Unit 3 Fire Risk Assessment

Learning Outcomes
By the end of this unit the learner will be able to:
✓ Discuss each of the primary stages involved in conducting a fire risk assessment ✓ Confidently identify potential fire hazards in the workplace ✓ Know how to respond appropriately when potential hazards are identified to protect the workforce

Unit 3

Fire Risk Assessment

Good management of fire safety is essential to ensure that fires are unlikely to occur; that if they do occur they are likely to be controlled or contained quickly, effectively and safely; or that, if a fire does occur and grow, everyone in your premises is able to escape to a place of total safety easily and quickly.

The risk assessment that you must carry out will help you ensure that your fire safety procedures, fire prevention measures, and fire precautions (plans, systems and equipment) are all in place and working properly, and the risk assessment should identify any issues that need attention.

What is a Fire Risk Assessment?

A fire risk assessment is an organised and methodical look at your premises, the activities carried on there and the likelihood that a fire could start and cause harm to those in and around the premises.

The aims of the fire risk assessment are:

- To identify the fire hazards.
- To reduce the risk of those hazards causing harm to as low as reasonably practicable.
- To decide what physical fire precautions and management arrangements are necessary to ensure the safety of people in your premises if a fire does start.

The terms 'hazard' and 'risk' are used throughout this guide and it is important that you have a clear understanding of how these should be used.

- **Hazard:** anything that has the potential to cause harm.
- **Risk:** the chance of that harm occurring.

If your organisation employs five or more people, or your premises are licensed or an alterations notice requiring it is in force, then the significant findings of the fire risk assessment, the actions to be taken as a result of the assessment and details of anyone especially at risk must be recorded. You will probably find it helpful to keep a record of the significant findings of your fire risk assessment even if you are not required to do so.

How Do You Carry Out a Fire Risk Assessment?

A fire risk assessment will help you determine the chances of a fire starting and the dangers from fire that your premises present for the people who use them and an person in the immediate vicinity.

Your fire risk assessment should demonstrate that, as far as is reasonable, you have considered the needs of all relevant persons, including disabled people.

FIRE SAFETY RISK ASSESSMENT	
1	**Identify fire hazards** **Identify:** Sources of ignition Sources of fuel Sources of oxygen
2	**Identify people at risk** **Identify:** People in and around the premises People especially at risk
3	**Evaluate, remove, reduce and protect from risk** Evaluate the risk of a fire occurring Evaluate the risk to people from fire Remove or reduce fire hazards Remove or reduce the risks to people • Detection and warning • Fire-fighting • Escape routes • Lighting • Signs and notices • Maintenance
4	**Record, plan, inform, instruct and train** Record significant finding and action taken Prepare an emergency plan Inform and instruct relevant people; co-operate and co-ordinate with others Provide training
5	**Review** Keep assessment under review Revise where necessary
Remember to keep to your fire risk assessment under review.	

Figure 3.1: The five steps of a fire risk assessment

Step 1 Identifying Fire Hazards

For a fire to start, three things are needed:

- A source of ignition/heat;
- Fuel; and
- Oxygen.

If any one of these is missing, a fire cannot start. Taking measures to avoid the three coming together will therefore reduce the chances of a fire occurring. The remainder of this step will advise on how to identify potential ignition sources, the materials that might fuel a fire and the oxygen supplies that will help it burn.

Identify Sources of Ignition/Heat

You can identify the potential ignition sources in your premises by looking for possible sources of heat which could get hot enough to ignite material found in your premises.

