PRACTICAL FIRE SAFETY GUIDANCE FOR TRANSPORT PREMISES

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The guidance in this document has been jointly produced by the Scottish Government's Police and Community Safety Directorate, HM Fire Service Inspectorate for Scotland, the Scottish Building Standards Agency and the Health and Safety Executive.

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Chapter 1: INTRODUCTION

1. This guide has been produced to assist those who have responsibility for ensuring fire safety in transport premises in Scotland. The *Fire (Scotland) Act 2005,* as amended, introduced changes to fire safety law in Scotland and repealed previous fire safety legislation. Sections 53, 54 and 56 of the *Fire (Scotland) Act 2005* place a duty on employers, employees, managers, owners and others in relation to fire safety. The guide may also be helpful to all other persons with a role in ensuring fire safety in transport premises.

2. Fire can pose a serious risk to persons using transport premises; it has the potential to injure or kill large numbers of people very quickly where there are high passenger numbers. This guide will assist owners, managers and staff to achieve a fire safe environment in their premises and will also assist in achieving compliance with fire safety law.

3. This guidance has been prepared by the Scottish Government, and is one in a series of guidance documents aimed at offering fire safety advice for different types of premises. In Scotland, this guide supersedes the use of the following guidance documents in respect of transport premises:

- *Guide to Fire Precautions in Existing Places of Work that Require a Fire Certificate. Factories, Offices, Shops and Railway Premises (ISBN 0 11 341079 4)*
- *Fire Safety at Work. (ISBN 0 11 340905 2)*
- *Fire Safety. An employer's guide. (ISBN 0 11 341229 0)*

4. The guide has twelve chapters and a number of Technical Annexes numbered 13.1 to 13.14. The first three chapters are an introduction, a description of the scope and an overview of fire safety law and responsibilities under the *Fire (Scotland) Act 2005,* as amended. The fourth chapter explains what fire safety risk assessment is and how it may be undertaken. Fire safety risk assessment should be the foundation for all the fire safety measures in the premises. Chapters 5 to 12 are about managing fire safety and identifying the general fire safety measures which should be in place. These chapters are written to provide guidance for those with statutory duties in relation to fire safety (as set out in the *Fire (Scotland) Act 2005,* as amended).

5. In the event that this guide is read by persons with duties under the *Fire (Scotland) Act 2005,* as amended, and those persons feel unable to apply the guidance, then they should seek assistance from someone with sufficient technical knowledge. In this respect, the Fire and Rescue Authority or Joint Fire and Rescue Board, as enforcer of the legislation, cannot undertake the role. However, the enforcing authority does have a statutory requirement to provide general advice on request about issues relating to fire safety and should be able to provide information and advice which will assist dutyholders to understand their obligations under the law.

6. The Technical Annexes set out more information about fire safety measures and offer benchmarks against which fire safety measures can be compared. The Technical Annexes contain some information that may require a level of knowledge and experience of fire safety matters.

Chapter 2: SCOPE

7. Part 3 of the *Fire (Scotland) Act 2005,* as amended, and related subordinate legislation makes provision in relation to fire safety in certain premises. These premises are defined in section 78 of the Act but are predominantly most premises which are not private dwellings. The Act and related subordinate legislation covers general fire safety which includes risk reduction measures, means of fire warning, fire-fighting, escape and staff training and instruction.

8. The guidance in this document is applicable to general fire safety in transport premises and specifically:

- Airport terminals;
- Railway stations (including sub-surface stations) ;
- Bus stations;
- Tunnels (road, pedestrian and railway);
- Car parks (enclosed and semi-enclosed); and
- Port and shipping passenger terminals.

9. Much of the guidance in this document is relevant to buildings, however, the requirements of fire safety law apply equally to other structures, external areas and open air premises.

10. The range of transport premises is very diverse in terms of size and complexity. In some premises there can be large numbers of people all within a complicated series of spaces, where most people are unfamiliar with the layout and may only know one way in or out of the building. Fire safety design in complex premises will often require specialist advice and a flexible design approach with performance related objectives using fire safety engineering methods to produce bespoke fire safety measures. Due to the complexity of certain transport premises such as airport terminals, this guide should in its application to those premises, be used only for general principles and more specialist information and advice in respect of general fire safety should be sought.

11. Parts of premises may be substantially put to a functional use which falls within the scope of another fire safety guide. For example, transport premises may contain restaurant, bar, shop, office, re-fuelling or storage areas. Where there is multiple functional use within premises, it may be appropriate to check whether there is a specific fire safety guide which is more appropriate for that area.

12. The fire safety provisions in Part 3 of the *Fire (Scotland) Act,* as amended, take precedence over terms, conditions or restrictions in licences which relate to fire safety. Section 71 of the Act makes it clear that terms, conditions or restrictions in licences – including statutory certification or registration schemes – are to have no effect if they relate to fire safety requirements or prohibitions which are, or could be, imposed under Part 3 of the Act.

13. Where possible, this guide does not set down prescriptive standards, but provides recommendations regarding the fire safety risk assessment process, the reduction of risk and guidance on fire safety measures that can be implemented to mitigate risk. It is not necessary to follow the recommendations of this guide if other fire safety risk assessment methods or fire safety measures which achieve the same end, are used. In some premises, the fire safety measures already in place may not be the same as those referred to in this guide as benchmarks, but so long as it can be demonstrated that they meet the requirement

of the outcomes of the risk assessment and provide a suitable level of fire safety, they may be acceptable. This means there is no obligation to adopt any particular solution in this guide if the outcomes of a fire safety risk assessment can be met in some other way.

14. Where the premises are, or include a listed building (a building of special architectural or historic interest, included in a list compiled by the Scottish Ministers), there may be a need to consider the character of the building inside as well as out. Measures to prevent fire, to limit its spread, and to ensure life safety will be as necessary in a historic building as in any other. Before changes are made, advice should be obtained from the local planning authority as to whether Listed Building Consent may be required. Alternatives could be considered to some of the conventional fire safety measures set out in the Technical Annexes, as these may, in some cases, harm the character of historic buildings. A fire engineering approach combining automatic fire detection, fire suppression system and smoke control is recommended in the Historic Scotland Technical Advice Notes 11, 14, 22 and 28.

15. All new buildings, including transport premises must be designed to the mandatory standards under the *Building (Scotland) Regulations 2004.* Guidance on the design and construction of new buildings is contained in the *Scottish Building Standards Technical Handbook for Non-Domestic Buildings*. Similarly buildings which undergo extension, structural alteration or change of use should also meet the same standards and be subject to building warrant approval, if required.

16. In many premises, existing fire safety measures have been incorporated in accordance with Building Regulations. Nothing in this guide should be interpreted as permitting a reduction in the standard of fire safety measures where they have been provided to comply with Building Regulations. It is possible for a standard higher than that required by Building Regulations to be necessary and appropriate as a consequence of a fire safety risk assessment.

Chapter 3: WHAT THE LAW REQUIRES

17. This guide and its contents constitute guidance given by the Scottish Ministers in terms of section 61(2) of the *Fire (Scotland) Act 2005,* as amended. Part 3 of the *Fire (Scotland) Act 2005,* as amended, and related subordinate legislation set out the fire safety duties for the majority of premises in Scotland, with the exception of private dwellings. Transport premises will be subject to the Act and related subordinate legislation. In general, the legislation seeks to ensure the safety of persons (whether they are employees, visitors or others) in the premises in respect of harm caused by fire, by setting out fire safety responsibilities.

18. Although this legislation does not apply to the individual aircraft, ships (during normal ship-board activities), locomotives, rolling stock, trailers or semi-trailers used for transport or to vehicles with a vehicle excise licence or exempt from such a licence, they must nevertheless be taken into account for their potential to be the origin of a fire, be involved in fire or for the consequences of their movement and passenger disembarkation in a fire or emergency situation.

19. Some transport premises required a fire certificate under previous legislation. One of the changes brought in by the *Fire (Scotland) Act 2005,* as amended, is the removal of the need for premises to be issued with a fire certificate. Where transport premises have previously been issued with a fire certificate, such fire certificates will have no legal force and fire safety in premises will be achieved by compliance with the legislation identified in paragraph 17 above. However, certain mainline and underground railway station in Scotland are also subject to the *Fire Precautions (Sub-surface Railway Stations) Regulations 1989*.

20. The legal duty which is imposed by Part 3 of the Fire (Scotland) Act, as amended, and subordinate legislation seeks to achieve safety in the event of fire and can be considered in terms of seven general requirements:

- Carrying out a fire safety risk assessment of the premises;
- Identifying the fire safety measures necessary as a result of the fire safety risk assessment outcome;
- Implementing these fire safety measures using risk reduction principles;
- Putting in place fire safety arrangements for the ongoing control and review of the fire safety measures;
- Complying additionally with the specific requirements of the fire safety regulations;
- Keeping the fire safety risk assessment and outcome under review; and
- Record keeping.

21. Guidance on complying with these requirements is considered in more detail in the remaining chapters. It should be noted that this chapter of the guidance is not intended to be a comprehensive summary of requirements under the *Fire (Scotland) Act 2005,* as amended*,* and related subordinate legislation. Anyone in any doubt about their legal obligations should seek their own independent legal advice.

Who Must Comply With These Duties?

22. The responsibility for complying with these fire safety duties sits with the employer, transport operator and other persons who have control of the premises to any extent, such as tenants, contractors and volunteers working on site may also have some responsibilities. Employers are required to ensure the safety of employees so far as is reasonably practicable. This means that the sacrifice in terms of time, effort, expense, and any other

disadvantages associated with the provision of fire safety measures should be weighed against the magnitude of the fire risk if they were not taken.

23. All other persons with fire safety responsibilities in respect of the premises are required to take all reasonable measures regarding the safety of persons in, or in the immediate vicinity of, the premises. Where premises or responsibilities are shared, each employer, owner or other person who has control over any part of the premises is required to co-operate and co-ordinate in respect of complying with fire safety law and to inform each other of risks.

Who Enforces The Fire Safety Law?

24. The responsibility for compliance with the legislation sits principally with the persons who operate and work in the premises, but there is also provision in the legislation for an enforcing authority with enforcement powers.

25. The Fire and Rescue Authority or Joint Fire and Rescue Board for the area will be the enforcing authority in respect of the majority of premises to which this guide applies.

26. There are exceptions which are:

- In premises occupied by the armed forces of the Crown or visiting forces, the Defence Fire and Rescue Service is the enforcing authority;
- In certain premises including some construction sites, ships under repair or construction and nuclear installations, the Health and Safety Executive is the enforcing authority;
- In other premises where the Crown has fire safety duties, HM Chief Inspector of Fire and Rescue Authorities is the enforcing authority; and
- In major sports grounds, the local authority is the enforcing authority.

27. The powers of enforcement officers (other than the Defence Fire and Rescue Service, to which the remainder of this chapter is not relevant), in relation to premises for which they have enforcement responsibilities are listed in section 62 of the Act and are summarised below.

28. Enforcement officers may do anything necessary to allow them to enforce the fire safety duties, including:

- Entering premises for inspection at any reasonable time, or at any time if the officer has reason to believe that the situation is dangerous;
- Requesting information, records etc, or assistance from any persons with fire safety duties;
- Inspecting, copying or removing any relevant documents from the premises;
- Carrying out any inspections, measurements or tests considered necessary on the premises or any article or substance found on the premises;
- Taking samples of any article or substance found on the premises;
- Dismantling articles found on premises which appear likely to cause danger from fire; and
- Taking possession of an article for purposes of examination or use as evidence.

29. If the enforcing authority is dissatisfied with the outcome of the fire safety risk assessment or the action taken, or the fire safety measures in place, it has the power to take action which could be:

- Informal action;
- Formal enforcement action which could result in the issue of an enforcement notice that requires specified action to be taken;
- In extreme cases, a prohibition notice may be issued that restricts the use of all or part of the premises until specified matters are remedied; or
- Reporting the matter for prosecution. Failure to comply with a notice issued by the enforcing authority **or** placing persons at risk by failing to carry out any duty imposed by fire safety law is an offence.

30. Enforcing authorities are required to take into account the content of this guide to assist in determining whether enforcement action may be necessary but in doing so they should have a flexible approach to enforcement and should not use the benchmarks in the Technical Annexes as prescriptive standards. This would be a misinterpretation, as the objective is to use the relevant benchmarks when assessing the existing fire safety measures and the guidance provided in the Technical Annexes may be a method of assisting with the reduction of the risk.

31. Where there is disagreement with the enforcing authority on compliance issues, there is a mechanism for joint referral for third party independent determination. The enforcing authority will supply details in relevant cases. There is also a right of appeal to the court against formal enforcement action.

32. Additionally, if the premises pose a serious risk to persons in respect of harm caused by fire, or would pose such a risk if particular changes were made to the premises, the authority may issue an alterations notice that obliges the recipient to inform the enforcing authority before making specified changes to the premises.

33. In all cases, when dealing with an enforcing authority, it is important to be able to distinguish between fire safety measures that are necessary for the protection of life and which are required to comply with fire safety legislation, as opposed to any fire safety measures that provide a higher standard than is necessary to comply with fire safety legislation, such as measures provided for the protection of property or the continuation of business.

34. Fire and Rescue Service crews may visit premises to enable crew members to gain familiarisation with them in the event they are called to a fire in the premises. This type of visit is unlikely to include an assessment of compliance with fire safety law. The fact that a Fire and Rescue Service visit has taken place should not be interpreted as an endorsement of fire safety standards and procedures in the premises.

Chapter 4: FIRE SAFETY RISK ASSESSMENT

35. Employers, managers and any persons with control to any extent of the premises, including its owner(s) in some cases, have duties in respect of fire safety of the premises. It is a legal requirement to carry out a fire safety risk assessment. This forms a crucial element in the overall safety policy for the premises. It is essential that the risk assessment is specific to **fire safety** and to the **premises concerned**. An overall generic risk assessment will **not** be sufficient. It is essential that the person who undertakes this fire safety risk assessment is proficient to do so.

36. Persons can be considered proficient where they have sufficient technical training and experience or knowledge, both to carry out a fire safety risk assessment and understand fully the procedures and management involved, and to undertake properly the measures referred to in this guide. Risk assessment in complex premises such as some airport terminals and railway stations may require the assessor to have a greater level of knowledge and expertise.

37. This chapter explains fire safety risk assessment and sets out a step-by-step guide to the process. The method suggested shares a similar approach to that used in general health and safety guidance.

What Is A Fire Safety Risk Assessment?

38. A fire safety risk assessment is an organised and methodical look at the premises, the activities within the premises, the potential for a fire to occur and the harm it could cause to the people in and around the premises. The existing fire safety measures are evaluated and kept under review to establish whether they are adequate or if more requires to be done.

39. For the purpose of fire safety risk assessment, a **hazard** is a situation that can give rise to a fire. **Risk** has two components: the **likelihood** that a fire may occur; and the potential for a fire to cause death or injury i.e. **consequence**. Both of these components should be considered in a fire safety risk assessment.

40. The aims of a fire safety risk assessment are:

- To identify hazards and reduce the risk of those hazards causing harm to as low as is reasonably practicable;
- To determine what fire safety measures and management policies are necessary to ensure the safety of people in the building should a fire occur.

How Is A Fire Safety Risk Assessment Carried Out?

41. There are 5 steps in the assessment process and these are shown in Figure 1.

FIRE SAFETY RISK ASSESSMENT	
1	Identify people at risk
2	Identify fire hazards Sources of ignition Sources of fuel Sources of oxygen
3	Evaluate the risk and decide if existing fire safety measures are adequate Evaluate the likelihood of a fire starting Evaluate the consequence to people from fire Implement fire safety measures • Remove or reduce fire hazards • Remove or reduce risks to people • Fire alarm • Fire-fighting equipment • Escape routes and lighting • Signs and notices • Maintenance • Effective management • Staff training
4	Record Record significant findings and action taken / action to be taken
5	Review Keep assessment under review Revise where necessary

Figure 1 Five steps of the fire safety risk assessment process

Step 1: Identify People At Risk

42. An assessment should be made of those persons at risk if a fire occurs. This involves identifying the number and location of people working and other persons who frequent the premises such as passengers, visitors, and contractors. Passengers and visitors may be unfamiliar with the internal layout.

43. The maximum numbers liable to be in the premises at the same time should be determined. This can be anticipated from the size of the premises and the frequency of traffic arrivals and departures, however transport delays and special events may greatly increase passenger numbers. There is guidance in Technical Annexe 13.8 for calculating potential occupancy capacity based on area. For some premises, the highest risk to life safety may occur at peak times when a high volume of people are passing through the premises.

44. The familiarity of passengers will vary. Passengers using airport terminals on an occasional basis may have less familiarity compared to underground stations where people are using the same facility daily, but persons may be familiar only with the routes they normally use. All transport premises have the potential to be used by persons unfamiliar with the facilities and who may not understand English.

45. Consideration needs to be given to the potential behaviour of passengers. Their behaviour may offer difficulty in the event of fire and they may be reluctant to obey instructions or evacuate. Examples are:

- People may be reluctant to evacuate without their luggage;
- People may be in a state of undress such as in changing rooms;
- People may decide their first priority is to try and rejoin children and/or friends; and
- People at check-in and ticket desks may be concerned at losing their place in the queue.

46. Account should be taken of the lack of awareness and immaturity of any young persons employed and consideration given to employees and others who may work alone such as cleaners and security staff and anyone who may be in isolated areas such as maintenance staff. In considering staff, any disability and associated difficulty should be identified.

47. Persons who have some form of disability may have difficulty in perceiving or responding to a fire or in leaving the premises if there is a fire and this must be considered. Alterations may have been made to the premises to increase accessibility for disabled persons in order to comply with the Disability Discrimination Act. The use by large groups could result in high numbers of persons with disabilities being present in the premises at the time of a fire. Information and guidance on the evacuation of disabled persons in the event of fire is available in *Practical fire safety guidance: the evacuation of disabled persons from buildings*.

48. There are other persons who may have some reason for not being able to leave the premises promptly such as the elderly or staff who have control of essential activities.

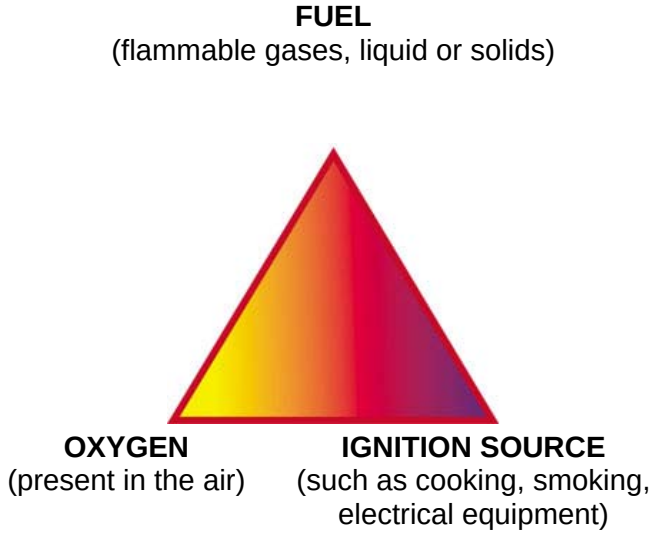
49. In considering persons at risk, account must be taken of the psychological stress and behaviour of passengers that may be associated with passenger congestion or perceived evacuation delay.

Step 2: Identify Fire Hazards

50. This step involves identifying potential ignition sources, the materials that might fuel a fire and the oxygen supplies which will help it burn.

51. For a fire to start, three components are needed: a source of ignition, fuel and oxygen. These components can be represented in the form of a triangle of fire as shown in Figure 2. If any one of these components is missing, a fire cannot start. Taking steps to avoid the three coming together will therefore reduce the chances of a fire occurring.

