Purging Pipe Systems

In the piping industry there are all types of alloys that a welder is exposed ranging from Stainless Steel, Chrome and Titanium. One of the most important factors a welder is faced with would be purging the inside of the pipe. The purpose of purging is to insure no atmospheric air enters the piping system; this will cause the molten weld material to instantly oxidize resulting in numerous problems such as root porosity, incomplete fusion and changes in the weld metal.

Though there are a number of manufactures who make purge dams and blocks, they are not always readily available on a job-site, resulting in welders having to improvise. A few techniques that can be used are as follows:

- Plastic caps that came on the pipe when delivered to the job site would be best; however, masking tape or card board could also be used.
    - When using masking tape on the smaller fusion pipe weld joint, place sticky side down on pipe and immediately back-fold around pipe, pull tight and place together.
    - When covering the ends of the pipe with masking tape, form tape to O.D. of pipe, punch vent hole from sticky side out, and place on the end of pipe. If using argon, vent hole must be positioned on top; this will prevent the vent hole from closing when argon flows from supply end. If vent hole is not punched from sticky side out, tape ears left from punch could close, creating back pressure.

In thin wall stainless steel tube, vent hole size and argon flow is critical; however, gas flow, bead width, amps and travel speed is a factor as well. Too much argon flow will cause the tube to bubble out, while too little argon flow will result in the weld being concave. When purging full lengths of tube, it is a good practice to place purge dams on each side, four to six inches from the weld joint with a vent hole on one side. Prior to fit-up, you must ensure a notch is placed in the tube face so a football needle moves freely, this will provide your gas supply inlet flow for the weld joint. When adding sanitary ferrules' to the tube ends, masking tape and plastic caps will burn resulting in the loss of purge and discoloration of tubing. A solution is to crimp heavy duty aluminum foil around the ferrule maintaining the purge and limiting clean-up.

The length of purge time is another common question. Besides using practical experience to determine purge time, welders can use many formulas that have been calculated to find the exact moment to weld. However; weld quality depends on many factors, including humidity, volume and material, just to name a few. A basic formula used in the field today is as follows:

- 4 X Pipe Diameter
  X Foot of Pipe
  ÷ Purge Rate (cfh)
  = Purge Time in Minutes

After purging is completed, welder must reduce the flow of argon to the desired cubic feet per hour (CFH).

When using argon for purging fabrications that are running vertical and horizontal thru a building or high line a good practice is to run the purge supply and vent hole from the highest point. Argon is heavier then air and will flow to the bottom and force air out at the top vent hole. A slow flow of argon is recommended for these applications to prevent the mixing of the air and argon. A good practice is to start at 30 to 45 CFH, after purge is completed turn the flow range down between 8 and 12 CFH.

Note: More shielding gas is not always better! Increasing the flow rate on the torch can create turbulence which pulls oxygen into the weld zone. It's always a good practice to set the flow meter and do some test welds using the material similar to what you will be welding.

On stainless piping systems dissolvable paper and tape are normally used but another alternative is rubber gasket material.

- Rubber gasket material can be cut slightly larger than the inside diameter of the pipe and two round disc made out of wood about one and half inches smaller in diameter than the rubber gasket material.
- Rubber gasket material is then placed between the wood discs and compressed together.
- Before the dams are installed gas lens or diffusers can be installed into the argon supply side of the dam. Depending on the size of the pipe you can use one or two diffusers.
- Gasket and discs are then bolted together with eye bolts and attached to rope or wire and place in pipe for a snug fit. Rope or wire is used allowing for removal of the dams once weld joint is complete.

When welding on a preheated heavy wall chrome piping systems, purging is a must. Because of the temperature of the preheated coils around the O.D. of the pipe, placement and cleaning of the dams is critical.

- Before the pipe joint is fit into place, purge dams are installed on each side of the joint in a distance fare enough back away from the heat affective zone so the dams are not damaged.
- Cleaning of the area that the purge dams are placed plays an important factor to ensure purge dams stability while weld is being preformed. Cleaning the I.D with denatured alcohol then wiped down with rags is a must!
- After cleaning is complete water soluble dam paper and tape is used.
    - The first application is to coat the I.D with Elmer's glue and install the dams and then coat it again after installation of the dams.
    - Once dam paper is installed the vent hole should be pushed in at the top of the dam paper.
    - After purge dames are installed, the purge supply can be placed either in the root opening or in gamma plug opening when they are installed.

Note: Because of the high preheat temperature it is sometimes difficult closing the root opening. Some techniques are accomplished by using heat tape or K-wool so it can be removed while the weld is in progress.

A change in shielding gas composition is usually considered an essential variable in most welding procedures, these are only recommendations, always read and understand the procedure specification that are unique to each job site.