

# Aluminium

## 'An Introduction and Process Guide'



Technical advice in the original SifTips style which started in 1932

Years ago 'aluminium' was considered a difficult material to weld, since when using oxy-acetylene there was no change in colour to indicate the metal's temperature and suddenly it could melt and collapse! With the introduction of TIG and MIG welding processes, these 'welder fears' have been put to one side, providing that the properties of aluminium are understood. This article is intended to give a general overview.

Aluminium and its alloys have special properties of lightness, strength, conductivity, malleability etc which make it a particularly useful material in a variety of industries. The metal can be either in 'cast' form or extruded (wrought), which then divides into non-heat treatable and heat treatable. Generally, it is readily weldable, but it is important to understand some of its characteristics:

**Oxidation:** in air aluminium immediately forms an oxide layer on its surface, which will increase in thickness with time. This oxide layer must be controlled during the welding process, by chemically and mechanically cleaning the metal, using an aggressive flux or ensure the arc has reverse polarity (electrode positive). Correct gas shielding (argon) will prevent oxides reforming in the weld.

**Thermal Conductivity:** as aluminium is a very good thermal conductor, it will rapidly disperse heat. Care must be taken to avoid distortion and possibly cracking.

**Colour:** unlike steel, there is no change in colour as it is being heated. Look out for a 'wet' appearance. For gas brazing, melting of flux powder is a temperature indicator.

**Preparation:** smooth all edges of workpiece to minimise trapped dirt. Use a commercial degreaser and stainless steel brush to remove dirt, oil, paint. Dry surface thoroughly. If TIG welding, wipe filler rod clean of any surface oil.

**Application:** support the joint to be welded, preferably with a jig, but spot tacking can be used. Keep the arc travelling at the right speed to build up a bead of the right proportions. Do not stop/start on one weld, as this can lead to oxidation/porosity. Carry out the weld quickly to minimize distortion.

### Typical Consumables

**Gas weld:** Sifalumin No 14 or No 15 and Aluminium Flux

**Braze:** Sifalumin No 36 & Aluminium No 36 Flux

**Solder:** SIF 555 Aluminium Solder

**MMA:** HILCO Aluminil Si5 & Si12

### MIG & TIG welding:

SIFMIG 1050 Sifalumin No 14 for pure aluminium

SIFMIG 4043 Sifalumin No 15 contains 5% silicon, for castings and heat treatable alloys 6063, 6061 & 6083

SIFMIG 4047 Sifalumin No 16 contains 12% silicon, for castings and automotive applications.

SIFMIG 5356 Sifalumin No 27 contains 5% magnesium, for similar 5xxx alloys and heat treatable alloys 6063, 6061 & 6083.

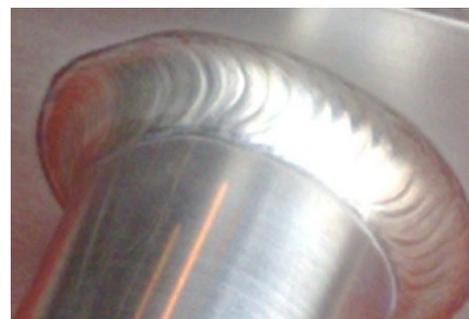
SIFMIG 5183 Sifalumin No 28 contains 5% magnesium with 0.75% manganese for improved weld strength

SIFMIG 5556 Sifalumin No 37 contains 5.3% magnesium and other closely controlled elements for 5083 military and aerospace applications.

Sifbronzing is an almost universally recognised way of describing the low temperature bronze welding of sheet steel, cast iron and other metals. The reason behind this fact summarises why Sifbronze, the company which first developed and promoted the technique, is generally considered to be a supplier of top-quality welding rods, wires, fluxes and equipment.

'Will The Welder' was a Siftips magazine that was produced in the early 1930's. The aim was to provide users with ideas and tips as to how to get the most out of their welding equipment.

In 2007, Weldability-Sif acquired Sifbronze, the welding consumables division of the Suffolk Iron Foundry, known internationally as Sif. Sif is renowned for its manufacturing heritage and for its complete range of quality welding consumables for MIG/GMAW, TIG/GTAW, Arc/SMAW, Oxy/Fuel Welding and Brazing, which have been used globally for almost a century.



**Conclusion:** it is hoped that these comments will lead to sound welds being produced. However, provided the right filler wire has been used, defects are usually due to inadequate cleaning/preparation or poor technique (shielding gas not effective, too long an arc, incorrect torch angle).

**Weldability sif**

PHONE : (+44) 0845 130 7757 FAX : (+44) 01462 482202  
Email: info@weldability-sif.com Website: www.weldability-sif.com