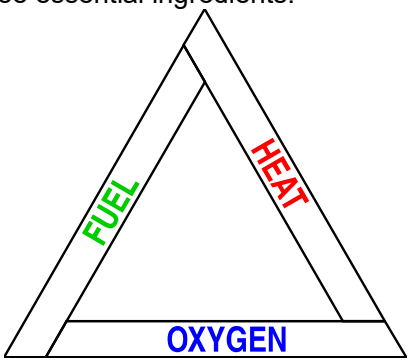
ELEMENT 6 – FIRE SAFETY

6.1 Describe the principles of fire initiation, classification and spread.
6.2 Outline the principles of fire risk assessment.
6.3 Describe the basic principles of fire prevention and the prevention of fire spread in buildings.
6.4 Outline the appropriate fire alarm systems and fire fighting arrangements for a simple workplace.
6.5 Outline the factors which could be considered when implementing a successful evacuation of a workplace in the event of a fire.

6.1 INTRODUCTION

Fire is the chemical reaction called **COMBUSTION;** it is oxidation resulting in the release of heat and potentially a variety of other hazardous substances. A fire will only occur if there are sufficient of the three essential ingredients:-



Fuel: Combustible substance either solid, liquid or gas.

Oxygen: 21% or more in the atmosphere

Heat: This does not have to be a flame but could be a heat source. Once a certain temperature has been reached, the fire will normally maintain its own heat supply and keep burning until the fuel runs out.

If all three elements of the FIRE TRIANGLE exist together in sufficient quantities the ingredients of fire are present and a fire can be sustained.

6.2 COMMON FIRE CAUSES 

- Smoking - discarded cigarettes
- Friction / sparks from machinery such as abrasive wheels
- Electrical systems & appliances - overheating
- Arson (from smoking materials)
- Static electric sparks
- Lightning / sun light
- Chemical reactions e.g. bleach which is an oxidiser
- Processes with naked flames e.g. welding / cooking

6.3  HAZARDS

- Smoke
- Gas
- Vapours
- Fumes from combustion
- Oxygen depletion
- Heat
- Structural collapse
- Falling objects or people

Q. If these are the hazards, what risks do they present to people on site?

For example:-

- Smoke leads to a risk of asphyxiation.
- Hot gases lead to ….
- The heat from the flames causes….
- Lack of oxygen could lead to …
- Structural collapse …….

6.4 CLASSES OF FIRE

A: PAPER, WOOD TEXTILES
B: FLAMMABLE LIQUIDS
C: FLAMMABLE GASES
D: COMBUSTIBLE METALS
F: FLAMMABLE OILS
ELECTRICAL
VEHICLES

6.5 EXTINGUISHING THE FIRE

For a fire to be extinguished one side of the fire triangle must be removed

Cool – to remove the heat
Smother – to remove the oxygen
Starve - taking away the fuel will remove the fire. (Note: this cannot be achieved with a fire extinguisher.)

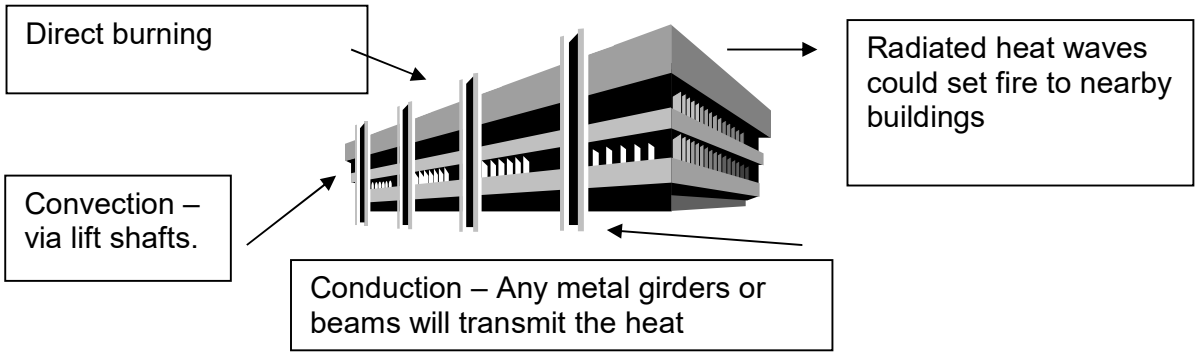
CLASS	IDEAL EXTINGUISHER
A:	WATER (red) - COOLING
B:	FOAM (cream) or POWDER (blue) - SMOTHERING
C:	POWDER (blue) - SMOTHERING
D:	SPECIALIST POWDER (blue), GRAPHITE or SAND – Chemical reaction which interferes with combustion – COOLING / SMOTHERING
F:	WET CHEMICAL (yellow) - SMOTHERING / COOLING
ELECTRIC:	$C0_2$ (black) and specialist powder - SMOTHERING
VEHICLES:	POWDER (blue) - COOLING / SMOTHERING
CHIP PAN:	FIRE BLANKET - SMOTHERING

The European Standard states that all extinguishers should be red. Most new extinguishers have a band or label of the colour previously used in the British Standard which allowed a variety of different colours to be used.

