Unit 4

Fire Safety Measures & Fire Prevention

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Understand the importance of proactive fire prevention and risk reduction
- ✓ Ensure dangerous materials and potentially hazardous substances are stored safely
- ✓ Discuss measures that can be taken to prevent the spread of smoke in a building

Unit 4

Fire Safety Measures & Fire Prevention

Good management of fire safety in your premises is essential to ensure that any fire safety matters that arise are always effectively addressed. In small premises this can be achieved by the manager or owner responsible for maintaining and planning fire safety in conjunction with general health and safety.

In larger premises, it is good practice for a senior manager to have overall responsibility for fire safety. It may be appropriate for this responsibility to be placed with the person designated with overall responsibility for health and safety.

An organisation's fire safety policy should be flexible enough to allow modification. It should be recognised that fire safety operates at all levels within an organisation and therefore those responsible for fire safety should be able to develop, where necessary, a local action plan for their premises.

The organisation's policy should be set out in writing and may cover such things as:

- who will hold the responsibility for fire safety at board level;
- who will be the responsible person for each of their premises (this will be the person who has overall control usually the manager);
- The arrangement whereby those responsible for fire safety will, where necessary, nominate in writing specific people to carry out particular tasks if there is a fire; and arrangements to monitor and check that individual persons responsible for fire safety are meeting the requirements of the fire safety law. You should have a plan of action to bring together all the features you have evaluated and noted from your fire risk assessment so that you can logically plan what needs to be done. It should not be confused with the emergency plan, which is a statement of what you will do if there is a fire.

The plan of action should include what you intend to do to reduce the hazards and risks you have identified and to implement the necessary protection measures.

You will need to prioritise these actions to ensure that any findings which identify people in immediate danger are dealt with straight away, e.g. unlocking fire exits. In other cases where people are not in immediate danger but action is still necessary, it may be acceptable to plan this over a period of time.

Before admitting the public to your premises you need to ensure that all of your fire safety provisions are in place and in working order, or, if not, that alternative arrangements are in place. Constant checks are needed while the public are present, and again after they have left.

- ensure good fire safety management by helping you establish your fire prevention measures, fire precautions and fire safety procedures (systems equipment and plans);

and

- assist you to carry out your fire safety risk assessment and identify any issues that need attention.

FireRisks and Preventative Measures

This section provides further information on evaluating the risk of a fire and its prevention in your premises. You should spend time developing long-term workable and effective strategies to reduce hazards and the risk of a fire starting. At its simplest this means separating flammable materials from ignition sources.

You should consider:

- housekeeping;
- storage;
- dangerous substances storage, display and use;
- equipment and machinery;
- electrical safety;
- smoking;
- managing building work and alterations;
- existing layout and construction;
- particular hazards in corridors and stairways used as escape routes;
- insulated core panels;
- restricting the spread of fire and smoke;
- fire-resisting structures;
- arson; and
- help for people with special needs.

Housekeeping

Good housekeeping will lower the chances of a fire starting, so the accumulation of combustible materials in all premises should be monitored carefully. Good housekeeping is essential to reduce the chances of escape routes and fire doors being blocked or obstructed.

Keep waste material in suitable containers before it is removed from the premises. If bins, particularly wheeled bins, are used outside, secure them in a compound to prevent them being moved to a position next to the building and set on fire. Never place skips against a building (Figure 4.1– they should normally be a minimum of 6m away from any part of the premises if you generate a considerable quantity of combustible waste material then you may need to develop a formal plan to manage this effectively.

In higher risk areas you need to make sure arrangements are in place for close down, e.g. checking all appliances are turned off and combustible waste has been removed.

Figure 4.1 *Bins under stairway (Courtesy of Cheshire fire and rescue service)*

Storage

Many of the materials found in your premises will be combustible. If your premises have inadequate or poorly managed storage areas then the risk of fire is likely to be increased (Figure 4.2). The more combustible materials you store the greater the source of fuel for a fire. Poorly arranged storage could prevent equipment such as sprinklers working effectively.

Combustible materials are not just those generally regarded as highly combustible, such as polystyrene, but all materials that will readily catch fire. However, by carefully considering the type of material, the quantities kept and the storage arrangements, the risks can be significantly reduced.

