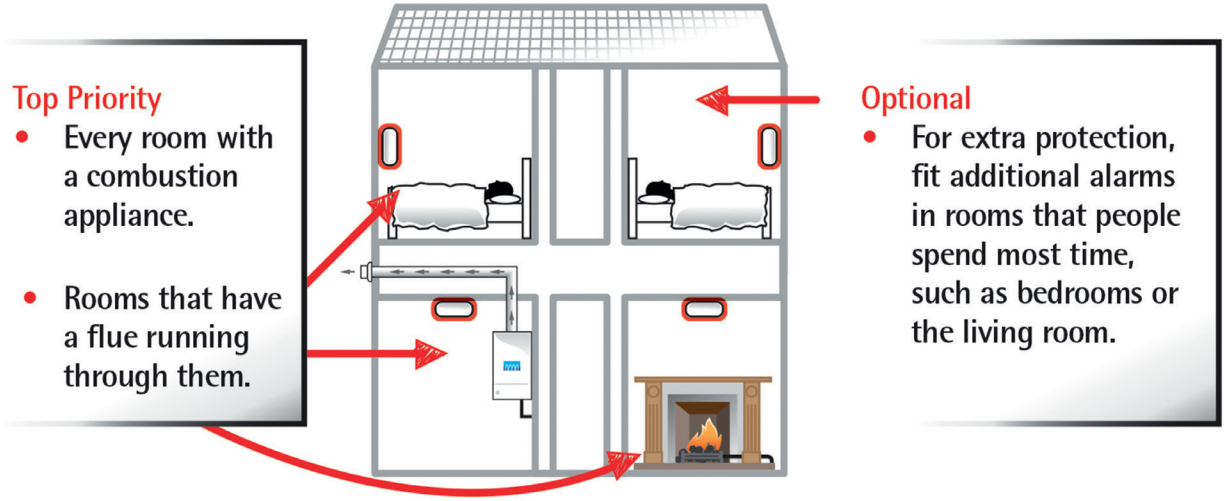


Figure 3.3b Siting of carbon monoxide detectors in a dwelling

Image courtesy of AICO Ltd (www.aico.co.uk)

A CO detector should not be sited:

- In an enclosed space (for example in a cupboard or behind a curtain).
- Where it can be obstructed (for example by furniture).
- Directly above a sink.
- Next to a door or window.
- Next to an extract fan.
- Next to an air vent or similar ventilation opening.
- In an area where the temperature may drop below -10°C or exceed 40°C, unless it is designed to do so.
- Where dirt and dust may block the sensor.
- In a damp or humid location.
- In the immediate vicinity of a cooking appliance.

CO detectors that are located in areas that staff will not normally frequent in non-[20]domestic [16]residential buildings, for example those located within boiler rooms, should be linked to a visual or audible alarm or control panel sited at a staffed location, such as a reception desk.

Additional guidance on the siting of CO detectors, including enhanced coverage, can be found in BS EN 50292:2013. Electrical apparatus for the detection of carbon monoxide in domestic premises, caravans and boats- Guide on the selectio, installation, use and maintenance.

3.4 Safety (Safety and Accessibility in Use)

Note - The [0]numbered terms in this guide are explained in Appendix B.

3.4.1 Access To and Within Buildings (Standards 4.1, 4.2 and 4.3)

Every non-[20]domestic building must be constructed in such a way that safe and convenient access is provided throughout. In [20]domestic buildings, similar access is required for individual [14]dwellings and the common areas of blocks of [11]flats etc.

Points to note:

- [30]Accessible entrances to [20]domestic buildings require automatic illumination.
- Avoid hazardous projections resulting from the position/location of equipment.
- Avoid obstruction of routes within areas accessible to disabled people in a [14]dwelling or within all similarly accessible [10]storeys of non-[20]domestic buildings.
- Avoid obstruction of spaces provided to assist wheelchair users when opening doors.
- Avoid obstruction of stairs or ramps.
- An assistance alarm may be required in a bedroom accessible to wheelchair users in a [16]residential building.

Detailed Guidance on Access to and Within Buildings

[30]Accessible entrances

Buildings should be constructed to provide occupants and visitors with facilities to allow safe and unassisted access. This includes access for wheelchair users. Where such an [30]accessible entrance is provided for an individual [14]dwelling, a means of automatic illumination should be installed above or adjacent to the door. This is also a requirement for the common entrance(s) to a [20]domestic building such as a block of [11]flats (see Section 3.4.2 of this guide).

Safe access and positioning of equipment

The positioning of services or fittings and any accompanying enclosures, particularly where they may affect [9]escape routes, should be carefully considered. A minimum headroom of at least 2 m (1.9 m in doorways) must be maintained. The minimum width of corridors should also be considered and is detailed below.

[20]Domestic buildings

There should be sufficient space within a [14]dwelling to allow disabled people to move around unaided and make use of facilities on at least one [10]storey. Wheelchair users, in particular, require additional space to manoeuvre from narrow corridors into rooms. Corridors are required to be at least 900 mm wide, although this dimension can be reduced to 800 mm over a maximum length of 900 mm by permanent obstructions to allow for such fixtures as radiators, heaters, or a future stair lift parking space, except where these are located on a wall opposite a doorway. The minimum clear opening width of opening doors to each [27]apartment, kitchen and accessible toilet should also be maintained without obstruction.

Non-[20]domestic buildings and common areas of [20]domestic buildings

Most corridors should have an unobstructed width of at least 1200 mm. This is the minimum width for [9]escape routes. Other than on a wall opposite a doorway, an obstruction such as a radiator or heater may project up to 100 mm, reducing a corridor width to 1100 mm over a maximum length of 900 mm.

An internal door should:

- Have a clear opening width of at least 800 mm.
- Have an unobstructed space on the side of the door, next to the leading edge of the opening face, of at least 300 mm. This unobstructed space is not required, however where the door is opened by automatic control.

Sleeping accommodation within [16]residential buildings

Within [16]residential buildings, such as hotels and halls of residence, at least 1 bedroom in 20 or part thereof should be accessible to wheelchair users. Such a bedroom should include an assistance alarm that can be operated or reset from a bedspace and is also operable from floor level. The alarm should have an audible tone, distinguishable from the fire alarm, together with a visual indicator provided both within and outside the bedroom and should also give alert at a location where staff will be on duty.

3.4.2 Electrical Safety (Standards 4.5, 4.6 and 4.8)

Every building must be designed and constructed in such a way that the electrical installation does not threaten the health and safety of the people in and around the building and become a source of fire.

Points to note:

- The standards apply to fixed electrical installations in and around buildings.
- Compliance with BS 7671 is deemed to satisfy the Building Standards.
- The provision of BS 7671 certification completed by the person responsible for the installation can be regarded as evidence of compliance with the standard when issued to the person ordering the work.
- The standards specify minimum requirements in relation to the provision of lighting points and socket-outlets in domestic premises.
- Outlets and controls of electrical fixtures, such as light switches and socket-outlets, should be positioned within certain limits.
- Door entry systems are required to be installed in the common entrance to certain [20]domestic buildings.

Detailed Guidance on Electrical Safety

Electrical installations

An electrical installation should be designed, constructed, installed and tested in accordance with BS 7671 Requirements for Electrical Installations (IET Wiring Regulations).

Professional expertise

Electrical installation work should be inspected and tested by persons who possess sufficient technical knowledge, relevant practical skills and experience for the nature of the electrical work undertaken.

An Approved Certifier of Construction, who has been assessed to have the professional skills and relevant experience, can certify compliance of an electrical installation.

[19]Extra-low voltage installations (ELV)
Installations operating at ELV (i.e. up to 50V AC or 120V DC) should also be designed, constructed, installed and tested in accordance with BS 7671.

Installations operating above [18]low voltage (LV)
Any circuit designed to operate at a voltage higher than [18]low voltage (i.e. above 1000V AC or 1500V DC) should be provided with a cut-off switch, in accordance with BS 7671. A firefighter's switch, in a conspicuous position, should be provided to any circuit supplying exterior electrical installations or internal discharge lighting installations (including luminous tube signage) operating above [18]low voltage.

Lighting within dwellings
A [14]dwelling should have an electric lighting system providing at least one lighting point to every circulation space, kitchen, bathroom, toilet and other space having a floor area of 2 m^2 or more. Any lighting point serving a stair should have controlling switches at, or in the immediate vicinity of, the stair landing on each [10]storey.

Lighting in the common areas of [20]domestic buildings
Common areas, such as within blocks of [11]flats, should have artificial lighting capable of providing a uniform lighting level, at floor level, of not less than 100 lux on stair flights and landings and 50 lux elsewhere within circulation areas. Lighting should not present sources of glare and should avoid creation of areas of strong shadow that may cause confusion or miss-step. In accordance with Building Standard 4.1.7 each [30]accessible entrance to a [20]domestic building should also have illumination above or adjacent to the door. A means of automatic control should be provided to ensure that all such lighting is operable during the hours of darkness.

Door entry systems
A common entrance door, intended as a principal means of access to a building, should have a door entry system installed. This should comprise of a remote door release and intercom at the point of entry and a call unit within each [14]dwelling served by that entrance. This may also apply to the principal entrance to a sheltered housing complex.

Any unit at a common entrance should be positioned between 900 mm and 1.2 m above floor level. It should include an inductive coupler compatible with the 'T' setting on a personal hearing aid, together with a visual indicator that a call made has been received. Controls should contrast visually with surrounding surfaces and any numeric keypad should follow the 12-button telephone convention, with an embossed locater to the central '5' digit.

Provision of socket-outlets in [14]dwellings
A [14]dwelling should be provided with at least the following number of 13A socket-outlets:

- 4 within each [27]apartment; and
- 6 within the kitchen, at least 3 of which should be situated above worktop level in addition to any outlets provided for floor-standing white goods or built in appliances; and
- An additional 4 anywhere in the [14]dwelling, including at least 1 within each circulation area on a level or [10]storey.

Sockets may be installed as single or double outlets, to give the recommended number of outlets in each space, i.e. a double outlet counts as two socket-outlets.

Positioning of electrical fixtures in both domestic and non-[20]domestic buildings

The location of a manual control device can have a significant effect on both the ease of operation of the device and safety in use. Positions that are inaccessible present a greater risk of accident when bending or reaching. The location of electrical socket-outlets, switches and other controls can, if not considered carefully, affect safe and convenient use.

Outlets and controls of electrical fixtures and systems located on a wall or other vertical surface should be positioned at least 350 mm from any internal corner, projecting wall or similar obstruction and, unless the need for a higher location can be demonstrated, not more than 1.2 m above the floor level. This would include fixtures such as socket-outlets, switches, fire alarm call points and timer controls or programmers.

Within the above height range:

- Light switches should be positioned at a height of between 900 mm and 1.1 m above floor level.
- Standard switched or unswitched socket-outlets and outlets for other services, such as a telephone or television, should be positioned at least 400 mm above floor level. Above an obstruction, such as a worktop, fixtures should be at least 150 mm above the projecting surface. Floor sockets can be used for specific purposes but should not be the only means of connection for appliances.
- In accommodation specifically intended for wheelchair users in non-[20]domestic buildings, such as accessible bedrooms, operable controls should be located not more the 1.0 m above floor level.

Where sockets are concealed, such as to the rear of built-in appliances or white goods (e.g. in kitchens) or obstructed by built-in furniture, separate switching should be provided in an accessible position, to allow appliances to be isolated.

The above guidance is illustrated in figures 3.4a and 3.4b.

