HSB

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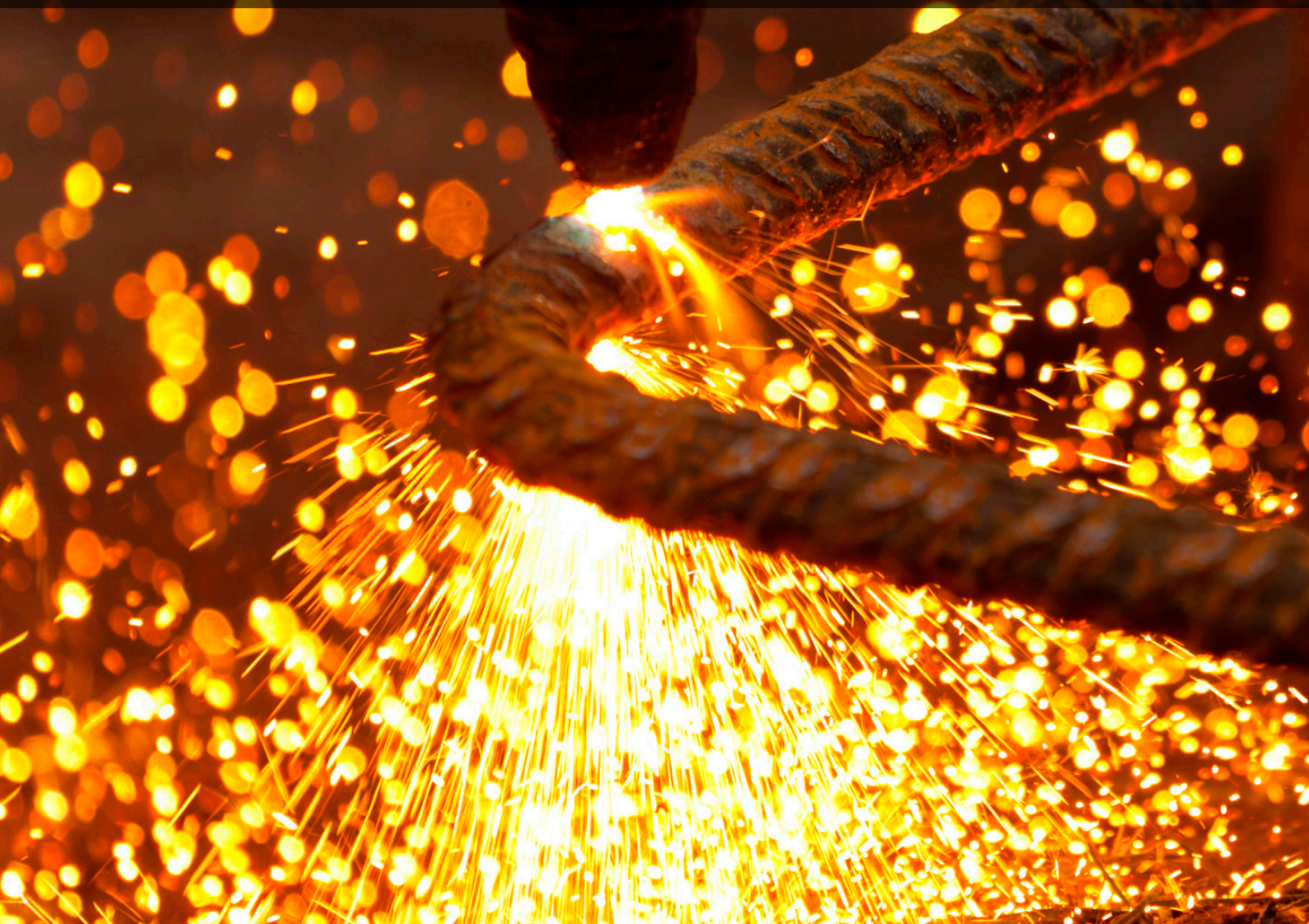
Risk management

Fire on construction sites

A guide to loss prevention



Each year, insurance companies pay out millions of pounds in claims following significant fire and smoke damage events to commercial and domestic properties during their refurbishment, extension or new construction.

