Acetylene

Guidance for University Departments and Functions

Safety Services Office
SAFE USE OF ACETYLENE

Existing legislation (Order in Council No. 30 as amended by the Compressed Acetylene Order 1947 made under the Explosives Act 1875) defines acetylene gas at pressures of more than 9psi (0.621 BAR) above that of the atmosphere as being an 'explosive' and requires that it may not be held:

(a) at pressures in excess of 9psi (0.621 BAR) above that of the atmosphere, except as approved by the Secretary of State, nor

(b) at pressures greater than 22psi (1.517 BAR) above that of the atmosphere, except when kept in conditions approved by the Secretary of State, in a manner, and for a purpose, defined in the Compressed Acetylene Order 1947.

It is now proposed to modify these requirements, involving the powers conferred on the Secretary of State by the Health and Safety at Work Act 1974.

We propose that the basic provisions should allow acetylene gas to be used at any pressure in excess of 9psi above that of the atmosphere (0.621 BAR) if the acetylene is kept and used in accordance with the terms of a licence granted by the Health and Safety Executive; or at pressures of between 9 and 22psi (0.621 and 1.517) above that of the atmosphere if the installation using acetylene is constructed and operated in accordance with the conditions set out in items (1)-(21) below.

(1) No part of the premises in which acetylene is used shall also be used for the manufacture of acetylene.

(2) Any acetylene stored on the premises in which the acetylene is to be used shall be kept in cylinders complying with the requirements of Order of Secretary of State No. 9 made under the Explosives Act 1875.

(3) No cylinder used to store acetylene shall be kept within a working building or elsewhere on the premises concerned other than in a structure used solely for the storage of acetylene cylinders, provided that cylinders of compressed rare gases or nitrogen may be stored together with acetylene cylinders. In this context, discharged acetylene cylinders shall be treated in the same way as acetylene cylinders.

(4) Any structure used to house acetylene cylinders must be protected by a weather-tight roof covering and must be so positioned or constructed that cylinders within it are not liable to damage as a result of impact by any vehicle on an adjacent road or access way. The structure must be adequately ventilated directly to atmosphere (both at its upper and lower levels) and must be separated by an impermeable partition, having a fire resistance of not less than one hour and a physical strength equivalent to a double brick wall, from any working space which is within the building to which it is attached, or which is less than 8 metres from the structure.
At least 25% of the wall area of the structure must be open to atmosphere or alternatively the whole of its roof must consist of light, easily frangible material.

(5) Any structure used to store acetylene cylinders shall be so designed that the cylinders contained within it are secure from interference by unauthorised persons. A barrier equivalent to weld mesh as defined in BS 405 : 1945 shall be deemed to provide a sufficient protection for this purpose provided that the normal mesh size is within the range of XM 21-XM 26 or XM 41-XM 43.

(6) Any acetylene cylinder used to supply acetylene gas must be closed by the valve on the cylinder at all times other than those during which the cylinder is either in use or is required for immediate use. The connections to the cylinders may be of approved HP hose, which shall be equivalent in standard to wire reinforced rubber hose of a quality not less than would satisfy ISO R1436.

(7) All acetylene cylinders used to supply the gas to the installation must be fitted with two reducing valves, the primary valve of which must reduce the gas pressure to not more than 50psig (3.447 BAR) between the cylinder or manifold and the piping used to convey acetylene.

(8) Any pipe-work used for the conveyance of acetylene at pressure in excess of 9psig (0.621 BAR) must be fitted as close as practicable to, and within one metre of, either any high pressure manifold or of the cylinders supplying gas to it, with a safety relief valve so designed and fitted as to ensure that the pressure in the system cannot exceed 22psig (1.517 BAR), and this in turn must be fitted with a vent pipe so that the acetylene gas passing through this valve will vent directly to atmosphere in a safe position. Safety relief valves shall be tested for correct operation not less often than once every two years.

(9) Flashback arrestors to a design approved by either the Health and Safety Executive or a body authorised to approve such arrestors on behalf of the Health and Safety Executive must be fitted:

(a) within one metre, measured along the pipe-work, of either the manifold, or of any cylinder reducing valve when no manifold is used, attached to the cylinders or cylinder, supplying acetylene;

(b) between any device operated by acetylene at pressures in excess of 9psig (0.621 BAR) and the pipe-work delivering acetylene to such a device at a distance of not more than one metre, measured along the pipe-work, from the device concerned.

