**Note:** The following is a review of setting up a nitrogen purge for brazing MedGas systems as required by the NFPA-99 2018, Please read the NFPA-99 2018 5.1.10.4.5 for more details. Project specifications may require other tube joining methods, please read the specs for each job.

All purging must be set up, monitored, and documented by the installer prior to brazing, please visit our forms page for a sample purge document.

All joints to be brazed are required to be purged with Nitrogen NF to prevent the formation of copper oxide inside the tube being brazed. Your source of nitrogen NF needs to be monitored and alert you when the contents reach a low pressure setting. When establishing your purge, verify using your oxygen analyzer, that each affected outlet has less than 1% oxygen and you have not created positive pressure within the system. Your purge must flow across each joint being brazed, make sure your connection point and the exit are on opposite sides of the joint(s) to be brazed. Control your purge flow with a pressure regulator and flow meter or a regulator designed for purging, continuing your purge until all joints are cool to the touch. At the end of your shift seal all openings of the MedGas system to prevent the entry of contamination and keep a nitrogen atmosphere with in the MedGas piping system.

A qualified installer must be able to adapt to the various outlet index keys as well as different portions of the pipe system to create a successful entry and exit point of a purge. Many installers carry a kit with the numerous adapters for NPT, DISS, CGA and the other variations of outlet/inlet indexing. The successful purge process is frequently the most time-consuming process of the MedGas install. Complete Purge Kits can be purchased from Installers tools page. Most companies find that the time savings from purchasing a Med Gas.com purge kit pays for the kit within a few weeks.

**Nitrogen NF:** The full name is Nitrogen United States Pharmacopeia, National Formulary. In many cases nitrogen NF is the same nitrogen pumped into any other cylinder of N2, the difference is the pedigree and traceability of the cylinder itself. Nitrogen NF is only sold for medical applications, the container shall never be used in any other environment. When a nitrogen NF bottle is returned to a gas supplier the cylinder is pumped down to a vacuum, inspected, filled, and analyzed for contents then issued a certificate of compliance. Industrial nitrogen containers are merely topped off and put out on the loading dock for sale.

**Purge Monitor:** NFPA99 requires the purge source to be monitored for low contents. There are two methods to monitor Nitrogen NF contents; first is to place your apprentice or other qualified person directly in front of your pressure regulator and relay contents pressure to the installer or employ our audible pressure monitor that sounds an alarm at low pressure. See purge regulator in our Installer tools section. It is important to note the quantity of purge gas in a cylinder before starting the brazing process. We do not recommend starting a purge with less than 500 PSI in a cylinder; cylinders with less than 500 PSI can be used for blowdown operations as well as testing your system.

**Purge Flow Rates:** The objective to purging is to create a nitrogen atmosphere that is less than 1% Oxygen within the MedGas system prior to brazing. Brazing employs capillary action to draw the filler metal into the being brazed. The flow rate needs to be controlled by a regulator and flow meters. Flow meters can be set in parallel to control multiple flow rates for multiple systems. Too high of flow could create positive pressure which could push the melted braze rod out of the joint, too low of flow will allow a higher concentration of oxygen to enter the MedGas system thus creating copper oxide. Although there is no code requirement for flow rate of your purge, we find that 3-5 LPM is a good flow rate to start at. Size of the piping system also plays a role in determining the proper rate of purge. We always recommend starting the brazing process closet to the purge inlet and working your way downstream. Purge rates can be adjusted as you make your way downstream and more joints become permanently brazed.

**Purge across the joint being brazed:** Connect the purge source to one end of your piping system and create a point of discharge that creates a flow across your joint to be brazed. A handheld oxygen analyzer shall be used at each affected outlet to determine the MedGas system contains less than 1% oxygen. The Nitrogen NF discharge should be light, just enough to blow out a cigarette lighter.

**Continuation of purge:** The Nitrogen NF purge must continue to flow until each joint brazed is cool to the touch to prevent the formation of copper oxide. Copper oxide is an inorganic flaky black compound that that starts to form when copper in an oxygen rich atmosphere reaches about 400⁰F and will start to sluff away from itself at around 600⁰F. Breathing particles of copper oxide can cause lung inflammation and cytotoxicity which can have lasting effects for several weeks. Mechanically cooling a joint with a wet rag or heat sink is against the ASME IX brazing procedure and can lead to joint stress and cracking. Remember it is much more costly to rework leaking joints than it is to allow them to properly cool.

**Seal the MedGas system:** All copper tube placed in a medical gas system shall be brazed and sealed within 8 hours of removing the factory plugs. A good manufacturing practice is to hang and assemble the medical gas piping system keeping open ends sealed as progress is made through the middle of the shift then brazed and allowed to cool at the end of the shift taking care to seal all ends to prevent the entry of construction debris or environmental dust.