Q. Which issues should you consider when locating fire extinguishers in the workplace?

- On fire routes and near fire exits
- Suitable for the fire risks in the area
- Accessible
- Clearly signed
- Not obstructed/not causing an obstruction
- Fixed to wall or in a holder to reduce the risk of them falling over and becoming an obstruction
- Visible
- Protected from the weather if outdoors

6.6 METHODS OF FIRE OR HEAT SPREAD WITHIN A BUILDING



CONVECTION

This is the way heat travels via the movement of air by natural air flows. Within the confines of a building, fire will spread upwards and through the building via the airflow. The hot air rises and if there are any open corridors or lift shafts, the fire and heat could be spread by convection.

CONDUCTION

This is where heat is transferred from one object through another. The material can be a liquid or solid. Within a building this occurs when the structure or metal girders of a building heat up. These can then transfer the heat and subsequently the fire to other areas within the building.

RADIATION

This is the movement of heat via electro magnetic waves which travel through the air at the speed of light. The heat from the sun is a form of radiated heat. Certain materials which reflect heat may assist the fire to spread, e.g. polished metal surfaces.

DIRECT CONTACT

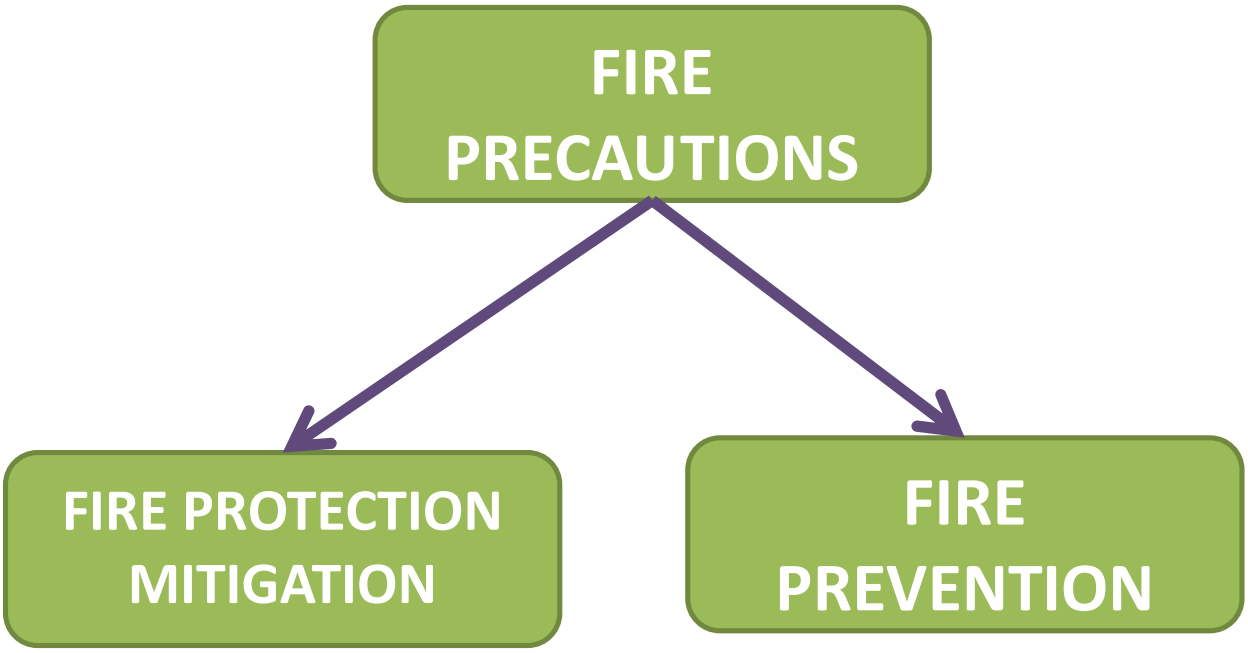
This is where the flames directly come into contact with a new fuel source.

6.7 FIRE PRECAUTIONS

Fire precautions can be divided into two specific areas, one which deals with preventing fire and the other which aims to minimise loss of property and life, should the fire occur.

FIRE PREVENTION - Measures intended to stop a fire from occurring in the first place.

FIRE PROTECTION / MITIGATION - Measures which intend to save life or minimise loss, by minimising the spread of fire and allowing people to escape safely should a fire occur.



