SMART TAP INC

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METHOD FOR SERVICING A LIVE MEDICAL GAS PIPELINE

THIS SYSTEM CAN BE USED FOR:

- Relocation of Bulk Gas Systems
- Relocation of zone valves
- Tie-ins of new additions and new buildings
- Tie-ins of new medical gas risers
- Capping off medical gas for renovations
- Additions and deletions within a zone without effecting patients in the adjoining rooms, especially in NICU & ICU locations

MEDICAL GAS VALVES AND MANUFACTURED ASSEMBLIES PRECLEANED FOR OXYGEN USE CAN BE INSTALLED

A NORMAL MEDICAL GAS SHUT DOWN REQUIRES:

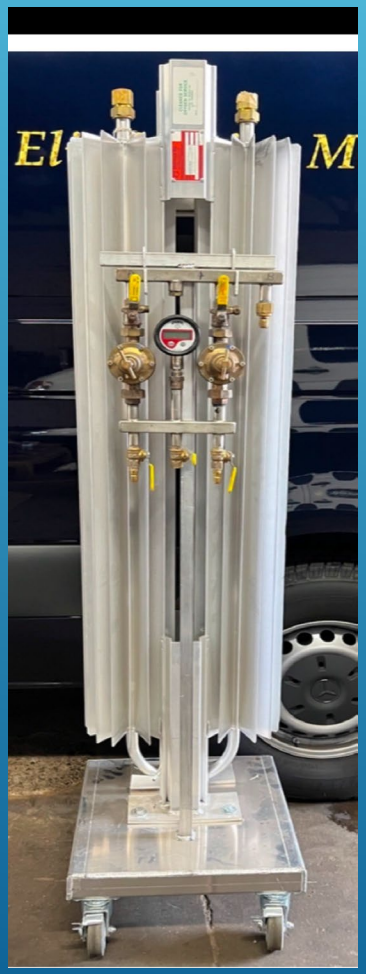
- Months of planning
- Countless meetings and memos
- Coordination of hospital staff
- Ordering & coordinating medical gas deliveries, regulators & tank carts
- Delivering the medical gas to the patient rooms and setting up the back up.
- Shutdowns usually occur in the early mornings of a Saturday or Sunday
- This means overtime and hospital personnel doing jobs other then taking care of the patients

USING THIS METHOD OF SERVICING A LIVE MEDICAL GAS PIPELINE INSTEAD OF A SHUTDOWN

- Hospital has only has to provide two or more locations each with 2 patient outlets of the gas being worked on downstream of the new valve placements to plug in backup
- Notify the facility personnel that work is being done on the medical gas system
- Hospital patients remain on the medical gas system with no change in their care
- The hospital staff remains doing their normal jobs
- This work is done during normal weekday hours of operation

- Saves Money by leaving the Respiratory, Nursing and Maintenance staff alone - doing what they are paid to do – patient and facility care. Not worrying about gas cylinders, regulators or running out of supply
- Maintains patient care without change
- Saves time - turnkey the meetings and coordination
- Requires very little interface to get the job done
- From the Hospital's perspective, the procedure is a "turnKey" process

BACK UP PROCEDURES



- **Oxygen** – A liquid oxygen back up that consists of an oxygen dewar that contains 150,000 ml of oxygen delivered through a vaporizer and dual line regulators
- One or more dewars are set up depending on size of back feed
- A duplication of the hospital's bulk system PLUS RESERVE

MEDICAL AIR AND OTHER TYPES OF MEDICAL GAS BACK UP

- One or more high pressure manifolds with line regulators are connected to the appropriate number of cylinders
- Each manifold has connected (in use and reserve cylinders) to provide an uninterrupted supply

PROCEDURE

- The location of a new valve or valve assembly is established
- Back up (if needed) is placed downstream of this point
- Blocking valves (one or two) are placed on the line. The amount of blocks is determined by whether the downstream side to be taken out of service (one block) or needs to be maintained (two blocks)
- One block is closed if the downstream piping is being demoed then the downstream pipe is cut away and replaced with a medical gas valve
- If the downstream piping is remaining and has patients connected the backup gas is allowed to run and pressure is monitored, if needed the block can be opened and backup can be adjusted
- When it is determined that the back feed is functioning properly then the second blocking valve is closed and the piping is cut in- between the two blocks