In this context, flexible rubber hoses of quality less than will satisfy BS 5120 : 1975, and necessarily used to carry acetylene gas to any particular mobile
device, shall be regarded as forming part of the device itself but the length of these hoses shall be kept to the minimum which is reasonably practicable.

(10) Subject to the conditions set out below at item (11), within any working building, acetylene, at pressures in excess of 9psig (0.621 BAR), shall be conveyed only via pipes of seamless mild steel of a quality not less than that required to satisfy British Standard 1387 : 1967 medium or heavy quality not galvanised on their internal surfaces or of seamless stainless steel tubing. Any piping used, including any manifold, shall have an internal diameter not exceeding 25mm and all joints shall be fusion welded wherever this is reasonably practicable. Where fusion joints are not reasonably practicable, steel compression joints or screwed fittings may be used.

(11) In so far as is reasonably practicable, all devices operated by use of acetylene at more than 9psig (0.621 BAR) shall be supplied with gas by means of a permanent fixed rigid pipe system. Where this is not reasonably practicable, any hoses used for the feeding of acetylene from the pipe system to the device in operation shall be of a quality not less than would satisfy BS 5120 : 1975. In this context, any metering and control equipment used in connection with the device shall be considered to form part of the device itself, always provided that it is positioned as close to the device as is reasonably practicable, and that a flashback arrestor is fitted between the metering and control equipment and the point at which the acetylene is burned.

(12) All pipe-work used for the conveyance of acetylene at pressures in excess of 9psig (0.621 BAR) shall be tested before being taken into use and at intervals of not more than two years thereafter, to ensure that all joints are leak free, i.e. with no noticeable drop in the system when tested with nitrogen at a pressure of not less than 50psig (3.447 BAR) over a period of 10 minutes. Records of such tests shall be retained for not less than three years.

(13) All rigid pipe-work must be securely fixed to a wall or flooring in such a position that it is protected from wear and mechanical damage and from corrosion by water or other industrial substances and is immediately visible except where it passes directly through walls and partitions. No acetylene piping may be run through enclosed roof spaces.

(14) All piping carrying acetylene must be so positioned or protected that it will not be exposed to any source of external heating.

(15) All rigid piping, carrying acetylene, must be clearly coloured maroon and must be conspicuously marked with the word "acetylene" at intervals of not greater than 3 metres.

(16) Any main supply pipe must be terminated with an isolating shut-off valve which is capable of providing a gas-tight shut-off with moderate manual effort. Where a common main supply pipe is used to carry acetylene to more than one device, a separate gas-tight shut-off valve must be provided between the supply pipe system and each individual device concerned. Every isolating shut-off valve must be so positioned as to be readily accessible to the operator
of any device fuelled by acetylene, the supply to which may be shut off using the valve concerned.

(17) Neither copper nor silver shall be used in the construction of the acetylene supply systems, nor in the construction of equipment used for the burning of acetylene, always provided that brass may be used for all purposes other than the construction of pipe-work, providing that its copper content is less than 70 per cent, and that silver brazing alloy to BS 1845 type AG 2 and AG 3 may be used in the construction of valves and fittings. In any brazing operations all flux residues are to be completely removed.

(18) No highly flammable material shall be kept within 3 metres of any apparatus in which acetylene, at pressures in excess of 9psig (0.621 BAR), is burned. No highly flammable liquids, as defined in the Highly Flammable Liquids Regulations 1971 shall be kept within 9 metres of such apparatus unless they are separated therefrom by a vapour tight barrier such that vapour must travel 9 metres from the point of use or keeping to the burning acetylene.

(19) Any artificial lighting fitted in any store used to keep acetylene cylinders shall be constructed to comply with Group IIC requirements of BS 4683: 1971 Part 2. Other electrical apparatus in such areas shall comply with one of the following:-

2. Type 'N' apparatus to BS 4683 : 1972 Part 3.
3. Type 'e' apparatus to BS 4683 : 1973 Part 4.

(20) Pipelines must be at least 50mm free from electrical apparatus and wiring and must not be used as an electrical earth.

(21) An effective non-return valve must be fitted in the acetylene pipeline as close to the junction with any oxygen pipeline as is practicable. Any such junction must be as close to the point at which the mixture is to be burned as is reasonably practicable.