Welding Consumables

Welding consumables are products that become molten during welding and flow together with the molten base material. They thereby contribute to the formation of the weld (joint welding) or the coating (surfacing). They significantly determine the properties of the weld such as strength, deformation capacity and corrosion resistance. When joint welding, the deposited weld metal usually has the same properties (such as strength, ductility, strain) as the base material due to the welding consumable that was used. When surfacing, the deposited weld metal often has different properties than the base material (such as higher hardness, wear resistance, corrosion resistance).

Product geometry

Solid wires are used most frequently, either in the shape of welding rods and covered electrodes or as quasi-endless wire electrodes. A variant are strip electrodes with their rectangular cross-section that are often used for surfacing. Quite a complex product form of their own are cored wires. They consist of a metallic mantle with powder filling. With some welding processes like powder welding, the deposited weld metal is used as a filler.

Proper storage

Welding consumables have to be stored in such a way that their temperature never falls below the dew point during the whole storage time. This can be achieved by keeping the room temperature above 15 °C and the relative humidity below 50 %. Pay heed that the original packaging remains undamaged. When withdrawing stocks, the product with the oldest production-date must be used first (FIFO). Consumables that were not used up must be wrapped again for storage. Basic covered electrodes for example must be re-dried according to the manufacturer’s specifications before using.

Selection

The choice of the right consumable for a welding task depends on the base material to be welded and on the welding process that is to be used. Consumables are described by international or European standards. Among other things, the standardized designations of consumables are explained in these regulations. The designations consist of various codes and figures that explain for example the chemical composition of the consumable and the mechanical properties of a pure weld metal that was produced with this filler.

Most manufacturers use brand names for their products. The designation according to the particular standard is also given on the packaging. The standardized designation gives information about the properties and facilitates the comparison of different products.

Marking on the packaging

Wire electrode

ISO designation gives information about the properties and facilitates the comparison of different products.

Stick electrode

ISO designation gives information about the properties and facilitates the comparison of different products.

Standardization of consumables

Type of base material

Gas shielded metal arc welding Wire electrode

Inert gas welding Welding rods

Submerged arc welding Wire electrode

Inert gas welding Welding rods

Manual metal arc welding Wire electrode

Inert gas welding Welding rods

Gas metal arc welding Wire electrode

Welding processes and welding consumables

Designation examples

Wire electrode GMAW and pure weld metal

ISO 14341-A–G 3Si1 standard consumption process (gas shielded metal arc welding) mechanical properties of the pure weld metal

Al (1: Zr 0,05) and Zr 0,15) (min. yield strength 460 N/mm², tensile strength 530-680 N/mm², min. strain at break 20 %)

High alloy welding rod TIG self shielding flux-cored wire and pure weld metal

ISO 17632-A–T 38 3 W 1 H10 standard welding process (tungsten inert gas welding) chemical composition

Hydrogen content