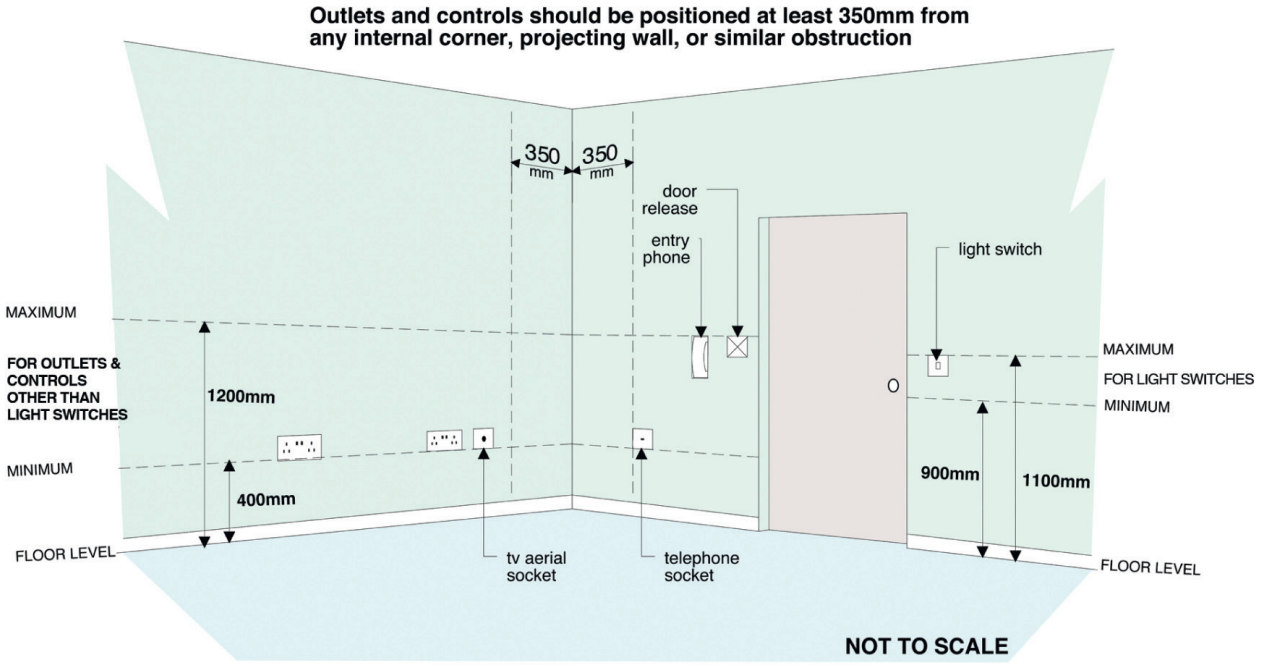


Figure 3.4a Positioning of electrical outlets and controls

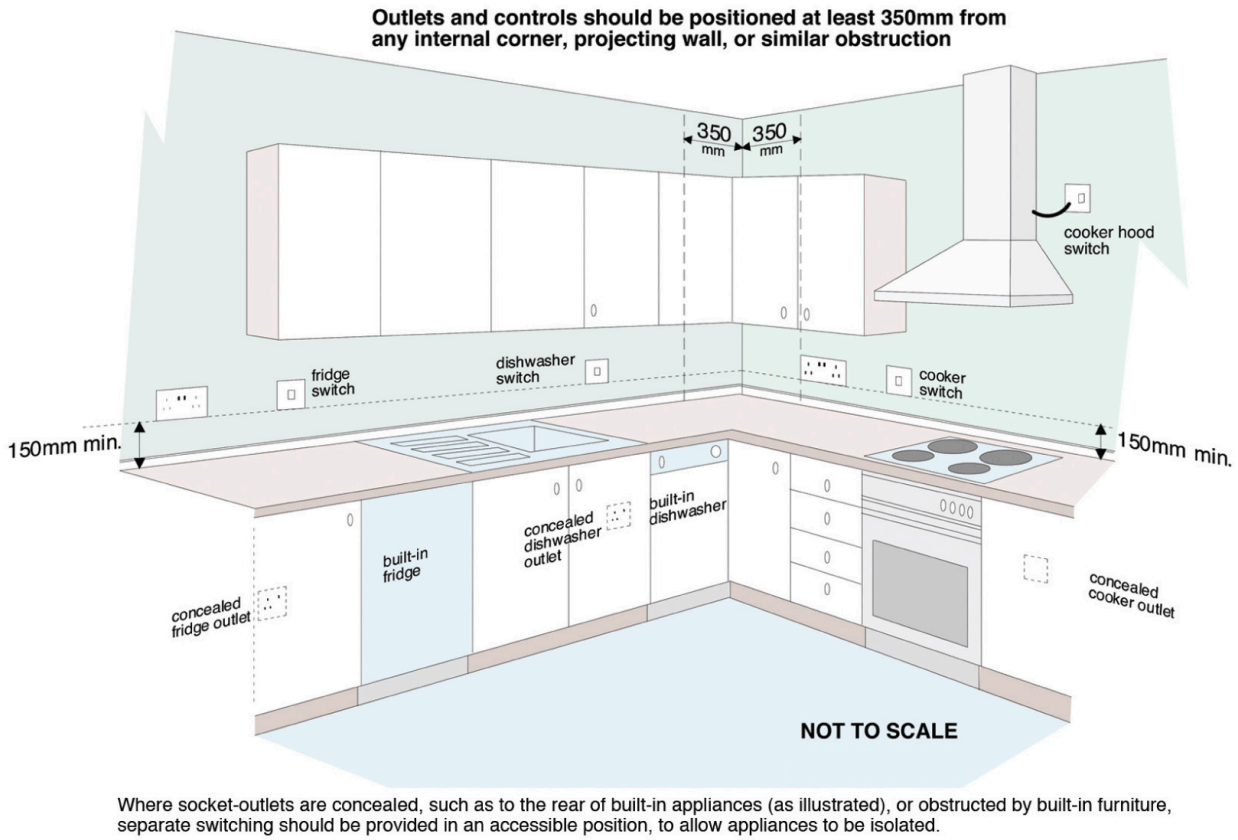


Figure 3.4b Positioning of electrical outlets and controls

Important note on the positioning of outlets and controls

The building regulations and standards are mandatory, but the choice on how to comply lies with the building owner. As pointed out in the introduction to this guide, following the advice in the SBS Technical Handbooks is likely to be the normal way of complying with the building regulations. It is, however, acceptable to use alternative methods, provided they satisfy the regulations.

The preceding guidance on electrical fixtures in [20]domestic and non-[20]domestic buildings is taken from the SBS Technical Handbooks as advice on positioning such fixtures so that they can be operated safely.

Where for aesthetic or practical reasons, particularly in conversions and extensions, the building owner requests that electrical fixtures are positioned at the same height as those in the existing electrical installation and these are fitted in reasonable positions (not for example in skirting boards) then this may comply with the regulations. It would, however, be prudent of the building owner to consult with the Verifier, who should be aware of the legal status of the guidance in the SBS Technical Handbooks and that ultimately the method of compliance lies with the building owner.

3.4.3 Aids to Communication (Standard 4.7)

In certain non-[20]domestic buildings, people with a hearing loss should be able to access facilities to enable participation in activities such as conferences, meetings and entertainment.

Detailed Guidance on Aids to Communication

Aids for people with a hearing impairment should be provided in:

a. any auditorium or other space, with fixed seating, where an audience or spectators will be present; and

b. 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

c. any location where a person is separated from a vendor or service provider by a physical barrier such as a glazed screen; and

d. 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.

Three forms of hearing enhancement are in common use:

- Audio frequency induction loop systems provide assistance to users of personal hearing aids incorporating an induction pick-up facility (T setting). These systems may not be suitable where interfering magnetic fields may be present.
- Infra-red systems are popular in auditorium applications, offering line-of-sight wireless communication. These systems are not readily affected by electrical interference but require the use of additional personal receiver units.
- Radio systems offer benefits similar to infra-red systems with the advantage that line-of-site is not required. These systems can potentially offer less privacy as signals can pass through walls etc. and be picked up on other receiving equipment.

More information on these systems can be obtained from the Royal National Institute for Deaf People website www.actiononhearingloss.org.uk

3.4.4 Danger from Accidents (Standard 4.8)

The installation of electrical equipment fitted in and around buildings should be positioned and secured so that they do not cause a dangerous obstruction or hazard.

Points to note

- Exterior lighting and other equipment should be positioned so as not to cause an obstruction to people in and around a building.
- Power cables mounted on the outside of buildings should be provided with mechanical protection where they are liable to be damaged with garden tools, etc.

3.5 Noise (Protection Against Noise)

Note - The [0]numbered terms in this guide are explained in Appendix B.

3.5.1 Resistance to the Passage of Sound (Standards 5.1 and 5.2)

Buildings must be designed and constructed in such a way that certain walls and floors will be resistant to the transmission of sound to a level that will not threaten the health of, or cause inconvenience to, the building occupants.

[20]Domestic buildings

For [14]dwellings these standards apply to the [2]separating floors and walls between [14]dwellings and between [14]dwellings and non-[20]domestic buildings. These standards also apply to the internal walls and intermediate floors in [14]dwellings but not the wall between an en-suite bathroom/shower room and the room it serves.

Non-[20]domestic buildings

For non-[20]domestic buildings used as [16]residential premises, i.e. with sleeping accommodation, the standards apply to those walls and floors between rooms used for sleeping and adjoining buildings. These standards also apply to internal walls between bedrooms and other parts of the same building such as common stairs or corridors and communal lounges, but not the walls of en-suite bath/shower rooms as above. In addition the intermediate floors above or below rooms intended to be used for sleeping require sound insulation measures.

Points to note:

- Openings for services passing through [2]separating walls or [2]separating floors provided with fire stopping can be assumed to be protected against the passage of noise (see Section 3.2.1 of this guide).
- Care should be taken not to disturb any sound insulation measures when installing electrical services in internal walls and intermediate floors.
- Downlighters in timber frame [2]separating floors and applicable intermediate floors should be installed as described overleaf.
- Ensure there is no fire risk from downlighters fitted in ceilings covered with sound absorbing or thermal insulation material.
- Flush electrical accessories installed in a timber frame wall can provide a pathway for sound. Such [2]separating walls however should not contain these accessories (see Section 3.2.1 of this guide).
- Flush mounted light switches, socket-outlets, etc. should not be installed back to back in a masonry [2]separating wall.
- Thermal insulation and other sound absorbing material used in walls and floors to help resist the passage of sound can have the effect of reducing the current carrying-capacity of cables in contact with such materials. In such circumstances the cross-sectional-area (CSA) of a cable may require to be increased as appropriate. See Regulation 523.9 of BS 7671.

Downlighters or recessed lighting - acoustic barriers

Downlighters or recessed lighting may be installed in the ceilings of timber frame [2]separating or applicable intermediate floors provided they are of the type with an integral acoustic barrier and have an appropriate fire resistance (see Section 3.2.1 of this guide), and are limited to the following:

- No more than one downlighter per 2 m^2 of ceiling area in each room unless the use of a greater density of light fittings is supported by acoustic test evidence undertaken in accordance with
  Annex B of the Scottish Government document entitled "Example Constructions and Generic Internal Constructions".
- Be at centres of not less than 0.75 m; and
- Have openings no greater than 100 mm diameter or 100 mm x 100 mm.

Figure 3.5 Fire and acoustic rated downlighter

Image courtesy of Scolmore Group (www.scolmore.com)

3.6 Energy (Energy Economy and Heat Retention)

Note – The [0]numbered terms in this guide are explained in Appendix B.

Every building should be designed and constructed in such a way that provision is made for energy conservation. The lowering of carbon emissions arising from the use of heating, hot water, ventilation and lighting in new buildings should also be considered.

3.6.1 Heating and Hot Water Systems (Standards 6.2, 6.3, 6.4, 6.6, 6.7, 6.8 and 6.11)

- In general, care should be taken not to disturb energy conservation measures in a building, such as thermal insulation, pipe lagging etc. when carrying out any work.
- With regard to [20]domestic and non-[20]domestic buildings the standards require controls for heating systems to allow optimum energy efficiency.
- All energy consuming plant should be properly commissioned.
- Written information on the operation and maintenance of plant should be provided to the occupier of the building.

Detailed Guidance on Controls for Space Heating and Hot Water Systems in [14]Dwellings

The following table correlates the guidance provided in the SELECT Technical Guide 2023 with that provided in the Domestic Building Services Compliance Guide for Scotland 2022.

Type of space heating / hot water system	SELECT Technical Guide 2023	Domestic Building Services Compliance Guide for Scotland 2022
Gas-fired wet central heating system **[Note 2]**	Page 53 (All wet systems) / Table 10	Sub-section 2.2 / Table 3 (Replacements - Table 4)
Gas-fired range cooker with integral central heating boiler **[Note 1]**		Sub-section 2.3
Gas-fired warm air heating system (with or without hot water) **[Note 1]**	Pages 59	Sub-section 2.4 / Table 6
Oil-fired wet central heating system **[Note 2]**	Page 53 (All wet systems) / Table 10	Sub-section 3.2 / Table 12 (Inclusive of Replacements)
Continuously burning oil-fired vaporising appliance providing secondary heating or hot water	**[Note 3]**	Sub-section 3.4 / Table 13
Oil-fired fixed independent space heating appliance **[Note 3]**		Sub-section 3.5
Electric wet central heating system **[Note 2]**	Page 55 (All wet systems) / Table 12	Sub-section 5.2 / Table 17a
Electric warm air system / Electric panel heater / Electric storage heater **[Note 1]**	Page 57	Sub-section 5.3 / Table 19
Solid fuel central heating system **[Note 2]**	Page 54 (All wet systems), page 54 / Table 11a	Sub-section 6.3 / Table 20
Wet underfloor heating system **[Note 2]**	Page 55 / Table 12	Sub-section 8.2 / Table 25
Electric underfloor heating system **[Note 2]**	Page 55 / Table 12	Sub-section 8.2 / Tables 25-27
Warm & hot water heat pump (ground-to-water, water-to-water & air-to-water systems) **[Note 2]**	Page 56 / Table 12a	Sub-section 4.3 / Table 15
Warm air heat pump (ground-to-air, water-to-air & air-to-air systems) **[Note 2]**	Page 56 / Table 12a	Sub-section 4.3 / Table 16
Indirect solar water heating **[Note 1]**	Page 58	Sub-section 12.2

Notes:

1. The guidance on the controls for such systems is essentially unchanged.
2. Amended guidance is provided in the Domestic Building Services Compliance Guide for Scotland 2022.
3. Guidance on the controls for such systems was not provided in the SELECT Technical Guide 2023.

Wet space heating and hot water systems

Independent time and temperature control of heating and hot water circuits should be provided along with a boiler interlock (refer to Tables 10 and 11) to ensure that the boiler and pump only operate when there is a demand for heat.

Zone controls are not considered necessary for single [27]apartment or other small [14]dwellings. For large [14]dwellings with a floor area over 150 m^2 independent time and temperature control of multiple space heating zones is recommended. Each zone (not exceeding 150 m^2) should have a room thermostat and a single multi-channel programmer or multiple heating zone programmers. For hot water systems in large [14]dwellings, more than one hot water system should be considered, e.g. a separately controlled second hot water cylinder or heat source or a separate distribution system from the same cylinder.

A hot water system (other than for combi boilers) should have controls that will switch off the heat when the water temperature required by the occupants has been achieved and during periods when there is no demand for hot water. For hot water central heating systems this thermostat should be interconnected with the other controls which are needed to form a boiler interlock.

Tables 10 and 11 summarise minimum recommendations for controls for space and hot water gas, oil, electric and solid fuel 'wet' central heating systems (radiators, convectors).

Table 10: Controls for Combis, Combined Primary Storage Unit (CPSU) Boilers, Electric Boilers

Type of control	Means to achieve
Boiler control	Boiler interlock Automatic bypass valve [1][2]
Time control	Time switch (7 day for space heating) Full programmer for electric
Room temperature control	TRV's (all radiators except in rooms with room thermostats or where 'heat bleed' required), Room thermostat(s)

Notes to Table 10:

1. As advised by boiler manufacturer, in conjunction with any requirements for a minimum pipe length.
2. An electric flow boiler should be fitted with a flow temperature control and be capable of modulating the power input to the primary water depending on space heating conditions.

Table 11: Controls for Other Boilers

Type of control	Means to achieve
Boiler control	Boiler interlock (for solid fuel as advised by manufacturer) Automatic bypass valve [1]
Time control	Full programmer (7 day for space and hot water) [2]
Room temperature control	As Table 10 above
Cylinder control	Cylinder thermostat plus 2 port valves or a 3 port valve [3] Separately controlled circuits to cylinder and radiators with pumped circulation
Pump control	Pump overrun timing device as required by manufacturer

Notes to Table 11:

1. As note 1 to Table 10.
2. For solid fuel, the level of sophistication of time controls should be selected to be compatible with the appliance. The highest levels should only be used for appliances with automatic ignition.
3. A zone valve is not recommended for the thermal store.

An alternative to the controls given in Tables 10 and 11 would be a boiler management control system.

Information and explanations of the various heating types and controls can be found on the energy saving trust website at www.energysavingtrust.org.uk and in the Government's Standard Assessment Procedure for Energy Rating of Dwellings (SAP 2009).

Solid fuel boilers

These should be thermostatically controlled to reduce the burning rate of the fuel, by varying the amount of combustion air to the fire. For safety reasons, a suitable heat bleed (slumber circuit) from the system should be formed, for example a gravity fed radiator without a TRV or a hot water cylinder that is connected independent of any controls.

For hot water systems, unless the cylinder is forming the slumber circuit, a thermostatically controlled valve should be fitted, provided that the appliance manufacturer's installation for dealing with excess heat created during a pump over-run are met.

