

# ◀ BEST PRACTICE GUIDE CONSTRUCTION SITE - FIRE SAFETY



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# Introduction ►

## Preface

The central section of the Crossrail project consists of 42 kilometres of new railway, served by 9 new stations. These in turn are supported by a wide infrastructure which will enable the railway to run effectively, efficiently and safely.

Constructing the new railway is a complex task with multiple trades carrying out many activities to ensure that the project is delivered. In line with Crossrail's Target Zero health and safety strategy, every effort is being taken to ensure that the risk to our workforce is kept to a minimum.

One of the key risks associated with the work we are carrying out is fire – whether the work involves welding, cutting metals or any other activity that generates heat, there is a risk of fire.

Crossrail has worked in collaboration with the London Fire Brigade, the Fire Protection Association and Construction Industry Publications Ltd to produce this Best Practice Guide which provides key information that will help prevent fires.

## Purpose

The purpose of this Best Practice Guide is to provide information to help users prevent fires and ensure good standards of fire safety management on Crossrail construction sites.

Every year there are numerous fires on construction sites across the UK. Each one of these fires has the potential to have serious consequences including loss of life and major damage to buildings and infrastructure, as well as

introducing complications and delay in the delivery of the project.

In many (but not all) cases fires can be prevented by designing out risk; the risk of fire can be reduced even further by taking a few simple precautions and ensuring that safe working practices are defined and complied with.

By following these fire safety guidelines the risk of fire can be substantially reduced.

Fire safety is collaborative – we all need to work together to ensure that activities on site are carried out to the highest standards of fire safety.

This Best Practice Guide is for use by everyone working on site and provides information and guidance that will help to ensure that the risk of a fire is kept as low as practicable. In addition it provides information on how sites should be set up to ensure that, in the event of a fire, everyone is able to leave the site safely and unharmed.

This Best Practice Guide is based upon extracts from “Fire Prevention on Construction Sites”, a Joint Code of Practice (JCoP) published (and copyrighted) by Construction Industry Publications Ltd and the Fire Protection Association\*.

This is a guide only and as such all contractors/subcontractors and anyone else working on Crossrail should comply with relevant legislation and the requirements of the JCoP. Details on how to obtain a copy of the JCoP can be found in the ‘Further sources of information’ section at the end of the Guide.

## Section A - General Guidance





The following general fire safety rules should always be kept in mind:

## Understanding the risks

Understanding the risks associated with fire are essential to keeping a site safe from fire. Legislation requires that a suitable and sufficient Fire Risk Assessment (FRA) should be undertaken and maintained throughout construction work; all actions regarding Fire Safety should be as a result of the FRA:

- **Identify hazards:** consider how a fire could start and what could burn
- **Identify people at risk:** employees, contractors, visitors and anyone who is vulnerable, e.g. people with disabilities
- **Evaluate and act:** consider the hazards and people identified (above); act to remove and reduce or control residual risk to ensure people and premises are protected
- **Record, plan and train:** keep a record of the risks and action taken. Make a clear plan for fire safety and ensure that people understand what they need to do in the event of a fire.

## Giving warning

There shall be a system to alert people on site. This may be a temporary or permanent mains operated, wired or wireless, fire alarm (tested weekly), a klaxon, bell, air horn or a whistle, depending on the size and complexity of the site. This list is not exhaustive.

The warning needs to be distinctive, audible above other noise and recognisable by everyone. Where

practical it should be demonstrated at induction.

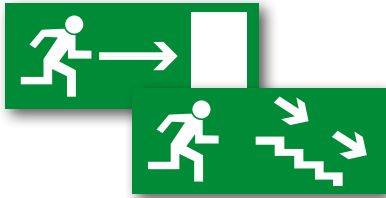


## Fire escape routes

As much as you may plan to prevent a fire occurring, in the event that one starts it is essential that all personnel in the area are able to escape quickly, easily and safely. Key aspects to providing safe means of escape on construction sites include:

- **Routes:** the FRA should evaluate the escape routes required - these must be kept available and unobstructed at all times
- **Alternatives:** well-separated alternative routes to ground level should be provided where possible
- **Protection:** Wherever possible (and when a need is identified by the FRA) routes should be protected by installing permanent fire separation and fire doors as soon as possible prior to use
- **Assembly:** make sure escape routes give access to a safe place away from buildings where people can assemble and be accounted for. On a small site the pavement outside may be adequate

- **Signs:** escape routes must be clearly identifiable and well signposted. Signage should be reviewed regularly to ensure it reflects the site layout



- **Lighting:** should be provided for enclosed escape routes and emergency lighting may be required.