BLOCKING VALVE IN PLACE

- One blocking valve means the downstream piping is being taken away

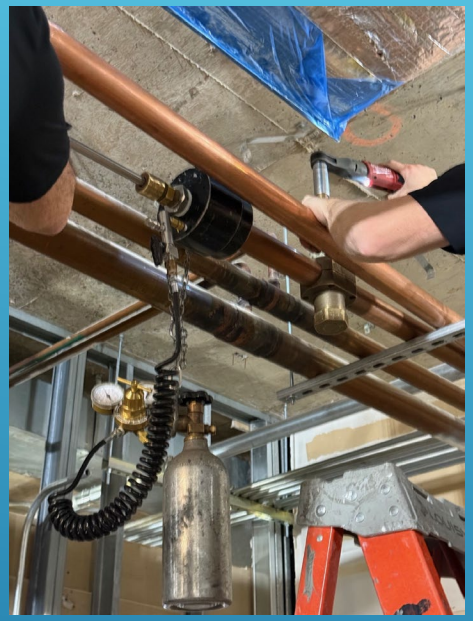
BLOCKING VALVE IS CLOSED

- At this TIME the upstream flow of gas is shutoff
- If back-up gas is in place it is tested to make sure it can maintain house pressure
- If needed the blocking valve is opened and back-up is adjusted
- Once the medical gas system is functioning normally, the block is cleaned out

THE PIPING IS CUT FREE

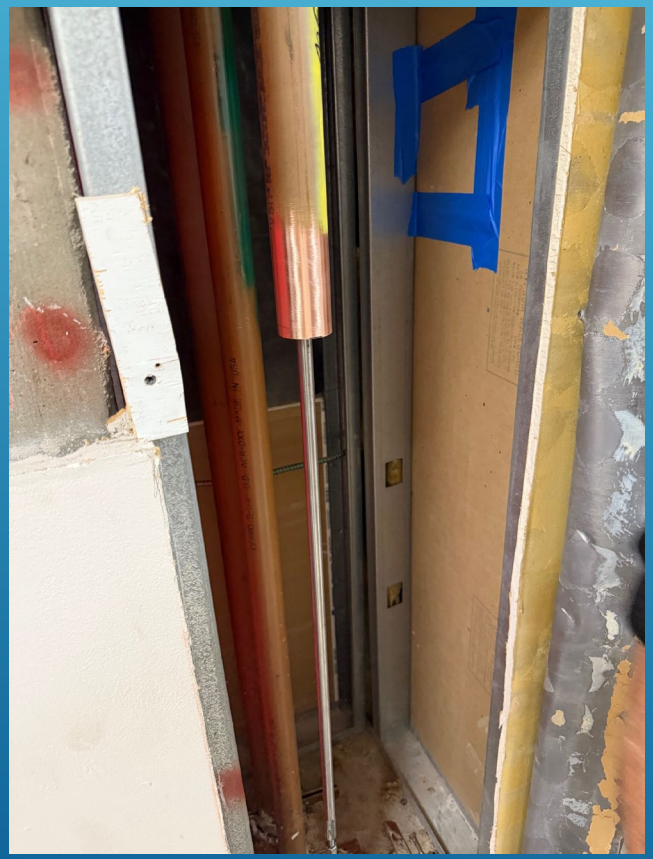
- 1. A pneumatic end cap (1) with a linear block (2) is placed on the piping
- This end cap and linear block seals the end of the cut pipe
- This allows for the next step to take place