Figure: 4.2: *An example of poor storage*

In offices, the retention of large quantities of paper records, especially if not filed away in proprietary cabinets, can increase the fire hazard. Such readily available flammable material makes the potential effect of arson more serious.

Many shops will take great care to present an efficient and attractive image in the retail area, while other areas are neglected and allowed to become over-stocked or dumping areas for unsold material.

To reduce the risk, store excess materials and stock in a dedicated storage area, storeroom or cupboard. Do not store excess stock in areas where the public would normally have access.

Do not pile combustible material against electrical equipment or heaters, even if turned off for the summer, and do not allow smoking in areas where combustible materials are stored. Consider how stock is displayed in shops and evaluate any additional risk of fire that it

generates. For example, rugs stacked on the floor on top of each other would not present a high fire risk, but rolls of carpet stored vertically up against a wall or hung on displays present a vertical surface for fire to spread rapidly upwards. The display of large quantities of clothing on vertical hangers is also likely to increase the risk of rapid fire development.

Your fire risk assessment should also consider any additional risk generated by seasonal products such as fireworks and Christmas decorations.

Consider the following to reduce these risks:

- Ensure storage and display areas are adequately controlled and monitored;
- Use fire-resistant display materials wherever possible (suppliers should be able to provide evidence of this); and
- Ensure electrical lighting used as part of the display does not become a potential source of ignition.

Voids

Voids (including roof voids) should not be used for the storage of combustible material. Such voids should be sealed off or kept entirely open to allow for easy access for inspection and the removal of combustible materials.

Combustible Waste and Packaging

Delivery of some goods results in large quantities of combustible waste and packaging. The sighting use and removal of these materials needs to be carefully managed to ensure that they cannot come into contact with potential ignition sources and to not cause obstructions.

Dangerous Substances: Storage, Display and Use

Specific precautions are required when handling and storing dangerous substances to oxidizing the possibility of an incident. Your supplier should be able to provide detailed advice on safe storage and handling, however, the following principles will help you reduce the risk from fire:

- Substitute highly flammable substances and materials with less flammable ones;
- Reduce the quantity of dangerous substances to the smallest reasonable amount necessary for running the business;
- Correctly store dangerous substances, e.g. in a fire-resisting enclosure. All flammable liquids and gases should ideally be locked away, especially when the premises are unoccupied, to reduce the chance of them being used in an arson attack; and
- Ensure that you and your employees are aware of the fire risk the dangerous substances present and the precautions necessary to avoid danger.

Additional general fire precautions may be needed to take account of the additional risks that may be posed by the storage and use of these substances.

Certain substances and materials are by their nature, highly flammable, potentially explosive. These substances are controlled by other legislation in addition to fire safety law, in particular the Dangerous Substances and Explosive Atmospheres Regulations2002.

Figure: 4.3: *A fire-resisting pedal bin for rags*

Flammable Liquids

Highly flammable liquids present a particularly high fire risk. For example, a leak from a container of flammable solvents, such as methylated spirit, will produce large quantities of heavier-than-air flammable vapours. These can travel large distances, increasing the likelihood of their reaching a source of ignition well away from the original leak, such as a basement containing heating plant and/or electrical equipment on automatic timers.

The risk is reduced by ensuring the storage and use of highly flammable liquids is carefully managed, that materials contaminated with solvent are properly disposed of (Figure 4.3) and when not in use, they are safely stored.

Up to 50 litres may be stored in a fire-resisting cabinet or bin that will contain any leaks (Figure 4.4).

In retail premises the quantity of flammable liquids on display should be kept to the minimum to meet business needs.

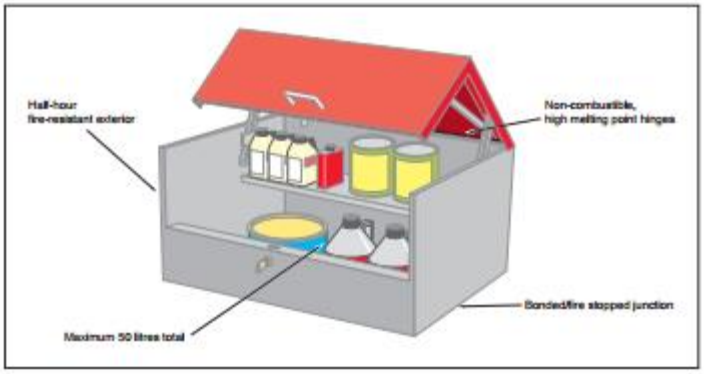

Figure 4.4: *A 50 litre storage bin for flammables*

There should be no potential ignition sources in areas where flammable liquids are used or stored and flammable concentrations of vapours may be present. Any electrical equipment used in these areas, including fire alarm and emergency lighting systems, needs to be suitable for use in flammable atmospheres. In such situations, it is recommended that you should seek advice from a competent person.

