Loss prevention standards

Hot Work Operations

Hot work is important but hazardous work, that can be a cause of fire or injury. Consideration of alternatives, awareness of the dangers and a strong hot work management system can reduce this risk.

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Hot Work Operations

Introduction

Hot work is a major cause of losses and injuries in many businesses, especially during construction schemes, maintenance or refurbishment projects where work is taking place on either the fabric of a building or machinery, plant, services, fixtures, etc.

A hot work management system and associated permit is a formal recorded process used to help control work which is identified as potentially hazardous and is an important part of an organisation's loss prevention strategy.

Experience shows that a satisfactory standard of care and supervision is far more likely to be achieved where a formal written permit to work system is in force, under competent supervision and with the authority to ensure compliance with procedures.

What is Hot Work?

Hot work includes any activity which generates or requires the use of flame, heat or sparks. Common hot work processes include:

- Gas and electric welding and cutting equipment,
- Blow lamps and blow torches,
- Electric or gas hot air guns, heaters or blowers,
- Bitumen and tar boilers,
- Angle grinders and grinding wheels,
- Brazing and soldering,
- Drilling, and
- Similar applications that can produce spark, frictional heat or flame.

How Loss, Injuries and Damage Occur

Hot work activities may ignite adjacent or unseen material, heat may be conducted away from the working area by metal components and sparks, or hot metal may travel a long distance while retaining the potential to ignite combustible materials. Many losses and injuries that occur are the result of carelessness and ineffective planning, organisation and supervision of the works. Failure to understand the hazards posed by the works is often the root cause of these incidents.

The hazards of completing hot works often include:

Sparks - generated from a cutting process such as an abrasive wheel or plasma torch, they can travel many metres whilst remaining hot.

Excessive Heat - materials being worked on can accumulate heat and ignite. It can also cause burns.

Conduction - heat can travel along an item such as a pipe and combustible material may sit behind or within the item such as a metal composite panel.

Flammable Gases - these may be gases created by the hot work itself or used as part of the work equipment. Leaks of gases can create fire and explosion or cause asphyxiation in an enclosed space.

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Swarf - can become highly flammable due to the increased surface area and ignite. Ejected particles can also cause cuts and eye injuries.

Often these hazards cause fires and/or explosions that can result in extensive damage to premises, plant and equipment and in some cases cause businesses to suffer loss of revenue or profits.

Property damage and interruption to premises/businesses operated by third parties can also arise directly as a result of the works, or as a result of the spread of fire or denial of access in the event of a serious incident.

Burns and eye injuries can also occur to those undertaking the work and also to passers-by.

Common management failings that contribute to such losses are included within Appendix 3.

Managing Hot Works

It is essential that a formal management system or procedure for hot works is in place to assess and manage the works. This should include the following elements:

Formal Procedures - these procedures should stipulate that the hot works management system **must** apply to employees as well as contractors who complete hot work operations.

Permit to Work (The Hot Work Permit) - a simple to follow form that when completed permits work to take place for a single shift only. The hot work permit should be completed and issued based on previously completed risk assessments, method statements and fire risk assessment for the works as well as a physical inspection of the work area, immediately prior to the work commencing.

Briefing and Training - everyone who is required to sign or abide by the conditions of a permit must receive an appropriate briefing or training. It is important that all individuals involved in the works can demonstrate competence for their role.

Spot Checks and Audits - arrangements should be in place to carry out spot checks of works in progress. The hot work management procedures must also be audited periodically to check they are being complied with and are still appropriate. Audits must check:

- Completed permits - are they being used/completed correctly?
- Training records - have all individuals within the management system received appropriate training?
- Public Liability Insurances - are checks being made on contractor's insurances and are the levels of cover provided appropriate?

Managing Contractors - where contractors are used, checks must be made on their competence to undertake the work. This must also apply to any sub-contractors appointed.

Contractors must have adequate public liability insurance in place at the time of the hot works. Contractors must have 'adequate' public liability limits and conditions checked to ensure they don't have any exclusions or require certain conditions to be met if carrying out hot work. Rigorous checks must be completed, and copies of the public liability insurance details should be held on file.

In relation to what constitutes 'adequate' public liability insurance, the exact amount will depend on the potential area at risk and should include any material damage (buildings, machinery, equipment, stock, etc…) and the impact that a loss would have on business interruption. An adequate limit would not normally be less than £5m and it is essential that the contractor's public liability limit is to an appropriate amount before any work can commence.

Equally, where there are conditions applying, such as heat or hot work conditions, then it must be ensured that they are complied with fully before any work can commence.

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If any contractor employed then uses a third-party sub-contractor, you must ensure they also have appropriate public liability insurances as per the above.

Contractors must be made aware of the specific site hazards and the fire safety procedures to be adopted, including the hot work permit system and fire watch requirements. A written undertaking to observe the precautions should be obtained from the contractor(s) prior to commencement of work. Time should be given to providing contractors with this site familiarisation.