Table 11a: Recommended minimum standards for control of solid fuel central heating systems

Topic	Minimum standard
	For single-storey, open-plan dwellings in which the living area is greater than 70% of the total floor area, sub-zoning of temperature control is not appropriate.
Time control of space and water heating	Time control of space and water heating should be provided by: • a full programmer with separate timing to each circuit, or • two or more separate timers providing timing control to each circuit, or • programmable room thermostats to the heating circuits, with separate timing of the hot water circuit.
Temperature control of space heating	Separate temperature control of zones within the dwelling should be provided using: • room thermostats or programmable room thermostats in all zones, or • a room thermostat or programmable room thermostat in the main zone, and individual radiator controls such as thermostatic radiator valves (TRVs), or • a combination of i. and ii. above.
Temperature control of domestic hot water	A cylinder thermostat and a zone valve or three-port valve should be fitted to control the temperature of stored hot water. Non-electric hot water controllers should not be used. Where permitted by the manufacturer, the cylinder thermostat should be wired to provide a boiler interlock.

Hot water underfloor heating

The controls described below should be fitted to ensure safe system operating temperatures:

a. a separate flow temperature high limit thermostat should be used for warm water systems connected to any high water temperature heat supply; and

b. mixed systems containing both radiators and underfloor heating, connected to a common high water temperature supply operating at more than 60^0 C should be provided with a separate means of reducing the water temperature to the underfloor heating system.

Minimum recommendations for room temperature, time and boiler controls are given in Table 12.

Table 12: Recommended minimum standards for control of wet and electric underfloor heating systems

Type of control	Means to achieve
System temperature control: Wet and electric underfloor heating systems	All floor heating systems should be fitted with controls to adjust the operating temperature. To prevent damage to floors and occupant discomfort, the temperature of the flow water from warm water systems connected to a high temperature (>60 ° C) heat source should be controlled using: • multi-port mixing valves and thermo-mechanical or thermo-electric actuators • a separate high-limit thermostat. Electric floor heating systems should comply with the rules in the current edition of BS 7671 – 'Requirements for electrical installations', 'Section 753, Floor and ceiling heating systems' for protection against electric shock and thermal effects, and for selection and installation of equipment.
Room temperature control: Wet and electric underfloor heating systems	Each room should have its own thermostat, sensor or programmable thermostat. Electric underfloor heating systems should have a manual override feature. Where two adjacent rooms have a similar function – for example a kitchen and a utility room – it may be appropriate for both rooms to share a single temperature control.
Time control:	Dwellings with a total floor area >150 m2 should have at least two space heating zones with independent on/off time and temperature control. For single storey open-plan dwellings in which the living area is greater than 70% of the total floor area, sub-zoning of temperature control is not appropriate. Thick screed floor heating systems (>65 mm) should have facilities to automatically adjust the room temperature to a lower level at night or when the room is unoccupied.
Wet and electric underfloor heating systems	The heating system controls should be connected so that when there is no demand for heat, the heat source and pumps are switched off.

Table 12a: Recommended minimum standards for warm water and hot water heat pumps (ground-to-water, water-to-water and air-to-water systems)	
Type of control	**Means to achieve**
Zoning	Dwellings with a total floor area > 150 m2 should have at least two space heating zones, each with an independently controlled heating circuit1. Dwellings with a total floor area2 < 150 m2 may have a single space heating zone3
System Controls	Heat pump unit controls should include: • control of water pump operation (internal and external as appropriate) • control of water temperature of the distribution system • defrost control of external airside heat exchanger for air-to-water systems • protection for water flow failure • protection for high water temperature • protection for high refrigerant pressure • protection for air flow failure on air-to-water units. External heat pump controls should include: • weather compensation or internal temperature control • timer or programmer for space heating. System controls should be wired to maximise the efficiency of the heating and hot water system and to extend the life of the heating appliance. When there is no demand for space heating or hot water and the associated buffer vessel is maintained at the correct design temperature, the heating appliance and pump are switched off
Control of space heating	Each space heating circuit should be provided with independent time control and either: • a room thermostat or programmable room thermostat located in a reference room[4] served by the heating circuit, together with individual emitter controls such as thermostatic radiator values (TRVs), on all emitters outside the reference rooms[5], or • individual networked emitter controls in each room on the circuit
Control of hot water	The domestic hot water system should have temperature control (e.g., a tank thermostat) and time control to optimise the time taken to heat the water

Controls for dry space heating and hot water systems

Zone controls are not considered necessary for single [27]apartment or other small [14]dwellings. For large [14]dwellings with a floor area over 150 m^2, independent time and temperature control of multiple space heating zones is recommended. Each zone (not exceeding 150 m^2) should have a room thermostat, and a single multi-channel programmer or multiple heating zone programmers.

Panel heaters

Figure 3.6b Panel heater

Image courtesy of Dimplex (www.dimplex.co.uk)

Table 13: Recommended minimum standards for control of primary and secondary electric heating systems (other than with electric boilers)

System	Control type	Minimum standard
	Zone control	Dwellings with a total floor area ≤ 150 m2 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 area >150 m2 should have at least two space heating zones with independent temperature and time control. Time control may be provided using: • multiple heating zone programmers, or • a single multi-channel programmer, or • programmable room thermostats, or • separate timers to each circuit, or • a combination of (iii) and (iv) above. In single-storey, open-plan dwellings in which the living area is greater than 70% of the total floor area, sub-zoning of temperature control is not appropriate.
Panel heaters	Local time and temperature control	Time control should be by a programmable time switch integrated into the appliance or by a separate time switch. Individual temperature control should be by integral thermostats or by separate room thermostats or programmable room thermostats.

Controls for solar water heating

A means of control should be provided to:

a) maximise the useful energy gain from the solar collectors
b) minimise the accidental loss of stored energy
c) ensure that hot water produced by back-up sources is not used when adequate solar pre-heated water is available
d) provide a means to control the adverse effects of excessive temperatures and pressures
e) where a separate DHW heating appliance is pre-heated by a solar system, the appliance should be controlled to add no extra heat if the target temperature is met from the solar pre-heated vessel
f) inform the end user of the system's correct function and performance at all times.

Work on existing [20]domestic buildings

The preceding guidance also relates to:

- space heating/hot water system alterations or installations (including new or replacement appliances) for conversions and extensions to the insulation envelope; and
- where alterations are being made to an existing heating/hot water system or a new or replacement heating/hot water system is being installed in an existing [14]dwelling (or building consisting of [14]dwellings). For example thermostatic radiator valves should be installed to all new radiators in an extension even when the heating is from an existing boiler.

If a heating and/or hot water system is being replaced in part, the preceding guidance should be followed but only as it affects the new or replaced components of the system. Such alterations should not allow the heating system as a whole to be downgraded in terms of energy efficiency or compromised from a safety point of view.

There may be exceptional circumstances which make it impractical or uneconomic to install a condensing boiler as recommended in the guidance to clause 6.3.1. of the SBS Technical Handbook (Domestic) which gives the minimun efficiencies of gas and oil wet central heating systems in dwellings. This can be shown by following the criteria set out in the 'Guide to Condensing Boiler Installation Assessment Procedure for [14]Dwellings (Scotland)'. Where this occurs the minimum Seasonal Efficiency of Domestic Boilers in the UK (SEDBUK) efficiencies are: mains natural gas 78%, LPG 80%, oil 85%, oil combo 82%. Alternatively a replacement back boiler with a SEDBUK of 3 percentage points less than the above recommended figures may be installed. In addition existing gas and oil systems with semi-gravity circulation should be converted to fully pumped systems.

For historic, listed or traditional buildings the preceding guidance should be referred to taking into account circumstances. Therefore systems which go beyond these minimum backstop levels may help offset the deficiency in other areas of energy efficiency and in carbon dioxide emissions terms.

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 [14]dwelling e.g. a TRV to each radiator.

Detailed Guidance on Boiler Plant and Heating Controls in Non-[20]Domestic Buildings

The following table correlates the guidance provided in the SELECT Technical Guide 2023 with that provided in the Non-domestic Building Services Compliance Guide for Scotland 2022.

Type(s) of space heating / hot water system	SELECT Technical Guide 2023	Non-domestic Building Services Compliance Guide for Scotland 2022
New boilers & multi-boiler systems (Gas, oil & biomass-fired boilers) **[Note1]**	Page 60 / Table 13	Sub-section 2.4 / Table 5
Replacement boilers & multi-boiler systems in existing buildings (Gas, oil & biomass-fired boilers) **[Note2]**	Page 63	Sub-section 2.5 / Table 7
Heat pump systems **[Note1]**	Page 61 / Table 14	Sub-section 3.3 / Table 10
Gas & oil-fired warm air heaters **[Note1]**	Page 62	Sub-section 4.3
Gas & oil-fired radiant heaters **[Note1]**	Page 62	Sub-section 5.4
Electric boiler system **[Note3]**	**[Note 3]**	Sub-section 7.2 / Table 14
Primary & secondary electric heating systems other than electric boilers **[Note1]**	Page 62 / Table 15	Sub-section 7.2 / Table 15
Gas & oil-fired domestic hot water systems **[Note2]**	Page 63 / Table 17	Sub-section 8.3 / Table 19
Electrically-heated domestic hot water systems **[Note3]**	**[Note3]**	Sub-section 3.2 / Table 10
Comfort cooling	**[Note3]**	Sub-section 9.3 / Table 22

Notes:

1. The guidance on the controls for such systems is essentially unchanged.
2. Amended guidance is provided in the Non-domestic Building Services Compliance Guide for Scotland 2022.
3. Guidance on the controls for such systems was not provided in the SELECT Technical Guide 2023.

When installing boiler plant in new buildings, the controls packages in the following tables should be installed. The same controls package should be installed for biomass boilers, where technically feasible.

Table 13: Minimum Controls for New Boilers or Multiple-boilers Systems (Depending on Boiler Plant Output or Combined Boiler Plant Output)

Boiler plant output and control package	Minimum controls
Less than 100 kW (Package A)	Timing and temperature demand control which should be zone-specific where the building floor area is greater than 150 m^2 Weather compensation except where a constant temperature supply is required Self regulating devices fitted at a room or zone level
100 – 500 kW (Package B)	Controls package A above plus: Optimal start/stop control is required with night set-back or frost protection outside occupied periods Boiler with two stage high/low firing facility or multiple boilers should be installed to provide efficient part-load performance For multiple boilers, sequence control should be provided and boilers, by design or application, should have limited heat loss from non-firing modules, for example by using isolation valves or dampers Individual boilers, by design or application, should have limited heat loss from non-firing modules. For boilers that do not have low standing losses it may be necessary to install isolation valves or dampers
Greater than 500 kW (Package C)	Controls package A and B above plus: For gas-fired boilers and multi-stage oil-fired boilers, fully modulating burner controls.

Heat pump controls

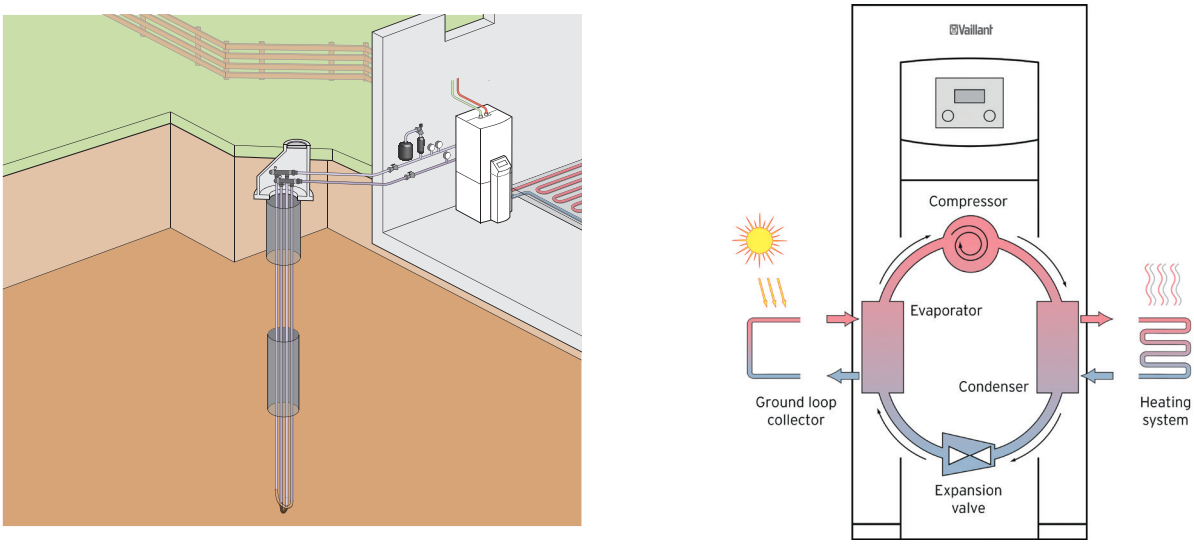


Figure 3.6d Vertical bore hole collector and associated ground source heat pump

Images courtesy of Vaillant Ltd

For minimum controls provisions where space heating is provided by heating only heat pumps or reverse cycle heat pumps in new and existing non-[20]domestic buildings, reference should be made to the control packages given in Table 14.

Table 14: Minimum Controls Package for Heat Pump Systems

Source	System	Minimum controls package
All types	All technologies	• On/off zone control If the unit serves a single zone, and for buildings with a floor area of 150 m² or less, the minimum requirement is achieved by default time control
Air to air	• Single package • Split system • Multi-split system • Variable refrigerant flow system.	Controls package for 'all types' above plus; Heat pump unit controls to include: • Control of room air temperature (if not provided externally) • Control of outdoor fan operation • Defrost control of external airside heat exchanger • Control for secondary heating (if fitted)
Water to air or Ground to air	Single package energy transfer systems (matching heating/cooling demand in buildings)	Controls package for 'all types' above plus; Heat pump unit controls to include: • Control of room air temperature (if not provided externally) • Control of outdoor fan operation for cooling tower or dry cooler (energy transfer systems) • Control for secondary heating (if fitted) on air to air systems • Control of external water pump operation
Air to water or Water to water or Ground to water	• Single package • Split package	Controls package for 'all types' above plus; Heat pump unit controls to include: • Control of water pump operation (internal and external as appropriate) • Control of water temperature for the distribution system • Control of outdoor fan operation for air to water systems • Defrost control of external airside heat exchanger for air to water systems
Gas engine driven heat pumps	• Multi-split • Variable refrigerant flow	Controls package for 'all types' above plus; Heat pump unit controls to include: • Control of room air temperature (if not provided externally) • Control of outdoor fan operation • Defrost control of external airside heat exchanger • Control for secondary heating (if fitted)

Notes to Table 14:

1. For all systems in Table 14 above, additional controls should include external room thermostat (if not integral to the heat pump) to regulate the space temperature and interlocked with the heat pump operation.
2. Reference should be made to provisions under Standard 6.6 where cooling is provided by reverse cycle heat pumps.
3. Additional guidance on design criteria for heating systems with integrated heat pumps is given in BS EN 15450: 2007.

