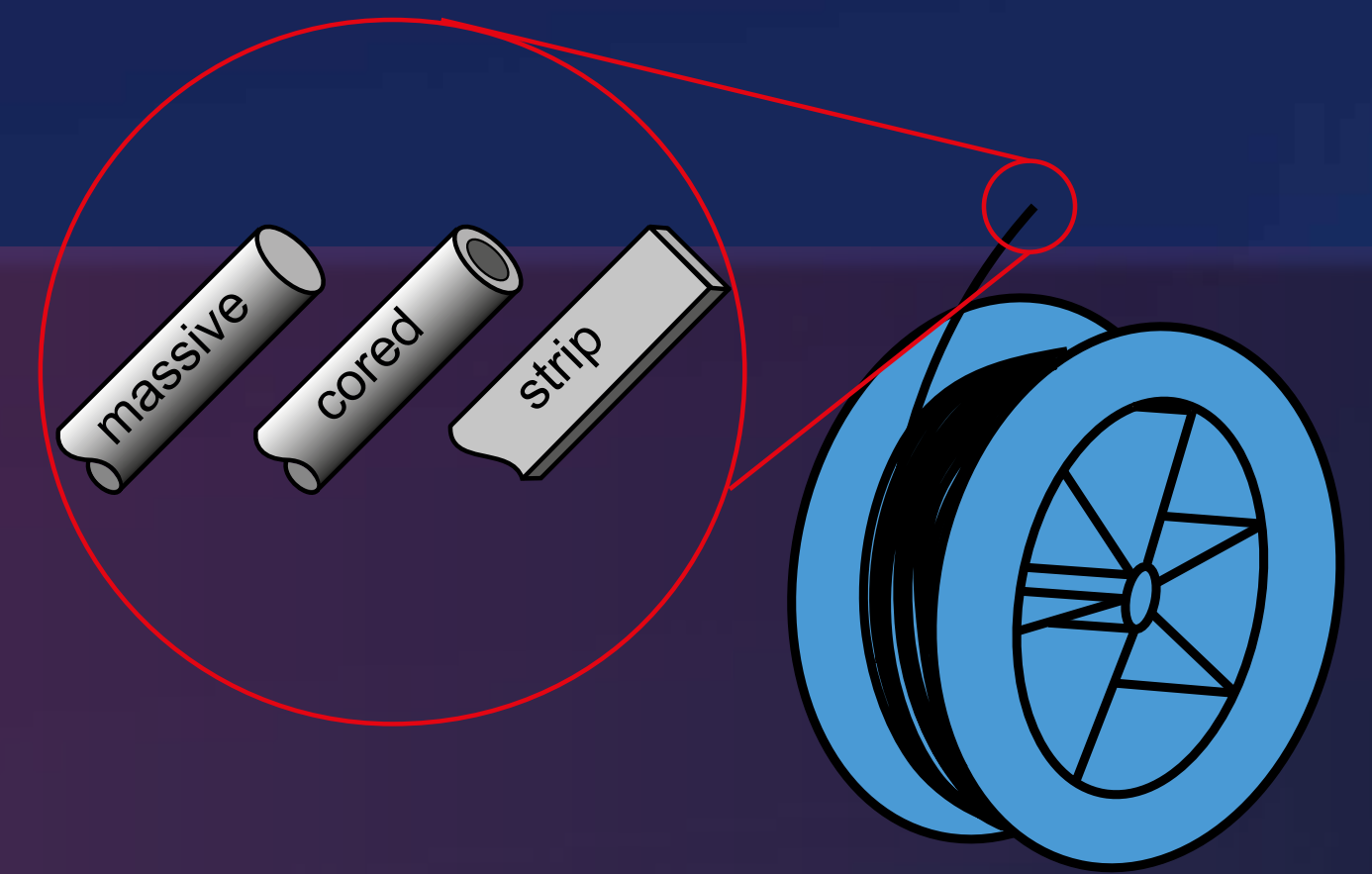


The welding consumable type most frequently used for metal-inert gas and metal active gas (MIG/MAG) welding is the solid wire electrode. It is welded under a shielding gas envelope consisting of an inert or active shielding gas. The shielding gas permits the formation of a stable arc and shields the liquid molten pool from the ingress of air.

One variant relates to strip electrodes which have rectangular cross sections and are utilised, for example, for weld surfacing. Tubular cored electrodes are also being utilised ever more frequently. They consist of a metallic covering with a filling in powder form. The filling consists either of a pure metal powder or of welding flux, comparable with the covering of a stick electrode.

