The Use of Heat for Roofing Operations

INTRODUCTION

Hot work is any process that generates flames, sparks, or heat. The risk of a fire arising from hot works depends on many factors such as the environment, materials being used, and the composition of the structure being worked on. Some materials can smoulder for a significant period of time after work has been completed and before they ignite.

Designers of a roofing systems can contribute to the elimination of fire hazards in construction at the earliest stage of a project. They should consider the risk of fire, including choice of materials and installation process. They need to either eliminate the risk or specify risk mitigation measures. Common hot work processes in roofing include:

- Cutting
- Grinding
- Welding
- Torch-on RBM
- Bitumen and hot-melt boiler sand
- Drying substrates with a gas torch.

Safe2Torch

Safe2Torch is an industry led initiative to promote the safe use of gas torches for the application of roofing membranes and the drying of roof surfaces. Safe2Torch principles need to be implemented at the design stage of a waterproofing system, and strictly adhered to throughout the planning and construction phase in order to prevent fires during the installation of the waterproofing system or drying of a substrate. **Safe2Torch has its own dedicated webpage**[1] where you can download the Safe2Torch guidance, safe system of work, pictorial checklists and hot work permit.

Controlling Hot Works

Where hot works cannot be avoided, training workers in fire safety for the system they are installing will help to reduce accidents to workers and the public.

A safe system of work *(SSoW)* is needed when hazards cannot be physically eliminated, and some elements of risk remain. The purpose of a SSoW is to define safe methods needed to ensure that any residual hazard is controlled, and the risks minimised. It will require the risks to be managed throughout the task by trained operatives who have a permit to work *(PTW)* and understand the risks and how to manage them.

Permit to work (PTW)

Never start hot works without a PTW being in place. All PTWs and fire watches should consider the following:

- Undertake a pre-hot work inspection to confirm that hot work can be managed safely.
- Complete relevant sections of the hot work permit with the permit issuer.
- Ensure all precautions required by the hot work permit, including the provision of a suitable extinguisher(s), are always in place during the hot work.
- Strictly comply with the requirements of the hot work permit at all times.
- Deploy firefighting equipment, as required, in accordance with the training you have received.
- Activate the site fire alarm should the hot works process cause a fire incident.
- Actively inspect the hot work location for the duration detailed on the hot work permit.
- Close and return the permit to the permit issuer on completion of works/expiry of the permit.

Fire watch

Any area specified in the hot work permit must be subject to a fire watch and you must always maintain a continuous fire watch at the location where the flames, sparks or heat have been applied along with keeping a careful watch for fire while work is being carried out. It is also important to remember that the fire watch is not just at the end of a working day or shift. You should maintain a fire watch in the hot works area when workers take breaks during the working day.

The fire watch should consider whether the hot works being undertaken has the possibility to breach any walls (internal or external), floors or ceilings as this could lead to the possibility of a fire risk in an area not directly visible from where the hot work is being carried out, and therefore in this situation, it would be advisable to also undertake a fire watch within the building or the susceptible areas that are not visible.

The handling and storage of LPG gas cylinders

When moving or handling gas cylinders, it is important to bear in mind the following:

- Plan the Lift; a gas cylinder should always be upright when lifted to the place of work.
- Move gas cylinders with a purpose-made trolley that has a chain attached to secure the cylinder.
- Always use the proper lifting technique when moving gas cylinders.
- Be aware of your personal lifting limits.
- Use suitable gloves to ensure you have a firm grip when gas cylinders are wet and slippery.
- Never roll gas cylinders on their side, throw them or drop them.
- Do not use the gas bottle cap, valve or shroud to lift them.
- Test 'empty' cylinder, which may still contain gas by rocking them to feel the movement of the liquid.
- Never open the valve of an unconnected gas cylinder as there is still likely to be some gas left inside.

It is important that LPG cylinders are stored in the upright position and removed from the workplace when not in use and cylinders should be stored in a lockable gas cage when not in use.

- Store and use gas cylinder in an upright position.
- Store gas cylinders in well-ventilated places.
- Ensure gas cylinders are stored away from heat and ignition sources.
- Avoid storing Propane gas cylinders indoors.
- Make sure gas cylinders are stored outdoors, away from building entry/exit points.
- Keep gas cylinders away from any corrosive, toxic or oxidant material.

Using LPG gas cylinders

The greatest hazard in working with LPG is that when mixed with air, it can burn or explode if there is a source of ignition. Containers of LPG are liable to explode if they are involved in a fire.

- When using a gas cylinder, you should always treat it with care, keep it upright and read the instructions and labels provided.
- Ensure you return the gas cylinder to the gas cage whether it is empty or not or when not in use for long periods.
- Remember to keep your LPG appliances *(like the gas torch)* clean and have them serviced regularly.
- Do not subject the gas cylinder to heat as this could increase the pressure inside and exceed the safe limit.
- Do not try to disconnect or unscrew a regulator from any cylinder if the flame doesn't go out.
- Leaks may be identified by smell, noise or an approved leak detection solution or leak detector.
- **NEVER SEARCH FOR LEAKS WITH A NAKED FLAME.**

Gas Hoses

LPG gas hoses should be orange in colour and of a suitable length. Hoses used to supply gas to bitumen and hot-melt boilers should have a metal braided hose *(armoured hose)* to protect the hose from damage. Hoses are relatively vulnerable pieces of equipment that play a vital and uniquely valuable role in ensuring a flow of gas to your equipment; therefore, they should be selected and stored with care:

- Ensure you keep your hoses and tubing in tip-top condition by keeping them away from bright sunlight, dampness, abrasion and excessive loading.
- Hoses should be stamped with the year of manufacture and name of the manufacturer.
- The normal useful service life for a hose is approximately five years and will need replacing at the end of their life span.
- Demanding operating conditions or misuse can reduce the lifetime of a hose.
- Routinely check for visual signs of cuts, cracks, fading, brittleness, and hot spots.

