Unit 6 Emergency Escape Routes

Learning Outcomes
By the end of this unit the learner will be able to:
✓ Determine the appropriateness of an emergency escape route in a workplace setting ✓ Identify when and where an emergency escape route may need to be improved ✓ Understand the factors that may compromise the effectiveness of an emergency escape route

Unit 6

Emergency Escape Routes

Once a fire has started, been detected and a warning given, everyone in your premises should be able to escape to a place of total safety unaided and without the help of the fire and rescue service. However, some people with disabilities and others with special needs may need help from staff who will need to be designated for the purpose.

Escape routes should be designed to ensure, as far as possible, that any person confronted by fire anywhere in the building, should be able to turn away from it and escape to a place of reasonable safety, e.g. a protected stairway. From there they will be able to go directly to a place of total safety away from the building.

In offices those who require special assistance (e.g. very young children in a creche and some people with disabilities) could be accommodated on the same level as the final exit from the premises to facilitate escape. Where they need assistance
to evacuate, you should make sure that there are sufficient staff to ensure a speedy evacuation.

The level of fire protection that should be given to escape routes will vary depending on the level of risk of fire within the premises and other related factors. Generally, premises that are simple, consisting of a single storey, will require fairly simple measures to protect the escape routes, compared to a large multi-storey building, which would require a more complex and inter-related system of fire precautions.

When determining whether your premises have adequate escape routes, you need to consider a number of factors, including:

- the type and number of people using the premises;
- escape time;
- the age and construction of the premises;
- the number and complexity of escape routes and exits;
- whether lifts can or need to be used;
- the use of phased or delayed alarm evacuation; and
- assisted means of escape/personal evacuation plans (PEEPS).

The type and Number of People using the Premises

The people present in your premises will sometimes just be employees, but most of the time will be a mixture of employees and members of the public. Employees can reasonably be expected to have an understanding of the layout of the premises, while members of the public will be unlikely to have knowledge of alternative escape routes.

The number and capability of people present will influence your assessment of the escape routes. You must ensure that your existing escape routes are sufficient and capable of safely evacuating all the people likely to use your premises at any time, including events such as sales. If necessary you may need either to increase the capacity of the escape routes or restrict the number of people in the premises.

Escape Time

In the event of a fire, it is important to evacuate people as quickly as possible from the premises. Escape routes in a building should be designed so that people can escape quickly enough to ensure they are not placed in any danger from fire. The time available will depend on a number of factors, including how quickly the fire is detected and the alarm raised, the number of escape routes available, the nature of the occupants and the speed of fire growth.

The age and Construction of the Premises

Older buildings may comprise different construction materials from newer buildings, and may be in a poorer state of repair. The materials from which your premises are constructed and the quality of building work and state of repair could contribute to the speed with which any fire may spread, and potentially affect the escape routes the occupants will need to use. A fire starting in a building constructed mainly from combustible material will spread faster than one where fire-resisting construction materials have been used.

If you wish to construct internal partitions or walls in your premises, perhaps to create a sales area or to divide up an office area, you should ensure that any new partition or wall does not obstruct any escape routes or fire exits, extend travel distances or reduce the sound levels of the fire alarm system. Any walls that affect the means of escape should be constructed of appropriate material.

Depending on the findings of your fire risk assessment, it may be necessary to protect the escape routes against fire and smoke by upgrading the construction of the floors, ceiling and walls to a fire-resisting standard. You should avoid having combustible wall and ceiling linings in your escape routes.

The Number of Escape Routes and Exits

In general there should normally be at least two escape routes from all parts of the premises but a single escape route may be acceptable in some circumstances (e.g. part of your premises accommodating less than 60 people or where travel distances are limited).

Where two escape routes are necessary and to further minimise the risk of people becoming trapped, you should ensure that the escape routes are completely independent of each other. This will prevent a fire affecting more than one escape route at the same time.

When evaluating escape routes, you may need to build in a safety factor by discounting the largest exit from your escape plan, then determine whether the remaining escape routes from a room, floor or building will be sufficient to evacuate all the occupants within a reasonable time. Escape routes that provide escape in a single direction only may need additional fire precautions to be regarded as adequate.

Exit doors on escape routes and final exit doors should normally open in the direction of travel, and be quickly and easily openable without the need for a key. Checks should be made to ensure final exits are wide enough to accommodate the number of people who may use the escape routes they serve.

Management of Escape Routes

It is essential that escape routes, and the means provided to ensure they are used safely, are managed and maintained to ensure that they remain usable and available at all times when the premises are occupied. Inform staff in training sessions about the escape routes within the premises.

