

BS 5410-1:2019

Incorporating corrigendum No. 1



BSI Standards Publication

Code of practice for liquid fuel firing

Part 1: Installations for space heating and hot water supply
purposes for domestic buildings

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Foreword

Publishing information

This part of BS 5410 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 June 2019. It was prepared by Technical Committee RHE/13, *Liquid fuel firing*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 5410 supersedes [BS 5410-1:2014](#) which is withdrawn.

Relationship with other publications

BS 5410 is published in three parts:

- *Part 1: Installations for space heating and hot water supply purposes for domestic buildings*
- *Part 2: Installations providing space heating, hot water and steam supply services to non-domestic buildings*
- *Part 3: Installations for furnaces, kilns, ovens, oil-fuelled standby generators and other industrial purposes.*

Hazard warnings

WARNING. Decommissioning and disposal of liquid fuel storage tanks

The decommissioning and disposal of liquid fuel storage tanks can become necessary as part of the maintenance cycle of a liquid fuelled system. This is not covered in the present standard. It is a very hazardous procedure, and it is imperative that it is only undertaken by specialist operatives who have the right equipment, expertise and insurance. Building owners should never attempt to cut up old liquid fuel storage tanks themselves.

NOTE 1 Attention is drawn to the Construction (Design and Management) Regulations 2007 (as amended, 2015) [1], which class such work as a “demolition project”.

NOTE 2 Detailed guidance on decommissioning and disposal of liquid fuel storage tanks is given in OFTEC Technical Book 3 [N4].

NOTE 3 Attention is drawn to The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR), as amended [2] and the need to risk assess the selection of equipment to ensure safety in use and maintenance operations.

Information about this document

Text introduced or altered by Corrigendum No. 1 is indicated in the text by tags C1 C1. Minor editorial corrections are not tagged.

This is a full revision of the document and introduces the following changes:

- the Scope has been revised to cover all sizes of installations serving domestic buildings up to those with an output of 70 kW;
- secondary containment fitted to storage tanks is required to be ventilated directly to atmosphere;
- a requirement to use a carbon monoxide detector with all internally installed combustion appliances has been added;

- combustion air requirements are to be calculated on the heating appliance's maximum rated output; and
- additional clarifications and guidance have been added for those carrying out installation, commissioning, service and maintenance works.

Where websites and webpages have been cited, they are provided for ease of reference and are correct at the time of publication. The location of a webpage or website, or its contents, cannot be guaranteed.

Use of this document

As a code of practice, this part of BS 5410 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of BS 5410 is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this part of BS 5410 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Particular attention is drawn to the following specific regulations:

- The Construction (Design and Management) Regulations 2007 (as amended, 2015) [1].
- The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR), as amended [2].
- The Boiler (Efficiency) Regulations 1993 as amended by the Boiler (Efficiency) (Amendment) Regulations 1994 and the Boiler (Efficiency) (Amendment) Regulations 2006 [3].
- The Building Regulations [4], [5], [6].
- The Control of Pollution (Special Waste) (Amendment) Regulations 1988 [7].
- The Control of Pollution (Oil Storage) (England) Regulations 2001 [8].
- The Control of Pollution (Oil Storage) (Amendment) Regulations (Northern Ireland) 2010 [9].
- Water Resources (Control of Pollution) (Oil Storage) (Wales) Regulations 2016 [10].
- The Water Environment (Miscellaneous) (Scotland) Regulations 2017 [11].

Attention is drawn also to amendments which may be made from time to time in these regulations.

1 Scope

This part of BS 5410 gives recommendations and guidance on the design, installation, commissioning and maintenance of liquid fuel burning installations for space heating and hot water supply purposes in domestic buildings with an output not exceeding 70 kW. It also gives recommendations and guidance on the selection and installation of liquid fuel storage tanks of capacity up to 3 500 l, when installed at domestic buildings. This British Standard is also applicable to liquid fuel fired cookers where these are connected to flues. This part of BS 5410 is not applicable to liquid fuel fired systems for marine and transportable installations, or for flueless heaters.

This part of BS 5410 is applicable to installations burning liquid fuel conforming to BS 2869, including biofuels conforming to BS EN 14214, and blends thereof.

This British Standard is intended for use by designers, specifiers, installers, and service and commissioning engineers.

NOTE 1 The types of appliances and burners covered by this part of BS 5410 are described in [Annex A](#).

NOTE 2 Liquid fuel tank installations at domestic buildings, with a storage capacity greater than 3 500 l, are covered by [BS 5410-2](#).

NOTE 3 Liquid fuel tank installations at non-domestic buildings, with a storage capacity up to 3 500 l, are covered by [BS 5410-2](#).

