

RISCAuthority Design Guide for the Fire Protection of Buildings ESSENTIAL PRINCIPLES



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Summary of Key Points

This document should be read in conjunction with the *RISCAuthority Design guide for the fire protection of buildings* and appropriate supporting documents including *Approved Document B incorporating insurers' requirements*. It outlines the basic principles that all designers and their supporting consultants shall consider during the design process, when they are taking either a prescriptive or fire engineering approach (or a combination of both). The principles should also be followed for major extensions and upgrades to existing building structures.

Principle 1	<ul style="list-style-type: none">• The building shall be constructed and protected in such a manner that if a fire starts, the extent of fire and smoke damage will be minimised and confined as close to the source of fire outbreak as is practical/feasible.
Principle 2	<ul style="list-style-type: none">• With the exception of non-structural joinery products, the building shall be constructed from building materials/products that will not make a significant contribution to the early stages of a fire or contribute to the spread of fire.
Principle 3	<ul style="list-style-type: none">• Suitable measures will be taken for the prevention of premature structural collapse and excessive deflection.
Principle 4	<ul style="list-style-type: none">• Consideration should be given at the design stage regarding potential damage from firefighting water and to ensure as far as practical that the effect on the environment of the fire effluent will be minimised.
Principle 5	<ul style="list-style-type: none">• As a minimum, all fire protection products shall be third party certified to an appropriate product- or performance-based standard.
Principle 6	<ul style="list-style-type: none">• All fire protection products/systems shall be installed by appropriately trained specialist installers.
Principle 7	<ul style="list-style-type: none">• The building shall be fitted with an appropriate automatic fire alarm system that should suitably reduce/prevent false alarms such as high-integrity detectors.
Principle 8	<ul style="list-style-type: none">• The fire protection systems shall be regularly inspected and maintained by a competently trained person so that they are able to perform their intended function throughout the life of the building.
Principle 9	<ul style="list-style-type: none">• There shall be adequate provision to prevent an arson attack.
Principle 10	<ul style="list-style-type: none">• The building shall be so constructed that fire cannot spread into the premises from an adjoining building or other external fire source.
Principle 11	<ul style="list-style-type: none">• The building owner shall ensure an adequate standard of fire safety management throughout the life of the building.
Principle 12	<ul style="list-style-type: none">• All building services (including all forms of renewable energy), eg heating, lighting and power, shall be designed, constructed and installed in a manner that reduces their potential as an accidental source of ignition.

Essential principles is one of a number of documents addressing specific areas of relevance which together form the *RISCAuthority Design guide for the fire protection of buildings*. It contains the essential principles on which the *RISCAuthority Design guide* is based.

The *RISCAuthority Design guide* is a development of the *LPC Design guide for the fire protection of buildings 2000* published by the Fire Protection Association (FPA) under the sponsorship of the RISCAuthority Funding Scheme. This scheme is supported by a significant group of insurance companies through a series of expert working groups furthering best practice for the protection of property and business from loss due to fire and other risks.

The technical expertise for the *RISCAuthority Design guide* is provided by the FPA and by insurance industry representatives comprising the RISCAuthority Passive Working Group.

1.1 Objectives

National building regulations are intended to ensure that a reasonable standard of life safety is provided in case of fire. The protection of property, including the building itself and the resilience of businesses, often requires additional measures.

It is the objective of the *RISCAuthority Design guide* to describe aspects of fire safety in buildings which will both reduce the risk of fire and make them better able to cope with the effect of fire in the event it should break out. The aims are to:

- reduce the likelihood of fire, either accidental or malicious;
- minimise the spread of fire and smoke;
- minimise the effect of fire on a business and the consequential loss;
- protect the buildings within a business;
- maintain the health and safety of those in and around the building (including firefighters); and
- protect the environment from the consequences of fire and firefighting.

These aims are achieved by fulfilling essential principles in the design, construction and management of commercial and industrial premises (see Diagram 1.1).

Note: RISCAuthority also publishes *Approved Document B incorporating insurers' requirements*, which supplements the *RISCAuthority Design guide* by integrating requirements for property protection into the English government guide *Approved Document B*. *Approved Document B* itself only describes fire safety measures necessary to protect life in most common building situations. (Wales publishes its own version of *Approved Document B*, and Scotland and Northern Ireland use *Technical Standards* and *Technical Booklet E* respectively. It should be noted that the additional measures described in *Approved Document B incorporating insurers' requirements* are not dependent on the English edition of *Approved Document B* within which they are contained; they should also be applied in Wales, Scotland and Northern Ireland.