Figure 7.1: A blocked corridor with incorrect signage

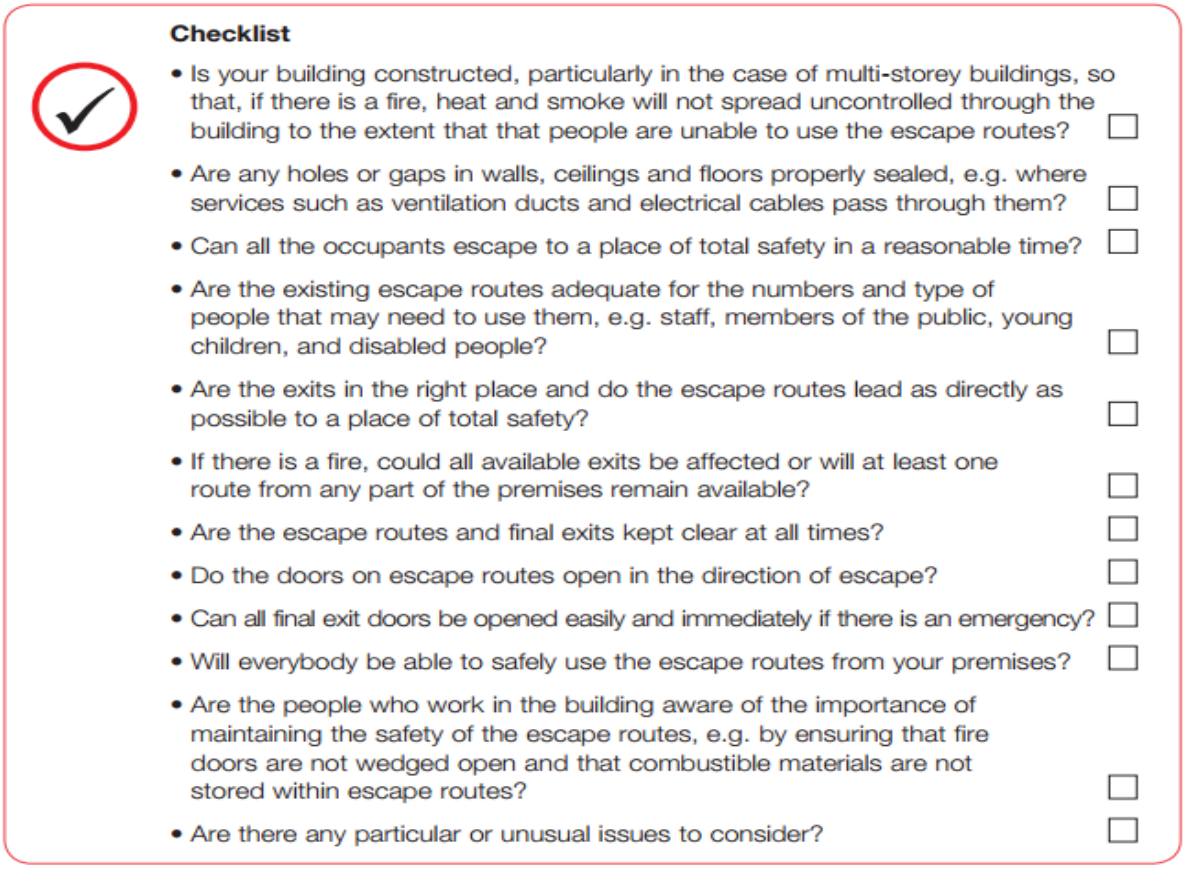
Corridors and stairways that form part of escape routes should be kept clear and hazard free at all times. Items that may be a source of fuel or pose an ignition risk should not normally be located on any corridor or stairway that will be used as an escape route.

Emergency Evacuation of Persons with Mobility Impairment

The means of escape you provide must be suitable for the evacuation of everyone likely to be in your premises. This may require additional planning and allocation of staff roles – with appropriate training. Provsions for the emergency evacuation of disabled persons may include:

- stairways;
- evacuation lifts;
- firefighting lifts;
- horizontal evacuation;
- refuges; and
- ramps.

Use of these facilities will need to be linked to effective management arrangements as part of your emergency plan. The plan should not rely on fire and rescue service involvement for it to be effective.



Checklist

- Is your building constructed, particularly in the case of multi-storey buildings, so that, if there is a fire, heat and smoke will not spread uncontrolled through the building to the extent that that people are unable to use the escape routes? ☐
- Are any holes or gaps in walls, ceilings and floors properly sealed, e.g. where services such as ventilation ducts and electrical cables pass through them? ☐
- Can all the occupants escape to a place of total safety in a reasonable time? ☐
- Are the existing escape routes adequate for the numbers and type of people that may need to use them, e.g. staff, members of the public, young children, and disabled people? ☐
- Are the exits in the right place and do the escape routes lead as directly as possible to a place of total safety? ☐
- If there is a fire, could all available exits be affected or will at least one route from any part of the premises remain available? ☐
- Are the escape routes and final exits kept clear at all times? ☐
- Do the doors on escape routes open in the direction of escape? ☐
- Can all final exit doors be opened easily and immediately if there is an emergency? ☐
- Will everybody be able to safely use the escape routes from your premises? ☐
- Are the people who work in the building aware of the importance of maintaining the safety of the escape routes, e.g. by ensuring that fire doors are not wedged open and that combustible materials are not stored within escape routes? ☐
- Are there any particular or unusual issues to consider? ☐

Checklist

- Is your building constructed, particularly in the case of multi-storey buildings, so that, if there is a fire, heat and smoke will not spread uncontrolled through the building to the extent that that people are unable to use the escape routes?
- Are any holes or gaps in walls, ceilings and floors properly sealed, e.g. where services such as ventilation ducts and electrical cables pass through them?
- Can all the occupants escape to a place of total safety in a reasonable time?
- Are the existing escape routes adequate for the numbers and type of people that may need to use them, e.g. staff, members of the public, young children, and disabled people?
- Are the exits in the right place and do the escape routes lead as directly as possible to a place of total safety?
- If there is a fire, could all available exits be affected or will at least one route from any part of the premises remain available?
- Are the escape routes and final exits kept clear at all times?
- Do the doors on escape routes open in the direction of escape?
- Can all final exit doors be opened easily and immediately if there is an emergency?
- Will everybody be able to safely use the escape routes from your premises?
- Are the people who work in the building aware of the importance of maintaining the safety of the escape routes, e.g. by ensuring that fire doors are not wedged open and that combustible materials are not stored within escape routes?
- Are there any particular or unusual issues to consider?