BLOCKING VALVE IS OPENED



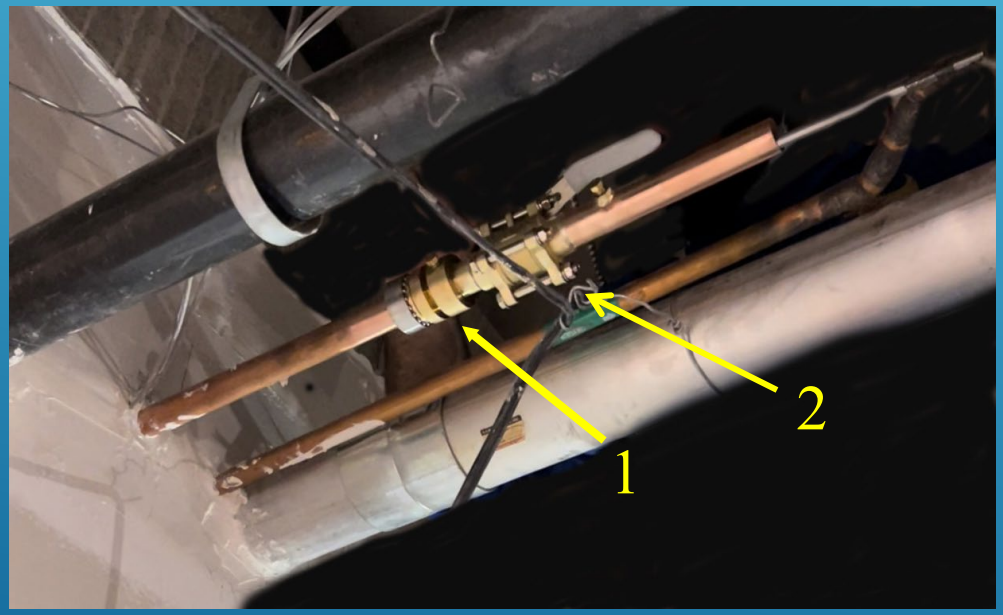
- The linear block is then slid into the pipe past the blocking valve & engaged
- It is now possible to cut the blocking valve off the pipe

BLOCKING VALVE AND PNEUMATIC END CAP ARE CUT AWAY & REMOVED



- The piping is sealed by this linear block
- This linear block is capable of holding 200 psig
- The piping is now ready for the new medical gas valve or valves

AN AXIALLY SWAGED COUPLING (1) AND VALVE (2) IS INSTALLED OVER LINEAR BLOCK



- The coupling and valve is installed over the pipe end and is then hydraulicly crimped with 10,000 psi that makes an axially swaged seal capable of withstanding 1000 Degrees and burst pressure of the copper pipe (in excess of 6,000 psi)

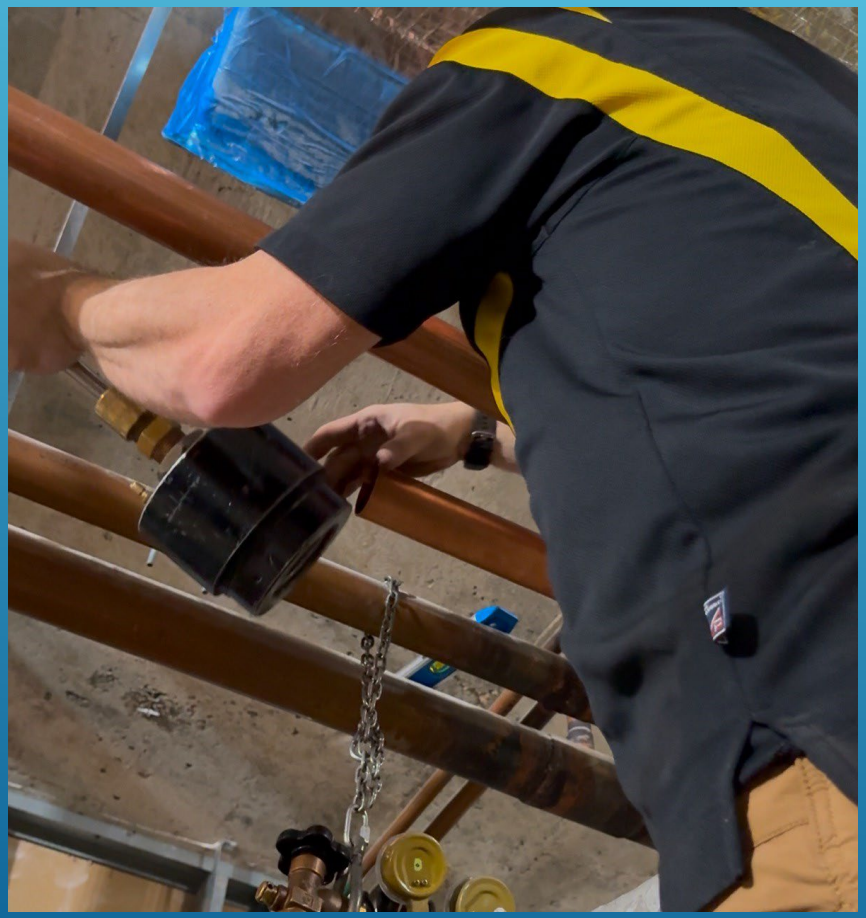
PNEUMATIC END CAP IS PUT BACK IN PLACE AND THE LINEAR BLOCK IS SLID BACK FROM THE VALVE

