



BSI Standards Publication

Fire protection installations and equipment on premises

Part 0: Guide for selection, use and application of fixed firefighting systems and other types of fire equipment

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Summary of pages

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Foreword

Publishing information

This part of BS 5306-0 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 August 2020. It was prepared by Technical Committee FSH/18, *Fixed fire fighting systems*. A list of organizations represented on this committees can be obtained on request to the committee manager.

Supersession

This part of BS 5306 supersedes [BS 5306-0:2011](#), which is withdrawn.

Relationship with other publications

This part of BS 5306 serves to introduce the subsequent parts of BS 5306 and references other standards as listed below and detailed in the Bibliography, each of which gives requirements or recommendations for the application of a particular type of firefighting system, discharging a particular firefighting medium. Taken together, the various parts of BS 5306 and other British Standards are intended to cover all the main types of firefighting media and systems for buildings in current use, and therefore form a comprehensive guide to all aspects of the subject.

The subsequent parts of BS 5306 are as follows:

- Part 1: *Hose reels and foam inlets*;
- Part 3: *Commissioning and maintenance of portable fire extinguishers – Code of practice*;
- Part 4: *Specification for carbon dioxide systems*;
- Part 5: *Halon systems*¹⁾:
 - Section 5.1: *Specification for Halon 1301 total flooding systems*;
 - Section 5.2: *Halon 1211 total flooding systems*;
- Part 8: *Selection and installation of portable fire extinguishers – Code of practice*;
- Part 9: *Recharging of portable fire extinguishers – Code of practice*;
- Part 10: *Colour coding to indicate the extinguishing medium contained in portable fire extinguishers – Code of practice*.

The following parts of BS 5306 have been superseded:

- Part 2: *Specification for sprinkler systems* (superseded by BS EN 12845, *Fixed firefighting systems – Automatic sprinkler systems – Design, installation and maintenance*);
- Part 6: *Foam systems* (superseded by BS EN 13565-2, *Fixed firefighting systems – Foam systems – Part 2: Design, construction and maintenance*):
 - Section 6.1: *Specification for low expansion foam systems*;
 - Section 6.2: *Specification for medium and high expansion foam systems*;
- Part 7: *Specification for powder systems* (superseded by BS EN 12416-2, *Fixed firefighting systems – Powder systems – Part 2: Design, construction and maintenance*).

Other related standards are detailed in [Clause 14](#).

¹⁾ Systems that can be used as an alternative to halon are covered by the BS EN 15004 series.

Information about this document

The aim of this part of BS 5306 is to aid selection of the appropriate firefighting medium and type of system or equipment by describing the characteristics and most suitable applications of each.

Consideration has been given to the impact of firefighting media, including toxicity to people, effect of discharge on visibility, and danger of use on electrical equipment, in addition to factors such as monitoring, testing, maintenance and user responsibility.

More detailed consideration of systems and equipment, including safety precautions, is given in the subsequent parts of BS 5306 and other British Standards.

During the preparation of this part of BS 5306 it was suggested by some commentators that the advice in [Table 1](#) appears to be focused on the use of sprinklers as a first priority. The Technical Committee responsible for the preparation of this part of BS 5306 understands this possible perception. However, its intent is not to promote the use of sprinklers to the exclusion of other types of system. It is an undeniable fact that the lengthy international experience of sprinkler systems (since the 1880s) has generated a substantial body of practical experience, effective loss prevention experience, reliability data and knowhow which underpin and offer significant assurance upon the level of performance of the most widely used means of automatic fire suppression. This part of BS 5306 does not advocate that sprinkler systems be specified to the exclusion of other types of systems, rather it recognizes that sprinklers are proven to be suitable and dependable in more applications and occupancies than other types of system. This is reflected in [Table 1](#) and [Table 2](#).

None of the recommendations or guidance in this standard are to be taken as precluding the provision of manual means of fighting fire or as obviating the necessity to notify the fire and rescue service in the event of a fire.

The International System of Units (SI) (see BS EN ISO 80000-1) is followed in this part of BS 5306, except for units of pressure, which are expressed in bar²⁾. Water discharge densities are expressed as rainfall at floor level, in mm/min.

This publication can be withdrawn, revised, partially superseded or superseded. Information regarding the status of this publication can be found in the Standards Catalogue on the BSI website at bsigroup.com/standards, or by contacting the Customer Services team.

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 guide, this part of BS 5306 takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice.

Presentation conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any 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”).

²⁾ 1 bar = 10⁵ N/m² = 100 kPa.

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.

Introduction

There is a wide range of different types of firefighting systems and equipment available that suppress, control and, in some cases, extinguish fire. These systems utilize different firefighting media and, in some cases, apply such media in varying ways to suit different applications. The whole range of media and systems means that virtually all types of fire in a wide range of combustible materials can be tackled reliably and effectively.

The fire suppression industry has developed substantial experience and expertise over many years. With the results obtained from real fires, as well as exhaustive testing of systems and their individual components, a high degree of reliability and effectiveness can be claimed.

This part of BS 5306 is intended to assist those charged with selecting and specifying fixed firefighting systems to determine the most appropriate medium and method of application. This is not the simple process that is sometimes thought. Care is needed to ensure that characteristics of the fire hazard in relation to the building and its contents are properly assessed. This needs to include the nature of the fuel and its configuration, whether the objective is to suppress or extinguish the fire, and the consequences in use in relation to safety of persons, extent of fire damage and scope for secondary damage from the medium itself or by-products of its use.

