

## **Gas welding safety flashback arresters**



**commission  
for occupational  
safety and health**

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## Guidance notes

A guidance note is an explanatory document issued by the Commission for Occupational Safety and Health (the Commission) providing detailed information on the requirements of legislation, regulations, standards, codes of practice or matters relating to occupational safety and health.

Guidance notes are developed within the tripartite setting of the Commission, with input from representatives of employer organisations, unions, the state government and experts.

## Introduction

The *Occupational Safety and Health Act 1984* contains general duties and responsibilities placed upon people to ensure their own safety at work, and that of others who are at the workplace or who might be injured by the work.

Flashback during oxy-fuel welding, cutting and allied processes can cause serious injury.

Equipment failure may result in a gas fire or explosion.

People most at risk are those using portable and mobile oxy-fuel gas systems for welding, heating or cutting metal in such industries as plumbing, boat building, engineering, demolition, fishing, farming, lift-installing, scrap metal, air conditioning and gas fitting.

This guidance note provides advice and information on the correct use of flashback arresters to minimise the risk of injury to workers and damage to equipment if flashback occurs.

### **Not a substitute for safety**

Flashback arresters are essential. They are not a substitute for safe work procedures, safe transporting and storage, regular checks and maintenance, instruction, information, training and supervision for operators, or for following the manufacturer's safety guidelines.



▲ **Flashback arresters fitted to portable gas welding equipment.**

## When flashback occurs

Flashback begins when the flame moves back from the welding tip and into the blowpipe, usually with a loud “bang” or a shrill hissing noise.

Unchecked by a flashback arrester, flame can travel extremely fast - about 13 metres a second - up gas supply hoses to the regulator possibly into the gas cylinders, and could even cause the cylinder to explode.

Internal damage to gas hoses and fittings from the extreme heat of a flashback will increase both the immediate and long term risk of equipment failure and a resulting fire or explosion.

A flashback is always a sign that something is wrong, either with the equipment or the work procedure. Always find the flashback cause before attempting to re-light.

## Damage to equipment

Correct use and maintenance of flashback arresters will minimise the risk of equipment failure through flashback.

However flashback arresters can themselves be damaged by repeated flashbacks, and lose their effectiveness.

Arresters and other fittings that look in good condition after a flashback may have been damaged internally and may fail during further normal use or in a subsequent flashback.

After any flashback incident, flashback arresters, gas hoses and fittings should be removed from use, inspected by a competent person and if necessary either discarded or repaired according to the manufacturer’s specifications or the applicable Australian Standard.

## What causes flashback?

Most flashbacks are caused by faults in gas hose fittings, resulting from wear and tear, dirt, excessive heat, carbonising, or damage during transport or storage, or from incorrect operating procedures.

Uneven gas pressure in the two supply hoses, caused by a blockage or equipment failure in one of the hoses, may cause the blowpipe flame to move into whichever gas hose is under least pressure.

Failure of hoses and fittings can allow gas to escape and trigger a workplace fire or explosion.

Regular maintenance of all gas welding, cutting and heating equipment by competent persons is essential, as are information, instruction and training for operators in the prevention of flashback.

## Some flashback causes

- Wrong gas sequence during start-up.
- Insufficient purging to clean hoses before use.
- Blocked, worn, undersized or overheated blowpipe tip.
- Blocked section in the blowpipe, cutting attachment or heating attachment.
- Hose run over by a vehicle during welding.
- Kinked or restricted hoses.
- Hoses of incorrect diameter.
- Wrong gas pressures. Where practicable, gauges should be within sight of the operator.
- Gas hoses of excessive length causing pressure loss.
- Gas hoses damaged by a previous flashback.
- Old gas hoses that have become stiff and brittle.
- Pressure loss or insufficient supply in either gas hose.
- Incorrect selection of flashback arresters.
- Slag blocking tip.

- Flame held too close to work surface.
- Hot metal falling on and burning through hose.
- Faulty equipment (eg worn locating serrations).
- Inappropriate selection of equipment for the job.
- Inappropriate use of equipment.

## Why arresters are essential

Because flashback happens too quickly for the gas to be turned off manually before damage occurs, it is essential to have flashback arresters on both gas hoses in all oxy-fuel welding, cutting or heating operations.

The OSH regulations require flashback arresters be fitted to each end of the hoses when using pressurised oxygen with a fuel gas. When using atmospheric air with a fuel gas, an arrester need only be fitted to the handpiece. A check valve alone is not considered to be an arrester.

Flashback arresters must be of the correct type and size recommended by the manufacturer. If flashback arresters are not of the correct type and size, there may be insufficient gas flow to safely complete the work.

Flashback arresters are required to be colour coded and marked with:

- Australian Standard (AS) 4603 or equivalent;
- the date and country of manufacture and the manufacturer's mark;
- the model or code number and the batch number; and
- the name and direction of gas.