Actions Prior to the Works Commencing

The following key steps can help ensure that planning of the hot work is robust and allows the works to proceed in the safest possible manner:

1. The Last Resort Option

Check whether the work can be done in a safer way, is hot work really necessary?

Hot work should be a last resort option when other methods of completing the task have been ruled out, e.g. bolts or compression joints rather than hot work; pipe jointing might be possible without soldered fittings; pipes could be cut using cold cutting techniques? These are just a few examples of how safer working methods can be deployed.

2. Use a Dedicated Hot Works Area

Check whether the work can be done in a dedicated safe work area especially set up for completing hot works, such as a purpose-built welding bay?

Whilst a hot work permit may not be required for works in these 'non-permit designated areas', it is essential that appropriate fire precautions are in place throughout the works, including the absence of combustible materials (including within the building fabric) and the provision of appropriate fire fighting equipment.

3. Checking the Competence of Operatives

The permit issuer, the person doing the hot work or the fire watch cannot be the same person and it's important to check the competence of everyone fulfilling these roles as well as those performing isolations on plant and protection systems.

Permit Issuer - individuals nominated to authorise hot work must have experience or training in the problems associated with hot works and be of suitable status to ensure compliance with the procedures. Permit issuers must be specified individuals who are also trained in the hot work system.

Hot Work Operatives - they must be formally trained in the safe use of hot work equipment, the associated hazards, controls and emergency procedures. They must also have an understanding of the operation of the permit to work procedures.

Fire Watcher - they must be trained and familiar with the hot work hazards. The person(s) completing the fire watch must have the confidence and authority to stop work if unsafe conditions develop and be familiar with the fire alarm locations and emergency notification procedures. They should be trained in the use of fire extinguishers/hose reels which are available. Additional fire watchers may be required if the work area is large, multi-level and/or congested; or an opening or thermally conductive assembly extends through a wall.

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People Performing Isolations - those isolating the fire alarm, suppression systems or pipelines must be competent and familiar with the equipment, the safe methods of isolation and have an understanding of the impacts of any isolation made.

4. Reviewing the Proposed Works

Review the risk assessments, method statements (RAMS) and the fire risk assessment for the work and consider whether people could be injured, or whether equipment or property may be damaged by the work or should a fire occur. This review must incorporate a check on the following:

- Whether any safety devices may also be affected? Examples being fire alarms or other fire protection systems which should remain operational so far as is practicable.
- Could fire spread out of the room, and if so, what other occupancies could be involved?
- Is there any incompatible process in progress in the relevant area, such as the use of flammable solvents to lay flooring?
- Is the hot work planned to be in or on combustible construction materials? If so, this work should not start. Hot work should be prohibited on all combustible construction.
- Is there a backup for any mechanical or electrical equipment, computer systems and data that could be damaged by fire?
- Are there any personnel who are required to use the area at the same time as the hot work is being carried out, and if so, can alternative arrangements be made?
- Could the work lead to the organisation's security being compromised?

5. Investigating the Work Area

A visit and inspection of the work area must be undertaken prior to the commencement of the work immediately beforehand.

Investigation of building materials in the work area is essential to understand if any of them can be set alight by the works. The following are examples of items/areas which may contain combustible materials:

- Metal deck roofing
- Gutters and downpipes
- Voids, roof cavities and false ceilings
- Wall cavities
- Fascia's and soffits
- Behind panelling in window frames
- Louvred vents, air intakes and out-takes
- Expansion joints
- Skylights
- Cold stores
- Cable ducts and trays
- Timber framed structural elements
- Plastic plumbing

This is not an exhaustive list and a thorough investigation of what could be set alight by the works is one of the most important tasks when planning hot work.

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Identifying voids - an inspection should be carried out for voids above, below or around the work area, which may be able to transmit flames or smoke from one area to another.

Where combustible materials are identified and cannot be removed prior to the works due to legal/planning requirements (e.g. historic buildings), options to complete the works off-site or use means other than hot work must be given additional consideration. Examples include completing alteration of any structural steel in an off-site setting or using robust push-fit plumbing services instead of using flame soldered couplings.

If there are no other options to avoid such works then whilst additional precautions such as the use of thermal imaging to spot heated items and an extended fire watch period may reduce the risk, such precautions do not necessarily make the work safe as their remains an inherent fire risk.

6. Decide Whether Works are Safe to Proceed

Some works should not go ahead because of the high risk of fire. For example, hot works on or affecting any combustible insulation panels, combustible building materials or on plant and equipment that may contain combustible materials (e.g. some cooling towers) is to be prohibited. If in doubt, it should be assumed that metal composite panels have a combustible core. Cold stores, in particular, may incorporate large amounts of combustible insulating materials in both wall and ceiling panels.

Any hot work in or on timber framed structures such as roofs and timber framed buildings needs additional scrutiny and should be avoided if at all possible.

