

Electrode Selection

- The electrode's primary function is to conduct electricity to generate the arc. Additionally, it serves as filler metal and provides shielding to the weld puddle
- There are many different types of electrodes and the type selected depends on many factors
- SMAW (stick) Electrodes (range from 5/64 - 1/4 inch diameter and come in 9, 18 and 24 inch lengths). They:
 - Conduct electricity
 - Serve as filler metal
 - Provide shielding gas
 - Generate flux
- The solid core (wire metal inside), contains alloys with properties designed to match a variety of base metals
 - All SMAW electrodes contain some amount of carbon and manganese, both of which add strength
 - SMAW electrodes are coated with flux, which helps stabilize the arc, adds alloys to the joint, cleans the weld and shields the weld puddle from impurities in the atmosphere
 - Flux acts as a deoxidizer that removes oxygen, nitrogen and other things harmful to the weld
 - As the weld bead forms, the deposited flux creates slag, which is a ceramic coating that protects the cooling weld bead

The 4 types of SMAW Electrodes

1. **Fast Freeze** - Solidifies quickly, are used in all positions, especially vertical and overhead. Provide easy control, deep penetration and flat beads

2. **Fast Fill** - Have the highest deposition rate (speed at which the electrode melts), fill joints quickly and are used in flat and horizontal positions only. Have shallow penetration and produce smooth beads with little spatter
3. **Fill Freeze** - Solidify quickly and have medium deposition rates. Can be used in any position but mostly downhill, vertical and flat. Have medium penetration, smooth beads with little spatter.
4. **Low Hydrogen** (E7018 is an example) -
 - a. Used for welding materials that may be susceptible to cracking
 - b. Characteristics are similar to fill freeze electrodes
 - c. Solidify quickly, leave medium deposition rates and can be used in any position
 - d. Ideal for awkward positions and crack sensitive applications
 - e. Slightly convex beads with little spatter