

- (2) Be tapered pipe threads complying with ASME B1.20.1, *Pipe Threads, General Purpose* or equivalent International Standard(s) approved by the Authority Having Jurisdiction.
- (3) Be made up with polytetrafluoroethylene (such as Teflon™) tape or other thread sealant recommended for oxygen service, with the sealant applied to the male threads only. [NFPA 99:5.1.10.4]

1315.4.2 Branch connections in vacuum piping systems shall be permitted to be made using mechanically formed, drilled, and extruded tee branch connections that are formed in accordance with the tool manufacturer's instructions and brazed. [NFPA 99:5.1.10.3.3]

1315.5 New or replacement shutoff valves shall be as follows:

- (1) Quarter turn, full ported ball type.
- (2) Brass or bronze construction.
- (3) Have extensions for brazing.
- (4) Have a handle indicating open or closed.
- (5) Consist of three pieces permitting in-line serviceability. [NFPA 99:5.1.4.3]

1315.6 Soldered joints in copper Level 3 vacuum and Level 3 gas-powered systems piping shall be made in accordance with ASTM B 828, *Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings* or equivalent International Standard(s) approved by the Authority Having Jurisdiction, using a lead-free solder filler metal containing not more than 0.2 percent lead by volume. [NFPA 99:5.3.10.5]

1316.0 Cleaning for Medical Gas Piping Systems.

1316.1 The interior surfaces of tube ends, fittings, and other components that were cleaned for oxygen service by the manufacturer, but become contaminated prior to being installed, shall be permitted to be recleaned on-site by the installer by thoroughly scrubbing the interior surfaces with a clean, hot water-alkaline solution, such as sodium carbonate or trisodium phosphate 454g to 11L (1 lb. to 3 gal.) of potable water and thoroughly rinsing them with clean, hot potable water. Other aqueous cleaning solutions shall be permitted to be used for on-site recleaning permitted above, provided that they are as recommended in CGA Pamphlet G-4.1, *Cleaning Equipment for Oxygen Service*, and are listed in CGA Pamphlet O2-DIR, *Directory of Cleaning Agents for Oxygen Service* or equivalent International Standard(s) approved by the Authority Having Jurisdiction. [NFPA 99:5.1.10.5.3.10 and 5.1.10.5.3.11]

1316.2 Material that has become contaminated internally and is not clean for oxygen service shall not be installed. [NFPA 99:5.1.10.5.3.12]

1317.0 Installation of Piping.

1317.1 Piping shall be protected against corrosion and physical damage. [NFPA 99:5.1.10.10.2]

Piping exposed in corridors and other areas where subject to physical damage from the movement of carts, stretchers, portable equipment, or vehicles shall be protected. [NFPA 99:5.1.10.10.2.1]

Piping underground within buildings or embedded in concrete floors or walls shall be installed in a continuous conduit. [NFPA 99:5.1.10.10.2.2]

1317.2 Piping risers shall be permitted to be installed in pipe shafts if protected from physical damage, effects of excessive heat, corrosion, or contact with oil.

Piping shall not be installed in kitchens, elevator shafts, elevator machine rooms, areas with open flames, electrical service equipment exceeding 600 volts, and areas prohibited under NFPA 70, *National Electrical Code* or equivalent International Standard(s) approved by the Authority Having Jurisdiction, except for the following locations:

- (1) Room locations for medical air compressor supply systems and medical-surgical vacuum pump supply systems.
- (2) Room locations for secondary distribution circuit panels and breakers having a maximum voltage rating of 600 volts.

Medical gas piping shall be permitted to be installed in the same service trench or tunnel with fuel gas lines, fuel oil lines, electrical lines, steam lines, and similar utilities, provided that the space is ventilated (naturally or mechanically) and the ambient temperature around the medical gas piping shall not exceed 54°C (130°F).

Medical gas piping shall not be located where subject to contact with oil, including a possible flooding area in the case of a major oil leak. [NFPA 99:5.1.10.10.3]

1317.3 The installation procedure for underground piping shall protect the piping from physical damage while being backfilled. [NFPA 99:5.1.10.10.5.2]

If underground piping is protected by a conduit, cover, or other enclosure, the following requirements shall be met [NFPA 99:5.1.10.10.5.3]:

- (1) Access shall be provided at the joints for visual inspection and leak testing.
- (2) The conduit, cover, or enclosure shall be self-draining and not retain groundwater in prolonged contact with the pipe.