NOTE 4 Where a domestic building has a boiler capacity in excess of 70 kW installed in a dedicated boiler or plant room, see [BS 5410-2](#).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

[BS 799-5](#), *Oil burning equipment — Part 5: Carbon steel oil storage tanks — Specification*

[BS 2869:2017](#), *Fuel oils for agricultural, domestic and industrial engines and boilers — Specification*

[BS 5410-2:2018](#), *Code of practice for liquid fuel firing — Part 2: Installations providing space heating, hot water and steam supply services to non-domestic buildings*

[BS 7671](#), *Requirements for Electrical Installations — IET Wiring Regulations*

BS EN 977:1998, *Underground tanks of glass-reinforced plastics (GRP) — Method for one side exposure to fluids*

BS EN 1057:2006+A1:2010, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications*

BS EN 1254-2:1998, *Copper and copper alloys — Plumbing fittings — Part 2: Fittings with compression ends for use with copper tubes*

BS EN 1856-1:2009, *Chimneys – Requirements for metal chimneys – Part 1: System chimney products*

BS EN 1856-2:2009, *Chimneys – Requirements for metal chimneys – Part 2: Metal flue liners and connecting flue pipes*

[BS EN 12285-3](#), *Workshop fabricated steel tanks — Part 3: Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and nonflammable water polluting liquids for heating and cooling of buildings*

BS EN 13341, *Static thermoplastic tanks for above ground storage of domestic heating oils, kerosene and diesel fuels — Blow moulded and rotationally moulded polyethylene tanks and rotationally moulded tanks made of anionically polymerized polyamide 6 – Requirements and test methods*

BS EN 14125, *Thermoplastic and flexible metal pipework for underground installation at petrol filling stations*

BS EN 14214, *Liquid petroleum products — Fatty acid methyl esters (FAME) for use in diesel engines and heating applications — Requirements and test methods*

BS EN 15940, *Automotive fuels — Paraffinic diesel fuel from synthesis or hydrotreatment — Requirements and test methods*

BS EN 50291-1, *Gas detectors — Electrical apparatus for the detection of carbon monoxide in domestic premises — Part 1: Test methods and performance requirements*

Other publications

[N1] CHARTERED INSTITUTION OF BUILDING SERVICES ENGINEERS. *Domestic Heating – Design Guide*. CIBSE, London, 2017.

[N2] OIL FIRING TECHNICAL ASSOCIATION. *OFS T200 Steel oil storage tanks with and without secondary containments for use with distillate fuels, bio-fuels, lubrication oils and waste oils. Issue 11*. OFTEC, Ipswich, 2016.

[N3] OIL FIRING TECHNICAL ASSOCIATION. *OFS T100 Polyethylene oil storage tanks and tank bunds for distillate fuels. Issue 9*. OFTEC, Ipswich, 2015.

[N4] OIL FIRING TECHNICAL ASSOCIATION. *Technical Book 3, Domestic and commercial requirements for oil storage and supply equipment: Serving fixed combustion appliances*. OFTEC, Ipswich, 2010.

[N5] CONSTRUCTION INDUSTRY RESEARCH AND INFORMATION ASSOCIATION. *Report 163 Construction of Bunds for Oil Storage Tanks*. CIRIA, 1997.

[N6] OIL FIRING TECHNICAL ASSOCIATION. *Technical Book 2, Domestic and light commercial service and commissioning: Requirements for oil fired systems (Pressure jet appliances)*. OFTEC, Ipswich, 2010.

[N7] OIL FIRING TECHNICAL ASSOCIATION. *Technical Book 5, Domestic servicing and commissioning: Requirements for oil fired systems (Vaporizing appliances)*. OFTEC, Ipswich, 2010.

[N8] OIL FIRING TECHNICAL ASSOCIATION. *OFS E103, Gauges for use with domestic oil supply tanks*. Ipswich: OFTEC.

3 Terms and definitions

For the purposes of this part of BS 5410 the following terms and definitions apply.

3.1 liquid fuel

mineral, vegetable or synthetic liquids or blends thereof, intended for combustion in boilers, cookers or air heaters

3.2 primary tank

vessel used for the containment of liquid fuel

3.3 secondary containment

containment system designed to contain any leakage from the primary fuel storage tank or fuel spillage in the event of an overfill occurring, and to hold a minimum of 110% of the primary tank capacity

NOTE It is also referred to using the term "bund".

3.3.1 enclosed secondary containment

form of secondary containment which fully encloses the primary liquid fuel storage tank inside it so as to contain any spillage caused by leakage from or overfilling of the primary tank

NOTE Manufacturers' literature sometimes refers to this type of tank system as being "integrally banded".

3.3.2 open secondary containment

form of secondary containment in which the primary tank is stood inside an open topped containment area which can be constructed of masonry or other material capable of containing liquid fuel

NOTE These containment areas are often referred to as "bunds".