Design and installation standards are available for all the individual systems and equipment referenced in this part of BS 5306. These standards are primarily aimed at giving recommendations or specifying requirements for the design, installation, operation and maintenance of such systems and equipment. These standards are not concerned with the relative merits of particular systems or equipment, nor do they compare these to other systems which might be available or focus on the limitations of such systems and equipment for any given application. That is the purpose of this part of BS 5306.

This part of BS 5306 is aimed at aiding the selection of the most effective firefighting medium and type of system or equipment by describing the characteristics and most suitable applications of each, as well as identifying limitations or safety aspects which need to be taken into account by stakeholders.

Section 1: Preliminaries

1 Scope

This part of BS 5306 gives guidance on the selection, use and application of automatic water sprinkler, water spray, water mist, gaseous, foam, condensed aerosol, wet chemical and powder firefighting systems and oxygen reduction systems. It also gives guidance on installed equipment for fire and rescue service use, and on portable fire extinguishers.

This part of BS 5306 does not cover firefighting systems for the following applications:

- use on ships, in aircraft, on vehicles and mobile fire appliances;
 - use below ground in the mining industry;
 - explosion suppression systems.
-

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document³⁾. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 4422, *Fire – Vocabulary*⁴⁾

[BS 5306-1](#), *Code of practice for fire extinguishing installations and equipment on premises – Part 1: Hose reels and foam inlets*⁵⁾

[BS 5306-3](#), *Fire extinguishing installations and equipment on premises – Part 3: Commissioning and maintenance of portable fire extinguishers – Code of practice*

[BS 5306-4](#), *Fire extinguishing installations and equipment on premises – Part 4: Specification for carbon dioxide systems*⁶⁾

[BS 5306-5](#), *Fire extinguishing installations and equipment on premises – Part 5: Halon systems*

[BS 7273-1](#), *Code of practice for the operation of fire protection measures – Part 1: Electrical actuation of gaseous total flooding extinguishing systems*⁷⁾

[BS 7273-2](#), *Code of practice for the operation of fire protection measures – Part 2: Mechanical actuation of gaseous total flooding and local application extinguishing systems*

[BS 7273-3](#), *Code of practice for the operation of fire protection measures – Part 3: Electrical actuation of pre-action watermist and sprinkler systems*

[BS 7273-5](#), *Code of practice for the operation of fire protection measures – Part 5: Electrical actuation of watermist systems (except pre-action systems)*

[BS 8458](#), *Fixed fire protection systems – Residential and domestic watermist systems – Code of practice for design and installation*

³⁾ Documents that are referred to solely in an informative manner are listed in the Bibliography.

⁴⁾ This standard also gives informative reference to BS 4422:2005.

⁵⁾ This standard also gives informative reference to BS 5306-1:2006.

⁶⁾ This standard also gives informative reference to BS 5306-4:2001+A1:2012.

⁷⁾ This standard also gives an informative reference to the BS 7273 series.

BS 8489-1, *Fixed fire protection systems – Industrial and commercial watermist systems – Code of practice for design and installation*⁸⁾

[BS 8663-1](#), *Fixed fire protection systems – Components for watermist systems – Part 1: Specification and test methods for watermist nozzles*

BS EN 54-4, *Fire detection and fire alarm systems – Part 4: Power supply equipment*

BS EN ISO 13943, *Fire safety – Vocabulary*

3 Terms and definitions

For the purposes of this part of BS 5306, the terms and definitions given in [BS 5306-1](#), [BS 5306-3](#), [BS 5306-4](#), [BS 5306-5](#), BS 4422, BS EN ISO 13943 and the following apply.

NOTE Additional terms, abbreviations and definitions are given in [Annex A](#).

3.1 authority having jurisdiction (AHJ)

organization, office or individual responsible for enforcing the requirements of legislation or standards, or for approving equipment, materials, an installation, or a procedure

3.2 class A fire

fire involving solid materials, usually of an organic nature, in which combustion normally takes place with the formation of glowing embers

[SOURCE: BS 4422:2005, 3.303]

3.3 class B fire

fire involving liquids or liquefiable solids

[SOURCE: BS 4422:2005, 3.304]

3.4 class C fire

fire involving gases

[SOURCE: BS 4422:2005, 3.305]

3.5 class D fire

fire involving metals

[SOURCE: BS 4422:2005, 3.306]

3.6 class F fire

fire involving cooking media (vegetable or animal oils and fats) in cooking appliances

[SOURCE: BS EN 2:1992, Clause 2, modified]

3.7 competent person

individual or organization that has the requisite training and experience, access to the requisite tools, equipment and information, and is capable of carrying out a defined task

3.8 condensed aerosol

extinguishing medium consisting of finely divided solid particles and gaseous matter, these being generated by a combustion process of a solid aerosol-forming compound

[SOURCE: BS EN 15276-1:2019, 3.2]

⁸⁾ This standard also gives an informative reference to BS 8489-1:2016 and to the BS 8489 series.