Figure 2 The triangle of fire



Identify Sources Of Ignition

52. Potential ignition sources are those where sources of heat could get hot enough to ignite material found in the premises. These sources could include:

- Smokers' material such as cigarettes, matches and lighters;
- Electrical, gas or oil-fired heaters (fixed or portable);
- Hot processes such as repair work by contractors;
- Cooking equipment;
- Lighting equipment;
- Deliberate fire raising;
- Faulty or misused electrical equipment;
- Sparks and frictional heat such as from overheating bearings or slipping drive belts;
- Items carried in passengers' luggage;
- Overhead line equipment on electrified rail lines;
- Hot surfaces such as exhaust pipes; and
- Spontaneous ignition.

53. Indications of 'near misses', such as scorch marks on furniture or fittings, discoloured or charred electrical plugs and sockets, cigarette burns etc, can help identify hazards.

Identify Sources Of Fuel

54. Anything that burns is fuel for a fire. Material which will burn reasonably easily and is in enough quantity to provide fuel for a fire or cause it to spread to another fuel source should be identified. This applies to contents, fixtures and fittings and also to structure and materials used to construct or line walls and ceilings. How these fuels might contribute to the spread of fire should be identified. Workshop, refuelling, retail and goods storage areas of transport premises are likely to contain significant quantities of fuel.

55. Some of the most common 'fuels' found are:

- Textiles, soft furnishings and clothing;
- Flammable liquids such as aviation fuel, white spirit, methylated spirit, cooking oils, some paints and adhesives;
- Flammable chemicals, such as certain cleaning products and photocopier chemicals that use hydrocarbon solvents;
- Packaging materials;
- Combustible core of insulated panels;
- Waste and litter (such as newspapers, food and drink packaging)
- Plastics, cellular foams and rubber, such as upholstered furniture and tyres;
- Waste material, particularly when finely divided such as shredded paper, wood shavings, off cuts, and dust;
- Flammable gases such as liquefied petroleum gas (LPG) and acetylene;
- Powdered materials or dusts, including materials which are not normally considered a fuel when in an undivided state, but where as a dust they may be prone to dust explosions;
- Vehicle and equipment fuels and lubricants: and
- Fittings and power units of road vehicles, locomotives, rolling stock and aircraft.

56. The configuration of the fuel can be such that extremely high heat release and fire spread occur. Materials located in vertical spaces/ducts, or spaces where fire can spread horizontally, can produce fires that spread quickly. Dense concentrations of plastic coated cables pose a particular hazard when cable trays are grouped vertically.

Identify Sources Of Oxygen

57. The main source of oxygen for a fire is in the air around us. Air supply generally falls into one of two categories: natural air flow through doors, windows and other openings; or mechanical air conditioning systems and air handling systems. In many premises there will be a combination of sources, which will be capable of introducing or extracting air to or from the premises.

58. In sub-surface railway tunnels and stations, substantial airflow may be caused by the movement of trains.

59. Additional sources of oxygen can sometimes be found in materials used or stored in premises such as:

- Some chemicals (oxidising materials), which can provide a fire with additional oxygen and so assist it to burn, or
- Oxygen supplies from cylinder storage.

60. Oxygen poses a special hazard. High concentrations of oxygen can cause materials to burn extremely rapidly and some materials which are not normally considered combustible, can burn in an enriched oxygen atmosphere. Oxygen is dangerous when in contact with grease or oil.

Step 3: Evaluate The Risk And Decide If Existing Fire Safety Measures Are Adequate

61. Step 3 of the fire safety risk assessment involves an assessment of the hazards and analysis of whether the fire safety measures taken reduce the risks posed by the hazards to an acceptable level.

Evaluate The Likelihood Of A Fire Starting

62. The chances of a fire starting will be low if there are few ignition sources and combustible materials are kept away from them. In general, fires start in one of three ways:

- **Accidentally**, such as when a bottle of flammable liquid is knocked over on to a source of ignition.
- By **act or omission**, such as when electrical equipment is not properly maintained, or when packaging is allowed to accumulate near to a heat source.
- **Deliberately**, such as intentional setting fire to external storage or rubbish bins.

63. The premises should be critically examined to identify any potential accidents and any acts or omissions which might allow a fire to start. This should include situations that may present an opportunity for deliberate ignition.

Evaluate The Consequence To People From A Fire Starting In The Premises

64. Having considered the people likely to be at risk should a fire start in the premises and the chances of a fire occurring, the extent of the actual risk to those people if a fire starts and spreads should be considered. In evaluating the risk to people it is necessary to consider situations such as:

- Fire starting on a lower floor affecting the escape routes for people on upper floors especially where there is only a single escape route;
- Fire developing in a space that people have to pass by to escape from the premises;
- Fires that may develop in unoccupied spaces;
- Fire or smoke spreading through a premises via routes such as poorly installed, poorly maintained or damaged vertical shafts, service ducts, ventilation systems, walls, partitions, ceilings and roof voids;
- Fire and smoke spreading through the premises due to open doors, doors not fitted with self-closers, doors being wedged open or damaged doors;
- Fire and smoke spread through open areas such as concourses;
- The contribution to fire spread and development if dangerous substances are involved or if there is failure of work processes;
- Fire and smoke may spread into the premises from exterior fires involving road vehicles, locomotives/rolling stock, aircraft or ships;
- Underground or tunnel fires where escape may involve upward travel above the fire; and
- Fire following a collision.

65. Additionally, where the premises are in multi-occupancy, specifically consider:

- The risk from a fire which may occur in communal parts or in another part of the building occupied by a different person; and
- The risk which a fire in the premises may pose to other occupiers of the building and any adjoining premises.

Risk Reduction

66. In implementing fire safety measures, fire safety law requires that certain principles should be considered, these are:

- Avoiding risks;
- Evaluating risks which cannot be avoided;
- Combating risks at source;
- Adapting to technical progress (as this often offers opportunities for improving working methods and making them safer);
- Replacing the dangerous with the non-dangerous or less dangerous;
- Developing a coherent fire prevention policy which covers technology, organisation of work and the influence of factors relating to the working environment;
- Giving collective fire safety protective measures priority over individual measures; and
- Giving appropriate instruction to employees.

Avoid Or Reduce The Hazards That May Cause A Fire

67. Having identified the fire hazards in Step 2, the risks should be avoided or removed if reasonably practicable to do so. If the hazards cannot be removed, measures should be taken to reduce the risks.

Remove Or Reduce Sources Of Ignition

68. There are various ways to reduce risk caused by potential sources of ignition, for example:

- Restrict the movement of, and guard portable heating appliances;
- Ensure that prohibition of smoking is enforced;
- Ensure electrical and mechanical equipment is installed, used, maintained and protected in accordance with the manufacturer's instructions;
- Take precautions to avoid deliberate fire raising;
- Eliminate static discharges which can be created when different materials separate such as when refuelling aircraft; and.
- Correctly store materials that are subject to spontaneous heating.

Remove Or Reduce Sources Of Fuel

69. There are various ways to reduce the risks caused by materials and substances which burn, for example:

- Ensure flammable materials are stored properly;
- Remove combustible wall and ceiling linings to reduce the surface rate of flame spread and smoke production;
- Reduce stocks of flammable or combustible materials to a minimum and store in dedicated storerooms or storage areas and keep the minimum required for the operation of the business;
- Take action to avoid storage areas being vulnerable to fire raising or vandalism;
- Do not store combustible materials against the outside of external walls;
- Develop a system for the control of combustible waste by ensuring that waste materials and rubbish are not allowed to build up and are carefully stored until properly disposed of;
- Remove combustible materials from the proximity of welding and/or metal grinding (sparks) operations;
- Allowing undergrowth to grow right up to the premises is a risk as it can be a source of accidental fires and a target for fireraisers; and
- Combustible materials should be kept clear of hot surfaces such as hot pipes, heat exchangers, electric motors, or unprotected light bulbs.

70. Consideration of materials' fire properties and smoke production is particularly important for tunnels, stations and transport premises that are underground. The use of combustible materials should be minimised. Some materials can be replaced by materials that are more difficult to ignite, less capable of spreading flame or do not emit toxic fumes or smoke when subject to high temperatures.

Remove Or Reduce Sources Of Oxygen

71. The potential source of oxygen supplied to a fire can be reduced by:

- Closing doors and other openings;
- Ensuring that doors are close fitting and, where appropriate, fitted with seals;
- Controlling the use and storage of oxygen cylinders, ensuring that they are not leaking and that where they are located is adequately ventilated;
- Closing down ventilation equipment; and
- Not storing oxidising materials near or within any heat source or flammable materials.

72. In some cases the action may be a precaution taken in case a fire starts, such as keeping certain doors closed. In other cases the action may take place once a fire is detected, such as when ventilation equipment is shut down (either manually or automatically) or the automatic release of door hold open devices.

73. In buildings with a smoke control system the situation is more complicated. Input of air will be essential to the operation of the smoke control system and some openings in the building may be designed to open automatically when the system operates.

74. Airflow in railway tunnels can be influenced by the movement of railway traffic.

Remove Or Reduce The Risks To People From A Fire

75. The fire risk to people should be reduced to as low as is reasonable by putting into place fire safety measures. The level of fire safety measures provided in premises should be proportional to the risk posed to the safety of the people on the premises. The higher the fire risk, the higher the standards of fire safety measures required. Fire safety law organises fire safety measures into seven groupings, which are:

- Measures to reduce the risk of fire and the spread of fire;
- Means of escape;
- Securing that the means of escape can be safely and effectively used;
- Means for fighting fires;
- Means for detecting fire and giving warning of fire;
- Arrangements for action to be taken in event of fire, including instruction and training and mitigation of the effects of fire; and
- Other measures prescribed in fire safety regulations.

76. The objective of fire safety law is to achieve life safety. Chapters 5 to 12 contain further guidance on fire safety measures which can be adopted within premises and the Technical Annexes contain further information and benchmarks against which existing fire safety measures can be compared. The guidance should be applied in a flexible manner but without compromising the safety of persons on the premises.

77. Where improvements to fire safety measures in premises are identified as a result of a fire safety risk assessment, a programme for the implementation of improvements should be drawn up. The programme should have determined timescales indicating the completion dates for any action required. Where improvements involve building work they are subject to Building Regulations.

78. It is important that the status of the Technical Annexes in this guide is understood. Most of the benchmarks in the Technical Annexes are a modification of the Building Regulation standards and associated Technical Handbook guidance that applies to new buildings. The intent of the modification is to provide benchmarks that can be used as a comparison in existing premises. Achieving the same standard as the benchmarks may reduce the risk in existing premises to a degree consistent with the result of a fire safety risk assessment. It may be reasonably practicable to upgrade to a particular benchmark in some situations but not in others. The relevant benchmarks should be used as guidance in order to achieve an overall degree of safety and reduction in risk.

79. Enforcing authorities should not seek to compel these benchmarks on a prescriptive basis. Prescription is not compatible with fire safety risk assessment and all premises will be different, with each risk assessment being site specific and decisions in respect of fire safety standards should at all times be based on judgement of risk and be justifiable, both from a compliance and an enforcement perspective.

Step 4: Record Fire Safety Risk Assessment Information

80. Having carried out a fire safety risk assessment in relation to the premises, the findings should, in some circumstances, be recorded, including any action taken or action still to be taken. Fire safety law requires information to be recorded where five or more employees are employed (whether they are on site or not) or the premises are subject to licensing or registration or an Alterations Notice has been issued requiring this. Recommendations in respect of recording are contained in Chapter 5.

Step 5: Review Of Fire Safety Risk Assessment

81. A review of the fire safety risk assessment should be carried out regularly. If the findings of the fire safety risk assessment are considered to be no longer valid or there has been a significant change in the matters to which it relates, such as a change to the premises that has affected the risk or the fire safety measures, the assessment should be reviewed. Other such changes that might prompt a review include:

- A change in passenger number trends or the characteristics of the occupants;
- Changes to work procedures, including the introduction of new equipment;
- Alterations to the building, including the internal layout; or
- Becoming aware of shortcomings in fire safety measures or potential improvements.

82. The potential risk of any proposed change should be considered before the change is introduced. If a change introduces new hazards consider the fire risk and, if significant, do whatever is needed to keep the fire risk under control. In any case the fire safety risk assessment should be kept under review to make sure that the fire safety measures remain adequate.

83. If a fire or ‘near miss’ occurs, this could indicate that the existing assessment may be inadequate and a re-assessment should be carried out. Identify the cause of any incident and then review and, if necessary, revise the outcome of the fire safety risk assessment in light of this experience. If the Fire and Rescue Service has attended a fire in the premises, its findings may help inform a review of the fire safety risk assessment.

Chapter 5: MANAGING FIRE SAFETY

84. A management commitment to fire safety is essential to assist with achieving suitable fire safety standards in premises and in the maintenance of a staff culture of fire safety. This chapter covers management standards that should be achieved within all premises, in respect of:

- **Fire safety policy;**
- **Emergency fire action plan;**
- **Fire safety information and training;**
- **Fire drills;**
- **Maintenance of fire safety measures; and**
- **Recording information and keeping records.**

Fire Safety Policy

85. There should be a clearly defined fire safety policy for the protection of all persons using the premises including passengers, staff and visitors and this should include the arrangements for planning, organisation, control, monitoring and review of fire safety measures. Factors to consider include:

- Planning: adopting a systematic approach which identifies priorities and objectives;
- Organisation: having a structure with the aim of ensuring improvement in fire safety performance;
- Control: ensuring decisions for achieving fire safety are being implemented as planned;
- Monitoring and review: constant development of policies and approaches;
- There should be one named individual with overall management responsibility for fire safety within the premises, whether the premises are staffed or un-staffed;
- The arrangements for carrying out and reviewing fire safety risk assessments;
- In staffed premises, there should be an adequate number of trained persons responsible for supervising and implementing the emergency fire action plan;
- Preparation of an emergency fire action plan;
- All means of escape should be maintained to ensure that they can be safely used at all times;
- Maintenance and testing of all other fire safety measures;
- Staff training on fire safety and the arrangements for ensuring that this training is given;
- The need for contingency plans for when life safety systems such as fire-detection and alarm systems, sprinklers or smoke control systems are out of order; and
- Arrangements for notifying information on risks and fire safety measures to:
  - workers from outside agencies or undertakings who are working in the premises and their employers; and
  - the parents of any child who may be employed to work on the premises.

86. Additional considerations in large organisations are:

- The responsibility for fire safety within the organisation and the arrangements for ensuring fire safety in all premises;
- The responsibility for fire safety at board level; and
- The arrangements whereby regional or area managers may monitor and check that individual managers are meeting the requirements of fire safety law.

Emergency Fire Action Plan

87. It is a management responsibility to have in place both an emergency fire action plan and arrangements to implement the plan. The evacuation of all persons, including disabled persons, is a management responsibility which cannot be delegated to the Fire and Rescue Service.

88. There should be a written emergency fire action plan which sets out the action that staff and other people in the premises should take in the event of a fire. It should be kept on the premises, be available in a format understood by all, as well as being known by staff and forming the basis of the training and instruction which is provided. The plan should also be available for inspection by the enforcing authority.

89. The purpose of the plan is:

- To ensure that the people on the premises know what to do if there is a fire; and
- To ensure that appropriate action is taken in the event of fire and that the premises can be safely evacuated.

90. In drawing up the emergency fire action plan, the results of the fire safety risk assessments should be considered along with the need for procedures for all occupants of the premises including disabled people.

91. In multi-occupied premises or complexes, the emergency fire action plan will need to be detailed and compiled after consultation with all occupiers and other responsible people such as management or owners who have control over the premises. In most cases this means that a single emergency plan covering the whole premises will be necessary.

92. A plan for a small bus station for example, may be simple; however a more sophisticated and comprehensive plan will be required for more complex premises such as a busy railway station or large airport terminal.

93. The plan should set out details of the procedures to be followed by staff in the event of fire and by any other persons present. It should be specific to the premises and should include:

- How people will be warned if there is a fire;
- What staff should do if they discover a fire;
- What staff should do in the event of a fire;
- The arrangements for calling the Fire and Rescue Service;
- The specific action to be taken by the person in charge when the fire alarm activates or a fire is discovered;
- The procedure to be followed to evacuate the premises, taking into account any personal emergency egress plans;
- Where persons should assemble or be taken after they have left the premises and procedures for checking whether the premises have been evacuated;
- Arrangements for fighting fire by staff trained in the use of portable fire extinguishers;
- Any processes, machines or power supplies that need to be stopped or isolated if there is a fire; and
- Procedures for meeting the Fire and Rescue Service on its arrival and notifying it of the circumstances of the incident, whether all persons are accounted for and the presence of any special dangers.

94. The list in paragraph 93 contains general information on emergency fire action plans. There are more specific management issues which need to be considered and therefore pre-planned for, such as:

- The procedure, should a fire occur while a train is in a sub-surface railway station, and whether a train should leave with passengers to reduce the number of persons using the station means of escape;

- Whether to prevent trains stopping at a sub-surface railway station in which there is a fire. If a train stops at the station platform some passengers may alight on to the platform;

- In each of the above cases, the plan should also consider that the movement of a train may cause undesirable air flows within tunnels, station and communicating areas;

- In other railway stations, whether trains should be stopped to prevent arrival and discharge of passengers;

- In a rail tunnel there is a need to consider planning for de-training and whether passengers need to alight from the train and walk along at track level, whether passengers can use cross-passages to an adjacent tunnel, and whether passengers have to travel along the tunnel to a final exit or station. Where appropriate, arranging disconnection and earthing of the traction current; and

- In the event of a fire within a road tunnel the procedure for closing the tunnel to traffic, the method of achieving this, and for managing traffic in such a way that unaffected vehicles can leave the tunnel.

95. In all cases, communication with passengers is extremely important. The plan should include the arrangements for informing passengers and travellers of what action they should take.

96. For locations where the Fire and Rescue Service has a specific emergency response plan, such as may be the case for tunnels, larger railway stations, airports and sub-surface railway stations, then the premises' emergency fire action plan should be compatible with the Fire and Rescue Service response plan. Discussion and agreement is required between the parties.

97. The needs or assistance required by any disabled staff member should be discussed with the individual. An individual personal emergency egress plan (PEEP) for each of these persons should be established. A PEEP should contain details of special evacuation arrangements. More information about the use of PEEPs is available in *Practical fire safety guidance: the evacuation of disabled persons from buildings*.

98. The use of **lifts** needs to be considered. In general, lifts should not be used for evacuation though some lifts may be designed for evacuation of disabled persons and in some situations, the fire safety measures provided may allow for the use of specific lifts for fire evacuation purposes. If fire-fighting lifts are to be used for evacuation, this should be agreed and co-ordinated with the Fire and Rescue Service who may, on arrival, need to take control of the lift for access and fire-fighting.

99. **Travelators** may be used for circulation within airports and railway stations. If they continue to run during a fire incident they could inadvertently convey passengers towards the fire. Therefore they should normally come to a halt on activation of a fire alarm.

100. The use of **escalators** to facilitate evacuation is an established protocol in some transport premises. Where escalators are used for evacuation, there is also the potential that persons could inadvertently be conveyed up (or down) into a fire situation. There needs to be consideration whether in event of fire alarm activation, an escalator can continue to operate along with additional staff supervision and control; or whether the escalator should stop on activation of the fire alarm.

101. In certain transport premises **phased evacuation** may be appropriate**.** This describes a situation where those people most at risk from a fire, usually those closest to where the alarm has originated, will be immediately evacuated from the area, steps are taken to prevent other persons entering the vicinity, while others in the building are given an alert signal and will then evacuate when it becomes necessary or after a pre-determined timescale. The initial movement, depending on the layout and configuration of the premises, can be either horizontal or vertical. Where major airport terminals have large compartments or smoke control zones, the evacuation of persons in to adjacent zones may be appropriate for the following reasons:

- to prevent people having to enter a hostile environment such as the airport apron;
- to avoid disruption to the operation of the building;
- to avoid the airside/landside barriers being breached;
- to avoid the segregation of arriving and departing passengers being breached; and
- to assist in the evacuation of people with disabilities.

102. Due to the significant operational disruption and associated risks that may be caused by a false alarm or a minor incident, the provision of a staged evacuation may be appropriate for some transport premises. Staged **evacuation** is where the initial alert signal from the fire alarm system is given to occupants, or more commonly, only to certain staff, who then carry out pre-arranged actions to help others to evacuate. This gives time for investigation purposes by staff before a general alarm is given. It requires such staff to be available at all times and should be used only where necessary to ensure fire safety.