7. Preparing the Work Area

Combustible materials - clear the area of all combustible and flammable materials within 10-metres of the hot work process. The distance may need to be more than 10-metres in some circumstances, especially where overhead work is to be undertaken or where there is the potential for spillage or leak of a flammable substance into the work area. Floors should be swept clean and flammable solvents must not be used to clean surfaces immediately before work commences.

Where combustible materials within 10-metres cannot be removed, they should be protected by the use of non-combustible or purpose-made blankets, drapes or screens. Protect all items of combustible materials, elements of combustible construction and surface finishes. Combustible floors within the area should be covered with overlapping sheets of non-combustible material or wetted and liberally covered with sand. Care should be taken to ensure that any holes or gaps in walls, floors and ceilings through which sparks could pass are adequately protected/covered. Flammable liquids should always be removed from the area. Gas cylinders not required for immediate use must be secured and kept at least 15-metres from where the application of heat is taking place.

Atmosphere hazards - hot work shouldn't be undertaken in an atmosphere containing flammable vapours or dusts, or on or near equipment or tanks containing flammable or combustible liquids or materials. Where a hazardous atmosphere is suspected, air samples should be taken and work only commenced when the atmosphere has been certified to be non-hazardous. Any pipes, equipment or tanks containing flammable liquids should be appropriately purged and tests completed to confirm no flammable liquid or vapour is present. If there is a risk that the hazardous atmosphere may recur, the job should not commence until further precautions are implemented and additional testing completed. Good ventilation should be provided in all areas where hot work is to be carried out, as the task may produce volumes of smoke and fumes.

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Check areas that could be affected by the works - before carrying out work on one side of a wall or partition, an examination should be made of the area on the other side and within the wall to ensure that any combustible materials are not in danger of ignition by direct or conducted heat. Heat might be readily conducted where walls are metal or where metal items such as beams, bolts, ducting, cable trays or pipes, etc., penetrate to the other side.

Check all areas where sparks or hot metal fragments may fall or be ejected, for example, into voids or onto levels below the work area. Ensure these areas are clear of combustible materials, and any remaining are protected, or that there are non-combustible barriers in place to arrest the pathway of the falling/ejected particles.

8. Controlling the Area

Take steps to prevent unauthorised access to the work area. Liaison should be established in multiple occupancy buildings before work commences, to enable contractors or others to be effectively controlled. Safe access to the work area and adjoining areas should be established for those who need it. A secure area should be provided for any items removed from the area being worked on.

9. Managing Fire Protection and Detection Systems

Fire protection and detection systems should remain active and operational during the works wherever possible. Sprinkler and some other suppression systems have a delayed response to any fire igniting, so careful consideration is required before these are isolated.

However, fire detection systems may need to be isolated to prevent false alarms. If so, only detectors in the vicinity of the work should be isolated, so that smoke in other areas will be quickly identified.

Should any system such as a smoke detector need to be impaired because of the hot works, it's reinstatement must be managed as part of the permit to work once the works are completed. There must also be an alternative method of fire detection, raising the alarm and summoning the Fire Brigade in all areas affected by the impairment, irrespective of whether the hot works are undertaken in that area. An example would be to provide a fire watcher in all areas affected by the impairment of a smoke detector or alarm zone.

10. Provide Fire Fighting Equipment

Ensure there is adequate provision of fire fighting equipment at the work site, for both those doing the work and additionally for those undertaking the fire watch.

A fire watcher should have at least two appropriate fire extinguishing appliances to hand at all times and be trained in their selection and use. Each of the fire extinguishers provided should have a minimum rating of 13A, unless the hot work involves arc welding, when two additional 2Kg CO_2 extinguishers should also be provided.

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11. Checking Work Equipment

It's important to check that work equipment used for the hot works is safe to use, and also that it has been installed and sited safely. Wherever equipment is found to be defective or unsafe, it must be repaired prior to use or immediately taken out of service. Consider the following:

Gas equipment

Any equipment and hoses should be checked prior to each use, and gas cylinders adequately supported, preferably by mounting on purpose-built trolleys. When using oxy-fuel gas equipment, flashbacks can occur. Hose-check valves, which prevent back feeding (one of the main causes of flashback), should be fitted to hoses for oxygen and fuel applications, such as acetylene or propane. Flashback arrestors, designed to quench flashback, should also be fitted to all gas, including oxygen, supply lines. Gas cylinders that are not in use should be stored away from the working area.

Acetylene

Wherever possible, the use of acetylene should be avoided, and an alternative solution provided. Acetylene is a flammable gas that is unstable and liable to decomposition at elevated temperatures and pressures. As a result, acetylene in cylinders, once suspected to be unstable, constitutes a unique fire-fighting hazard in comparison with other gas cylinders. Where the use of acetylene cannot be avoided, only the minimum number of cylinders should be present on site, and these should be removed as soon as their work is complete.