Gas and oil firing warm air systems controls

When installing gas and oil firing warm air systems in new and existing buildings a controls package should be installed. This should feature, as a minimum, time control, space temperature control and where appropriate for buildings with a floor area greater than 150 m^2 zone control.

Electric heating controls

When installing primary and secondary electric heating or an electric boiler the controls package given in Tables 15 or 16 should be installed.

Table 15: Primary and Secondary Electric Heating System Controls (Other than Electric Boilers)

System	Controls
Electric warm air system	Time and temperature control, either integral to the heater system or external: (a) a time switch/programmer and room thermostat; or (b) a programmable room thermostat
	Zone control: For buildings with a total usable floor area greater than 150 m^2 more than one space heating circuit should be provided, each having separate timing and temperature control: (a) multiple heating zone programmers; or (b) a single multi-channel programmer (c) Programmable room thermostat (d) Separate timer to each circuit (e) Combination of (c) or (d) above
Panel/skirting heater	Local time and temperature control heater: (a) Time control provided by a programmable time switch integrated into the appliance or a separate time switch; or (b) Individual temperature control provided by integral thermostats or bby a separate programmable room thermostat (Panel heater systems provide instantaneous heat)

2. Manufacturer's instructions should be followed for the control of electric boilers

Domestic hot water heating controls non-[20]domestic buildings

Although this guidance refers only to non-[20]domestic buildings, hot water systems are generally referred to as 'domestic' hot water (DHW) systems. A DHW system (other than a system with a solid fuel boiler) should have controls that will switch off the heat when the water temperature required by the occupants has been achieved and during periods when there is no demand for hot water. In the case of DHW central heating systems this thermostat should be interconnected with the other controls which are needed to form a boiler interlock. The DHW controls package given in Tables 17 or18 should be installed.

Table 17: Gas/Oil Firing Systems DHW Controls	
System	Controls
Direct	Automatic thermostat control to shut off the burner/primary heat supply when the desired temperature of the hot water has been reached
	Time control

Work on existing non-[20]domestic buildings

It is recognised that some alterations to building services, because they are done on a piecemeal basis, will not result in optimum energy efficiency being attained for the entire system. Where this occurs, the person responsible for the commissioning of that part of the system should make available to the owner and occupier, a list of recommendations that will improve the overall energy efficiency of the system. On completion of the extension or alteration to the building services system, the commissioning information should be updated in the logbooks.

Heating efficiency credits in existing non-[20]domestic buildings

Applicants should assess the potential for cost-effective improvement in the following areas, each of which is addressed in guidance on compliance to Standards 6.3, 6.4, 6.5 or 6.6 within the Non-domestic Technical Handbook:

1. upgrading of heating controls and system components (Standard 6.3)

2. upgrading of insulation to hot water storage vessels (Standard 6.4)

3. upgrading of lighting controls and luminaires (Standard 6.5)

4. upgrading of ventilation or cooling controls or system components (Standard 6.6)

5. replacement of existing boiler, if more than 15 years old (Standard 6.3)

6. replacement of existing air-conditioning chiller units, if more than 10 years old (Standard 6.6)

Assessment need only consider the types of fixed building services within the existing building that slso form part of proposed works (for example, if no water services or plumbing element under proposed works, there is no need to consider improvement to insulation of vessels and work to circulatory elements to wet heating systems). The intent of this is to avoid the need to engage specialist contractors that are not already involved in a project. However, the applicant may broaden the scope of improvements considered if they choose to (for example, where the applicant considers such improvements to be more relevant to the building in question).

6.C.3 Extent of improvement required (assessing cost and practicality)

Improvement should be proportionate to the extent of proposed works. It is recommended that the cost of improvement works should amount to approximately 5% of the cost of proposed work. In this respect, assessment should be based upon cost of carrying out improvement works, exclude any design or consultancy fees. Where proposed improvements amount to less than this percentage, the applicant should, in scheduling the assessment process, provide evidence to support any reduced level of improvement.

It is the intent that improvement works proposed should be cost-effective, with a short to medium payback period. Assessment need only consider improvements that, when combined, have a payback period of five years or less. The exception to this is the replacement of a boiler or chiller unit, where near the end of its useful life, as there will be additional cost benefit where replacing such equipment as part of more extensive works.

The cost of any improvement works should be included in the estimated value of works used to determine the level of building warrant fee. The value of improvement works and proposed works should be identified separately to allow the proportion of improvement works to be verified.

Work to improve fixed building services should be neither overly disruptive to the operation of the existing building nor require costly or extensive intervention to the building fabric. However, it is recognised that work chosen by the applicant (see clause 6.C.4) may be of such a nature. Where such enabling work is required, it should not be counted as part of the cost of improvement work.

3.6.2 Artificial and Display Lighting (Standard 6.5)

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, emissions and running costs.
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.

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).

Key terms:
Fixed external lighting means lighting fixed to an external surface of the dwelling supplied from the occupier's electrical system. It excludes lighting in common areas of blocks of flats and in other communal accessways.
Circuit-watt means the power consumed in lighting circuits by lamps and, where applicable, their associated control gear (including transformers and drivers) and power factor correction equipment.
Light fitting means a fixed light or lighting unit that can comprise one or more lamps and lampholders, control gear and an appropriate housing. The control gear may be integrated in the lamp or located elsewhere in or near to the fixed light

Fixed internal lighting in domestic dwellings
A dwelling should have an electric lighting system providing at least one lighting point to every circulation space, kitchen, bathroom, toilet and other space having a floor area of 2m2 or more. Any lighting point serving a stair should have controlling switches at, or in the immediate vicinity of, the stair landing on each storey.
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 and controls may be automatic, manual or a combination of both.

Lighting in common areas of domestic buildings
In communal areas and particularly on stairs and ramps within a building, the possibility of slips, trips and falls and of collision with obstacles should be minimised. Lighting conditions play an important part in this.
Common areas should have artificial lighting capable of providing a uniform lighting level, at floor level, of not less than 100 lux on stair flights and landings and 50 lux elsewhere within circulation areas. Lighting should not present sources of glare and should avoid creation of areas of strong shadow that may cause confusion or miss-step. A means of automatic control should be provided to ensure that lighting is operable during the hours of darkness.

Fixed external lighting for Domestic buildings
Where fixed external lighting is installed, provide light fittings with the following characteristics:
- Automatic controls to switch off the luminaires in response to daylight.
- If the lamp efficacy is 75 lamp lumens per circuit watt or less external light fittings should have automatic controls which switch luminaires off in response to occupancy, otherwise manual control is acceptable.

Detailed Guidance on Energy Efficiency of Artificial and Display Lighting in Non-[2 0]Domestic Buildings

This section provides guidance on specifying lighting for new and existing non-domestic buildings to meet relevant energy efficiency requirements in the building regulations.

There are two alternative approaches, applicable both to systems in new buildings and to replacement systems in existing buildings. The guidance in this section applies to the following types of lighting:

- general interior lighting
- display lighting.

Lighting should be designed to achieve lighting levels appropriate to the activity in the space, based on the CIBSE SLL Lighting Handbook or an equivalent design guide. Spaces should be within the recommended illuminance range and should not be over-illuminated.

Table 19: Minimum Lighting Efficacy in New and Existing Buildings

Lighting type	Average Initial Efficacy
General Lighting in office, industrial and storage spaces	Not less than 60 luminaire lumens per circuit-watt
General Lighting in other types of space	Not less than 60 lamp lumens per circuit-watt

In smaller spaces, where total lighting power is likely to be low (toilets, store rooms, etc.) there is no expectation that lighting calculations should be produced.

Table 20: Minimum Lighting Efficiacy Control Factors for New and Existing Buildings

Light output control	Control factor
A daylit space with photo-switching with or without override	0.90
B daylit space with photo-switching and dimming with or without override	0.85
C unoccupied space with auto on and off	0.90
D unoccupied space with manual on and auto off	0.85
E space not daylit, dimmed for constant illuminance	0.90
A + C or E + C	0.80
A + D or B + C or E + D	0.75
B + D	0.70
For guidance on utilisation of the alternative (LENI) method, please refer to Sub-section 12.5 of the Non-domestic Building Services Compliance Guide for Scotland 2022.	

General Lighting - efficacy

General lighting should have an average luminaire efficacy of 95 luminaire lumens per circuit-watt or demonstrate an equivalent efficacy using the Lighting Energy Numeric Indicator (LENI) method (see section 12.4).

Display Lighting - efficacy

Display lighting should have either:

- an average light source efficacy of 80 light source lumens per circuit-watt
- a rated power usage no greater than 0.3 W/m² in each space
- the LENI method, following advice in section 12.4.

High excitation purity light sources should have an average light source efficacy of 65 light source lumens per circuit-watt.

Lighting controls Lighting controls in new and existing buildings should follow the guidance in BRE Digest 498 – 'Selecting lighting controls'.

Unoccupied spaces should have automatic controls to turn the general lighting off when the space is not in use (e.g. through presence or absence detection).

Occupied spaces should have automatic controls where suitable for the use of the space. General lighting in occupied spaces should have daylight controls (e.g. photo-switching and dimming) for parts of the space which are likely to receive high levels of natural light.
Display lighting, where provided, should be controlled on dedicated circuits that can be switched off at times when it is not needed for the purpose for which it is provided.

Table 21: Controls for General and Display Lighting

Space Classification	Control Type
Owned (small room for one or two people who control the lighting)	Manual, by door
Shared (multi-occupied area, e.g. an open-plan office or factory production area)	Flexible manual switching, e.g. pull cords or wireless transmitter
Temporarily owned (where people are expected to operate the lighting controls while they are there, e.g. a hotel room or meeting room)	All types and ratings
Occasionally visited (used for a short period of time, e.g. store room or toilet)	Presence or absence detection (avoid use where this may cause a hazard or inconvenience, e.g. in an accessible toilet), manual control
Unowned (where individual users require lighting but are not expected to operate controls, e.g. a corridor or atrium)	a. time switching; b. presence or absence detection; or c. photoelectric switching or dimming (if daylit space)
Managed (where lighting is under the control of a responsible person, e.g. a hotel lounge, restaurant or shop)	a. time switching b. centralised manual switching; or c. photoelectric switching or dimming (if daylit space)

Lighting metering

The lighting should be metered to record its energy consumption in accordance with the minimum standards in Table 28.

Recommended minimum standards for metering of general and display lighting in new and existing buildings should be either:

- kWh meters on dedicated lighting circuits in the electrical distribution; or
- local power meter coupled to or integrated in the lighting controllers of a lighting or building management system; or
- a lighting management system that can calculate the consumed energy and make this information available to a building management system or in an exportable file format. (This could involve logging the hours run and the dimming level, and relating to this the installed load).

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).

Consequential improvement

Where work to an existing building is subject to a building warrant and includes the provision of new fixed building services or alters or extends the capacity of existing fixed building services, the opportunity should be taken to review and improve the performance of fixed building systems.

Guidance on the extent to which improvement should be made is given in Annex 6.C – 'Improvement to the energy performance of existing building services when carrying out building work'

3.6.3 Mechanical Ventilation and Air Conditioning (Standard 6.6)

Every building must be designed and constructed in such a way that:

- the form and fabric of the building minimises the use of mechanical ventilating or cooling systems for cooling purposes; and
- the ventilating and cooling systems installed are energy efficient and are capable of being controlled to achieve optimum energy efficiency.

Minimum Controls for Mechanical Ventilation Systems in New and Existing Non-domestic Buildings		
	System type	**Controls package**
Central mechanical ventilation with heating, cooling or heat recovery	Air flow control at room level	Time control
	Air flow control at air handler level	On/off time control
	Heat exchanger defrosting control	Defrost control so that during cold periods ice does not form on the heat exchanger
	Heat exchanger overheating control	Overheating control so that when the system is cooling and heat recovery is undesirable, the heat exchanger is stopped, modulated or bypassed
	Supply temperature control	Variable set point with outdoor temperature compensation
Central mechanical ventilation with heating or heat recovery	Air flow control at room level	Time control
	Air flow control at air handler level	On/off time control
	Heat exchanger defrosting control	Defrost control so that during cold periods ice does not form on the heat exchanger
	Heat exchanger overheating control	Overheating control so that when the system is cooling and heat recovery is undesirable, the heat exchanger is stopped, modulated or bypassed
	Supply temperature control	Demand control
Local	Air flow control at room level	On/off time control
	Air flow control at air handler level	No control
	Supply temperature control	No control
Local	Air flow control at room level	On/off
	Air flow control at air handler level	No control
	Supply temperature control	No control

3.6.4 Heating and Hot Water – Direct Emission Heating System (Standard 6.11)

Every building must be designed and constructed in such a way that the means by which space within the building is heated or cooled and by which hot water is made available in the building is not by means of a direct emission heating system.

Limitation:

This standard does not apply to:
a) alterations to, or extension of, a pre-2024 building,
b) emergency heating,
c) heating provided solely for the purpose of frost protection.

6.11.0 Introduction

There are a range of simple and practical solutions which can be implemented at a national scale and which can deliver the heat we use in our buildings without the need for combustion solutions, avoiding the use of fossil and biofuels. That transition begins with how we regulate for heat in our new buildings.

This standard addresses the greenhouse gas emissions associated with delivering space heating, hot water and cooling in new buildings and certain conversions by prohibiting the use of direct emission heating (DEH) systems. This will deliver progress towards achieving Scotland's 2045 net zero target laid out in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, and meets the commitment initially announced within Scotland's Programme for Government 2019-20 that new homes consented from 2024 must use renewable or low carbon heat.

The Scottish Government has ambitions to align with the EU, where appropriate, and in a manner that contributes towards maintaining and advancing standards. In December 2021, the EU proposed a revision of the Energy Performance of Buildings Directive (EPBD). This recast Directive sets out how Europe can achieve a zero-emission and fully decarbonised building stock by 2050 and is seeking to introduce requirements that all new buildings must be zero-emission buildings. The EPBD is now entering the last phase of the EU legislative process. Once final agreement on the EPBD has been reached, we will be able to fully consider any opportunities for alignment.

Standard 6.11 also supports the wider Heat in Buildings landscape by ensuring that new buildings will not have to retrofit their heating systems with a zero direct emission heating (ZDEH) alternative in future - eliminating the need for potentially disruptive retrofit works - while also providing certainty to the ZDEH supply chain to invest with confidence.

Whilst a Target Emission Rate calculation no longer needs to be undertaken under standard 6.1, it is recognised that emissions are still associated with heat generated by Domestic Technical Handbook April 2024 Edition Page 484 Applicable from 1 April 2024 'zero direct emission heating systems' which may be remote from the point of use. These emissions will still be reported for new buildings through Energy Performance Certificates under standard 6.9.

