

Safe System of Work for Gas Torches

Guidance for the safe installation of torch-on reinforced bitumen membranes and use of gas torches in the workplace.





Introduction

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.

A safe system of work (SSoW) is needed when hazards cannot be physically eliminated, and some elements of risk remain.

The SSoW described in this document defines safe methods needed to eliminate hazards and minimise all risks when using gas torches to dry a roof substrate or install a torch-on membrane. It requires 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.

Handling and storing LPG cylinders

Handling

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

- **Plan the lift** - an LPG cylinder should always be upright when lifted to the place of work
- **Lift properly** - always use the proper lifting technique when moving LPG cylinders.
- **Know your limits** - be aware of your personal lifting limits
- **Wear gloves** - use suitable gloves to ensure you have a firm grip when LPG cylinders are wet and slippery
- **Never roll** - never roll LPG cylinders on their side, throw them or drop them
- **Use the correct trolley** - move LPG cylinders with a purpose-made trolley that has a chain attached to secure the cylinder
- **Never lift by the bottle cap** - do not use the LPG bottle cap, valve or shroud to lift the cylinder
- **Test the 'empty' cylinder** - it may still contain LPG; rock it to feel the movement of the liquid
- **Never open valve of an unconnected cylinder** - do not open the valve of an unconnected LPG cylinder as there is still likely to be some LPG left inside (even on cylinders that appear empty)

Storing

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.

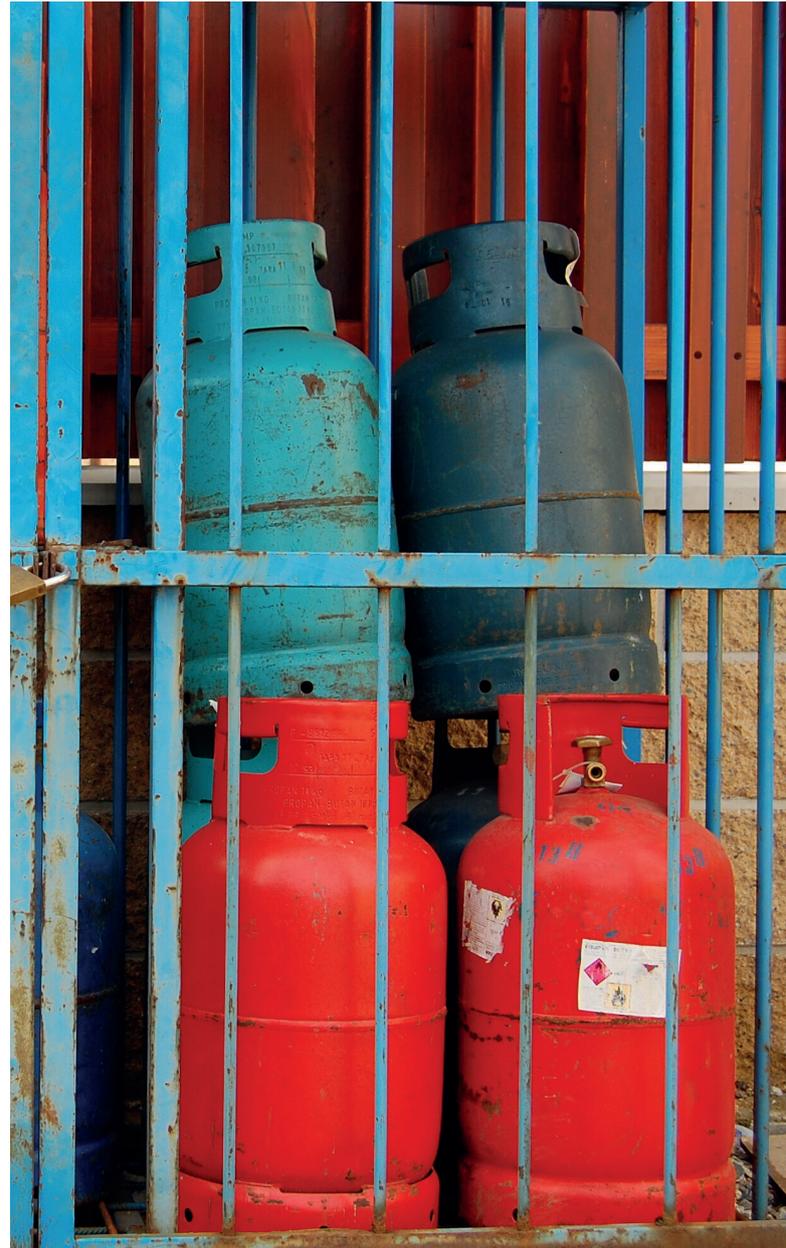
- **Keep upright** - store and use the LPG cylinder in an upright position
- **Keep well-ventilated** - store LPG cylinders in well-ventilated places
- **Keep away from heat** - ensure LPG cylinders are stored away from heat and ignition sources
- **Keep Propane outside** - avoid storing Propane LPG cylinders indoors
- **Keep away from access points** - ensure LPG cylinders are stored outdoors, away from building entry/exit points
- **Isolate from other material** - keep LPG cylinders away from any corrosive, toxic or oxidant material