3.9 condensed aerosol generator

non-pressurized device (including mounting brackets) which, when activated, generates an aerosol

[SOURCE: BS EN 15276-1:2019, 3.3, modified]

3.10 control valve set

assembly comprising an alarm valve, a stop valve and all the associated valves and accessories for the control of one sprinkler installation

[SOURCE: BS EN 12845:2015+A1, 3.17]

3.11 deluge system

water spray system, usually with separate detection system, incorporating open nozzles which discharge over a prescribed area

3.12 design concentration

concentration of extinguishant, including a safety factor, required for system design purposes

[SOURCE: BS EN 15004-1:2019, 3.8.1]

3.13 design density

minimum density of discharge, in millimetres per minute of water, for which a sprinkler installation is designed, determined from the discharge of a specified group of sprinklers, in litres per minute, divided by the area covered, in square metres

3.14 extinguishing concentration

minimum concentration of extinguishant required to extinguish a fire involving a particular fuel under defined experimental conditions, excluding any safety factor

3.15 fire extinguishment

complete elimination of any flaming or smouldering fire

3.16 fire mains**3.16.1 dry fire main**

water supply pipe installed in a building for firefighting purposes, fitted with inlet connections at fire and rescue service access level and landing valves at specified points, which is normally dry but is capable of being charged with water, usually by pumping from fire and rescue service appliances

[SOURCE: BS 9990:2015, 3.10.2]

3.16.2 wet fire main

water supply pipe installed in a building for firefighting purposes and permanently charged with water from a pressurized supply, and fitted with landing valves at specified points

[SOURCE: BS 9990:2015, 3.10.4]

3.17 fire suppression

reduction or limitation in the heat release rate and prevention of regrowth of a fire over the discharge duration

NOTE The terms "fire suppression" and "fire control" are sometimes used interchangeably. Depending upon the context they might sometimes have slightly different meanings.

3.18 firefighting medium

substance contained in a firefighting system that, when discharged on to the fire, is intended to produce extinction, suppression or control depending upon the objective of the system

3.19 foam branch

hand-held foam-generating and discharge device in which foam is created upstream at an in-line generator, and reaches the branch as expanded foam

3.20 foam inlet

fixed equipment consisting of an inlet connection, fixed piping and a discharge assembly, enabling the fire and rescue service to introduce foam into an enclosed compartment

[SOURCE: BS 5306-1:2006, 3.1, modified]

3.21 foam monitor

hand-held foam-generating and discharge device, mounted on a swivelling base so that its greater output can be discharged without reaction on the operator

NOTE The base unit can be fixed at one place, or can be trolley-mounted or vehicle-mounted.

3.22 foam-making branch pipe

hand-held foam-generating and discharge device in which foam solution is aerated, expanded and discharged as a jet or spray

3.23 fluorinated surfactant

particular type of surfactant that gives greater reduction of surface tension

3.24 halon

halogenated hydrocarbon used as an extinguishing medium

NOTE Halon is no longer used or widely available, except for a limited number of critical applications as defined in EC Regulation No. 744/2010 [1].

3.25 fire hazard

potential for injury and/or damage from fire

3.26 high-racked storage

storage in which goods are held on high racking so that they are accessible for loading and withdrawal, usually by mechanical means

3.27 hose reel (water)

firefighting equipment, consisting of a length of tubing fitted with a shut-off nozzle and attached to a reel, with a permanent connection to a pressurized water supply

[SOURCE: BS 5306-1:2006, 3.2]

3.28 hypoxic air

air containing a constant reduced oxygen concentration relative to that at atmospheric pressure at sea level

3.29 in-cabinet system

system where a suitable fire extinguishing agent is injected directly into one or more un-occupiable cabinet(s)

3.30 landing valve

assembly comprising a valve and outlet to enable connection of firefighting hose to a fire main

[SOURCE: BS 9990:2015, 3.16]

3.31 liquefied natural gas (LNG)

gas comprising naturally occurring light hydrocarbons at normal atmospheric temperature and pressure

NOTE These hydrocarbons are often associated with crude oil deposits. They are stored and handled as deeply refrigerated liquids at substantially atmospheric pressure.

3.32 liquefied petroleum gas (LPG)

gas comprising light hydrocarbons, which at normal atmospheric temperature and pressure exist as gases but which are readily liquefied by the application of moderate pressure

NOTE These hydrocarbons can be stored and handled as liquids under pressure at ambient temperature or as refrigerated liquids at substantially atmospheric pressure. The term is used to include commercial butane, commercial propane and mixtures thereof.

3.33 local application system

automatic or manual firefighting system in which a fixed supply of a firefighting medium is permanently connected to fixed piping with nozzles arranged to discharge the firefighting medium directly to a fire occurring in a defined area that has no enclosure surrounding it, or is only partially enclosed, and that does not produce an extinguishing concentration throughout the entire volume containing the protected hazard

[SOURCE: BS 5306-4:2001+A1, 3.9, modified]

3.34 lowest observed adverse effect level (LOAEL)

lowest concentration at which an adverse toxicological or physiological effect has been observed

[SOURCE: BS 4422:2005, 3.537]

3.35 manual hose-reel (gaseous) system

firefighting system consisting of a hose, stowed on a reel or rack, with a manually operated discharge assembly, all connected by a fixed pipe to a supply of carbon dioxide

3.36 no observed adverse effect level (NOAEL)

highest concentration at which no adverse toxicological or physiological effect has been observed

[SOURCE: BS 4422:2005, 3.580]

3.37 personal protection system

self-contained fire suppression system with its own detection and actuation equipment, which generates water mist to protect a small discrete area such as a sleeping place

NOTE Personal protection systems are used to protect individuals who are likely to be unable to easily escape without assistance in case of fire.