3.4 chimney

construction to carry the products of combustion to the atmosphere having one or more passages

NOTE The passages are known as "flues".

3.5 buildings

3.5.1 domestic buildings

single buildings used primarily as dwellings

NOTE Attention is drawn to the Town and Country Planning Act 1990 (as amended), definition C3 [24].

3.5.2 non-domestic buildings

places of work, public assembly, entertainment or hospitality, communal areas and shared services therein associated with buildings which contain multiple separate dwelling units

NOTE Examples of non-domestic buildings can include public houses, restaurants, village halls, churches, guest houses, hotels, etc. For further information see the Town and Country Planning Act (1990, as amended) [24].

3.6 tank chamber

enclosure of a tank consisting of structural walls, floor and ceiling or roof

NOTE 1 The main purpose of a tank chamber is to protect the contents of the tank from a fire originating outside the tank chamber.

NOTE 2 Non fire-rated buildings or structures should not be used to house liquid fuel storage tanks.

3.7 compartment

enclosed space intended solely to contain a heating appliance with or without ancillary equipment

3.8 de-aerators

3.8.1 open de-aerators

de-aerator specifically designed to vent gaseous emissions to atmosphere

3.8.2 closed de-aerators

de-aerator specifically designed to collect and finely disperse gaseous emissions to the burner

3.9 boundary

legal boundary dividing one person's property from another which might or might not be a physical boundary in the form of a hedge, fence, wall, etc.

NOTE 1 A boundary is additionally a boundary line dividing property and permitted land use such as the demarcation line between agricultural, equine, livestock and domestic land such as can be found at farms, commercial and domestic land use such as can be found at schools or colleges having a caretaker's dwelling house on site or campus.

NOTE 2 For further information refer to the Town and Country Planning Act 1990 (as amended) [24].

4 Liquid fuels

4.1 Types of liquid fuel

Liquid fuel conforming to [BS 2869:2017](#), class C2 and D, and biofuels conforming to BS EN 14214 or BS EN 15940, as specified by the equipment manufacturer, should be used with the equipment covered by this British Standard.

The specifier of the installation and the user should consult the local authority regarding any local controls which might limit the types of liquid fuel that may be used.

4.2 Liquid fuel characteristics

Users should obtain information on the typical characteristics of the fuel supplied, and advice on the safe storage and handling of this, from their fuel supplier.

A safety data sheet should also be obtained from the fuel supplier or from the fuel producer.

NOTE Attention is drawn to the Control of Substances Hazardous to Health Regulations [12] regarding the information that the safety data sheet is required to contain.

Liquid fuels intended for use in fixed combustion appliances should have defined and industry agreed limits for density and specific energy (maximums and minimums). Producers and/or suppliers of such fuels should declare the typical density and specific energy of the fuels to be supplied to enable safe and efficient combustion to be achieved.

Fuels with unknown density and/or specific energy values should not be used in fixed combustion appliances.

5 Installation of liquid fuel fired appliances

5.1 General

NOTE 1 The initial installation and replacement of liquid fuel fired appliances is work covered by the Building Regulations [4], [5], [6].

This type of work should be undertaken by competent technicians, subject to supervision by either a registration body or the local authority building control department.

NOTE 2 If a person registered with an approved scheme is used for such work then it is not required that application is made to the local authority building control department for approval prior to the work commencing and such individuals can self-certify compliance of their own work at completion.

NOTE 3 Where documentation is required by the local authority to confirm competent installation work, OFTEC form CD/10 [13] or equivalent may be used.

NOTE 4 Attention is drawn to the Building Regulations [4], [5], [6] with respect to structural alterations to buildings.

5.2 Selection of appliance

5.2.1 Factors affecting selection

NOTE The serviceability and safety of a heating appliance depend upon careful selection to enable it to match its working environment as well as the characteristics of the appliance itself.

The manner in which appliances are used varies from building to building and this should be taken into account when a heating appliance is selected. The operating factors listed in 5.2.2 should be ascertained and used in the selection of the appliance.

5.2.2 Operating factors

5.2.2.1 The required gross capacity of the heating appliance should be determined on the basis of the following factors:

- a) the preferred room temperature;
- b) the design winter temperature;
- c) the structural and ventilation heat losses per °C;
- d) the degree of continuity of heating required by the user;
- e) the extent to which space and water heating are to be coupled; and
- f) the preferred form of user control or programming.

5.2.2.2 The rated output of the appliance should be able to meet the calculated space and water heating demand.

NOTE Correct selection of system controls can avoid the need for a margin of extra capacity.

5.2.2.3 The low load requirements of the system should also be taken into account, particularly when space and water heating are to be combined.