General Principles

Suitability of Escape Routes

You should ensure that your escape routes are:

- suitable;
- easily, safely and immediately usable at all relevant times;
- adequate for the number of people likely to use them;
- free from any obstructions, slip or trip hazards; and
- available for access by the emergency services.

In multi-occupied premises, escape routes should normally be independent of other occupiers, i.e. people should not have to go through another occupier's premises as the route may be secured or obstructed. Where this is not possible, then robust legal agreements should be in place to ensure their availability at all times.

All doors on escape routes should open in the direction of escape and ideally be fitted with a safety vision panel. This is particularly important if more than 60 people use them or they provide an exit from an area of high fire risk.

At least two exits should be provided if a room/area is to be occupied by more than 60 persons. This number of 60 can be varied in proportion to the risk; for a lower risk there can be a slight increase, for a higher risk, lower numbers of persons should be allowed.

Movement of persons up or down a group of not less than three steps will be so obvious to those following that they will be prepared for the change in level, but movement up or down one step is not so readily observed and may easily lead to a fall. Wherever practicable, differences of level in corridors, passages and lobbies should be overcome by the provision of inclines or ramps of gradients not exceeding 1 in 12 or steps not having less than three risers in any flight. Corridors and passages should be level for a distance of 1.5 metres in each direction from any steps.

Any mirrors situated in escape routes should be sited so that persons escaping from a fire will not be thrown into confusion by any reflected image of the route they are using, or be misled as to the direction they should take to reach fire exits While not normally acceptable, the use of ladders, floor hatches, wall hatches or window exits may be suitable for small numbers of able-bodied, trained staff in exceptional circumstances.

Fire-resisting Construction

The type and age of construction are crucial factors to consider when assessing the adequacy of the existing escape routes. To ensure the safety of people it may be necessary to protect escape routes from the effects of a fire. In older premises (see Appendix C for more information on historical properties) it is possible that the type of construction and materials used may not perform to current fire standards. Also changes of occupier and refurbishment may have led to:

- cavities and voids being created, allowing the potential for a fire to spread unseen;

- doors and hardware worn by age and movement being less likely to limit the spread of smoke;
- damaged or lack of cavity barriers in modular construction; and
- breaches in fire compartment walls, floors and ceilings created by the installation of new services, e.g. computer cabling.

Where an escape route needs to be separated from the rest of the premises by fire-resisting construction, e.g. a dead-end corridor or protected stairway (see Figures 31 and 35 on pages 74 and 78 respectively), then you should ensure the following:

- Doors (including access hatches to cupboards, ducts and vertical shafts linking floors) walls, floors and ceilings protecting escape routes should be capable of resisting the passage of smoke and fire for long enough so that people can escape from the building.
- Where suspended or false ceilings are provided, the fire resistance should extend up to the floor slab level above. For means of escape purposes a 30 minutes fire-resisting rating is normally enough.
- Cavity barriers, fire stopping and dampers in ducts are appropriately installed.

If there is any doubt about the nature of the construction of your premises, ask for advice from a competent person.

Number of people using the Premises

As your escape routes need to be adequate for the people likely to use them you will need to consider how many people, including employees and the public, may be present at any one time. Where premises have been subject to building regulations approval for use as either an office or a shop, the number and width of escape routes and exits will normally be enough for the anticipated number of people using the building. In such buildings where the risk has changed or buildings were constructed before national Building Regulations it is still necessary to confirm the provision.

For offices, the maximum numbers of staff, visitors and contractors liable to be in the building at the same time will be known by the responsible person. For shops, the responsible person will normally be aware of the maximum number of people liable to be present from a personal knowledge of trading patterns. There will also be an appreciation of the use of the building by those with special needs, such as the disabled.

Mobility Impairment

Effective management arrangements need to be put in place for those that need help to escape.

Consider the following points:

- A refuge is a place of reasonable safety in which disabled people can wait either for an evacuation lift or for assistance up or down stairs (see Figure 23). Disabled people should not be left alone in a refuge area whilst waiting for assistance with evacuation from the building. Depending on the design and fire resistance of other elements, a refuge could be a lobby, corridor, part of a public area or stairway, or an open space

such as a flat roof, balcony or similar place which is sufficiently protected (or remote) from any fire risk and provided with its own means of escape and a means of communication.

- Where refuges are provided, they should be enclosed in a fire-resisting structure which creates a protected escape route which leads directly to a place of total safety and should only be used in conjunction with effective management rescue arrangements. Your fire safety strategy should not rely on the fire and rescue service rescuing people waiting in these refuges.
- If firefighting lifts (provided in high buildings as firefighting access) are to be used for evacuation, this should be co-ordinated with the fire and rescue service as part of the pre-planned evacuation procedures.
- Normal lifts may be considered suitable for fire evacuation purposes, subject to an
- adequate fire risk assessment and development of a suitable fire safety strategy by a competent person.
- Since evacuation lifts can fail, having reached a refuge a disabled person should also be able to gain access to a stairway (should conditions in the refuge become untenable). An evacuation lift with its associated refuge should therefore be located adjacent to a protected stairway.
- Enough escape routes should always be available for use by disabled people. This does not mean that every exit will need to be adapted. Staff should be aware of routes suitable for disabled people so that they can direct and help people accordingly.
- Stairways used for the emergency evacuation of disabled people should comply with
- the requirements for internal stairs in the building regulations. Specialist evacuation chairs or other equipment may be necessary to negotiate stairs.
- Plans should allow for the careful carrying of disabled people down stairs without their wheelchairs, should the wheelchair be too large or heavy. You will need to take into account health and safety manual handling procedures in addition to the dignity and confidence of the disabled person.
- Stairlifts should not be used for emergency evacuation. Where installed in a stairway used for emergency evacuation, no parts of the lift, such as its carriage rail, should be allowed to reduce the effective width of the stairway or any other part of an emergency evacuation route.
- Where ramps are necessary for the emergency evacuation of people in wheelchairs they should be as gentle as possible. Ramps should be constructed in accordance with Approved Document.