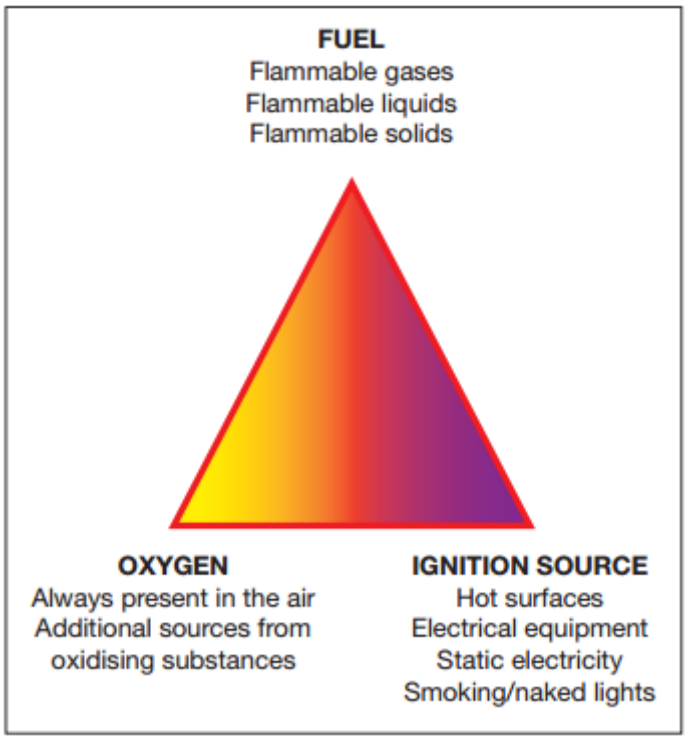


Figure: 3.2 the Fire Triangle

These sources could include:

- smokers' material, e.g. cigarettes, matches and lighters;
- naked flames, e.g. candles or gas or liquid-fuelled open-flame equipment;
- electrical, gas or oil-fired heaters (fixed or portable);
- hot processes, e.g. welding by contractors or shrink wrapping;
- cooking equipment;
- faulty or misused electrical equipment;
- Lighting equipment, e.g. halogen lamps or display lighting too close to stored products;

- Hot surfaces and obstruction of equipment ventilation, e.g. office equipment; and
- Arson.

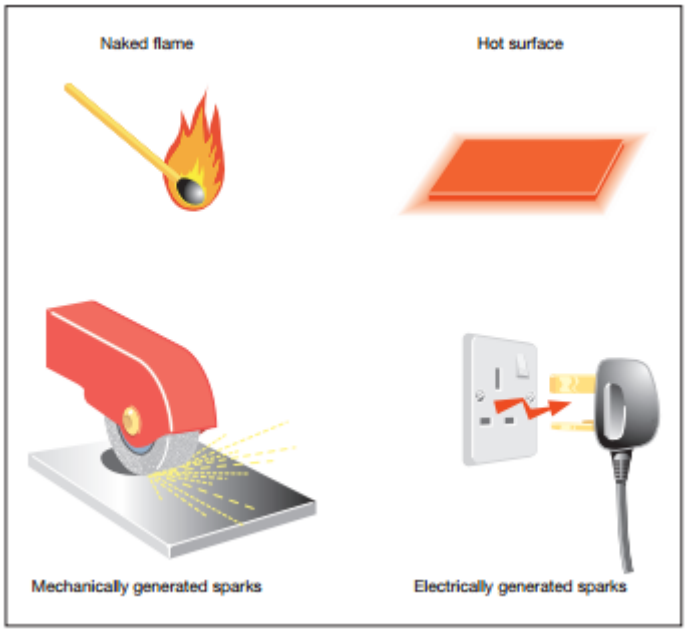


Figure: 3.3 Sources of Ignition

Indications of 'near-misses', such as scorch marks on furniture or fittings, discoloured or charred electrical plugs and sockets, cigarette burns etc., can help you identify hazards which you may not otherwise notice.

Identify Sources of Fuel

Anything that burns is fuel for a fire. You need to look for the things that will burn reasonably easily and are in enough quantity to provide fuel for a fire or cause it to spread to another fuel source. Some of the most common 'fuels' found in offices and shops are:

- flammable-liquid-based products, such as paints, varnishes, thinners and adhesives;
- flammable liquids and solvents, such as white spirit, methylated spirit, cooking oils and disposable cigarette lighters;
- flammable chemicals, such as certain cleaning products, photocopier chemicals and dry cleaning that uses hydrocarbon solvents;
- packaging materials, stationery, advertising material and decorations;
- plastics and rubber, such as video tapes, polyurethane foam-filled furniture and polystyrene-based display materials;
- textiles and soft furnishings, such as hanging curtains and clothing displays;
- waste products, particularly finely divided items such as shredded paper and wood shavings, off cuts, and dust; and

- flammable gases such as liquefied petroleum gas (LPG).

Figure: 3.4 Label on oxidising materials

You should also consider the materials used to line walls and ceilings, e.g. polystyrene or carpet tiles, the fixtures and fittings, and how they might contribute to the spread of fire.