3.38 portable fire extinguisher

fire extinguisher which is designed to be carried and operated by hand and which in working order has a mass of not more than 20 kg

[SOURCE: BS EN 3-7:2004+A1:2007, 3.2]

3.39 sprinkler (automatic)

nozzle with a thermally sensitive sealing device which opens to discharge water for firefighting

[SOURCE: BS EN 12845:2015+A1, 3.54]

3.40 sprinkler installation

part of sprinkler system comprising a control valve set, the associated downstream pipes and sprinklers

[SOURCE: BS EN 12845:2015+A1, 3.34]

3.41 sprinkler system

entire means of providing sprinkler protection in the premises comprising one or more sprinkler installations, the pipework to the installations and the water supply/supplies

[SOURCE: BS EN 12845:2015+A1, 3.71]

3.42 surfactant

compound that lowers the surface tension (or interfacial tension) between two liquids, between a gas and a liquid, or between a liquid and a solid

NOTE Surfactants can act as detergents, wetting agents, emulsifiers, foaming agents and dispersants.

3.43 total flooding system

automatic or manual fire-extinguishing system in which a fixed supply of extinguishing medium is permanently connected to fixed piping with nozzles arranged to discharge the extinguishing medium into an enclosed space in order to produce a concentration sufficient to extinguish fire throughout the entire volume of the enclosed space

[SOURCE: BS 5306-4:2001+A1, 3.17, modified]

3.44 water mist system

distribution system connected to a water supply, with atomizing media where required, that is fitted with one or more nozzles capable of delivering water mist intended to control, suppress or extinguish fire

NOTE Water mist systems can discharge water or a mixture of water and some other agent or agents, i.e. inert gases or additives.

[SOURCE: BS 8489-1:2016, 3.37]

3.45 water spray system

entire means of providing water spray protection in the premises comprising one or more deluge installations or multiple control installations, the pipe work to the installations and the water supply/supplies

[SOURCE: DD CEN/TS 14816:2008, 3.21]

3.46 voltages**3.46.1 extra low voltage (ELV)**

voltage of <50 V AC or <120 V DC

3.46.2 low voltage (LV)

voltage in the range 50 V AC to 1 000 V AC or 120 V DC to 1 500 V DC

3.46.3 high voltage (HV)

voltage of >1 000 V AC or >1 500 V DC

3.47 vulnerable person

person who is at greater risk from fire because they are unable to easily evacuate without assistance, or who has a higher than average likelihood of experiencing a fire, or a combination of the two

Section 2: Key concepts and initial considerations

4 Initial considerations and assessment of factors influencing protection design

4.1 General

The selection of appropriate firefighting equipment and media should largely be determined by:

- a) the protection objectives (see [4.2](#)) and required firefighting system performance characteristics; and
- b) the characteristic of the fire hazard(s) that are to be mitigated.

In order to decide the most suitable type of fixed firefighting system for a given hazard, an assessment should be made of factors influencing firefighting system selection. This process can be referred to as a form of risk assessment, or can otherwise be known as forms of business impact assessment (BIA) or qualitative design review (QDR). The depth of the analysis should be proportionate to the circumstances. The process should take into account all significant aspects of cause and effect, with the intention of determining the optimal solution based upon the objectives. [BS 7974](#) provides further detailed guidance on the QDR process in a fire engineering context.

Interested parties and key stakeholders (see [Clause 5](#)) should be consulted and included in this process.

This assessment should take into account at least the issues discussed in [4.2](#) to [4.7](#) and [Clause 5](#).

NOTE This process is not to be confused with the statutory (life safety) fire risk assessment, which is required for work places and other premises.

All fixed firefighting systems require a degree of ongoing inspection, testing and maintenance to help ensure their continued satisfactory operation. Any “change of use” or “change of circumstances” (i.e. change of any significant underpinning design assumptions) is a critical aspect of continued satisfactory performance (see [Clause 10](#)).

4.2 Determining the protection objectives

4.2.1 General

The first step is to determine what is to be protected, why, and to what extent.

This could include factors such as:

- a) regulatory requirements;
- b) safety of life;
- c) analysis of cost and benefit;
- d) probability and impact of incidence, fire and smoke damage;
- e) firefighting media discharge consequences;
- f) operation consequences; and
- g) upkeep implications.

Statutory requirements and associated design codes are generally intended to protect life and to prevent conflagration. Compliance with statutory requirements and associated design codes might not provide adequate protection of property in the event of a fire.

Protection objectives are sometimes discussed in terms of, for example, the factors described in [4.2.2](#) to [4.2.4](#). In assessing the protection objectives, it is possible that this might reveal that there are multiple objectives. The overall objective should always be based on the highest required.

4.2.2 Life safety

The occupants of a building, firefighters and members of the public who are in the vicinity of a building can be put at risk by fire. The main life safety functional objective can be refined into design objectives such as:

- a) the occupants are ultimately able to leave the building in reasonable safety or the risk to occupants is acceptably low;
- b) firefighters can operate without undue risk to:
 - 1) assist evacuation when necessary;
 - 2) effect rescue when necessary;
 - 3) prevent conflagration; and
- c) collapse does not endanger people (including firefighters) who are likely to be in or near the building.