Using LPG cylinders

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

- **Treat with care** - when using an LPG cylinder, you should always treat it with care, keep it upright and read the instructions and labels provided
- **Return empty cylinders** - ensure you return the LPG cylinder when it's empty or not in use for long periods
- **Keep clean** - remember to keep your LPG appliances clean and have them serviced regularly.
- **Avoid heat** - do not subject the LPG cylinder to heat as this could increase the pressure inside and exceed the safe limit. This applies to empty cylinders as it does to full ones.
- **Do not disconnect the regulator** - do not try to disconnect or unscrew a regulator from any cylinder if the flame doesn't go out
- **Use your senses** - leaks may be identified by smell, noise or an approved leak detection solution or leak detector.

NOTE: Never search for leaks with a naked flame



Tools and equipment

Connections

The regulator should be a left-hand threaded for fuel gases, with the hexagonal nut on the union connections notched to aid identification. It should also have a safety cut-off valve that stops the gas supply to the hose should the hose become damaged during use.

After attaching the gas torch to the LPG cylinder, you should check all connections for leakage, using an approved leak detection solution. If there are leaks which cannot easily be stopped:

- **Isolate the gas supply** - you should isolate the gas supply before the leaking components are taken out of service
- **Avoid excessive force** - Never use excessive force on cylinder valve spindles or hexagon regulator connection nuts to stop a leak
- **Avoid using sealing tape** - Never use sealing tape or other jointing materials because they are not suitable for preventing leaks between metal-to-metal surfaces that are designed to be gas tight

Hoses

LPG hoses should be orange in colour and of a suitable length. Hoses are relatively vulnerable pieces of equipment, which are vital to ensuring a flow of gas to your torch. You should therefore select and store them with care:

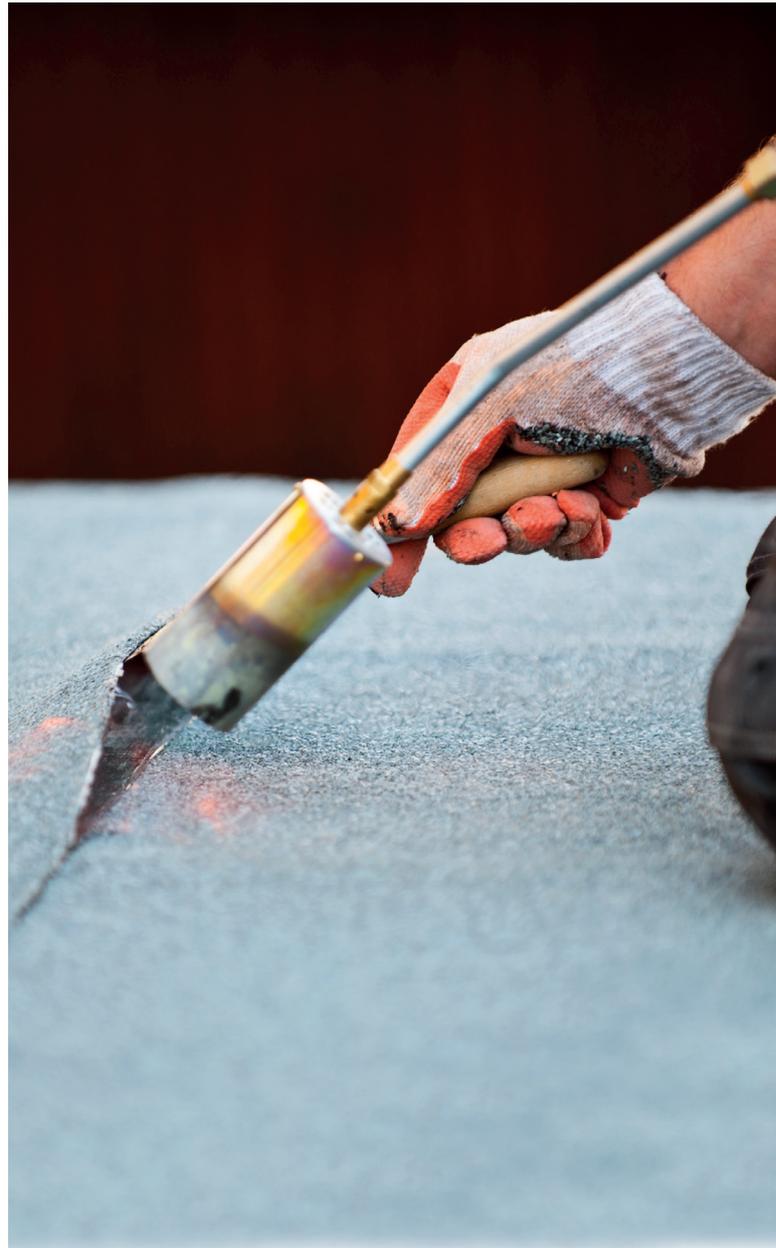
- **Keep in good condition** - ensure you keep your hoses and tubing in tip-top condition by keeping them away from bright sunlight, dampness, abrasion and excessive loading
- **Check manufacturer details** - hoses should also include the year and name of the manufacturer.
- **Check service life** - the normal useful service life for a hose is approximately five years, so do remember to replace them at the end of their life span.
- **Avoid misuse** - demanding operating conditions or misuse can reduce the lifetime of a hose
- **Carry out routine checks** - routinely check for visual signs of cuts, cracks, fading, brittleness, hot spots

