

MANUAL METAL ARC WELDING – TYPES OF ELECTRODES

The consumable electrodes are essential in the electric arc priming and are used as addition material as well. The electrode is formed by a metal rod known as the core covered by a flux coating of mineral or organic materials.

Flux coating function: Gas protection by releasing fumes, fusion bath protection by the covering slag, electric isolation of the electrode, addition of alloy elements, addition of easily ionized elements (improves the electric arc stability) and making the priming easier.

COATING	PROPERTIES	CONSTITUTION
Rutile	<ul style="list-style-type: none"> Dense and abundant slag Medium penetration and an easy priming Stable electric arc Weak resistance to hot cracking Very versatile and generally used 	Coated with titanium dioxide (Rutile – Ti O ₂)
Basic	<ul style="list-style-type: none"> Low percentage of hydrogen Good resistance to cold cracking Highly hygroscopic Does not possess organic matter in its constitution Mean penetration and good mechanical properties 	Coating with calcium carbonates and fluoride.
Acid	<ul style="list-style-type: none"> Abundant slag, viscous and very easy to remove Medium penetration and high fusion rate Limited to horizontal down welding Low resistance to hot cracking Good mechanical properties 	Composed by iron oxide, manganese and silica
Cellulosic	<ul style="list-style-type: none"> Large amount of gas protection High percentage of hydrogen High probability of cold cracking Deep penetration and a very stable electric arc Little slag and a coarse weld deposit Suitable for vertical down welding and first weld pass 	Composed by a high amount of organic material, mostly cellulose
Oxide	<ul style="list-style-type: none"> Oxide slag, abundant and very easily removed Low penetration and a good looking weld deposit 	Composed by iron oxide and manganese

AWS SPECIFICATION FOR CONSUMABLE ELECTRODES

Ref. AWS	Material/target function
A 5.1	Carbon steel
A 5.3	Aluminium alloys
A 5.4	Inox steel
A 5.5	Low alloy steel
A 5.6	Copper alloys
A 5.11	Nickel alloys
A 5.13	Coating (Solid core)
A 5.15	Cast iron
A 5.21	Coating (tungsten carbide)

