

The source of the purge gas shall be monitored, and the installer shall be audibly alerted when the source content is low. [NFPA 99:5.1.10.5.5.2]

The purge gas flow rate shall be controlled by the use of a pressure regulator and flow meter or combination thereof. [NFPA 99:5.1.10.5.5.3]

Pressure regulators alone shall not be used to control purge gas flow rates. [NFPA 99:5.1.10.5.5.4]

In order to assure that all ambient air has been removed from the pipeline prior to brazing, an oxygen analyzer shall be used to verify the effectiveness of the purge. The oxygen analyzer shall read below 1 percent oxygen concentration before brazing is to begin. [NFPA 99:5.1.10.5.5.5]

During and after installation, openings in the piping system shall be kept sealed to maintain a nitrogen atmosphere within the piping to prevent debris or other contaminants from entering the system. [NFPA 99:5.1.10.5.5.6]

While a joint is being brazed, a discharge opening shall be provided on the opposite side of the joint from where the purge gas is being introduced. [NFPA 99:5.1.10.5.5.7]

The flow of purge gas shall be maintained until the joint is cool to the touch. [NFPA 99:5.1.10.5.5.8]

After the joint has cooled, the purge discharge opening shall be sealed to prevent contamination of the inside of the tube and maintain the nitrogen atmosphere within the piping system. [NFPA 99:5.1.10.5.5.9]

The final connection of new piping to an existing, in-use pipeline shall be permitted to be made without the use of a nitrogen purge. [NFPA 99:5.1.10.5.5.10]

After a final connection in a positive-pressure medical gas pipeline is made without a nitrogen purge, an outlet in the immediate downstream zone of the affected portions of both the new and existing in-use piping shall be tested in accordance with Section 1326.0. [NFPA 99:5.1.10.5.5.11]

When using the autogenous orbital welding process, joints shall be continuously purged inside and outside with inert gas(es) in accordance with the qualified welding procedure. [NFPA 99:5.1.10.5.5.12]

**1318.7** After brazing, the outside of all joints shall be cleaned by washing with water and a wire brush to remove any residue and permit clear visual inspection of the joint. [NFPA 99:5.1.10.5.7.1]

Where flux has been used, the wash water shall be hot. [NFPA 99:5.1.10.5.7.2]

Each brazed joint shall be visually inspected after cleaning the outside surfaces. [NFPA 99:5.1.10.5.7.3]

Joints exhibiting the following conditions shall not be permitted:

- (1) Flux or flux residue (when flux or flux-coated BAg series rods are used with dissimilar metals).
- (2) Base metal melting or erosion.
- (3) Unmelted filler metal.
- (4) Failure of the filler metal to be clearly visible all the way around the joint at the interface between the socket and the tube.
- (5) Cracks in the tube or component.
- (6) Cracks in the brazed filler metal.
- (7) Failure of the joint to hold the test pressure under the installer-performed initial pressure test (Section 1326.10) and standing pressure test (Section 1326.11). [NFPA 99:5.1.10.5.7.4]

Brazed joints that are identified as defective under conditions of Section 1318.7(2) or (5) shall be replaced. [NFPA 99:5.1.10.5.7.5]

Brazed joints that are identified as defective under Sections 1318.7(1), (3), (4), (6), or (7) shall be permitted to be repaired, except that no joint shall be reheated more than once before being replaced. [NFPA 99:5.1.10.5.7.6]

## **1319.0 Valves – Requirements, Locations, and Labeling.**

**1319.1 General Requirements.** Shutoff valves accessible to other than authorized personnel shall be installed in valve boxes with frangible or removable windows large enough to permit manual operation of valves. [NFPA 99:5.1.4.2.1]

Shutoff valves for use in certain areas, such as psychiatric or pediatric, shall be permitted to be secured with the approval of the Authority Having Jurisdiction to prevent inappropriate access. [NFPA 99:5.1.4.2.2]

**1319.1.1** Where valves are concealed in any enclosure, the door or entry to the enclosure shall be identified and color coded with the type of gas service installed, as described in Section 1322.0. Enclosures shall be of sufficient size to permit valve operation. Valve handles in the off position shall prevent closure of the access panel or door.

**1319.2** In-line shutoff valves intended for use to isolate piping for maintenance or modification shall meet the following requirements:

- (1) Be located in a restricted area.
- (2) Be locked or latched open.
- (3) Be identified in accordance with Section 1322.0. [NFPA 99:5.1.4.9.1]