Identify Sources of Oxygen

The main source of oxygen for a fire is in the air around us. In an enclosed building this is provided by the ventilation system in use. This generally falls into one of two categories: natural airflow through doors, windows and other openings; or mechanical air conditioning systems and air handling systems. In many buildings there will be a combination of systems, which will be capable of introducing/extracting air to and from the building.
Additional sources of oxygen can sometimes be found in materials used or stored at premises such as:

- Some chemicals (oxidising materials), which can provide a fire with additional oxygen and so help it burn. These chemicals should be identified on their container (and Control of Substances Hazardous to Health data sheet, see Figure 4) by the manufacturer or supplier who can advise as to their safe use and storage;
- Oxygen supplies from cylinder storage and piped systems, e.g. oxygen used in welding processes; and
- Pyrotechnics (fireworks), which contain oxidising materials and need to be treated with great care.

Checklist

- Have you identified all potential ignition sources? ☐
- Have you identified all potential fuel sources? ☐
- Have you identified all potential sources of oxygen? ☐
- Have you made a note of your findings? ☐

Step 2 Identifying People at Risk

As part of your fire risk assessment, you need to identify those at risk if there is a fire. To do this you need to identify where you have people working, either at permanent workstations or at occasional locations around the premises, and to consider who else may be at risk, such as customers, visiting contractors etc., and where these people are likely to be found.

You must consider all the people who use the premsies but you should pay particular attention to people who may be especially at risk such as:

- employees who work alone and/or in isolated areas, e.g. cleaners, security staff;
- people who are unfamiliar with the premises, e.g. seasonal workers, contractors, visitors and customers;
- people with disabilities or those who may have some other reason for not being able to leave the premises quickly, e.g. elderly customers or parents with children;
- other persons in the immediate vicinity of the premises; and
- People with language difficulties.

In evaluating the risk to people with disabilities you may need to discuss their individual needs with them. In larger buildings used extensively by the public you may need to seek professional

Checklist

- Have you identified who is at risk? ☐
- Have you identified why they are at risk? ☐
- Have you made a note of your findings? ☐

Step 3 Evaluate, Remove, Reduce and Protect From Risk

The management of the premises and the way people use it will have an effect on your evaluation of risk. Management may be your responsibility alone or there may be others, such as the building owners or managing agents, who also have responsibilities. In multi-occupied buildings all those with some control must co-operate and you need to consider the risk generated by others in the building.

Evaluate the Risk of a Fire Occurring

The chances of a fire starting will be low if your premises has few ignition sources and combustible materials are kept away from them.

In general, fires start in one of three ways:

- Accidentally, such as when smoking materials are not properly extinguished or when lighting displays are knocked over;
- By act or omission, such as when electrical office equipment is not properly maintained, or when waste packaging is allowed to accumulate near to a heat source; and
- Deliberately, such as an arson attack involving setting fire to external rubbish bins placed too close to the building.
- Look critically at your premises and try to identify any accidents waiting to happen and any acts or omissions which might allow a fire to start. You should also look for any situation that may present an opportunity for an arsonist.

Evaluate the Risk to People

While determining the possible incidents, you should also consider the likelihood of any particular incident; but be aware that some very unlikely incidents can put many people at risk.

To evaluate the risk to people in your premises, you will need to understand the way fire can spread. Fire is spread by three methods:

- Convection;
- Conduction; and
- Radiation.

Convection

Fire spread by convection is the most dangerous and causes the largest number of injuries and deaths. When fires start in enclosed spaces such as buildings, the smoke rising from the fire gets 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.