The initial New Building Heat Standard: scoping consultation in 2020 set out the rationale for focusing our approach on regulating direct emissions. This was to ensure that responsibility for eliminating emissions is appropriately allocated to those with the ability to act. The proposed approach places a duty on the developer to take action where they have the agency and power

to do so. With responsibility for decisions about decarbonising upstream emissions properly located elsewhere and met through duties on other actors to deliver wider-energy system decarbonisation.

There will be situations where some form of fixed 'emergency heating' are sought in new buildings and this is recognised. This may be relevant both to buildings where maintaining heating is a critical function and to those in remote and rural areas where there are concerns about the historic resilience of the energy supply.

Definitions
"Direct emission heating system", in relation to a building, means a fixed combustion appliance installation (other than a fixed combustion appliance installation which is a source of production from which thermal energy is distributed by a heat network) the purpose of which is to produce thermal energy by which space within the building is heated or cooled, or by which hot water is made available in the building, and which:

a. is located within the building, or curtilage of the building, and

b. during normal operation produces more than a negligible level of greenhouse gas emissions at the point of production of that thermal energy.

Accordingly, "zero direct emission heating systems" are solutions other than direct emission heating systems.

"Pre-2024 building" means a building originally constructed before 1 April 2024, or constructed after that date in accordance with a building warrant granted (whether before or after that date) in respect of an application for a building warrant made before that date.

"Emergency heating" means a fixed combustion appliance installation which is installed to be used only in the event of the failure of the heating or hot water service system which is designed and installed for use during normal operation of the building.

Conversions – in the case of conversions, as specified in regulation 4 and schedule 2, the building as converted shall meet the requirement of this standard, (regulation 12, schedule 6). However, the conversion of a pre-April 2024 building must meet this standard only:

a. if the conversion involves a change in occupation or use of the part of the building in which an existing direct emission heating system is located, and

b. in so far as it is reasonably practicable to do so.

6.11.1 Zero direct emission heating
New buildings, including certain new building created by conversion (see clause 6.11.3), shall be constructed without the use of direct emission heating systems.

This will result in zero direct emissions from new buildings through the avoidance of fossil fuel and bio fuel combustion solutions as heat sources at the building (other than solutions supplying a heat network).

These zero direct emission heating systems provide heat for space heating and hot water whilst emitting no more than a 'negligible' level of greenhouse gas emissions at the point of heat use. Whilst Standard 6.11 permits only the use of zero direct emission heating systems (ZDEHS) it is recognised that emissions are still associated with heat generated by these systems, which may be remote from the point of use.

Common examples of ZDEHS are:

• **Heat pump** – the use of electricity to capture heat from external sources and deliver it to a dwelling, regardless of the source from which environmental heat is drawn.

• **Heat network** – supply of heat to more than one dwelling from an external source as defined within the Heat Networks (Scotland) Act 2021. That Act also includes powers to introduce a licensing regime for heat networks in Scotland, which could require networks to transition to zero direct emission heat sources.

• **Electric heating** – The use of electricity to generate heat by passing a current through a conductor (resistive heating). Common examples include electric boilers, convector and radiant panel heaters and storage heaters.

Other ZDEHS solutions include:

• **100% Hydrogen** – the use of 100% hydrogen is the only current example of a fuel which, when combusted to produce heat, results in negligible levels of greenhouse gas emissions.

• **Solar thermal systems** – use energy from the sun to contribute to space and/or water heating demand in a building.

6.11.2 Emergency heating

Unexpected interruption of power is rare and when it does occur, is typically resolved as a matter of priority, with planned power cuts typically lasting a maximum of 3 hours. Distribution Network Operators (DNOs), who are responsible for the supply of power, operate a Priority Service Register for people who might need extra support during a power cut – for example, the elderly and people who need electricity for vital medical equipment.

The use of direct emission heating systems is permitted for 'emergency heating'.

In smaller buildings, including dwellings, there will be little justification to install emergency heating as heat demand on failure of the normal heating system can usually be addressed simply and easily through use of independent, portable heaters. Portable heaters are not subject to building regulations.

Emergency heating via a fixed installation becomes a consideration where the size, complexity or heat demand of a building makes portable solutions non-viable or difficult to manage effectively.

In determining the need for emergency heating, applicants will commonly consider both the risk that failure of the normal heating system creates for occupants and the likelihood of such a failure (e.g. increased risk of loss of electrical supply in remote rural areas due to adverse weather).

For ease of operation and switchover, a combustion appliance installed to provide emergency heating will normally be connected to the same means of heat distribution used by the normal heating system. A back-up source of electrical power would be needed to enable operation of related auxiliary systems.

If an emergency heating installation is proposed for a new dwelling, applicants should provide information to the verifier which clearly:

- Conveys how emergency heating will function on the failure of the normal heating system; and
- Indicates the switchover arrangement when the normal heating system becomes operational again.

Any emergency heating installation should also be in accordance with the minimum provisions set out in the Domestic Building Services Compliance Guide. Information on installed emergency heating and how to operate it should be included in the written information provided to the occupier under standard 6.8.

6.11.3 Conversions Where undertaking work to convert a building, the requirement to avoid direct emission heating systems is applied in specific situations. This recognises that some types of conversion are small in scale and applied only to part of a building, for example the conversion of roof space or attached garage into habitable accommodation.

• A building which has previously been subject to standard 6.11 will already have no direct emission heating system and this should remain the case after conversion.

• A building which has not previously been subject to standard 6.11 (a pre-April 2024 building) should, subject to such action being reasonably practicable, have no direct emission heating system after conversion where the existing heat source for that system was located within a part of the building which is subject to conversion.

It is the responsibility of the applicant to demonstrate, to the satisfaction of the verifier, that installation of a zero direct emission heating system is not reasonably practicable for a given conversion project. In this respect, the following describes the criteria for assessing whether installation is reasonably practicable.

a. If the building, pre-conversion has no direct emission heating system, then it is reasonably practicable to maintain this on conversion.

b. The cost of a new installation is not considered, except to the extent that replacement would remove the benefit of previous expenditure. Where the existing heating system meets the provisions of standard 6.3 as set out for the relevant system type in the 2015 Domestic Building Services Compliance Guide or later, replacement may be deemed not reasonably practicable.

c. If there is written evidence from a chartered construction professional specialising in heating systems that it is not technically feasible to install any type of zero emission heating system as part of conversion works, replacement may be deemed not Domestic Technical Handbook April 2024 Edition Page 487 Applicable from 1 April 2024 reasonably practicable. This will likely require to be supported by a significant level of evidence.

d. In the case of conversion of a building which has a statutory listing due to its historical or cultural character, replacement may be deemed not reasonably practicable where the relevant statutory body confirms that no zero direct emission heating system would be accepted due to adverse impact on the character of the building. Historic Environment Scotland has developed a guide to Energy Retrofit of Traditional Buildings which may help in considering a heating system change in traditional buildings as part of a conversion - Guide to Energy Retrofit of Traditional Buildings | Hist Env Scotland (historicenvironment.scot)

The introduction of this standard for new homes is the first of the steps to decarbonise heating, with regulation for existing buildings to follow. Where installation of ZDEH is not reasonably practicable, developers should be aware that there will likely be a future requirement to install such a system prior to 2045. Accordingly, it may be more cost effective to install ZDEH on conversion even where the above exceptions can be applied. Current information on the future planned proposals for the regulation of existing buildings can be found in the **Heat in Buildings Programme.**

6.11.4 Alterations and extensions
Alterations and extensions to existing heating systems do not fall within the scope of this standard, except where the building was originally constructed or converted to meet the 2024 New Building Heat Standard.

- For a building originally constructed to a building warrant applied for on or after 1 April 2024, any alteration or extension of the building or replacement of the heat source shall maintain heating without use of direct emission heating systems.

- For a building converted under a building warrant applied for on or after 1 April 2024, any alteration or extension or replacement of the heat source shall maintain heating without use of direct emission heating systems, except where direct emission heating systems were retained under clause 6.11.3.

For any 'pre-2024 building', developers should again be aware that there will likely be a future requirement to install a ZDEH system prior to 2045. Accordingly, it may be more cost effective to install ZDEH when considering alteration or extension of the building or replacement of the heat source.

3.7 Sustainability (Sustainable Use of Natural Resources)

Note - The [0]numbered terms in this guide are explained in Appendix B.

3.7.1 Statement of Sustainability (Standard 7.1)

Sustainable development can be defined as meeting "the needs of the present without compromising the ability of future generations to meet their own needs." Whilst the Standards within Sections 1 to 6 in the SBS Technical Handbooks deliver a level of sustainability in areas such as energy efficiency and sound insulation, there is always the possibility of going beyond the minimum standard. Developers may therefore wish to gain recognition for building to higher standards by opting to meet higher levels that include energy and carbon emissions targets, but also aspects such as adaptability in design.

A statement of the level of sustainability achieved by a new [14]dwelling or new non-[20]domestic building is required to be affixed in a suitable location within the building prior to completion **by the builder or developer**.

Standard 7.1 does **not** apply to:

a) alterations and extensions to buildings;
b) conversions of buildings;
c) buildings that are ancillary to a [14]dwelling that are stand-alone having an area less than 50 m^2;
d) buildings which will not be heated (other than solely for frost protection) or cooled;
e) Buildings intended to have a life not exceeding the period specified in Regulation 6 of the Domestic Handbook; or
f) conservatories.

Points to note - every building must be designed and constructed in such a way that:

- With regard to a new [14]dwelling or a new school building containing classrooms, levels of sustainability are specified in respect of carbon dioxide emissions, resource use, building flexibility, adaptability and occupant well-being is achieved;
- With regard to a new non-[20]domestic building, other than a school building containing classrooms, levels of sustainability are specified in respect of carbon dioxide emissions is achieved.

The specified levels of sustainability are as follows:

- Bronze or Bronze Active
- Silver or Silver Active
- Gold
- Platinum

Guidance on Sustainability Labelling of New [14]Dwellings

New Dwellings - Bronze level

This is the baseline level for sustainability achieved where the [14]dwelling complies with the functional Standards set out in Sections 1 to 6 of the SBS Technical Handbook (Domestic).

New Dwellings - Bronze Active level

This is the level for sustainability achieved where the [14]dwelling complies with the functional Standards set out in Sections 1 to 6, but in addition includes the use of a low or zero carbon generating technology (LZCGT) in meeting Standard 6.1 within Section 6 - Energy. LZCGTs include wind turbines, water

turbines, heat pumps (all varieties), solar thermal panels, photovoltaic panels, combined heat and power units (which do not use [31]direct emission heating systems), fuel cells and fuel cells.

New Dwellings - Silver level

A [14]dwelling at this first optional/voluntary upper level should apply with all the Standards in Sections 1 to 6 for the Bronze level and, in addition, must comply with the Silver level in each of eight Aspects (i.e. subject areas of sustainability). The eight Aspects are listed in column one of Table 22 overleaf. Column two of Table 22 only gives details of those Silver Aspects relevant to Approved Certifiers of Construction (Electrical Installations to BS 7671).

New Dwellings - Silver Active level

This requirement is the same as the Silver level but, in addition, the [14]dwelling must include the use of a LZCGT. Insert Refer to page 78 [31]direct greenhouse gas emissions.

New Dwellings - Gold level

A [14]dwelling at this second optional/voluntary upper level should comply with all the Standards in Sections 1 to 6 for the Bronze level and, in addition, should comply with the Gold level in each of the eight Aspects given in Table 22. Column three of Table 22 only gives details of those Gold Aspects relevant to Approved Certifiers of Construction (Electrical Installations to BS 7671). Refer to page 73 direct greenhouse gas emissions

New Dwellings - [31]Direct greenhouse gas emissions only at Platinum level

A [14]dwelling at this third optional/voluntary upper level must comply with all the Standards in Sections 1 to 6 for the Bronze level. Refer to page 78 [31]direct greenhouse gas emissions.

Example sustainability label for a new [14]dwelling

An example sustainability label is illustrated here.

In this example the [14]dwelling has achieved the Bronze Active level of sustainability by use of solar photovoltaic panels as the low or zero carbon generating technology.

In addition, the Gold level in the Aspect of well-being and security and the Silver level in the Aspects of energy for space heating and flexibility and adaptability have been achieved.

Note: A suitable location for a sustainability label in a dwelling could be within an internal cupboard containing a utility meter.

Table 22: Silver and Gold Levels of Sustainability for New Dwellings		
Aspect	**Silver level**	**Gold level**
Aspect 2: Energy for space heating	Maximum annual demand for useful energy for space heating should be not greater than 40 kWh/m^2 for houses or 30 kWh/m^2 for flats or maisonettes	Maximum annual demand for useful energy for space heating should be not greater than 30 kWh/m^2 for houses or 20 kWh/m^2 for flats or maisonettes
Aspect 3: Energy for water heating	At least 5% of the annual energy demand for water heating should be from heat recovery, such as from renewable sources (e.g. solar thermal water heating and associated storage or heat recovery from grey water)	At least 50% of the annual energy demand for water heating should be from heat recovery, such as from renewable sources (e.g. solar thermal water heating and associated storage or heat recovery from grey water)
Aspect 4: Water use efficiency	*	*
Aspect 5: Optimising performance	A quick start guide to inform occupants on how to optimise performance, in addition to the written information to be provided under section 6. A sample quick start guide is available from the BSD website (Annex B) A real-time monitor that displays electricity use in an easily accessible and readable position	A quick start guide as for Aspect Silver 5 plus colour coded easy release adhesive labels on key heating and ventilation equipment including extract fans and heating controls indicating standard settings A real-time monitor that displays electricity use as for Aspect Silver 5 plus a display indicating gas use
Aspect 6: Flexibility and adaptability	A clear space against a wall or partition where a desk of 1800mm long by 600mm deep could be placed to provide a home office space: • Two switched socket-outlets in addition to the number recommended under section 4 of this guide • A connection giving direct access to internet services unless provided elsewhere in the dwelling	Provide home office space(s) as for Aspect Silver 6 and; A secure mobility space(s) to accommodate an electric wheelchair (or pram) and one or more bicycles. The mobility space(s) should have a socket-outlet for recharging
Aspect 7: Well-being and security	A fused connection unit suitable for an intruder alarm system within 2 metres of the main entrance door	An intruder alarm system is installed
Aspect 8: Material use and waste	*	*

* This Aspect/level is not relevant to Approved Certifiers of Construction (Electrical Installations to BS 7671)

Guidance on Sustainability Labelling of New Non-[20]domestic Buildings

New non-[20]domestic buildings - Bronze level
This is the baseline level for sustainability achieved where the building complies with the functional Standards set out in Sections 1 to 6 of the SBS Technical Handbook (Non-[20]domestic).

New non-[20]domestic buildings - Bronze Active level
This is the level for sustainability achieved where the building complies with the functional Standards set out in Sections 1 to 6, but in addition includes the use of a LZCGT in meeting Standard 6.1 within Section 6 - Energy.