LPG Storage

Where LPG in cylinders or cartridges is present, you need to take particular care to minimise the possibility of its involvement in a fire. The total amount of LPG for display or demonstration in retail areas should be kept to the minimum necessary to meet business needs. In no circumstances should it exceed 70kg and this should be reduced to 15kg if the retail premises are under residential accommodation or part of a multi-use building, unless the two are separated by a substantial partition that is imperforate and provides at least 60 minutes fire resistance.

Locate cylinders and cartridges in a safe and secure place where they:

- cannot be interfered with;
- can be kept upright (with valve protection fitted);
- are away from sources of ignition and/or readily ignitable materials;
- are away from any corrosive, toxic or oxidant materials; and;
- are away from stairways, exit doors and places where they may obstruct the means of escape.

Quantities of LPG in excess of the amounts indicated for retail areas should be stored in a properly designed and located storage area that is dedicated for LPG. Bulk storage tanks for LPG should be designed, installed and located in accordance with industry guidance.

Further guidance on the safe storage of LPG is available from your supplier or the Liquefied Petroleum Gas Association's Code of Practice.

Fireworks

Fireworks can cause fires and explosions in shops. They have the potential for a violent release of pressure and heat that can cause severe harm to people and damage to a building.

Fireworks can be ignited or detonated by contact with ignition sources or by contamination, where other chemicals or water cause the material to become unstable.

If you sell fireworks you have certain obligations to the public and your staff. You must:

- be 'registered' or obtain a licence to store fireworks;
- obtain a 'licence to sell fireworks' if you intend to sell outside the usual fireworks period;
- store fireworks safely;
- not sell fireworks to under 18s; and
- review your risk assessment and, where necessary, take additional measures.

Preventative measures include:

- store and display fireworks in appropriate containers, display cabinets;
- keep all fireworks in a dry place;
- do not store an excessive amount of fireworks either in the shop or stockroom and do not store more than your licence permits;
- do not store the fireworks near other articles that could spread the fire;
- do not store fireworks near an escape route;
- exclude sources of ignition and in particular, stop people smoking anywhere near the fireworks; and
- avoid all unnecessary handling of fireworks;

Aerosols

Some aerosols can contain flammable products stored at pressure and they can present a high level of hazard. When ignited they can explode, produce fireballs and rocket to distances of 40m. Their presence in premises can make it unsafe for firefighters to enter a building and they have the potential for starting multiple fires.

The following should be considered to reduce these risks:

- All staff involved in the movement, storage and display of aerosol cans should be adequately instructed, trained and supervised.
- Damaged and leaking aerosol cans should be removed immediately to a safe, secure, well ventilated place prior to disposal. Powered vehicles should not be used to move damaged stock, unless specially adapted for use in flammable atmospheres. Arrangements should be made for disposal at a licenced waste management facility.

Equipment and Machinery

Common causes of fire in equipment are:

- allowing ventilation points to become clogged or blocked, causing overheating;
- inadequate cleaning of heat-shrink packaging equipment, such as that used in in-store

bakeries;
- allowing extraction equipment in catering environments to build up excessive grease deposits;
- misuse or lack of maintenance of cooking equipment and appliances; and
- disabling or interfering with automatic or manual safety features and cut-outs.

All machinery, apparatus and office equipment should be properly maintained by a competent person. Appropriate signs and instructions on safe use may be necessary. Heating Individual heating appliances require particular care if they are to be used safely, particularly those which are kept for emergency use during a power cut or as supplementary heating during severe weather. The greatest risks arise from lack of maintenance and staff unfamiliarity with them. Heaters should preferably be secured in position when in use and fitted with a fire guard if appropriate.

As a general rule, convector or fan heaters should be preferred to radiant heaters because they present a lower risk of fire and injury.