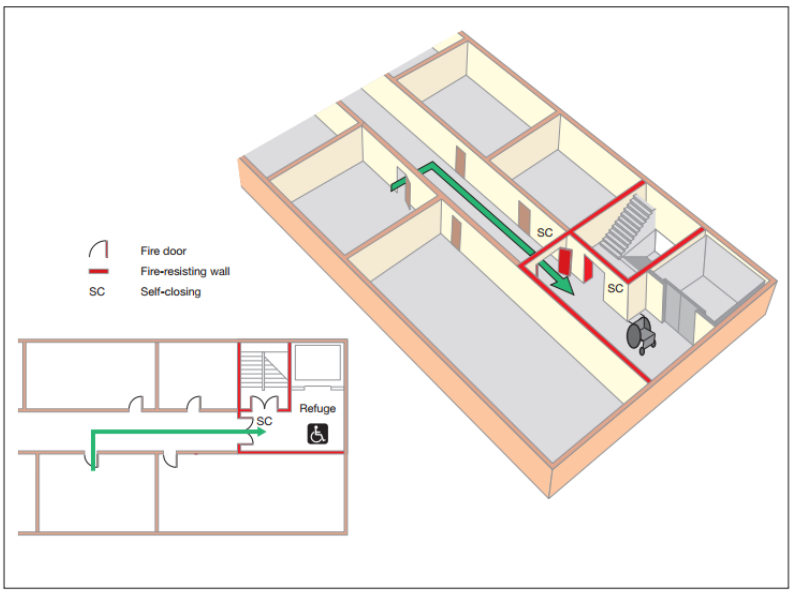


Figure 7.2: An example of refuge

Widths and Capacity of Escape Routes and Stairways

Once you have established the maximum number of people likely to be in any part of the premises, the next step is to establish that the capacity of the escape routes is adequate for people to escape safely in sufficient time to ensure their safety in case of fire.

The capacity of a route is determined by a number of factors including the width of the route, the time available for escape and the ability of the persons using them.

The effective usable width of an escape route is the narrowest point, normally a door or other restriction such as narrowing of a corridor due to fixtures and fittings. The capacity of an escape route is measured by the number of persons per minute that can pass through it, so to establish the capacity of the route, it is first necessary to measure the width of the route at the narrowest point. The effective width of a doorway is the clear unobstructed width through the doorway when the door is open at right angles to the frame. The effective width at any other point is the narrowest clear unobstructed width through which people can pass.

The time available for escape depends on several factors. Studies of human behaviour in an emergency situation have shown that about two thirds of the time available to escape is taken up by the initial reaction to the developing situation. For example, people will decide whether the situation is real or false, often waiting to see the reaction of people around them, and generally gathering information to decide whether to act or not. The final third is taken up by the actual movement away from the area of the fire. Throughout this time the fire may be growing and spreading. Therefore to account for the limited available time for people to travel to a place of reasonable safety, the length of escape routes needs to be restricted.

The following guide can be used to determine the general capacities of escape routes:
A width of at least 750mm can accommodate up to:

- 80 people in higher risk premises;
- 100 people in normal risk premises; or
- 120 people in lower risk premises.

- A width of at least 1050mm can accommodate up to:
- 160 people in higher risk premises;
- 200 people in normal risk premises; or
- 240 people in lower risk premises.

An additional 75mm should be allowed for each additional 15 persons (or part of 15).

Note: The minimum width of an escape route should not be less than 750mm (unless it is for use by less than five people in part of your premises) and, where wheelchair users are likely to use it, not less than 900mm.

The aggregate width of all the escape routes should be not less than that required to accommodate the maximum numbers of people likely to use them.

When calculating the overall available escape route capacity for premises that have more than one way out, you should normally assume that the widest is not available because it has been compromised by fire. If doors or other exits leading to escape routes are too close to one another you should consider whether the fire could affect both at the same time. If that is the case, it may be necessary to discount them both from your calculation.

As a general rule stairways should be at least 1050mm wide and in any case not less than the width of the escape routes that lead to them. In all cases the aggregate capacity of the stairways should be sufficient for the number of people likely to have to use them in case of fire.

Stairways wider than 2100mm should normally be devided into sections, each separated from the adjacent section by a handrail, so that each section measured between the handrails is not less than 1050mm wide.

Travel Distance

Having established the number and location of people and the exit capacity required to evacuate them safely, you now need to confirm that the number and location of existing exits is adequate. This normally determined by the distance people have to travel to reach them.

Table 7.1 gives guidance on travel distances.