New non-[20]domestic buildings - [31]Direct greenhouse gas emissions only at Platinum level
A building at this third optional upper level must comply with all the Standards in Sections 1 to 6 for the Bronze level and, in addition, under the guidance to Standard 6.1 and 6.11.

Note 1: A suitable location for a sustainability label in a non-[20]domestic building could be within a plant room.

Aspect Silver level 1, Aspect Gold Level 1 and Aspect Platinum 1 for both Domestic and Non-domestic Buildings: Direct greenhouse gas emissions

With the introduction of standard 6.11 'Heating and hot water – 31direct emission heating systems from 1 April 2024, the use of '31direct emission heating systems' is not permitted in new buildings.

As a result, Standard 6.1 'energy demand' no longer requires that an emissions calculation be undertaken and reported against a target for each new building.

Accordingly, this aspect is retitled 'Direct greenhouse gas emissions' and a rating of 'Platinum' is assigned for each new building. This reports that, under the 2024 New Build Heat Standard, the building results in zero direct emissions, those created from the generation of heat at the building itself.

It should be noted that there are still greenhouse gas emissions associated with energy consumed at the building and that these will be reported on through the production of an energy performance certificate on completion of the building.

Table 23: Silver and Gold Levels of Sustainability for New Non-domestic Buildings		
Aspect	**Silver level**	**Gold level**
Aspect 2: Energy for thermal comfort and artificial lighting #	All artificial lighting for: • classrooms to be automatically controlled using presence or absence detection sensors, with daylight photoelectric switching or dimming devices • ancillary spaces to be automatically controlled using presence or absence detection switching or dimming devices • classrooms and ancillary spaces to have a time operated switch to allow lighting to be automatically turned off when the school is not in operation Automatically controlled presence or absence detection should not be used where this may cause hazard or inconvenience (e.g. in an accessible toilet, changing places toilet or medical room)	Artificial lighting control as provided for Aspect Silver 2 A building management system including sequential control, zone control, weather compensation, frost protection, night set back including monitoring and targeting. Thermal comfort control - provided for Aspect Silver 2 including destratification fans in all spaces with a ceiling height greater than 6m.
Aspect 3: Water efficiency #	At least 10% of the annual energy demand for water heating should be from heat recovery, such as from renewable sources (e.g. solar thermal water heating and associated storage) Point of use/instantaneous electrically heated DHW systems should be considered where the use of hot water is remote from the main hot water heating systems	As for Aspect Silver 3, except 50% of the annual energy demand for water heating should be from heat recovery, such as from renewable sources (e.g. solar thermal water heating and associated storage)
Aspect 4: Biodiversity #	*	*
Aspect 5: Well-being #	*	*
Aspect 6: Flexibility and adaptability #	*	*
Aspect 7: Material use and waste #	*	*
Aspect 8: Optimising performance #	A user information guide for use by occupants on the ways in which all classrooms are intended to function (heating, cooling, lighting and ventilation) and how to optimise energy performance Resource use display(s) real time energy use for heating, ventilation, cooling, lighting and small power in an easily accessible position in a principal entrance area	User guide as provided for Aspect Silver 8 Resource use display(s) as provided for Aspect Silver 8, including the capability for the information collected to be recorded centrally to allow comparison over time

Aspects 2 to 8 only apply to new school buildings containing classrooms

* This Aspect/level is not relevant to Approved Certifiers of Construction (Electrical Installations to BS 7671)

3.7.2 Provision of Electric Vehicle Charging points.

With the Scottish Governments policy on sustainable transport remaining at promoting the use of active and public transport, it is also recognises that there will be situations where the use of a private vehicle will be required.

In recognition of the drive towards net-zero and the move away from internal combustion engines towards electric vehicles, the provision of electric vehicle charging points in new building work has been set out in 7.2 of the Building Standards Division Technical Handbook for both Domestic and Non-Domestic properties.

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 (7.2 of the Domestic Technical Handbook).

The standards relate to new building work, but they do **not** apply to:
a non-domestic building where ten or fewer car parking spaces are present within the building or the curtilage of the building, alteration to, or extension of a building, other than major renovation works.

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.

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.

Location of charge points.

Charge points should be located out with 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.

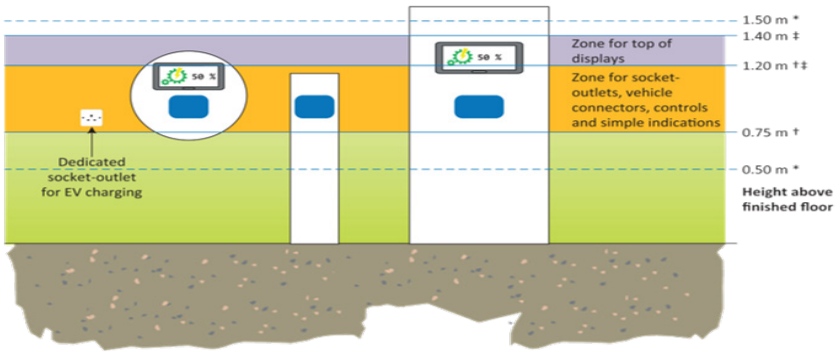
Charge points should be positioned in relation to parking spaces to minimise the risk of accidental damage, for example, from vehicles projecting over kerbs. Where a protective barrier is provided, this should not impede the use of the charge point.

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 be positioned to enable safe and convenient use of all outlets at the same time.

To enable installation, maintenance and ease of use:

- 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.

- 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'.
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. of the relevant Technical Handbook. 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. 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"

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:

- 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;
- Be fitted with a universal socket (also known as an untethered electric vehicle charge point);
- Be fitted with an indicator to show the equipment's charging status that uses lights, or a visual display; and
- 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.

(image courtesy of BG Sync EV)

Installations should meet the requirements of BS 7671 and the IET's 'Code of Practice: Electric Vehicle Charging Equipment Installation'.

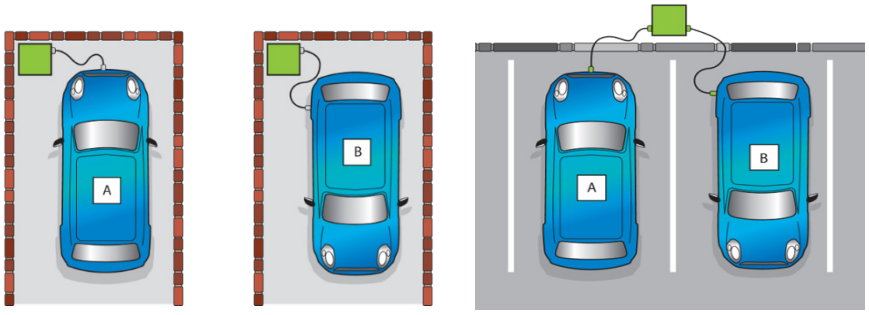
Information on the installation and operation of charge points

On completion of the works associated with the Electric Vehicle Charging sockets written information on the installation, as well as all relevant information as stated in 7.2.7 of the technical handbooks should be provided.

Typical required information would include information on the charge point and socket, connection of charge point back into the building, means of isolation, summary on how to use facility, commissioning information, underground cable or ducting routes and manufacturers literature on the installed products.

Electric Vehicle charging for Domestic Buildings7

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. 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.



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 residential building to any other type of building, or
- a building so that it becomes a residential building,

shall meet the requirements of the standard (regulation 12, schedule 6).

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.

Installations for single dwellings and other dwellings should be cost-effective as explained under the heading of "installation cost cap" in 7.2.1 of the Domestic Technical Handbook.

Other domestic buildings

Where car parking is provided within the curtilage of a domestic building comprising more than one dwelling, enabling infrastructure 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 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.

(image courtesy of BG Sync EV)

In this respect, 'covered car park' is car parking located within the footprint of a building such as a single dwelling garage or roof-top, open-sided, enclosed or underground car park.

Provision to domestic buildings undergoing major renovation works.

For the purpose of the 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 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:

- 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 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 such as a single dwelling garage or roof-top, open-sided, enclosed or underground car park

Defined cost limit.

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.

Electric Vehicle charging for Non-Domestic Buildings

There is anticipated to be 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.

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:

- An electrical vehicle charge point need not be installed to car parking spaces located within a covered car park.

- Any accessible parking spaces 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 such as a roof-top, open-sided, enclosed or underground car park.

Provision to non-domestic buildings undergoing major renovation.

For the purpose of the 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 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:

- 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.

- Any accessible parking spaces 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 such as a roof-top, open-sided, enclosed or underground car park.

Defined cost limit.

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.

4. Certification

4.1 Certification Practice

The certification procedures are given in the SBSC Certification of Construction Scheme Guide. For information, however, a summary is given below:

- The building owner or developer should inform the appropriate Verifier that they intend to use an Approved Body for their electrical installation work at the warrant application stage in order to be eligible for a discount on the building warrant fee.
- During construction and on completion the Certifier must be satisfied that the work complies with the Building (Scotland) Regulations 2004, not simply that it complies with BS 7671 or Standards 4.5 and 4.6.
- The Certifier must be satisfied that they are competent to certify particular aspects of the work. If appropriate, they can use the advice of suitably qualified and experienced persons to establish compliance.
- The Certifier completes the Scheme Checklist and retains it for audit purposes.
- The Certifier completes the Certificate of Construction online, and signs Part A. The Certification Co-ordinator signs Part B.
- The completed Certificate of Construction along with the appropriate British Standard (BS) Certification is given to the relevant person (i.e. the building owner or developer).
- The relevant person fills in the Completion Certificate, attaches the Certificate of Construction and submits them to the Verifier.
- The Verifier will check that the Approved Body and Approved Certifier are currently registered on the BSD website (www.scotland.gov.uk/bsd).
- A record of all certificates issued must be maintained by the Approved Body together with details of any third party relied on for making decisions on compliance.

4.2 Completion of the Scheme Checklist

The Scheme Checklist is essentially a précis of the Building Standards requirements relevant to electrical installations and is used for confirmation that the work being certified complies with the appropriate standards.

The Certifier should undertake the inspection of the work in a logical manner using the Scheme Checklist and appropriate BS7671 certification.

The Checklist is produced from the SELECTcerts website (www.SELECTcerts.co.uk) is available for SELECT scheme members only. The Approved Certifier of Construction should complete the Scheme Checklist and retain it as their record of how compliance was determined.

An example of a completed Scheme Checklist.

Scottish Building Standards Certification

Checklist

Checklist in support of Certificate of Construction

(Electrical Installations to BS 7671)

SEL1-C-32165-13

Confirm how you established that the work complies with the appropriate standards

- **1** You have checked work carried out by other competent persons
- **2** You have checked your own work
- **3** You have referred to a competent third party for confirmation of compliance
- **N/A** Not applicable (if there is no relevant part of the building or particular work carried out)

Insert 1, 2, 3 or N/A against each item as appropriate

Structure	
Notches and holes in joists and/or wall studs within limits	2
Walls chases (raggles) within limits	N/A

Fire	
Service openings in compartment floors and walls fire stopped	N/A
Service openings in separating floors and walls fire stopped	N/A
Service openings in cavity barriers fire stopped	N/A
Recessed downlighters in combustible floors provided with fire protection	2
Thermoplastic light fittings and diffusers meet limits of Table 2.5.7 or ceiling tested	N/A
Electrical installation does not obstruct escape routes	N/A
Escape route lighting to appropriate level supplied by protected circuit	N/A
Emergency lighting to BS 5266	N/A
Fire detection and fire alarm system to BS 5839	2

Environment	
Sealing of openings and service penetrations to outside of building	2
Facilities in dwellings - activity space for heating controls and/or oven	2
Sanitary facilities incorporate assistance alarm in non-domestic buildings only	N/A
Sufficient fixed heating system (only dwellings heated by electricity)	N/A
Suitable mechanical ventilation	2
Combustion appliances not affected by mechanical ventilation	2

Scottish Building Standards Certification
Checklist
Checklist in support of Certificate of Construction
(Electrical Installations to BS 7671)
SEL1-C-32165-13

Confirm how you established that the work complies with the appropriate standards

- **1** You have checked work carried out by other competent persons
- **2** You have checked your own work
- **3** You have referred to a competent third party for confirmation of compliance
- **N/A** Not applicable (if there is no relevant part of the building or particular work carried out)

Insert 1, 2, 3 or N/A against each item as appropriate

Safety	
Electrical installation does not impede access within buildings including stairs and ramps	2
Automatic illumination provided for accessible entrances (domestic buildings only)	2
Electrical installation to BS 7671	2
Sufficient lighting points and socket-outlets (dwellings only)	2
Aids to communication with appropriate performance and segragation (non-domestic buildings only)	N/A
Outlets and controls of electrical fixtures positioned within limits	2
Bedroom(s) provided for wheelchair users in residential premises fitted with assistance alarm(s)	N/A

Noise	
Service penetrations sealed to limit noise transmission in separating walls/floors	N/A
Service penetrations sealed to limit noise transmission in walls and floors of bedrooms in non-domestic residential premises	N/A
Restitution of sound insulation measures in applicable internal walls and intermediate floors	2
No electrical services within timber frame separating walls	N/A
Recessed downlighters installed in timber frame separating and/or intermediate floors within limits	2

Energy	
Restitution of any thermal insulation disturbed by electrical installation	2
Controls for heating and hot water systems to ensure optimum energy efficiency	2
Artificial and/or display lighting energy conservation measures	2
Provision of written information on maintenance and operation of electrical installation	2

This checklist should be retained by the Approved Certifier of Construction for audit purposes.

Guidance on each item in this checklist is given in the 2014 SELECT Technical Guide to the Scottish Building Standards. If any doubt exists contact SELECT Technical Services for clarification.

4.3 Completion of the Certificate of Construction (Electrical Installations to BS 7671)

The Certificate of Construction should only be issued when the complete contract is ready for handover, not when the electrical installation work alone has been completed. A final inspection should be carried out prior to handing over the Certificate, to ensure that the installation has not been damaged and that potential hazards, such as the fitting of thermal insulation over downlighters, have not arisen.

SELECT does not allow Certificates of Construction to be issued for work that is exempt from a warrant.

Certifiers should note that Section 19 (4) of the Building (Scotland) Act 2003 introduced the possibility of prosecution in the event of giving false or misleading statements on certificates, or reckless certification. Any person signing a certificate who is not entitled to do so, or issuing a certificate for work which is not complete, is also liable to prosecution.

Where a single building warrant has been issued for multiple buildings, such as a number of [14]dwellings or individual [11]flats within a development, the relevant person (applicant) may submit a separate completion certificate for each [14]dwelling included on the warrant. Where an Approved Certifier of Construction is being used, a Certificate of Construction must be provided with each completion certificate submitted to show their part of the work is complete and has been inspected.