The following rules should be observed:

- All heaters should be kept well clear of combustible materials and where they do not cause an obstruction.
- Heaters which burn a fuel should be sited away from draughts.
- Portable fuel burning heaters (including bottled gas (LPG)) should only be used in exceptional circumstances and if shown to be acceptable in your risk assessment.

All gas heating appliances should be used only in accordance with manufacturer's instructions and should be serviced annually by a competent person.

In general, staff should be discouraged from bringing in their own portable heaters and other electrical equipment (e.g. kettles) into the premises.

Cooking Processes

Typical installations used in cooking processes include deep fat fryers, ovens, grills, surface cookers, ductwork, flues, filters, hoods, extract and ventilation ducts and dampers.

These cooking processes can operate with high temperatures, involving large quantities of oil and combustible food stuffs. Heat sources used for cooking processes include: gas, electric and microwave. The main cause of fire are ignition of cooking oil, combustion of crumbs and sediment deposits, and ductwork fires from a build up of fats and grease.

The siting of cooking processes close to insulated core panels with combustible insulation can lead to the likely ignition of the panels and consequent rapid fire spread to other parts of the building. This practice should therefore be avoided.

The following should be considered to reduce the risk from cooking processes:

- regular cleaning to prevent build-up of crumbs and other combustible material;
- fire resisting containers for waste products;
- a fire suppression system capable of controlling an outbreak of fire;
- monitored heat/oil levels, even after the cooking process is complete and installation

of temperature control/cut-off/ shut off devices as appropriate;
- duct, joints and supports able to withstand high cooking temperatures;
- seperation from wall and ceiling panels (with combustible insulation) e.g. 2.5m for walls, 4m for ceilings;
- insulation of ducts to prevent heating/ignition of nearby combustible wall and ceiling materials;
- a regular programme for inspection and cleaning;
- a programme of electrical and mechanical maintenance; and
- annual service of all gas heating appliances by a competent person.

Electrical Safety

Electrical equipment can be a significant cause of accidental fires in shops and offices. The main causes are:

- overheating cables and equipment, e.g. due to overloading circuits, bunched or coiled cables or impaired cooling fans;
- incorrect installation or use of equipment;
- little or no maintenance and testing of equipment;
- incorrect fuse ratings;
- damaged or inadequate insulation on cables or wiring;
- combustible materials being placed too close to electrical equipment which may give off heat even when operating normally or may become hot due to a fault;
- arcing or sparking by electrical equipment; and
- embrittlement and cracking of cable sheathing in cold environments. All electrical equipment should be installed and maintained in a safe manner by a competent person. If portable electrical equipment is used, including items brought into a workplace by staff, then your fire risk assessment should ensure that it visually inspected and undergoes portable appliance testing ('PAT') at intervals suitable for the type of equipment and its frequency of use. If you have any doubt about the safety of your electrical installation then you should consult a competent electrician.
- Issues to consider include:
- overloading of equipment;
- correct fuse ratings;
- PAT testing and testing of fixed installations;
- protection against overloading of installation;
- protection against short circuit;
- insulation, earthing and electrical isolation requirements;
- frequency of electrical inspection and test;
- temperature rating and mechanical strength of flexible cables;
- portable electrical equipment;
- physical environment in which the equipment is used (e.g. wet or dusty atmospheres); and
- suitable use and maintenance of personal protective equipment.

All electrical installations should be regularly inspected by a competent electrical engineer appointed by you, or on your behalf, in accordance with the Electricity at Work Regulations 1989

(EAW Regulations). The use of low voltage equipment should conform to the requirements of the Electrical Equipment (Safety) Regulations 1994, including the requirement to be CE marked.

Smoking

Carelessly discarded cigarettes and other smoking materials are a major cause of fire. A cigarette can smoulder for several hours, especially when surrounded by combustible material. Many fires are started several hours after the smoking materials have been emptied into waste bags and left for future disposal.
Consider prohibiting smoking in your premises other than in the designated smoking areas. Display suitable signs throughout the premises informing people of the smoking policy and the locations where smoking is permitted.

In those areas where smoking is permitted, provide non-combustible deep and substantial ashtrays to help prevent unsuitable containers being used. Empty all ashtrays daily into a metal waste bin and take it outside. It is dangerous to empty ashtrays into plastic waste sacks which are then left inside for disposal later.