It should be understood, however, that these distances are flexible and may be increased or decreased depending upon the level of risk after you have put in place the appropriate fire-prevention measures

In new buildings which have been designed and constructed in accordance with modern building standards the travel distances will already have been calculated. Once you have completed your fire risk assessment you need to confirm that those distances are still relevant. When assessing travel distances you need to consider the distance to be travelled by people when escaping, allowing for walking around furniture or display material etc. (see Figure 24). The distance should be measured from all parts of the premises (e.g. from the most remote part of an office or shop on any floor) to the nearest place of reasonable safety which is:

- a protected stairway enclosure (a storey exit);
- a separate fire compartment from which there is a final exit to a place of total safety;

or

- the nearest available final exit.

Table 7.1: Suggested travel distances

Escape routes	Suggested range of travel distance
Where more than one escape route is provided	25m in higher fire-risk area[1] 45m in normal fire-risk area 60m in lower fire-risk area[2]
Where only a single escape route is provided	12m in higher fire-risk area[1] 18m in normal fire-risk area 25m in lower fire-risk area[2]

Note 1:

Where there are small high-risk areas this travel distance should apply. Where the risk assessment indicates that the whole building is high- risk, ask advice from a competent person.

Note 2:

The travel distance for lower risk premises should only be applied in exceptional cases in the very lowest risk premises where densities are low, occupants are familiar with the premises, excellent visual awareness, and very limited combustibles.

Measuring Travel Distance

The figures that follow are schematic and are intended to represent part of a larger building.

The route taken through a room or space will be determinted by the layout of the contents e.g. work stations, aisle layout (Figure 7.2). It is good practice to ensure routes to the exits are kept as direct and short as possible. In a small room there may be only one exit but in a larger room or area there may be many exits.

In some cases where the contents are moved around or the space is liable to frequent change, e.g. in a storage area or where racking is moveable you should ensure that the exits, or the routes to them, do not become blocked or the length of the route is not significantly extended.

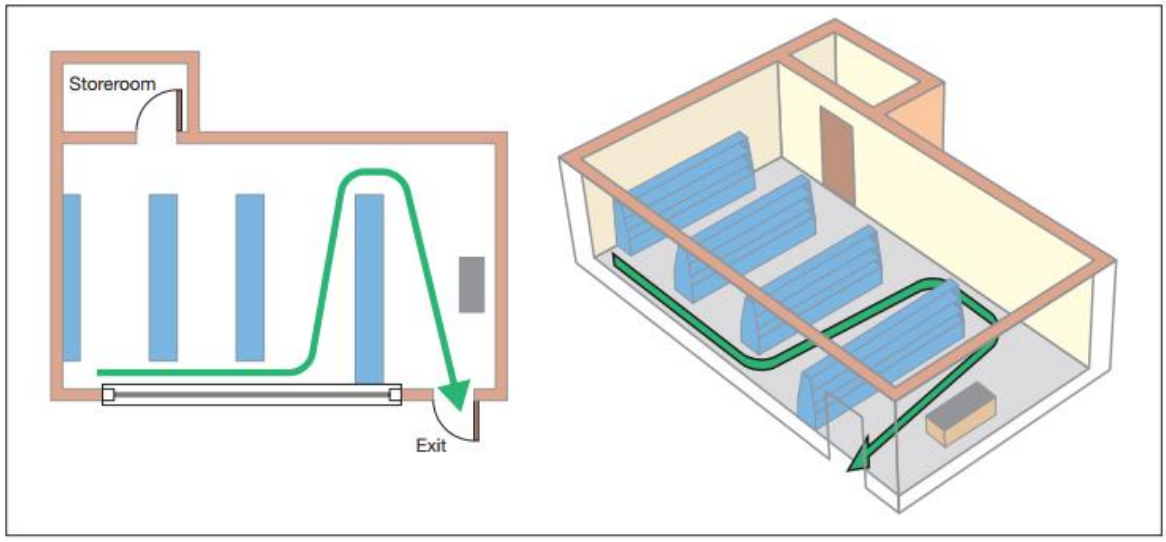


Figure 7.2 Measuring travel distance

Inner Rooms

Where the only way out of a room is through another room (Figure 7.3), an unnoticed fire in the outer room could trap people in the inner room. This means of exit should be avoided where possible. If, however, this cannot be achieved then adequate warning of a fire should be provided by any one of the following means:

- a vision panel between the two rooms providing adequate vision to give an indication of the conditions in the outer room and the means of escape;
- a large enough gap between the dividing wall and the ceiling, e.g. 500mm, so that smoke will be seen; or
- an automatic smoke detector in the outer room that will sound a warning in the inner room. In addition, the following points should also be considered:
- Restrict the number of people using an inner room to 60.
- Access rooms should be under the control of the same person as the inner room.
- The travel distance from any point in the inner room to the exit from the access room should be restricted to escape in one direction only (see Table 2 on page 68), unless there are alternative exits from the access room.
- No one should have to pass through more than one access room while making their escape.
- The outer room should not be an area of high fire risk.

