

Brief Information of Submerged Arc Welding (SAW)

Submerged arc welding (SAW) is one automatic welding that use electric arc to be heat source, wire to be electrode and electric arc burning covered by the meltable granular flux. The features of SAW: molten pool is shielded very well; deposition efficiency is high; adjustment of alloy transfer efficiency of weld metal is easier; heavy current can be applied and labor condition of welder is better than other kind of welding. The wire in SAW can be solid one, flux cored one and strip one and not only single wire but also twin-wire or multiplewire can be applied in SAW. Normally SAW is suitable for horizontal position welding or upward welding that gradient is $<15^\circ$ and the thickness of the welded plate is $>6\text{mm}$ and welding joint is rule and longitude.

A) Choose for Wire and Flux

SAW use flux/wire combination and one flux can match different wire to get different weld metal and one wire can match different flux to get different weld metal also. The chemical composition and mechanical properties of deposited metal is affected by big electric current, deep penetration and higher penetration ratio of base metal so choosing wire should not only see composition of flux but also base metal and choosing flux should not only see composition of wire but also base metal too. It is applicable to choose a flux/wire combination of mild steel or low tensile strength low alloy steel for the welded joint that tensile strength and toughness required not higher but it is not suitable for the structure with big thickness, deep groove, narrow root gap and high current density welding. As for the structures of low alloy high tensile strength steel, heat resistance steel and cryogenic steel the matching low alloy flux/wire combination should be chosen.

B) The Matters Need Attention for SAW

- 1) The direction of dip for both welding wire and weldment will affect the shape of bead and penetration. Upward welding in the inclined position or wire forerake the penetration will be deeper otherwise downward welding in the inclined position or wire hypsokinesis the penetration will be shallower and wider.
- 2) Over heavy current in welding is very disruptive for the welded joint: appearance will be rough, slag detachability will be worse, crack resistance will be worse, even more burn though the workpiece.
- 3) The contact tube should match diameter of the wire if it is bigger conductive will be bad even current interruption and the appearance of weld joint will be bad.
- 4) The fine particle flux is suitable for heavy current welding in this case the appearance of weld joint will be better. Choose coarse particle flux for the lower current welding so that easy discharge gas to ensure the quality of weld joint and also for high speed welding.
- 5) SAW flux should be re-dry before welding. Different kind of flux need different temperature and time period for re-bake please read the **Notice** for this matter below the literature of each flux/wire combination.

C) Storage and Moving the SAW Flux / Wire

- 1) The storeroom should be arefaction and ventilated. The temperature is better 10°C-40°C and relative humidity (RH) $\leq 60\%$. Moisture should be avoided and repulsing any liquid or mordant effumability materials, such as water, acid, alkali and so on, far away from fire also.
- 2) Both welding fluxes and wires can not be put on ground directly and they should be put on pallets that made by wooden/metal/ plastic and the distance of the fluxes/wires against the wall of storeroom at least 300mm.
- 3) It is important to store the wires and fluxes respectively according to the types and specifications and do not misapplication.
- 4) Moving flux/wire must be careful and do not damage any package of it.
- 5) SAW wire has strong elasticity so must be careful to open its package and be careful to put it on the welding machine.