Service Piping Systems
Oxy-fuel gas
Welding and cutting
4-22-13

(13) Materials and designs of service piping systems

(a) Service piping systems must use:

(A) Piping and fittings that comply with section 2, Industrial Gas and Air Piping Systems, of the American National Standard Code for Power Piping ASME B31.1 2010. 253(d)(1)(i)

(B) At least Schedule 40 pipe and use fittings that are at least standard weight in sizes up to and including 6-inch nominal. 253(d)(1)(i)(A)*(1)*

(C) Copper tubing that is Type K or L and complies with the Standard Specification for Seamless Copper Water Tube, ASTM B88-66a. 253(d)(1)(i)(A)(2)

(D) Steel, wrought iron, brass or copper pipe, or seamless copper, brass or stainless steel tubing, except when stated otherwise . 253(d)(1)(i)(B)

(E) Stainless steel or copper alloys for oxygen piping and fittings when pressures exceed 700 psi. 253(d)(1)(ii)(A)

(F) Hose connections and hose to connect the outlet of a manifold pressure regulator to piping, provided that the working pressure of the piping is 250 psi or less and they comply with the rules for hose and hose connections found in paragraphs (10) (a)(A), (10) (a)(K), (10) (b)(G), (10)(c)(A), (10)(c)(B), 253(d)(1)(ii)(B)

(G) Hose(s) that do not exceed 5 feet in length to connect manifold pressure regulators to piping. 253(d)(1)(ii)(B)

(H) Hose that has a minimum bursting pressure of 1,000 psig (6.8 MPa). 253(d)(1)(ii)(B)

(I) A piping system with a minimum design pressure of 250 psig when oxygen is supplied from a low-pressure oxygen manifold without an intervening pressure regulating device. 253(d)(1)(ii)(C)

(J) Pressure regulating devices at each station outlet when the connected equipment is for use at pressures less than 250 psig (1.7 MPa). 253(d)(1)(ii)(C)

(K) Steel or wrought iron piping for acetylene or acetylenic compounds. 253(d)(1)(iii)(A)

(L) Unalloyed copper for acetylene or acetylenic compounds **only** with equipment listed as appropriate for its use. 253(d)(1)(iii)(B) & 437-002-0291(1).

(b) Piping joints must be treated as follows. You must:

(A) Weld, thread or flange joints in steel or wrought iron piping. 253(d)(2)(i)

NOTE: Fittings, such as ells, tees, couplings, and unions, may be rolled, forged or cast steel, malleable iron or nodular iron.

(B) Weld, braze, thread, or flange brass or copper pipe joints. 253(d)(2)(ii)

(C) Braze socket type joints with silver-brazing alloy or similar high melting point (not less than 800° F (427° C)) filler metal. 253(d)(2)(ii)

(D) Braze joints or use approved gas tubing fittings in seamless copper, brass, or stainless steel tubing. 253(d)(2)(iii)

(E) Braze socket type joints with silver-brazing alloy or similar high melting point (not less than 800° F (427° C)) filler metal. 253(d)(2)(iii)

(F) Prohibit the use of gray or white cast iron fittings on piping joints. 253(d)(2)(i)

(c) When installing piping systems you must: (d)(3)

(A) Internally examine and remove scale and dirt from fittings and lengths of pipe before assembly. 253(d)(3)(vii)

(B) Wash out oxygen pipe and fittings with a suitable solution which will effectively remove grease and dirt but will not react with oxygen. 253(d)(3)(vii)

NOTE: Hot water solutions of caustic soda or trisodium phosphate are effective cleaning agents for this purpose.

(C) Install and maintain distribution lines in a safe operating condition. 253(d)(3)(i)

(D) Run all piping as directly as practicable. 253(d)(3)(ii)

(E) Protect piping against physical damage. 253(d)(3)(ii)

(F) Make allowances for piping expansion, contraction, jarring and vibration. 253(d)(3)(ii)

(G) Locate pipe laid underground below the frost line. 253(d)(3)(ii)

(H) Protect against corrosion. 253(d)(3)(ii)

(I) Weld or braze piping that is installed in tunnels, trenches or ducts. 253(d)(3)(iii)

(J) Install shutoff valves outside of tunnels, trenches or ducts. 253(d)(3)(iii)

(K) Provide good natural or forced ventilation when oxygen piping is installed in the same tunnel, trench or duct with fuel-gas pipelines. 253(d)(3)(iii)