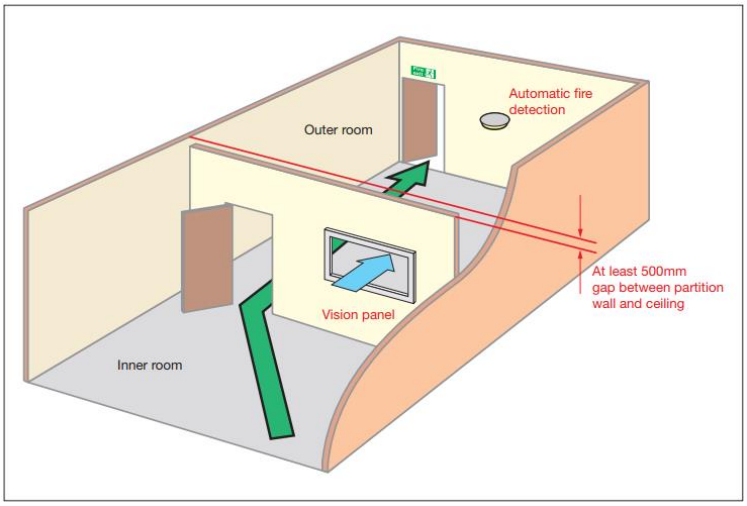


Figure: 7.3 Inner Rooms

Alternative Exits

Where alternative exits from a space or room are necessary, they should wherever possible be located at least 45° apart (see Figure 7.4) unless the routes to them are seperated by fire-resisting construction (see Figure 7.5). If in doubt consult a competent person.

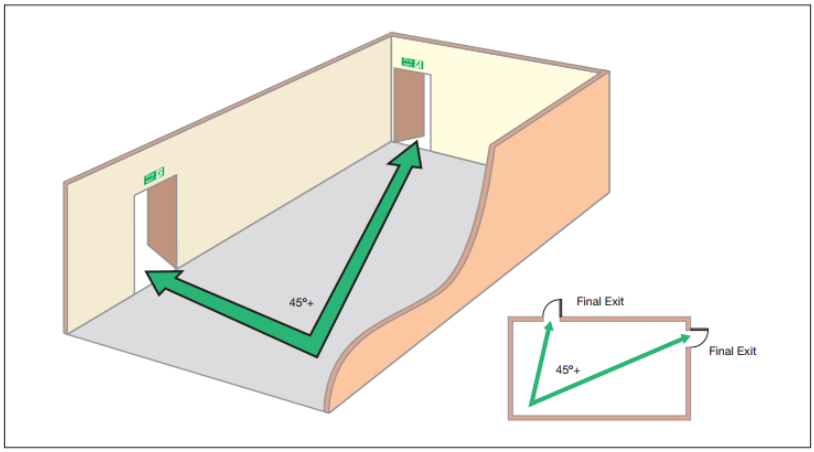


Figure 7.4 Alternative exits

Basement, Escape and Protection

Any floor over a basement should provide 60 minutes fire resistance. For smaller premises 30 minutes may be acceptable. Where this is impractical, and as long as no smoke can get through the floor, automatic smoke detection linked to a fire-alarm system which is audible throughout the premises could, as an alternative, be provided in the basement area. If in doubt, contact a competent person for more detailed advice.

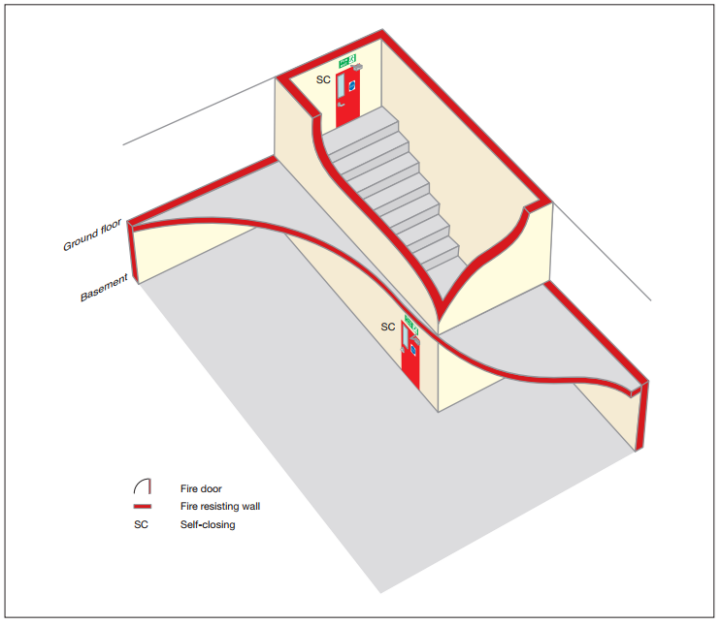


Figure 7.5 Basement Protection

Subdivision of Corridors

If your premises has corridors more than 30m long, then generally these corridors should be subdivided near the centre of the corridor with fire doors and, where necessary, fire-resisting construction to limit the spread of fire and smoke and to protect escape routes if there is a fire.

Stairway Enclosures

Stairways if unprotected from fire can rapidly become affected by heat and smoke cutting off the escape route and allowing fire to spread to other floors. However if adequately protected, escape stairways can be regarded as places of reasonable safety to enable people to escape to a place of total safety. In most premises which are served by more than one stairway, it is probable that these stairways will be protected by fire-resisting construction and will lead to a final exit. If any floor has an occupancy of over 60 each storey should have at least two exits i.e. protected routes. The figure of 60 can be varied in proportion to the risk, lower risk slight increase, higher risk lower numbers of persons.