4.2.3 Property protection, business continuity, loss control and organizational resilience

The effects of a fire on the continuing viability of a business can be substantial, and, depending on the clients' or insurers' objectives, methods to minimize the damage to the following should be assessed:

- a) the structure and fabric of the building;
- b) the building contents;
- c) the critical asset(s);
- d) the ongoing business viability; and
- e) the corporate reputation.

4.2.4 Environmental impact

A conflagration involving one or more buildings or the release of quantities of hazardous materials can have a significant impact on the environment. Means should be devised to limit:

- a) the effects of fire on adjacent buildings or facilities;
- b) the release of hazardous materials into the environment; and
- c) the unintended effects of methods of firefighting (e.g. avoidance of river and water table pollution).

4.3 Determining the firefighting ambition

In order to achieve the protection objectives, the mode of fixed firefighting system performance should be assessed. This often affects the choice of media, application method and many other fixed firefighting system design parameters. For example, it might need to:

- a) extinguish the fire;
- b) suppress the fire (e.g. fire and rescue service intervention is still required to perform final extinguishment); or
- c) control the fire (e.g. fire and rescue service intervention is still required to perform final extinguishment). This is sometimes intended to support structural fire protection measures to contain the fire to the compartment of origin.

Users of buildings should determine whether the expectations they place on others (the anticipated fire and rescue services response, equipment users, etc.) are reasonable.

4.4 Additional motivation for installing protection

In addition to the primary design objectives in 4.2, there might be additional reasons for installing fixed firefighting systems.

The motivation for the protection can have implications upon the specification, design and application of the protection measures. The motivation is generally a need to reduce the risk(s) posed by identified hazard(s). The risk(s) and hazard(s) should be well understood in order to properly inform the selection process.

Examples of other motivations can include:

- a) design flexibilities as permitted by [BS 9991](#), [BS 9992](#) or [BS 9999](#);

NOTE [BS 9991](#) differentiates between firefighting system types. For example, water mist systems conforming to [BS 8458](#) are not recommended for many of the variations permitted by [BS 9991](#). In the case of many buildings outside the scope of [BS 9991](#), water mist systems are not recommended for the variations permitted.

- b) an alternative form of compliance when guidance such as Approved Document B [2] cannot be complied with (e.g. to provide adequate means of escape);
- c) insurance (e.g. the insurer requires technical risk modification measures in order to offer or renew insurance cover; the solution needs to be acceptable to the insurer);
- d) voluntary additional fire protection (e.g. an organization or individual determines that it is prudent to utilize a fixed firefighting system to reduce a risk which could otherwise result in a more consequential fire);
- e) cost-benefit analysis risk reduction measure (e.g. an organization determines that it is prudent to utilize fixed firefighting system to reduce risk);
- f) heritage protection (e.g. an organization determines that it is prudent to utilize a fixed firefighting system to protect heritage artefacts or buildings);
- g) a higher than acceptable fire hazard identified by a risk assessment (e.g. by a bespoke assessment or to achieve compliance with machinery safety standards such as BS EN ISO 12100 or BS EN ISO 19353);
- h) a higher than acceptable fire hazard identified by other means, (e.g. by a standard such as the BS 5908 series); and
- i) compliance with the Companies Acts [3] (whereby directors have a “duty to act in good faith in the best interests of the company”).

In the UK (particularly England and Wales), the Building Regulations ([4], [5], [6]) are primarily concerned with the protection of life. This can result in comparatively high thresholds being reached before fixed firefighting systems are mandated. These thresholds are often not appropriate for property protection, business continuity, mission preservations, heritage protection or community resilience purposes. In such cases it is often prudent to employ suitable fixed firefighting system protection. Further information is given in the publication *Business resilience through property protection* [7].

4.5 Nature of the hazard(s) to be mitigated

It is suggested that at least the following are taken into account in the evaluation:

- a) sources of ignition;
- b) combustible material quantities;
- c) scale of operation and extent of potential fire spread;
- d) combustible material hazard class (e.g. as defined in [BS EN 2](#));
- e) combustible material geometric presentation and other factors likely to affect combustion and firefighting;
- f) fire and rescue service response time, resources, risk appetite, operational protocols (e.g. will take risk to save life but less so to save property);
- g) extent of smoke and fire damage that can be tolerated; and
- h) extent of consequential impact (see Note).

NOTE There is a need to determine the consequential impact (e.g. from wanted or unwanted media discharge) that can be tolerated. Often, water is suitable for most applications in the built environment. In the event of a fire, limited water damage is very often preferable to extensive fire damage. However, there are exceptions where the fire load or items to be protected are strongly incompatible with water. Desirable discharges will offer no benefit if the extent of damage caused by the media is greater than or equal to that which would have been caused by fire. Unwanted media discharges are extremely rare with properly designed systems, but nevertheless it might be appropriate to take into account the consequences in some circumstances.

4.6 Extent of protection

The required extent of fixed firefighting system protection should be identified. This might be, for example:

- a) a complete building; and/or
- b) specific room(s) or area(s) within a building (e.g. protection of valuable contents in an archive, museum or gallery); and/or
- c) individual item(s) of equipment or process which have been identified as posing a fire hazard of concern.

Sometimes it is appropriate to protect both equipment and processes, and the complete building. The different hazard characteristics posed by mixed-use buildings should also form part of these considerations.