Managing building Work and Alterations

Fires are more frequent when buildings are undergoing refurbishment or alteration.

You should ensure that, before any building work starts, you have reviewed the fire risk assessment and considered what additional dangers are likely to be introduced. You will need to evaluate the additional risks to people, particularly in those buildings that continue to be occupied. Lack of pre-planning can lead to haphazard co-ordination of fire safety measures.

You should liaise and exchange information with contractors who will also have a duty under the Construction (Health, Safety and Welfare) Regulations 1996 to carry out a risk assessment and inform you of their significant findings and the preventive measures they may employ. This may be supported by the contractors' agreed work method statement. The designer should also have considered fire safety as part of the Construction (Design and Management) Regulations 1994 (the CDM Regulations).

You should continuously monitor the impact of the building work on the general fire safety precautions, such as the increased risk from quantities of combustible materials and accumulated waste and maintaining adequate means of escape. You should only allow the minimum materials necessary for the work in hand within or adjacent to your building.

Additional risks can include:

- hot work such as flame cutting, welding, soldering, or paint stripping;
- temporary electrical equipment;
- blocking of escape routes, including external escape routes;
- introduction of combustibles into an escape route;
- loss of normal storage facilities;
- fire safety equipment, such as automatic fire-detection systems becoming affected;
- fire-resisting partitions being breached or fire doors being wedged open (see Appendix B1 for information on fire-resisting separation); and

- additional personnel who may be unfamiliar with the premises.

Activities such as welding, flame cutting, use of blow lamps or portable grinding equipment can pose a serious fire hazard and need to be strictly controlled when carried out in areas near flammable materials. This can be done by having a written permit to work for the people involved (whether they are your employees or those of the contractor).

A permit to work is appropriate in situations of high hazard/risk and, for example, where there is a need to:

- ensure that there is a formal check confirming that a safe system of work is being followed;
- co-ordinate with other people or activities;
- provide time-limits when it is safe to carry out the work; and
- provide specialised personal protective equipment (such as breathing apparatus) or methods of communication.

You must notify the fire and rescue service about alterations in your premises if an alterations notice is in force.

Existing Layout and Construction

In many shops, and increasingly in offices, the design is for open-plan areas allowing customers and employees to move freely throughout the floor.
Traditionally, occupants are advised to shut doors when escaping from a fire but in open- plan areas there are few doors to shut. In these areas the fire, and especially the smoke, may spread faster than expected.

To assess the risk in your premises you need to evaluate the construction and layout of your premises. This does not mean a structural survey, unless you suspect that the structure is damaged or any structural fire protection is missing or damaged, but rather an informed look around to see if there are any easy paths through which smoke and fire may spread and what you can do to stop that. In general, older buildings will have more void areas, possibly hidden from view, which will allow smoke and fire to spread away from its source. Whatever your type of building, you may need to consider typical situations that may assist the spread of fire and smoke such as:

- vertical shafts, e.g. lifts, open stairways, dumb waiters or holes for moving stock around;
- false ceilings, especially if they are not fire- stopped above walls;
- voids behind wall panelling;
- unsealed holes in walls and ceilings where pipe work, cables or other services have been installed; and
- doors, particularly to stairways, which are ill-fitting or routinely left open.

Particular Hazards in Corridors and Stairways used as escape Routes

Items that are a source of fuel, pose an ignition risk, or are combustible and likely to increase the fire loading or spread of fire, should not be located on any corridor or, stairway or circulation space that will be used as an escape route.

Such items include:

- portable heaters, e.g. bottled gas (LPG) or electric radiant heaters and electric convectors or boilers;
- gas cylinders for supplying heaters;
- cooking appliances; and
- unenclosed gas pipes, meters, and other fittings.

However, where more than one escape route is available and depending on the findings of your risk assessment, items such as those below may be acceptable if the minimum exit widths are maintained and the item presents a relatively low fire risk:

- non-combustible lockers;
- vending machines;
- small items of electrical equipment (e.g. photocopiers); and
- small coat racks and/or small quantities of upholstered furniture which meets
- BS 7176 or the Furniture and Furnishings (Fire) (Safety) Regulations 1988.