The construction process involves significant fire hazards and risks. Fire can totally destroy not only the newly constructed aspects, but also much or all of the existing structure where refurbishment works are being undertaken. The following guidance provides a best practice guide for contractors and home renovators in preventing fire on both commercial and domestic projects, whether that be a new build or a refurbishment. Our guide is designed to raise awareness of some of the key practical arrangements and working methods that should be in place to mitigate the risk of fire.

For more detailed guidance, reference should be made to the document entitled 'Fire Prevention on Construction Sites - the Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation' (JCoP), obtainable from the Fire Protection Association's website: www.thefpa.co.uk. Compliance with the document may well be a condition of your insurance policy and you can ask your construction team/project manager to demonstrate how they are meeting its requirements and recommendations. This guide applies equally if you intend to project manage the works yourself.

A note on timber-framed buildings

If your project involves a timber frame, then significant additional control measures will be required. The timber frame should be constructed by a contractor registered with the Structural Timber Association (STA, previously known as the UK Timber Frame Association; UKTFA) and built in accordance with STA/UKTFA guidelines or jurisdictional equivalent. These guidelines will include fire safety and fire prevention arrangements, as well as the need to risk-assess the possibility of fire spreading to neighbouring properties. These guidelines can be obtained from the Structural Timber Association's website: www.structuraltimber.co.uk

The nature of fire

Fire is sustained by three elements; heat, combustible material and oxygen. Remove any one of these elements and fire will cease to exist. Construction projects will, at various stages, have all three elements in place. The key is ensuring they are not combined in an uncontrolled manner. Typical sources of heat on construction sites include, but not limited to, soldering or brazing of pipes, welding, grinding, hot tar boilers, lead work, smoking, combustion engines, temporary heaters, lights, arson activity, temporary electrical supplies. Typical sources of combustible material include timber joists, floorboards, roof trusses, joinery, waste (cardboard, polythene, timber pallets etc.), gas bottles, petrol, diesel, sawdust, vehicles, fuel-driven plant, temporary buildings, temporary protective coverings, etc. Oxygen is ever present but is also enhanced through oxidising agents and oxygen bottles.

Fire prevention

Design phase

Fire prevention starts during the design and planning stage and can be heavily influenced by decisions made by the contractor/design team/homeowner prior to the commencement of construction. Consideration should be given to the mitigation of all potential fire hazards through:

- 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 the building
- design of access routes to retain safe evacuation during the construction phase

Fire safety and prevention management

Those responsible for undertaking the construction or refurbishment works also have a responsibility for fire safety and fire prevention throughout the construction phase. Such individuals should be formally appointed, appropriately trained and be competent in their roles. Typical appointments should include a 'Responsible Person'/Fire Safety Coordinator and Fire Marshal(s). Full details of their responsibilities can be found in the document, 'Fire Prevention on Construction Sites - the Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation' (JCoP), available from the Fire Protection Association's website: www.thefpa.co.uk.