- The end cap is placed over the end of the valve extension/ linear block
- End cap is energized to seal valve pipe extension & linear block is loosened

THE VALVE IS CLOSED

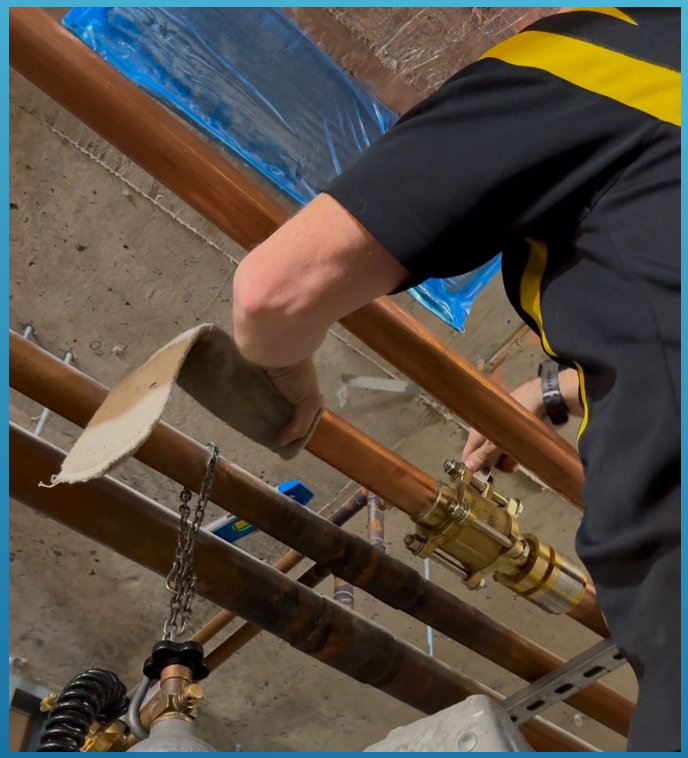
- The linear block is retacked.
- The valve is closed

END CAP AND LINEAR BLOCK REMOVED



- The end cap and linear block are removed

PIPING IS PURGED THROUGH A FULL PORT VALVE



DOWNSTREAM PIPING WOULD BE DONE USING THE SAME PROCEDURE AND FUTURE VALVE ASSEMBLY WOULD BE INSTALLED

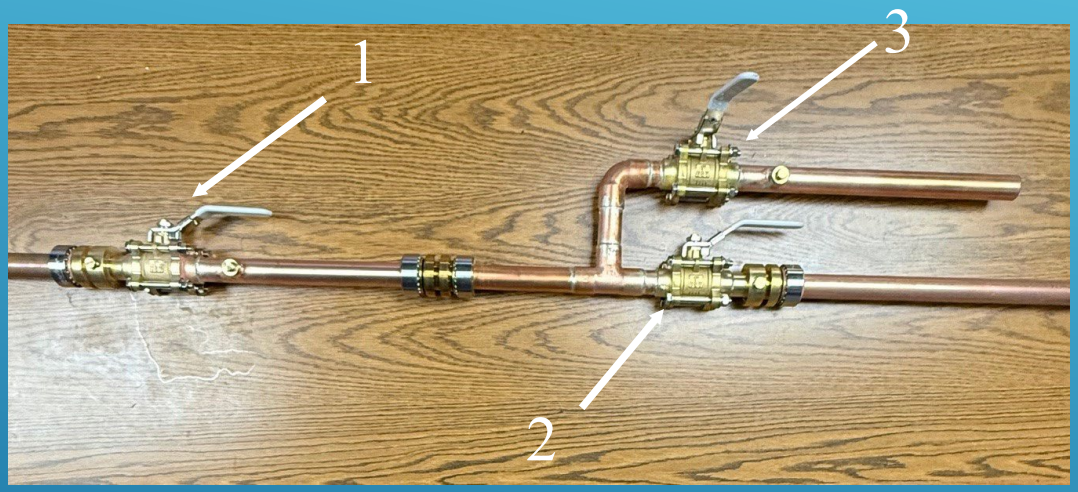
Future valve assembly

Purge point from both sides

Supply side valve

- This future valve assembly would be inserted on the downstream side of the second block
- Single valve is inserted on supply side
- A full port future valve installed between the two inline valves so there is control of all piping downstream or just control the existing or new piping