Insulated Core Panels

Many buildings have insulated core panels as exterior cladding or for internal structures (Figure 4.5) and partitions. The food industry, in particular, uses insulated core panels because they are easy to clean and facilitate consistent temperature control within the premises. The simple construction of these panels enables alterations and for additional internal partitions to be erected with minimum disruption to business.

Figure 4.5: *Insulated core panels - internal*

They normally consist of a central insulated core, sandwiched between an inner and outer metal skin. There is no air gap. The external surface is then normally coated with a PVC covering to improve weather resistance or the aesthetic appeal of the panel. The central core can be made of various insulating materials, ranging from virtually non-combustible through to highly combustible. Differing fire hazards are associated with common types of insulation, when the panels are subjected to certain temperatures.

Typical examples are:

- Mineral rock/modified phenolic will produce surface char and little smoke or gaseous combustion products, at temperatures above 230°C.
- Polyisocyanurate (PIR)/polyurethane (PUR) will char and will generate smoke and gaseous combustion products, at temperatures above 430°C PIR and 300°C PUR.
- Expanded polystyrene (EPS) will melt and will generate smoke and gaseous combustion products, at temperatures above 430°C PIR.

Insulation charring can lead to panel delamination/ collapse, and the gaseous combustion products can fill areas with the toxic gases carbon monoxide and styrene.

A number of fires in buildings where insulated panels have been used extensively in the fabric of the building have highlighted the particular dangers that may be associated with this form of construction, i.e. where the fabric of the building can contribute to the fire hazards.

In a fire the following may occur:

- early buckling and falling away of the facing materials;
- burning of the combustible insulating material;
- production of large quantities of dense, toxic smoke;
- rapid heat generation;
- early loss of structural strength can result if the system has not been properly designed, and this can lead to the collapse of the wall, partition or ceiling;
- there may be cavities in older buildings where the panels are used as an internal envelope, enabling fire to spread unnoticed and possibly unchecked by fire barriers.

Once installed it is difficult to identify the core material of a panel and its potential fire hazard.

The following best practise can help you reduce risks associated with insulated panels.

- Do not install heating appliances, such as ovens, against the panels. Operate a clear distance policy for cooking systems.
- Control ignition sources that are adjacent to, or penetrating the panels.
- Control hot working.
- Check for damage to heater tapes used to prevent ice build-up at doors.
- Do not store highly combustible materials against panels or allow rubbish to collect against panels.
- Have damaged panels or sealed joints repaired 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 to ensure that these have been effectively sealed and the inner core has not been exposed.
- Check that there has been no mechanical damage and repair any that has occured,
- e.g. caused by mobile equipment such as fork lift trucks.
- Ensure that any loads, such as storage and equipment, are only supported by panels which have been designed and installed to perform this function.
- Check that the inner and outer skins are adhering tightly to the core.

- Ensure that the panels are correctly secured to the structure or are designed to be independently structurally secure. One solution is to ensure the retaining brackets bolt the panel to a support frame through the outer and inner skins;
- Ensure large roof cavities are appropriately protected, e.g. escape routes are clear, signed and have limited travel distance, and fire warning systems are audible.

The use of combustible panels in areas of buildings with a high life risk, e.g. where large numbers of people are present, should be carefully considered. Your fire risk assessment may need to be revised to ensure that any increased risk resulting from this type of construction is considered.

The potential for fire development involving mineral fibre cores is less than that for panels containing polymeric cores. Therefore, in areas where there is considerable life risk, it may be appropriate to consider replacing combustible panels, providing a fire suppression system or installing non-combustible fire breaks within or between the panels at suitable intervals. Insulated core panels should be installed by a competent person in accordance with industry guidance.

Guidance on the design, construction, specification and fire management of insulated core panels has been published by the International Association of Cold Storage Contractors.

Restricting the spread of Fire and Smoke

To reduce the risk to people if there is a fire, you need 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.

It is important ensure that, in the event of fire, the rate of fire growth is restricted in its early stages. It should also be noted that most measures which restrict the rate of fire growth in its early stages will also serve to restrict the fire spread in its later stages.

Display Materials and Decorations

Displays are often located in corridors, entrance foyers and shop floors, and generally comprise materials such as paper, cardboard and plastic which provide a means for the rapid spread of fire. You should assess how these materials could contribute to the development of a fire in the area where they are located. To reduce the risk of fire spread, you should consider the following:

- avoid the use of displays in corridors and foyers;
- minimise the size and number of display areas to discrete, separated areas;
- treating displays with proprietary flame- retardant sprays;
- the use of display boxes;
- keep displays away from curtains, light fittings and heaters;
- keep displays away from ceiling voids which may lack fire barriers; and
- ensure that there are no igntion sources in the vicinity.