Electric welding

The cable connecting any electric welding apparatus to the source of electrical supply should be as short as possible. Care should be taken to ensure that all wiring is of suitable design and construction to carry the heavy currents required, and all connections must be correctly made so that they cannot give rise to overheating or sparking. Operators should be made aware of the importance of three connections (welding lead, welding return and welding safety earth) for every welding circuit. Before each period of use, the electric cables should be inspected visually to ensure that they have not been damaged by heat or abrasion, and all welding and cutting equipment should be periodically inspected and tested by a competent person.

Blow lamps, torches and heaters

LPG blow lamps, blow torches and heaters should be extinguished and allowed to cool before changing cylinders. Paraffin or petrol blow lamps should only be filled and lit in the open and should not be refilled when hot. Blow lamps and blow torches should be lit as short a time as possible before work commences and extinguished immediately after the work ceases – they should not be left unattended when alight or hot. Lighting of the torch should only be carried out in accordance with manufacturer's instructions.

Hot air guns and blowers

Electrically powered hot air guns or blowers are a particular source of danger as no flame is apparent. When using these appliances, the same safety measures should be observed as when undertaking other forms of hot work. The electrical cable to the blower should be inspected visually prior to each period of use, and the equipment periodically inspected and tested by a competent person.

Bitumen and tar boilers

Bitumen and tar boilers, along with similar equipment, should only be taken onto roofs in exceptional circumstances, when a non-combustible heat-insulating base must be provided to prevent heat igniting the roof. The boiler should always be on a firm and level surface where spilled material can easily be controlled, and the equipment must be supervised by an experienced operator at all times.

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Gas cylinders must be at least 3-metres from the burner and gas hoses checked to ensure they are in good condition and properly fitted prior to each period of work. Additional gas cylinders not in use should be stored away from the working area. The bitumen level and its temperature should be monitored, and the lid normally kept on the boiler. The burner should be turned off before transporting the boiler on a lorry or trailer.

Angle grinders and grinding wheels
In respect of angle grinders and grinding wheels, the correct grade of wheel or disc must be used for the task, and before each period of use the wheel or disc checked to ensure that it is securely fastened, in good condition, and that the electric cable has not been damaged.

12. Permit Issue

Now that the task and equipment has been risk assessed and the competent personnel appointed, they will need to make themselves familiar with the work area and ensure the controls from the risk assessment have been implemented. Once they are satisfied that work can begin, a hot work permit must be obtained from the authorised permit issuer, an example permit is shown in Appendix 1.

The person responsible for issuing the permit for the work should then complete the checklist (see Appendix 2) in conjunction with the person responsible for carrying out the work, to indicate that fire protection measures are adequate, suitable precautions have been taken and the equipment to be used is safe.

If any fire protection/detection systems need to be isolated this must be completed immediately prior to signing off the permit, before the works.

A separate permit should be used on every occasion that hot work of any type is undertaken and must not be issued without considering the significance of any other permits to work in the vicinity. It should be issued for a specific task detailing what the works are, the clearly identified area of works, the type of work equipment being used, and the materials being worked upon.

Before issuing a permit, a check should be made to ensure that the hot work would be completed in time for any shift changeover, end of shift/workday or for the appropriate post-work fire watch to take place. If this is not the case, then additional precautions and alternative arrangements will need to be implemented.

If the person authorised to issue the hot work permit is not satisfied with the arrangements, further measures may be requested, and any additional conditions entered in the space provided. The earliest time at which a final fire-check should be made should also be specified. This will normally be at least 120-minutes after the completion of the works or expiry of the permit, whichever is sooner but possibly longer depending on the risks identified. If trained individuals will not be available to make this check, e.g. in the case of a permit issued late in the day, work must not be commenced.

The permit issuer must state the period for which the permit is to be open for (no longer than a single shift), sign, time and date the permit. The hot work operative must sign receipt of the permit with agreement to follow the conditions of the risk assessment and permit.

The hot work permit should be completed in duplicate, with the top copy handed to the person responsible for carrying out the work. The permit should then be displayed in the work area, as this provides a clear visual confirmation to other personnel that a permit has been issued. This also enables personnel to challenge anybody undertaking such works where a permit is not displayed. The second copy should be kept by the issuer. It is good practice to have this displayed on a wall, in a ready to view location such as a control room or by the fire alarm panel, as this will ensure that personnel can easily identify which permits are open at any particular time.

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Where electronic permits have been issued, it is good practice to issue those working under the permit with a display board indicating 'Permit to Work in Progress' or similar with the permit reference number and name/contact details of permit issuer. This must be located in a clearly visible location at the work site.