NOTE 1 Where these requirements are likely to be exceeded at the lowest limit of the turn down range of an appliance then a multi stage burner and controls is preferred.

NOTE 2 Guidance on the design of space and water heating systems is given in BS EN 12828 and the CIBSE Domestic Heating – Design Guide [N1].

5.2.2.4 Heating systems served by fully automatic liquid fuel fired appliances should be of the fully pumped circulation type with their electrical controls arranged to prevent the burner short cycling.

NOTE Attention is drawn to the Building Regulations [4], [5], [6] with regard to heating system control.

5.3 Siting of appliance

5.3.1 General

The appliance should be sited so as to reduce risks, especially the risk of fire, to a minimum. If possible, the appliance should be installed at ground floor or basement level, preferably in a boiler room, utility area or kitchen. The appliance should be installed on a floor or above a surface which is impervious to liquid fuel. Minor spillages from the burner or its connections occurring during installation or maintenance should be contained within the appliance or within a separate containment tray. The appliance should not be positioned where accidental spillage would be able to soak into combustible material such as wood or carpeting. Fuel pipework within the building or structure should be kept to a minimum.

NOTE 1 Alternatively, floor standing or wall mounted appliances designed specifically for external locations may be installed.

NOTE 2 Attention is drawn to the Building Regulations [4], [5], [6].

Where a liquid fuelled appliance is located inside a building or structure or within a restricted area externally, a carbon monoxide detector alarm conforming to BS EN 50291-1 should be installed in accordance with the manufacturer's instructions.

The need to avoid noise and vibration nuisance to building occupants and neighbours should be taken into account.

The following should also be taken into account:

- a) any constraint imposed under [5.2.2](#);
- b) the manufacturer's installation instructions with respect to the provision of space around the appliance to allow:
 - 1) sufficient circulation of air for combustion and cooling and the operation of a draught diverter if required;
 - 2) sufficient access and clearance for maintenance and servicing (see also [5.6.10](#));
- c) environmental conditions, and need for combustion and ventilation air in accordance with [5.4](#);
- d) heat emission from the appliance casing and the manufacturer's instructions with respect to provision of protection of the floor or wall on which the appliance is to be mounted;
- e) the recommendations given in [Clause 10](#) regarding flues and chimneys; and
- f) the fact that open-flued appliances should not be installed in bathrooms, bedrooms or bedsitting rooms because of the possible increased risk of carbon monoxide poisoning.

NOTE 3 The physical size of the appliance might determine whether it can be accommodated in a habitable room or whether it needs to be separately housed.

If an appliance is intended to be built-in, so that it is adjacent to combustible material, an appliance classified as suitable for this purpose should be selected.

5.3.2 Room sealed appliances

It is recommended that where possible room sealed appliances should be selected for installation within habitable spaces.

5.4 Provision of air for combustion and ventilation

NOTE The recommendations given in this Clause for the provision of combustion and ventilation air supplies for different types of appliances are illustrated in [Figure 1](#) and [Figure 2](#).