103. Where a staged evacuation strategy is in place, it is normally advisable for those known disabled people who have an extended evacuation time to be alerted at the first stage to give them the maximum time to escape. Phased and staged evacuation strategies both require fire-warning systems capable of giving staged alarms, including an ‘alert signal’ and a different ‘evacuate signal’.

Fire Safety Information And Training

104. It is essential that staff know what they have to do to safeguard themselves and others on the premises and to have an awareness of the importance of their actions. This includes risk reduction, maintenance of fire safety measures and action if there is a fire. In busy transport premises, the actions of staff if there is a fire, are likely to be crucial to the safety of the public using the premises.

105. All staff (including volunteers, temporary and agency staff) should be given information, training and instruction on the fire safety measures to be taken or observed on the premises, including the action to be taken in case of fire. The specific fire safety training needs of any young persons employed should be considered. Training of each member of staff should take place as soon as possible after they are appointed and regularly, at

predetermined intervals after that, to ensure that they remain familiar with procedures. Information should be given to staff whenever there is a change in the risk from fire, where changes have been made to the emergency fire action plan or other fire safety measures, or where working practices or people's responsibilities have changed.

106. Staff who have a supervisory role should be given details of the findings of the fire safety risk assessments and should receive additional training which will enable them to discharge their specific responsibility. Training for this role may include:

- Detailed knowledge of the fire safety strategy of the premises;
- Instruction on the operation of any fire alarm control panel installed within the building, with particular attention to the information displayed and how to interpret this information;
- How to search safely and recognise areas that are unsafe to enter; and
- The difficulties that disabled persons may have in escaping and associated special evacuation arrangements.

107. Where staff may require to physically move or assist persons during an evacuation, they should receive training on the method of achieving this and should be familiar with the use of any evacuation aids or equipment provided for this purpose.

108. Written instructions should be concise, comprehensible and relevant and should be reviewed and updated as new working practices and changes are introduced. Inclusive employment policies mean that staff with differing levels of capability may be present in premises and the fire safety risk assessments should consider whether further instruction or guidance is necessary for those staff, to ensure that the evacuation strategy is appropriate and understood by everyone. Instructions will need to be given to people delegated to carry out particular tasks, such as daily or weekly fire equipment checks.

109. Instruction and training should take place during working hours and should include staff on shift working. The information and instruction should be in a form that can be understood, taking account of those with differing abilities such as hearing or sight impairment, those with learning difficulties and those who do not use English as their first language.

110. All training should support the fire safety strategy and emergency fire action plan, be verifiable and be supported by management records as evidence that adequate training has been given. Fire safety training should be specific to the premises and should include the following:

- The action to take on discovering a fire;
- How to raise the alarm and what happens then;
- The action to take upon hearing the fire alarm;
- The significant findings of the fire safety risk assessments;
- The measures that have been put in place to reduce the risk from fire;
- The identity of people nominated with responsibilities for fire safety;
- Any special arrangements for serious and imminent danger to persons from fire;
- The procedures for alerting visitors and members of the public including, where appropriate, directing them to exits;
- The arrangements for calling the Fire and Rescue Service;
- The measures in place to ensure a safe escape from the premises and how they will operate;
- The personal emergency egress plans for disabled persons;

- The evacuation procedures for everyone in the premises to reach an assembly point at a safe place;
- The fire prevention and fire safety measures and procedures in the premises and where they impact on staff and others in the premises;
- The location and, where appropriate, the use of fire-fighting equipment;
- The location of the escape routes, especially those not in regular use;
- How to open all doors on escape routes, including the use of any emergency fastenings (and locks where appropriate);
- The importance of keeping fire doors closed to prevent the spread of fire, heat and smoke;
- The importance of good housekeeping;
- The risks from flammable materials used or stored on the premises;
- The precautions to be taken to minimise and control the risks, with particular attention to their role in reducing and controlling fuel and ignition sources; and
- How to stop any machines and processes or isolate power supplies where necessary in the event of a fire.

Fire Drills

111. Fire drills should be carried out to check that staff understand the emergency fire action plan (including all relevant personal emergency egress plans), to ensure that staff are familiar with operation of the emergency fire action plan, to evaluate effectiveness of the plan and to identify any weaknesses in the evacuation strategy.

112. The frequency of drills for each premises will be different and should reflect the level of risk. Fire drills should take place at least once a year. Where there is more than one escape route, the drills should assume conditions in which one or more of these are obstructed by smoke. In transport premises, fire drills should involve a rehearsal for evacuation and will normally be scheduled outwith peak times.

113. Where there is the possibility that someone may misinterpret the fire drill and call the Fire and Rescue Service, it may be appropriate to inform the Fire and Rescue Service prior to the commencement and on conclusion of a drill in order to alert it to the exercise and so prevent its unnecessary attendance. If the fire alarm system is connected to a remote alarm receiving centre, inform the receiving centre, to ensure that the Fire and Rescue Service is not inadvertently called out to the premises, and inform the receiving centre when the fire drill has been completed.

114. Within each building the fire drill evacuation should be tailored to the needs of the premises and take into account what is achievable and what is realistic.

115. When carrying out the fire drill it may be helpful to:

- Circulate details concerning the fire drill and inform all staff of their duty to participate;
- Ensure that any equipment which is in use can be made safe by isolating or turning off controls, where appropriate;
- In larger premises, nominate observers who can assess the appropriateness of actions and identify problems; and
- Inform visitors if they are present.

116. The pre-planned procedure for identifying all persons have evacuated, should be carried out. In some cases this will involve a roll call for staff being carried out as soon as possible at the designated assembly point(s), noting any persons who are unaccounted for.

In a fire evacuation this information would need to be passed to the Fire and Rescue Service on arrival. The results of the fire drill should be recorded.

117. Throughout the fire drill, the person in charge and any nominated observers should pay particular attention to:

- Inappropriate actions such as stopping to collect personal items etc;
- Difficulties experienced by people with disabilities;
- Communication difficulties with regard to the roll-call and establishing that everyone is accounted for;
- The use of frequently used routes instead of the nearest available escape routes;
- Difficulties with the opening of doors; and
- Doors not being closed as people leave rooms.

Maintenance Of Fire Safety Measures

118. The premises, emergency routes and exits, fire-fighting equipment, fire alarm, emergency lighting, Fire and Rescue Service facilities and other fire safety measures should be kept in efficient working order and covered by a suitable system of maintenance. There should be regular checks, periodic servicing and maintenance and any defects put right as quickly as possible. Some systems and equipment will be the subject of a British Standard which will likely contain recommendations in respect of maintenance and testing. Experience in individual premises may show that there is a need to vary the suggested frequencies. The examples below of testing and maintenance are not intended to be prescriptive and other testing regimes may be appropriate where this can be justified. Six monthly and annual tests will normally be carried out by a person with specialist knowledge, possibly by entering into a service contract. The following are examples of checks and tests that should be carried out:

119. Daily:

- Walk through premises and check escape routes to ensure they are clear of obstructions and combustible materials, that self-closing doors are not wedged open, that out of hours security devices on exit doors have been disabled;
- Check any fire alarm control panel and indicating equipment to ensure the system is active and fully operational; and
- Regular inspection and removal of waste and litter.

120. Weekly:

- Test fire alarm system by activating a manual call point (using a different call point for each successive weekly test), usually by inserting a dedicated test key. This will check that the control equipment is capable of receiving a signal and in turn, activating the warning alarms. Manual call points may be numbered to ensure they are sequentially tested. It is good practice to test the alarm at the same time each week, but consider the need to ensure that staff working shifts are given the opportunity to hear the alarm. During a test, the alarm should not operate for too long so that there can be a ready distinction between a test and an unplanned actuation. Where the system is connected to an alarm receiving centre, the centre should be notified prior to testing and on completion of the test;
- Smoke control systems installed for life safety purposes should be tested as part of a weekly test of all systems which incorporate a fire engineered design within the building;
- A check should be made to determine that the testing of the fire alarm also results in the operation or disabling of other linked features such as electrically powered locks,

the release of any doors on hold open devices, the operation of doors on swing free arms and automatic opening doors reverting to manual operation;
- Check that all safety signs and notices are legible;
- Check escape routes, and test exit locking mechanisms such as panic bars, push pads and electromagnetic locking devices;
- Ensure that fire door self-closing devices operate effectively; and
- Check sprinkler system.

121. Monthly:

- Functional tests of all emergency lighting systems should be at an appropriate time when, following the test, they will not be immediately required. However, some modern systems have self-testing facilities that reduce routine checks to a minimum. Depending on the type of installation certain routine checks and routine maintenance work may be able to be done in house. Test methods will vary. Further maintenance may need to be carried out by a service engineer;
- Carry out brief visual check of fire extinguishers and hose reels to ensure there are no obvious faults;
- Check sprinkler system; and
- Fire doors should be checked to ensure they are in good working order as follows:
  - Inspect doors for any warping or distortion that will prevent the door from closing flush into the frame;
  - Check any fire-resisting glazed panels are in good condition and secure in their frame; and
  - Check that intumescent strips and smoke seals are in good condition.

122. Three monthly:

- Smoke control systems installed to assist with fire-fighting operations should be tested as part of the quarterly test of all systems which incorporate a fire engineered design within the building; and
- Quarterly checks and inspection of sprinkler system.

123. Six monthly:

- A person with specialist knowledge of fire-warning and automatic detection systems should carry out six-monthly servicing and preventative maintenance on the fire alarm; and
- Six-monthly checks and inspection of sprinkler system.

124. Annual:

- Maintenance of portable fire extinguishers;
- Annual discharge test of emergency lighting;
- Maintenance check to hose reels; and
- Annual checks, inspection and test of sprinkler system.

Recording Information And Keeping Records

125. Information and records as necessary to comply with the legislation should be kept and made available for inspection. The information recorded should in itself offer proof that a suitable fire safety risk assessment has been carried out. Information should be recorded in respect of:

- The significant findings from the fire safety risk assessment;
- The resulting fire safety measures and action to be taken;
- Persons who are especially at risk; and
- Fire safety arrangements for the effective planning, organisation, control, monitoring and review of the fire safety measures.

126. The maintenance of accurate records can assist with the provision of fire safety standards, the review of a fire safety risk assessment and with staff awareness. Maintaining an up-to-date drawing or plan of the premises will assist in verifying that the fire safety measures that are in place are appropriate. Features which could be included in a plan are:

- Indication of essential structural features such as the layout of the premises, escape routes, doorways, walls, partitions, corridors, stairways etc, including fire-resisting structure and self-closing fire doors provided to protect the means of escape;
- The extent of compartments and location of ventilation system fire dampers;
- Details of the number, type and location of the fire-fighting equipment;
- Operation control room location;
- The location of manually operated fire alarm call points and control equipment for the fire alarm;
- The extent and type of automatic fire detectors;
- The location of any emergency lighting equipment and any exit route signs;
- The location of any automatic life safety fire suppression systems such as sprinklers and the location of the sprinkler shut-off valve;
- The location of the main electrical supply switch, the main water shut-off valve and, where appropriate, the main gas or oil shut-off valves;
- Details of any facilities that are provided to assist fire-fighters; and
- Places of special fire risk.

127. In some very small transport premises, record keeping may be no more than details of the significant findings and any action taken as a result of the fire safety risk assessment and a copy of the emergency fire action plan.

128. The range and type of records necessary will be more detailed for more complex buildings or those with a fire safety engineered design. In these cases a fire safety manual should be kept in addition to any other records. This type of fire safety manual should contain technical specifications, detail of the fire safety engineered design, an explanation of the operation of different systems and give specific information on testing and maintenance.

129. Records of the maintenance and testing recommended in paragraphs 118 to 124 above, should be made and retained. It is for management to determine how long they wish to retain this type of record, but for the purposes of audit by the enforcing authority, records for a minimum period of three years should be available. Records can be kept in either an electronic or paper based format and should include:

- Escape routes, including exit locking mechanisms, such as panic bars, push pads and electromagnetic locking devices;

- Means of escape (self-closing doors, stairways, corridors and essential structural features);
- Fire alarm systems, including weekly alarm tests and periodic maintenance;
- False alarms of the fire alarm system;
- Emergency lighting systems;
- Fire extinguishers, hose reels and fire blankets etc;
- Any automatic life safety fire suppression systems such as sprinklers;
- Smoke control systems and other components of any fire safety engineered design;
- Staff instruction and training in fire safety and the evacuation procedure; and
- Fire drills.

Chapter 6: REDUCING THE LIKELIHOOD OF FIRE

130. This chapter provides further information which will assist in evaluating the risk from fire and its prevention. A long-term workable and effective strategy should be developed to reduce hazards and the likelihood of a fire starting. At its simplest this means separating flammable and combustible materials from ignition sources. Advice under the following headings is given in this chapter:

- **Housekeeping and storage;**
- **Storage and use of dangerous substances;**
- **Safe use of equipment;**
- **Electrical;**
- **Smoking;**
- **Managing building work and alterations;**
- **Particular hazards in escape routes;**
- **Fire raising; and**
- **Furniture and textiles**

Housekeeping And Storage

131. All reasonable provision should be made to reduce the possibility of fires occurring due to accidental ignition. Control of combustible materials should be achieved by attention to good housekeeping principles; this can reduce the likelihood of fire. Combustible materials are not just those generally regarded as highly combustible, but all materials that will readily catch fire. By carefully considering the type of material, the quantities kept and the storage arrangements, the risks can be significantly reduced. If a considerable quantity of combustible waste material is generated then a formal plan should be developed to manage this effectively. Some of the practices which should be followed are:

- The storage of equipment should be in designated areas only;
- Storage of combustible materials should not be permitted in plant rooms, boiler rooms, service voids and shafts, electrical main or sub-switch rooms;
- Storage of any description should not be permitted in escape stairs or corridors in protected zones unless within a locked cupboard which is separated by fire-resisting construction and with fire-resisting doors;
- Regular checks and cleaning should be carried out to prevent the accumulation of rubbish in “out of sight” spaces, such as plant rooms, service voids and shafts, basements, dead-end corridors and behind radiators;
- There should be control and frequent disposal of packaging, waste and other combustible rubbish and storage external to the building should be well away from external walls or overhanging eaves;
- Storage of excess materials should be in a dedicated storage area, storeroom or cupboard;
- Bins (particularly wheeled bins) and storage containers which are used outside the building should not be kept in a position next to the building or under overhanging eaves and if capable of being readily moved, they should be secured to prevent this. In some cases where fire raising is a problem or there are security considerations, bins may be fitted with locks; and
- Combustible material in external storage areas should be divided into separate stacks or piles with sufficient space separation between them to restrict the spread of fire.

Storage And Use Of Dangerous Substances

132. Certain substances and materials are by their nature, flammable, oxidising or potentially explosive. These substances are controlled by other legislation in addition to fire safety law, in particular the *Dangerous Substances and Explosive Atmospheres Regulations 2002*. The principles of safe handling and storage are:

- Avoid the use of flammable materials and liquids wherever possible or substitute flammable substances and materials with less flammable ones;
- Reduce the quantity of dangerous substances to the smallest reasonable amount necessary for use;
- Correctly store dangerous substances, for example in a fire-resisting enclosure. All flammable liquids and gases should ideally be locked away, and segregated if necessary, to reduce the chance of them being involved in a fire or used in deliberate ignition;
- Ensure good ventilation to allow any flammable vapours to be dispersed; and
- Ensure that all staff are aware of the fire risk of dangerous substances present and the precautions necessary to avoid danger.

133. **Aerosols** are liable to explode if involved in a fire, causing spread and intensification of fire and possibly damaging doors so that they fail to function in restricting the spread of fire and smoke. These potential consequences should be taken into account and appropriate storage and disposal arrangements put into place for aerosols, taking into account the quantities involved and manufacturers' instructions. Storage should be away from escape routes and no storage should be allowed in boiler houses or other areas containing fixed sources of ignition such as electrical distribution boards in cupboards. They should never be stored or placed in damp areas (such as under sinks) where the container might corrode causing the canister to rupture when picked up, or on windowsills in direct sunlight or next to heat sources, however minor, where they may overheat and burst.

134. **Flammable liquids** present a particularly high fire risk. For example, a leak from a container of flammable liquid may produce large quantities of flammable vapours. These vapours can travel large distances, increasing the likelihood of their reaching a source of ignition well away from the original leak, such as a room containing heating plant and/or electrical equipment on automatic timers. The risk is reduced by ensuring the storage and use of flammable liquids is carefully managed and that materials contaminated with flammables are properly disposed of.

135. Under normal circumstances, **Liquefied Petroleum Gas (LPG)** is explosive and is heavier than air. Cylinders or cartridges should be stored and used in the open air outside the building. Particular care should be taken to minimise the possibility of involvement in a fire.

Safe Use Of Equipment

136. Lack of preventative maintenance increases the likelihood of fire starting in equipment. Common causes of fire in equipment are:

- Allowing extraction equipment to build up excessive grease and/or dust deposits;
- Disabling or interfering with automatic or manual safety features and cut-outs;
- Loose drive belts or lack of lubrication leading to increased friction;
- Leaking valves, glands or joints allowing oils and other flammable liquids to contaminate adjacent floors or goods; and
- Allowing ventilation points to become clogged or blocked, causing overheating.

137. A capable person should adequately and regularly maintain machinery, equipment and plant. Appropriate signs and instructions on safe use may be necessary.

138. Individual heaters where provided, should be fixed in position, installed and guarded and used in accordance with the manufacturers' instructions.

Electrical

139. Electrical equipment is a significant cause of accidental fires. The main causes include:

- Overheating cables and equipment due to overloading or loose connections;
- Incorrect installation or use of equipment;
- Damaged or inadequate insulation on cables or wiring;
- Combustible materials being placed close to electrical equipment which may give off heat (heat may be generated when equipment is operating normally or when equipment becomes hot due to a fault or inadequate ventilation); and
- Arcing or sparking by electrical equipment.

140. Electrical equipment should only be used for its intended purpose. The safe installation of electrical equipment depends not only on good practice such as adequate earthing; using correctly rated equipment; providing overload, short-circuit and earth fault protection; and monitoring but also in compliance with procedures and instructions.

141. All electrical equipment should be installed and maintained in a safe manner. If there is any doubt about the safety of electrical installations, consult an electrician. Where portable electrical equipment is used, including items brought into the premises by staff, then the potential for defects can be reduced if it undergoes portable appliance testing at suitable intervals.

142. An effective programme of planned preventative maintenance for all fixed installations and portable appliances should be implemented for the premises, with an agreed procedure for reporting faults. Once reported, action should be taken to repair any faults as quickly as possible or otherwise ensure that the equipment is made safe:

- Instruction should be available for all equipment;
- Only correctly fused extension leads should be used and should be positioned to avoid a tripping hazard;
- Ensure correct wiring of plugs and correct fuse ratings; and
- Electrical equipment should only be used for its intended purpose.

Smoking

143. Careless use of cigarettes and other smoking materials is a common cause of fire. Disposal of smoking materials also needs to be done with care. A cigarette can smoulder for some time, especially when surrounded by combustible material. Many fires are started several hours after smoking materials have been emptied into waste bags and left for future disposal. However, smoking is banned in all wholly or substantially enclosed public places and the smoking policies in premises should reflect this but where smoking takes place in external areas, consideration should be given to minimising the risk of combustible materials being ignited.

Managing Building Work And Alterations

144. Fires often occur when buildings are undergoing refurbishment or alteration, therefore before any building work or decoration starts, the fire safety risk assessment should be reviewed and additional risks likely to be introduced, considered and evaluated. Lack of pre-planning can lead to haphazard co-ordination of fire safety measures.

145. A 'permit to work' system is a useful procedure and management tool which allows a degree of control over contractors or staff who may be carrying out work involving ignition sources.