A Certificate of Construction is obtained from the SELECTcerts website (www.SELECTcerts.co.uk) for SELECT scheme members only. The Certifier uses their secure 'login' to access the certification area. On entering the required information the completed certificate, having a unique number, can then be downloaded and emailed to the relevant person or printed out.

Only an Approved Certifier of Construction is authorised to complete and sign Part A of the certificate. Similarly, Part B should only be counter-signed by the Certification Co-ordinator of the Approved Body.

An example of a completed Certificate of Construction is shown overleaf.

CERTIFICATE OF CONSTRUCTION

Issued in compliance with the Building (Scotland) Regulations 2004 for Electrical Installations to BS 7671

SCC 13

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

PART 1 : DETAILS OF THE CONTRACTOR/APPROVED BODY, CLIENT AND INSTALLATION

DETAILS OF THE CONTRACTOR/APPROVED BODY

Approved Body Number: SEL1-CB-98765
Trading Title: Select Member Services
Address: The Walled Garden Bush Estate
Penicuik Midlothian
Postcode: EH26 0SB Tel No: 0131 445 5577

DETAILS OF CLIENT

Trading Title:
Address: 2 Mill Bank Road
Anytown Midlothian
Postcode: EH0 0HE Tel No: 0131 333 0000

DETAILS OF THE INSTALLATION

INSTALLATION ADDRESS:
2 Mill Bank Road Anytown Midlothian
Postcode: EH0 0HE Tel No: 0131 333 0000

PART 2 : DETAILS OF THE ELECTRICAL INSTALLATION WORK TO BS 7671 COVERED BY THIS CERTIFICATE OF CONSTRUCTION

Date works completed: 01/03/2023
Building use: Domestic ☑
(tick as appropriate can be both) Non-Domestic ☐
Is this part of a multiplot (Yes or No)? ☑
Plot 2 of 10
Is this the final plot (Yes or No)? No

The installation is-
New: ☑
An addition: ☐
An alteration: ☐
Was a building Warrant application made for the work described here in PART 2?
Yes or No:
If Yes, Warrant Number: 05/24589/ALT
Verifier issuing a Warrant: Midlothian Council

New dwelling

	Nature of Work	Scheme Checklist	BS Certificate
Low and Extra-low Voltage Electrical Installations to BS 7671	✔	✔	✔
Emergency Lighting Systems for premises other than the dwellings and certain places of entertainment to BS 5266	N/A	N/A	N/A
Fire Detection and Fire Alarm Systems for dwellings to BS 5839-6	✔	✔	✔
Fire Detection and Fire Alarm Systems for buildings other than dwellings to BS 5839-1	N/A	N/A	N/A

PART 3 : DECLARATION

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) T Certifier
Approved Certifier Number: SEL1-C-32165

Signature: Ω *Date:* 01/03/2023

B) To be completed by the Approved Certification Co-ordinator of the Approved Body

I, being the Certification Co-ordinator, confirm that the person who has signed A) PART 3 of this Certificate is an Approved Certifier of Construction (Electrical Installations to BS7671). This body is registered by the Scottish Government Building Standards Division to provide certification services for Certification of Construction (Electrical Installations to BS 7671) and employs at least one approved certifier under the scheme.

Name (capitals) C Ordinator

Signature: *Date:* 01/03/2023

This certificate and associated schedules are based on the models given in Appendix 6 of BS 7671 - IET Wiring Regulations
They were developed by SELECT (the trading style of The Electrical Contractors' Association of Scotland)

CONTRACTOR/APPROVED BODY - THIS PAGE TO BE PASSED TO VERIFIER

4.4 Completion of Appropriate British Standard Certification

Although a Certifier signs a Certificate of Construction stating that the work complies with the Building (Scotland) Regulations 2004, it is assumed that for most electrical and associated installations an element of design has been undertaken and test results etc. should be checked to verify compliance with the relevant requirements of BS 7671, BS 5839, BS 5266 etc.

Appropriate British Standard (BS) certificates should be completed where applicable.

Examples of such certificates may include:

- An Electrical Installation Certificate, together with schedule of circuit details and schedule of test results to BS 7671. See example on pages 94 to 97.
- An Electric Vehicle Charging Point Risk Assessment and Checklist can be sought via SELECTcerts.
- A Fire Detection and Fire Alarm System Certificate (Domestic Premises) to BS 5839-6. See example on page 98.
- A Fire Detection and Fire Alarm System Installation Certificate to BS 5839-1.
- An Emergency Lighting Completion Certificate to BS 5266-1.

Note: SELECT members can obtain copies of all of the above certificates from SELECT Technical Services or certificates can be obtained from SELECTcerts website (www.SELECTcerts.co.uk).

4.5 Certification of Work Not Carried Out by the Approved Body

Where some of the work that is being certified was not carried out by the Certifier's Approved Body (e.g. the installation of a fire detection and fire alarm system by a third party) reasonable enquiries should be made as to the competence of the installer. The Certifier should also obtain a copy of the relevant BS certification to ensure compliance with the appropriate standard and such certification should be attached to the Certificate of Construction.

Where electrical work to be certified has not been carried out by the Certifier's Approved Body, a Certificate of Construction can only be issued by the Certifier if they have supervised the work, i.e. they have inspected the work at the various stages of the construction.

Where electrical work has already been completed by others, but has not been certified under the Scheme, the BSD Guidance for Verifiers allows acceptance of an Electrical Installation Condition Report accompanied by a Schedule of Inspections and Schedule(s) of Circuit details and schedule test results. Such a report can be provided by an Approved Body or a member of SELECT or the NICEIC. A Certificate of Construction must **not** be issued under such circumstances.

ELECTRICAL INSTALLATION CERTIFICATE (SINGLE-SIGNATURE)

For use where design, construction, inspection and testing are the responsibility of one person

(REQUIREMENTS FOR ELECTRICAL INSTALLATIONS — BS 7671 [IET WIRING REGULATIONS])

SELECT MEMBERSHIP NUMBER .....

SSC

DETAILS OF THE CLIENT Mr A SMITH

INSTALLATION ADDRESS 2 MILL BANK ROAD, ANYTOWN MIDLOTHIAN AN3 6YT

DESCRIPTION AND EXTENT OF THE INSTALLATION

Description of installation: NEW 2 STOREY HOUSE WITH INTEGRAL GARAGE

Extent of installation covered by this Certificate: COMPLETE HOUSE INCLUDING GARAGE

New installation ☑ Addition ☐ Alteration ☐

FOR DESIGN, CONSTRUCTION, INSPECTION AND TESTING

I being the person responsible for the Design, Construction, Inspection and Testing of the electrical installation (as indicated by my signature), particulars of which are described above, having exercised reasonable skill and care when carrying out the Design, Construction, Inspection and Testing hereby CERTIFY that the work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671: 2018, amended to 2022 (date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120.3, 133.1.3 and 133.5) and comments on existing installation: NONE

Details of permitted exceptions (Regulation 411.3.3): NONE

Where applicable, a suitable risk assessment(s) must be attached to this Certificate. Risk assessment attached ☐

Name (Block Letters) GEORGE GRAY

For and on behalf of G. G. ELECTRICAL LTD

1 MAIN STREET, OTHER TOWN, MIDLOTHIAN EH99 2AT

Position QUALIFIED SUPERVISOR

Signature ..... Date 28/03/2022

I recommend that this installation is further inspected and tested after an interval of not more than 10 years/~~month~~s.

The attached schedule of inspections and schedules(s) of test results are part of this document and this Certificate is only valid when they are attached to it.

SUPPLY CHARACTERISTICS AND EARTHING ARRANGEMENTS

Nature of Supply Parameters

Nominal voltage 230 V

Prospective fault current, I_{pf} 1.4 kA

Nominal frequency 50 Hz

External earth fault loop Impedance, Z_e 0.16 Ω

Number and Type of Live Conductors

AC ☑

1-phase, 2-wire ☑

2-phase, 3-wire ☐

3-phase, 3-wire ☐

3-phase, 4-wire ☐

Supply Protective Device Characteristics

BS (EN): BS 1361

Type: HRC

Rated current 80 A

Earthing arrangements

Distributor's facility ☐

☑ TN-S

☐ TN-C-S

☐ TT

☐ Other sources of supply

Installation earth electrode ☐

Type (e.g. rod(s), tape etc) .....

Location .....

Electrode resistance to earth ..... Ω

PARTICULARS OF INSTALLATION REFERRED TO IN THE CERTIFICATE

Maximum Demand

Load 45 ~~kVA~~/Amps (delete as appropriate)

Polarity and Phase Sequence

Supply polarity confirmed ☑

Phase sequence confirmed ☐

(delete as appropriate)

Main Switch / Switch-Fuse / Circuit-Breaker / RCD

Location HALL CUPBOARD

BS (EN) 60947-3

No. of poles 2

Current rating 100 A

Fuse/device rating or setting n/a A

Voltage rating 240 V

If RCD main switch

Rated residual operating current ($I_{\Delta n}$) n/a mA

Rated time delay n/a ms

Measured operating time (at $I_{\Delta n}$) n/a ms

Main Protective Conductors

Earthing conductor: Material COPPER csa 16 mm² Connection / continuity verified ☑

Main protective bonding conductors: Material COPPER csa 10 mm² Connection / continuity verified ☑

To water installation pipes ☑	To gas installation pipes ☑	To oil installation pipes ☐
To structural steel ☐	To lightning protection ☐	To other ☐ Specify: .....

SCHEDULE OF INSPECTIONS

Item No.	Description	Outcome ✓ / N/A	Item No.	Description	Outcome ✓ / N/A	Item No.	Description	Outcome ✓ / N/A
1.0	Condition of consumer's intake equipment (Visual inspection only)	✓	5.0	Protective measures other than ADS	✓	11.0	Identification and notices	✓
			6.0	Additional protection	✓	12.0	Location(s) containing a bath or shower	✓
2.0	Parallel or switched alternative sources of supply	N/A	7.0	Distribution Equipment	✓	13.0	Other special installations or locations	N/A
			8.0	Circuits (Distribution and Final)	✓	14.0	Prosumer's low voltage electrical installation(s)	N/A
3.0	Methods of protection	✓	9.0	Isolation and switching	✓			
4.0	Basic protection	✓	10.0	Current-using equipment (permanently connected)	✓			

This certificate and associated schedules are based on the models given in Appendix 6 of BS 7671 - IET Wiring Regulations.
They were developed by SELECT (the trading style of The Electrical Contractors' Association of Scotland).

SSC

SCHEDULE OF CIRCUIT DETAILS

Distribution board details

DB reference: CONSUMER UNIT Location: HALL CUPBOARD Supplied from: SUPPLY METER

Distribution circuit OCPD: BS (EN): 1361 Type: ..... Rating/Setting: 80 A

SPD Details: Type(s)*: T1 ☐ T2 ☑ T3† ☐ N/A ☐

CIRCUIT DETAILS

		Conductor details					Overcurrent protective device					RCD			
					Number & size										
1 Circuit number	2 Circuit description	3 Type of wiring	4 Reference method‡	5 Number of points served	6 Live (mm^2)	7 cpc (mm^2)	8 BS (EN)	9 Type	10 Rating (A)	11 Breaking capacity (kA)	12 Maximum permitted Z_s (Ω)§	13 BS (EN)	14 Type	15 $I_{\Delta n}$(mA)	16 Rating (A)
1	OVEN	A	B	1	2x6	1x2.5	61009	B	32	6	1.37	61009	A	30	32
2	CENTRAL HEATING	A	B	1	2x2.5	1x1.5	61009	B	20	6	2.19	61009	A	30	20
3	DOWNSTAIRS LIGHTING	A	B	21	2x1	1x1	61009	B	6	6	7.28	61009	A	30	6
4	UPSTAIRS SOCKETS	A	B	8	4x2.5	2x1.5	61009	B	32	6	1.37	61009	A	30	32
5	GARAGE SOCKETS	C	B	4	2x2.5	1x1.5	61009	B	32	6	1.37	61009	A	30	32
6	SPARE														
7	SHOWER	A	B	1	2x10	1x4	61009	B	40	6	1.09	61009	A	30	40
8	KITCHEN SOCKETS	A	B	6	4x2.5	2x1.5	61009	B	32	6	1.37	61009	A	30	32
9	DOWNSTAIRS SOCKETS	A	B	12	4x2.5	2x1.5	61009	B	32	6	1.37	61009	A	30	32
10	UPSTAIRS LIGHTS	A	100	15	2x1	1x1	61009	B	6	6	7.28	61009	A	30	6
11	SPARE														
12	DOORBELL	A	B	1	2x1	1x1	61009	B	6	6	7.28	61009	A	30	6

CODES FOR TYPES OF WIRING

A	B	C	D	E	F	G	H	O
Thermoplastic insulated/ sheathed cables	Thermoplastic cables in metallic conduits	Thermoplastic cables in non-metallic conduit	Thermoplastic cables in metallic trunking	Thermoplastic cables in non-metallic trunking	Thermoplastic SWA cables	Thermosetting SWA cables	Mineral insulated cables	Other - please state

* SPD Type. Where a combined T1 + T2 or T2 + T3 device is installed, indicate by ticking both Type boxes.
† Where a T3 SPD is installed to protect sensitive equipment, enter details in 'Remarks', column 31, of the Schedule of Test Results. (See Section 534 of BS 7671:2018+A2:2022.)
‡ See Table 4A2 of Appendix 4 of BS 7671:2018+A2:2022.
§ Where the maximum permitted earth fault loop impedance value stated in column 12 is taken from a source other than the tabulated values given in Chapter 41 of BS 7671:2018+A2:2022, state the source of the data in the appropriate cell for the circuit in the 'Remarks', column 31, of the Schedule of Test Results.