## Fighting fire

As a general rule, fighting fires should be left to professional fire fighters. Only tackle a fire using a hand held extinguisher (or other fire fighting equipment such as fire blankets) if you are trained and confident that you can do so without putting yourself at risk.

Fire extinguishers should be located at identified fire points around the site – these locations should be determined by the FRA. The extinguishers should be appropriate to the nature of the potential fire:

- wood, paper and cloth – water or foam extinguisher
- flammable liquids – dry powder (not to be used sub surface) or foam extinguisher
- electrical – carbon dioxide (CO<sub>2</sub>) extinguisher.

Nominated people should be trained in how to use extinguishers.

A system of regular inspections of fire extinguishers should be in place.



## Design

Even before work commences on site, designers will have been tasked with designing the construction so that fire risk is reduced as far as is reasonably practicable. Consideration should have been given to all potential fire hazards which may be identifiable at the design stage, and managing these by considering:

- The use of non-combustible and non flammable materials
- Materials and methods that avoid the need for hot work on site
- Design details that prevent the passage of smoke and flames up through a building during the construction phase
- Design of access routes to enable contractors to construct buildings in a way that retains safe evacuation routes during the construction phase
- Design for fire fighting systems and fire alarm systems for their possible early use.



Designers should ensure that travel distances, escape routes, compartmentation and fire fighting measures in the incomplete building are regularly reviewed and any changes advised to the construction team.

The construction team must regularly review the impact that their activities have on escape routes.

Designers should consider where the construction team will be able to store combustible and flammable materials including waste (e.g. packaging) – it is important to ensure that this can be stored in an area where fire risk is minimised.

Wherever possible the design should accommodate the early installation of:

- Permanent fire escape doors (including fire compartment walls)
- Fire compartments within the building (including fire doors and fire stopping)
- Structural steelwork fire protection
- Firefighting shafts
- Automatic fire detection systems (where these are planned to be installed)
- Automatic sprinklers and other fixed firefighting equipment
- Temporary emergency lighting.



# Section B - Fire Safety on Site





## Site Fire Safety Plan

The site safety plan should be developed from a site specific FRA. It should be specific to the site and reviewed and updated periodically and should include the following as a minimum:

- The organisation and responsibilities for fire safety arrangements
- Fire safety training for site operatives (including keeping training records)
- General site precautions, fire detection and alarm systems and emergency lighting
- Fire extinguishers, general fire fighting equipment and fire points
- A requirement to maintain all forms of access (e.g. pedestrian, vehicular) to the site and buildings at all times
- The need for fire escape routes associated with the construction including internal corridors and stairwells
- The need for clear signage of all fire escape routes
- A requirement for all fire escape routes to be kept clear of obstructions
- The location(s) of any designated smoking area(s). Smoking should generally be discouraged, absolutely prohibited in non-designated areas
- The requirement for a hot works permit regime if hot works will be carried out
- Temporary buildings and accommodation including location, fire protection, construction and maintenance
- Communications – including a fire evacuation plan and arrangements for calling emergency services
- Fire and rescue services access, facilities and co-ordination
- Instructions for anyone on site on actions to take in the event of a fire (including assembly point location)
- Security measures to minimise the risk of arson
- Material storage arrangements with particular reference to flammable materials
- Waste storage arrangements with particular reference to flammable materials
- Maintenance arrangements for electrical installations (including temporary installations)
- The use of fire retardant coverings as deemed necessary
- Arrangements for plant and vehicles (e.g. fire suppressants)
- Measures to prevent fire spread from the site to adjoining areas
- Housekeeping requirements – waste and clutter can present a fire risk
- Appropriate segregation of materials.

## Fire Marshals

The Principal Contractor should appoint a Fire Marshal, Deputy Fire Marshal and Fire Wardens, to assist in the implementation of the site fire safety plan. The number of Fire Marshals etc. required will be dependent on the findings of the FRA.

The number of Fire Marshals, Deputy Fire Marshals and Fire Wardens should be determined by a FRA and should take into account the size and organisation of the project.

Fire Marshals, Deputy Fire Marshals and Fire Wardens should receive adequate training to ensure that they are competent to carry out their duties. They should have sufficient status and authority to enable them to carry out their duties effectively.

Duties of Fire Marshals, Deputy Fire Marshals and Fire Wardens should be clearly defined in an appointment letter.