FIRE PREVENTION TECHNIQUES

- Inspection of electrical installations and wiring
- Portable appliance testing and inspections of portable electrical equipment
- Permits to work for hot work (e.g. welding)
- Naked flame management e.g. barriers around welding processes
- Training in the safe use of welding equipment
- Safe storage of highly flammables – away from heat sources
- Good security arrangements to reduce the risk of arson
- Reduce the amount of fuel available to a fire by limiting stocks of combustible building materials and the accumulation of rubbish close to sources of ignition or inside buildings
- Consider moving to the use of substances which are flame retardant / fire resistant
- Volatile flammable materials such as LPG cylinders are stored in a suitably secure external store. Access to be limited so as to control distribution/use around the site. Cylinders to be returned to the store after use/ at end of the working day
- Initiate a system where electrical equipment (and cabling) is checked on a regular basis, particularly in relation to usage and the conditions in which it is being used
- Ensure that any electrical equipment or plant being employed in areas where solvents are being used or dusts are being generated, is appropriately protected and will not overheat
- Before hot work is started, clear combustible items from the area
- Check the areas around and under where hot work has taken place up to an hour after the work has been completed to ensure there is no sign of fire
- Enforce the No Smoking policy and designate specific safe areas for smoking
- Ensure good security arrangements are in place, with no gaps in fencing and flammables appropriately locked away
- Maintain plant and equipment in safe working condition

- If refuelling of vehicles or plant takes place on-site, ensure a safe system is employed which takes place in the open air and away from potential sources of ignition
- Ensure portable lamps are appropriately secured so as not to fall over. Keep halogen lamps which generate large amounts of heat away from combustible materials

FIRE PROTECTION/MITIGATION MEASURES

Fire Alarm and Warning Signals

The signals can be bells, sirens, hooters or public address system. Any system incorporated into the electrical alarm system should be distinctive. In premises where the noise levels may be excessive, or in any other situation where a normal type of sounder may be ineffective e.g. where deaf persons are employed, visual signals should be used to supplement the audible alarms. Tests have proven that a flashing white strobe is most suitable for this purpose.

(BS 5839) In situations where people are present, alarms must not be operated solely by the detector system but must also have manual operation points. There are a variety of ways in which alarms may be connected in order to meet the needs of different buildings. Alarms may be sounded as follows:

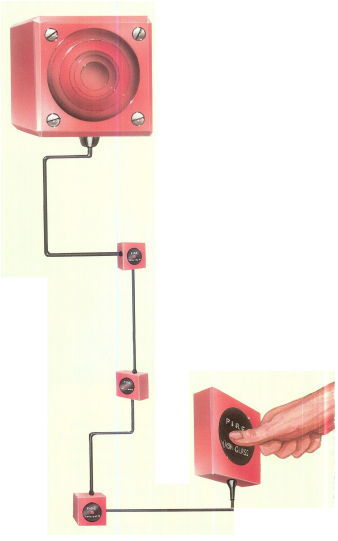
1) Simple - all alarms sounded.

2) Zoned - alarms sounded in alarm zone and neighbouring zones.

As a guide, the minimum sound level at any point in the premises should be 65 dB(A), or 10dB(A) above the ambient noise levels. Where there are people who are sleeping, or who are on medication, the sound level should be increased to 75 dB(A) or more.

In the event of a false alarm, it is important that the cause and extent of the problem is determined as quickly as possible. This is especially important where there is disruption to the fire warning system resulting in a substandard level of protection. It is essential that the utmost care should be taken by system designers, installers and users to reduce the incidence of false alarms.

Detectors and call points are arranged in zones, which may be considered as unit fire compartments each with a floor area less than 200m^2. Each zone is connected via one individual loop of wiring to control and indicator panel. More complicated buildings may utilise a zone/sector definition, where the main indicator board will display sector file location information and sector boards will display zone fire location information.



Manual Call Points

Manual call points are the square "break glass" appliances commonly located around work and other premises. Generally, no point in a building should be further than 30m from a call point, although this distance should be reduced where there are specific fire hazards. Call points may be connected to the same wiring circuit as automatic detectors but the possibility of disabling the manual system during false alarms or servicing should be taken into account.

Heat and Smoke Detectors

The specification for high temperature heat detectors determines the height above floor level at which the detector should be positioned. Smoke detectors are normally sited at the highest point of a compartment.

In addition to the actual detector/alarm components, it is also very important to have a fully independent and integral electrical wiring system. The wiring will connect all the components in a complete fire warning system and ensure the correct sequence of events is followed in the event of a fire. Fire detectors detect one of the three characteristics of fire - heat, smoke or flames - and the advantages of one system over another will depend on the specific purposes for which the system was initially installed and the physical reactions of the contents etc. in the event of a fire.