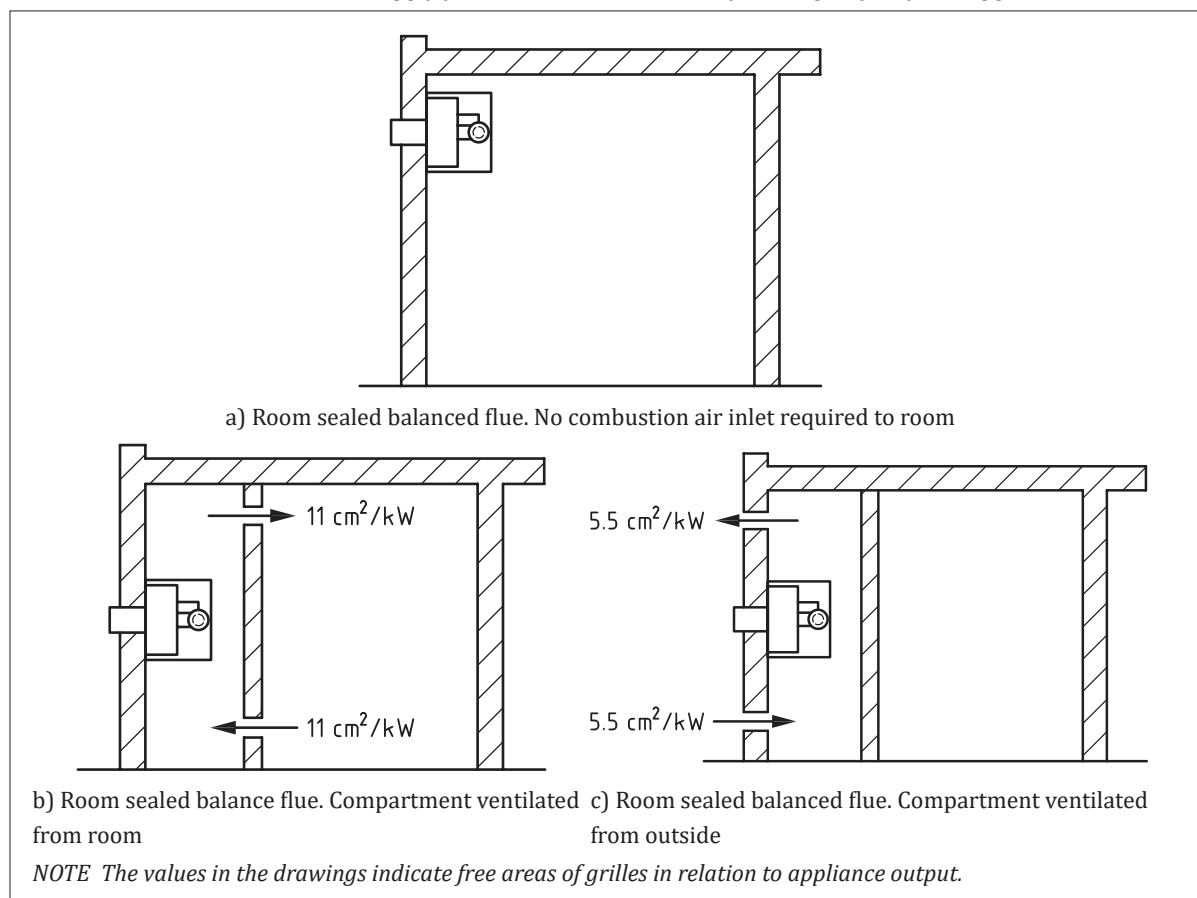
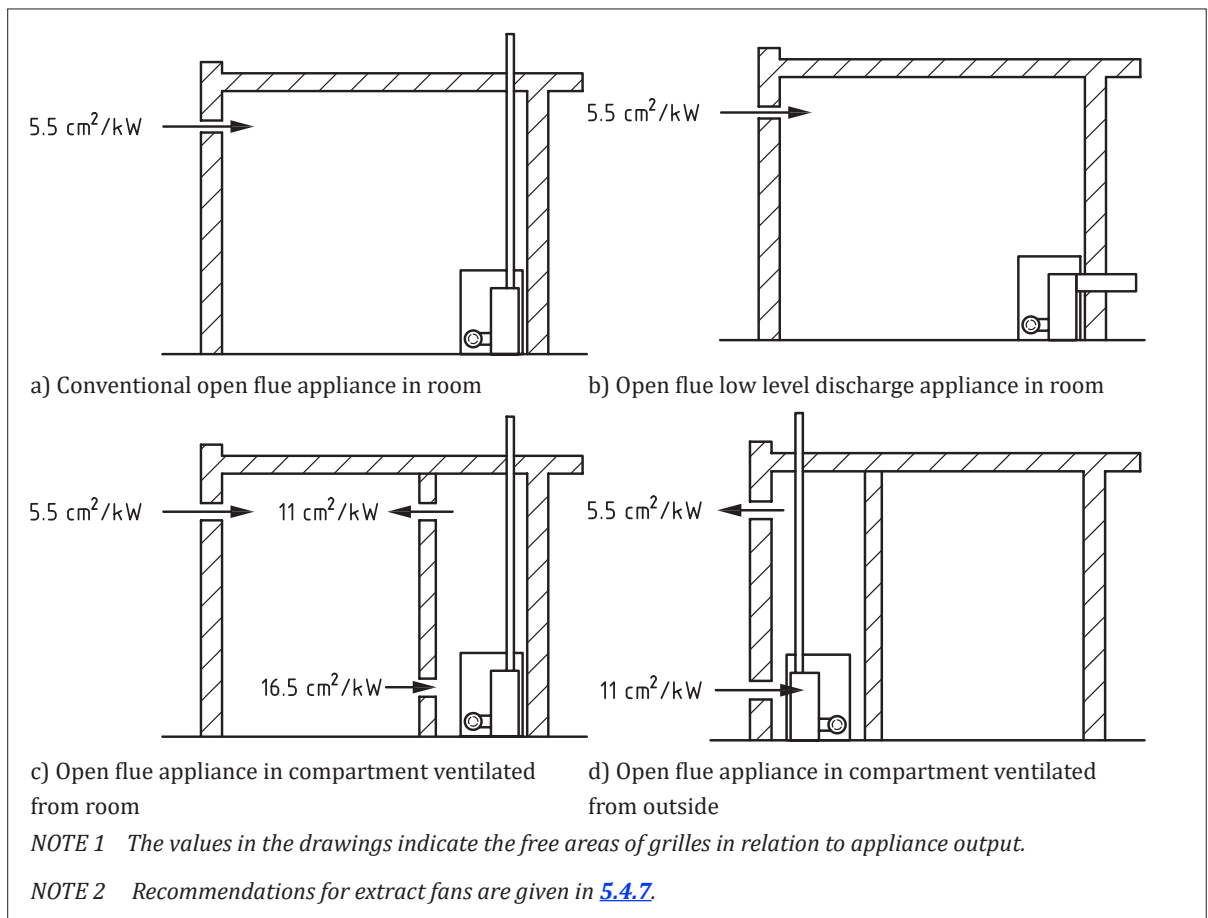
Figure 1 — Combustion and ventilation air supply for room sealed balanced flued liquid fuel fired appliances