## Emergency Services liaison

During the design phase access arrangements should have been agreed with the fire and rescue services. Once the site has mobilised, the fire and rescue services should be provided with an initial site layout plan; provisions for water supply and emergency services communications equipment should also be agreed at this time. The site plan should be updated regularly to ensure it reflects the site layout. An up-to-date plan should be held on site for use by the fire and rescue services; this should include:

- Access points, fire fighting shafts, fire lifts, temporary hoists, fire fighting bridgeheads
- Dedicated emergency escape routes and staircases
- Fire points & sprinkler installations
- Floor loading limits
- Positions of hydrants, wet risers and dry riser inlets and outlets
- Temporary buildings and accommodation
- Any hazardous substances or areas e.g. flammable liquids, gas bottles, floor slab holes, electrical risers etc.

Local fire and rescue services should have access to the site to assess water supplies, fire fighting arrangements, site access arrangements and site layout.



## Emergency procedures

Suitable arrangements must be in place for raising the alarm in the event of a fire. The following should be considered:

- The FRA will assess which type of device is to be used



- Irrespective of the system used, the alarm must be easily identified as a fire alarm and audible at all affected locations
- If a manual device is being used there should be enough of these across the site to ensure they can be accessed at all times
- Use of hand held devices inside buildings should be considered in the FRA as they have the potential to delay the escape of the device user.

Consider also whether there is a need to install automatic fire detection systems based on the findings of the FRA.

Written emergency procedures must be prominently displayed and provided to all personnel on site at induction. These procedures (as well as Fire Action Notices) must identify the fire assembly point.

Nominated personnel must have received a briefing explaining the actions to take in the event of an emergency (e.g. calling emergency services, ensuring access for emergency services, assisting evacuation, etc.).

Suitable arrangements need to be in place for checking that all personnel are accounted for; the Fire Marshal is the central point of contact for co-ordinating this information.

The Principal Contractor should ensure:

- Everyone on site is aware of the emergency procedures
- Any responsibilities assigned to individuals are carried out effectively.

Appropriate training should be delivered and this should be supplemented by regular refresher training.

It is important to ensure that people who do not have English as a first language are clear on the emergency procedures.

Emergency procedures should be tested by carrying out regular fire drills which include personnel being evacuated to the fire assembly point; drills should be carried out at least every six months or whenever there are significant changes to the site. Fire drills should be observed and recorded; any issues identified (and changes made as a consequence) should also be recorded.

## Fire protection

The project should, wherever possible, be designed to enable the early installation and operation of:

- Permanent fire escape stairs (including fire compartment walls)
- Fire compartments within the building including fire doors and fire stopping
- Structural steelwork fire protection
- Fire fighting shafts – these should be commissioned and maintained
- Lightning conductors
- Automatic fire detection systems (where these are planned to be installed)
- Automatic suppression systems and other fixed fire fighting equipment
- Temporary emergency lighting (prior to the installation of permanent emergency lighting).

Generally, two means of escape should be available from the work area; any 'dead-end' situations should be subject to special attention, even when they are temporary.

With the FRA in mind, sites should be set up so that escape travel distances are proportionate to the level of fire hazard. Generally fire escape distances should be kept as short as possible and avoid, wherever practicable, moving through areas of higher fire risk.

Adequate supplies of water should be made available for fire fighting; these should be made available as part of site mobilisation and reviewed at appropriate times throughout the works. The following should be considered when setting up water supplies:

- Any extensions to the fire hydrant main should be installed as early as possible
- Distance of fire main from source and resultant water pressure reduction must be considered – and addressed as appropriate
- Rising and temporary mains must be provided where planned
- If it is necessary to move the fire brigade inlet point, information on the new location must be readily available
- Periodic testing of water supplies should be carried out; testing records should be maintained
- All hydrants must be suitably marked and kept clear of obstructions.



Appropriate fire extinguishers (e.g. CO<sub>2</sub>) should be within the vicinity of distribution panels and other items of electrical equipment.

Clear signs relating to fire safety issues must be installed and maintained in prominent locations. These signs include:

- Fire and rescue services access routes
- Fire Action Notices
- Escape routes
- Positions of dry riser inlets
- Fire extinguishers
- Fire alarm call points
- Manually operated devices for raising the alarm.

Signs should be reviewed regularly and replaced or repositioned as necessary.

Fire checks should be undertaken at the end of each working day, especially in areas where hot work has been carried out.

No part of a building should become permanently occupied until all fire protection and control measures have been installed, tested and, where appropriate, commissioned.

## Temporary coverings

When temporary coverings are used to protect finished surfaces, fittings, floors or equipment the protective covering to be used should be assessed as part of the FRA. This assessment should consider the relative fire load (amount of material that may burn) and the potential for fire growth and spread.

Any flexible protective covering materials used must conform to LPS 1207 (Fire requirements for protective covering materials); the relevant approval mark must be printed on the material. Without the approval mark it cannot be guaranteed that the material is compliant.