Other Protection Measures

- Fire exit doors (unlocked and opening in the direction of travel)
- Fire alarms
- Sprinkler systems
- Heat and smoke detectors
- Maintenance of a means of escape
- Means of escape: provide suitable exit doors / points from buildings and the site
- Provide adequate escape routes. Be aware there may be a need for additional
- Fire evacuation plan
- Where necessary appoint and train fire wardens to supervise and lead in a fire emergency
- Arrange specific fire assembly points where staff can be checked off
- Carry out fire drills to test the effectiveness of all of the above
- Provide a suitable fire alarm system to alert all staff
- Make specific and suitable arrangements for calling the Fire Service and meeting and advising them on site
- Provide fire extinguishers and other fire fighting equipment appropriate to need, particularly for hot work situations
- Provide or utilise existing fire resisting doors and fit with/maintain intumescent strips to prevent spread of smoke and gases
- Provide fire action notices, exit signs and emergency lighting and be aware of the need to update and relocate as work progresses
- Install heat and smoke detectors or ensure those in existing buildings remain operational. Make requirements for reactivation of detectors following hot work part of the PTW
- Ensure regular maintenance and inspection of the means of escape

Cavities and Voids

Are primarily by their very nature out of sight and as such can conceal a fire of considerable proportions before it becomes apparent.

They can form channels or passageways through which heat and smoke can move rapidly and unseen to other parts of a building, often at considerable distance from the original fire. Fire fighting in such areas can prove problematic due to their inaccessibility.

Cavities and voids may be present in cavity walls between constructional walls and cladding between external walls and linings, or as part of the internal divisions of the building between floors and ceilings and between structural and false ceilings.

Measures to reduce the risks associated with cavities and voids include:

- Ensuring the separation between cavities and spaces is fire-resisting.
- Providing fire-resisting barriers e.g. above the structural or partition wall in the space between false and structural ceilings.
- Providing appropriate dampers in ducting which are activated by fire detection
- Ensuring the linings of such areas are non–combustible. Metal components which will afford heat transfer by conduction should be enclosed in fire resistant cladding.
- Limiting size / cross communication and ensuring they do not compromise fire compartmentation.
- Ensuring that combustible materials are not stored in voids.

6.8 MEANS OF ESCAPE

The means of escape includes rooms, corridors, stairs and extends up to a point outside the building where assembly may take place in relative safety. **See Fire Guide for further details.**

A safe means of escape is provided by structural elements forming an integral part of the building whereby persons can escape from fire using their own unaided efforts to reach a place of safety.

This means that the building must be designed and constructed to provide safe routes out of the building, wherever possible providing alternative routes in roughly opposite directions so that occupants can turn their backs on a fire and smoke.

Routes should be unobstructed, doors unlocked, well signposted, provided with artificial light where necessary and free from combustible materials and ignition sources. Such routes should provide protected passage to a final exit door kept clear on the outside to allow rapid dispersal to safe assembly points.

Main issues to consider include:-

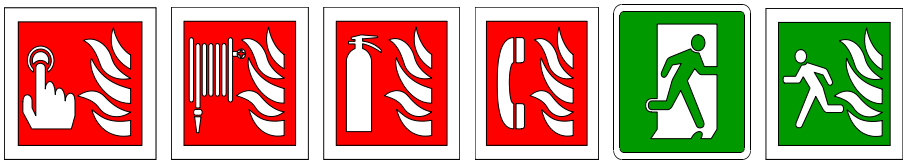
- The nature of the occupants, e.g. mobility
- The number of people attempting to escape
- The distance they may have to travel to reach a place of safety
- The size and extent of the 'place of safety'

Minimum Standards

- Travel distance appropriate for type of building, number of floors and building use
- Suitable for the number of employees & others who may need to evacuate

- Special arrangements for evacuation of disabled – they may need to be taken to a place of safety to wait until they can be evacuated safely.
- Fire doors - easy to open, outward opening, lead to safe area, unlocked.
- Corridors - not obstructed, well lit, good condition
- Signs - green and white to British standards
- Emergency lighting where there is no natural light
- Leading to a final exit to assembly point

6.9 FIRE SAFETY SIGNAGE



Pictogram signage should have been in place by 24th December 1998. Fire exit signage should be green and white with fire appliance signage red and white.

6.10 RECORD KEEPING

The following records must be available to the fire officer from the fire brigade if requested:-

- risk assessment and evidence of remedial action
- fire extinguishers - types and location & maintenance records
- details of any fires (whether the fire brigade was contacted or not)
- inspections of workplace
- fire drills
- employee training records
- fire marshal training records
- fire induction records
- maintenance records for electrical equipment / sprinklers / flooding systems
- emergency lighting testing
- plan of building to show fire evacuation exit routes and the means of escape. They may also show fire doors, fire alarm points and emergency lighting etc.
- evacuation procedures

6.11 EVACUATION PROCEDURES

Any training given to employees must emphasise that they should only use a fire extinguisher to tackle a fire if they have been trained, feel safe to do so, they know the type of fire they are tackling and have access to the correct type of extinguisher. Many people put themselves at risk by tackling large fires which will not be extinguished with a small portable extinguisher. Others use the wrong extinguisher which can make a small fire potentially life threatening. Specific arrangements may need to be in place if there are people with disabilities who may be at greater risk if they are evacuated along with everyone else. Personal evacuation plans may be needed to take into account the specific needs of each individual disabled worker.