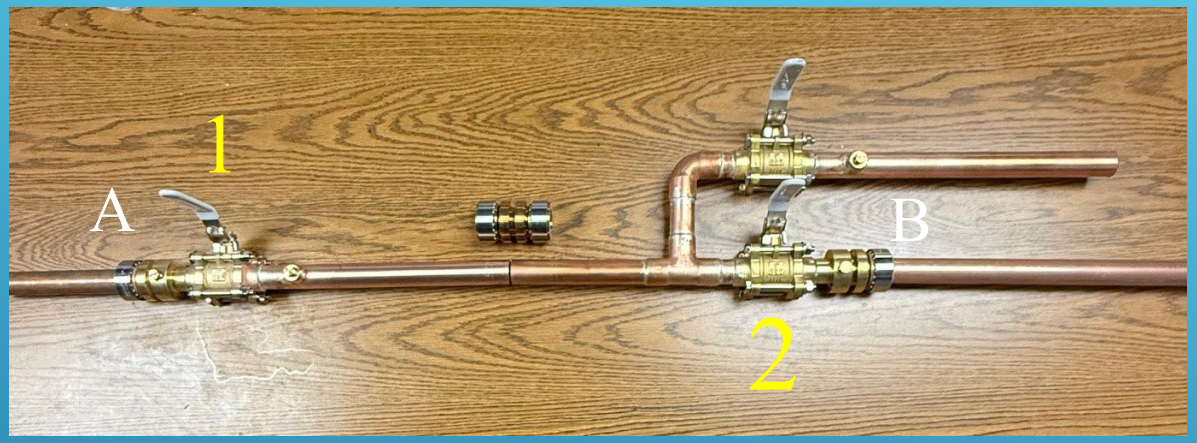
FUTURE VALVE INSTALLATIONS USES 3 VALVES



There would be a valve (1) that controls both the new inline valve to the old system (2) and the new valve (3) to the future piping addition

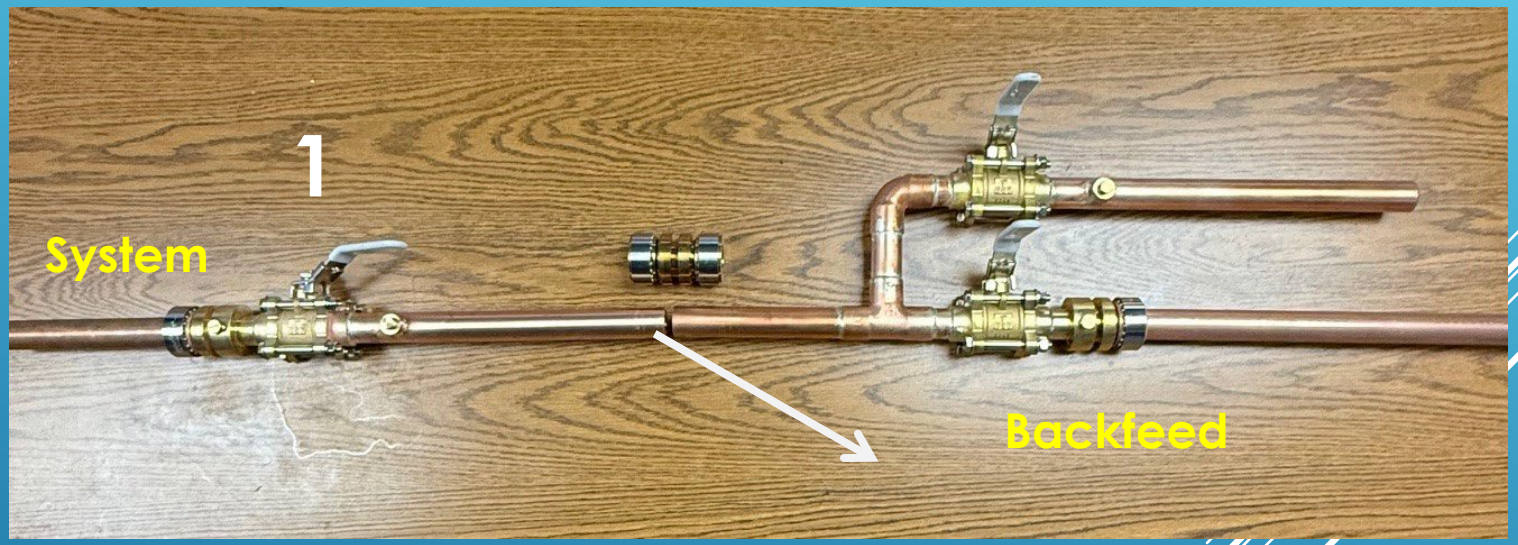
- Allowing for more control of your piping systems