146. The impact of the building work on the general fire safety measures should be continuously monitored. Only allow the minimum materials necessary for the work in hand within or adjacent to the building. Additional hazards associated with building work can include:

- Hot work such as soldering, roof repair and paint stripping;
- Use of temporary electrical equipment;
- Blocking or obstruction of escape routes including external escape routes;
- Loss of normal storage facilities;
- Fire safety equipment, such as automatic fire detectors becoming affected;
- Fire-resisting partitions being breached or fire-resisting doors being wedged open; and
- Increased risk from quantities of combustible materials and accumulated waste.

147. Any areas where hot work is undertaken should be frequently inspected during the first 30 minutes after the work is completed, and again 30 minutes later to ensure that materials are not smouldering.

148. The content of skips or refuse containers, if not emptied regularly to prevent a build up of waste materials, may be subject to deliberate ignition; these containers should therefore not be sited against or close to a building; they should normally be a minimum of 6 m away.

Particular Hazards In Escape Routes

149. If a fire were to occur in an escape route or spread to material in the escape route, this would be a particularly difficult and threatening situation preventing occupants from escaping. Corridors and stairways that form part of escape routes should be kept clear and hazard free at all times. Items that may be a source of fuel or ignition should not be located on any corridor or stairway that will be used as an escape route (reduction in escape route width may also be an issue). Such items include:

- Portable heaters;
- Gas cylinders for supplying heaters;
- Cooking appliances;
- Upholstered furniture;
- Vending machines;
- Gas pipes, meters, and similar fittings;
- Electrical equipment;
- Combustibles, such as refuse and catering supplies; and
- Luggage.

Fire Raising

150. The possibility of deliberate fire raising should be considered as a component of the fire safety risk assessment particularly in areas with a known history of vandalism or fire-setting. Appropriate security measures, including the protection of stored materials, the efficient and prompt removal of rubbish and security against unauthorised entry or access, can do much to alleviate this particular problem.

151. Fires started deliberately can be particularly dangerous because they may develop rapidly and may be intentionally started in escape routes. Where there is easy access for the opportunist premises may be targeted specifically or at random. Deliberately set fires in the locality may indicate an increased risk to premises.

152. Additional measures which may reduce the potential for fire raising include the following:

- Regular removal of all combustible rubbish;
- Upholstered furniture should be maintained so that there are no tears which have caused the filling material to be exposed;
- Encouraging staff to challenge persons acting suspiciously;
- Controlling entry rights of staff who have been dismissed;
- Keeping flammable liquids stored securely so that intruders cannot use them;
- Fitting secure metal letterboxes on the inside of letter flaps to contain any burning materials that may be pushed through;
- Ensuring that storage areas located in public circulation areas are secured; and
- In unstaffed facilities ensure all combustible material is locked away.

Furniture And Textiles

153. Upholstered furniture (and composites of cover material and infill) should meet the standards in, and in addition, pass the flammability standard in BS 5852 with ignition sources 0 and 5. BS EN 1021: Part 1 offers an acceptable direct equivalent standard to ignition source 0 of BS 5852.

Chapter 7: RESTRICTING THE SPREAD OF FIRE AND SMOKE

154. To reduce the risk to persons if there is a fire, it is necessary to consider how to control or restrict the spread of fire and smoke. The majority of people who die in fires are overcome by the smoke and gases. To evaluate the risk to people in premises requires a basic appreciation of the way fires grow and how smoke and poisonous gases can spread through a premises. A fire in premises can generate smoke that is thick and black, obscures vision, causes great difficulty in breathing, and can block the escape routes. Smoke is a serious threat to life which should not be underestimated.

155. Fire is spread by three methods:

- Convection;
- Conduction; and
- Radiation.

156. Fire and smoke spread by **convection** is the most dangerous and causes the major proportion of injuries and deaths. When fire starts in an enclosed space such as a building, the smoke rising from the fire becomes trapped by the ceiling and then spreads in all directions to form an ever-deepening layer over the entire room space. The smoke will pass through any holes or gaps in the walls, ceiling and floor into other parts of the building. The heat from the fire gets trapped in the building and the temperature rises.

157. In many transport premises the open design may lead to the rapid exposure of occupants to smoke and/or fire. Also openings in floors may allow smoke and hot gases to move from the fire source to areas occupied by people who may not be aware of the fire. This lack of containment potentially increases the number of people at risk from a fire.

158. Some materials, such as metal can absorb heat readily and transmit it to other rooms by **conduction**, where it can set fire to combustible items that are in contact with the heated material. **Radiation** transfers heat in the air in the same way that an electric bar heater heats a room. Any material close to a fire will absorb the heat until the item starts to smoulder and then burn.

159. In this chapter, restricting the spread of fire is considered under the headings of:

- **Fire compartmentation;**
- **Doors;**
- **Smoke control;**
- **Fire separation;**
- **Fire spread through cavities;**
- **Ventilation systems;**
- **Fire spread on internal linings;**
- **Fire spread on external walls; and**
- **Fire spread from neighbouring buildings.**

160. These areas should be considered to the extent that they are appropriate to life safety objectives in individual premises. The protection of fire spread into escape routes is covered in Chapter 8.

Fire Compartmentation

161. To limit the severity of fire, a building may be divided into different fire-resisting compartments by fire-resisting doors, walls and floors which will provide a physical barrier to a fire. The intention is to confine the fire to the compartment of origin, avoiding the spread of fire, products of combustion, smoke, heat and toxic gases.

162. The life safety objectives of fire compartmentation may be to:

- Reduce the number of occupants who may be immediately at risk;
- Reduce the travel distance for persons escaping;
- Restrict the size and growth of fire to facilitate persons escaping; and/or
- Protect occupants where there may be continued occupation of premises such as where there is a phased evacuation strategy.

163. Technical Annexe 13.1 contains benchmarks against which existing provision can be compared.

Doors

164. A closed door may restrict fire spread by holding back fire and smoke. A ‘fire door’ is a fire-resisting door which is rated by performance to fire when tested to an appropriate standard. Fire doors are an essential part of a fire compartment and for the protection of means of escape. A self-closing device is a normal feature of a fire door other than for some doors such as cupboards which are kept locked when not in use.

165. In determining the fire-resistance of a door, it is necessary to consider all the doorset components including the frame, glazing, side-panels, transoms and ironmongery.

166. Technical Annexe 13.9 contains guidance and benchmarks against which existing provision can be compared.

Smoke Control

167. In some transport complexes an automatic smoke and heat exhaust ventilation system (SHEVS) may be installed (in conjunction with an automatic fire suppression system) to control smoke and limit the size of a potential fire. These systems are designed to collect heat and smoke in a smoke reservoir at roof level where the heat and smoke will vent to the outside. Smoke control is a subject that requires specialist advice.

Fire Separation

168. Where buildings or parts of buildings are in different occupation this poses particular problems in terms of fire safety, as one occupier does not usually have any control over the working practices of their co-occupiers. The purpose of fire separation is to restrict fire spread between different occupancies.

169. Where the premises adjoin or are part of a larger building, such as where it is a unit within a multi-occupied complex, the potential for an outbreak of fire in the neighbouring building or occupancy ultimately spreading to the premises should be considered. The provision of fire separation will ensure that in the event of an outbreak of fire within the building, fire and smoke is inhibited from spreading beyond the area of occupation where the fire originated.

170. Technical Annexe 13.2 contains benchmarks against which existing provision can be compared.

Fire Spread Through Cavities

171. A cavity is a concealed space enclosed by elements of a building or contained within a building element. The unseen spread of fire and smoke within concealed spaces in the structure and fabric could pose a risk to occupants.

172. The premises should be examined to see if there are any easy paths through which smoke and fire may spread. Many buildings will have void areas, possibly hidden from view, which will allow smoke and fire to spread away from its source. It will be necessary to consider the provision of cavity barriers to restrict the spread of fire in the following:

- Vertical shafts and goods lifts;
- False ceilings, especially if walls do not continue above the ceiling;
- Voids behind wall panelling;
- Unsealed holes in walls and ceilings where pipe work, cables or other services have been installed;
- A roof space or attic; and
- A duct or any other space used to run services around the building.

173. In particular, certain types of buildings which are of a modular construction have hidden voids through which fire may spread. In this type of building it is important that appropriate assessment is carried out and cavity barriers that restrict the spread of fire are installed if appropriate, especially to walls and floors that need to be fire-resisting.

174. **Insulated core panels (sandwich panels)** may be used in buildings as exterior cladding or for internal structures and partitions. These panels normally consist of a central insulated core, sandwiched between an inner and outer metal skin. The central core can be made of various insulating materials, ranging from non-combustible through to combustible.

175. Fire may spread through sandwich panels which have a combustible core. The existence of panels with a combustible core needs to be carefully considered, particularly in areas of buildings where large numbers of people are present. Some of the practices which should be followed are:

- Control ignition sources that are adjacent to, or penetrating the panels;
- Do not store highly combustible materials or install heating appliances against the panels;
- Repair damaged panels or sealed joints immediately and make sure that jointing compounds or gaskets used around the edges of the panels are in good order;
- Check where openings have been made for doors, windows, cables and ducts that these have been effectively sealed and the inner core has not been exposed;
- Ensure there has been no mechanical damage such as may be caused by mobile equipment; and
- Ensure that all electrical installations work has been carried out by a qualified electrician.

176. Technical Annexe 13.4 contains benchmarks against which existing provision can be compared.

Ventilation Systems

177. The potential for ventilation systems to allow the spread of fire and smoke should be considered. A powered circulation system may assist the spread of smoke unless it is designed to shut down automatically if fire is detected. The ducting of any ventilation system may also provide a pathway for the spread of heat and smoke and this needs to be considered to prevent potential spread between compartments. The integrity of compartments can be achieved by means of fire dampers which close automatically and hold back fire and smoke in the event of a fire.

178. Technical Annexe 13.1 contains benchmarks against which existing provision can be compared.

Fire Spread On Internal Linings

179. Materials used on the surfaces of walls and ceilings can significantly affect the spread of fire and its rate of growth. The potential for fire spread on internal linings in escape routes is particularly important as rapid fire spread could prevent occupants from escaping. The internal linings of premises should be such that in the event of an outbreak of fire within the building, the development of fire and smoke from the surfaces of walls and ceilings within the area of origin is inhibited.

180. Multiple layers of paint applied to the face of a wall or ceiling surface can increase flame spread and hence the fire growth rate. For this reason, multiple layers of paint are not recommended when carrying out refurbishment work involving the re-decoration of wall and ceiling surfaces.

181. Technical Annexe 13.5 contains benchmarks against which existing provision can be compared.

Fire Spread On External Walls

182. If there is combustible external wall cladding, such as timber, it will be necessary to consider the potential for an outbreak of fire within the building, or from an external source, to spread on the external walls of the building and pose a risk to occupants. Fire can spread horizontally along the face of the building and vertically up the face of the building and this can result in extensive fire spread both externally and internally

183. Technical Annexe 13.6 contains benchmarks against which existing provision can be compared.

Fire Spread From Neighbouring Buildings

184. An assessment should be made to what extent a fire may spread to the premises from a neighbouring building or structure and whether this could pose a risk to occupants. In some building configurations, such as a courtyard, the fire spread potential may be from one compartment in the building across an open space to another compartment of the same building. This is of particular relevance if any external wall cladding is of a combustible material. The results of the assessment should then be considered and appropriate fire safety measures put in place.

185. Technical Annexe 13.7 contains benchmarks against which existing provision can be compared.

Chapter 8: MEANS OF ESCAPE

186. Once a fire has started, been detected and a warning given, everyone in the premises should be able to move or be assisted to move away from the fire to a place of reasonable safety such as a protected stair or other compartment. From there they should be able to continue to escape to an unenclosed safe area beyond the premises before being affected by fire or smoke. Sufficient means of escape should be provided for persons using the premises, both in terms of the number of escape routes and capacity and in terms of protection by enclosure from fire and smoke. Escape must also be considered from external areas like secure enclosed yards.

187. Structural fire protection should also be considered to ensure that in the event of an outbreak of fire within the building, the loadbearing capacity of the building will continue to function until all occupants have escaped, or been assisted to escape, from the building.

188. The level of provision of means of escape and the fire protection that should be given to an escape route will vary depending on the level of risk within the premises and the occupants. In some small premises a single escape route may be acceptable, in other cases there should be at least two exits and independent escape routes from each storey of the premises. This will prevent a fire affecting more than one escape route at the same time. When determining whether premises have adequate escape routes, a number of interdependent factors should be considered, these are:

- The capability and number of people in the premises;
- The time it will take people to escape;
- The construction of the premises and potential for fire and smoke spread; and
- The fire compartmentation of the premises (see Chapter 7).

189. The people present in transport premises will primarily be the passengers, staff and a number of visitors, which could include contractors, and they will have been considered during the fire safety risk assessment. The escape time available will depend on a number of factors, including the number of escape routes available, the travel distance to be covered, the nature of the occupants, staff availability and the speed of fire growth.

190. Railway stations and airport terminals are operated to ensure the most efficient movement of passengers throughout the building. If possible the escape routes should be aligned with the general access and circulation routes, as passengers will generally use routes with which they are familiar.

191. However in railway stations, fences and automatic barriers are often used for revenue protection purposes. The potential impact of these on means of escape needs to be assessed and the consequences carefully considered in respect of congestion, reduction in escape width and emergency opening arrangements.

192. The number and capability of people present will influence the assessment of the escape routes. The existing escape routes must be sufficient to enable the maximum number of people (including peak passenger numbers) likely to use the premises at any time to safely escape. The outcome of a fire safety risk assessment may necessitate an increase in the capacity of the escape routes or a restriction on the number of people in the premises.

193. Traditionally, limits are imposed on the travel distance for occupants of buildings. This approach will not be appropriate for some large or underground facilities which have escape distances in excess of the benchmarks. Such distances may be acceptable in some

railway stations with large dispersal volume for smoke, heat and toxic fumes, or in underground facilities where combustible materials have been reduced to a point where there is little to burn. Expert advice should be sought to establish the adequacy of existing means of escape provision.

194. Where large numbers of people use transport premises, there may be a need to monitor the number of people entering the premises. Where the number of people entering may exceed capacity then procedures may be needed to control numbers within specific areas or prevent migration and overcrowding.

195. In multi-occupied buildings, escape routes within premises should normally be independent of separately occupied premises; people should not have to go through another occupier's premises to escape as the route may be secured or obstructed. Where such independent escape is not possible, then a robust legal agreement may be required to ensure access at all relevant times.

196. Technical Annexes 13.3 and 13.8 contain benchmarks against which existing provision can be compared.

Chapter 9: ENSURING THAT MEANS OF ESCAPE CAN BE USED

197. Means of escape and protected escape routes should be provided with effective lighting to allow persons to safely use these routes in the event of a fire occurring or in the event of failure of the normal lighting power supply. Signs and notices should be provided to help people identify escape routes, find fire-fighting equipment, or to provide specific information or warning about particular equipment, doors, rooms or procedures.

198. The people present in transport premises will primarily be passengers and employees. Employees can reasonably be expected to have an understanding of the layout of the premises and its escape routes, including alternative escape routes.

199. This chapter considers:

- **Escape route lighting;**
- **Emergency lighting;**
- **Signs; and**
- **Notices.**

Escape Route Lighting

200. The premises should be provided with escape route lighting to the extent necessary to ensure that in the event of an outbreak of fire within the building, illumination is provided to assist in escape and to aid staff in implementing the emergency fire action plan.

201. Technical Annexe 13.10 contains benchmarks against which existing provision can be compared.

Emergency Lighting

202. Emergency lighting is lighting designed to come into, or remain in, operation automatically in the event of a local or general power failure. Emergency lighting may also be provided on a wider scale to allow some of the normal functions of the premises to continue, in the event of interruption to the mains supply.

203. A system of automatic emergency lighting is likely to be needed in most complex premises, particularly in those with extensive basements or where there are significant numbers of staff or members of the public. If some escape routes are internal and without windows, such as sub-surface railway stations, or premises are used during periods of darkness, including early darkness on winter days, then some form of emergency lighting is likely to be required.

204. In small premises, in which the escape routes are simple and straightforward, borrowed light may be relied upon to illuminate escape routes, such as from street lamps.

205. The size and type of the premises and the risk to the occupants will determine the complexity of appropriate emergency lighting.

206. Technical Annexe 13.10 contains benchmarks against which existing provision can be compared.

Signs

207. In small simple premises where the locations of escape routes and fire-fighting equipment are readily apparent then fire signs may not be necessary. Where there are two escape routes a single sign indicating an alternative exit may be all that is needed. In larger and more complex premises, a series of signs may be needed to indicate the direction of escape routes.

208. Where signs are provided, they should be sited in conspicuous positions. They should be recognisable, readable and informative, as they convey essential information to frequent and infrequent users of the premises. The visibility, illumination and height of display should be carefully considered. Fire signs should normally follow the guidance in British Standards. There is also a need to consider the requirement for those who are visually impaired.

209. **Escape route signs** clearly indicate exits not in normal use. The legibility of an escape sign is determined by the size of the sign, the level of illumination and the distance over which it is viewed. The use of signs within the same premises should follow a consistent design pattern or scheme. In multi-occupied premises, co-operation between the respective occupiers, including, if necessary, the managing agent or landlord should be sought to ensure that, as far as possible, all signs in the building conform to a single pattern or scheme. Where an exit cannot be seen or where a person escaping may be in doubt about an escape route, signs with directional arrows should be provided along the route.

210. **Other safety signs** should be provided to indicate non-automatic fire safety equipment if there is any doubt about its location, such as fire extinguishers that are kept in cabinets or in recesses. A number of other signs may also be necessary such as:

- ‘Fire door keep shut’ or ‘Fire door keep locked shut’ on fire doors;
- How to operate the security devices on doors;
- Location of sprinkler stop valve; and
- Not to use lift in event of fire.

211. All signs and notices should be illuminated to ensure they are conspicuous and legible.

212. Technical Annexe 13.11 contains further information and benchmarks against which existing provision can be compared.

Notices

213. Notices are used to provide instructions on how to use any fire safety equipment, the actions to be taken in the event of fire, and to help the Fire and Rescue Service.

214. Notices containing details of the emergency fire action plan specific to the premises should be permanently displayed in appropriate positions throughout the premises. A distinction may be required between notices that are designed for visitors as opposed to those for staff. Notices giving full instruction for staff should also be displayed on staff notice boards.

215. In very small transport premises where there is a limited number of people and there is no fire alarm system, it may be reasonable to provide staff with verbal reminders of what they need to do if there is a fire.

216. In multi-occupied, larger and complex premises or where there is a high turnover of staff, a more considered approach for staff notices and instructions will be necessary. As well as positioning fire instruction notices on escape routes adjacent to fire alarm call points, they should be located where staff frequently assemble in the premises such as the canteen and locker room.

217. If premises regularly accommodate people whose first language is not English there may be a need to consider providing instruction in appropriate languages.

Chapter 10: MEANS FOR DETECTING FIRE AND GIVING WARNING

218. It is important that an outbreak of fire in premises should be detected at an early stage so that the occupants are alerted and the emergency fire action plan implemented as soon as possible. There should also be a means so that anyone in the premises who discovers a fire, can alert others to the existence of the fire.

219. In some small, mostly open plan, transport premises such as a bus station waiting lounge or open platform station, a fire may be obvious soon after it starts. In such cases and where travel distances are short or the risk from fire is exceedingly low, a shouted warning of 'fire' or a simple manually operated device, such as a gong that can be heard throughout when operated from any single point within the premises, may be all that is needed.

220. In larger premises, particularly those with more than one floor or that are multi occupied, where a shout or warning sounded from a single point will not be heard throughout, an electrical fire alarm system incorporating sounders and manually operated call points is likely to be required.

221. In large or complex premises, particularly those accommodating large numbers of people, a more sophisticated fire alarm system may be required.

222. Where the layout of the premises is such that a fire could develop to the extent that escape routes could be affected before the fire is discovered, it may be necessary for the fire alarm system to incorporate automatic fire detectors to ensure an early warning. This may be the case where there are unoccupied areas or common corridors and circulation areas in multi-occupied buildings or where people work alone and might not see a fire; but the need for the provision of automatic fire detection will be influenced by the means of escape available.