Any flexible materials used to clad scaffolding must conform to LPS 1215 (Flammability requirements and tests for approval of scaffolding materials). The relevant approval mark must be printed on the material. Without the approval mark it cannot be guaranteed that the material is compliant.

Where flexible protective covering have been overprinted (e.g. with advertising) it is important to ensure that this does not adversely affect the fire performance of the material. This should be checked through the certification body.

## Protection against arson

Arson protection should be detailed in the site fire safety plan and should be based on the site specific FRA. Buildings should be suitably protected in accordance with findings of the risk assessment.

The best way to deter would-be arsonists is to ensure the site is protected as far

as possible against unauthorised entry. All site entry points (including windows and doors) should be secured, and the site entrance should be locked outside normal working hours.

If the finished project is due to have permanent security fencing, consideration should be given to installing this early in the programme.

Pedestrian and vehicle access points should be secured with high security locks, shackles, chains or similar. These should be assessed to ensure they are capable of providing the required level of security.

Storage areas used specifically for flammable substances and materials should be fenced, caged or otherwise suitably secured. The storage area should be kept out of view from outside the site.

Good site illumination is a known deterrent to potential intruders and is recommended. However, consideration should be given to site neighbours and the potential impact an illuminated site would have on them at night.

Additional out of hours security arrangements should be considered including monitored CCTV and the use of appropriately licensed security guards.

It is important to remember that not all fires are started by intruders, and all site staff should be alert to the potential for fires to be started maliciously by other on site personnel.

In the event that work on site is suspended (or the site is subject to a long term closure), FRAs may no longer be valid – they should be reviewed and



appropriate new precautions taken to ensure that the 'mothballed' project is appropriately protected.

Valuable items (e.g. plant, cable) should be conspicuously secured, kept out of sight or immobilised – this will help to deter theft-related arson.

It is worth considering the installation of intruder alarm systems in temporary buildings and accommodation.

## Temporary buildings & accommodation

Temporary buildings include prefabricated cabins, site huts, caravans and any other non-permanent structures for use as offices, stores, workshops etc.

Temporary accommodation includes any segregated part of the construction that is being used as offices, stores, workshops etc.

The site fire safety plan must be based on a suitable and sufficient FRA for all temporary buildings and accommodation. This risk assessment

should be reviewed following changes to site, and at least annually.

Wherever possible, temporary buildings should be separated from the main work site by as large a gap as possible – a minimum of 10 metres is preferred. This will create a fire break and help prevent the spread of fire. The gap should be kept clear of all combustible materials.

Rows of temporary buildings should be separated to help prevent the spread of fire.

Where there is not enough space to provide a suitable fire break, temporary buildings should be made from materials that will inhibit the spread of fire or the creation of toxic fumes and smoke.

Temporary buildings should be checked to ensure that they are compliant with all relevant regulatory requirements. Where the appropriate expertise for these checks is not present on site a third party specialist may be engaged to carry out an assessment.



Temporary buildings should be designed and constructed to meet the relevant requirements of BS 476 including:

- All internal walls, internal walls and ceilings should inhibit the spread of fire
- Walls and roof must have 30 minutes fire resistance
- Doors and windows' must have 30 minutes fire resistance and must be securely closed when the area is unoccupied. Fire doors must be fitted with self closers.

Where temporary buildings are vertically stacked, the roof, floor and supporting structural members must have at least 30 minutes fire resistance.

Where the floor of a temporary building is raised above ground level the space beneath must be closed off to prevent the accumulation of rubbish beneath; adequate ventilation should, however, be maintained.

Combustible or flammable materials should never be stored under a temporary building, temporary stairs or access to a temporary building.

As with temporary buildings, all temporary accommodation elements must be compliant with the relevant clauses of BS 476 including:

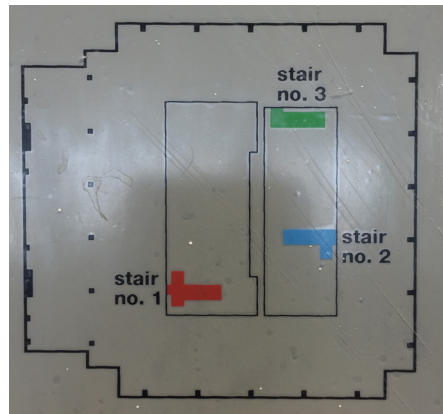
- The accommodation must be separated from the rest of building by walls and ceilings that achieve 30 minute fire resistance
- Doors and windows in 30 minute fire resisting walls must achieve 30 minutes fire resistance and be

securely closed when the area is unoccupied

- Fire doors must be fitted with self closers.