(L) Drain low points in piping that carries moist gas into drip pots, constructed to permit pumping or draining out the condensate, at necessary intervals. 253(d)(3)(iv)

(M) Install drain valves having outlets normally closed with screw caps or plugs for draining low points in piping systems. 253(d)(3)(iv)

(N) Case or jacket pipes leading to the surface of the ground where necessary to prevent loosening or breaking. 253(d)(3)(iv)

(O) Install gas cocks or valves for all buildings at points where they will be readily accessible for shutting off the gas supply to these buildings in an emergency. 253(d)(3)(v)

(P) Install a shutoff valve in the discharge line from the generator, gas holder, manifold or other source of supply. 253(d)(3)(v)

(Q) Thoroughly blow out assembled piping with air, nitrogen or carbon dioxide to remove foreign materials. 253(d)(3)(ii)

(R) Blowout oxygen piping using oil-free air, oil-free nitrogen, or oil-free carbon dioxide: 253(d)(3)(ii)

NOTE: Air or inert gas may be used with other piping. 253(d)(3)(viii)

(S) Purge oxygen lines, using oil-free air, oil-free nitrogen, or oil-free carbon dioxide. 253(d)(3)(x)

(T) Use pressure relief devices set to function at not more than the design pressure of the systems and that discharge upwards to a safe location. 253(e)(2)

(d) When installing piping systems you must not:

(A) Install shutoff valves in safety relief lines in such a manner that the safety relief device can be rendered ineffective. 253(d)(3)(vi)

(B) Have uncapped openings of flammable gas lines or other parts of equipment being purged of air or gas near open lights or other sources of ignition. 253(d)(3)(ix)

(C) Use open end valves or petcocks except when drips are located outdoors, underground, and not readily accessible. 253(d)(3)(iv)

(D) Use valves outdoors, underground or in areas not readily accessible unless they are equipped with a means to secure them in the closed position. 253(d)(3)(iv)

(E) Weld or cut an acetylene or oxygen pipeline, including the attachment of hangers or supports, until the line has been purged. 253(d)(3)(x)

(e) When painting and marking piping systems you must ensure that: (d)(4):

(A) Underground pipe and tubing and outdoor ferrous pipe and tubing is covered or painted with a suitable material for protection against corrosion. 253(d)(4)(i)

(B) Aboveground piping systems are marked in accordance with the American National Standard Scheme for the Identification of Piping Systems, ASME A13.1 2007. 253(d)(4(ii)

(C) Station outlets are marked with the name of the gas. 253(d)(4)(iii)

(f) When testing piping systems you must: 253(d)(5)(i)

(A) Test and prove they are gas-tight at 1-1/2 times their maximum operating pressure. 253(d)(5)(i)

(B) Thoroughly purge them of air before placing them in service. 253(d)(5)(i)

(C) Use oil free and noncombustible material to test oxygen lines. 253(d)(5)(i)

(g) When testing piping systems you must not:

(A) Use flames to detect leaks. 253(d)(5)(i)

(B) Purge flammable gas lines or other parts of equipment of air or gas when uncapped openings are near sources of ignition. 253(d)(5)(ii)

(h) When installing protective equipment, hose and regulators in service piping systems you must:

(A) Install and use equipment in the service for which it was approved and as recommended by the manufacturer. 253(e)(1)

(B) Install the protective equipment shown in Figures Q-1, Q-2, and Q-3 in portable outlet headers and fuel-gas and oxygen piping systems to prevent: 253(e)(3)(ii)

NOTE: When only a portion of a fuel-gas system is to be used with oxygen, only that portion need comply with paragraph (h)(A).