4.7 Fixed firefighting system reliability and performance

The level of fixed firefighting system reliability and performance sought should be as high as reasonably practicable. There are various published performance and reliability studies available for sprinkler systems (see [Clause 12](#)). Performance and reliability data for other system types is not as readily available.

In assessing reliability and performance, all foreseeable lifecycle conditions should be taken into account (normal operation, maintenance, malfunction, shutdown, etc).

The desired levels of interoperability need to be determined, together with the implications that this will have for system maintainability and costs (see [12.3](#)).

Firefighting systems and their components should be suitable for their intended application in terms of:

- a) suitability for the application and objectives;
- b) the degree and suitability of quality assurance measures provided;
- c) fire testing as required by the design and installation standard, or bespoke application where there is no relevant standard;
- d) design in accordance with the relevant design and system standard;
- e) incorporating components conforming to the relevant component standard as set out in the applicable design and installation standard;
- f) compatibility of components used in the same system;
- g) compatibility of firefighting media;
- h) compliance with the manufacturer's design, installation, operation and maintenance requirements;
- i) installation in accordance with the relevant installation standard; and
- j) maintenance in accordance with the relevant maintenance standard.

Product certification/inspection/testing. *Users of fixed firefighting systems are advised to consider the desirability of third-party testing, inspection and certification of conformity to the relevant standards (see [Clause 9](#)) by bodies certified to:*

- *BS EN ISO/IEC 17025 for the competence of testing and calibration laboratories; the scope of accreditation needs to include the applicable test protocols;*
- *BS EN ISO/IEC 17065 for the competence of certification bodies (products and services); the scope of accreditation needs to include the applicable product or system standards;*
- *BS EN ISO/IEC 17024 for the competence of certification bodies (persons); the scope of accreditation needs to include the applicable competency area; and/or*
- *BS EN ISO/IEC 17021 for the audit and certification of management systems; the scope of accreditation needs to include the applicable standards.*

5 Interested parties and key stakeholders

A list should be prepared of all individuals and organizations whose views, recommendations or published requirements might need to be taken into account. This list is likely to include some or all of the following, as appropriate:

- a) the client and/or their architect;
- b) the authority having jurisdiction (AHJ) for the area;
- c) the responsible person or duty holder;
- d) the insurer(s);
- e) the fire protection consultant or fire engineer;
- f) the Health and Safety Executive (HSE);
- g) the fire and rescue service;
- h) the Crown Premises Fire Safety Inspectorate;
- i) the building authority, including the local authority listing officer;

- j) the Environment Agency;
- k) heritage organizations, where the building is listed;
- l) the water undertaker, where the system requires a connection to the water service main;
- m) the firefighting system manufacturer or installer; and
- n) any authority concerned with the particular type of hazard.

Interested parties should be consulted on matters relating to the selection of fixed firefighting systems.

Section 3: Method of selection

6 Identifying a suitable fixed firefighting system option

Once all of the relevant factors have been assessed, as described in the [Clause 4](#), [Clause 5](#), and [Clause 9](#) onwards, one of the following selection routes should be followed:

- Method A ([Clause 7](#)); or
- Method B ([Clause 8](#)).

Method A ([Clause 7](#)) gives examples, drawing on decades of real-world experience, of risks and occupancies for which particular systems are often found to be suitable.

Method B ([Clause 8](#)) should be used where there are novel factors, applications where standards cannot be complied with or specific unavoidable constraints, and only where the Method A ([Clause 7](#)) route is not possible.

7 Method A: Simplified selection method

Hazard profiles can often be adequately approximated by building or equipment occupancy, purpose or type. This clause gives guidance on, and examples of, typically suitable combinations of fixed firefighting system by hazard profile and protection objective.

NOTE There are exceptions, so it is important that each hazard profile (building or equipment purpose or type) and protection objective is evaluated and verified through detailed enquiry by a suitably competent person [e.g. see [Clause 5](#), item e)].

Method A, which should be used in its entirety, comprises the steps set out in:

- a) [Clause 4](#) and [Clause 5](#);
- b) [Figure 1](#);
- c) [Table 1](#) and/or [Table 2](#) (as applicable); and
- d) supplementary clauses as applicable.

[Table 1](#) gives typical examples of scenarios where fixed firefighting systems are used in buildings. [Table 2](#) gives typical examples of applications for which fixed firefighting systems are used.

Users are cautioned not to “cherry-pick” or modify solutions offered by design standards or the material in this part of BS 5306.

Where a fixed firefighting system is specified using Method A, it should be in full compliance with the applicable standard.

Some situations might require more than one firefighting system type to be installed to meet the protection objectives. In such cases it might be necessary to apply Method A multiple times to suit each circumstance. Alternatively, Method B might be more appropriate.