Staff information should be confined to appropriately located display boards in areas away from escape routes. Display boards may be used on escape routes as long as they are no bigger than $1m^2$ or have been enclosed in a sealed display case.

Catering Facilities

Wherever possible any extensive catering facilities, particularly those with deep fryers, should be located in a separate building, or alternatively, separated from the remainder of the building by fire doors and fire resisting construction and provided with adequate ventilation.

Where flues pass through any part of the structure, the structure should be protected by fire resisting construction. Where fire shutters are used these should be capable of operating both manually and by fusible link. Where a fire detection and warning system is installed, the fire shutter should also be designed to close on activation of the system via a controlled geared mechanism.

Fire-Resisting Structures

Many buildings are divided into different areas by fire doors and fire-resisting walls and floors. These are partly designed to keep a fire within one area, giving people more time to escape. You will need to identify which doors, wall and floors in your building are fire-resisting. There may be information available from when the building was built, if alterations have been made, or from a previously held fire certificate.

High-risk areas should be separated from the rest of the premises by 30-minute fire- resisting construction.

Normally if there are fire doors in a wall, then the wall itself will also need to be fire-resisting. (See Appendix B1 for more information about fire-resisting walls.) If a wall or floor is required to be fire-resisting then you should not make any holes in it, e.g. for extra doors or pipe ducts, without consulting a competent person.

Smoke Control

In larger buildings and some units in shopping complexes, there may be some form of automatic smoke ventilation (Figure 4.6) provided for the safety of the occupants and to assist firefighting (e.g. Smoke and Heat Exhaust Ventilation Systems (SHEVS)). These systems are designed to restrict the spread of fire and smoke usually by venting the heat and smoke through the roof or via other routes to the outside. Low level inlet air is essential for the operation of SHEVS and all openings for this purpose should not be obstructed.

Special down-stands may have been installed to create a reservoir which will contain the smoke and hot gases at roof level, while vents allow the smoke to escape. It is important that any smoke can flow easily into the reservoirs and that nothing which could cause an obstruction, e.g. display material, is fixed near the vents. It is important that any smoke can flow easily into the reservoirs and that nothing which could cause an obstruction, e.g. large advertising displays, is fixed near the vents.

In shopping complexes the front of individual shops often forms part of the smoke control design. If your building has smoke vents fitted, or any other form of smoke control, then you may need to seek advice from someone who is competent in such systems.

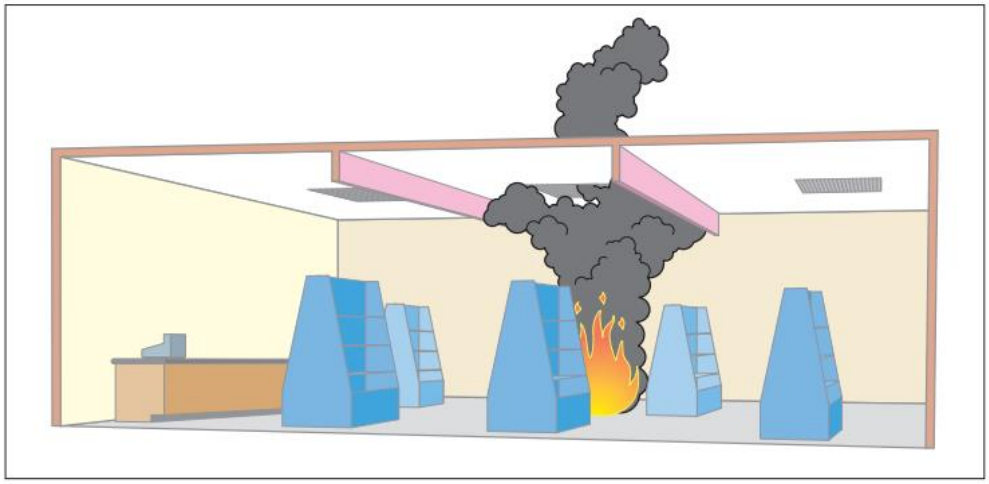

Figure 4.6 *Smoke vents*

Arson

Recent studies indicate that, across all premises types, over 2,100 deliberately set fires, resulting in two deaths and 55 injuries, occur every week. In shops it is estimated that 44% of all fires are deliberately set. All premises can be targeted either deliberately or just because they offer easy access.