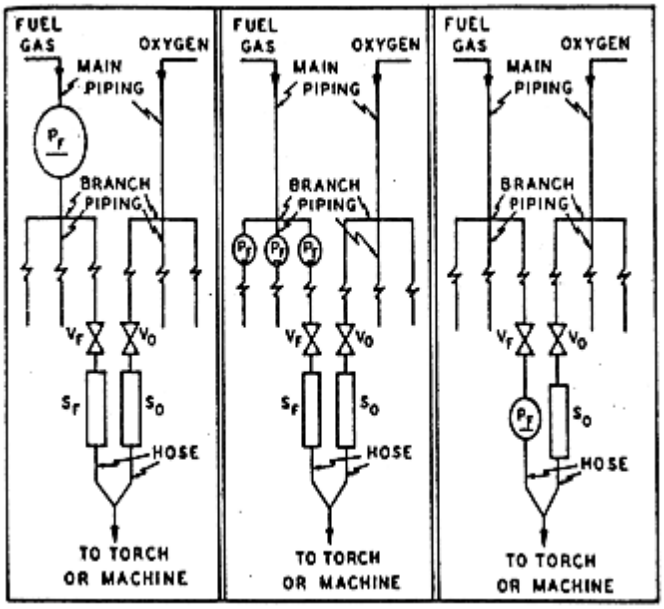

Fig. Q-1 **Fig. Q-2** **Fig. Q-3**

LEGEND
P_F — Protective equipment in fuel gas piping
S_F — Backflow prevention device(s) at fuel gas station outlet
S_O — Backflow prevention device(s) at oxygen
V_F — Fuel gas station outlet valve
V_O — Oxygen station outlet valve station outlet

(i) Backflow of oxygen into the fuel-gas supply system.

(ii) Passage of a flash back into the fuel-gas supply system.

(iii) Excessive back pressure of oxygen in the fuel-gas supply system.

NOTE: The three functions of the protective equipment may be combined in one device or may be provided by separate devices. 253(e)(3)(ii)

(C) Locate protective equipment: 253(e)(3)(ii)(1)

(i) As in Figure Q-1In the main supply line, Figure Q-1, or

(ii) As in Figure Q-2 at the head of each branch line, or

(iii) As in Figure Q-3 at each location where fuel-gas is withdrawn.

(iv) As in Figure Q-2 or Figure Q-3 where branch lines are of 2 inch pipe size or larger or of substantial length.

(D) Install flash-back protection that will prevent flame from passing into the fuel-gas system. 253(e)(3)(ii)(3)

(E) Provide an approved back-pressure relief device set at a pressure not greater than the pressure rating of the backflow or the flashback protection device, whichever is lower. 253(e)(3)(ii)(4)

(F) Locate pressure-relief devices on the downstream side of backflow and flashback protection devices.

(G) Install pressure-relief device vents that are at least as large as the relief device inlet.

(H) Install pressure-relief vents without low points that may collect moisture.

(I) Install drip pots with drains closed with screw plugs or caps at the low points if low points are unavoidable.

(J) Install the vent end so it:

(i) Does not endanger personnel or property through gas discharge.

(ii) Is located away from ignition sources.

(iii) Terminates in a hood or bend.

(K) When pipeline protective equipment uses a liquid, the liquid level must be maintained.

NOTE: Suitable antifreeze may be used to prevent freezing.

(L) Withdraw fuel-gas for use with equipment not requiring oxygen upstream of the piping protective devices.

(l) Station outlet protective equipment must:

(A) Have a check valve, pressure regulator, hydraulic seal, or combination of these devices at each station outlet, including those on portable headers. 253(e)(4)(i)

(B) Have these devices as shown in Figures Q-1, Q-2, and Q-3 and designated as SF and SO.

(C) Use approved pipeline protective equipment (designated PF) located at the station outlet as in Figure Q-3, or an additional check valve, pressure regulator, or hydraulic seal is required. 253(e)(4)(ii)

(D) Have a shutoff valve (designated VF and VO) installed at each station outlet. 253(e)(4)(iii)

(E) Have a shutoff valve located on the upstream side of other station outlet equipment. 253(e)(4)(iii)

(F) Terminate the station outlet in a union connection that complies with the Regulator Connection Standards, 1958, Compressed Gas Association if the outlet is equipped with a detachable regulator.

(G) Terminate in a union connection complying with the Standard Hose Connection Specifications, 1957, CGA if it is connected directly to a hose. 253(e)(4)(v)

(H) Terminate in pipe threads to which permanent connections are to be made, such as a machine. 253(e)(4)(vi)

(I) Have station outlets equipped with a detachable outlet seal cap secured in place. 253(e)(4)(vii)

(J) Use this cap to seal the outlet except when a hose, a regulator, or piping is attached. 253(e)(4)(vii)

(K) Be equipped with station outlets with approved backflow and flash-back protective devices when four or less torches are supplied from one station outlet through rigid piping provided: 253(e)(4)(viii)

(i) Each outlet from this piping is equipped with a shutoff valve, and

(ii) The fuel-gas capacity of any one torch does not exceed 15 cubic feet (0.42m3) per hour.