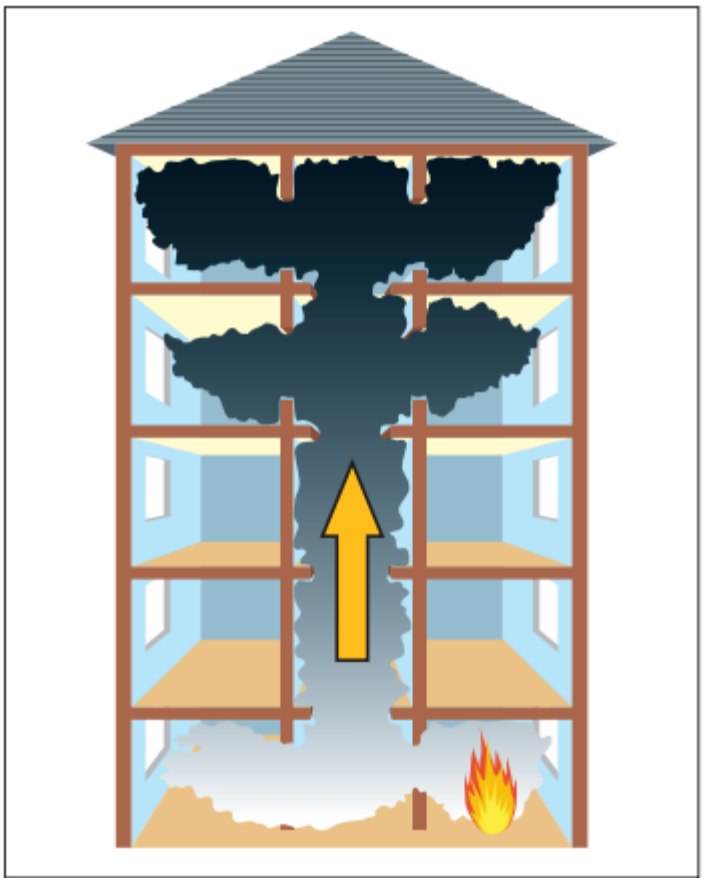


Figure 3.5 Smoke moving through a building

Conduction

Some materials, such as metal shutters and ducting, can absorb heat and transmit it to the next room, where it can set fire to combustible items that are in contact with the heated material.

Radiation

Radiation heats the air in the same way as 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.

Smoke produced by a fire also contains toxic gases which are harmful to people. A fire in a building with modern fittings and materials generates smoke that is thick and black, obscures vision, causes great difficulty in breathing and can block the escape routes.

It is essential that the means of escape and other fire precautions are adequate to ensure that everyone can make their escape to a place of total safety before the fire and its effects can trap them in the building.

In evaluating this risk to people you will need to consider situations such as:

- fire starting on a lower floor affecting the only escape route for people on upper floors or the only escape route for people with disabilities;
- fire developing in an unoccupied space that people have to pass by to escape from the building;
- fire or smoke spreading through a building via routes such as vertical shafts, service ducts, ventilation systems, poorly installed, poorly maintained or damaged walls, partitions and ceilings affecting people in remote areas;
- fire starting in a service room and affecting hazardous materials;
- fire spreading rapidly through the building because of combustible structural elements and/or large quantities of combustible goods;
- Rapid vertical fire spread in racked displays; Fire and smoke spreading through a building due to poor installation of fire precautions, e.g. incorrectly installed fire doors
- Fire and smoke spreading through the building due to poorly maintained and damaged fire doors or fire doors being wedged open.

Remove or Reduce the Hazards

Having identified the fire hazards in Step 1, you now need to remove those hazards if reasonably practicable to do so. If you cannot remove the hazards, you need to take reasonable steps to reduce them if you can. This is an essential part of fire risk assessment and as a priority this must take place before any other actions.

Ensure that any actions you take to remove or reduce fire hazards or risk are not substituted by other hazards or risks. For example, if you replace a flammable substance with a toxic or corrosive one, you must consider whether this might cause harm to people in other ways.

Remove or reduce sources of ignition

There are various ways that you can reduce the risk caused by potential sources of ignition, for example:

- Wherever possible replace a potential ignition source by a safer alternative.
- Replace naked flame and radiant heaters with fixed convector heaters or a central heating system. Restrict the movement of and guard portable heating appliances.
- Seperate ignition hazards and combustibles e.g. ensure sufficient clear space between lights and combustibles.
- Operate a safe smoking policy in designated smoking areas and prohibit smoking elsewhere.
- Ensure electrical and mechanical and gas equipment is installed, used, maintained and protected in accordance with the manufacturer's instructions.
- Check all areas where hot work (e.g. welding) has been carried out to ensure that no ignition has taken place or any smouldering materials remain that may cause of fire.
- Ensure that no-one carrying out work on gas fittings which involves exposing pipes that contain or have contained flammable gas uses any source of ignition such as blow-lamps or hot-air guns.
- Take precautions to avoid arson.