During the Works

Actions taken to manage the risks whilst the works are underway are vital to ensuring that fires and injuries don't occur. These actions should include:

Providing a sufficient number of fire watchers at any locations where a fire may start - fire watchers continually watch for any stray sparks, smouldering fire, or other fire hazards and are ready to provide the initial fire response and stop the works if they have any concerns. They must be:

- Trained, briefed and confident in being able to stop the works if required
- Located in all areas where fire could develop
- Able to raise the fire alarm and alert building occupants as well as those doing the work
- Able to summon the Fire Brigade
- Provided with a suitable means of fighting any fire

They must remain in place throughout the course of the works and during any breaks in the work in case a fire develops when the work is otherwise unattended, this includes lunch breaks. They can and should use thermal imaging technology during the works to help identify how heat is being transferred to the surroundings and whether any hot spots or ignition is taking place.

If a fire watcher needs to leave their area, the responsibilities must be passed temporarily or permanently to another competent fire watcher until cessation of the continuous fire watch period.

Monitoring the works by the permit issuer - if the hot works are open for a period exceeding an hour the permit issuer should review the work area to ensure the controls remain in place and no additional hazards have been introduced. The use of 'Stop Audits' and unannounced safety inspections can identify an unsafe situation developing and provide an effective framework for ensuring the works continue in a safe manner.

Encourage others to spot and report hazards and problems - anyone who sees an unsafe situation developing should be encouraged and empowered to take action to safeguard those working and others who could be affected. Making this easy to do can help ensure speedy intervention when it's needed.

Switch off - all hot work equipment involving the application of heat must be extinguished or switched off when it is not being used.

If a fire occurs - should a fire occur which is extinguished by the fire watcher or operative, the work must be stopped until a root cause analysis has been completed and appropriate action has been taken to prevent a re-occurrence. Any fire extinguisher(s) used must be replaced.

Encountering other problems - despite the best planning, sometimes things don't go to plan and the hot works management system needs to cater for this whilst maintaining strict control of the hazards and risks posed.
If the works overrun the permitted time, the hot work permit may need to be extended or the decision taken to cease the work altogether. This decision must be taken by the permit issuer and they must be informed of any problems arising.

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Extending the permit must only by done if the permit issuer is able to remain on-site. If this cannot be done the permit should be closed and if the works need to continue a new permit should be issued by another formally trained permit issuer. It's important that a handover between the two permit issuers takes place and the two permits should cross reference each other.

This approach should also be followed where works are spanning two shifts, with the 1st permit closed off at the end of the 1st shift and a new permit issued for the 2nd shift and responsibilities formally reconfirmed or reassigned. All permits must be closed off in accordance with the procedure including the recording of a fire watch. In both situations it's important for the continuous fire watch to be in place until at least 1-hour after the works are finished, with the ongoing fire checks completed as indicated on the permits that were issued.

If extending and continuing the permit arrangements cannot be accommodated as described above, the works should cease, and the work area made safe. The hot work permit must be closed in accordance with the procedure, including the completion and recording of the fire watch requirements.

It is recognised poor practice to temporarily suspend a permit where difficulties in completing the works are encountered and it won't be possible to complete the works within the permitted time. This is due to the potential for conditions in the work area to change whilst the permit is suspended. Injuries and losses have occurred where it has been assumed that circumstances haven't changed when they had. For this reason, its best to ensure the worksite is made safe and all combustible working materials and ignition sources removed to a secure and safe area. An appropriate fire watch should operate, and the permit should be cancelled/completed. A new permit will be required when the work restarts.

Upon Completion of the Works

Once the works are finished the risk of fire can remain due to the risks from hot materials and even materials that may have already ignited but could be smouldering. For these reasons it's important that the following steps are taken upon completion of the works:

13. Continue the Fire Watch

- In all areas where fire may start
- Continuously present during the work and for 1-hour after the work is completed
- Intermittent checks (e.g. every 20-minutes) will be required for a minimum of a further 1-hour but may be needed for longer based on a risk assessment. In some cases, completing these checks for up to 3-hours, or more, might be appropriate. Such intermittent checks must be made at intervals of not more than 20-minutes and must include any area(s) on the other side of any wall, partition or ceiling within 10-metres of the area, and/or floors below, in which the hot work has been carried out
- Using thermal imaging cameras to search for hot spots. Aviva recommend that thermographic cameras are used routinely, before the work is undertaken, during and after the work as part of the fire watch. Their use allows the fire watcher to compare images and ensure the thermographic signatures match pre- and post-work, so, checking the area for any potential hot spots

14. Reinstate Fire Protection/Detection Systems as Early as Possible

Review which systems have been isolated in conjunction with the site/fire engineer to ensure these can be fully reinstated and are effective once reinstated. Reinstatement must include a review of detection points to ensure they have not been obstructed, that nozzles are not blocked and are clean, and that signalling equipment continues to function correctly.

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15. Make the Work Area Safe

Remove waste, paint strippings, hot stub ends of welding rods, dusts, debris and waste materials from the work area and dispose of them safely. All equipment, including gas cylinders, etc., should be removed from the work area to a secure area at the end of the working period or when the task is completed, if this is sooner.