Wherever possible fire exits from temporary accommodation should lead to open air and away from the work site.

Escape routes should be regularly inspected and assessed Where possible fire escape routes should be protected by a minimum 30 minute fire resistant temporary protection.



When it is necessary to install temporary buildings and accommodation within the building under construction the following guidance should be followed:

- A FRA should be carried out to ensure that temporary buildings and accommodation will only be located in areas that can be quickly evacuated by personnel and easily accessed by fire and rescue services

- Temporary buildings or accommodation that is located within the building under construction, inside another permanent building or within 10m of a permanent building must be fitted with an appropriate fire detection system. This should be linked to the fire alarm system in the building which is under construction.

Generally it is recommended that suitable automatic fire detection systems are installed. However, this is essential where flammable liquids are being stored or where cooking and / or drying of clothes is taking place.

Where heaters are installed these should be fixed, above floor level and fitted with securely fixed metal guards.

Heaters should:

- be thermostatically controlled
- have enclosed elements
- be subject to regular visual checks
- NOT be left running 24/7.

Coat stands and drying racks have been seen in the past to present a high fire risk because of the potential for drying clothes to ignite. They must therefore be firmly positioned at a safe distance from heaters.

All heaters and cooking appliances must be properly installed; adequate ventilation must be provided. Where possible microwave ovens should be used. Gas cooking appliances should be avoided.

In line with the FRA temporary buildings should not contain more than the minimum of furniture and fittings, which should be of a fire retardant nature.









Open plan areas created by joining temporary buildings should be subject to FRA to identify if fire resistant sub divisions are required.

Temporary living accommodation must not be inhabited within a structure whilst work is being carried out.

## Acetylene

Acetylene is an extremely flammable gas that can become unstable at high temperatures; it constitutes a substantial fire risk.

Wherever possible acetylene should be eliminated from site and alternative methods of cutting and welding adopted. Where this is not possible the following precautions should be taken:

- The number of cylinders on site should be kept to a minimum
- Acetylene cylinders should:
  1. be removed from the work area and returned to a clearly labelled secure storage area as soon as work is completed
  2. Be chained if no secure storage area is available
  3. Be stored upright
  4. Never be stored below ground
  5. Be secured away from other gas cylinders.

Acetylene cylinders should be removed from site altogether as soon as they are no longer needed.

## Flammable liquids and LPG

Ideally flammable liquids and LPG will not be brought onto site; these significantly increase the fire risk, particularly when not used and stored

correctly. It is recognised that prohibiting them from site is impractical, so where their use is unavoidable the following precautions should be taken:

- Flammable liquids must only be stored in containers specifically designed for the purpose
- Flammable liquids should be stored separately from other materials
- Wherever possible flammable liquids should be stored in securely fenced open compounds which are shaded from the sun; they should be remote from pits, drains and low lying areas
- Flammable liquids should be stored within sealed bunds which are capable of holding the contents of the largest container plus 10%



- Flammable liquid storage areas should be kept clear of all waste including weeds
- The quantity stored should always be the minimum required

- Flammable liquid storage areas should be away from any buildings
- Flammable gas cylinder be stored in the same location as flammable liquids
- Appropriate signage must be in place indicating that flammable materials are stored in the area (e.g. NO SMOKING)
- Electrical installations in the storage areas must be kept to a minimum, be appropriate for the area and be competently fitted
- An adequate number of appropriate fire extinguishers should be available at the entrance to the storage area
- Storage area locations should be marked on Fire Brigade plans.

Flammable liquids stored on site must form part of the FRA.

## Hot works

The potential for accidents resulting from hot works is significant. Welding, cutting and grinding all carry the risk of damaging eyes, skin, and hearing. In addition to the hot metal, flying metal chips and sparks are the risks presented by compressed flammable gases.

Consideration should also be given to the risk that welding fumes and gases can present to the respiratory system.

Appropriate PPE should be worn during all hot works activities.

Welding and allied processes produce molten metal, sparks, slag and hot surfaces which pose a risk of fire and explosion. Flying sparks are the main

cause of fire and explosion, especially as sparks and molten metal can travel up to 10m from the work space; they can travel even greater distances when falling and can pass through and become lodged in cracks, clothing, pipe holes and other openings. To reduce the risk of fire and explosion when carrying out Hot Works:

- Plan work in advance– can the hot work be eliminated or carried out in another area?
- A permit to work (PtW) should be obtained before commencing work; the permit must be specific to the work and closed when the work is complete
- PtWs should be co-ordinated across contracts and communicated to anyone likely to be affected by the work
- Working areas and the areas below them should be kept free of combustible material.
- Hot work should not be undertaken in areas designated for the storage of flammable / combustible materials
- Fixed items of plant, such as installed electrical cables should be protected by a fire blanket
- When welding, cutting or grinding the work area must be protected by means of a non-flammable material
- Welding, cutting and other hot works are only to be carried out by suitably competent personnel.