Remove or reduce sources of fuel

There are various ways that you can reduce the risks caused by materials and substances which burn, for example:

- Reduce stocks of flammable materials, liquids and gases on display in public areas to a minimum. Keep remaining stock in dedicated storerooms or storage areas where the public are not allowed to go, and keep the minimum required for the operation of the business.
- Ensure flammable materials, liquids and gases, are kept to a minimum, and are stored properly with adequate separation distances between them.
- Keep areas containing flammable gasses ventilated?
- Do not keep flammable solids, liquids and gases together.
- Remove, or treat large areas of highly combustible wall and ceiling linings, e.g. polystyrene or carpet tiles, to reduce the rate of flame spread across the surface.
- Develop a formal 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, particularly at the end of the day.
- Take action to avoid storage areas being vulnerable to arson or vandalism.
- Check all areas where hot work
- (e.g. welding) has been carried out to ensure that no ignition has taken

Place and no smouldering or hot materials remain that may cause a fire later.

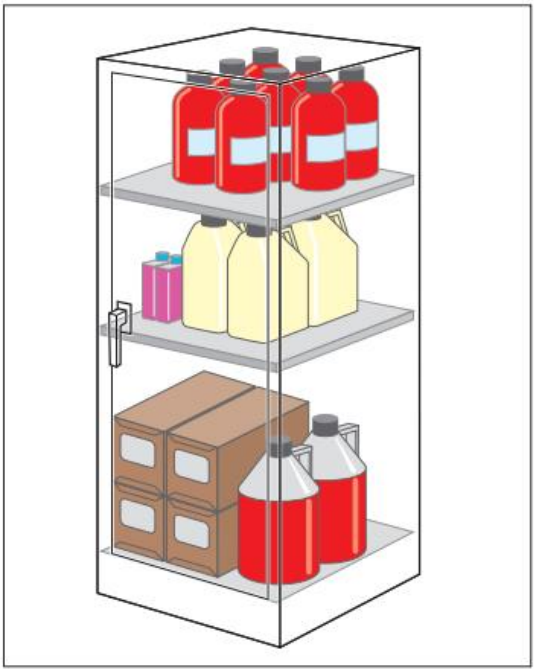


Figure 3.6 Storage of flammables

Remove or Reduce Sources of Oxygen

You can reduce the potential source of oxygen supplied to a fire by:

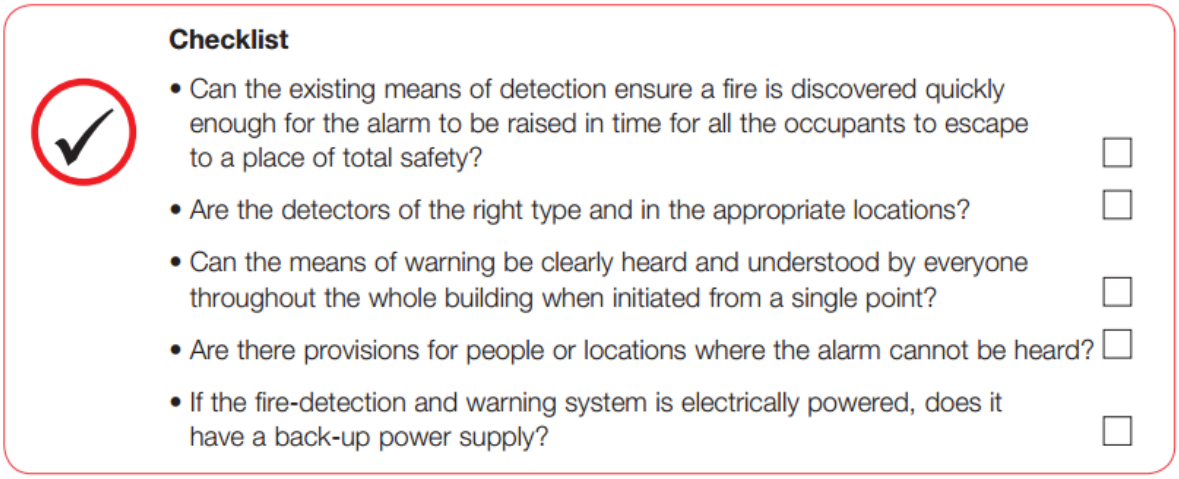
- Closing all doors, windows and other openings not required for ventilation, particularly out of working hours;
- Shutting down ventilation systems which are not essential to the function of the premises;
- Not storing oxidising materials near or with any heat source or flammable materials; and
- Controlling the use and storage of oxygen cylinders, ensuring that they are not leaking, are not used to 'sweeten' the atmosphere, and that where they are.

