



Welding Safe Working Practices

GAS WELDING

Oxygen cylinders are painted black and the outlet valve threads are right-hand.

The outlet valve threads on fuel cylinders are left-hand, acetylene cylinders being painted maroon and the propane, the most commonly used LPG, red.

Valve connections are not, therefore, interchangeable and every effort should be made to preserve the original colour to avoid confusion.

Oxygen has no smell and is not itself flammable. However, too much oxygen in the atmosphere can be extremely dangerous. If the gas impregnates materials which normally don't burn, they are liable to burst into flame.

Acetylene is highly flammable and, with air or oxygen, may form an explosive mixture.

LPG is heavier than air and may, therefore collect in low-lying areas.

STORAGE OF GAS CYLINDERS

Oxygen cylinders should be stored at least 3m away from those containing acetylene or LPG.

Gas cylinders should preferably be kept on a hard standing in a safe place in the open air.

Oxygen cylinders must not be kept in the same storeroom as LPG or acetylene cylinders.

Acetylene and LPG cylinders, whether full or empty, should always be kept upright.

Oxygen cylinders may be stacked horizontally, maximum four high, and wedged to prevent rolling.

Vertically stacked cylinders, whether full or empty should be secured against falling.

Full cylinders should be kept separate from empty ones.

Cylinder should be shielded from direct sunlight, or other heat, to avoid the build-up of excess internal pressure which might lead to a gas leakage or, in extreme cases, bursting of the cylinder.

Gas cylinders must be treated with care and not subjected to shocks or falls. When they are transported in a vehicle around a site, they should be secured to avoid any violent contact

which could weaken the walls. When they are being unloaded from a vehicle they should not be dropped to the ground.

Acetylene cylinders must always be transported and used in the vertical position. If they have been left in the horizontal position they must be stood upright for approximately 10 minutes to settle out before use.

REGULATORS

Regulators must always be fitted to the cylinder to reduce the gas pressure from that in the cylinder to the working pressure of the blowpipe. Only regulators designed for the gas being used may be fitted to the cylinders.

Periodic checks should be made to ensure that no gas is leaking from the regulator when the pressure regulating screw is set at zero. A leak will cause a build-up of pressure in the hose to the torch, when the blowpipe is shut. Checks for gas leakage from any part of the equipment should only be made with water containing detergent. Bubbles in the detergent indicate the presence of a leak.

HOSES

Hoses should be kept for one type of gas only, and colour coded for identification - red for acetylene or other fuel gases (except LPG), orange for LPG and blue for oxygen.

Hoses should be inspected daily to see that they are free from cuts, scratches, cracks, burnt or worn patches. They should be effectively clipped or crimped to the equipment and protected at all times from sharp edges, falling metal, passing traffic and sparks from the welding operation.

NON RETURN VALVES AND FLASHBACK ARRESTORS

If oxygen and the fuel gas become mixed in one of the hoses, a mixed gas explosion or “flashback” may occur. To avoid the risk of igniting such an explosive mixture, each hose should be purged with its own gas before the blowpipe is lit. This operation should be carried out in a well ventilated space away from any source of ignition.

BLOWPIPES

If the nozzle of a blowpipe becomes damaged or blocked, then a build-up of pressure can cause a reverse flow of gas and a flashback may occur. Blowpipes should be dismantled and cleaned at regular intervals.

GENERAL PRECAUTIONS

Only proprietary fittings should be used on gas welding equipment.

If a cylinder valve leaks and cannot be tightened with a spanner, the valve should be closed and the cylinder returned to the supplier, with a label indicating the fault. Cylinder valves should never be packed with washers.

On no account should any oil, grease or other fatty substances, such as soap, be allowed to come into contact with an oxygen regulator valve or fittings, as these substances are spontaneously combustible in the presence of oxygen. It is dangerous to allow the flame to come into contact with the cylinders, or a lighted torch to be hung on a regulator, or its guard.

It is equally dangerous to rest blowpipes, even after the flame has been extinguished, on empty oil drums or similar containers.

ELECTRIC ARC WELDING

The Circuit

The current used for electric arc welding may be either direct or alternating but, whichever system is used, it is important that the voltage be as low as is consistent with efficient welding.

Cables and Cable Couplings

Welding leads and welding return cables are frequently dragged over rough surfaces. Their insulation should, therefore be suitable for resisting hard wear and should be examined frequently for defects. The part of the cable which is connected to the electrode holder should be as flexible as possible, so as not to hamper the movement of the welder.

The welder return should be of a section not less than that of the welding lead.

Joints between cable sections should be made with properly constructed insulated cable couplings, adequately shrouded so that live metal is not exposed if the parts of the connector are separated.

The welding return should be firmly connected to the metal on which welding is taking place, by means of a well constructed clamp.

Electrode Holders

An electrode holder is essentially a pair of spring loaded jaws, or a threaded sleeve, fitted to the end of the welding lead. The holder should be fully insulated, so that the live portions cannot be touched accidentally.

FIRE AND EXPLOSIONS

The potential for fires and explosions is always present unless gas cylinders are stored and handled correctly. Where possible flammable materials should be kept out of any area where welding is taking place. Where such a course of action is not practicable, fire resisting sheets should be used to protect the surroundings from the flame and from spatter. At least one fire extinguisher should always be immediately available in the area of any welding operation.

BURNS

Skin burns may result from metal spatter or from touching hot workpieces. The hands, arms, legs, and feet are particularly vulnerable so should be protected by gloves or gauntlets, spats and jackets made from chrome leather. Use leather safety footwear.

Prolonged exposure to the heat from welding may lead to reddening of the skin of the face. In the case of gas welding discomfort may be avoided by the use of a hand shield.

EYE DAMAGE

During any welding operation, the eyes may be penetrated by sparks, spatter, slag and other foreign bodies. During gas welding, infra-red and of course visible light is emitted but not ultra-violet lights. Infra-red may dry the outer surface of the eye which may become irritated.

The eyes must be protected from infra-red and visible light by means of box goggles with a housing made to BS 1542, and filters made to BS 679.

Ultra-violet (UV) radiation, to which the eyes are very sensitive, is produced during arc welding. The effect of UV radiation on the eyes may vary from conjunctivitis to possible permanent damage to the retina. In order to avoid these injuries, welders must use a welding helmet or hand screen, with housing complying with BS 1542, and fitted with appropriate filters to BS 679. Persons working in the vicinity of arc welding also need protection from UV radiation. This protection can be given by means of screens placed around the welder's working area.

HEAT STRESS

The longer the duration of welding the hotter the surrounds, including the welder, become. The heat stress is intensified the smaller the confines in which the welding operation is taking place. If thermal stress is envisaged then ventilation should be introduced and consideration should be given to having a second person on standby in case of emergencies.

RESPIRATORY DISEASE

Every welding process produces gases and fumes which may result in respiratory disease.

Before carrying out welding operations, the materials involved should be identified, the risks assessed and necessary control measures established.

SYSTEMIC POISONING

The fumes from galvanised metals, lead coated or other toxic metals may affect not only the respiratory system, but also the rest of the body, particularly where the work which produces the fumes is carried on for any length of time in poorly ventilated conditions. The provision of an exhaust ventilation system for this type of work is essential and, in addition, the use of respirators may be required. Air sampling must be carried out to confirm the adequacy of the precautions.