Fire drills needs to be held on a regular basis, the exact frequency will depend on the number of employees on site, layout of the buildings, hazards on site and the results of the fire risk assessment. Fire drills need to be undertaken at different times especially if the company operates more than one shift system. Practicing fire drills gives an opportunity to check that the fire evacuation procedure works, people can hear the alarm in all work locations, employees know the location of the nearest fire exit and that all exits open freely. Drills also prepare people so that if a real fire occurs they are less likely to panic.

RAISE THE ALARM
TACKLE THE FIRE IF SAFE TO DO SO
EVACUATE AND CLOSE DOORS
CHECK ALL VISITORS AND EMPLOYEES ARE OUT OF THE BUILDING
GO TO THE ASSEMBLY POINT

Fire Marshall Role

- To check their area is clear during fire evacuations and drills
- To check fire exits are clear on a daily basis
- To check on a weekly basis fire extinguishers are in place with clear access
- To ensure new staff are aware of the fire evacuation / precaution arrangements
- To report any problems and hazards which may increase the fire risks on site

6.12 THE FIRE LEGISLATIVE FRAMEWORK – BACKGROUND TO THE FIRE SAFETY ORDER 2005

UK fire safety provisions were scattered across more than 100 different pieces of legislation, all with many implications for businesses, and some with overlaps between their requirements.

This was confusing to businesses as they attempted to become compliant with this raft of legislation. The aim of the Regulatory Reform (Fire Safety) Order 2005 – produced under the Regulatory Reform Act - was to ‘simplify, rationalise and consolidate existing legislation’

The order applies to virtually all premises and covers nearly every type of building, structure and open space. For example, it applies to:

- offices and shops;
- premises that provide care, including care homes and hospitals;
- community halls, places of worship and other community premises;
- the shared areas of properties which contain several households pubs, clubs and restaurants;
- schools and sports centres;
- tents and marquees;
- hotels and hostels; and
- factories and warehouses.

It does not apply to:

- private homes including individual flats in a block or house.

Employers must:

- carry out a fire-risk assessment identifying any possible dangers and risks;
- consider who may be especially at risk
- get rid of or reduce the risk from fire as far as is reasonably possible and
- provide general fire precautions to deal with any possible risk left
- take other measures to make sure there is protection if flammable or explosive materials are used or stored
- create a plan to deal with any emergency and, in most cases
- review plans and assessments when needed
- train and inform those on site
- provide minimum standards for warning and alarm
- ensure the means of escape is maintained
- appoint a responsible person to co-ordinate their fire safety arrangements
- maintain any fire protection systems

Employees must:

- take reasonable care of self and others
- comply with any requirements imposed by the employer in relation to fire safety
- inform the employer of serious and imminent danger
- identify any shortcomings in fire arrangements (these are a combination of the requirements already in HASAWA and the Mgt Regs but here they are related to fire safety issues)

Who is responsible for meeting the order?

Under the order, anyone who has control of premises or anyone who has a degree of control over certain areas or systems may be a 'responsible person'. For example, it could be:

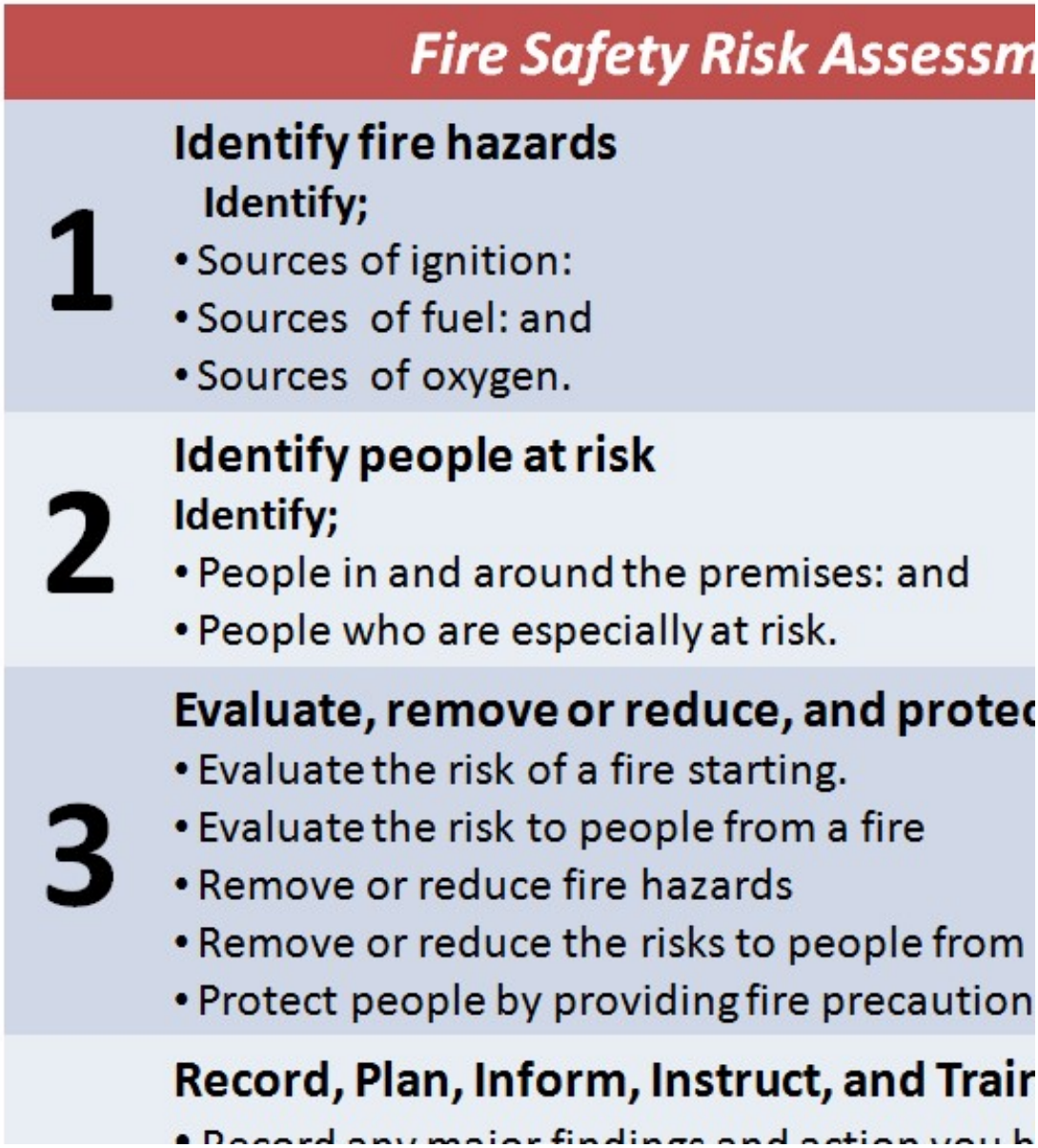
- the employer for those parts of premises that staff may go to
- the managing agent or owner for shared parts of premises or shared fire safety equipment such as fire-warning systems or sprinklers
- the occupier, such as self-employed people or voluntary organisations if they have any control or
- any other person who has some control over a part of the premises

6.13 FIRE RISK ASSESSMENT

The employer must carry out a fire risk assessment and decide what fire reduction measures are required. This follows very similar principles to that of a general risk assessment as required by the Management of Health & Safety at Work Regulations. This requirement has been reinforced by the Regulatory Reform (Fire Safety) Order 2005.

Fire authorities will continue to offer advice to ensure employers are able to discharge their new responsibilities. A series of fire guides are available to guide the employer

through their responsibilities. These have key sections which are identical but also include specific sections relating to areas such as factories, educational establishments, shops, offices and places of entertainment. They can be downloaded free of charge or purchased (www.firesafetyguides.communities.gov.uk or 0870 830 7099).



Hazard Identification: Consider the hazards which cause a fire to start, the features of the building and its use which may increase the risk of fire spreading and the storage of combustibles.

Who is at risk? How many people use the building, are there any young people or those who would have difficulty evacuating without assistance? Do people sleep on the premises?

Existing controls: Identify the current fire prevention and fire protection measures which are in place and working e.g. fire extinguishers, Non Smoking policy etc.

Evaluation: Based on the hazards and existing controls, evaluate the fire risk either of each department, building, or site or from each hazard.

Remove, reduce and protect: Identify any additional control measures which need to be taken to prevent and protect.

Record, plan, inform, instruct and train: Record the significant findings from the risk assessment, prepare emergency plans, train and inform staff and others of these plans and co-operate with others on site.

Review: The whole assessment needs to be reviewed regularly or if there are any significant changes**.** Check that control measures are being followed by completing workplace inspections, checking maintenance records and observing staff in the workplace.

Note: See useful forms section for an extract fire risk assessment record form.

6.14 HIGHLY FLAMMABLE LIQUIDS AND GASES

Flammable liquids are in common use in many industries, yet they have the power to destroy very easily if appropriate precautions are not taken. Substances with low flash points present the highest risks. It is normally the flammable vapour which the liquid produces which is the fire hazard, mixed with air these can ignite very rapidly to give an explosion.