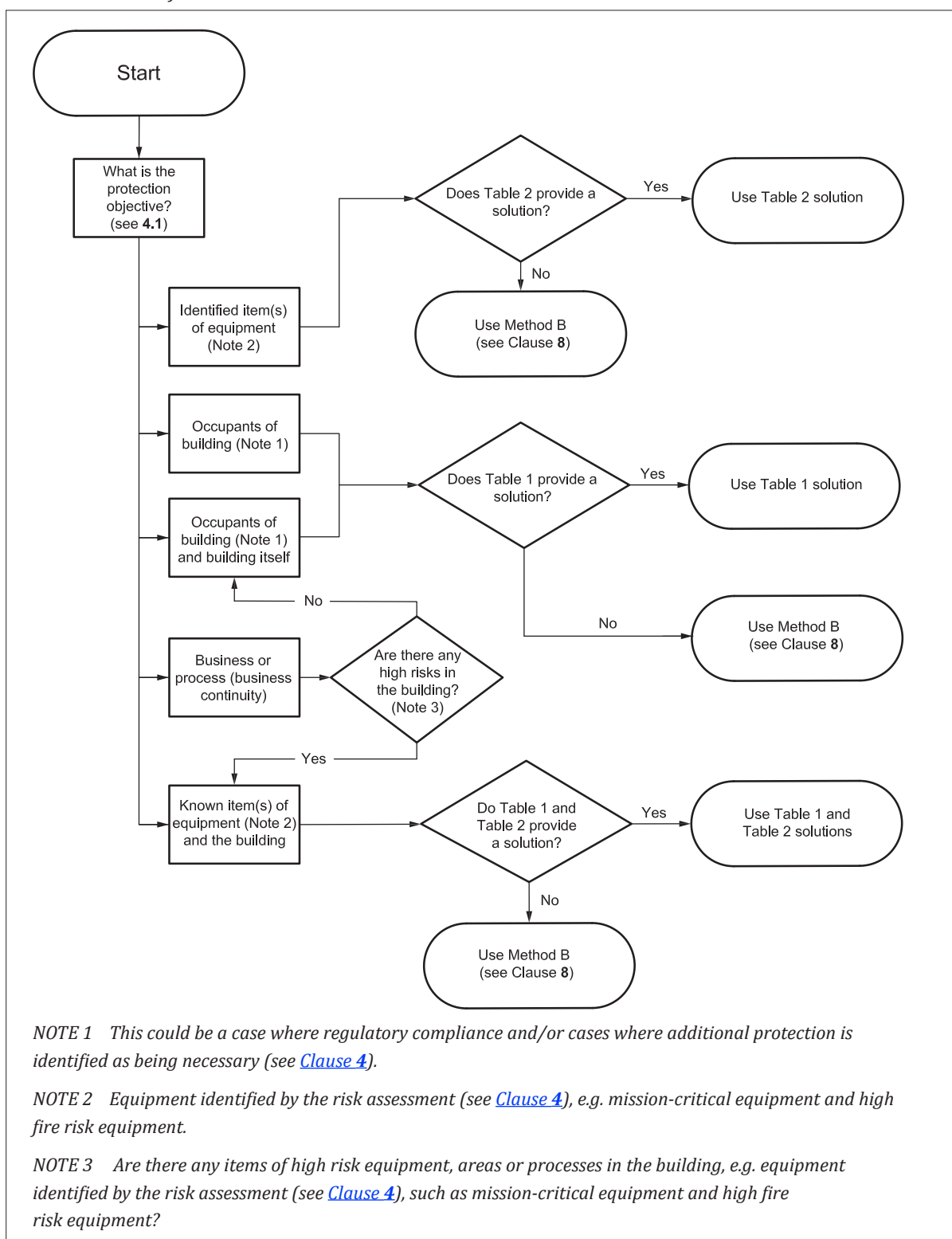
Figure 1 — Selection method flow chart

Table 1 — Method A: Typical examples of fixed firefighting system by building occupancy (or part thereof) — by common purpose groups (1 of 2)

System type	Suitability according to purpose group													
	Domestic	Residential	Residential (mixed use e.g. residential + commercial)	Hotel	Office	School and educational	Warehouse	Data centre	Laboratory or cleanroom	Places of assembly or recreation	Licensed premises (bars and restaurants)	Retail	Hospital	Factory or process
Sprinkler to BS 9251	●	●	● ^{A)}	● ^{B)}	○	○	○	○	○	○	○ ^{C)}	○	○	○
Sprinkler to BS EN 16925	●	●	● ^{A)}	● ^{B)}	○	○	○	○	○	○	○	○	○	○
Water mist to BS 8458	● ^{D)}	● ^{D), E)}	● ^{A), D), E)}	● ^{B), D), E)}	○	○	○	○	○	○	○ ^{F)}	○	○	○
Sprinkler to BS EN 12845	● ^{A)}	● ^{A)}	●	●	●	●	●	● ^{G)}	● ^{H)}	●	●	●	●	●
Water mist to BS 8489-1	○	● ^{D), I)}	● ^{D), I), J)}	● ^{D), K)}	● ^{D), L)}	● ^{D), M)}	○	● ^{D), N)}	○	● ^{D), J)}	● ^{D), J)}	○	○	○ ^{O)}
Foam to BS EN 13565-2	○	○	○	○	○	○	● ^{P)}	○	● ^{P)}	○	○	○	○	● ^{P)}
Powder to BS EN 12416-2	○	○	○	○	○	○	○	○	○	○	○	○	○	● ^{Q)}
Water spray to DD CEN/TS 14816	○	○	○	○	○	○	● ^{R)}	○	○	○	○	○	○	● ^{R)}
Aerosol to BS EN 15276-2	○	○	○	○ ^{S)}	○ ^{S)}	○ ^{S)}	○ ^{S)}	○ ^{S)}	○ ^{S)}	○ ^{S)}	○ ^{S)}	○ ^{S)}	○ ^{S)}	● ^{S)}
Gaseous extinguishing to BS EN 15004-1	○	● ^{J)}	● ^{J)}	● ^{J)}	● ^{J)}	● ^{J)}	● ^{J)}	● ^{G)}	● ^{H)}	● ^{J)}	○	● ^{J)}	● ^{J)}	● ^{J)}
Gaseous extinguishing to BS 5306-4	○	○	○	○	○	○	○	○	○	○	○	○	○	● ^{Q)}
Oxygen reduction systems to BS EN 16750	○	○	○	○	○	○	● ^{T), U), V)}	● ^{U), V), W)}	● ^{U), V), W)}	○	○	○	● ^{Q), U), V)}	○
Personal protection systems to LPS 1655 [8]	● ^{X)}	● ^{X)}	● ^{X)}	○	○	○	○	○	○	○	○	○	○	○
Key														
● Suitable if in full compliance with cited standard.														
● Suitable for specific applications or areas within this purpose group, if in full compliance with cited standard and paying particular attention to accompanying footnotes.														
○ Unsuitable (out of scope of the system design, installation and maintenance standard).														