223. Automatic fire detection is only required under fire safety law when it is needed to safeguard life. In addition to the example in paragraph 222 above, other examples of the use of automatic fire detection for life safety are:

- As a feature to compensate for a reduction in other fire safety measures;
- To operate smoke control and ventilation systems;
- To operate door release devices; and
- To ensure early warning of fire to allow the use of phased or staged evacuation.

224. Some of the features of a fire alarm system may be:

- **Manual call points;**
- **Automatic fire detectors;**
- **Sounders and other warning devices;**
- **Control and indicator panel;**
- **Detection zoning; and**
- **Linked operation.**

Fire Alarm Features

225. **Manual call points**, often known as 'break-glass' call points, enable a person who discovers a fire to operate the fire alarm and immediately raise the alarm and warn other people in the premises of the danger.

226. **Automatic fire detectors.** The choice of type depends on the nature of the hazard, the required speed of system response and the need to avoid false alarms. The common types of automatic fire detector are:

- **Heat detectors** operate when a fixed temperature is reached and may also have a sensor that responds to an abnormal rate of rise of temperature. Heat detectors have a good performance in respect of false alarms but are not appropriate in areas where the detection of the presence of smoke is required.
- **Smoke detectors** detect the presence of smoke using either an **ionisation** chamber or **optical** light scatter sensor. They give a speedier response to most fires than heat detectors but have greater potential to generate false alarms.
- **Optical beam detectors** are a type of smoke detector which comprise a separate light source and receiver and operate by detecting the obscuration of the light source by smoke. They may be suited for large, open plan spaces with high ceilings where access to point smoke detectors for maintenance could be difficult.
- **Flame detectors** detect the infra-red and/or ultraviolet radiation that is emitted by flame. They are not general purpose and are normally used for specialized applications.
- **Combustion gas detectors** respond to gases produced in a fire such as Carbon Monoxide. They can be sensitive to smouldering fires, respond to many fires faster than heat detectors and have a good false alarm performance in the presence of dust, steam and cigarette smoke.
- **Multi-sensor detectors** can be used which combine heat and smoke or combustion gas detection. Combined sensors enhance system performance and have the potential for a reduction in false alarm actuations.

227. **Sounders** are provided to alert occupants and the most appropriate type and extent of use will depend on the building configuration. In all cases, the sounders of a fire alarm system should be capable of alerting the staff. As an alternative to conventional sounders, a specially designed voice-alarm may be suitable for some premises. Consideration must be given to the effect of ambient noise and the ability to hear the fire alarm sounders. It may be necessary to provide tactile and/or visual alarm devices for those staff engaged in work in high noise level areas.

228. **Voice alarm systems** can provide significant benefits in terms of reduced response time and improved information dissemination. Research has shown that the public do not always react quickly to a conventional fire alarm. Voice alarms are therefore very important in transport premises where there is a high public occupancy load and where the public normally expect information to be given by public address facility. The message or messages sent must be carefully considered.

229. Public address voice alarms need to be intelligible to occupants and expert advice may be required to assess speech intelligibility. The provision of a combined public address/voice alarm system is appropriate for some transport premises, and can allow the use of coded messages for staff investigation where this is part of the pre-planned response to activation of the fire alarm.

230. Where there are staff with hearing impairment to the extent that the fire alarm sounders cannot be perceived, then it will be necessary to consider whether there is a need to provide tactile and/or visual alarm devices for those persons.

231. The **control and indicator panel** provides the facility for indication of fire or fault signals and manual controls such as silencing and resetting. The fire alarm control and indicator panel should be sited at a location which is appropriate for staff and Fire and Rescue Service use taking account of the fire and evacuation strategy that is adopted for the building.

232. When a fire alarm system operates, the evacuation strategy may require that the source of the actuation be quickly identifiable. To achieve this, the premises should be divided into **detection zones**. These zones should be influenced not by the physical installation of the fire alarm system but by compatibility with the emergency fire action plan. The existence of fire compartments should be considered and it may be that detection zones extending no further than a single fire compartment are appropriate.

233. Where the fire alarm system is zoned, a **schematic plan** showing the fire detection zones in a simple and unambiguous way should be displayed adjacent to the control panel to allow the source of a fire alarm actuation to be quickly identified. Even in the case where an addressable system is installed, zone indication is also likely to be an essential feature (an addressable fire alarm system is one where individual detectors and call points can be identified at the control and indicating equipment).

Linked Operation

234. If a sprinkler system or other automatic life safety fire suppression system is installed in the building, this should be interlinked so that actuation of the suppression system in response to a fire should also cause operation of the fire alarm system.

235. Operation of the fire alarm system should cause the following:

- Automatic closure of self-closing doors which are normally held in the open position by automatic release devices;
- Automatic closure of self-closing doors which are fitted with swing free arms;
- Internal swing doors with automatic opening should have the automatic opening facility disabled, this is particularly essential for fire-resisting doors;
- Electronically powered locks on doors should return to the unlocked position; and
- Automatic opening of exit doors which satisfy the second bullet point in paragraph 28 of Technical Annex 13.9.

Remote Monitoring

236. With remote monitoring, the actuation of the fire alarm will cause a signal to be transmitted automatically to a remote alarm receiving centre (ARC); on receipt of a signal, the ARC would then call the Fire and Rescue Service. Even where there is monitoring by a remote alarm receiving centre, a back up 999 call should also be made to the Fire and Rescue Service.

Reducing False Alarms

237. False alarms from automatic fire detection systems are a major problem which cause disruption to the running of premises and result in many unwanted calls to the Fire and Rescue Service. If there are frequent false alarms in the premises, people may become complacent and may not respond correctly to a warning in the event of a real fire. False alarms should not be seen as inevitable: each one should be investigated and the cause identified. Where remedial action is required to prevent a recurrence, such as changing a detector head or re-siting a call point, then this should be implemented. A fire alarm system should never be disabled by staff; if it is posing a problem then specialist help should be sought.

238. Information on maintenance and testing of fire alarm systems is contained in Chapter 5.

239. Technical Annexe 13.12 contains further information and benchmarks for fire alarm systems against which existing provision can be compared.

Chapter 11: MEANS FOR FIGHTING FIRE

240. A small fire tackled with fire-fighting equipment in the early stages may be prevented from developing into a fire of life-threatening proportions. Fire-fighting equipment can fall into one of two categories; either (a) it is designed for use by persons, such as portable fire extinguishers and hose reels or (b) it is a fixed installation, such as a sprinkler system which comes into operation automatically in the event of fire.

Fire-fighting Equipment For Use By Persons

241. Portable fire-fighting equipment should be provided in premises for staff use. Fire-fighting equipment can be used to prevent a small fire developing into a large one. The safe use of an appropriate fire extinguisher to control a fire in its early stages can also reduce the risk to people in the premises.

242. For the purpose of selecting fire extinguishers, fires generated by different materials can be classified as in the following table.

Table 1 Class of fire

Class of fire	Description
Class A	Fires involving solid materials such as wood, paper or textiles
Class B	Fires involving flammable liquids such as petrol, diesel or oils
Class C*	Fires involving gases
Class D*	Fires involving metals
Class F	Fires involving cooking oils such as in deep-fat fryers

*Note: For class C and D fires, specialist advice is required.

243. A **Water Extinguisher (red body)** can only be used on Class A fires. It allows the user to direct water onto a fire from a considerable distance. A 9 litre water extinguisher can be quite heavy and some water extinguishers with additives can achieve the same rating, although they are smaller and therefore considerably lighter. This type of extinguisher is not suitable for use on live electrical equipment because water is a conductor of electricity.

244. A **Water Extinguisher with Additives (red body)** is suitable for Class A fires and can also be suitable for use on Class B fires and where appropriate, this will be indicated on the extinguisher. This type is generally more efficient than conventional water extinguishers.

245. A **Foam Extinguisher (red body with cream label/band)** can be used on Class A or B fires and is particularly suited to extinguishing liquid fires. It should not be used on free-flowing liquid fires unless the operator has been specially trained, as these have the potential to rapidly spread the fire to adjacent material. This type of extinguisher is not suitable for deep-fat fryers or chip pans.

246. A **Powder Extinguisher (red body with blue label/band)** can be used on most classes of fire and achieve a good ‘knock down’ of the fire. It can be used on fires involving electrical equipment but may damage the equipment. Since powder does not cool a fire appreciably, it should be noted that the fire may re-ignite.

247. A **Carbon Dioxide (CO_2) Extinguisher (red body with black label/band)** can be used on Class B fires and is particularly suitable for fires involving electrical equipment as it is a non-conductor. As with all fires involving electrical equipment, the power should be disconnected if possible. The loud noise accompanying discharge and the freezing effect on the discharge horn of this extinguisher can startle operators so that they drop the extinguisher. It should be noted that CO_2 may not cool a fire appreciably and the fire may therefore re-ignite.

248. A **Class 'F' Extinguisher (red with canary yellow label/band)** is particularly suitable for commercial catering establishments with deep-fat fryers.

249. In small premises, having one or two **portable fire extinguishers** of the appropriate type and readily available for use, may be all that is necessary. In larger, more complex premises, more extinguishers will be required. Portable extinguishers should be simple to operate and readily accessible. They should also be within the handling capabilities of staff who may be called upon to use them. It may also be necessary to indicate the location of extinguishers by suitable signs.

250. Technical Annexe 13.13 contains further information on portable fire extinguishers and benchmarks against which existing provision can be compared.

251. Permanent **hose reels** provide an effective fire-fighting facility; they are fixed units permanently connected to a water supply. They may offer an alternative, or be in addition to, portable fire extinguishers. There are disadvantages with hose reels that should be considered; when deployed a hose reel may obstruct doors causing the spread of smoke, and it may pose an obstacle to the movement or escape of persons.

252. A **fire blanket** is appropriate where there are containers of cooking oil or fat and there is the potential for fire. A fire blanket may be used to smother a small fire involving oil or fat.

253. Where fire-fighting equipment is provided, a suitable number of staff should be trained in its use.

Automatic Life Safety Fire Suppression Systems

254. An automatic life safety fire suppression system may be an automatic sprinkler system or an equivalent system. Sprinklers can be designed to protect life and/or property and may be regarded as a cost-effective solution for reducing the risks created by fire. Automatic life safety fire sprinkler systems operate automatically on detection of an outbreak of fire within the premises to inhibit the spread of fire. Water is discharged from the individual sprinkler head which has detected heat from the fire, other sprinkler heads remain closed.

255. An automatic life safety fire suppression system can be very effective in controlling a fire. It may limit fire growth and extend the time taken for untenable conditions to develop giving more time to evacuate, particularly in cases where the standard of fire compartmentation, structural fire protection, fire spread on internal linings or travel distance may be a concern. Where premises are fitted with a smoke and heat exhaust ventilation system, sprinklers are usually installed to restrict the potential fire to a particular size assumed in the design. Sprinklers may also be fitted to compensate for increased compartment size.

256. Specialised sprinkler systems may be necessary for high hazard situations where there is a need to increase the available evacuation time.

257. Fire engineering advice should be sought in all cases where sprinkler systems are used as part of compensatory features that may be needed for life safety.

258. Other suppression systems which may have application for particular hazards include water mist systems, foam installations and gas flooding systems (total flooding or local application).

259. Benchmarks for sprinklers are contained in Technical Annexe 13.14.

Chapter 12: FIRE AND RESCUE SERVICE FACILITIES

260. Building Regulations and other legislation may have required premises to be provided with facilities, equipment and devices provided for use by, or protection of, fire-fighters. Fire safety law includes a duty requiring suitable maintenance of such features to keep them in good order. Examples of such facilities are given below. Supplementary Annexe 14.1 contains further reference information relative to current standards for Fire and Rescue Service facilities.

261. It will also be helpful to provide information to the Fire and Rescue Service if there is a temporary loss of a fire-fighting facility or a change in access arrangements.

Fire And Rescue Service Access

262. Buildings that have been constructed to Building Regulations may have been provided with facilities that allow Fire and Rescue Service vehicles to approach and park within a reasonable distance so that fire-fighters can use their equipment without too much difficulty. These facilities may consist of access roads to the building, hard standing areas for Fire and Rescue Service vehicles and access into the building for fire-fighters. Where such facilities are provided access should be maintained and available for use at all times.

Water Supply For Fire And Rescue Service Use

263. External water hydrants provide a water supply for use by the Fire and Rescue Service. Where no piped water supply is available, or there is insufficient pressure and flow in the water main an alternative supply may have been provided such as a water tank, or access provided to a spring, river, canal, loch or pond, to which a hard standing is available for Fire and Rescue Service vehicles. In some cases, water supplies may be under the control of the premises' management.

Fire-fighting Shafts And Lifts

264. Fire-fighting shafts are provided in tall buildings to provide fire-fighters with a protected route from the point of building entry to the floor where the fire has occurred and to enable fire-fighting operations to commence. The stairway within the shaft is likely also to be used by the occupants for normal movement through the building. Entry points from a stairway in a fire-fighting shaft to a floor will be via a protected lobby.

265. Most fire-fighting shafts will also incorporate a fire-fighting lift. The lift will have a back-up electrical supply and car control overrides. A function of the lift is to transport fire-fighting personnel and their equipment to the scene of a fire.

266. Fire-fighting shafts, lifts and self-closing doors of protected lobbies require to be maintained in good condition.

Smoke Ventilation

267. Smoke ventilators or outlets may be provided for the specific purpose of assisting Fire and Rescue Service personnel with smoke control and clearance. These may be located in basement storeys and stairs and may be openable windows.

Fire-fighters' Switches For Luminous Tube Signs

268. Safety switches are normally provided to isolate electrical power from high-voltage luminous signs. The switch requires to be in a suitable location and appropriately identified.

Dry And Wet Rising Fire Mains

269. The rising fire main is an important facility for the Fire and Rescue Service in taller buildings; buildings with large areas such as airport terminals and tunnels; and sub-surface stations. It consists of an inlet box where fire-fighters can connect their hose; a pipe running up, down or through the building or facility; and outlet valves on each floor level for the connection of a hose. Dry risers are empty fire mains which are charged with water by Fire and Rescue Service personnel when they arrive; a wet riser is kept full of water from the mains water supply. Wet rising mains have a facility to allow the Fire and Rescue Service to supplement the water supply.

270. It is important that fire mains remain in good working order. Issues to be considered include the following:

- The physical approach to the inlet box should be such that a Fire and Rescue Service vehicle can reach within 18 m;
- Car parking should be prohibited in front of the inlet box;
- The inlet box door should be secured in such a way that fire-fighters can readily open the door;
- The outlet valves (landing valves) should be secured in the closed position, usually with a leather strap and padlock to prevent tampering; and
- The outlet valves should be maintained so that they are easily openable.

Information Arrangements For Fire-fighters

271. In complex premises, there may be layout plans available for fire-fighters or information on the presence of particular hazards.

TECHNICAL ANNEXES

Introduction

The following pages set out more information about fire safety measures. Benchmarks are offered for use to assist with assessing the adequacy of existing fire safety measures. Where existing fire safety measures fall below these benchmarks, then consideration should be given during the fire safety risk assessment as to whether this poses a risk which requires action. Where this is the case then upgrading may remove or reduce the risk.

It is important that the status of the Technical Annexes in this guide is understood. Most of the benchmarks in the Technical Annexes are a modification of the Building Regulation standards and associated Technical Handbook guidance that applies to new buildings. The intent of the modification is to provide benchmarks which can be used as a comparison in existing premises. It may be reasonably practicable to upgrade to a particular benchmark in some situations but not in others. The aim is to use the relevant benchmarks as guidance in order to achieve an overall degree of safety or reduction in risk consistent with that required as a result of the risk assessment. All premises are different and each risk assessment will be site specific and decisions in respect of fire safety standards should at all times be based on judgement of risk.

There are 14 Technical Annexes:

Technical Annexe 13.1

Fire Compartmentation

This Technical Annexe contains benchmarks in respect of compartmentation to restrict the spread of fire, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements. If this is not possible or practicable the provision of an automatic life safety fire suppression system, as detailed in Technical Annexe 13.14, may be considered as an alternative.

1. The maximum area of a compartment is indicated in the following tables and is determined by the use of the premises, the height of the topmost storey, the inclusion of automatic fire suppression systems and the minimum fire-resistance duration of the compartment and elements of structure. Technical Annexe 13.14 gives details on automatic fire suppression systems.

Table 2 Single storey buildings

Use	Automatic fire suppression system installed	Maximum area of any compartment (m^2)	Fire-resistance Duration
Passenger terminal or station for air, rail, road, or sea travel	No	6,000	Long duration (120 mins)
	Yes	12,000	
Semi-enclosed car park	Not relevant	Unlimited	Not relevant
Enclosed car park	No	14,000	Long duration (120 mins)
	Yes	28,000	Long duration [1] (120 mins)

Note:
[1] A medium duration (60 minutes) fire-resistance compartment wall or floor may be provided between the single-storey and a multi-storey part provided a multi-storey part does not exceed the limitations for fire-resistance duration highlighted in Table 3.

Table 3 Multi-storey buildings

Use	Maximum area of any compartment (m^2)	Maximum area of an individual storey within a compartment (m^2)	Minimum fire-resistance duration (minutes) for compartmentation and elements of structure where appropriate			
			Basements	topmost storey height above ground		
				not more than 7.5 m	not more than 18 m	more than 18 m
Passenger terminal or station for air, rail, road, or sea travel	1,500 [1]	1,500 [1]	60	30	60	120 [2]
	3,000 [1]	3,000 [1]	60	60	60	120 [2]
	6,000 [1]	3,000 [1]	120	120	120	120
Semi-enclosed car park	Unlimited	Unlimited	60	30	30	60
Enclosed car park	500 [1]	500 [1]	60	60	60	60
	5,000 [1]	2,500 [1]	120	120	120	120

Notes:
[1] Areas may be doubled where there is an automatic fire suppression system.
[2] Medium duration (60 minutes) fire-resistance for compartment walls.

2. Where a compartment wall abuts an external wall, a 1 m wide projection of external wall having the requisite period of fire-resistance should be provided to prevent lateral fire spread. This does not apply to separate compartments where both are fitted with an automatic fire suppression system.

3. Unless provided within a stair enclosure, a **lift** should be enclosed by compartment walls with a medium duration (60 minutes) fire-resistance and, where the lift well is not the full height of the building, a compartment floor/ceiling with a medium duration (60 minutes) fire-resistance. A compartment wall is not needed between a lift well and a protected zone. Where a lift is installed, the landing controls and lift car controls should be of a type that do not operate on heat or pressure resulting from a fire.

4. Where an element of structure provides support to a compartment wall or compartment floor which attracts a higher fire-resistance duration, the supporting element of structure should have at least the same period of fire-resistance.

5. Where services pass through a compartment floor, wall or cavity barrier they should, where appropriate, be fitted with proprietary fire-stopping materials capable of maintaining the required fire-resistance of the floor, wall or cavity barrier.

6. Where ventilation ducts penetrate compartments, fire dampers actuated by smoke detection should be provided to close automatically thereby maintaining the fire-resistance duration of the compartment concerned. BS 5588: Part 9 provides guidance on design and construction including fire-resisting duct enclosures, fire-resisting ductwork and the use and activation of fire dampers.

7. Any door in a compartment wall should be a self-closing fire door with the same fire-resistance duration as the wall. See also Technical Annexe 13.9.

8. In multi-occupied buildings, where premises are put to different uses within the building, there should be compartment walls and compartment floors between the premises.

9. A place of special fire risk should be enclosed by compartment walls with a medium duration (60 minutes) fire-resistance. Where a place of special fire risk contains any appliance or equipment using hazardous liquid, the room and any opening in a wall or floor dividing should be constructed in such a manner that, in the event of any liquid spillage, the room will contain all the liquid in the appliance or equipment plus 10%.

Technical Annexe 13.2

Fire Separation

This Technical Annexe contains benchmarks in respect of separation to restrict the spread of fire, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements.

1. A separating wall or separating floor should be provided between **parts of buildings where they are in different occupation.** There should be no openings or doors in separating walls. Every part of a separating wall or separating floor should be of materials that are non-combustible.