Fire risk assessment

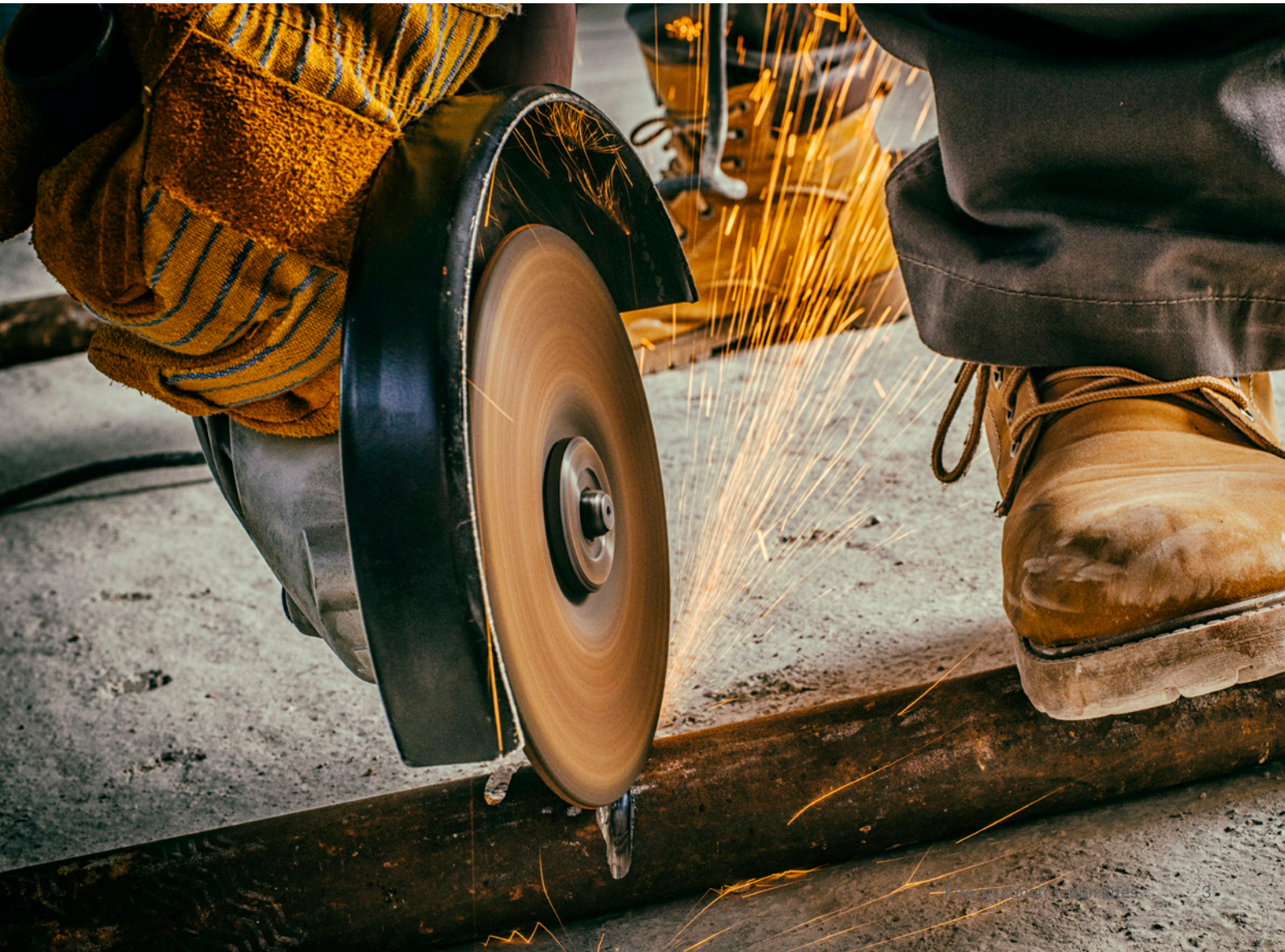
A project-specific fire risk assessment must be carried out to formally assess and record all potential fire hazards and personnel affected.

Fire safety management plan
The control measures for any residual fire hazards should be recorded in a Fire Safety Management Plan, together with all fire safety and fire prevention arrangements. The minimum contents of the plan (accompanied by a detailed fire protection checklist) are included in the document 'Fire Prevention on Construction Sites - the Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation' available at www.thefpa.co.uk.

Fire protection
Wherever possible, steps should be taken to limit the spread of fire and smoke. Aspects to consider should include the early installation of permanent fire escape stairs, including compartment walls, fire stopping, fire-protective materials to steelwork, lightning conductors, and also fire doors to stairwells, lift shafts, service ducts and voids.

Hot work
A major cause of fire on construction projects is hot work. This consists of operations involving the use of open flames, grinding, welding and the local application of heat or the generation of sparks. Hot work should be designed out of a project and replaced with cold work applications wherever possible. Where hot work cannot be avoided, then typical control measures should include; clearing the immediate area of combustible materials prior to undertaking any hot work, provision of two appropriate, dedicated fire extinguishers and a designated person appointed to monitor the area for at least one hour following completion of the hot work. All hot work should be strictly controlled by a hot work permit. Further detailed guidance is available in our separate guide to loss prevention entitled 'Fire caused by hot works'.