16. Cancelling the Permit

The work area and any areas which could have been affected by the works and all areas where precautions were taken or a fire watch was present, must be re-visited and inspected by the permit issuer. Thermal images of the hot works and the surrounding areas should be taken to confirm that a fire watch has been completed and held along with the hot work permit for review. The permit issuer must check the status and condition of fire protection/detection systems and also any isolations to plant, machinery and equipment, satisfying themselves that the area is safe for the resumption of normal/planned occupancy. Once satisfied the permit can be cancelled.

The completed hot work permit and any applicable risk assessments must be retained for at least 12-months and be made available to Insurers/auditors to inspect upon request.

Other Standards and Guidance

The works should be completed in accordance with Aviva Loss Prevention Standards along with other recognised guidance and best practices, such as the Joint Code of Practice (JCoP) on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation, and those produced by the Health and Safety Executive (HSE).

Where there are conflicts in specific guidance or controls, the higher standard of risk control must be applied and where policy conditions apply these must be met in full.

This approach should be reflected in both method statements and actual working practices.

Construction Projects - Joint Code of Practice (JCoP)

The approach, main points and risk controls set out in this Loss Prevention Standard remain relevant on construction sites including the fire watch. However, further consideration should be given to complying with the JCoP, which can be a requirement of insurance.

Adaptations and further controls on construction projects should include the Principal Contractor remaining in control of issuing all hot work permits. The fire watch period should be considered by the Principal Contractor to ensure hot work activities are completed at a suitable time to enable the necessary fire watch periods before the end of the working shift.

Whilst the JCoP details fire watch periods, which differ if completed on standard construction (non-timber or non-combustible) projects or where hot work is completed within or adjacent to timber framed structures or combustible structures and materials, Aviva consider for all cases that the fire watch should be:

- A continuous fire watch during the work; and
- An additional 60-minutes continuous monitoring immediately after completion of the work
- Intermittent checks (e.g. every 20-minutes) will be required for a further 60-minutes but may be needed for longer based on a risk assessment, for example, within timber framed structures, heritage properties or where combustible cored composite insulation panels form part of the fabric of the building.

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HSE Guidance

To ensure the safety of workers and others during the works, it is important that HSE guidance is considered during the planning standards and incorporated in the risk assessments and method statements. Specific guidance on the safe use of individual pieces of work equipment, working on construction sites and even working in confined spaces may all be relevant. Aviva's expectations are that HSE Approved Codes of Practice and accompanying guidance are followed and adhered to.

Hot Work Passport – Fire Protection Association (FPA)

Training is available, and considered essential, to demonstrate competence and understanding to both employers and clients, of having appropriate fire safety knowledge to help prevent fires during hot work operations. The FPA is the UK's national fire safety organisation and is a 'Not for Profit' organisation that provides such a scheme and comprehensive training, aimed at both supervisors and operatives who carry out risk assessments in order to complete hot work permits. Contact the FPA by calling +44 (0)1608 812 500 or email training@thefpa.co.uk.

Click here for further details of this hot work passport safety training.

Trade Bodies

There are a variety of trade bodies who can provide additional support and guidance which may be useful as part of the risk assessment process.

Policy Conditions

In some circumstances there could be a hot work policy condition included on your insurance policy. Where present, you must manage hot works in full compliance with these conditions.

Specialist Partner Solutions

Aviva Risk Management Solutions can offer access to a wide range of risk management products and services at preferential rates via our network of Specialist Partners. These include:

- Thermal Imaging Equipment and Training - **PASS** stocks a huge range of thermal cameras from one of the world's leading thermal imaging manufacturer; FLIR. With PASS' leading thermography training, you can learn how this equipment operates and how to use them effectively.
  Call PASS on 01642 631652 or click here.
- Inspection/Auditing Tools – **iAuditor** provides digital tools that work on mobile/tablet devices that enables your teams to carry out area inspections and can allow completion of a permit to work. Example hot works checklists and permit to work templates based on Aviva's Loss Prevention Standard are available for free download.
  Contact Adam Gillett on aviva@safetyculture.com or call 0161 768 1124. Further information is available here or visit www.safetyculture.com/aviva.
- Training on Managing Hot Works – To access free training on the management of hot works which can be viewed on mobile/tablet devices as well as laptops, please contact Milly Wallace on milly.wallace@safetyculture.io or call 0161 519 0567. Further information is available here or visit www.edapp.com/aviva.

For more information please visit: Aviva Risk Management Solutions – Specialist Partners

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Sources and Useful Links

- RC7 – Recommendations for Hot Work - RISCAuthority
- The Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation – Fire Protection Association/RISCAuthority
- Hot Work Guide – Aviva Risk Management Solutions

Additional Information

Relevant Aviva Loss Prevention Standards include:

- Managing Change - Property
- Managing Contractors
- Permits to Work
- The Power of Stop Audits
- Thermographic Surveys

To find out more, please visit Aviva Risk Management Solutions or speak to one of our advisors.