2. A separating wall or separating floor with a medium duration (60 minutes) fire-resistance should be provided between parts of a building **where one part is in single occupation and the other is in communal occupation.** However this is not necessary between any part of premises in single occupation and a common external stair**,** access balcony or deck.

3. Self-closing fire doors are permitted in separating walls between single and communal occupation provided each fire door has the same fire-resistance duration as the separating wall concerned. Fire shutters should not be installed in a separating wall or a separating floor.

4. Separating walls and separating floors **between the different occupiers of multi-occupied premises** may not be provided when the premises have a common fire alarm system and evacuation strategy and are under a single management regime. For example, multi-occupied units with a shared reception and sanitary facilities may be regarded as being in the same occupation. This philosophy is in effect very similar to individual departments within a large organisation. However where each unit is under the control of an individual tenant, employer or self-employed person, separating floors and walls should be provided between the areas intended for different occupation.

5. Every part of separating wall or separating floor should be constructed from materials that are non-combustible. Where materials are combustible then they should possess a medium duration (60 minutes) fire-resistance or higher as indicated in paragraph 7 below.

6. The wall should contain no pipes, wires or other services within the wall but where these already exist then they should be fire-stopped and protected by intumescent materials which achieve a medium duration (60 minutes) fire-resistance or higher as indicated in paragraph 7 below.

7. The fire-resistance duration should be the most stringent applicable, in respect of any abutting occupancy by reference to the tables in Technical Annexe 13.1. However, there are some situations where the wall or floor will demand a greater fire-resistance. For example, where the separating floor is also an element of structure in a building where the topmost storey is at a height of more than 18 m, long duration (120 minutes) fire-resistance would be necessary in most cases.

Technical Annexe 13.3

Structural Fire Protection

This Technical Annexe contains benchmarks in respect of structural fire protection, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements. If this is not possible or practicable the provision of an automatic life safety fire suppression system, as detailed in Technical Annexe 13.14, may be considered as an alternative.

1. The elements of structure should have at least the fire-resistance duration set out in Table 2 or 3 in Technical Annexe 13.1.

2. A roof structure should not be considered as an element of structure unless the roof provides support to an element of structure or which performs the function of a floor, or where the collapse of unrated roof elements would cause the consequential collapse of fire rated elements, or premature collapse of the roof on the means of escape.

3. Where an element of structure provides support to another element of structure which is required to be non-combustible, the supporting element of structure should also be constructed from materials which are non-combustible.

4. Where an element of structure provides support to another element of structure which attracts a higher period of fire-resistance, the supporting element of structure should have at least the same period of fire-resistance.

Technical Annexe 13.4

Fire Spread Through Cavities

This Technical Annexe contains benchmarks in respect of restriction of spread of fire and smoke within concealed spaces in the structure and fabric of the building, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements.

1. In order to inhibit fire spread in a cavity, every cavity within a building should have cavity barriers with at least a short duration (30 minutes) fire-resistance, installed around the edges of the cavity. This includes for example, around the head, jambs and sill of an external door or window opening. A cavity barrier should also be installed between a roof space and any other roof space or between a cavity and any other cavity such as at a wall-head between a wall cavity and a roof space cavity.

2. Every cavity should also be divided by cavity barriers so that the maximum distance between cavity barriers is not more than 20 m (10 m where the cavity has surfaces which are category 1 or less stringent: see Technical Annexe 13.5). Cavities should be measured horizontally or vertically, as the case may be, along the centre line of the cavity and not diagonally.

3. Cavity barriers are not necessary to divide a cavity:

- Formed by 2 leaves of masonry or concrete at least 75 mm thick; or where cavities are closed at the top and around openings;
- In a ceiling void between a floor and a ceiling construction that has at least a short duration (30 minutes) fire-resistance;
- Between a roof and a ceiling construction that has at least a short duration (30 minutes) fire-resistance;
- Below a floor next to the ground where the cavity is either inaccessible or is not more than 1 m high;
- Formed by external wall or roof cladding, where the inner, outer or other exposed surfaces of the cladding are no less stringent than category 0 (see Technical Annexe 13.5) and attached to a masonry or concrete external wall or a concrete roof, and where the cavity contains only non-combustible material; or
- Between a floor which is an element of structure (see Technical Annexe 13.3) and a raised floor consisting of removable panels.

4. Reference to surfaces in a cavity is intended to include the surface of the enclosing envelope of the cavity (including insulation material) but excludes timber roof trusses or lintels, joist ends, pipes, conduits or cables.

5. A cavity barrier should be fixed so that its performance is not affected by:

- Movement of the building due to subsidence, shrinkage or thermal collapse in a fire of any services penetrating it;
- Failure in a fire of its fixings; or
- Failure in a fire of any material or element of structure to which it abuts.

6. All cavity barriers should be tightly fitted to rigid construction. Where this is not possible as in the case of a junction with slates, tiles, corrugated sheeting or similar materials, the junction should be fire-stopped.

7. In a building with a storey height of more than 18 m, thermal insulation material situated or exposed within an external wall cavity, or in a cavity formed by external wall cladding, should be constructed of non-combustible materials.

Technical Annexe 13.5

Fire Spread On Internal Linings

This Technical Annexe contains benchmarks in respect of linings to restrict the development of fire and smoke from the surfaces of walls and ceilings within the area of origin, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements. If this is not possible or practicable the provision of an automatic life safety fire suppression system, as detailed in Technical Annexe 13.14, may be considered as an alternative.

1. The wall and ceiling surfaces of internal linings should have a reaction to fire as shown in the table:

Table 4 Surface linings of walls and ceilings

Rooms not more than 30 m^2 **(category)**	**Rooms more than 30 m^2** **(category)**	**Unprotected zone** **(category)**	**Protected zone*** **(category)**
2/3	1	1	0

***** includes any toilet or washroom within a protected zone

Category Description:

0 *means the surface material or where it is bonded throughout to a substrate, the surface material combined with the substrate has a surface of Class 1 when tested to BS 476: Part 7 and, when tested in accordance with BS 476: Part 6 has an index of performance (I) not more than 12 and a sub-index (i_1) not more than 6 or has achieved a classification of B-s3, d2 or better when tested in accordance with BS EN 13823 and BS EN ISO 11925: Part 2.*

Materials which may fall into this category include brickwork, blockwork, concrete, ceramic tiles, plaster finishes (including rendering on wood or metal lathes), wood-wool cement slabs and mineral fibre tiles or sheets with cement or resin binding.

1 *means the material when tested to BS 476: Part 7 attains a Class 1 surface spread of flame or has achieved a classification of C-s3, d2 or better when tested in accordance with BS EN 13823 and BS EN ISO 11925: Part 2.*

Materials which may fall into this category are timber, hardboard, blockboard and particle board, which have been treated to achieve category 1.

2/3 *means the material when tested to BS 476: Part 7 attains a Class 2 or Class 3 surface spread of flame or has achieved a classification of D-s3, d2 or better when tested in accordance with BS EN 13823 and BS EN ISO 11925: Part 2*.

Materials which may fall into this category include timber, hardboard, blockboard, particle board and certain dense timber or plywood.

2. Additional finishes to surfaces may be detrimental to the fire performance of the surface. Wall and ceiling surfaces mean the substrate or lining material including any treatment thereof to restrict flame spread, but exclude any decorative wallpaper or paints.

3. In a room, any part of the wall may be of one category less stringent than that shown in the table above, but no less stringent than Class 2/3, where the total area of those parts in any one room is not more than half the floor area of the room (subject to a maximum of 60 m^2).

4. The following **wall surfaces** should be taken into account in the assessment:

- Glazing, except glazing in doors; and
- Any part of a ceiling which slopes at an angle of more than 70^0 to the horizontal.

5. The following surfaces need not be taken into account:

- Doors and door frames;
- Window frames and frames in which glazing is fitted;
- Skirting and facings, cover moulds, picture rails, and similar narrow members; and
- Fireplace surrounds, mantle shelves and fitted furniture.

6. The following **ceiling surfaces** should be taken into account in the assessment:

- The surface of glazing; and
- Any part of a wall which slopes at an angle of 70^0 or less to the horizontal.

7. The following surfaces need not be taken into account:

- The frames of windows or roof lights and the frames in which glazing is fitted; and
- Facings, cover moulds, picture rails, and similar narrow members.

8. The use of plastics and thermoplastics is a complex issue and outwith the scope of this guidance document. Further guidance on the suitability of plastic or thermoplastic materials can be found in the *Scottish Building Standards Technical Handbook for Non-Domestic Premises.*

Technical Annexe 13.6

Fire Spread On External Walls

This Technical Annexe contains benchmarks in respect of fire spread on external walls, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements.

1. External wall cladding includes non-loadbearing external wall cladding systems attached to the building structure, for example, clay or concrete tiles, slates, pre-cast concrete panels, stone panels, masonry, profile metal sheeting including sandwich panels, weather boarding, thermally insulated external wall rendered systems, glazing systems and other ventilated cladding systems.

2. The external wall cladding where not more than 1 m from a boundary should be of a non-combustible material. Where the external wall cladding is combustible then it should achieve a category 0 rating as specified in Technical Annexe 13.5.

3. The boundary distance in paragraph 2 is not relevant unless there is a different building, structure, or activity on or within 1 m of that boundary, and from which there is the potential for fire to spread.

4. For buildings more than 18 m in height where the external cladding is more than 1 m from a boundary the cladding should be category 0 as specified in Technical Annexe 13.5.

Technical Annexe 13.7

Fire Spread From Neighbouring Buildings

This Technical Annexe contains benchmarks in respect of fire spread from neighbouring buildings, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements.

1. Where the building is less than 1 m from a boundary or notional boundary, and there is a different building or structure on or within 1 m of that boundary, and from which there is the potential for fire to spread, then the external wall should be at least medium duration (60 minutes) fire-resistance and any supporting element of structure should also have at least the same fire-resistance duration as the external wall. It is probable that there will be unprotected areas (including doors or window opening) with a lower fire-resistance within the wall structure, then these door or window openings should provide a short duration (30 minutes) fire-resistance.

Technical Annexe 13.8

Escape

This Technical Annexe contains benchmarks in respect of escape, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements. Providing an appropriate number of stairs, escape routes and exits is fundamental to fire safety. Where it is not practical to reduce travel distance, the provision of an automatic life safety fire suppression system, as detailed in Technical Annexe 13.14, may be considered as an alternative.

1. Where there is reference in this annexe to fire doors, see also Technical Annexe 13.9.

Travel Distance

2. Travel distance is the distance measured along the actual route of escape (having regard to the layout of furniture and fittings etc) from any point within a storey to the nearest protected door giving direct access to:

- Another compartment;
- A protected zone;
- An unenclosed external escape stair; or
- A final exit.

3. Where a compartment does not contain either a final exit or direct access to a protected zone, then each of the adjoining compartments should contain either a final exit or direct access to a protected zone.

4. **Single direction of escape** is escape before there is the choice of escape routes, and it may mean moving towards or past the fire, if the fire occurs between the occupant and the choice of escape routes. This includes escape from the room of origin of a fire and any horizontal travel distance prior to the choice of escape routes. Single direction of escape ceases at the point where there are alternative escape routes. See figures a), b) and c).

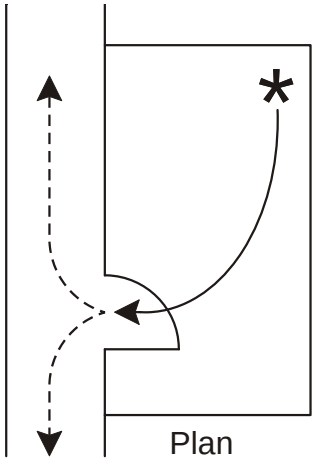


Fig a) - single direction of escape within a room before a choice of escape routes becomes available

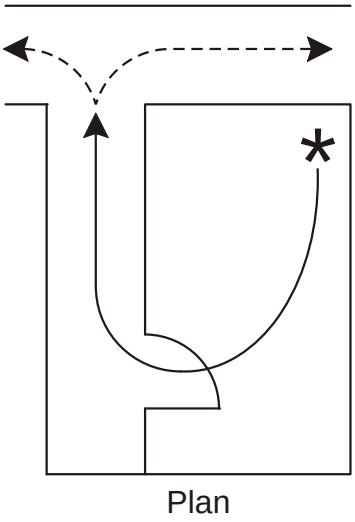


Fig b) - Single direction of escape out of room and along a corridor before a choice of escape routes becomes available

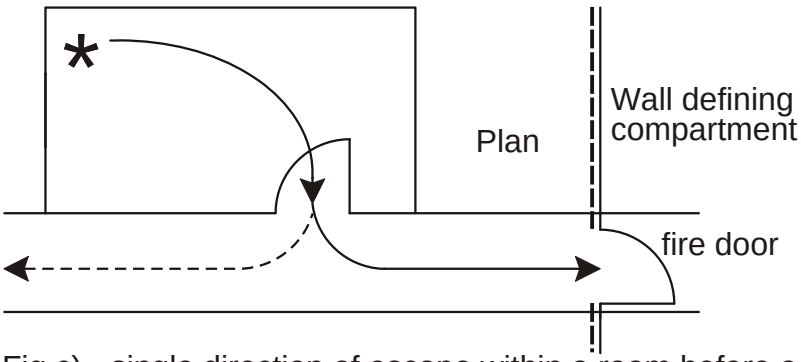


Fig c) - single direction of escape within a room before a choice of escape routes, one of which goes through a fire door into another compartment

5. The assessment of travel distance should be made by reference to Table 5 below.

Table 5 Travel distance within buildings by reference to use

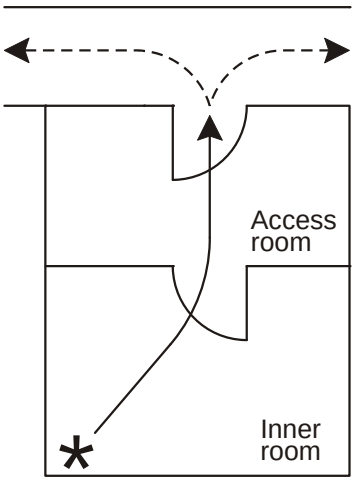
Use	Maximum travel distance (m)	
	Single direction of travel	More than one direction of travel *
Passenger terminal or station for air, rail, road or sea travel	15	32
Restaurant, cafe, snack bar	15	32
Semi-enclosed car park	18	45
Enclosed car park	18	45
Within a place of special fire risk	9	18
Within a protected zone to a safe area beyond the building	100	Unlimited

* this includes single direction distance

6. Where a measurement of travel distance includes an internal escape stair not in a protected zone, the travel distance should be measured along the pitch line from the centre of the nosing of the topmost tread to the lower landing, including the length of any intermediate landings.

Inner Rooms

7. An inner room is a room where access to a circulation route can only be achieved by passing through another room. The maximum travel distance from any point in the inner room to the exit from the access room should not exceed the distances for single direction of travel shown in Table 5 above (see figure d), unless there are alternative exits from the access room.



Plan

Fig d) - single direction of escape out of an inner room and through an access room before a choice of escape routes becomes available

Escape Routes

8. Each storey and room should have a minimum of two escape routes or exits, unless otherwise indicated in the table below:

Table 6 Number of escape routes or exits relevant to occupancy capacity

Occupancy capacity of room or storey	Minimum number of room exits	Minimum number of storey escape routes
Not more than 60	1	1 *
61 - 600	2	2
More than 600	3	3

* At least two storey escape routes should be provided from:
- any storey at a height of more than 7.5 m;
- a basement storey at a depth of more than 4.5 m; or
- a basement storey at a depth of not more than 4.5 m where the storey is intended to be used by members of the general public (other than for access to sanitary accommodation).

9. Where more than one exit from a room is required, the directions of travel from any point within the storey or from any point within the room should:

- Diverge at an angle of at least 45°; or
- Be combined for a distance not more than that allowed for one direction of travel and then diverge to two exits at an angle of at least 45° plus 2½° for every metre travelled in one direction.

10. An escape route should give access to a safe area beyond the building or to another compartment:

- Directly;
- By way of a protected zone or unprotected zone;

- By way of an unprotected zone to a protected zone;
- By way of a flat roof or access deck (**only suitable for staff use**);
- By way of an exit to an external escape stair; or
- In the case of escape from an inner room, by way of one other room but not through a place of special fire risk, or a room containing dangerous substances, or a room where there is the potential for rapid fire spread.

11. An escape route should not be by way of:

- A lift;
- An escalator;
- Turnstiles, other than those with breakout facility opening in the direction of escape;
- A fire shutter which closes automatically in the event of fire;
- A manual sliding door, other than one to which the general public does not have access; or
- Revolving or automatic doors unless arranged to fail safely in the outward opening position and designed in accordance with BS 7036.

12. An escape route and circulation area should have clear headroom of at least 2 m. In a doorway it may be reduced to not less than 1.9 m.

13. The unobstructed width of each individual escape route from a room or storey should be at least 1200 mm. However where the room or storey is inaccessible to wheelchair users, the width may be reduced to not less than 1100 mm. Where the occupancy capacity of the room or storey is not more than 100 and is inaccessible to wheelchair users the width may be reduced to not less than 1000 mm. Doorways can reduce the width of escape routes by 150 mm. This nominal reduction allows for the construction of door frames; however the clear opening width of the doorway should be at least 850 mm where the number of people using the escape route is not more than 225, and may be reduced to 750 mm where the number of people is not more than 100. An escape route should not narrow in the direction of escape. However an escape route may pass through a wider circulation area leading to a narrower circulation area provided the latter is of a width at least that recommended for the escape route.

14. A side-hung door across an escape route may open against the direction of escape where the occupancy capacity in the building or part of the building is sufficiently low. Where the occupancy capacity is 10 or more, the door should open in the direction of travel. However, if the door is an emergency door or a door serving a place of special fire risk, the door should open in the direction of escape regardless of occupancy levels.

Occupancy Capacity

15. The potential occupancy capacity of a room or space can be established by using Table 7 below. The occupancy capacity of a room or space without fixed seating is obtained by dividing the area (in square metres) by the relevant occupancy load factor. The occupancy capacity of a building or storey which is divided into rooms or spaces is the sum of the occupancy capacities of all the rooms or spaces. Where a room or space is likely to be put to more than one use, the largest relevant occupancy capacity should be used.

16. This calculation method provides only guidance on the number of persons which the room or space can occupy in relation to the area available and use. It should not be used in isolation for final determination of capacity because it takes no account of existing means of escape and other fire safety measures. In practice, the number of persons who can safely

use rooms, areas or storeys will often be less than that calculated because of the impact of the fire safety measures provided.

Table 7 Occupancy load factors of a room or space by use of premises

Description of room or space	Occupancy load factor
Concourse, queuing area	0.7
Semi-enclosed car park	30
Enclosed car park	30

Subdivision Of Corridors

17. For purposes of smoke control, certain corridors should be subdivided with a wall or screen with a short duration (30 minutes) fire-resistance (insulation criteria need not be applied to the wall, screen or any door). Any door in the wall or screen should be an FD 30S self-closing fire door and:

- Where the corridor is a single direction of travel more than 4.5 m long and provides access to a point from which more than one direction of escape is possible, it should be divided at that point or points; and
- Where the corridor provides at least two directions of escape and is more than 12 m in length between the exits it serves, it should be divided in the middle third of the corridor. This does not mean that the corridor should be subdivided into 12 m lengths.

Stairways

18. In every storey required to have at least two escape stairs such stairs must be independent of each other. Every escape stair should give access directly to a safe area or, in the case of escape routes that will be used by **staff only**, an escape route across a flat roof or access deck to a safe area.

19. The effective width of an escape stair should be at least the width of any escape route giving access to it. However where the number of people using the escape route is not more than 225 it may be reduced to not less than 1100 mm and for 100 people to not less than 1000 mm. The effective width of an escape stair is measured between handrails. An escape stair should not narrow in the direction of escape.