Figure 2 — Combustion and ventilation air supply for open flued liquid fuel fired appliances

5.4.1 General

A sufficient permanent air supply to an appliance should be provided:

- a) for proper combustion of fuel and effective discharge of combustion products to the open air;
- b) for the ventilation of any confined space in which an appliance is installed to prevent overheating of the room or space in which the appliance is installed and any equipment in and near the appliance; and
- c) for the satisfactory operation of any draught break or stabilizer which might be fitted.

The designer and installer should ensure that the air required for these functions is introduced in such a way as to cause as little discomfort as possible to building occupants and thus to offer them the least temptation to obstruct ventilators.

5.4.2 Air for combustion for open flued appliances

The room or space in which the appliance is installed should have a purpose designed non-closeable opening or duct which is designed to allow the passage of air at all times, equivalent in total free area to 5.5 cm² for each kilowatt (kW) of appliance maximum rated output.

NOTE 1 For vaporizing appliances the minimum combustion air supply shall be 100 cm². Where the calculated amount of combustion air supply is greater than 100 cm² the greater value shall be applied.

NOTE 2 Such provision is not necessary for a room sealed appliance designed to take air for combustion directly from outside.

5.4.3 Air for ventilation

For an appliance in a confined space, such as a compartment, care should be taken to provide air for ventilation. The minimum free area of openings to be provided in addition to that for combustion air equivalent to that required at the appliance maximum rated output and should be as follows:

- a) where the air is taken from a heated space, 11 cm²/kW at high level and 11 cm²/kW at low level;
- b) where the air is taken from outside, 5.5 cm²/kW at high level and 5.5 cm²/kW at low level.

This provision should be made for both open flued and room sealed appliances.

NOTE Free area is the unobstructed opening allowing air to flow through the grille or air brick.

5.4.4 Air supply ducts and grilles

Grilles and other openings should be of the purpose designed non-closeable type.

They should be positioned so that they are not likely to be accidentally blocked, i.e. they should always be positioned in the vertical plane even if they supply air from an underfloor or similar area. Where more than two air vents are fitted in series across an air supply path, the free area of each vent should be increased by at least 50% over that required for a corresponding single vent. Ductwork should be properly supported and sealed, particularly where it crosses cavities. The cross-sectional area should not be less than the area of the opening required to accommodate the air vent it serves.

5.4.5 Draught breaks and stabilizers

An appliance fitted with a draught break or draught stabilizer should have adequate inlet air supply to allow efficient operation. Where ventilation openings are provided as recommended in [5.4.3](#) no separate allowance need be made, but where a combustion air supply opening only is provided an additional free area of 5.5 cm²/kW should be provided.

5.4.6 Basement installations

When combustion air is supplied to an appliance in a basement, or similar below ground enclosed area, it should be ducted to low level.

5.4.7 Extract fans

5.4.7.1 General

If the building or structure containing an open flued combustion appliance has an extract ventilation fan fitted that could affect appliance performance, the supply of air should be such that the operation of the appliance and flue is unaffected when the extract fan is running. In these cases a flue draught interference test, as described in [5.4.7.2](#), should be carried out. Extract fans should be fitted far enough away from open flued appliances to minimize the risk of interference with the flue. A separate air supply opening should be provided to supply air to the extract fan. This should be sized to allow the entry of sufficient air to ensure that the fan does not affect the operation of the flue to the liquid fuel fired appliance.

5.4.7.2 Testing for flue draught interference

To carry out a flue draught interference test when the appliance and the extract fan are in the same room, the doors and windows of the room should be closed. Any adjustable ventilation openings should also be closed. Where the extract fan is located elsewhere in the building or structure, the external doors should be closed and the internal doors between the fan and the appliance should be left open.

When the doors and windows have been adjusted, the extract fan should be set in operation at its full capacity. After the fan has established its normal airflow pattern the liquid fuel fired appliance

should be set in operation at maximum output. Combustion condition readings should then be taken with and without the extract fan running. The test should be carried out to check that there is no interference by the fan with the performance of the liquid fuel fired appliance under all operating conditions.