Security against arson
Many fires are started deliberately. Having a full-time professional guarding service in place on site is an effective way of mitigating this risk however if this will not be in place and the site is not occupied day and night, then you should take precautions to secure the property when left unoccupied. If you do not intend to employ full-time security, or you do not intend to live in your home during the project, then you should make allowance for securing the property when it is unoccupied.
Security precautions should be actively managed on site typically by the main contractor. Provisions should include;
- a solid, timber hoarding around the property with lockable gates and doors
- securing all openings in external walls, basements, doors and windows, with temporary boarding, metal sheeting or bars, at all stages of the project, when the site is unoccupied



– a temporary, internal, motion-sensor intruder alarm system linked to a remote monitoring centre
– scaffold alarm
– lockable steel containers for materials, equipment and tools
– motion-sensor site lighting

Further advice and guidance on security measures against arson is included in the publication 'Risk Control Arson Prevention – Further advice and guidance on security measures against arson can be found on the Arson Prevention Forum's website: www.stoparsonuk.org

Smoking
Another major cause of fires is smoking on-site. A no smoking policy must be established throughout the site with the exception of designated areas where smoking may be allowed. These areas should be established as far as reasonably practical from any building or structure and be provided with metal ashtrays and a fire extinguisher.

Waste materials
Waste material, if allowed to accumulate, can provide a volatile starting point for fire. Good housekeeping is essential to reduce the amount of combustible material stored on-site. All waste packing materials, wood, polythene, timber pallets, oily rags, etc must be removed from the workplace at least once a day.

Storage of flammable liquids and gases
Flammable liquids and gases can accelerate the growth and spread of a fire and should be located as far as reasonably practical from buildings and not stored together. Minimal quantities should be retained on-site and ideally removed at the end of each shift. Gas bottles should be stored upright within cages, and flammable liquids in suitable fire rated containers. Acetylene should be avoided if possible due to its unstable, explosive nature when exposed to fire.

Temporary electrics and gas
Faulty electrics can often lead to fires. All temporary electrics should only be installed by a competent electrician. Installations must be inspected regularly and tested at least every three months. Portable electrical equipment used on-site (kettles, microwaves and computers, for example) should also be inspected. Temporary electrical cabling should be protected against damage and all temporary electrics turned off/isolated outside normal working hours or when the site is unattended; with the exception of those controlling security and automatic fire detection systems. Permanent gas supplies must only be installed by a registered gas installer.

Stored materials
Stored combustible materials can provide fuel for a fire. Where possible, these should be stored outside the building under construction or undergoing refurbishment. When combustible materials need to be stored internally, they should have controlled access and firefighting equipment should be located nearby. In addition, all non-essential combustible wrapping and packaging should be removed at the earliest opportunity and materials protected/covered by a flame retardant covering compliant with requirements of LPS 1207 or equivalent jurisdictional standard.

Plant and vehicles
Plant and vehicles generate heat and contain fuel, which can lead to a fire. Stationary plant powered by internal combustion engines (such as compressors and generators) should be positioned in the open air and separated from all buildings.

Exhaust pipes should be kept clear of combustible materials. Fuel should not be stored in or near buildings. Fuel tanks must not be filled while engines are hot or are running and filling should be carried out in designated areas only. All plant and equipment should be protected against any accidental impacts. As a general rule, the long term parking of vehicles should not be permitted within 10m of the building except to allow loading or unloading.

Temporary buildings and accommodation
Many fires start in temporary buildings and accommodation where there are often heaters (for drying clothes), electrical items, office furniture, documents, etc.

Temporary buildings should be separated from the building under construction/refurbishment and other permanent buildings in order to provide as wide a firebreak as reasonably practicable. Where the firebreak is less than 6m, temporary buildings should be fire rated to provide at least 30 minutes' fire resistance.

Temporary accommodation (i.e. constructed on-site) must be constructed with materials which do not significantly contribute to the growth of fire or the propagation of smoke and/or corrosive fumes. Where unavoidable, and where temporary accommodation is constructed within a building under construction, the arrangements must be separated from the rest of the building by walls and ceilings which provide 30 minutes fire resistance. They must also be fitted with smoke detection equipment. Establishing temporary accommodation in existing structures should be avoided where possible. Establishing temporary accommodation within timber-framed structures should be prohibited.

If temporary heaters are used within temporary buildings or accommodation, they should be thermostatically controlled with enclosed elements. Coat stands and drying racks must be positioned a safe distance from heaters. Microwaves should be used in preference to gas cookers.