SSC

SCHEDULE OF TEST RESULTS

Distribution board details

DB reference: CONSUMER UNIT. Z_{db}: 0.16 Ω I_{pf}: 1.4 kA

Confirmed: Correct polarity ☑ Phase sequence ☐

SPD: Operational status confirmed¶ ☑ N/A ☐

Details of test instruments used (serial and/or asset numbers)

Multifunction: MEGGER MFT 1720 124689
Continuity:
Insulation resistance:
Earth fault loop impedance:
RCD:
Earth electrode resistance:

TEST RESULT DETAILS

17 Circuit number	Continuity (Ω)					Insulation resistance			26 Polarity#	Zs (Ω)	RCD		AFDD	31 Remarks
	Ring final circuit			$(R_1 + R_2)$ or R_2										Include details of circuits and/or installed equipment vulnerable to damage when testing (continue on a separate sheet if necessary)
	18 r_1 (line) (Ω)	19 r_n (neutral)	20 r_2 (cpc)	21 $(R_1 + R_2)$	22 R_2	23 Test voltage (V)	24 Live - Live (MΩ)	25 Live - Earth (MΩ)		27 Maximum measured	28 Disconnection time (ms)**	29 Test button operation	30 Manual test button operation††	
1				0.15		500	>999	>999	✓	0.31	28	✓	N/A	
2				0.2		500	>999	>999	✓	0.36	36	✓	N/A	
3				0.35		500	>999	>999	✓	0.51	25	✓	N/A	
4	0.37	0.37	0.6	0.24		500	>999	>999	✓	0.4	34	✓	N/A	
5	0.2	0.2	0.33	0.13		500	>999	>999	✓	0.3	29	✓	N/A	
6														
7				0.11		500	>999	>999	✓	0.27	33	✓	N/A	
8	0.25	0.25	0.42	0.17		500	>999	>999	✓	0.33	31	✓	N/A	
9	0.4	0.4	0.67	0.27		500	>999	>999	✓	0.43	28	✓	N/A	
10				0.4		500	>999	>999	✓	0.56	36	✓	N/A	
11														
12				0.05		500	>999	>999	✓	0.21	39	✓	N/A	

Tested by name (Capitals): GEORGE GRAY

Signature: ..... Date: 28/03/2022

¶ Not all SPDs have visible functionality indication.
# Where this schedule is issued with an Electrical Installation Condition Report, and incorrect polarity is identified, an 'X' should be entered.
**RCD effectiveness is verified using an alternating current test at rated residual operating current (IΔn)
†† Not all AFDDs have a test button.

ELECTRICAL INSTALLATION CERTIFICATE

GUIDANCE FOR RECIPIENTS

This safety Certificate has been issued to confirm that the electrical installation work to which it relates has been designed, constructed, inspected and tested in accordance with BS 7671.

You should have received an 'original' Certificate and the person that issued the Certificate should have retained a duplicate. If you were the person ordering the work, but not the owner of the installation, you should pass this Certificate, or a full copy of it including the schedules, immediately to the owner.

The 'original' Certificate should be retained in a safe place and be shown to any person inspecting or undertaking further work on the electrical installation in the future. If you later vacate the property, this Certificate will demonstrate to the new owner that the electrical installation complied with the requirements of BS 7671 at the time the Certificate was issued. The Construction (Design and Management) Regulations require that, for a project covered by those Regulations, a copy of this Certificate, together with schedules, is included in the project health and safety documentation.

For safety reasons, the electrical installation will need to be inspected at appropriate intervals by a skilled person or persons, competent in such work. The maximum time interval recommended before the next inspection is stated on Page 1 under 'NEXT INSPECTION'.

This Certificate is intended to be issued only for a new electrical installation or for new work associated with an addition or alteration to an existing installation. It should not have been issued for the inspection and testing of an existing electrical installation. An 'Electrical Installation Condition Report' should be issued for such an inspection.

This Certificate is only valid if the Schedule of Inspections has been completed to confirm that all relevant inspections have been carried out and where accompanied by Schedule(s) of Circuit Details and Test Results.

Where the installation includes a residual current device (RCD) it should be tested six-monthly by pressing the button marked 'T' or 'Test'. The device should switch off the supply and should then be switched on to restore the supply. If the device does not switch off the supply when the button is pressed, seek expert advice.

For safety reasons it is important that this instruction is followed. Where the installation includes an arc fault detection device (AFDD) having a manual test facility it should be tested six-monthly by pressing the test button. Where an AFDD has both a test button and automatic test function, manufacturer's instructions shall be followed with respect to test button operation.

Where the installation includes a surge protection device (SPD) the status indicator should be checked to confirm it is in operational condition in accordance with manufacturer's information. If the indication shows that the device is not operational, seek expert advice. For safety reasons it is important that this instruction is followed.

Where the installation includes alternative or additional sources of supply, warning notices should be found at the origin or meter position or, if remote from the origin, at the consumer unit or distribution board and at all points of isolation of all sources of supply.

FIRE DETECTION and FIRE ALARM SYSTEMS [Domestic Premises]

Certificate for Design, Installation & Commissioning of Grade C, D & F Systems

SELECT MEMBERSHIP NUMBER 12345	**DF 6**

Certificate of design*, installation* and commissioning of the fire detection and fire alarm system at:

Address: 2 Mill Bank Road
Anytown Midlothian Postcode: AN3 6YT

It is certified that the fire detection and fire alarm system at the above address complies with the recommendations of BS 5839-6 for design*, installation* and commissioning* of a Grade D1 Category LD2 system, other than in respect of the following variations:*

Brief description of areas protected (only applicable to Category LD2 and PD2 systems).
Hall, Landing, Living room and Kitchen

The entire system has been tested for satisfactory operation in accordance (with the recommendations of **23.3n**) of BS 5839-6:2019.* ☑

Instructions in accordance with the recommendations of Clause 24 of BS 5839-6:2019 have been supplied to:*
Mr A Smith

An Electrical Installation Certificate or Minor Electrical Installation Works Certificate as appropriate has been issued in accordance with BS 7671. ☑

Name (in block letters): George Gray Position: Qualified Supervisor

Signature: George Gray Date: 21/04/2023

For and on behalf of: G. G. Electrical Ltd

Address:

1 Main Street Other Town Midlothian Postcode: EH99 2AT

* Where design, installation and commissioning are not all the responsibility of a single organisation or person, the relevant words should be deleted. The signatory of the certificate should sign only as confirmation that the work for which they have been responsible complies with the relevant recommendations of BS 5839-6:2019. A separate certificate(s) should then be issued for other work.

This certificate may be required by an authority responsible for enforcement of fire safety legislation, such as the building control authority or housing authority. The recipient of this certificate might rely on the certificate as evidence of compliance with legislation. Liability could arise on the part of any organisation or person that issues a certificate without due care in ensuring its validity.

This certificate is based on the model contained in Annex E of BS 5839-6:2019: Fire detection and fire alarm systems for buildings - Part 6: Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises. It was developed by SELECT (the trading style of The Electrical Contractors' Association of Scotland).

Appendix A Sources of Information

The following publications and standards have been referred to in the preparation of this guide:

1) Building Standards Division (BSD) publications accessible from www.scotland.gov.uk/bsd

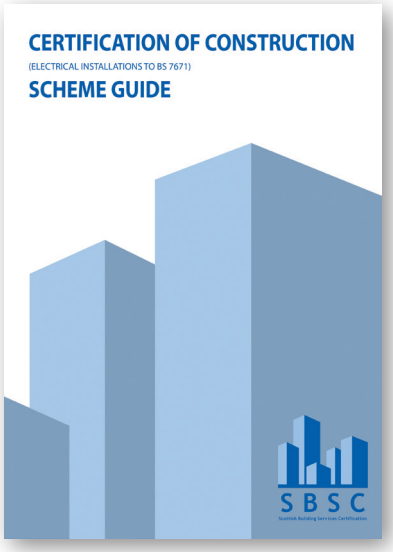
- Scottish Building Standards Technical Handbook (Domestic) 2024.
- Scottish Building Standards Technical Handbook (Non-domestic) 2024.
- Scottish Building Standards Technical Handbook (Conservatories) 2nd Edition 2010.
- The Scottish Building Standards Procedural Handbook - Third Edition Version 1.3 (2013).
- The Small Buildings Structural Guidance (2010).
- Example Constructions and Generic Internal Constructions (2011).
- Certification Handbook - Edition 3 (2012).
- A Simplified Approach to Alternative Fire Safety Strategies (2010).

2) British and European Standards

- BS 7671 Requirements for Electrical Installations (IET Wiring Regulations).
- BS 5839-1 Fire detection and fire alarm systems for buildings – Part 1: Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises.
- BS 5839-6 Fire detection and fire alarm systems for buildings – Part 6: Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises.
- BS 5266-1 Emergency lighting. Code of practice for the emergency escape lighting of premises.
- BS EN 1838 Lighting applications – Emergency lighting.
- BS EN 50292 Electrical apparatus for the detection of carbon monoxide in domestic premises, caravans and boats – Guide on the selection, installation, use and maintenance

3) Other Publications

- The SELECT Scheme Guide for Certification of Construction (Electrical Installations to BS 7671) Issue No 3- 2023.
- Best Practice Guide 5: Electrical installations and their impact on the fire performance of buildings: Part 1 – Domestic premises: Single family units (houses, flats, maisonettes, bungalows) published by The Electrical Safety Council (now Electrical Safety First).



Appendix B
Explanations of [0]Numbered Terms Based on SBS Definitions

This appendix provides explanations of the [0]numbered terms based on the definitions in Appendix A in the Scottish Building Standards (SBS) Technical Handbooks.

1) Compartment means a part of a building (which may contain one or more rooms, spaces or storey 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 mean respectively a floor or a wall with the fire resistance required to ensure compartmentation.

2) Separating floors and walls are floors and walls constructed to prevent the spread of fire between buildings or part of buildings of different occupations. (Generally one hour duration).
   - For domestic premises these floors and walls are required between adjoining dwellings or between dwellings and adjoining common areas e.g. stairwells, garages or non-domestic buildings. (Normally half hour duration).
   - For non-domestic premises separating walls and floors are required between parts of a building with different occupation. For multi-occupied buildings with a shared reception and facilities including fire alarm systems etc. separating floors and walls are not required.

3) Cavity barrier means any construction provided to seal a cavity against the penetration of fire and smoke, or to restrict its movement within the cavity.
   - A cavity barrier should be installed, for example, between a roof space and any other roof space or between a cavity and any other cavity such as at the wall-head between a wall cavity and a roof space cavity.

4) Fire-stop means 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.

5) Intumescent products are fire resistant products designed to expand and provide fire stopping, when subjected to heat.

6) Thermoplastic materials are synthetic products which have a softening point below 200[0]C. Burning droplets from these products can increase the spread of fire and the resulting smoke is particularly dense and toxic.

7) Protected zone means that part of an escape route which is within a building, but not within a room, and to which access is only by way of a protected door and from which there is an exit directly to a place of safety.

8) Unprotected zone means that part of an escape route, which is separated by walls, glazed screens or any other permanent form of demarcation from any space intended for human occupation, including a protected zone.

9) Escape route means a route by which a person may reach a place of safety, and in relation to:
   a) a storey, a space or an access deck, means a route from an exit from that storey, space or access deck;
   b) a room, means a route from an exit of that room;
   c) an inner room, other than an inner room in a dwelling, means a route from an exit of the room which provides access to the inner room;
   d) a flat or maisonette, means a route from the main entrance door of that flat or maisonette;
   e) a gallery, catwalk or openwork floor, means a route from any doorway of, or from the head of any unenclosed escape stair from, that gallery, catwalk or openwork floor;
   f) a place of special fire risk, means a route from an exit of that room or from an exit of the protected lobby serving that room, or from an exit of the room or lobby separating the place of special fire risk from any other accommodation, as the case may be.

10) Storey means 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.

11) Flat means 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.

12) Maisonette means a dwelling on more than one storey, forming part of a building from some other part of which it is divided horizontally.

13) Protected circuit is a circuit originating at the main incoming switch or distribution board, the conductors of which are protected against fire. Examples include PVC cables in metal conduit or trunking. PVC SWA cables, MICC cables, BS 7629 'soft skinned' LSF cables and PVC sheathed cables embedded in walls or ceilings. Surface mounted PVC sheathed cables are not suitable.

14) Dwelling means a unit of residential accommodation occupied (whether or not as a sole or main residence):
   a) by an individual or by individuals living together as a family; or
   b) by not more than six individuals living together as a single household (including a household where care is provided for residents), and includes any surgeries, consulting rooms, offices or other accommodation, of a floor area not exceeding in the aggregate 50 square metres, forming part of a dwelling and used by an occupant of the dwelling in a professional or business capacity.

15) Smoke alarm means a device powered by mains electricity, with a secondary power source, containing within one housing all the components necessary for detecting fire and thereupon giving an audible alarm.

16) Residential building means a building, other than a domestic building, having sleeping accommodation.

17) Open-flued appliance means one that draws its air for combustion from the room or internal space within which it is installed and uses a flue system to discharge its products of combustion to the outside air.

18) Low voltage (LV) is a voltage exceeding extra-low voltage but not exceeding 1000V AC. or 1500V DC. between conductors or 600V AC. or 900V DC. between conductors and Earth.

19) Extra-low voltage (ELV) is a voltage not exceeding 50V AC. or 120V DC. between conductors or to Earth.

20) Domestic building means a dwelling or dwellings and any common areas associated with the dwellings.

21) Residential care building means a building used, or to be used, for the provision of:
a) a care home service; or
b) a school care accommodation service,
and for these purposes the expressions mentioned in sub-paragraphs a) and b) above have the same a care home service; or meaning as in the Regulation of Care (Scotland) Act 2001.

22) Differential movement means distinctive movement of materials due to expansion and contraction caused by differences in ambient temperature or other similar factors.

23) Passive stack ventilation system consists of a suitable duct from a ceiling to a roof terminal designed to remove any moisture-laden air. The differences in internal and external air temperature cause natural air movement in the duct.

24) Protected enclosure in a dwelling means a circulation area constructed to resist fire in an adjoining accommodation. It includes a hall, landing or private stair or ramp, but not a room.

25) Height of a storey is the vertical height from the adjacent ground to the upper surface of the floor of that storey.

26) House means a dwelling on one or more storeys, either detached or forming part of a building, from all other parts of which it is divided only vertically.

27) Apartment means a room in a dwelling not used solely as a kitchen, store or utility room.

28) Inner room means 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.
- As escape from an inner room is possible only by passing through an adjoining access room, occupants within an inner room could become trapped in the event of an outbreak of fire in the access room.

29) Protected door means a fire door giving access to:
a) a protected zone, including a protected lobby; or
b) a fire fighting shaft; or
c) another compartment; or
d) a place of safety; or
e) an unenclosed external escape stair; or
f) an open access balcony; or
g) an escape route access across a flat roof or access deck.

30) Accessible entrance means the entrance to a building designed to present as little restriction to passage as possible and includes facilities to allow wheelchair access.

31) Direct emission heating system in relation to a building, means a fixed combustion appliance installation (other than a fixed combustion appliance installation which is a source of production from which thermal energy is distributed by a heat network) the purpose of which is to produce thermal energy by which space within the building is heated or cooled, or by which hot water is made available in the building, and which:

a. is located within the building, or curtilage of the building, and

b. during normal operation produces more than a negligible level of greenhouse gas emissions at the point of production of that thermal energy.

Accordingly, "zero direct emission heating systems" are solutions other than direct emission heating systems.

"Pre-2024 building" means a building originally constructed before 1 April 2024, or constructed after that date in accordance with a building warrant granted (whether before or after that date) in respect of an application for a building warrant made before that date.

32) Emergency heating means a fixed combustion appliance installation which is installed to be used only in the event of the failure of the heating or hot water service system which is designed and installed for use during normal operation of the building.

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