Suitable fire extinguishers should always be close at hand, and the working area should be inspected when work ceases to ensure there is no residual risk of fire or explosion.

The potential for heat to be conducted through a wall or floor slab (e.g. via metal pipework) should be considered and eliminated.

Additional precautions are necessary when working with oxy-gas equipment:

- Gas bottles should be in an upright position, secured to prevent falling and located in an open aspect during use
- The cylinder valves should be kept shut while hoses and equipment are being connected or disconnected
- The requirement to fit flash back arrestors to both hoses is mandatory

- Operatives should ensure that there is enough gas in both cylinders to complete the job
- Manufacturer's guidelines for proper shut-down and start-up to prevent flashback must be followed
- The bottle key should be kept on the valves while equipment is in use to enable quick shut off in the event of an emergency.

A fire watch should be maintained during and after all hot works operations.

The fire watch should monitor the area for a minimum of one hour following hot works to ensure that the area is fully cooled and there is no risk of a subsequent fire. Works should therefore be finished one hour before shift end.





## Gas

The following guidance is to be used for all gas installations on site:

- All gas supplies must be installed by a Gas Safe registered installer
- Checks should be made to ensure that those carrying out installation or maintenance work on gas appliances are Gas Safe registered
- Gas supplies to appliances should be by fixed piping or armoured flexible tubing
- Gas cylinders should be located outside buildings, secured and protected from unauthorised interference
- All gas appliances should be fitted with clearly labelled control taps
- Location of control taps should be identified on Fire Brigade plans
- LPG connected to an appliance by a flexible link should only be installed by a competent person.



## Electricity

All electrical installations, whether temporary or permanent, must be installed in accordance with relevant regulations.

- Portable electrical equipment should be visually inspected at the time of installation
- Portable electrical equipment should be tested at appropriate periods and carry an attached label clearly displaying the date when the next test is due
- Equipment bearing an expired Portable Appliance Test (PAT) label should be removed from use and quarantined; it should only be returned to use when it has successfully passed a PAT
- All electrical work should only be undertaken by a competent electrician
- All electrical installations must be checked regularly and a register held of the checks
- All electrical cables should be protected against damage
- Where temporary lighting is required, the following guidance should be followed:
  1. Lights should be located well away from combustible materials
  2. Low voltage festoon lighting should be used; where this is not possible sealed fluorescent light units should be used
  3. Unprotected quartz halogen lights should not be used
- Where possible main switches should be turned off when work

ceases; this does not apply to switches controlling security and automatic fire detection equipment

- Where extension power leads are used they must be surge protected; care must be taken to ensure that circuits do not become overloaded.



## Waste materials

Good housekeeping is essential on site as waste materials can provide a source of fuel for a fire. The following guidance should be followed:

- The introduction of combustible waste should be kept to a minimum. Combustible waste includes old storage containers, packing materials, wood, shavings, cardboard boxes, foam chips, polystyrene etc
- Where combustible waste is generated on the work site it

should be removed regularly or, as a minimum, at least once a day

- All waste materials should be removed to appropriately sited and managed waste storage areas as soon as possible
- Combustible waste materials should not be allowed to accumulate and should be removed from the work area at the earliest opportunity
- Combustible waste should not be stored below ground
- Separate metal bins with close fitting metal lids should be provided for combustible materials such as oily rags
- Waste receptacles for flammable liquids should be appropriate for this use and should be fitted with self-closing lids and appropriate flash arrestors
- Waste receptacles storing flammable liquids should be appropriately earthed to a fixed earth installation
- Unwanted materials from open areas of the site must be collected at regular intervals
- Waste storage areas (including recycling bins) should be kept as far as possible from the construction, temporary buildings, accommodation, potential sources of ignition and other areas containing flammable / combustible substances

- Waste should not be stored on escape routes or shaft
- All vegetation should be cleared from site regularly.

Site bonfires are not permitted for both fire safety and environmental reasons.

Suitable fire fighting equipment should be available near to waste storage areas for emergency use.



## Stored materials

Even when the most stringent of controls have been put in place to manage fire risks on site, a stray spark can still cause a fire if combustible materials are stored near the area where hot works are being carried out.

As a general rule, combustible / flammable materials and liquids should never be stored in tunnels or underground working areas; they should only be taken into those areas when required and removed at the first opportunity.