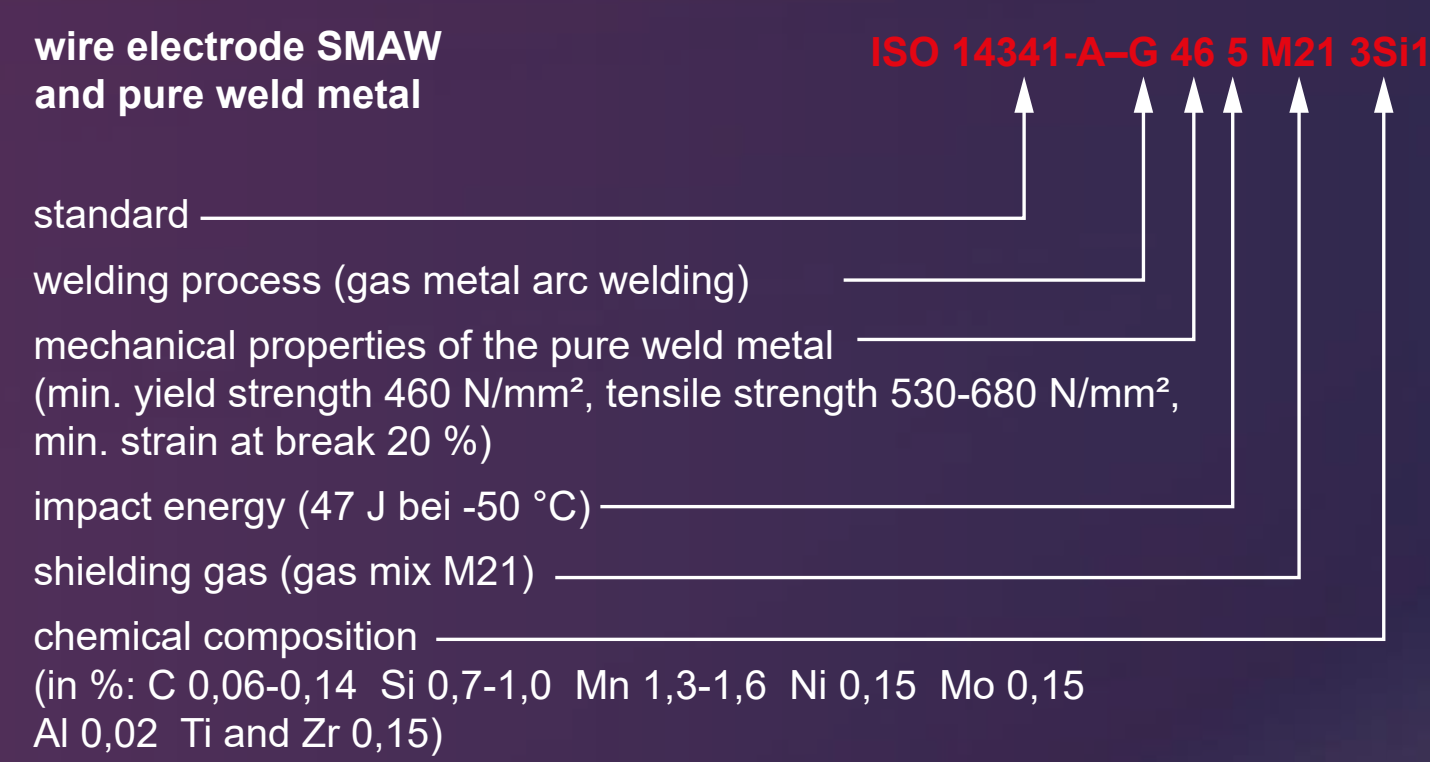


## WELDING CONSUMABLE STANDARDS

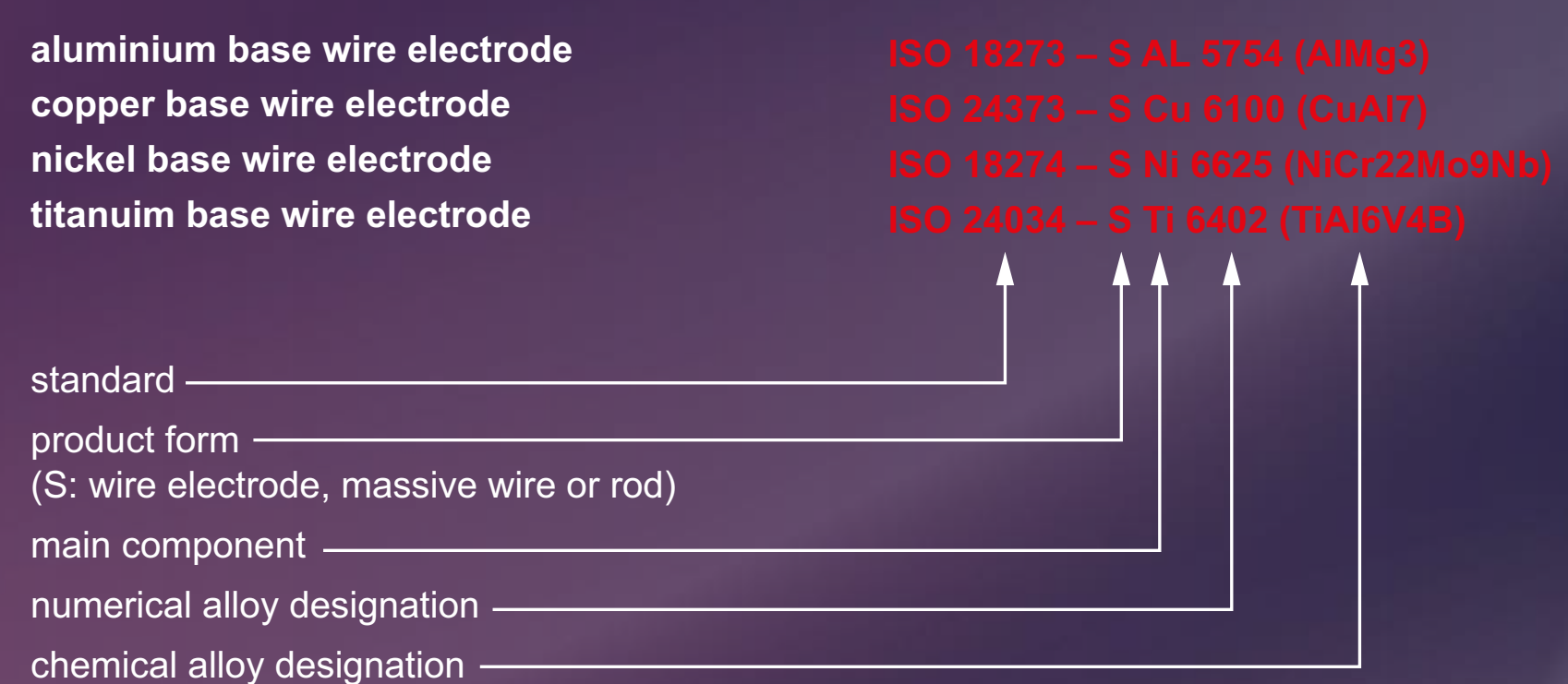
Welding consumables are described by international standards. Amongst other aspects, the welding consumable designations according to the standards are explained there.

Material group		Welding consumable	
		MIG/MAG Solid wire electrodes	MIG/MAG Tubular cored electrodes
Ferrous materials	Non-alloy steels and fine-grain structural steels	EN ISO 14341	EN ISO 17632
	Creep-resisting steels	EN ISO 21952	EN ISO 17634
	High-strength steels	EN ISO 16834	EN ISO 18276
	Stainless and heat-resisting steels	EN ISO 14343	EN ISO 17633
	Cast iron	EN ISO 1071	
Non-ferrous materials	Nickel and it alloys	EN ISO 18274	EN ISO 12153
	Aluminium and it alloys	EN ISO 18273	-
	Copper and it alloys	EN ISO 24373	-
	Titanium and it alloys	EN ISO 24034	-

Example - Welding consumables for steels:



Example - Welding consumables for aluminium, nickel, copper or titanium materials:



## SELECTION

The selection of the welding consumable mainly depends on what material is processed.

Non-alloy steels and fine-grain structural steels: The strength and toughness properties of the base material should be reached in the weld deposit too. Information about the mechanical properties of the weld deposit can be taken from the designation according to EN ISO 14341.

Tubular cored electrodes for the MAG welding of these steels: According to the composition of the filling, a distinction is made between rutile types, basic types and metal powder types.

Creep-resisting, high-strength, corrosion-resisting and heat-resisting steels: The weld deposit should be similar to the base material to be welded or somewhat higher-alloy. For wire electrodes and tubular cored electrodes, information about mechanical parameters can also be found in the corresponding standards. However, these values are not a constituent of the designation system.