Email us at riskadvice@aviva.com or call 0345 366 6666.*

*Calls may be recorded and/or monitored for our joint protection.

Appendix 1
Sample Hot Work Permit

Procedure for Hot Work Permits

The completed form should be returned to the issuer and retained for future reference.
The hot work permit system should be regularly audited to ensure compliance with procedures.

A copy to be displayed in the work area and another in the issuing office.

PERMIT NUMBER		OTHER RELEVANT PERMIT DETAILS	

SECTION A - PROPOSAL **(to be completed by the Permit Issuer).**

COMPANY NAME & SITE ADDRESS				
EXACT LOCATION OF PROPOSED WORK				
NATURE OF WORK TO BE UNDERTAKEN/TYPE OF HOT WORK/ITEMS WORKED ON				
NAME OF HOT WORK OPERATOR & COMPANY				
NAME OF PERSON SUPERVISING THE WORKS (PRINT NAME)				
PERMIT VALID ON DATE		START TIME EXPIRY TIME		
NAME OF FIRE WATCHER(S) (PRINT NAME(S))				
ANTICIPATED EARLIEST TIME OF FINAL FIRE WATCH CHECK	CONTINUOUS FIRE WATCH		INTERMITTENT FIRE WATCH	

SECTION B - ISOLATIONS & IMPAIRMENTS

DETAILS OF SYSTEMS AND AREA(S) ISOLATED			
NAME & POSITION OF PERSON COMPLETING ISOLATION/REINSTATEMENT			
DATE & TIME OF ISOLATION		DATE & TIME OF REINSTATEMENT	

SECTION C - ISSUE

I confirm the work area and other areas that may be impacted by the works have been inspected and checked for the presence of combustible materials. I have reviewed and completed the attached checklist and I am satisfied that all appropriate precautions and risk controls are in place.

PRINT NAME	
SIGNATURE OF PERMIT ISSUER	
DATE & TIME	

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SECTION D - ACCEPTANCE

I understand the scope of work and precautions to be taken and will adhere to the safe method of work and report any problems or difficulties to the Permit Issuer, in safely completing the works.

	SIGNED	DATE
HOT WORK SUPERVISOR		
FIRE WATCHER		
FIRE WATCHER		

SECTION E - FOLLOWING COMPLETION OF WORK (Contractor responsible for the work must ensure this section is completed)

The work area and all adjacent areas to which sparks and heat might have spread (such as floors below and above and areas on other sides of walls) have been inspected and found to be free of smouldering materials and flames.		
Stub ends of welding rods and other hot waste materials have been removed and disposed of safely.		
All equipment, including gas cylinders, has been removed to a safe area.		
	SIGNED	DATE & TIME
HOT WORK OPERATOR		

CONTINUOUS FIRE WATCH – (the permit should then be returned to the issuer)

TIME INSPECTION COMPLETED (this must be at least 60-minutes after work has been completed as determined by the fire risk assessment for the task):		
	SIGNED	DATE & TIME
FIRE WATCHER		
FIRE WATCHER		

INTERMITTENT FIRE WATCH CHECKS (should be one of the Fire Watchers)

Intermittent Checks (every 20-minutes for at least a further 1-hour)

TIME	INITIALS	TIME	INITIALS	TIME	INITIALS

All fire protection systems are in service and operable and equipment isolated has been reinstated where safe to do so.

(Check Section B has been completed fully).

	SIGNED	DATE & TIME
PERMIT ISSUER		

SECTION F – CANCELLATION (SIGN OFF BY ISSUER OF PERMIT)

I have inspected the works area and all tools, equipment and waste has been removed.
The fire watch has been completed in accordance with the risk assessment and thermal images taken of the work area and other areas that may have been affected by the works.
The area has been returned to a condition which is safe for normal/planned occupancy and operations.

SIGNED		DATE/TIME	

LOSS PREVENTION STANDARDS

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Appendix 2
Hot Work Permit Checklist

The following checks should be carried out by the Permit Issuer prior to hot work commencing. The person carrying out these checks should tick the appropriate boxes and retain this with the permit.

ISSUING COMPANY		PERMIT NUMBER	

GENERAL

Wherever practicable the use of hot work should be avoided, and a safer way employed. If you cannot comply with the following points, do not go ahead with the hot work.

Risk assessments and method statements have been provided and reviewed prior to authorisation of the works.	
Evidence of appropriate Public Liability Insurance has been provided.	
All fire protection systems are in service and operable (if not complete Section B on the permit).	
Competence of operatives have been reviewed and confirmed.	
The works area and any other areas which could be affected have been investigated for the presence of combustible materials. This includes the identification of any voids.	
Hot works will not take place on/or affecting combustible composite panels or other materials known to be combustible.	
There are no other permits to work in operation or other planned activities that will be adversely impacted by these works.	