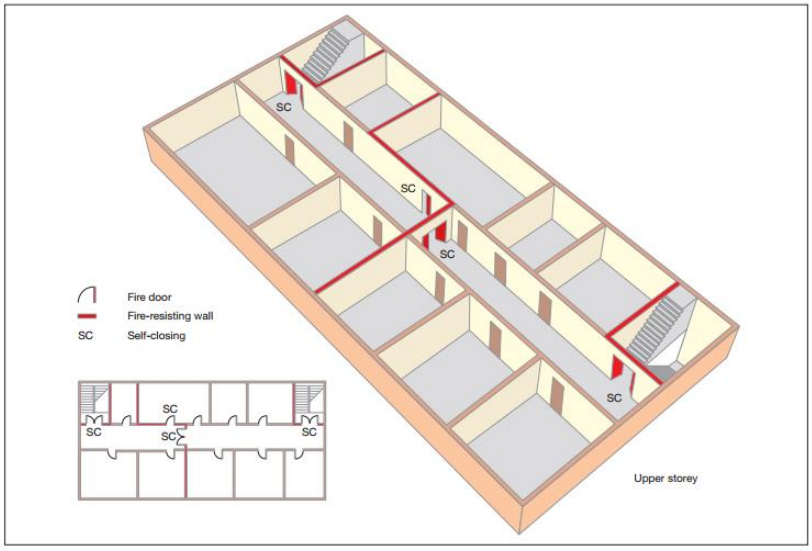


Figure 7.6 Subdivision of corridor between two stairways or exits

Reception Areas

Reception or enquiry areas should only be located in protected stairways where the stairway is not the only one serving the upper floors, the reception area is small (less than $10m^2$) and is of low fire risk.

Accommodation Stairways

If you have stairways that are used for general communication and movement of people in the premises, and they are not designated as fire escape stairs then these are called 'accommodation stairways'. They may not require fire separation from the remainder of the floor as long as they do not pass through a compartment floor, or people do not have to pass the head of such a stairway in order to access a means of escape stairway. However, experience shows that many people will continue to use these as an escape route.

Accommodation stairways, escalators and travelators should not normally form an integral part of the calculated escape route capacity, however, where your fire risk assessment indicates that it is safe to do so, then you may consider them for that purpose.

In these circumstances it may be necessary to seek advice from a competent person to verify this.

External Stairways

To be considered a viable escape route, an external stairway should normally be protected from the effects of a fire along its full length.
This means that any door, window (other than toilet windows) and walls within 1.8m horizontally and 9m vertically below any part of the stairway should be fire-resisting.
Windows should be fixed shut and doors self- closing gure .

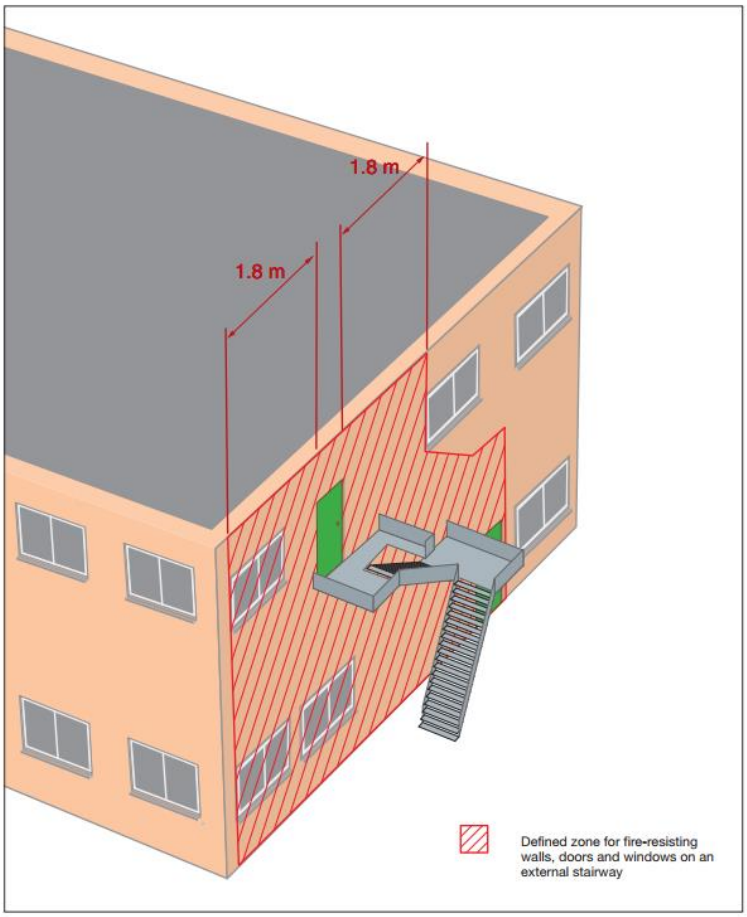


Figure 7.7: Protection to an external stairway

These should not normally be used for members of the public, particularly where large numbers are likely to use them.

Consider protecting the external stairway from the weather as the treads may become slippery, e.g. due to algae, moss or ice. If this is not possible, you must ensure that the stairway is regularly maintained. Consider fixing non-slip material to the treads.

Spiral and Helical Stairways

Spiral and helical stairways are usually acceptable only in exceptional situations, e.g. for a maximum of 50 people who are not members of the public. The stairway should not be more than 9m in total height and not less than 1.5m in diameter with adequate headroom. A handrail should be continuous throughout the full length of the stairway.

However, spiral and helical stairways may be used as means of escape by more than 50 staff and may be used by the public if the stairways have been designed for the purpose.

Lifts

Due to the danger of the power supplies to a lift being affected by a fire, lifts not specifically designed as 'firefighting' or 'evacuation' lifts are not normally considered acceptable as a means of escape. However, where a lift and stairway for a means of escape are incorporated in a fire-resisting shaft which has a final exit from it at the access level and the lift has a

separate electrical supply to that of the remainder of the building, than that lift subject to an agreed fire risk assessment, may be acceptable as a means of escape in case of fire.

Lifts are housed in vertical shafts that interconnect floors and compartments, therefore precautions have to be taken to protect people from the risk of fire and smoke spreading from floor to floor via the lift shaft.