ASSEMBLY PURGE



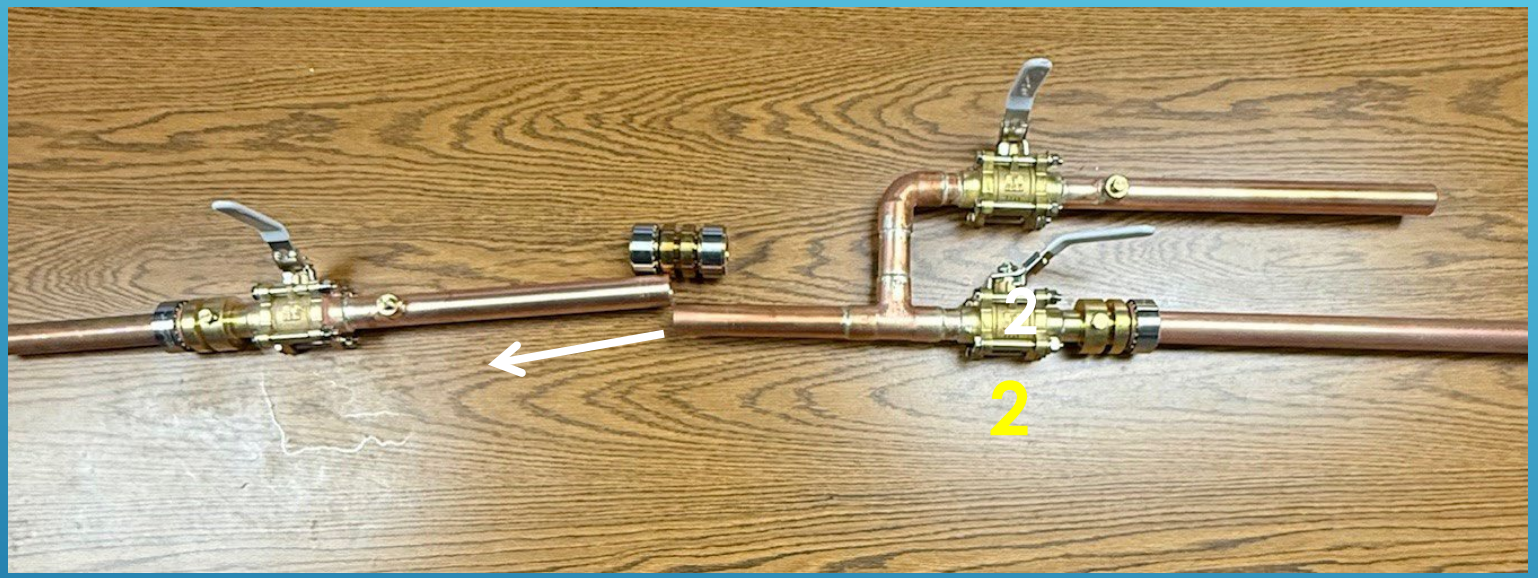
- An axially swaged coupling would be in place at location “A” & “B” there IS system gas pressure at both valves “1” & “2” which would be closed at this point of the procedure

