Advantages

- Suitable for all weldable materials and applications
- Highest possible welding quality guaranteed
- Even weld seam, no spatter or slag
- Often no need for any filler metal
- Can be automated

Application areas

- The main application areas are stainless steels, aluminium and nickel alloys
- Applications with the highest quality requirements, e.g. pipelines in reactor construction

The welding process: TIG

Tungsten inert gas welding

1 Power source

The TIG power source transforms electrical energy into a form suitable for welding and produces an almost constant output current. In addition, continuous current adjustment is required for all sheet thicknesses. For most metals, welding is carried out using direct current (⎓); alternating current (∿) is only used for aluminium.

2 Cooling unit

The cooling unit ensures optimum cooling of the welding torch.

3 Welding torch

At the heart of a TIG welding torch is a non-consumable, temperature-resistant tungsten electrode. Fitted around this is the gas nozzle for the shielding gas, which prevents the heated material from reacting with atmospheric oxygen and therefore ensures the required strength and durability of the weld metal. TIG welding torches are available as either gas-cooled or water-cooled versions.

5 Tungsten electrodes

Tungsten is used because of its high melting point (3380 °C). Depending on the type of current, either pure tungsten electrodes or tungsten electrodes alloyed with oxide fillers are used (colour-coded). The electrode should not protrude more than 5 mm out of the gas nozzle. The tip must be ground centrally and to produce a defined angle.

6 Shielding gas

The most commonly used shielding gas for TIG welding is argon, but helium, or a mixture of the two gases are also used. These gases are inert and therefore inactive.

7 Filler metals

Fillers for unalloyed, low-alloy and medium-alloy steels are usually copperised; fillers for high-alloy steels and aluminium alloys are usually exposed. For manual TIG welding the filler is in rod form; for semi-mechanised, fully mechanised and automated TIG welding, they are usually in the form of a spooled wire. In many cases, no filler material at all is required when welding small air gaps.

The Process

The arc is ignited by bringing the tungsten electrode into contact with the workpiece, or alternatively using a high-voltage source that is only switched on during ignition, with no need for contact. The arc heats up and liquifies the material. If required, a welding wire is either fed in manually or using a wirefeeder.

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