When purchasing flashback arresters, advice should be sought from the supplier or manufacturer about selection, use and maintenance. The purchaser should advise the seller of the nature of the work undertaken with the equipment, such as welding, heating or cutting, to enable the flashback arresters to be adequately sized. Installation material should be kept and the recommendations of the manufacture for maintenance should be followed.

## Safe start-up

Before lighting the blowpipe, each gas hose should be purged separately, and the gas allowed to flow freely until the operator is certain the hose contains no impurities such as water, dirt or blockages.

After purging, close down each blowpipe valve. This operation should take place in a well ventilated space away from any naked flame or source of ignition.

The purging procedure should follow each period of non-use before re-lighting.

The blowpipe manufacturer's instructions should be followed to light up and shut down the blowpipe.

If there are any signs of leakage, fluctuating gas supply, gas starvation or misshapen flames, the equipment should be shut down and the fault corrected.

## Flame safety

The shape and movement of the flame on an oxy-fuel nozzle or tip are important indicators of the safe or unsafe condition of gas supply hoses and equipment.

It is critical that a stable and useful flame is obtained at all times when using gas welding and cutting systems. Unstable flames not only reduce productivity, but also place the operator and others nearby at risk.

Another common but less serious flame problem is backfire - when the flame burns back into the blowpipe tip, usually with a loud "bang".

Backfire may be caused by touching the tip against the work, allowing particles to enter the tip and obstruct the gas flow, overheating the tip, or using pressures too low for that tip. If a backfire does occur:

- shut off the blowpipe valves, oxygen first and then the fuel gas;
- shut off the oxygen and fuel gas cylinder valves;
- cool the blowpipe with water, if necessary; and
- check the equipment for damage or faults, particularly the nozzle.

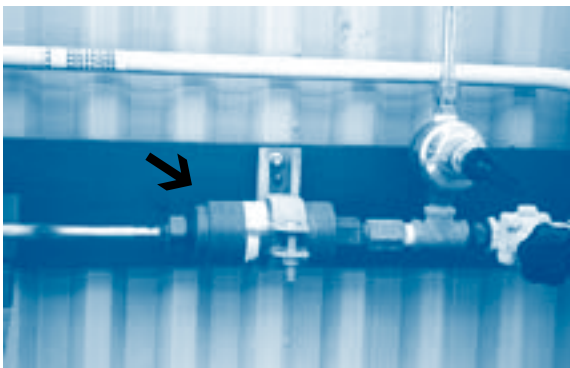
## Emergency procedures

If flashback occurs and the flame moves into the blowpipe, a shrill hissing sound will be heard.

Close the blowpipe oxygen valve at once, then close the fuel gas valve.

**Note:** This is the reverse of the normal shutting down procedure.

Wait for a few moments to make sure the flame has gone out. Allow the tip to cool before re-lighting.



▲ *Flashback arrester fitted on manifold system.*

## What the law says

All parties at the workplace have responsibilities for safety and health at the workplace.

Section 19 of the *Occupational Safety and Health Act 1984* says employers must, as far as is practicable, provide a working environment in which employees are not exposed to hazards. This includes providing safe work systems, information, instruction, training, supervision and protective clothing and equipment.

Regulation 3.1 says employers, main contractors, self-employed persons and persons in control of workplaces or access must, as far as practicable, identify each hazard to which people at the workplace could be exposed, assess the risk of injury or harm resulting from each hazard and consider means of reducing the risk.

Regulation 3.98(1) of the *Occupational Safety and Health Regulations 1996* says employers, main contractors and self employed persons at workplaces where welding, heating, cutting or an allied process is done must ensure that a flashback arrester is fitted to the operator's side of each regulator connection or gas discharge of a manifolded cylinder pack, and to the blowpipe.

Regulation 3.98(2) says that this does not apply to a gas cylinder that is used with atmospheric air.

Apart from the employer's responsibilities outlined above, Section 20 of the *Occupational Safety and Health Act 1984* says that employees have responsibilities to take reasonable care to ensure their own safety and health, and that of others affected by their work.

## Further information

Technical Note 7 - Health and Safety in Welding published by the Welding Technology Institute of Australia is an approved code of practice under the *Occupational Safety and Health Act 1984*. It provides guidance on safety and health practices in various welding, cutting and allied processes and serves as a basis for the general guidance of industry and for the training of personnel.

Detailed information on safe welding procedures is provided in Australian Standard *AS 1674 Safety in welding and allied processes*.

*AS 1674.1 Fire precautions* specifies precautions to be taken prior to and during hot work to prevent the possibility of fire or explosion which may result in harm to persons or property.

*AS 4603 Flashback arresters - Safety devices for fuel gases and oxygen or compressed air*.

*AS 4839 The safe use of portable and mobile oxy-fuel gas systems for welding cutting, heating and allied processes*.

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Comprehensive work safety and health information can be found at: [www.worksafe.wa.gov.au](http://www.worksafe.wa.gov.au)

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