20. Where a building or part of a building has only one escape route by way of an escape stair, access to the escape stair should be by way of a protected lobby. This should afford people making their escape additional time to pass the fire floor in relative safety. The wall dividing a protected lobby from the remainder of the protected zone may have a short duration (30 minutes) fire-resistance for integrity only and any door in the wall should be at least an FD 30S self-closing fire door. A protected lobby is not necessary on the topmost storey provided that it is not the exit storey or needed for fire-fighting purposes.

21. Where an escape stair serves a storey at a height of more than 18 m, access to the protected zone containing the escape stair should be by way of a protected lobby.

22. An escape stair should be within a protected zone. However, this is not necessary in the following situations:

- An escape stair which connects two or more levels within a single storey where the difference in level between the highest and lowest level is not more than 1.8 m;
- An external escape stair with a total rise of not more than 1.6 m; or
- An escape stair from a gallery where the gallery has:
  - an occupancy capacity of not more than 60 or;
  - an occupancy capacity of 61 to 100 and at least one route of escape is by way of a protected zone, an external escape stair, or another compartment.

23. The enclosing structure of the protected zone should have at least a medium duration (60 minutes) fire-resistance; any door in the enclosing structure should be at least an FD 60S self-closing fire door. However, the floor of the lowest storey or an external wall (other than an external wall described below), need not be fire-resisting.

24. The enclosing structure of a fire-fighting shaft should have a long duration (120 minutes) fire-resistance. However, where the elements of structure in a building have a medium duration (60 minutes) fire-resistance, the fire-fighting shaft need only have a medium duration. A self-closing door in the enclosing structure of a fire-fighting shaft need only attain a medium duration (60 minutes) fire-resistance.

25. The speed of evacuation of people with mobility problems can be slow and they should be provided with space to wait temporarily until it is safe to use the escape stair. The spaces should not be used for any form of storage. A protected zone enclosing an escape stair and an external escape stair should be provided with an unobstructed clear space capable of accommodating a wheelchair and measuring not less than 700 mm x 1200 mm on every landing to which there is access from a storey. However, a temporary waiting space need not be provided in a protected zone where the storey has level or ramped egress to a safe area or the storey is inaccessible to wheelchair users.

26. Where an escape stair also serves a basement storey, the protected zone enclosing the escape stair in the basement storey should be separated from the protected zone containing the escape stair serving the rest of the building, by a wall or screen, with or without a door, at the ground storey floor level. The wall, screen and self-closing fire door where provided, should have a medium duration (60 minutes) fire-resistance.

27. Every part of an escape stair (including landings) and the floor of a protected zone or protected lobby, should be constructed of non-combustible material. Where the stair is combustible it should be protected on its underside with material which offers at least a nominal medium duration (60 minutes) fire-resistance. However, this guidance does not apply to:

- Any handrail, balustrade or protective barrier on an escape stair;
- An escape stair which connects two or more levels within a single-storey where the difference in height between the highest and lowest level is not more than 1.8 m;
- An escape stair from a gallery; or
- A floor finish (such as laminate flooring) applied to the escape stair (including landings) or to the floor of a protected zone or protected lobby.

28. Where an element of structure provides support to a non-combustible protected route of escape, the supporting element of structure should also be constructed from materials which are non-combustible.

29. Where any part of a protected zone enclosing an escape stair is not more than 2 m from, and makes an angle of not more than 135^{o} with any part of an external wall of another part of the building, the escape stair should be protected for a distance of 2 m, by construction with:

- Short duration (30 minutes) fire-resistance where every storey in the building is at a height of not more than 7.5 m above the ground; or
- Medium duration (60 minutes) fire-resistance where any storey is at a height of more than 7.5 m above the ground.

30. However, where the external wall of the protected zone is used to protect the escape stair, it is not sufficient to use the final exit door as a barrier between the evacuees and the fire. In such cases, the external wall adjoining the protected zone at the final exit level should be constructed from materials which are non combustible.

31. Certain small rooms as described below, may be sited within protected zones enclosing escape stairs because the fire risk is considered to be low. However, all other parts of the building served by that escape stair should have at least one other escape route. This allows the occupants in other parts of the building to evacuate without the need to enter the protected zone enclosing the escape stair which has the additional permitted rooms within it. No flammable materials should be stored in these rooms. The types of rooms are:

- A reception room having a floor area of not more than 10 m^2;
- Toilets and washrooms;
- An office having a floor area of not more than 10 m^2;
- A general store room having a floor area of not more than 10 m^2; or
- A cleaner's cupboard not more than 3 m^2.

32. An office, general store room or reception room located within the protected zone should be separated from the protected zone by walls providing a short duration (30 minutes) fire-resistance and any doors in those walls should be at least FD 30S fire doors. More than one toilet, washroom or cleaners' cupboard may be located in a protected zone enclosing an escape stair. The walls, floors and ceiling separating the cupboard(s) from the protected zone should have a short duration (30 minutes) fire-resistance. A door to a cleaners' cupboard should be at least an FD 30S fire door but need not be self-closing provided it is kept locked. Where toilets or washrooms are located within the protected zone, then the walls and doors need not have fire-resistance.

Escape Across Flat Roofs And Access Decks

33. An escape route across a flat roof or access deck is only acceptable provided the following criteria are met:

- Routes across flat roofs should not normally exceed 7.5 m in height;
- Routes across flat roofs should be for staff use only;
- Any escape route across a flat roof or access deck should be unobstructed and normally be flat;
- Routes should be clearly defined and capable of being adequately illuminated across their entire length as appropriate;
- Routes should have a slip free surface and be guarded with protective barriers not less than 1.1 m in height along their length including roof edge protection at the point any such route across a flat roof meets an unenclosed external staircase;
- Routes should be constructed as a fire-resisting floor with a minimum of medium duration (60 minutes) fire-resistance for a distance of 3 m on either side;

- There should be no unprotected openings such as roof exhausts/ventilators, windows or other openings, from adjacent rooftop structures, within a distance of 2 m on either side;
- Where any wall along the escape route is within 3 m of the route then it should have a minimum of short duration (30 minutes) fire-resistance up to a height of at least 1.1 m from the level of the escape route;
- An exit from a flat roof or access deck must lead directly to a safe area via an enclosed or, alternatively, unenclosed external staircase or by other suitable means; and
- An escape route across a flat roof should be an alternative additional provision to an existing fully compliant protected staircase in any building.

External Stairs

34. External escape stairs may present additional problems for persons evacuating a building in the event of fire because the escape stair will be exposed to the possible effects of inclement weather and people who are unfamiliar with the escape routes can feel less confident using an unenclosed stair high above the ground. If external stairs are used for evacuation, then consideration should be given to weather protection measures and surfaces must be maintained free of any slip hazards. For these reasons, an external escape stair should only serve a building where:

- The topmost storey height is not more than 7.5 m; and
- The stair is intended to be used by staff only.

35. An external escape stair should lead directly to a safe area beyond the premises and be protected against fire from within the building in accordance with the guidance below. However, fire protection need not be provided to an external escape stair with a total rise of not more than 1.6 m. External escape stairs should be constructed of non combustible materials.

36. Every part of an external wall (including a door, window or other opening) not more than 2 m from the external escape stair, should have short duration (30 minutes) fire-resistance. However, this does not apply to a door opening from the top storey to the external escape stair. Fire protection to the wall below an escape stair should be extended to the lowest ground level. Due to the likely smoke dissipation to the atmosphere, service openings including ventilation ducts not more than 2 m from the escape stair should be protected by heat activated sealing devices or systems.

Technical Annexe 13.9

Doors

This Technical Annexe contains benchmarks in respect of doors, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements. Fire doors are fundamental to the escape process within premises.

Fire Doors

1. A fire door is rated by its fire-resistance performance under test conditions: a door rated to 30 minutes (short duration) will be described as FD 30 (when tested to BS 476: Part 22) or E 30 (when tested to BS EN 1634: Part 1). A suffix is added to denote the door has a smoke control function giving FD 30S and E 30Sa respectively. An equivalent 60 minutes (medium duration) fire door will be designated FD 60S or E 60Sa. This test rating is an indication of test performance and not necessarily how a door will perform in a real fire.

2. The level of protection provided by a fire door is measured, primarily by determining the time taken for a fire to breach the integrity of the door assembly, together with its resistance to the passage of smoke, hot gases and flame. The gap between the door leaf and the frame is normally fitted with intumescent strips, in either the door or preferably the frame. The strips expand in the early stages of a fire in response to heat and enhance the protection given by the door. In nearly all cases, smoke seals will be required to prevent the spread of smoke at ambient temperatures.

3. Specification for fire door performance in respect of Fire Compartmentation and Escape is contained in Technical Annexes 13.1 and 13.8.

4. To ensure compliance with their rated fire performance, fire doors should be hung with the correct number, size and quality of hinges. Normally a minimum of three hinges are required; the manufacturer's instructions should be closely followed. Care should be taken to ensure that any other ironmongery used on doors is not detrimental to the integrity of the door.

5. Although glazing provides additional safety in everyday use and can enhance the appearance of fire doors, it should never reduce the fire-resistance of a door. The fitting of glazing should only be entrusted to a capable person. In nearly all cases the door and glazing should be purchased from a supplier who can provide documentary evidence that the door continues to achieve the required rating.

Self-closing Function

6. A well fitting fire door will provide a barrier to fire and smoke but will only fulfil its function if it is closed at the time a fire occurs. A controlled self-closing device should be fitted to each fire door to ensure that the door is returned to the closed position and is held in this position so that it can restrict the spread of fire and smoke. Controlled self-closers should comply with BS EN 1154.

Hold Open And Door Release Devices

7. Self-closing doors can be fitted with **electromagnetic hold open devices** (which comply, where appropriate to BS EN 1155 or BS 5839: Part 3) or with **electromagnetic hold open door closers** (to BS EN 1155) provided the door is not an emergency door, a protected door serving the only escape stair in the building (or the only escape stair serving part of the building) or a protected door serving a fire-fighting shaft. In some situations, such as corridors in constant use by large numbers of people, hold open devices may be essential. It is important that hold open devices deactivate on operation of the fire alarm system and that the fire alarm incorporates automatic smoke detectors installed and sited in accordance with BS 7273: Part 4. Electrically operated hold open devices should deactivate and release the door on:

- Operation of the fire alarm system; or
- Any loss of power to the hold open device, apparatus or switch.

8. BS 7273: Part 4 contains detailed guidance on the conditions under which fail-safe actuation of a hold open release should occur. It introduces a system of three actuation categories and identifies the type of door locations to which each actuation category may be appropriate.

9. As an alternative to the above hold open device, an **acoustically activated door release mechanism** and floor plate complying with BS EN 1155 may be installed in some cases, subject to risk assessment and correct fitting. However, this type of hold open device is not suitable for use where:

- The premises do not have a fire alarm system;
- The door is a fire door serving the only escape stair in the building (or the only escape stair serving part of the building);
- The initial fire alarm warning signal is intended to alert staff only;
- The fire alarm sounders may be muted or the sound level reduced; or
- The fire alarm system incorporates a voice alarm.

10. This type of device could fail to operate where a single fire alarm sounder failure may result in a drop in sound pressure. It also will not operate in response to electrical mains failure or during an alarm fault or failure condition.

11. Acoustic door release devices have limited application in respect of the actuation category guidance in BS 7273: Part 4.

12. Where hold open devices that are separate from the self-closing device are used, they require to be fitted in a manner that avoids twisting of the door which may cause damage, preferably on the same level as the closing device. They also may not be suitable for prolonged use over an indefinite period due to the potential for warping of the door, hinge drop and damage to the self-closing device.

13. A further type of self-closing device comprises a **‘swing free’ arm** which operates by allowing the door leaf to work independently of the closing device in normal conditions. An electro-magnetic device within the self-closer, linked to the fire alarm system, ensures the door closes on the operation of the fire alarm or power failure.

14. Swing free devices may not be suitable in some parts of transport premises, where draughts are a problem and the doors are likely to swing uncontrolled, causing possible difficulty or injury.

Door Fastening

15. Security measures should not compromise the ability of the occupants to escape from premises in the event of fire, the emergency fire action plan, or any potential Fire and Rescue Service operations. However it is not intended to prohibit the use of locks (including key operated locks) to secure a room, storey or premises when the premises or part of the premises are unoccupied.

16. In some larger premises, when only staff are on the premises and there is a security issue, it may be acceptable to restrict the number of exits immediately available such as when only security or cleaning staff are present at night and/or when members of staff are preparing to open up the premises in the morning. Staff should be made fully aware of any restrictions and the number of exits that may not be immediately available. The number of exits remaining available should be justified by the fire safety risk assessment.

17. Where an exit door from a room, storey or a door across an escape route has to be secured against entry, it should only be fitted with a lock or fastening which is readily operated, without a key, from the side approached by people making their escape. Similarly, where a secure door is operated by a code, combination, swipe or proximity card, biometric data or similar means, it should also be capable of being overridden from the side approached by people making their escape.

18. For outward opening final exit doors, push pad devices to BS EN 179 are suitable where occupants can be expected to be familiar with the devices. In other cases, panic exit devices operated by a horizontal bar to BS EN 1125, are suitable.

19. Where a door accessing an escape route, particularly a self-closing door, has a fastening which can only be opened from one side of the door, there is a need to consider that a person after passing through the door could be prevented from returning through it. For example, on encountering adverse conditions they may need to retrace their steps to seek an alternative escape route and should not be prevented from doing so by the type of fastening on the door.

Electrically Powered Locks

20. Electrically powered locks should not be installed on any door where it is:

- The only route of escape from a building or part of a building;
- A protected door serving a fire-fighting shaft; or
- Serving any room or storey with an aggregate occupancy capacity exceeding 60 persons.

21. Electrically powered locks should return to the unlocked position:

- On operation of the fire alarm system, where installed;
- On loss of power; and
- On actuation of a manual door release unit positioned at the door on the side approached by people making their escape (where the door provides escape in either direction, a unit should be installed on both sides of the door).

22. BS 7273: Part 4 provides more detailed guidance on the electrical control arrangements for the fail-safe release of powered locks.

23. Access control systems across the escape route should in the event of a fire, power failure, or malfunction, continue to provide a means of escape without reducing the width by:

- Automatically opening and remaining open; or
- Being readily pushed to the outward open position by occupants in an emergency; or
- Provide alternative adjacent means of escape.

24. Access control systems may be in the form of revolving doors, sliding doors, ticket barriers, or entrance gates.

25. A locking mechanism which remains locked in the event of a power failure or system error, is not appropriate for use on exit doors and doors across an escape route.

26. Electrically powered locks can be operated by electromagnetic or electromechanical means. **Electromechanical** devices mostly operate by using a spring mechanism to return the lock keep or draw bolt(s). These mechanisms can jam when pressure is applied to the door and are normally unacceptable on escape doors unless it can be verified that they do not rely on a spring mechanism, they fail-safe to the unlocked position and are not affected by pressure, in which case the criteria for electromagnetic devices should be adhered to.

27. **Electromagnetic** devices operate by the interruption of electrical current to an electromagnet. They are generally considered to be more reliable than electromechanical devices due to the absence of moving parts and their inherent ‘fail-safe’ operation.

Automatic Opening Doors

28. Where an internal swing door is an automatic door to facilitate movement of occupants, the automatic opening mechanism should be linked to the fire alarm system so that on operation of the fire alarm system, the automatic opening function is disabled (but still permitting the door to be manually opened). Automatic opening doors should not be placed across exits unless they are designed in accordance with BS 7036 and are either arranged to fail safely to outward opening from any position of opening **or**;

- Be provided with a monitored fail-safe system for opening the door from any position in the event of mains supply failure and also in the event of failure of the opening sensing device; and
- Opens automatically from any position in the event of operation of the fire alarm in the fire alarm zone within which the door is situated.

29. Automation of fire doors should not detract from their essential function as fire doors. Where doors giving direct access into protected zones, or any other doors required for fire-resisting or smoke stopping purposes, are automatic opening to facilitate movement of occupants, they must be fitted with suitable self-closing devices and must have their automatic opening function disabled (but still permit the doors to be manually opened) following:

- Actuation of the fire alarm system; or
- On loss of power or system error.

Powered Sliding Doors

30. Powered sliding doors normally open in response to a motion sensor. Where a powered sliding door is acceptable across an escape route, it is important that the door has suitable fail-safe operation to enable the escape route to be used. The door should open:

- On operation of the fire alarm system, where installed;
- On loss of power; and
- On actuation of a manual door release unit positioned at the door on the side approached by people making their escape (where the door provides escape in either direction, a unit should be installed on both sides of the door).

31. BS 7273: Part 4 contains detailed guidance on the electrical control arrangements for fail-safe operation of powered sliding doors.

Technical Annexe 13.10

Escape Lighting

This Technical Annexe contains benchmarks in respect of escape lighting, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements.

Escape Route Lighting

1. Escape route lighting utilises the artificial lighting within the building. Every part of an escape route should have artificial lighting supplied by a protected circuit that provides a level of illumination not less than that recommended for emergency lighting. The escape route lighting need not be supplied by a protected circuit if the building has an emergency lighting system installed.

2. In protected zones the artificial lighting should be supplied via a protected circuit separate from that supplying any other part of the escape route, unless a system of emergency lighting is installed in the protected zone. A protected circuit is a circuit originating at the main incoming switch or distribution board, the conductors of which are protected against fire. It may be easier to rely on self-contained emergency lighting luminaires than to install a protected circuit to an existing lighting system.

3. If there are escape routes that are not permanently illuminated, such as external stairs, then a switch, clearly marked ‘Escape lighting’, or some other means of switching on the lighting should be provided at the entry to that area.

Emergency Lighting

4. Emergency lighting should be installed in:

- A protected zone and an unprotected zone in a building or parts of a building with a storey height of more than 18 m;
- A room with an occupancy capacity of more than 60, or in the case of an inner room, the combined occupancy capacity of the inner room plus the adjoining room (and any protected zone or unprotected zone serving such a room);
- A protected zone or unprotected zone serving a basement storey;
- A place of special fire risk (other than one requiring access only for the purpose of maintenance) and any protected zone or unprotected zone serving it;
- A protected zone and an unprotected zone serving a storey which has two storey exits for transport premises;
- A protected unprotected zone serving any storey in an open sided car park; and
- An underground car park including any protected zone or unprotected zone serving it where less than 30% of the perimeter of the car park is open to the external air.

5. The lighting should comply with BS 5266: Part 1 as read in association with Parts 7 and 8 (BS EN 1838).

6. Emergency lighting can be stand-alone dedicated units or incorporated into normal light fittings. Power supplies can be rechargeable batteries integral to each unit, a central

battery bank or an automatic generator. Single ‘stand-alone’ emergency lighting units may be sufficient in some premises and these can sometimes be combined with exit or directional exit signs. The level of general illumination should not be significantly reduced by the sign.

7. An emergency lighting system provided for escape purposes would normally cover the following:

- Each exit door;
- Escape routes;
- Intersections of corridors;
- Outside each final exit and on external escape routes;
- Emergency escape signs;
- Staircases so that each flight receives adequate light;
- Changes in floor level;
- Windowless rooms and toilet accommodation exceeding 8 m^2;
- Fire-fighting equipment;
- Fire alarm call points;
- Equipment that would need to be shut down in an emergency; and
- Lifts.

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

9. Emergency lighting can be ‘maintained’, i.e. on all the time, or ‘non-maintained’ which only operates when the normal lighting fails.

Technical Annexe 13.11

Signs

This Technical Annexe contains benchmarks in respect of signs, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements.

1. **Escape route signs** should meet the following criteria:

- If the escape route to the nearest exit is not obvious then it should be indicated by a sign(s);
- They should provide clear, unambiguous instruction with enough information to enable people to safely leave a building in an emergency;
- Every escape route sign should, where necessary, incorporate a directional arrow. Arrows should not be used on their own;
- Escape route and exit signs should not be fixed to doors as they will not be visible if the door is open;
- Signs mounted above doors should be at a height of between 2 m and 2.5 m above the floor. Signs on walls and hanging signs should be mounted between 1.7 m and 2 m above the floor.