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 with 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 extinguish 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:

- **Use correct gasses and pressures** - do not use torch with gases and pressures other than those for which it is intended
- **Use only with propane fuel gas**
- **Inspect all equipment before use** - do not use damaged, defective, or improperly adjusted equipment
- **Ensure valves work** - make sure valves work properly; threads on equipment are clean (no grease or oil) and not de-formed; and fittings are properly sized for the cylinder
- **Ensure torch is clean** - make sure torches are clean (no grease or oil) and manufacturer's maintenance instructions are followed
- **Ensure all connections are tight**
- **Check for leaks** - do not use 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**



NOTE: never leave a gas torch running on a pilot flame



Fire extinguishers

Fire extinguishers should be selected and have an up-to-date service record. It is important to select an appropriate fire extinguisher for the task. Depending on the types of material and risk involved, it may be necessary to provide more than one type of fire extinguisher



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.



CO₂

CO₂ 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 CO₂ when released from the extinguisher

Personal Protective Equipment (PPE)

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 out hot works include:

- Hard hat (with 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. They can be a member of the team who 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 do not make the situation worse.

Working with gas torches increases the risk of burns and scalds; to treat a burn or scald you can:

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

Permit to work (PTW)

Never start hot works without a PTW being in place. PTWs and fire watches MUST NEVER be seen as a tick box exercise which is paid lip service to. Working within the permit needs to be as robust as the installation of the roofing membrane - watertight.

- **Undertake a pre-hot work inspection** - use the Safe2Torch checklist to confirm that hot work can be managed safely
- **Complete the work permit** - complete relevant sections of the hot work permit with the permit issuer
- **Ensure precautions are in place** - make sure all precautions required by the hot work permit, including the provision of a suitable extinguisher(s), are always in place during the hot work
- **Comply at all times** - strictly comply with the requirements of the hot work permit at all times
- **Use firefighting equipment** - deploy firefighting equipment, as required, in accordance with the training you have received
- **Activate fire alarms** - activate the site fire alarm should the hot works process cause a fire incident
- **Inspect hot works location** - actively inspect the hot work location for the duration detailed on the hot work permit
- **Return permit** - Close the permit and return it 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:

- **Always maintain continuous fire watch at the location** - Maintain a careful watch for fire while work is being carried out. Also maintain a fire watch in the hot works area when workers take breaks during the working day. This fire watch should consider whether the work breaches walls, floors and ceilings; this could lead to a fire in an area not directly visible from where the hot work is being carried out
- **60-minute continuous fire watch** - Any area of hot work must be actively monitored for at least one hour following the cessation of hot work
- **Inspect the area for at least two hours** - After completion of the 60-minute continuous fire watch of the area, it must be followed by at least one more check two hours after the end of the hot work. This will mean that any hot work cannot be carried out near the end of the day or within at least two hours of the site or building being vacated
- **Departing from this procedure** - Only where a suitable and sufficient risk assessment clearly demonstrates that the risk of a fire from hot works is minimal will it be acceptable to follow a different procedure
- **Thermal imaging** - Use a thermal imaging camera at set times during the fire watch to document the cooling process of the area where heat was used to help to ensure that there are no smouldering materials; it is recommended that this approach is adopted within your fire watch