1.2 Limitations

The essential principles are not directly intended to deliver life safety. For this, appropriate advice should be obtained from the local building control authority and reference made to the relevant parts of documents approved for the purpose of national building regulations for the design of buildings. Also, advice should be obtained from the local fire authority and reference made to relevant legislation and regulation for the fire safety management of buildings.

1.3 Fire engineering

One way of meeting the essential principles in the design of a building is to follow the guidance contained in the *RISCAuthority Design guide*. Fire engineering may be used as an alternative route, but:

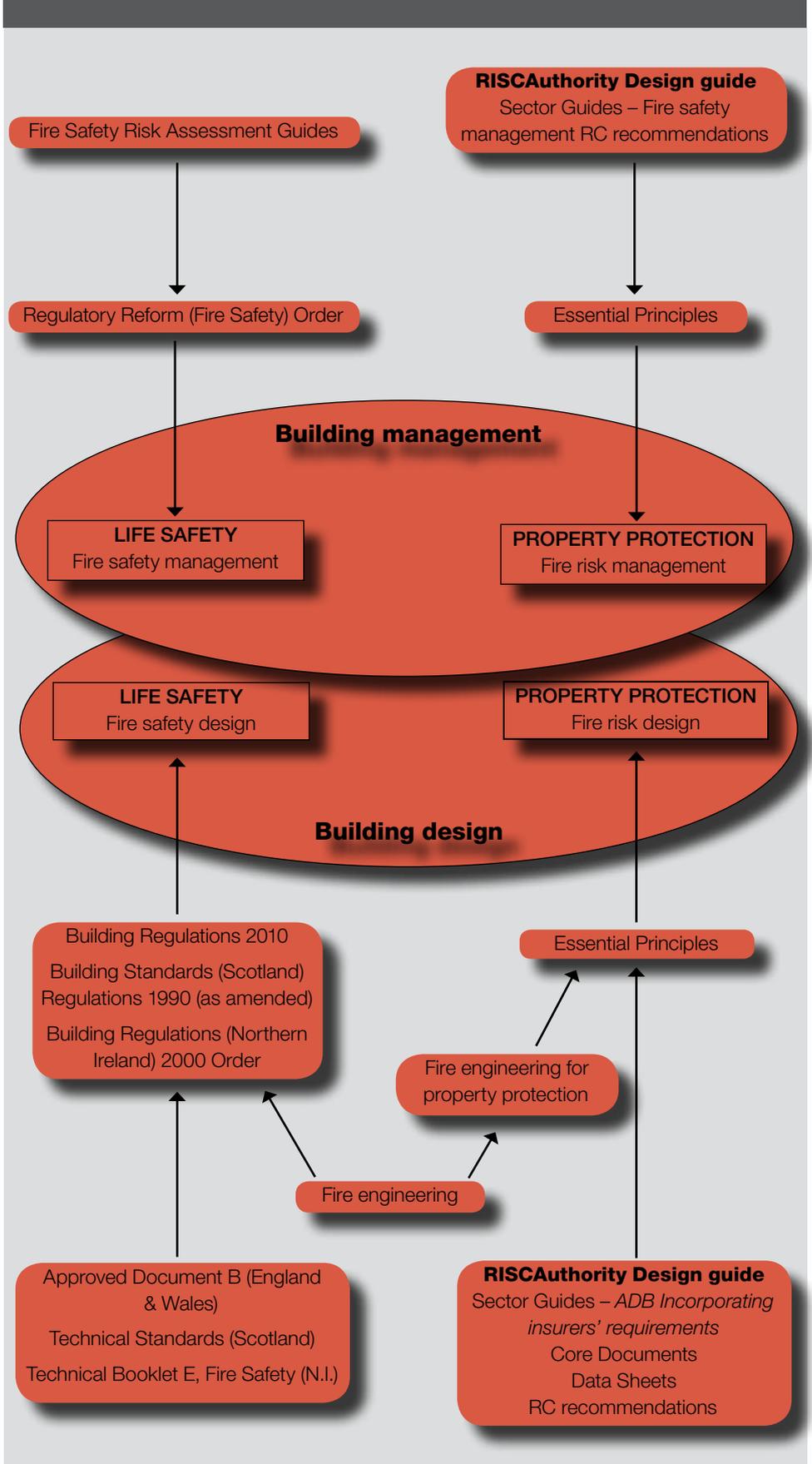
- a. it is important that early consultation with insurers during the building design phase is carried out. This should ensure that the most effective fire protection measures appropriate to the specific property, its occupancy and business protection needs are suitably satisfied;
- b. an appropriate fire engineering standard must be followed in full. PD 7974-8: 2012 is recommended, although CIBSE Guide E is also acceptable;
- c. the essential principles must be achieved to the extent that they would be if the *RISCAuthority Design guide* was followed in full (when assessed as a comparative approach);
- d. the fire engineer must have due regard for the FPA's fire engineering document *Fire engineering for property protection* and the fire engineering must be based on the following fire safety objectives:
 - i. protection of the structure and fabric of the building;
 - ii. protection of the building contents;
 - iii. protection of the ongoing business viability;
 - iv. protection of the corporate image;and
- e. the fire engineering strategy must be passed on to the building occupier so that ongoing fire risk management can take it into account if any material changes are made to the structure, internal layout, occupancy, use or contents of the building.