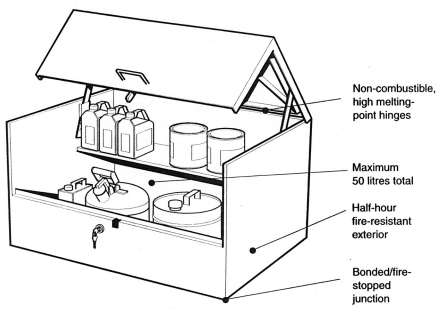
Almost all highly flammable (HF) vapours are denser than air, this means they will accumulate at the lowest point available. The use of correct and suitable equipment for the storage, use and transfer of these liquids is essential if the risks are to be minimised.

Where possible the use of substances with low flash points should be avoided. If this is not possible areas where HF are used should normally be separated from the other parts of the workplace. Partitions should be in place but there should still be a clear means of escape.

FLASH POINT - The temperature at which, under certain conditions, a liquid gives off sufficient flammable vapour to produce a flash on application of an ignition source. The minimum temperature at which ignitable vapour will ignite.

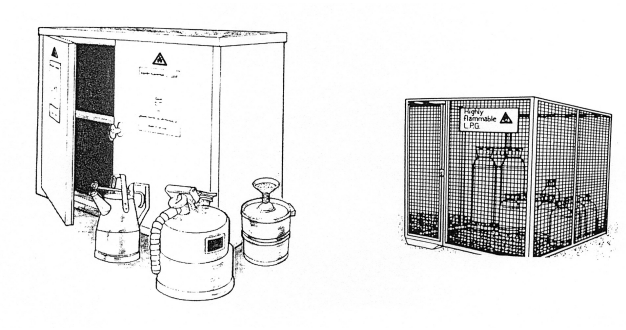
a. Storage

Safety cabinets, ideally double walled for additional insulation, should be provided. These can be fitted with air vents to enable spillage and leakages to be taken away safely. Safety cans may be used for storing smaller quantities of up to 20 litres. These have spring loaded, self-closing lids to minimise the vapour from them, some may have a flame arrestor in the neck to prevent the fire from occurring.



Storage in the workroom

The minimum amount of HF possible should be kept in the work area.



The issue of segregation is particularly relevant where both toxic and flammable materials are used together. Poor segregation substantially increases the risk (of both fire and from toxic fumes) to emergency response organisations and neighbours. Leakage or spillage of certain materials may act as a source of ignition when they come into contact with each other through an exothermic chemical reaction. Flammable materials should be stored in accordance with the requirements of relevant legislation. Typical features are:

- substances stored in bulk containers which are piped to place of use
- adequate identification, bunding and protection by fire suppression equipment of storage arrangements
- sources of ignition controlled

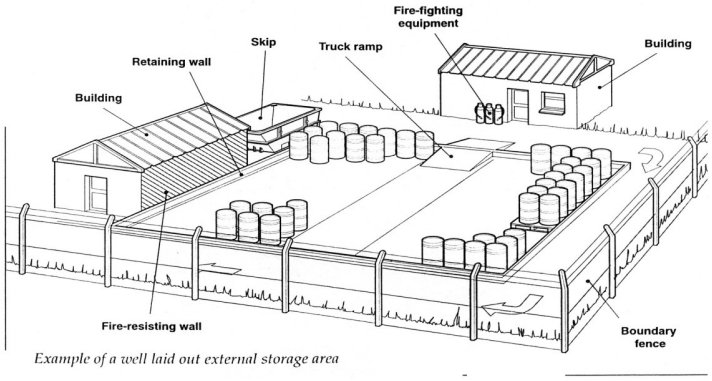
Where substances are supplied or used from containers, the storage facility should meet the above requirements as a minimum standard. They should be secure and adequately ventilated. Highly flammable materials for immediate use in the workplace should not exceed 50 litres (250 litres for substances classified as flammable). Containers should be designed to reduce risk by the incorporation of self-closing, spring loaded caps with a flame arrestor in the neck. The spring loaded cap will snap shut in the event of it being dropped and will act as a safety relief valve which prevents excess pressure rupturing the container. Safety storage cabinets should be used for storing flammable liquids in the workplace. Ideally, these should incorporate the following features:

- double walls for improved thermal insulation
- fitted with low level vents housing flame arrestors in order for the vapours to be safely ducted away and
- liquid traps to collect any leaks and spills from stored containers within the cabinet

Particular care should be taken to keep the floors of the warehouse or bunded areas free of contamination. Drip trays or containers used for repackaging must be clean before use.

