

Electric Arc Welding

Electric Arc Welding provides the heat required for melting the parent as well as filler material. The workpiece and the electrode are connected to the power source (*The electrode is an electrical conductor used to make contact between cathode and anode to fuse or melt of workpiece*) and the arc is started with touching the electrode to the workpiece and then withdrawing it to a short distance (a few mm) from the workpiece. When the electrode and workpiece are in contact the current is flows. The arc is generated by the electrons emitted form cathode and moving towards anode and the arc changes electrical energy into heat and light.

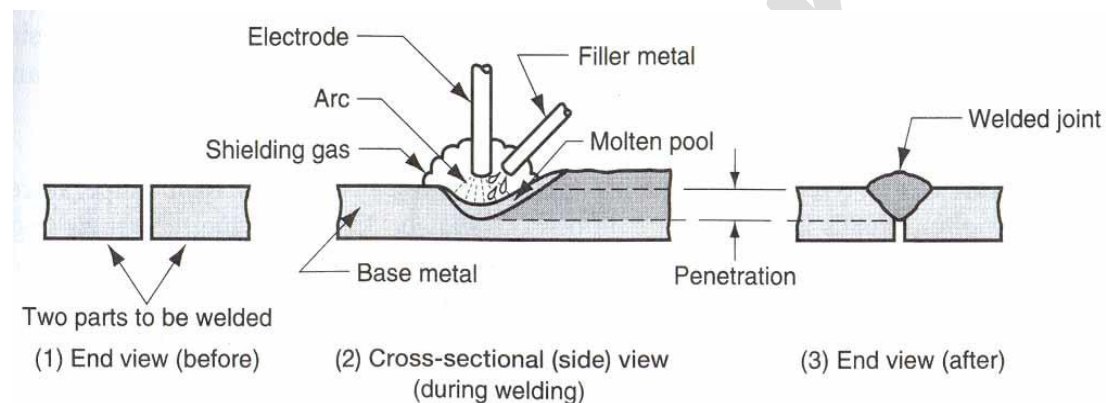


Figure 28 Electric Arc Welding

About 70% of the heat emitted due to flux of electrons at anode raises the anode temperature to high values (5,000 to 30,000°C). This heat melts the base metal as well as tip of the electrode in the area surrounding the arc. A weld is formed when the mixture of molten base and electrode metal solidifies in the weld area.

Both direct current (DC) and alternating currents (AC) are used in arc welding. AC machines are less expensive to purchase and operate, but generally limited to welding of ferrous metals. DC equipment can be used on all metals with good results and is generally famous for better arc control. The used can be either non-consumable or consumable electrodes. Consumable electrodes usually have a coating on its outer surface which on melting emitted gases like hydrogen or carbon dioxide to form covering around the molten pool.

The electrode also reacts to slag which is a liquid and lighter than the molten metal. The slag therefore rises and floats on the surface and by solidification forms a protective covering over the hot metal. This also slows down the rate of cooling of the weld. The slag layer can be removed by light chipping or small hammering on the slag cover. Electric arc welding of this type is known as (Shielded Metal Arc Welding). More than 50% industrial arc welding is done by this method.

For continuous arc welding operations, the consumable electrode is wire in the form of a coil and the flux is fed into the welding zone, or the weld area is covered by an inert gas. In Submerged Arc Welding the electrode is shielded by granular flux supplied from a source, while in Gas Metal Arc Welding shielding of the area is provided by an inert gas such as argon, helium, carbon dioxide, etc.

Arc Welding (GTAW) is also called as Tungsten Inert Gas (TIG) welding. It uses tungsten alloy electrode and helium gas shield. Because of inert gas atmosphere tungsten is not consumed. Filler materials are supplied by a separate rod or wire in this case.