Gas Torches

Gas torches should be fitted with a stand to ensure the hot burner does not come into contact with the roof surface, or materials within the work area. Torches that self-ignite and extinguish by using an electronic ignition system are safer and use less gas. Gas torches that are manually lit, must be extinguished after use; **never leave a gas torch running on a pilot flame**.

Gas torches must be used correctly and be cleaned and maintained at regular intervals:

- Do not use the gas torch with gases and pressures other than those for which it is intended.
- Inspect all equipment before use. Do not use damaged, defective, or improperly adjusted equipment.
- Make sure valves work properly, threads on equipment are clean *(no grease or oil)* and not deformed, and fittings are properly sized for the cylinder.

- Make sure torches are clean *(no grease or oil)* and manufacturer's maintenance instructions are followed.
- Ensure that all connections are tight.
- Do not use a torch if you smell gas. Check system for leaks with an approved leak detection solution or leak detector.
- **NEVER SEARCH FOR LEAKS WITH A NAKED FLAME.**

Bitumen and Hot-melt Boilers

Bitumen and hot-melt boilers are widely used in work on flat roofs. There are three types of risks that need to be controlled when using these boilers, which are:

- Fire and explosion risk from storage and use of liquefied petroleum gas *(LPG)*;
- Risk of burning from contact with hot bitumen; and
- Risk of respiratory irritation from excessive inhalation of bitumen fumes.

When setting up either a bitumen or hot-melt boiler, a number of basic safety guidelines should be followed:

- Stand the boiler on a firm, level surface, which should be non-combustible and capable of carrying the load. Do not site the boiler inside a building or in any enclosed space.
- Boilers should only be operated by a trained operative.
- For hot-melt boilers, check power lead for damage and wear and tear, and ensure that the main power source is no more than 20 metres from the boiler.
- The hose that connects the gas cylinder to the boiler needs to be a minimum of four metres in length and of metal braided hose *(armoured hose)*, the minimum distance between the cylinders and the machine should be three metres, and the armoured hose should be laid flat along the ground to prevent any tripping accidents.
- The lid of the boiler must be closed at all times, especially whilst paddle*(s)* are engaged in a hot-melt boiler.
- Protective clothing and full-face mask should always be worn when operating or loading material.
- Never leave the boiler unattended when alight or running.
- If a fault occurs, shut down the equipment immediately and report the fault.
- Always turn engine/burners off, and where applicable allow cooling before maintenance or repairs are carried out. Remove external power sources *(where applicable)*.
- The boiler should be enclosed with protective fencing where the general public may come into contact.

Fire Extinguishers

Fire extinguishers should be selected and have an up-to-date service record.

It is important to select an appropriate fire extinguisher(s) for the task:

WATER

Water fire extinguishers can be used on fires involving wood, paper, textiles and similar materials. They are not suitable for combustible liquids, oil, petrol or fires involving electricity.

DRY-POWDER

Dry powder fire extinguishers can be used on fires involving wood, paper, textiles and similar materials. Dry powder can also be used on fires involving electrical equipment however, they do not cool the fire, so it can re-ignite.

FOAM

Foam fire extinguishers are most suited to extinguishing liquid fires such as petrol or diesel and are more versatile than water jet extinguishers because they can also be used on solids such as wood and paper. The foam extinguishes liquid fires by sealing the surface of the liquid, preventing flammable vapour reaching the air and starving the fire of fuel. Not suitable for fires involving electricity.

CO_2

CO_2 fire extinguishers can be used on any type of fires, including electrical equipment and is an effective way to put out fires and prevent fire from reoccurring because of the lack of oxygen and the ice-cold temperature of the CO_2 when released from the extinguisher.

PPE

Personal Protective Equipment *(PPE)* is considered to be the lowest rank of risk control measures and it is only appropriate where the hazard in question cannot be totally removed or controlled in such a way that harm is unlikely. The types of PPE likely to be selected when carrying on hot works include:

- Hard hat *(to include a chin strap when working from height)*.
- High visibility vest.
- Steel toe-capped boots.
- Heat resistant gloves.
- Safety goggles.
- Long-sleeve flame-retardant workwear.

First Aid

An appointed first aider should be present throughout the shift, who can be a member of the team that has suitable current first-aid training. The role of a first aider is to give someone help, while making sure that they and anyone else involved are safe and that they don't make the situation worse.

The risk of burns and scalds are increased when carrying out hot works; to treat a burn or scald you can:

- put the burnt area under cool running water for at least 20 minutes, but don't use ice.
- use a hydrogel for first aid if water is not available.
- remove any clothing near the burn that is not stuck to it.

Further information

[1] Safe2Torch webpage: www.nfrc.co.uk/safe2torch

HSG168 Fire Safety in Construction: www.hse.gov.uk/pubns/priced/hsg168.pdf explains how everyone involved in construction projects can comply with their legal duties relating to fire risks.

Published by

NFRC
020 7638 7663
info@nfrc.co.uk

www.nfrc.co.uk
@TheNFRC

January 2024

NFRC
LEADING ROOFING EXCELLENCE

MRK061:v2.0 01/2024