Remove or Reduce the Risks to People

Having evaluated and addressed the risk of fire occuring and the risk to people (preventative measures) it is unlikely that you will be able to conclude that no risk remains of fire starting and presenting a risk to people in your premises.

You now need to reduce any remaining fire risk to people to as low as reasonably practicable, by ensuring that adequate fire precautions are in place to warn people in the event of a fire and allow them to safely escape.

Step 3 Checklist Evaluate, remove, reduce and protect from risks by:



Step 4 Record, Plan, Inform, Instruct and Train

Record the significant findings and action taken

If you or your organisation employ five or more people, your premises are licensed, or an alterations notice requiring you to do so is in force, you must record the significant findings of your fire risk assessment and the actions you have taken.

Significant findings should include details of:

- The fire hazards you have identified (you don't need to include trivial things like a small tin of solvent based glue).
- The actions you have taken or will take to remove or reduce the chance of a fire occurring (preventive measures).

- Persons who may be at risk, particularly those at greatest risk.
- The actions you have taken or will take to reduce the risk to people from the spread of fire and smoke (protective measures).
- The actions people need to take in case of fire including details of any persons nominated to carry out a particular function (your emergency plan).
- The information, instruction and training you have identified that people need and how it will be given.

You may also wish to record discussions you have had with staff or staff representatives (including trade unions).

Even where you are not required to record the significant findings, it is good practice to do so.

In some very small offices and shops, record keeping may be no more than a few sheets of paper (possibly forming part of a health and safety folder), containing details of significant findings, any action taken and a copy of the emergency plan.

The record could take the form of a simple list which may be supported by a simple plan of the premises (see Figure 3.7).

In more complex premises, it is best to keep a dedicated record including details of significant findings, any action taken, a copy of the emergency plan, maintenance of fire-protection equipment and training. There is no one 'correct' format specified for this.

You must be able to satisfy the enforcing authority, if called upon to do so, that you have carried out a suitable and sufficient fire risk assessment. Keeping records will help you do this and will also form the basis of your subsequent reviews.
If you keep records, you do not need to record all the details, only those that are significant and the action you have taken.

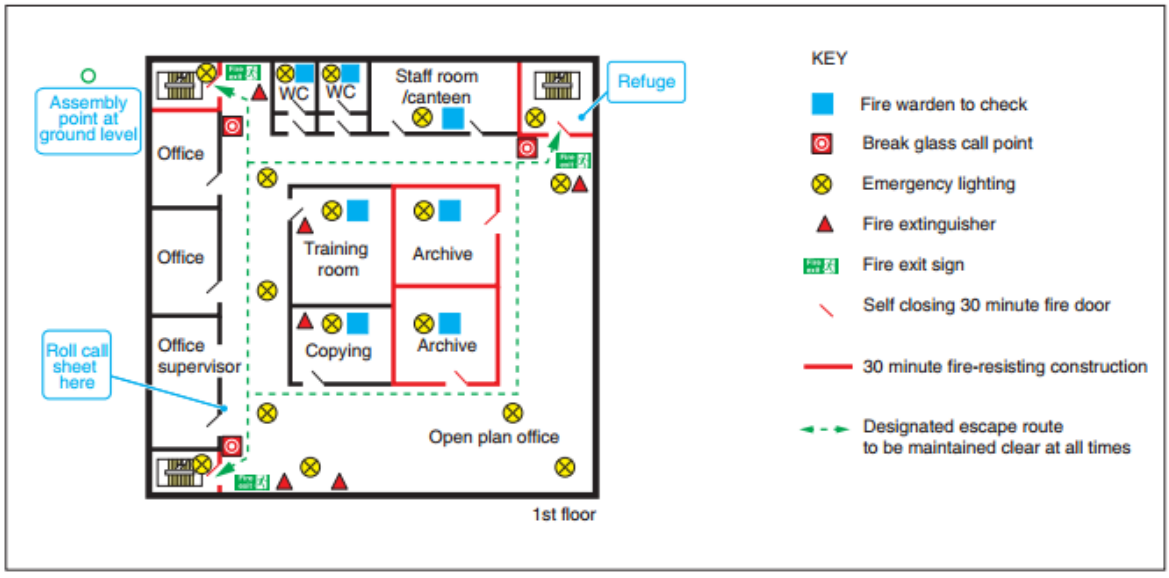


Figure 3.7: Example of a line drawing showing general fire safety precautions

The findings of your fire risk assessment will help you to develop your emergency plan, the instruction, information and training you need to provide, the co-operation and co-ordination

arrangements you may need to have with other responsible people and the arrangements for maintenance and testing of the fire precautions.
If you are required to record the significant findings of your fire risk assessment then these arrangements must also be recorded.