Be aware of other small, deliberately set fires in the locality, which can indicate an increased risk to your premises. Be suspicious of any small 'accidental' fires on the premises and investigate them fully and record your findings.

Fires started deliberately can be particularly dangerous because they generally develop much faster and may be intentionally started in escape routes. Of all the risk-reduction measures, the most benefit may come from efforts to reduce the threat from arson.

Measures to reduce arson may include the following:

- ensure the outside of the premises is well lit and, if practical, secure the perimeter of the premises;
- thoroughly secure all entry points to
- the premises, including windows and the roof, but make sure that this does not compromise people's ability to use the escape routes;
- make sure you regularly remove all combustible rubbish;
- do not place rubbish skips adjacent to the building and secure waste bins in a compound separated from the building;
- do not park vehicles or store goods or materials in the open next to windows or doors opening into buildings;
- encourage staff to report people acting suspiciously;
- remove automatic entry rights from staff who have been dismissed;
- ensure that your security alarm/fire- detection system is monitored and acted on;
- secure flammable liquids so that intruders cannot use them;
- secure all storage areas and unused areas of the building that do not form part of an escape route against unauthorised access, ensure access to keys to those areas is restricted; and

- fit secure metal letterboxes on the inside of letter flaps to contain any burning materials that may be pushed through.

Help for people with special needs

Of all the people who may be especially at risk you will need to pay particular attention to people who may have special needs, including those with a disability. The Disability Rights Commission estimates that 11 million people in this country have some form of disability, which may mean that they find it more difficult to leave a building if there is a fire. Under the Disability Discrimination Act, if disabled people could realistically expect to use your premises, then you must anticipate any reasonable adjustments that would make it easier for that right to be exercised.

The Disability Discrimination Act includes the concept of 'reasonable adjustments' and this can be carried over into fire safety law. It can mean different things in different circumstances. For a small business, it may be considered reasonable to provide contrasting colours on a handrail to help those with vision impairment to follow an escape route more easily. However, it might be unreasonable to expect that same business to install an expensive voice-alarm system. Appropriate 'reasonable adjustments' for a large business or organisation may be much more significant.

If disabled people are going to be in your premises then you must also provide a safe means for them to leave if there is a fire. You and your staff should be aware that disabled people may not react, or can react differently, to a fire warning or small fire. You should give similar consideration to others with special needs such as parents with young children or the elderly. In premises with a simple layout, common- sense approach, such as offering to help lead a blind person or helping an elderly person down steps may be enough. In more complex premises, more elaborate plans and procedures will be needed, with trained staff assigned to specified duties. In this case you may also wish to contact a professional consultant or take advice from disability organisations.

Consider the needs of those with mental disabilities or spatial recognition problems. The range of disabilities encountered can be considerable, extending from mild epilepsy to complete disorientation in an emergency situation. Many of these can be addressed by properly trained staff, discreet and empathetic use of the 'buddy system' or by careful planning of colour and texture to identify escape routes.

Where people with special needs use or work in the premises, their needs should, so far as is practicable, be discussed with them. These will often be modest and may require only changes or modifications to existing procedures. You may need to develop individual 'personal emergency evacuation plans' (PEEPs) for disabled people who frequently use a building. They will need to be confident of any plan/PEEP that is put in place after consultation with them. As part of your consultation exercise you will need to consider the matter of personal dignity.

If members of the public use your building then you may need to develop a range of standard PEEPs which can be provided on request to a disabled person or others with special needs.

Guidance on removing barriers to the everyday needs of disabled people is in BS 8300. Much of this advice will also help disabled people during an evacuation.

Further Reading:

- ✓ Guidelines for Vapor Cloud Explosion, Pressure Vessel Burst, BLEVE, and Flash Fire Hazards 2nd Edition, Kindle Edition by CCPS (Center for Chemical Process Safety) (Author), 2011
- ✓ Fire Department Incident Safety Officer 3rd Edition by David W. Dodson (Author), 2015