The effects of the operation of appliances using other fuels and of appliances such as tumble dryers, which extract air to the outside, should be taken into account.

5.5 Water circulating heating systems

Water circulating heating systems should be designed and installed in accordance with the recommendations given in the CIBSE *Domestic Heating – Design Guide* [N1].

5.6 Special installations

5.6.1 General

If it is not possible to install the appliance at ground floor or basement level in a kitchen or utility area or the boiler room, and an alternative installation is needed; the recommendations given in [5.6.2](#) to [5.6.11](#), as applicable, should be followed. In these cases, the general safety recommendations for the siting of the appliance given in [5.3](#) should also be followed.

5.6.2 Heating appliance compartment installations

A heating appliance compartment should be in accordance with the following recommendations.

- a) It should be a fixed rigid structure, the internal surfaces of which are protected in accordance with item f).
- b) It should incorporate air vents for the provision of air for ventilation and, where necessary, for combustion in accordance with [5.4](#).
- c) It should permit access for inspection and servicing of the appliance and any ancillary equipment. It should be fitted with a door that will permit withdrawal of the appliance and any ancillary equipment. To discourage its use as a storage cupboard, a notice should be fixed in a prominent position to warn against such use.
- d) Where the appliance compartment houses an open-flued appliance, the air vents should not communicate with a garage, bathroom, bedroom or bedsitting room. Any draught diverter should be in the compartment.
- e) Where the compartment houses an open-flued appliance and the door opens on to a garage, bathroom, bedroom, bedsitting room, then the door should have a warning notice attached stating: "This door must be kept closed at all times except when resetting the appliance controls".
- f) The internal surfaces of the compartment should be protected in accordance with the appliance manufacturer's installation instructions. Where the appliance manufacturer's installation instructions do not give specific instructions, any internal surface of the compartment which is of combustible material either should be at least 75 mm from any part of the appliance or should be lined with non-combustible material.

NOTE Information on determining whether a material may be described as combustible or non-combustible is given in [BS 476-4](#).

5.6.3 Airing cupboard installations

The partitioned space of an airing cupboard adapted to house an appliance should be in accordance with [5.6.2](#).

Additionally, the airing spaces should be separated from the appliance by a non-combustible partition which may be perforated, if required, by apertures, the major dimension of which should not be greater than 13 mm.

The flue pipe should not pass through the airing space unless protected sufficiently to prevent damage to the airing space contents or injury to users.

NOTE 1 For double wall flue pipe, the external skin and air gap provide insulation to a standard where no extra precautions are necessary other than normal installation tolerances.

NOTE 2 Further information on double wall flue pipe is given in BS EN 1856-2.

Flue pipes should be separated from combustible material by at least the minimum safe distance as specified by the flue or chimney component manufacturer. For single wall flue pipe, protection should be provided by an air gap of at least 25 mm.

NOTE 3 This air gap may be provided by a non-combustible guard which forms an annular space around the flue pipe.

Where the compartment partition is positioned next to a protected flue, the gap between the flue guard and compartment partition should not exceed 13 mm.

NOTE 4 Expanded metal or rigid wire mesh can be used for the partition and guard.

5.6.4 Understairs installations

An appliance should only be installed in an understairs location where no practicable alternative location is available. Whenever possible, an appliance in an understairs location should be of the room sealed type.

Understairs installations should be in accordance with the following recommendations.

- a) The premises in which the appliance is to be located should be no more than two storeys.
- b) Where the area is enclosed, the enclosure should be in accordance with [5.6.2](#).
- c) All internal surfaces around and above the appliance, including its base, should be non-combustible or lined with non-combustible material having a fire resistance of not less than 30 min.

NOTE Further information on determining fire resistance is given in [BS 476-22](#).

- d) The air vents should be direct to outside air.

5.6.5 Fireplace installations

Fireplace installations should be in accordance with the following recommendations.

- a) An appliance which is purpose designed for location in a fireplace recess should be installed with space around it for air circulation and combustion air supply and with space for maintenance and servicing in accordance with the manufacturer's installation instructions.
- b) The dimensions of the fireplace opening and the flue should be as given in the appliance manufacturer's instructions.

NOTE 1 It might be necessary to modify the fireplace opening or the flue to give the appropriate dimensions (however, see Note 3).

- c) A hearth should be provided in accordance with [5.7](#).
- d) The appliance should be flued in accordance with [Clause 10](#). An existing brick chimney should be swept and lined with an appropriate rigid or flexible liner before use for this type of appliance.

Purpose designed enclosures and flues should be constructed of non-combustible material and sized in accordance with the appliance manufacturer's instructions.