Cast iron: It contains from 2.5% to 4% carbon. This has an extremely detrimental effect on the weld-

ability. A distinction is made between the hot welding of cast iron with similar welding consumables at preheating temperatures from 450°C to 650°C and the cold welding of cast iron with dissimilar welding consumables (these mostly have high nickel contents) without any preheating or with slight preheating.

Alloys of the non-ferrous metals aluminium, nickel, copper or titanium: Similar welding consumables or slightly higher-alloy welding consumables which compensate for the burn-out of alloying elements are used.

Various resources are available for the selection of the appropriate welding consumable, such as manufacturers' recommendations on data sheets or in selection tables as well as expert advice from the qualified specialised trade or the manufacturer itself. Technical bulletins which are helpful when choosing the welding consumables and include additional notes about the processing and the suitability for certain utilisation fields are available from DVS.

## TECHNICAL SUPPLY CONDITIONS

Standardised diameters and permissible tolerances for wire electrodes and tubular cored electrodes can be found in EN ISO 544.

Non-alloy and low-alloy solid wire electrodes are mostly utilised with copper-plated surfaces. The copper plating decreases the sliding resistance when the electrode is pushed forwards in the hose package and improves the current contacting. It does not result in any notable corrosion protection for the wire electrode because it is porous. Tubular cored electrodes can only be copper-plated if they have

closed coverings without any gaps. High-alloy wires and welding wires made of aluminium are utilised with bright surfaces.

Welding consumables in wire form for gas-shielded arc welding are supplied on reels, mandrel spools or basket spools. In addition, there are also large containers such as drum spools with large wire quantities for robot installations.