Checklist

- Have you recorded the significant findings of your assessment? ☐
- Have you recorded what you have done to remove or reduce the risk? ☐
- Are your records available for inspection by the enforcing authority? ☐

Emergency Plans

You need to have an emergency plan for dealing with any fire situation.

The purpose of an emergency plan is to ensure that the people in your premises know what to do if there is a fire and that the premises can be safely evacuated.

If you or your organisation employ five or more people, or your premises are licensed or an alterations notice requiring it is in force, then details of your emergency plan must be recorded. Even if it is not required, it is good practice to keep a record.
Your emergency plan should be based on the outcome of your fire risk assessment and be available for your employees, their representatives (where appointed) and the enforcing authority.

In small offices and shops the emergency plan may be no more than a fire action notice.

In multi-occupied, larger and more complex offices and shops, the emergency plan will need to be more detailed and compiled only after consultation with other occupiers and other responsible people, e.g. owners, who have control over the building. In most cases this means that a single emergency plan covering the whole building will be necessary. It will help if you can agree on one person to co-ordinate this task.

Inform, Instruct, Co-Operate and Co-Ordinate

Checklist

- Do you have an emergency plan and, where necessary, have you recorded the details? ☐
- Does your plan take account of other emergency plans applicable in the building? ☐
- Is the plan readily available for staff to read? ☐
- Is the emergency plan available to the enforcing authority? ☐

You must give clear and relevant information and appropriate instructions to your staff and the employers of other people working in your premises, such as contractors, about how to prevent fires and what they should do if there is a fire.

Any other relevant persons should be given information about the fire safety arrangements as soon as possible.

If you intend to employ a child, you must inform the parents of the significant risks you have identified and the precautions you have taken. You must also co-operate and co-ordinate with other responsible people who use any part of the premises. It is unlikely that your emergency plan will work without this.

Information and Instruction

All staff should be given information and instruction as soon as possible after they are appointed and regularly after that. Make sure you include staff who work outside normal working hours, such as contract cleaners or maintenance staff.

The information and instructions you give must be in a form that can be used and understood. They should take account of those with disabilities such as hearing or sight impairment, those with learning difficulties and those who do not use English as their first language.

The information and instruction you give should be based on your emergency plan and must include:

- The significant findings from your fire risk assessment;
- The measures that you have put in place to reduce the risk;
- What staff should do if there is a fire;
- The identity of people you have nominated with responsibilities for fire safety; and
- Any special arrangements for serious and imminent danger to persons from fire.

In small premises, where no significant risks have been identified and there are limited numbers of staff, information and instruction may simply involve an explanation of the fire procedures and how they are to be applied. This should include showing staff the fire-protection arrangements, including the designated escape routes, the location and operation of the fire-warning system and any other fire-safety equipment provided, such as fire extinguishers. Fire action notices can complement this information and, where used, should be posted in prominent locations.

In larger premises, particularly those in multi-occupied buildings, you should ensure that written instructions are given to people who have been nominated to carry out a designated safety task, such as calling the fire and rescue service or checking that exit doors are available for use at the start of each working day.

Co-Operation and Co-Ordination

In premises that are not multi-occupied you are likely to be solely responsible. However, in buildings owned by someone else, or where there is more than one occupier, and others are responsible for different parts of the building, it is important that you liaise with them and inform them of any significant risks that you have identified. By liaising you can co-ordinate

your resources to ensure that your actions and working practices do not place others at risk if there is a fire, and a co-ordinated emergency plan operates effectively.

Where two or more responsible persons share premises in which an explosive atmosphere may occur, the responsible person with overall responsibility for the premises must co-ordinate any measures necessary to protect everyone from any risk that may arise. Employees also have a responsibility to co-operate with their employer so far as it is necessary to help the employer comply with any legal duty.