NOTE 2 Proprietary items constructed of suitable material are available.

NOTE 3 Structural work to fireplace recesses requires Building Regulation [4], [5], [6] approval.

5.6.6 Bathroom installations

An appliance should only be installed in a bathroom if no practicable alternative location is available.

An appliance installed in a bathroom should be of the room sealed type.

The electrical connections to the appliance should be in accordance with [BS 7671](#). Switches or controls in bathrooms should be enclosed by the appliance outer casing or compartment in such a way that they cannot be touched by a person using the bath or shower.

5.6.7 Bedroom and bedsitting room installations

An appliance should only be installed in a bedroom or bedsitting room if no practicable alternative location is available.

An appliance installed in a bedroom or bedsitting room should be of the room sealed type.

The need to avoid noise and vibration nuisance to building occupants and neighbours should be taken into account.

5.6.8 Garage installations

For garage installations only room sealed appliances should be used.

5.6.9 Roof space installations

An appliance should only be installed in a roof space if no practicable alternative location is available.

The level of noise emitted by the appliance should be taken into account.

Roof space installations should be in accordance with the following recommendations.

- a) Vertical clearances should be provided so that the static head requirement of the appliance is met.
- b) A flooring area for normal use and servicing should be provided under and around the appliance. This should take the form of a fuel-proof tray with impervious sides at least 75 mm high. The tray should be provided with a fuel level detector valve that will shut off the fuel supply and the appliance if the presence of fuel is detected.
- c) The appliance support should be capable of supporting the load of the water filled boiler, associated pipework and equipment, and the tray if it became filled with water or liquid fuel. It should also be capable of supporting maintenance personnel.
- d) Where the floor is of combustible material and supports the appliance, a non-combustible insulating base of at least 12 mm thickness should be provided under the boiler.
- e) The liquid fuel supply pipe should preferably be run up to the height required on the outside of the building or structure and should have no joints in its internal section, other than within the area protected by the fuel-proof tray [see [5.6.9 b\)](#)].
- f) A permanent means of access to the appliance installation should be provided, for example a permanently fixed retractable roof ladder leading to a loft access hatch. A hatch guard rail and a protected walkway from the hatch to the appliance should be provided.
- g) A safety guard should be provided around the appliance.

- h) A means should be provided to shut down the appliance and isolate the liquid fuel supply without entering the roof space.
- i) The appliance should be flued in accordance with [Clause 10](#). Where an existing brick chimney is utilized, the unused lower portion should be blanked off by means of a plate inserted to form a void extending approximately 240 mm below the appliance connection to the chimney but ensuring that the other flues in the same chimney stack are not sealed off.
- j) Access should be provided to the void immediately below the appliance connection to the chimney. Any openings into the lower portion of an internal flue, i.e. the sealed-off section, should be permanently closed off. For a flue with at least one external face, the sealed section should be ventilated to the external air at high and low level to prevent moisture accumulation.

5.6.10 External installations

External installations should be in accordance with the following recommendations.

- a) An appliance installed in an external location should be either:
 - 1) an appliance specifically designated in the manufacturer's literature as being suitable for external installation without the need for additional protection; or
 - 2) installed in an enclosure capable of providing permanent weather protection.
- b) Where an enclosure is required it should be in accordance with [5.6.2](#) and the following recommendations.
 - 1) Within the enclosure an accessible, waterproof, fused double-pole switch should be provided to give complete electrical isolation of the appliance.
 - 2) Air vents should be fitted in the enclosure connecting directly to the outside air, at both high and low level in accordance with [5.4](#). The lowest part of the low level vent should be not less than 300 mm above ground level.
 - 3) Any permanent openings to the enclosure, including those in the air vents, should have a minor dimension not greater than 16 mm to prevent the entry of birds or rodents. However, this dimension should not be less than 6 mm in order to minimize the risk of blockage.
- c) Where an appliance is installed in an enclosure, the enclosure should be fitted with a means of preventing access by unauthorized persons.
- d) Appliances installed in an external enclosure should be flued in accordance with [Clause 10](#).
- e) The system should incorporate protection against corrosion, damage and freezing. Water-carrying pipework should be insulated against freezing.

NOTE Information on protection against freezing is given in [BS 5422](#).
- f) The appliance should be located such that it is accessible for maintenance without the use of ladders.
- g) If maintenance work is likely to be required in wet weather or at night, weather protection and lighting should be provided.
- h) Purpose built external appliances should be located on a free draining hard surface.

5.6.11 Other installations

An appliance installed in a location other than those covered in [5.6.2](#) to [5.6.10](#) should be installed in accordance with the manufacturer's instructions.

NOTE 1 Further information on the installation of appliances in leisure accommodation vehicles and transportable accommodation units is given in BS EN 722-1.