

Purging: Why it is so Important

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All most all the alloys react with Oxygen when heated. Rate of oxidation depends on temp to which it is heated and tore off alloy. We shall also note that different Alloys have varying levels of oxidation.

In welding our focus is to ensure that we weld with no or minimum defects and we also try to match chemistry and physical properties so that we have seamless and homogenous joint to take care of operating conditions and design criteria's.

Primary side of welding or side from where we are welding, we ensure that it does not get oxidised and weld metal is well protected. The other side sometimes gets neglected as we do not know properties of alloy getting welded, complex geometry, inaccessible other side, hindrance of welding fixture, manipulator. But my observation is that we need to understand need for purging well. There are means and methods to achieve good purging to protect backside of welding.

Water Soluble paper, inflatable balloons, ceramic tapes, Ni/Ti sponge, stainless steel fine wire mesh, Aluminum/Copper C groove perforated strips, temporary closures, spirager pipes.... Good fixtures to support and control distortion with any of the above aid shall ensure a low pressure bit high volume Argon or any other protective gas with LAMELLAR flow. In purging we need to ensure that desired flow from 2-15 LPM is achieved with least pressure and it has to be distributed in the cavity

equally with least turbulence. Purging shall be done like PRE flow and POST flow and once we ensure that all the air or oxygen from it has been driven away then only welding shall start. It depends up on geometry of the joint and fixtures used. So, best way is to check with O2 meter or by taking a burning cotton waste near the front side of joint. Secondly back side purging area shall be as closely sealed as possible and shall be able to maintain positive pressure.

If we need control on penetration we may require pressure in purging area which could be 10-30 mm of water column and in such cases fixture or aggressive tapes used shall be stuck on the joint after proper cleaning. Also depending on thickness, material, welding process and parameters adhesive tape or other means shall be kept away from the joint so that high temp will not make them burn during welding of the joint. Purging looks easy but to implement in practice is a big challenge and often neglected. I insist on use of boroscope which are nowadays available easily and cheap to use for non accessible joints after first few cm of weld or use simulations on pipes for cross country pipelines which goes km and each section is 8-10 m long. Setting up PRE flow and post flow shall be done using small automation using auxiliary power supply from welding machine with timers and shall be programmable using low cost relays and timers. Today's world IoT sensors and controls are easy to assemble and deploy. Use same purity of gas as of main and trailing shield.