1.4 The audience

The purpose of this document is to provide a property protection equivalent of the basic fire safety objectives – the functional requirements – which are contained in national building regulations.

This document is intended for designers and owners/occupiers of buildings which are, for the most part, industrial and commercial premises, consultants, construction companies and insurers.

Diagram 1.1: Life safety and property protection guidance framework



Note

The word 'property' refers to a building, its contents, business viability, and intangible assets such as image and reputation.

This document contains measures which are applicable to all buildings except residential buildings under 20m in height (but does include commercial hotel buildings). It is applicable to new buildings and to major refurbishment and upgrading of existing premises.

2.1 Guidance for building designers and fire safety managers

The route to achieving adequate levels of property and business protection is compared with the regulatory system in Diagram 1.1. Building design involves the mandatory incorporation of life safety-fire safety design, but it should also involve the incorporation of property protection fire risk design. Note that Diagram 1.1 shows that there is a certain amount of overlap between these two areas.

Building management similarly involves the mandatory application of life safety-fire safety legislation and regulation, but it too should incorporate property protection fire risk management to protect property and to prevent business interruption. Again, Diagram 1.1 shows that there is an overlap between these two areas. Diagram 1.1 also shows that there is overlap between building design and building management. Good design must take account of the needs of ongoing management

Life safety-fire safety design is delivered through national building regulations. This may be achieved either by following approved codes of practice, or by way of fire engineering. In exactly the same way, property protection fire risk design is delivered through the essential principles described in this document. These may be achieved either by following the *RISCAuthority Design guide*, or by way of fire engineering.

Life safety-fire safety management is delivered through risk assessed standards via the Regulatory Reform (Fire Safety) Order and other similar provisions in Northern Ireland and Scotland. These mandatory standards are supported by guidance in the form of government published documents. From the perspective of property protection fire risk management, the essential principles still outline the standards which should be achieved. Guidance on achieving property protection fire safety management is presented in sector specific guides, and in RC recommendations documents.

2.2 Status of essential principles document

Whilst the detailed recommendations of the *RISCAuthority Design guide* are not mandatory, the essential principles shall be regarded as being of vital importance and need to be considered in detail by building designers, fire engineers, consultants, occupiers or building owners.

It is essential that insurers are consulted at the earliest possible stage of design, so that factors that influence the ability of the building owner to secure insurance at the most attractive terms can be identified.

Reaction in the event of fire

Principle 1

The building shall be constructed and protected in such a manner that if a fire starts, the extent of fire and smoke damage will be minimised and confined as close to the source of fire outbreak as is practical/feasible.

This will be deemed to have been satisfied if:

- the building is fully sprinkler protected in accordance with the *LPC Rules for automatic sprinkler installations* which will control a fire in its early stages and will reduce the contribution to fire spread made by combustible construction materials;
- the building is subdivided by fire-resisting compartment walls and/or floors which have a minimum fire resistance of not less than 90 minutes (see table 2.2 of the *RISCAuthority Design guide for the fire protection of buildings*) and are suitably constructed to prevent the passage of smoke. The number of openings shall be kept as few as practical and they shall be constructed to minimise the passage of heat and the flow of hot and cold smoke;
- hidden voids are adequately protected by cavity barriers suitable for the purpose (see 4.5 of *RISCAuthority Design guide for the fire protection of buildings*);
- no compartment floor area exceeds the limits given in Table 2.3 of the *RISCAuthority Design guide for the fire protection of buildings*; and
- glazing in compartmentation and fire separation barriers is classified for integrity and insulation fire resistance, for at least a minimum 30 minute tested performance.