Checklist

- Have you told your staff about the emergency plan? ☐
- Have you informed guests and visitors about what to do in an emergency? ☐
- Have you identified people you have nominated to do a particular task? ☐
- Have you given staff information about any dangerous substances? ☐
- Do you have arrangements for informing temporary or agency staff? ☐
- Do you have arrangements for informing other employers whose staff are guest workers in your premises, such as maintenance contractors and cleaners? ☐
- Have you co-ordinated your fire safety arrangements with other responsible people in the building? ☐
- Have you recorded details of any information or instructions you have given and the details of any arrangements for co-operation and co-ordination with others? ☐

Fire Safety Training

You must provide adequate fire safety training for your staff. The type of training should be based on the particular features of your premises and should:

- Take account of the findings of the fire risk assessment;
- Explain your emergency procedures;
- Take account of the work activity and explain the duties and responsibilities of staff;
- Take place during normal working hours and be repeated periodically where appropriate;
- Be easily understandable by your staff and other people who may be present; and
- Be tested by fire drills.

In small premises this may be no more than showing new staff the fire exits and giving basic training on what to do if there is a fire. In larger premises, such as a supermarket with a high staff turnover and many shift patterns, the organisation of fire safety training will need to be planned.

Your staff training should include the following:

- what to do on discovering a fire;
- how to raise the alarm and what happens then;

- what to do upon hearing the fire alarm;
- the procedures for alerting members of the public and visitors including, where appropriate, directing them to exits;
- the arrangements for calling the fire and rescue service;
- the evacuation procedures for everyone in your office or shop to reach an assembly point at a place of total safety;
- the location and, when appropriate, the use of freighting equipment;
- the location of escape routes, especially those not in regular use;
- how to open all emergency exit doors;
- the importance of keeping fire doors closed to prevent the spread of fire, heat and smoke;
- where appropriate, how to stop machines and processes and isolate power supplies in the event of a fire;
- the reason for not using lifts (except those specifically installed or nominated, following a suitable fire risk assessment, for the evacuation of people with a disability);
- the safe use of and risks from storing or working with highly flammable and explosive substances; and
- The importance of general fire safety, which includes good housekeeping.
- All the staff identified in your emergency plan that have a supervisory role
- If there is a fire (e.g. heads of department, fire marshals or wardens and, in larger offices and shops, fire parties or teams), should be given details of your fire risk assessment and receive additional training.

Checklist

- Have your staff received fire safety training? ☐
- Have you carried out a fire drill recently? ☐
- Are employees aware of specific tasks if there is a fire? ☐
- Are you maintaining a record of training sessions? ☐
- Do you carry out joint training and fire drills in multi-occupied buildings? ☐
- If you use or store hazardous or explosive substances have your staff received appropriate training? ☐

You should constantly monitor what you are doing to implement the fire risk assessment to assess how effectively the risk is being controlled.

Step 5 Review

If you have any reason to suspect that your fire risk assessment is no longer valid or there has been a significant change in your premises that has affected your fire precautions, you will need to review your assessment and if necessary revise it.
Reasons for review could include:

- changes to work processes or the way that you organise them, including the introduction of new equipment;

- alterations to the building, including the internal layout;
- substantial changes to furniture and fixings;
- the introduction, change of use or increase in the storage of hazardous substances;
- the failure of fire precautions, e.g. fire-detection systems and alarm systems, life safety sprinklers or ventilation systems;
- significant changes to displays or quantities of stock;
- a significant increase in the number of people present; and
- The presence of people with some form of disability.

You should consider the potential risk of any significant change before it is introduced. It is usually more effective to minimise a risk by, for example, ensuring adequate, appropriate storage space for an item before introducing it to your premises. Do not amend your assessment for every trivial change, but if a change introduces new hazards you should consider them and, if significant, do whatever you need to do to keep the risks under control. In any case you should keep your assessment under review to make sure that the precautions are still working effectively. You may want to re-examine the fire prevention and protection measures at the same time as your health and safety assessment.

If a fire or 'near miss' occurs, this could indicate that your existing assessment may be inadequate and you should carry out a re-assessment. It is good practice to identify the cause of any incident and then review and, if necessary, revise your fire risk assessment in the light of this.

Alterations Notices

If you have been served with an 'alterations notice' check it to see whether you need to notify the enforcing authority about any changes you propose to make as a result of your review. If these changes include building work, you should also consult a building control body.

Further Reading:

- ✓ Principles of Fire Risk Assessment in Buildings 1st Edition by David Yung ,2009
- ✓ Quantitative Risk Assessment in Fire Safety 1st Edition, Kindle Edition by Ganapathy Ramachandran (Author), David Charters (Author), 2011