Key

● Suitable if in full compliance with cited standard.

● Suitable for specific applications or areas within this purpose group, if in full compliance with cited standard and paying particular attention to accompanying footnotes.

○ Unsuitable (out of scope of the system design, installation and maintenance standard).

Table 1 — *Method A: Typical examples of fixed firefighting system by building occupancy (or part thereof) — by common purpose groups (2 of 2)*

- A) BS EN 12845 could be used and might be more suitable for certain more challenging areas and in certain scenarios e.g. very tall buildings, common parts, plant rooms, car parks, higher than usual risk profile, bin stores, mixed use buildings, or where property protection is sought
- B) Bed and breakfast accommodation only.
- C) Might be suitable for small unlicensed B&Bs. Not suitable for bars, clubs, restaurants, etc.
- D) Fire test evidence alone is insufficient to demonstrate fitness for purpose. Third-party approval (see 4.7) of critical system components, design and installation is considered normal industry good practice. Users are cautioned that many systems of this type might not meet this expectation and therefore thorough checks should be made. See also 9.1.1.3.
- E) Usually BS 8458 should be used for residential parts. BS 8489-1 might be more suitable for certain scenarios beyond the scope of BS 8458.
- F) Might be suitable for small licenced B&Bs. Not suitable for bars, clubs, restaurants, etc.
- G) Data centres require complex protection strategies. Gaseous extinguishing systems can be employed to offer the highest level of protection to the equipment, and sprinkler systems can be employed to protect the buildings. Sprinkler systems can be pre-action in areas particularly sensitive to water damage. See also BS EN 50600-2-5.
- H) Laboratories and cleanrooms might require complex protection strategies. Gaseous extinguishing systems can be employed to offer the highest level of protection to the equipment in certain parts, and sprinkler systems can be employed to protect the buildings. Sprinkler systems can be pre-action in areas particularly sensitive to water damage.
- I) Suitable for special hazards within this occupancy type, e.g. server room or other critical infrastructure. See Table 2.
- J) Might be suitable for protecting some parts of the building. e.g. apartments beyond the scope of BS 8458, low fire load common parts, office areas or other parts within the scope and Table 1 of BS 8489-1:2016.
- K) Bedrooms and corridors only. The rest of the building should be protected by a sprinkler system conforming to BS EN 12845, or a Method B solution (see Clause 8).
- L) Might only be suitable for protecting some parts of the building. e.g. low fire load areas and other parts within the scope and Table 1 of BS 8489-1:2016. Might not be suitable for storage or plant areas, where a sprinkler system conforming to BS EN 12845, or a Method B solution (see Clause 8) might be more suitable.
- M) Classrooms only. Other parts should be protected with other solutions such as a sprinkler system conforming to BS EN 12845, or a Method B solution (see Clause 8).
- N) In full compliance with FM 5560:2016 [9], Annex M and Annex N, and FM datasheet 5-32 [10].
- O) See Table 2. Factories can employ water mist systems in special applications where suitable test protocols exist.
- P) In some circumstances (e.g. where there are significant quantities of plastics or there are flammable liquid stores), foam-enhanced firefighting systems might be required.
- Q) Might be suitable for special hazards within this occupancy type. See Table 2.
- R) Water spray firefighting systems might be suitable in some exceptional circumstances where isolation (i.e. fire exposure protection) is required or fire spread is expected to be unusually rapid. See also NFPA 15 [11].
- S) Might be suitable for protecting special hazards. Aerosol systems can generate hazards for personnel and should be used only in normally unoccupied or unoccupiable spaces. Use of such systems requires particularly careful consideration of potential health and safety effects upon occupants. See Table 2.
- T) Might be used in warehousing where there is no other feasible solution (e.g. building height in excess of capability of other technologies, or where absolute fire prevention is sought). See Table 2.
- U) Generally, not suitable for buildings with frequent air changes (e.g. caused by large openings, frequent ingress/egress, high rates of air change due to ventilation and cooling, buildings with low integrity or poor access control).
- V) Low oxygen atmospheres require particularly careful consideration of health and safety effects upon occupants (see 14.8.2).
- W) Could only be used here when ventilation and/or cooling arrangements are compatible, noting the need to retain the low oxygen atmosphere.
- X) Personal Protection Systems (PPSs) are only intended to protect vulnerable persons. They do not provide building protection and should not be used in lieu of other building protection systems. See LPS 1655 [8].