Consideration may also be given to the provision of smoke ventilation to assist in fire and rescue service operation.

All of the above may require implementation, depending on the outcome of the risk assessment, which will include a business impact analysis, the level of financial exposure, estimated maximum loss (EML), risk of ignition, fire load, level of fire safety management etc.

Principle 2

With the exception of non-structural joinery products, the building shall be constructed from building materials/products that will not make a significant contribution to the early stages of a fire or contribute to the spread of fire.

Compliance with this principle will be deemed to have been satisfied if:

- the materials/products used are non-combustible, Euro-class A1 or A2 or are approved by LPCB to the requirements of the appropriate part of LPS 1181 (see 2.2 of the *RISCAuthority Design Guide for the fire protection of buildings*);
- no more than 10% of the construction products used in the construction of the building are combustible; and
- the provision of sprinklers will control a fire in its early stages and will reduce the contribution to fire spread made by combustible construction materials.

Principle 3

Suitable measures will be taken for the prevention of premature structural collapse and excessive deflection.

- The building structure shall have fire resistance sufficient to prevent collapse or partial collapse and shall ideally exhibit restricted deflections (see 3.2.1 of the *RISCAuthority Design guide for the fire protection of buildings*).
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Principle 4

Consideration should be given at the design stage regarding potential damage from firefighting water and to ensure as far as practical that the effect on the environment of the fire effluent will be minimised.

The most efficient way of achieving this is to use products (materials) that do not give off toxic fumes in a fire situation and fully sprinkler the risk, combined with a good standard of fire safety management. Convenient drainage for sprinkler water should be provided if possible.

- In England, the Environment Agency has identified Source Protection Zones (SPZs) for ground sources of drinking water. Potential polluters within these zones are monitored, and firefighting water runoff is considered a pollutant. This may have a significant impact on firefighting activity. Consideration of groundwater pollution must be a consideration throughout the UK and is vital to meet Principle 4.
 - Firefighting foam and other water additives can be harmful to the environment. If they may be used either in fixed installations or in firefighting, measures should be put in place to capture firefighting runoff for safe disposal.
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Workmanship

Principle 5

As a minimum, all fire protection products shall be third party certified to an appropriate product-or performance-based standard.

- Designers or their consultants shall ensure that the scope of certification granted by the certification body is appropriate for the end use application in the specific building, taking due regard of processes, fire load and anticipated fire inception hazards (fire risk assessment).
- Where a change in use occurs, the suitability of the fire protection product/system shall be re-assessed by a fire engineer having sufficient knowledge of the product(s)/system in question.
- CE marking to the appropriate CEN product standard or ETAG standard only demonstrates evidence of a product's ability to meet the appropriate essential requirements of the CPR (Construction Products Regulations). This may not necessarily be adequate to meet insurer needs in all cases.
- Penetration that breaches compartmentation should be fire stopped by appropriate products/systems installed by competent personell or third party contractor.

Principle 6

All fire protection products/systems shall be installed by appropriately trained specialist installers.

- Installers shall be third party certified to install the specific product/system when an appropriate scheme is available (eg FIRAS, LPCB, BM Trada, BAFE etc).

Response to fire

Principle 7

The building shall be fitted with an appropriate automatic fire alarm system that should suitably reduce/prevent false alarms such as high-integrity detectors.

- Alarms installed to BS 5839 levels P1, linked to alarm receiving centre, BS EN 54-2: 1997 + A1: 2006 may be regarded as being suitable.

Some fire and rescue authorities will no longer respond to a report of the actuation of a fire alarm unless it is backed up by a confirmation emergency call. Therefore, the design of a fire alarm system must reduce the chances of a false fire alarm to as near to zero as possible to increase the confidence of the fire and rescue service in the validity of signals from automatic fire detection systems.
- Sprinkler systems are known to be reliable and very rarely activate in non-fire situations. They therefore provide reliable notification of fire as well as fire suppression.
- High-integrity detectors are single (multi-sensor) devices or suites of fire detection devices capable of robust differentiation of false (eg shower stream), unwanted (eg burnt toast) and real fire signatures accompanied by a means of communicating actual fire alarms to ARC, by a method that identifies it as originating from high-integrity hardware.

Principle 8

The fire protection systems shall be regularly inspected and maintained by a competently trained person so that they are able to perform their intended function throughout the life of the building.