2. Signs should be in pictogram form, the pictogram can be supplemented by text if this is considered necessary to make the sign easily understood, but an escape route sign should not use only text. Guidance is available in BS 5499: Parts 4 and 5.

Technical Annexe 13.12

Fire Alarm Systems

This Technical Annexe contains benchmarks in respect of fire detection and alarms, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements.

System Type

1. Where an electrical fire alarm system is necessary, a fire warning system designed, installed and maintained in accordance with the guidance in BS 5839: Part 1 for a category M system is likely to be appropriate for low occupant capacity transport premises. A category M system is a system designed to give a warning of fire and is operated by manual call points only.

2. Where automatic detection of fire is necessary for life safety, the system will be designated as a category L system, within which there are subdivisions from L1 to L5.

- L5 is a system designed to achieve a specific fire safety objective;
- L4 is a system which provides warning of smoke within escape routes;
- L3 is a system designed to give a warning before escape routes are impassable;
- L2 is a system designed to give warning before escape routes are impassable but with enhanced coverage in specified areas; and
- L1 is a system installed throughout all areas of the building.

Power Supply

3. The fire alarm system should have a secure power supply for the system derived from a dedicated mains supply and a back up power supply.

Call Points

4. Manual call points are normally positioned at every exit and storey exit, not just those designated as fire exits. They should be conspicuous, fitted at a height of about 1.4 m (or less for premises with a significant number of wheelchair users), and not in an area likely to be obstructed. They should normally be positioned so that no one should have to travel more than 45 m to reach the nearest call point.

5. However, it is not necessary in every case to provide call points at every exit. Conventionally sited call points that operate an immediate general alarm are not desirable in many transport premises. To reduce the risk of malicious or accidental operation which may promote unnecessary evacuations in the event of an actuation by a member of the public, alternative arrangements may be considered. For alternative approaches to be effective, robust management procedures should be in place. Examples are:

- Locating the majority of manual call points in staff areas;
- The provision of hinged guards around the call points;
- The use of CCTV to allow management to confirm the outbreak of fire; and

- Areas that are well checked and patrolled may have less need for a manual call point.

Sounders

6. An appropriate sound level for sounders will vary with the nature of the premises and staffing arrangements.

Voice Alarm Systems

7. Where a voice alarm system is installed then it should comply with the guidance in BS 5839: Part 8. In considering the areas of the premises to be provided with a voice alarm system, the desirability or otherwise of providing occupants with information regarding the fire and factors such as background noise levels need to be taken into account. The wording of the message on the voice alarm system should be clear, unambiguous and precise.

Technical Annexe 13.13

Portable Fire Extinguishers

This Technical Annexe contains benchmarks in respect of portable fire extinguishers, against which the existing level of provision can be compared.

Where these benchmarks are not achieved and the results of the risk assessment indicate risk reduction measures are required, consideration should be given to implementing improvements.

Number And Type Of Extinguishers

1. The provision of extinguishers can be determined by their extinguishing capacity and size. They are marked with a letter and a number: the letter denotes the class of fire (see Table 1 in Chapter 11), the number denotes the size of fire tested against. An extinguisher could therefore have a rating of, for example '9A' or '13B'.

2. A guide to the level of provision of class A extinguishers, is obtained by multiplying the floor area of a storey by 0.065. For example, a floor area of 400 m^2 would have a rating of 26A (400 x 0.065 = 26). which is the total value of class A extinguisher and can be achieved by combinations of extinguishers with different ratings to achieve the total value. Where there are other classes of fire risk, appropriate extinguishers for these risks should be provided. In small premises, multi-purpose extinguishers which can cover a range of risks may be appropriate. Generally, at least one water-based extinguisher for approximately every 200 m^2 of floor space, with a minimum of two extinguishers per floor will be adequate.

3. Fire extinguishers should be positioned on escape routes, close to room or floor exits, final exits from the building or, if necessary, adjacent to hazards. They should be placed on a dedicated stand or hung on a wall at a convenient height so that staff can easily lift them off (at about 1 m for larger extinguishers, 1.5 m for smaller ones, to the level of the handle). Ideally, no one should have to travel more than 30 m to reach a fire extinguisher. The weight of extinguishers and manual handling by staff should be taken into account.

4. It can be good practice to group extinguishers together in fire points clearly and conspicuously indicated and at a similar position on each floor.

5. Extinguishers are red and may have a colour-coded area, sited above or within the instructions and denoting the type of extinguisher. Older extinguishers which have been manufactured with the body of the extinguisher painted entirely in a single colour remain acceptable until they are no longer serviceable.

6. Information on the selection and installation of fire extinguishers is contained in BS 5306: Part 8.

Technical Annexe 13.14

Automatic Life Safety Fire Suppression Systems

This Technical Annexe contains benchmarks in respect of automatic life safety fire suppression systems, against which the existing level of provision can be compared.

1. Fire suppression should be appropriate to the occupancy and should be determined on the basis of a risk assessment. If provided, an automatic life safety sprinkler system should be designed and installed to comply with:

- BS EN 12845, including the relevant hazard classification together with the special requirements for life safety systems; or

- 'Rules for Automatic Sprinkler Installations' LPC 2004, including all additional life safety recommendations. Sprinkler heads should be 'quick response type' with a response time index (RTI) of not more than 50 $(m.s)^{1/2}$ and a conductivity factor (c) of not more than 1 $(m/s)^{2}$.

2. Specialised systems may be necessary for higher hazard situations where there is a need to increase the available evacuation time. Such automatic fire suppression systems should be appropriate to the hazard. Information on the systems available is contained in BS 5306: Part 0. The design and installation should comply with the relevant standards listed below in conjunction with the use of fire engineering advice.

- BS 5306: Part 2 or BS EN 12845 for sprinkler systems;
- BS 5306: Part 4 for carbon dioxide systems;
- BS 5306: Part 6: Section 6.1: for low expansion foam systems;
- BS 5306: Part 6: Section 6.2: for medium and high expansion foam systems; or
- BS 5306: Part 7 for powder systems.

3. For a suppression system such as sprinklers to be effective it is essential that there is an appropriate water supply. Therefore designers need to discuss with the water undertaker what supply is likely to be available and what pressure can be expected. It is recognised that pressures will vary during the day, over the year and perhaps in future years. Therefore it is imperative that the system is designed on the basis of what the minimum pressure and flow is likely to be.

Supplementary Annexe 14.1

Fire And Rescue Service Access, Water Supply And Facilities

The following information on Fire and Rescue Service access, Fire and Rescue Service water supply and other Fire and Rescue Service facilities, is for reference purposes only. Persons with duties under the *Fire (Scotland) Act 2005*, as amended, are required to maintain existing facilities under these headings where they have been provided for use or safety of fire-fighters. Chapter 12 deals with maintenance requirements.

Fire And Rescue Service Access

1. Vehicle access to the exterior of a building may be needed to enable high reach appliances, such as turntable ladders and hydraulic platforms to be used, and to enable pumping appliances to supply water and equipment for fire-fighting and rescue activities. The access arrangements increase with building size and height.

2. Vehicle access should be provided to at least one or more elevations of the building, where the principal entrance or entrances are located. Vehicle access routes to more than one elevation may not always be possible due to the constraints of the site. Where this is the case then pedestrian access for Fire and Rescue Service personnel should be provided which consists of a paved (or equivalent) footpath at least 900 mm wide to the principal entrance, or entrances, of the building.

3. Every elevation which is provided with vehicle or pedestrian access for Fire and Rescue Service personnel should have a door giving access to the interior of the building.

4. Where any compartment exceeds 900 m^2, or the building footprint has a perimeter greater than 150 m, then access should be provided to the other elevations.

5. Fire and Rescue Service vehicles should not have to reverse more than 20 m from the end of an access road (where any dead-end route is more than 20 m long, turning facilities should be provided). Following consultation with the Fire and Rescue Service, it may be recommended that an operating space, or spaces, for a high reach appliance be provided.

Table 8 Access route for Fire and Rescue Service vehicles

	High reach appliance	**Pumping appliance only**
Minimum width of road between kerbs	3.7 m	3.7 m
Minimum width of gateways etc	3.5 m	3.5 m
Minimum clearance height	4 m	3.7 m
Minimum turning circle between kerbs	26 m	16.8 m
Minimum turning circle between walls	29 m	19.2 m
Minimum axle loading	14 tonnes	14 tonnes

Water Supply For Fire And Rescue Service Use

6. Fire-fighting operations depend on a sufficient supply of water in order to control fire growth and assist in effective rescue operations.

7. At least one external water hydrant should be provided. Hydrants should be positioned so that there is one not more than 60 m from at least one normal entrance to the building and every external elevation of the building is within 60 m of a hydrant. Hydrants should be:

- At least 6 m from the building;
- Located adjacent to a parking space for a pumping appliance;
- Where a parking space is provided for a Fire and Rescue Service vehicle to facilitate the use of a dry rising main, then the water hydrant located adjacent to that parking space;
- Accessible for use at all times;
- Located so that there is a clear route for the fire hose between the hydrant and the building; and
- Constructed in accordance with BS 750.

8. Each hydrant should be connected to a water service pipe capable of delivering water at a flow rate of at least 1500 litres per minute, provided by a water main vested in a public water authority. Whilst it is desirable to achieve 1500 litres per minute flow rate, it is accepted that the flow rates in the water mains may not achieve this.

9. Localised areas throughout Scotland may not be supplied by mains water or, where mains water is available, the pressure and flow rates in the main may not be sufficient for fire-fighting operations. Skilled pump operators can regulate the water supplies to the fire-fighters and take care not to overdraw the mains especially where the mains pressure and flow rates are poor.

10. Where no piped water supply is available, or there is insufficient pressure and flow in the water main, or an alternative arrangement is proposed, the alternative source of supply should be provided in accordance with the following recommendations:

- A charged static water tank of at least 45,000 litre capacity; or
- A spring, river, canal, loch or pond capable of providing or storing at least 45,000 litres of water at all times of the year, to which access, space and a hard standing are available for a pumping appliance; or
- Any other means of providing a water supply for fire-fighting operations considered appropriate by the Fire and Rescue Authority.

Other Fire And Rescue Service Facilities

11. Where the topmost storey is at a height of more than 7.5 m above ground level, at least two of the escape stairs should be provided with a protected lobby in which there is located a dry rising fire main.

12. The inlets to the risers will be located externally to the building and not more than 18 m from a parking space suitable for a pumping appliance and with a clear hose route between the appliance and the inlet. This will allow fire-fighters to connect the hose to the inlets quickly saving time. Where vehicle access is not possible to within 18 m of the riser inlets a footpath should also be provided to the riser inlets. Dry risers should be installed in accordance with BS 5306: Part 1 and where there are:

- Landing valves, conform to BS 5041: Part 2;
- Inlet breachings, conform to BS 5041: Part 3;
- Boxes for landing valves, conform to BS 5041: Part 4; and
- Boxes for dry risers, conform to BS 5041: Part 5.

13. Where there is only one escape stair in the building, then fire-fighting facilities may only be provided to that stair.

Definition Of Terms Used In This Guide

Child	A person who is not over school age (to be construed in accordance with section 31 of the *Education (Scotland) Act (1980).*
Combustible	Capable of burning in the presence of oxygen.
Compartment	Part of a building (which may contain one or more rooms, spaces or storeys and includes, where relevant, the space above the top storey of the compartment) constructed so as to prevent the spread of fire to or from another part of the same building.
Dry rising main (dry riser)	A vertical pipe installed in a building for fire-fighting operations, fitted with inlet connections at the Fire and Rescue Service access level and with landing valves at specified locations. The pipe is normally dry but is charged with water, usually by pumping from a Fire and Rescue Service vehicle.
Element of structure	Part of the structural frame of a building which is loadbearing.
Emergency door	A door which may be a fire door and which is intended to be used only during an emergency.
Emergency lighting	Lighting designed to come into, or remain in, operation automatically in the event of a local and general power failure.
Enclosed car park	A building or part of a building that is mechanically ventilated and accommodates passenger or light goods vehicles.
Escape route	A route forming part of the means of escape from any point in the building to the final exit.
Escape stair	A stair or ramp forming part of an escape route.
Final exit	Termination of an escape route from a building, giving direct access to a street or open space, where people are no longer in danger from fire.
Fire damper	A device within a duct, which operates automatically and will stop the passage of fire and smoke which together with its frame, has the same fire-resistance as that element of building construction through which the duct passes.
Fire door	A fire door is rated by its fire-resistance performance under test conditions: a door rated to 30 minutes (short duration) will be described as FD 30 (when tested to BS 476: Part 22) or E 30 (when tested to BS EN 1634: Part 1). A suffix is added to denote the door has a smoke control function giving FD 30S and E 30Sa respectively. An equivalent 60 minutes (medium duration) fire door will be designated FD 60S or E 60Sa. This

	test rating is an indication of test performance and not necessarily how a door will perform in a real fire.
Fire load	The quantity of heat which would be released by the combustion of all the combustible materials in a volume, including the facings of all bounding surfaces.
Fire safety engineering	The application of scientific and engineering principles to evaluate fire safety and calculate design and safety levels for the protection of people.
Fire-stopping	The sealing between elements, components or any joints in the construction of the building in order to prevent the passage of fire or smoke through the building.
Hard standing	An area of ground which will support the weight of a Fire and Rescue Service vehicle regardless of the weather conditions.
Hazard	A situation that can give rise to a fire.
Means of escape	Safe routes provided for people to travel from any point in a building to an unenclosed safe area beyond the premises including fire safety measures to maintain those routes.
Non-combustible	The material is certified as non-combustible throughout according to the test specified in BS 476: Part 4 or 11.
Occupancy capacity	The number of persons a room, storey or building can safely contain in relation to the fire safety measures provided.
Place of special fire risk	Any place within, or attached to, or on a roof of a building in which there is installed one or more: • Solid fuel appliances, with an output rating more than 50 kW, other than kitchen appliances; or • Oil or gas fired appliances, with a total installed net input rating more than 70 kW; or • Fixed internal combustion engines, including gas turbine engines with a total output rating more than 45 kW; or • Fuel oil storage tanks having a capacity more than 90 litres.
Protected circuit	A circuit originating at the main incoming switch or distribution board, the conductors of which are protected against fire.
Protected door	A fire door giving access to: • A protected zone, (including a protected lobby); or • A fire-fighting shaft; or • Another compartment; or • An unenclosed safe area beyond the premises; or • An unenclosed external escape stair; or • An open access balcony; or • An escape route across a flat roof or access deck.

Protected lobby	A lobby within a protected zone but separated from the remainder of the protected zone so as to resist the movement of smoke from the adjoining accommodation to the remainder of the protected zone.
Protected zone	That part of an escape route within a building, but not within a room, and to which access is only by way of a protected door from which there is an exit directly to an unenclosed safe area beyond the premises.
Risk	The potential for a fire to occur (likelihood) and cause death or injury (consequence).
Semi-enclosed car park	A building or part of a building that is naturally ventilated and accommodating passenger or light goods vehicles.
Smoke control system	A type of ventilation system that either provides permanent ventilation or automatically activates or switches into a fire mode operation in order to reduce smoke in escape routes. Examples are: natural smoke venting, smoke control function in air handling systems, mechanical extraction, and pressurisation systems for protected zones.
Unprotected zone	That part of an escape route which is separated by walls, glazed screens or any other permanent form of demarcation from any space intended for human occupation, including a protected zone.
Voice alarm system	A method that provides the means for automatically broadcasting a speech message and warning signal.
Young person	Any person who has not attained the age of 18.

Reference Material

1. Fire (Scotland) Act 2005: Part 3, as amended

2. Fire legislation website: www.infoscotland.com/firelaw

3. Building (Scotland) Regulations 2004

4. Scottish Building Standards Technical Handbook for Non-Domestic Buildings

5. Practical Fire Safety Guidance: The Evacuation of Disabled Persons from Buildings

6. Dangerous Substances and Explosive Atmospheres Regulations 2002 (www.hse.gov.uk/fireandexplosion/dsear.htm)

7. Guidance on smoking policies (www.clearingtheairscotland.com)

8. Historic Scotland Technical Advice Notes:

   TAN 11 Fire Protection Measures in Scottish Historic Buildings
   TAN 14 The Installation of Sprinkler Systems in Historic Buildings
   TAN 22 Fire Risk Management in Heritage Buildings
   TAN 28 Fire Safety Management in Heritage Buildings

9. British Standards: British Standards Institution (www.bsi-global.com). The dates quoted below are those at the time of publication.

   British Standard EN 179 Building hardware. Emergency exit devices operated by a lever handle or push pad. Requirements and test methods

   British Standard EN 1125: 1997 Building hardware. Panic exit devices operated by a horizontal bar. Requirements and test methods

   British Standard EN 1154: 1997 Building hardware. Controlled door closing devices. Requirements and test methods

   British Standard EN 1155: 1997 Building hardware. Electrically powered hold open devices for swing doors. Requirements and test methods

   British Standard EN 1634: Part 1: 2000 Fire-resistance tests for door and shutter assemblies. Fire doors and shutters

   British Standard EN 12845: 2004 Fire-fighting systems; Automatic sprinkler systems: Design, Installation and maintenance

   British Standard EN 13823: 2002 Reaction to fire tests for building products. Building products excluding floorings exposed to the thermal attack by a single burning item

   British Standard EN ISO 11925: Part 2: 2002 Reaction to fire tests. Ignitability of building products subjected to direct impingement of flame. Single-flame source test

   British Standard 476: Part 4: 1970 Fire tests on building materials and structures. Non-combustibility test for materials

British Standard 476: Part 6: 1989 Fire tests on building materials and structures. Method of test for fire propagation for products

British Standard 476: Part 7: 1997 Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products

British Standard 476: Part 11: 1982 Fire tests on building materials and structures. Method for assessing the heat emission from building materials

British Standard 476: Part 22: 1987 Fire tests on building materials and structures. Methods for determination of the fire-resistance of non-loadbearing elements of construction

British Standard 5266: Part 1: 2005 Emergency lighting. Code of practice for the emergency lighting of premises

British Standard 5266: Part 7: 1999 (BS EN 1838: 1999) Lighting applications. Emergency lighting

British Standards 5266: Part 8: 2004 Emergency escape lighting systems (BS EN 50172: 2004)

British Standard 5306: Part 0: 1986 Fire extinguishing installations and equipment on premises. Guide for the selection of installed systems and other fire equipment

British Standard 5306: Part 2: 1990 Fire extinguishing installations and equipment on premises. Specification for sprinkler systems

British Standard 5306: Part 4: 2001 Fire extinguishing installations and equipment on premises. Specification for carbon dioxide systems

British Standard 5306: Part 6: Section 6.1: 1988 Fire extinguishing installations and equipment on premises. Foam systems. Specification for low expansion foam systems

British Standard 5306: Part 6: Section 6.2: 1989 Fire extinguishing installations and equipment on premises. Foam systems. Specification for medium and high expansion foam systems

British Standard 5306: Part 7: 1988 Fire extinguishing installations and equipment on premises. Specification for powder systems

British Standard 5306: Part 8: 2000 Fire extinguishing installations and equipment on premises. Selection and installation of portable fire extinguishers. Code of practice

British Standard 5499: Part 4: 2000 Safety signs, including fire safety signs. Code of practice for escape route signing

British Standard 5499: Part 5: 2002 Signs with specific safety meanings

British Standard 5588: Part 9: 1999 Fire precautions in the design construction and use of buildings – Part 9: Code of practice for ventilation and air conditioning ductwork

British Standards 5839: Part 1: 2002 Fire detection and alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance

British Standard 5839: Part 3: 1988 Fire detection and alarm systems for buildings. Specification for automatic release mechanisms for certain fire protection equipment

British Standard 5839: Part 8: 1998 Fire detection and fire alarm systems for buildings. Code of practice for the design, installation, commissioning, and maintenance of voice alarm systems

British Standard 7036: 1996 Code of practice for safety at powered doors for pedestrian use

British Standard 7273: Part 4: 2007 Code of practice for the operation of fire protection measures. Actuation of release mechanisms for doors