PRECAUTIONS WITHIN 10-METRES (MINIMUM) OF THE WORK AREA:

Combustible materials have been cleared from the area. Where materials cannot be removed, protection has been provided by non-combustible or purpose-made blankets, drapes or screens.	
Flammable liquids and gas cylinders have been removed from the area.	
Floors have been swept clean. Combustible floors have been covered with overlapping sheets of non-combustible material or wetted and liberally covered with sand. All openings and gaps (combustible floors or otherwise) are adequately covered.	
Protection (non-combustible or purpose-made blankets, drapes or screens) has been provided for: • Walls, partitions and ceilings of combustible construction or surface finish; and • All holes and other openings in walls, partitions and ceilings through which sparks could pass.	
Where work is being carried out on building panels, an assessment has been made of insulating or other materials behind or forming the core of the panels which confirms they are non-combustible.	
Combustible materials have been moved away from the far side of walls or partitions where heat could be conducted, especially where these incorporate metals.	
Enclosed equipment (tanks, containers, dust collectors, etc.) has been emptied, purged and tested, or is known to be free of flammable concentrations of vapour or dust. Where there is a possibility of such, atmosphere air sample monitoring must be in place.	
Unauthorised access to the work area has been prevented.	
Equipment for hot work has been checked and found to be in good repair. Gas cylinders have been properly secured and any gas cylinders not in use have been removed at least 15-metres away from the work area.	

FIRE PROTECTION:

Where sprinklers are installed, they are operative. In sprinklered premises, hot work should not be carried out when the water supply to the sprinkler system is shut off.	
Where an automatic fire detection system has been installed, it will be kept operative. Only the zone where the hot work is being carried out will be isolated for the period whilst hot work is in progress.	
A trained person not directly involved with the work will provide a continuous fire watch during the period of hot work. Following completion of each period of work, the continuous fire watch will remain in place for at least 60-minutes, with further checks at regular intervals for at least a further 60-minutes, or a period as determined by the fire risk assessment, after completion, to ensure that the working area and all adjacent areas, including the floors below and above, and areas on the other side of walls, screens, partitions and above false ceilings, are free of smouldering materials and flames.	
At least two appropriate fire extinguishers are immediately available. The personnel undertaking the work and providing the fire watch are trained in their use.	
Personnel involved with the work and providing the fire watch are familiar with the means of escape and method of raising the alarm/calling the Fire Brigade.	

SIGNED		BLOCK CAPITALS	
DATE		TIME	

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Appendix 3
Common Management Failings that can Cause Hot Works Losses

Common management failings that can cause hot works losses include:

- A lack of procedures to assess whether hot work is necessary, i.e. can the task be completed using alternative measures which do not require the need for hot work?
- An inappropriate dedicated hot work area where formal permits are not required, e.g. maintenance workshop. It's important the same risk assessment processes, procedures and controls are applied.
- If large numbers of permits are regularly issued, their use could be seen as a formality meaning that an appropriate assessment of the area/risk may not be completed. Conversely, if an organisation rarely carries out hot work, they may be inclined not to implement a permit system given the infrequency of such work.
- The hot work permit form is poorly designed.
- Contractors not adequately monitored as they are deemed by an organisation to be the 'experts' in the type of work they are undertaking. The same robust procedures should apply to both own employees and contractors. Contractors should be able to demonstrate their ability to carry out the work safely, complying with your organisation's hot work system.
- Hot work permit procedures and guidelines are not adhered to.
- The permit does not identify all the potential hazards, e.g. not inspecting for combustible insulation in nearby composite panels or combustible materials on lower floors where stray sparks could travel. Failure to consider conduction as a means of heat transfer especially on ducting systems and steel construction. Fires have occurred where heat conducted has ignited combustible materials located more than 10-metres away from the hot work location.
- Competent individuals not inspecting the area where the work will be completed prior to issuing the permit, e.g. to ensure that appropriate arrangements are in place.
- The permit remains open for a shift/day rather than being restricted to the shortest period required for the task to be completed. This can and has led to unauthorised works being undertaken.
- No formal communication of the hot work task between different teams (including fire watch) when there is a hand-over/shift change.
- A lack of appropriate training for all those individuals involved in the permit process.
- No dedicated fire watch in place, with appropriate portable fire extinguishers, to monitor the area both during the work and also for a defined period after completion of the work.
- The fire watch duration is inadequate for the work being completed. An example being the number of fire watches and their location is not consistent with the risk and/or location of hot work. The hot work task is completed at the end of the working day, not allowing sufficient time for an appropriate fire watch duration.
- Inadequate supervision of the works.
- Inadequate auditing and poor enforcement of the hot work permit system.
- Failure to reinstate fire protection/detection systems following completion of the work.

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