Temporary covering materials
Large quantities of temporary covering materials, often used on-site to protect finished surfaces, fixtures and fittings or expensive material/items, can act as fuel for a fire. Any temporary protections should therefore be of a fire retardant nature and must conform to the requirements of insurance industry Loss Prevention Standard LPS1207 not included in appendix. Any scaffold netting/ sheeting required on-site must also be of a fire retardant nature and conform to LPS1215 not included in appendix.

Fire safety procedures

Although this guide is primarily about preventing fires, a critical consideration is the safe evacuation of all inhabitants of the building, including construction workers and possibly family members, in the event of a fire.

To this end, robust emergency procedures need to be in place and should include:

Fire instructions	written emergency procedures, displayed on-site and communicated to all personnel within the building
Fire alarm	an adequate means of raising the alarm must be in place; typically air horns, push-button 'howlers' or, on larger projects, a linked, wired or wireless fire alarm system
Fire escape signs and lighting	provision of prominent fire escape signs and temporary lighting, where permanent provisions have been impaired
Escape routes	two escape routes must be available at all times from all areas of the building and dead-end situations should be avoided, or kept to the absolute minimum for the shortest possible time
Fire drills	the emergency procedures should be checked every three months by carrying out fire drills to evacuate the building to an assembly point and any shortcomings in the procedures should be addressed
Fire detection	smoke detection systems should be provided where temporary accommodation (such as offices, stores, canteens, drying rooms etc.) has been established within the building

Firefighting equipment
Firefighting equipment must be provided in accordance with the requirements of Expert Commentary on BS 5306-8:2012 (Fire extinguishing installations and equipment on premises. Selection and positioning of portable fire extinguishers. Code of Practice). Equipment should consist of an appropriate type and number of portable fire extinguishers, located at the exit points at each level of the building. All fire extinguishers should be stored in high-profile 'Fire Point' cabinets and receive an annual service.

Liaison with the fire and rescue service
On buildings with several storeys or particularly extensive/complex layouts, the local fire and rescue service should be contacted to inform them of the construction works and, ideally, invited to undertake a familiarisation tour. At that time, a site layout plan should be forwarded detailing access arrangements, emergency escape routes and staircases, fire points, temporary buildings and internal temporary accommodation, and the location of hazardous items (such as flammable liquids and gas cylinders). The site plan should be updated as work progresses to reflect the current situation on-site.

Terms	Definitions
Hazard	something with the potential to cause harm or damage.
Risk	a measure of the impact and likelihood that a hazard will cause harm or damage (severity x probability).
Control measure	something which manages the hazard and reduces the risk.
Loss	a claim made under an insurance policy as a result of theft or damage.
Design team	the professional team comprised of construction specialists including an architect and a structural engineer, project manager, quantity surveyor, interior designer and building services engineer, etc.
Fire risk assessment	an assessment of the fire safety hazards to people and property.
Fire safety management plan	a stand-alone document detailing how fire safety will be managed on a construction site.
Hot work permit	a form issued to allow hot works to proceed subject to certain conditions and control measures.
Hot work	an activity involving the application of heat, naked flames or sparks.
Temporary buildings	includes prefabricated cabins, site huts, cargo containers, caravans and portable buildings brought onto and constructed on site for use as offices, stores, workshops or welfare facilities, during the course of the works.
Temporary accommodation	a segregated part of the building under construction or undergoing refurbishment and occupied as offices, stores, workshops or welfare facilities during the course of the works.
Firebreak	an obstacle to the spread of fire, such as a strip of open space.

Guidance	References
HSB guides to loss prevention	
- The Construction (Design and Management) Regulations 1994 (as amended 1997 and 2015)	www.hse.gov.uk/construction/cdm.htm
- Fire Prevention on Construction Sites - the Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation' 10th edition (August 2022)	www.thefpa.co.uk
- Regulatory Reform (Fire Safety) Order 2005	
- Fire caused by hot works' - a guide to loss prevention	
- Structural Timber Association – health & safety guidance notes on fire safety and fire prevention on timber framed construction projects	www.structuraltimber.co.uk
- Risk Control Arson Prevention – 'The Protection of Premises from Deliberate Fire Raising' (RC48)	www.stoparsonuk.org
- Fire Safety in Construction - HSG168	www.hse.gov.uk

HSB-LCE-RGN-012 Rev: 1 Date: November 2021

HSBEI-1486-0123-4

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