Ni ALLOY WELDING CONSUMABLES SUGGESTED SELECTIONS
NICKEL & HIGH NICKEL ALLOY WELDING WIRES
Ni ALLOY WELDING CONSUMABLES FOR GAS TUNGSTEN WELDING

SUGGESTIONS FOR WELDING NICKEL & HIGH NICKEL ALLOYS

Nickel and High Nickel Alloys are used in fabrication of equipment which have to withstand highly corrosive environments. Often the corrosion is enhanced by the operating conditions of high pressure and temperature. Various high nickel alloys are developed and are being developed to meet these demanding conditions. In some cases the mild and low alloy steel equipment and vessels are clad by nickel alloys to combat corrosion.

Welding of nickel is different from welding other metals and alloys. Two characteristics contribute to this difference:

- Nickel could form a tenacious viscous oxide during welding which restricts the weftability and flow of the weld metal.

- Nickel is highly susceptible to embrittlement by sulfur, phosphorus, lead, and other low-melting substances. The weld metal flow problem can be reduced by:

- Selecting an appropriate joint design.

- Choosing the correct type of gas and gas flow rate to ensure proper protection from atmospheric oxygen.

- Clean welding consumables which do not contain any lubricants or oxides or contaminants.

- Selecting a superior formulated covered electrode to ensure proper flow and cleanliness.

The weld area on both sides of the weld joint must be lightly ground to remove oxide from the surface. Interpass cleaning is essential to ensure complete slag removal as well as fusion between the weld beads.

Weld joint designs used for nickel alloy welding should be different from those used for welding steels. The sluggish nature of the weld metal calls for more open joint, which will provide better accessibility to the welder. Another characteristic of nickel alloy weld metal is the lower penetration, which makes the joints necessary to use smaller land at the root of the joint. For joining tubes and pipes, they should be purged and filled with inert gas before welding to avoid oxidation at the root. For manual welding, appropriate current range should be used to avoid overheating. Overheating of the electrode could result in loss of deoxidizers and breakdown of the binder of the flux, leading to defective welding. MIG welding calls for helium additions to argon to improve the wetting of the weld metal. For TIG welding, argon or argon helium mixtures are generally used. Gas flow rates of 30 to 50 CFH are required to obtain high quality welds. With submerged arc welding, the flux has to be pre-baked before welding to reduce the chances of weld defects due to moisture. A procedure test is generally required to assure that the proposed welding parameters and filler metals result in sound and acceptable chemical and mechanical properties of the welds.