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Hot Work Permit



Company name		Project Title	
Location of Hot Works		Permit Number	
Person Authorising the Permit		Signature	
Supervisor/Fire Marshal		Signature	
Names of Operatives Involved in the Hot Works			
Equipment Used (including type of fire extinguishers)			
Date and Time of Hot Works		Time Permit Activated (Permit active for 1 day)	
Before Hot Work Commences Identify the Following Fires Risks (Safe2Torch Checklist)			
	Yes	No	N/A
Exposed timber deck			
Metal deck (refurbishment) where old materials may accumulate in the troughs			
Insulation - unless specifically designed and tested for use with torch-on membranes			
Details			
Expansion joints with voids and/or combustible fillers			
Fibreboard or timber fillets			
Detail under all abutments to roof tiles, slates and thatch			
Detail under cladding/rendering			
All abutments with open cavities (open perpend)			
All timber substrates			
Change in level details with fixed timber			
Plastic fascia's, soffits or gutters			
Restricted spaces			
Windowsills and frames and door sills			
louvered vents, air ducts, intakes and outtakes			
Junctions to existing waterproofing with flammable insulation/deck materials			
Vulnerable plastic curbs, domes, pipes and similar details			
Working when in close proximity to potentially flammable coatings			
Timber, DPC or sarking membranes beneath fixed metal capping systems			
Existing kitchen extraction plant coated in oils or fats			
Timber cladding			
Flammable wrapping to trunking/ducting			
Precautions to be taken			
Have fire doors with magnetic hold open devices, in the vicinity of the works, been closed?			
Are floors and surrounds swept clean and clear of rubbish?			
Has all combustible stock, plant, insulations etc been located 12m from the area?			
Has a trained, responsible person with authority to stop the work and to regularly check the area, particularly during lunch breaks and rest periods, been appointed?			
	Yes	No	N/A
Has firefighting equipment (e.g. extinguishers, water/sand buckets) been provided?			
Have all operatives undertaking the works been trained in the use of the firefighting equipment?			
Have warning notices been posted adjacent to, and where necessary, below the work area?			
Are all gas cylinders safely secured in upright positions and gas pipes and cable in good condition properly secured and kept as short as possible?			
Do the operatives know where the nearest fire alarm break glass point is located?			
Is the work permit clearly displayed at the job location?			
Has the work area been designated a no smoking area?			
Do all staff know the procedures for discovery of a fire and raising the alarm?			
Are the gas torches supervised by experienced persons and never left unattended unless switched off? (Never leave a gas torch running on a pilot flame)			
Have hoses on gas torches been checked before use?			
If operating adjacent to a gas supply, has the gas been turned off or the pipe protected?			
Are gas cylinders positioned 3 metres away from the gas torch?			
Have safety cut-off valves been fitted to gas cylinders?			
Is correct Personal Protective Equipment provided and worn in relation to the task?			

Operatives carrying out hot work		Yes	No	N/A
Must understand the permit conditions and the fire and safety precautions				
Must be in possession of a permit at all times during the hot works				
Must stop work if required to do so by an authorised person				
Must report immediately any hazard likely to affect the fire and safety precautions				
Must ensure a satisfactory access/egress from the work area				
Must understand the sites emergency plans and location of the muster point				
Confirmation by the supervisor: I confirm that the precautions specified above will be complied with and I will ensure that the persons carrying out the work, described above, are fully briefed on the safe method of work.				
Name		Signature		
Immediate Checks Upon Completion				
Is work area clean, tidy and safe?				
Have checks been made for smouldering debris with thermal imaging camera?				
Have all detector head covers been removed?				
Have all fire alarm zones been checked, confirmed as operational and the system been put online?				
A continuous fire watch should be maintained for at least 60 minutes after hot work is completed, with further checks being made at regular intervals, up to 2 hours after completion before the permit is signed off. A thermal imaging camera should be utilised during the fire watch to take images at regular 15-minute intervals.				
Work area checked with thermal imaging camera at 15 minutes:				
Work area checked with thermal imaging camera at 30 minutes:				
Work area checked with thermal imaging camera at 45 minutes:				
Work area checked with thermal imaging camera at 1 hour:				
Final sign-off at 2 hours:				
Permit Sign-off				
To be signed by the competent person on completion of ALL tasks: I confirm that notification has been given to the permit issuer for re-activation of the fire alarm system.				
Name		Signature	Date	
Name		Signature		



For more information and to pledge your support

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