- Designers shall ensure that the building owner is provided with all necessary listings of both passive and active fire protection measures, details of the manufacturer and installer and recommendations for maintenance.
- Maintenance and service to be undertaken by companies that are third party certified for the specific product/system (eg FIRAS, BAFE, LPCB, BM Trada, NSI, SSAIB etc).

Fire prevention

Principle 9

There shall be adequate provision to prevent an arson attack.

This may be achieved by an appropriate combination of:

- controlled access to the external fabric and fittings of the building;
- perimeter security;
- specific provisions being made in the fire safety management system;
- security alarms;
- security cameras;
- external storage being kept well clear of the building;
- the external fabric (including the eaves) being capable of resisting an arson attack;
- external groundfloor glazing made up of minimum anti-burglar or anti-vandal specifications based on laminated glass formulations, to prevent or at least delay unauthorised access to the building.

Principle 10

The building shall be so constructed that fire cannot spread into the premises from an adjoining building or other external fire source.

This principle will be facilitated if:

- for compartment walls separating adjoining buildings of different occupancy, the fire resistance shall not be less than 120 minutes (see Table 2.2 of the *RISCAuthority Design guide for the fire protection of buildings*);
- provision shall be made to house skips etc in enclosures well away from the external fabric of a building (see part 5 of *RISCAuthority Design guide for the fire protection of buildings*); or
- the external fabric has adequate fire resistance (see guidance on protected zone in part 5 of *RISCAuthority Design guide for the fire protection of buildings*).

In relation to separation between buildings, provided that combustibles are kept well away, it is reasonable to follow the recommendations given in documents supporting building regulations.

Fire risk management

Principle 11

The building owner shall ensure an adequate standard of fire safety management throughout the life of the building.

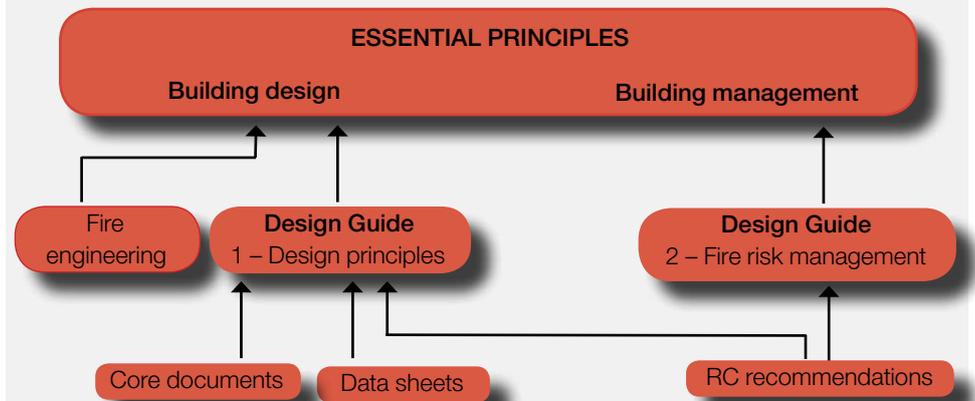
- Insurers are able to provide advice on fire risk management, loss mitigation and business resilience measures that are appropriate for the specific risk. Information on specific risks is available in the RISC Authority suite of documents at www.riscauthority.co.uk
- Insurance availability and terms may be linked to an adequate standard of fire risk management being maintained, with suitable documented evidence.
- Building owners shall therefore maintain documented fire risk management procedures and provide adequate proof that such systems are being complied with on a continuing basis.
- The mandatory fire risk assessment carried out for life safety under national regulations must also include a suitable and sufficient fire risk assessment that addresses property protection.
- In a fire engineered building, the appropriate frequency and depth of life safety and property protection fire risk assessments must be described in the fire engineering strategy.

Principle 12

All building services (including all forms of renewable energy), eg heating, lighting and power, shall be designed, constructed, installed in a manner that reduces their potential as an accidental source of ignition.

- Fuel burning appliances such as fixed and moveable space heaters, dryers, etc shall be maintained in good working order by appropriately trained people in line with manufacturer's specifications.

This document should be read in conjunction with the *RISCAuthority Design guide for the fire protection of buildings* and appropriate supporting documents including *Approved Document B with insurers' requirements*. It outlines the basic principles that all designers and their supporting consultants shall consider during the design process, when they are taking either a prescriptive or fire engineering approach (or a combination of both). The principles should also be followed for major extensions and upgrades.

Diagram A.1 Essential principles and the *RISC Authority Design Guide***Note**

Guidance on risk assessments is given in the supporting documents relating to a specific building or end-use application.



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