Examples of bunding.

b. External Compound Storage



Example of a well laid out external storage area

c. Pipework

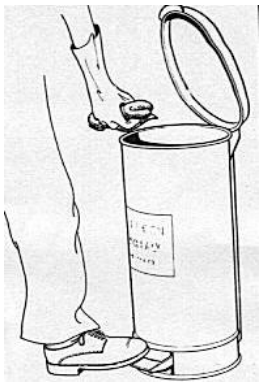
Any pipework used to transfer HF must be made from a suitable material compatible with the liquids being used. Plastic pipes may cause fire risks and have problems with electro static charges. Joints in piping should be kept to a minimum. Pipes must be located where they will not cause a problem if they do leak e.g. not above hot surfaces or naked flames.

d. Use

Bottles with self-closing lids should be used where possible; plunger cans may be used for moistening clothes and wipes. Bench cans and rinse trays enable parts to be cleaned safely in solvents etc.

e. Sources of Ignition

These must be excluded from the areas where HF are being used, decanted and transferred. Electrical equipment in the nearby area will need to be intrinsically safe. Precautions to reduce the risk from static electricity will also be needed. Non-conducting footwear should be worn. Smoking must not be allowed near HFs.



f. Disposal

Even small quantities of waste contaminated with HF can cause problems if not stored correctly. Waste should be put in a waste bin with a self-closing lid. It should be emptied regularly, before the waste is disposed of by an approved contractor. Do not mix waste from different processes unless the substances are known to be compatible.

g. Training

All staff should know about the hazards of using HFs and the need to ensure ignition sources are controlled and eliminated in the work area. The training should cover as a minimum:-

- The types of HF in use
- Safe handling

- Use of PPE
- The importance of good housekeeping
- Fault reporting
- Spillage arrangements
- Emergency procedures
- Risk assessments (Dangerous Substances & Dangerous Environments Regs)

h. Gas Cylinder Storage & Handling Precautions

- store in an open space or properly constructed store room
- oxygen should not be stored in the same area as fuel cylinders
- store cylinders upright
- separate full cylinders from empty cylinders; protect from sunlight and heat
- handle with care - during transportation cylinders should be secured to prevent movement
- never use / store cylinders on their side
- use suitable hoses and check prior to use
- do not drop or knock cylinders
- never repaint or change the markings on a cylinder
- do not use a cylinder which has been involved in an incident/fire
- never transfer the gas from one cylinder to another
- make sure cylinders do not get hot
- never oil or grease cylinder valves
- shut valves after use but do not over-tighten connectors
- check for leaks with soapy water or detectors, not naked flames

6.15 DANGEROUS SUBSTANCES AND EXPLOSIVE ATMOSPHERES (DSEAR) REGULATIONS 2002

DSEAR are concerned with protecting people against the risk from flash fires and explosions arising from dangerous substances and explosive atmospheres. Explosive atmospheres occur in commonplace activities such as wood machining, milling cereals, gas welding, spray painting and using LPG and flammable fluids.

More information can be obtained via: A “Short guide to the Dangerous Substances and Explosive Atmospheres Regulations" http://www.hse.gov.uk/pubns/indg370.pdf

Dangerous substances include a substance or preparation that because of its chemical and sometimes physical properties, and the way it is present and / or used at work, creates a fire or explosion risk to people; for example substances like petrol, LPG, paints, cleaners, solvents and flammable gases and dusts.


OXIDISING


FLAMMABLE


EXPLOSIVE

GAS

Risk Assessment

Before beginning work with a dangerous substance it is a requirement to **carry out a risk assessment**, to review it as necessary and to record the significant findings where five or

more people are employed. Records must include the usual risk assessment issues (as required by Reg 3 MHSWR 1999), and the precautions in place (or to be put in place) and specific information relating to the DSEAR requirements including information on zone classification and protected equipment.

Employers should also consider:

- The hazardous properties of the substance
- The safety information provided by the supplier
- The circumstances of the work, the amounts used, the process and interaction or combined effects of more than one Dangerous Substance (DS)
- The arrangements for safe storage, transport and handling of the DS or waste containing a DS
- Activities where there is a high level of risk such as maintenance
- The effectiveness of measures that are taken
- The likelihood of an explosion and its persistence or duration/effect
- The likelihood that ignition sources or electrostatic discharges will be present
- The scale of the anticipated effects of a fire or explosion
- Other places which are, or could become connected by openings to, places in which explosive atmospheres can occur
- Additional safety information needed by the employer to complete the risk assessment

The risk assessment should then lead to a programme of risk control measures and the application of the hierarchy of control. There also needs to be specific procedures for dealing with accidents and emergencies involving flammable and explosive materials.

Since 1st July 2003 there has been a duty to record on the risk assessment details of any areas zoned as being hazardous due to the likely presence of explosive atmospheres created by dangerous substances.

Information Instruction and Training

- precautions and actions;
- details of the substances, any relevant data sheets and legal provisions;
- the significant findings of the risk assessment.

Enforcement - The HSE or Local Authority, depending on the allocation of premises under the Health and Safety (Enforcing Authority) Regulations 1998.

In the main, the HSE will enforce at all industrial premises and Local Authorities elsewhere. The fire authorities will enforce general fire precautions at most premises subject to DSEAR.