SYSTEM PIPING IS PURGED



SYSTEM VALVE 1 IS OPENED TO ALLOW THE TO PURGE OUT OF OPEN JOINT

BACKFEED PIPING IS PURGED

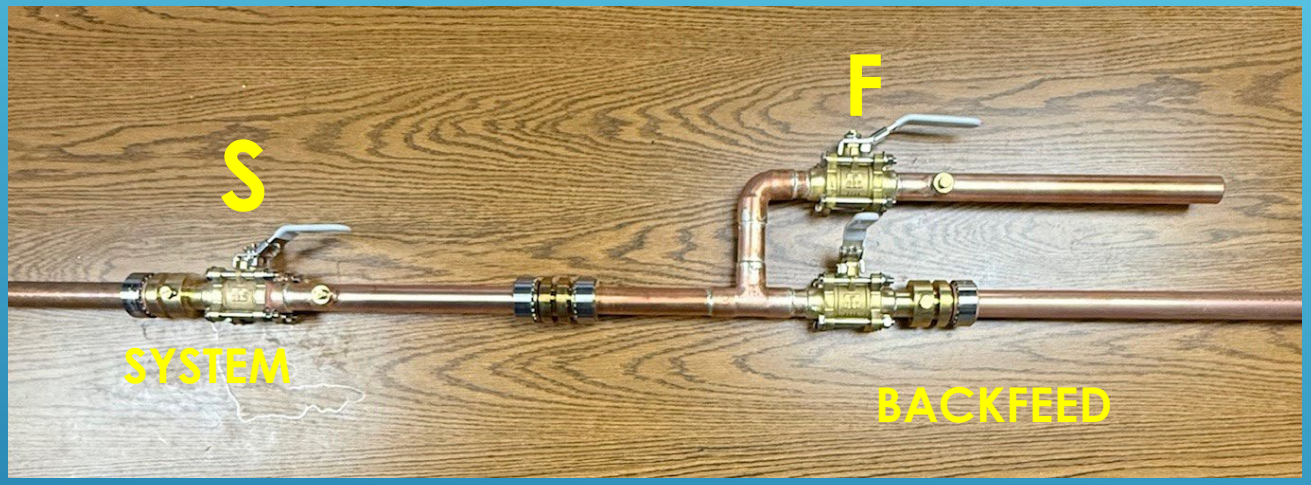


- VALVE “2” IS OPENED TO ALLOW BACKFEED GAS TO PURGE

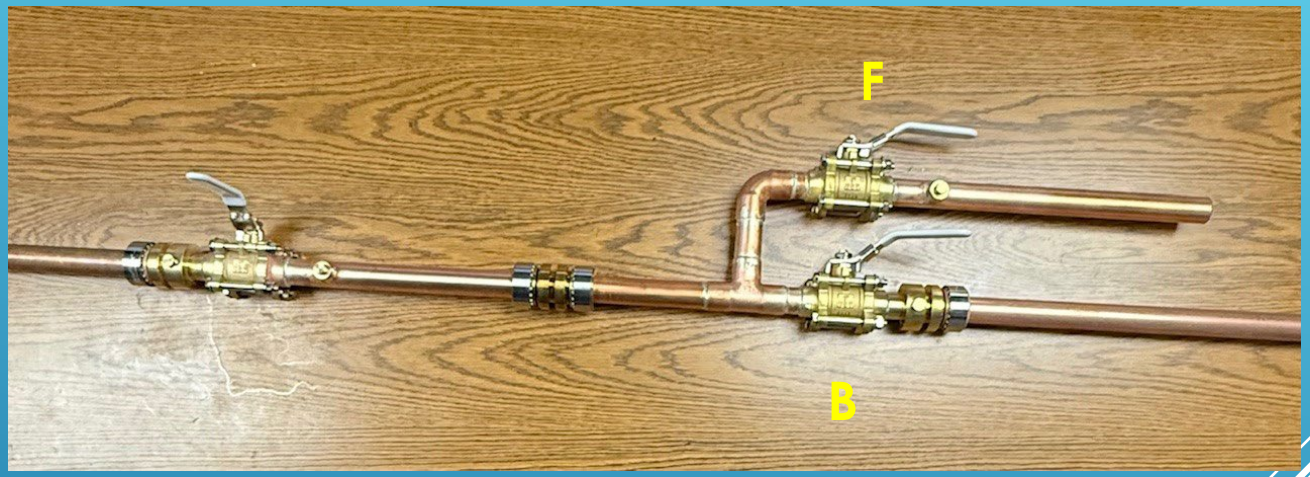
BOTH SIDES OF THE TAP ARE JOINED

AN AXIALLY SWAGED COUPLING IS INSTALLED

BEFORE SYSTEM IS TURNED ON A FINAL PURGED IS PERFORMED



THE FUTURE VALVE (F) IS OPENED AND THEN THE SYSTEM VALVE (S) IS OPENED AND PURGED THROUGH THE FUTURE VALVE

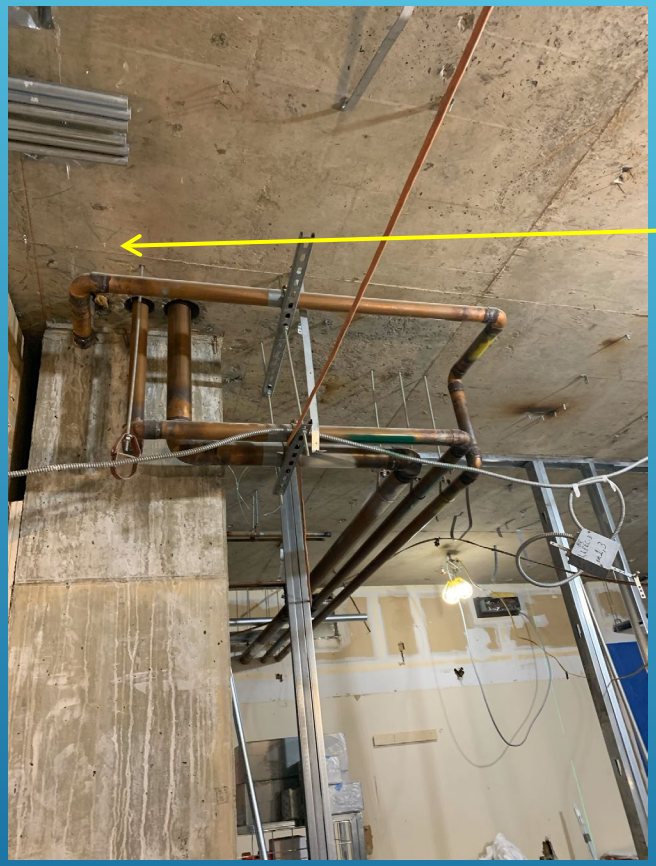


THE FUTURE VALVE (F) IS LEFT OPENED AND THEN THE BACKFEED VALVE (B) IS OPENED AND PURGED THROUGH THE FUTURE VALVE

THE SYSTEM IS THEN TURNED ON

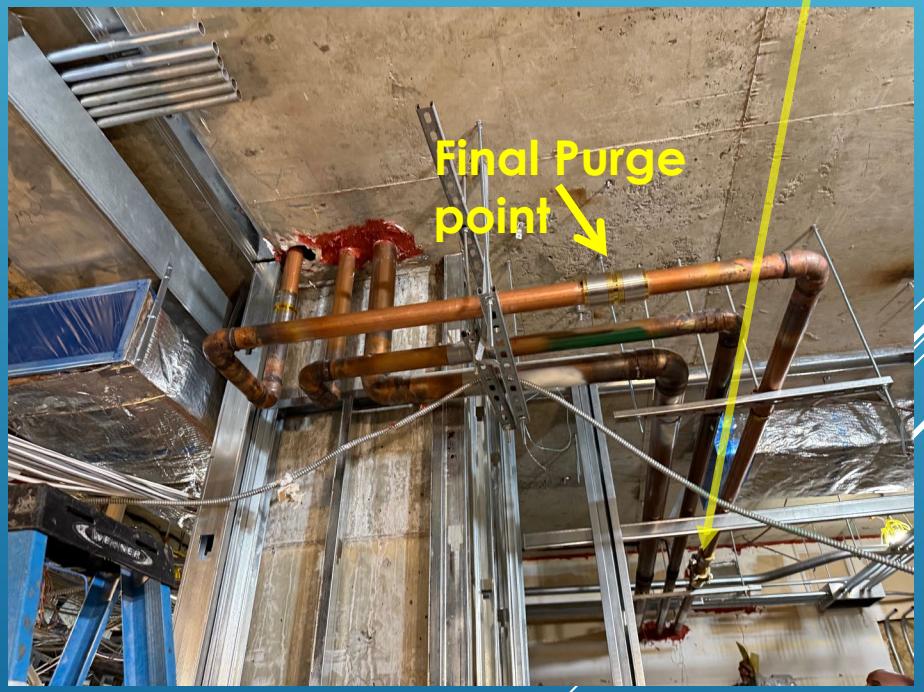
ALL FITTINGS AND VALVES ARE CHECKED FOR LEAKS AND THEN TURNED OVER TO A THIRD-PARTY CERTIFIER HIRED BY THE FACILITY OR CONTRACTOR

RECENT PIPING RELOCATION



This valve is holding house system supply is located above Deck

Second Valve holding backfeed supply is located here



The Hospital needed upper pipe lowered down to the lower pipe rack. New piping was preinstalled by contractor

THE METHOD FOR SERVICING A LIVE MEDICAL GAS LINE HAS CONTROL OF BOTH SIDES OF THE PIPING SYSTEM IN THE WORKSPACE

- Has control of the gas from beginning to end
- A very small amount of system gas 4 lpm is allowed to flow when inserting the linear block this allows for no contamination to get into the piping
- The piping is then purged using the newly installed valve or valves and placed back into service