Wherever possible combustible / flammable materials should be stored outside; they should not be so close to the work area that it is possible for a fire to spread from the materials to the building.

Combustible / flammable materials should be stored in flameproof containers (ideally metal) whenever possible.

When combustible materials are being stored indoors the following guidance should be followed:

- The area should be regularly checked
- Access to the storage area should be controlled
- The storage area should not be in the work area
- The storage area should be covered by the site fire detection system
- Appropriate fire fighting equipment should be located close to the storage area.

It is recommended that combustible / flammable materials are covered with a layer of flame retardant material – consider the use of materials meeting the requirements of LPS 1207.





## Plant

Fuel powered plant, is often essential on site. However, it carries a high level of fire risk when not managed properly – the following guidelines should be followed to ensure that the risk of fire is kept as low as possible:

- The FRA should determine the best place for vehicles to park and any additional controls that may be required
- Any stationary plant should be positioned either in the open air or in a designated well ventilated, non combustible enclosure
- Exhaust pipes / exhaust gases should be kept clear of combustible materials
- Wherever possible plant should be kept separate from work areas and other buildings
- Exhausts should be kept clear of ventilation inlets
- When refuelling on site:
  1. Fuel tanks must not be filled when engines are running or hot
  2. Refuelling should only be carried out in designated areas
  3. Fuel should be safely stored above ground in appropriate, clearly labelled containers
- Compressors should be separated from other plant and kept in enclosures
- All plant and equipment should be protected from impact

- Air intakes should be kept clear and out of the way of any flammable vapours or gases
- A spill kit or appropriate bunding should be put in place to contain any drips of fuel or lubricant.

Any plant found to be leaking fuel or lubricant should be removed from use until effective repairs have been carried out.

Fire suppression systems should be installed on mobile plant where a need is identified by the FRA.



## Vehicles

Vehicles can present a large number of risks on site; fire is one of these, and the following measures should be taken to reduce this risk:

- Wherever possible, vehicles should be parked at least 10m away from the construction and any other nearby buildings
- If a vehicle cannot be parked away from the building (e.g. in tunnels) a specific FRA should be carried out and appropriate controls put in place
- Any oil / lubricant leaks should be reported and repaired at the first available opportunity; the leak should be contained by putting appropriate bunding beneath it or using a spill kit to contain the leaked fluid
- Fuel leak presents a substantial risk; if this occurs the vehicle must be moved to open air away from the construction area and not used until repaired
- In tunnels, appropriate fire suppression systems are to be installed in engine bays to ensure rapid extinguishing of engine fires
- In addition to site fire fighting equipment appropriate hand held fire extinguishers should be available in the cab of all vehicles.



## Smoking

For fire and health reasons it is best to prohibit smoking across the entire site. However, this is often not practical, so where smoking is to be permitted on site the following guidance should be followed:

- A no smoking policy should be established and enforced throughout the site –except for designated smoking areas where smoking will be allowed
- Designated smoking areas should be safe to get to and use
- If a smoking shelter is to be provided in the designated smoking area:
  1. It should be included in the site FRA
  2. It should be constructed of non combustible materials
  3. It should be sited as far as possible from the construction area
  4. Metal ash trays or bins with fitted lids should be provided
  5. A suitable fire extinguisher (as per the FRA) should be readily available
- The shelter and the area around it should be kept clear of combustible materials
- The shelter and area around it should be checked regularly – ash trays and bins should be emptied during these checks
- Raised, slatted floors or decking should not be used for floors
- It should not be possible for combustible waste to collect beneath the shelter
- Combustible curtains, canopies and drapes must be avoided
- Shelters should never be sited near:
  1. Windows
  2. Ventilation intakes or extracts
  3. Entrances and exits from the construction area
  4. Hazardous materials including flammable material stores
  5. Waste storage containers (e.g. skips, bins)
  6. Beneath a canopy or low slung eaves
- Shelters should be a minimum of 1.5m away from the nearest entry point to the building
- If there is no shelter provided, smoking areas should be kept clear of combustible materials and equipped with fire extinguishers, metal ash trays and a metal bin with a fitted metal lid.

A no smoking policy must be implemented and enforced across all areas of the site that are not designated smoking areas. Compliant 'NO SMOKING' signage should be displayed prominently in relevant areas including the entrance to the site / offices / accommodation.





## Portable fire extinguishers

Additional signage should be provided where the location of the fire point is obscured from view.

All non-automatic fire fighting equipment must be easily accessible.