Such precautions may include:

- separating the lift from the remainder of the storey using fire-resisting construction and access via a fire door;
- ensuring the lift shaft is situated in a protected enclosure which may also be a stairway enclosure; and
- providing ventilation of at least 0.1m2 at the top of each lift-well to exhaust any smoke.

Roof Exits

- It may be reasonable for an escape route to cross a roof. Where this is the case, additional precautions will normally be necessary:
- The roof should be flat and the route across it should be adequately defined and well-illuminated where necessary with normal electric and emergency escape lighting. The route should be non-slip and guarded with a protective barrier.
- The escape route across the roof and its supporting structure should be constructed as a fire-resisting floor.
- Where there are no alternatives other than to use a roof exit, any doors, windows, roof lights and ducting within 3m of the escape route should be fire-resisting.
- Where an escape route passes through or across another person's property, you will need to have a robust legal agreement in place to allow its use at all times when people are on your premises.
- The exit from the roof should be in, or lead to, a place of reasonable safety where people can quickly move to a place of total safety.

A typical escape route across a roof is illustrated in Figure 7.8.

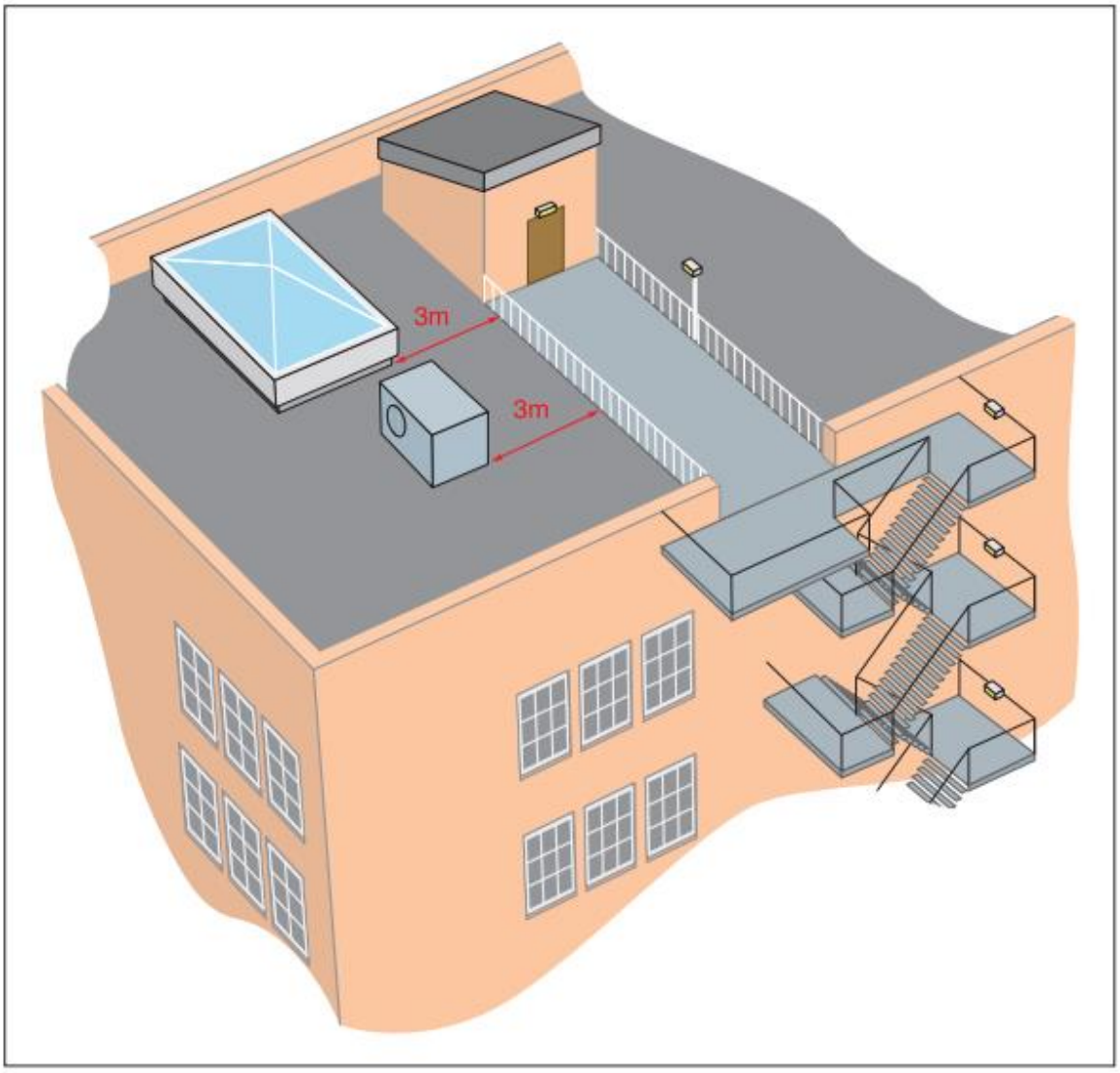


Figure 7.8: An escape route across a roof

External escape routes should receive routine inspection and maintenance to ensure they remain fit for use. You will need to ensure that any legal agreements in place cover access for maintenance of the escape route.

Further Reading:

- ✓ An Introduction to Fire Dynamics 3rd Edition, Kindle Edition by Dougal Drysdale ,2011
- ✓ Introduction to Fire Protection 4th Edition by Robert W. Klinoff 2011