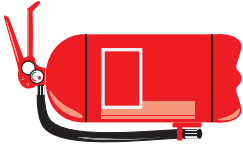
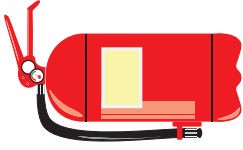
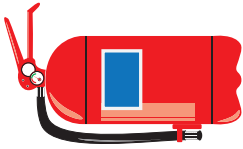
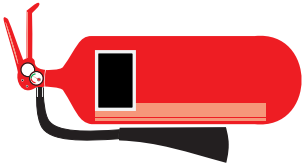
All portable fire fighting equipment must be inspected annually in accordance with BS 5306: Part 3 – or more frequently if sited in a harsh location / environment (extremes of temperature for example).

There should be ongoing assessment of the adequacy of the fire fighting equipment as the work progresses and the site changes.

Due to the potential asphyxiation and visibility hazards afforded by dry powder extinguishers, their use indoors should only be permitted if supported by a specific Health and Safety risk assessment where the location of the fire point is obscured from view.



# KNOW YOUR FIRE EXTINGUISHER TYPES

Symbols found on fire extinguishers and what they mean	 WATER	 FOAM SPRAY	 DRY POWDER	 CARBON DIOXIDE
Wood, Paper & Textiles	✓	✓	✓	✗
Electrical Contact	✗	✗	✓	✓
Flammable Gases	✗	✗	✓	✗
Flammable Liquids	✗	✓	✓	✓
Cooking Oils & Fats	✗	✓	✗	✓

# Section C – Appendix



## Reference documents

In addition to any other standards and regulations that apply to construction sites, the following are particularly relevant when implementing Site Fire Safety controls:

Document	Publisher
HSG 168 - Fire safety in Construction	HSE
Electricity at Work Regulations	HSE
Construction (Design and Management Regulations)	HSE
Dangerous substances and explosive atmosphere regulations (DSEAR)	HSE
Maintaining Portable Electrical Equipment	HSE
Regulatory Reform (Fire Safety) Order	UK Government legislation
The Smoke-free (Premises and Enforcement) Regulations	UK Government legislation
Private Security Industry Act	UK Government legislation
Fire prevention on construction sites: Joint Code of Practice	Construction Industry Publications / Fire Protection Association
RC7 – Recommendations for Hot Works	RISCAuthority / Fire Protection Association
Protection of empty buildings, fire safety and security: Code of Practice	Fire Protection Association
LPC Sprinkler Rules incorporating BS EN 12845	Fire Protection Association
Loss Prevention Standard LPS 1207: Fire requirements for protective covering materials	LPCB
Loss Prevention Standard LPS 1215: Flammability requirements and tests - scaffolding materials	LPCB
Code of Practice for In-service Inspection and Testing of Electrical Equipment	IET
BS 5306: Fire extinguishing installations and equipment on premises	BSI
BS 476 series of fire safety standards	BSI
BS 5839-1: Fire detection and alarm systems for buildings	BSI
BS 7671: Requirements for electrical installations	BSI

A number of the documents above are supported by guidance documents. These can be found at the web sites listed overleaf, or ask your local safety professional for guidance.



## Further sources of information

All of the documents listed in the 'Reference documents' section can be found at the following sites which are also extremely useful for information on all other aspects of site safety.

Health and Safety Executive	<a href="http://www.hse.gov.uk">www.hse.gov.uk</a>
UK Government legislation	<a href="http://www.legislation.gov.uk">www.legislation.gov.uk</a>
Construction Industry Publications	<a href="http://www.cip-books.com">www.cip-books.com</a>
Fire Protection Association	<a href="http://www.thefpa.co.uk">www.thefpa.co.uk</a>
RISCAuthority	<a href="http://www.riscauthority.co.uk">www.riscauthority.co.uk</a>
Loss Prevention Certification Board (LPCB)	<a href="http://www.bre.co.uk">www.bre.co.uk</a>
Institution of Engineering & Technology (IET)	<a href="http://www.theiet.org">www.theiet.org</a>
British Standards Institution (BSI)	<a href="http://www.bsigroup.co.uk">www.bsigroup.co.uk</a>

## Phonetic alphabet

A	Alpha	J	Juliet	S	Sierra
B	Bravo	K	Kilo	T	Tango
C	Charlie	L	Lima	U	Uniform
D	Delta	M	Mike	V	Victor
E	Echo	N	November	W	Whiskey
F	Foxtrot	O	Oscar	X	X-ray
G	Golf	P	Papa	Y	Yankee
H	Hotel	Q	Quebec	Z	Zulu
I	India	R	Romeo		

Numerals should be spelled out, not given as whole numbers:  
121 is 'one-two-one', NOT 'one hundred and twenty one'.







**MOVING LONDON FORWARD**

