

# sif tips



Sifbronze was established in 1925 and is one of the last companies who continue to manufacture welding consumables here in the UK.

In February 2008 they became a wholly owned company within the WWS Group and now feature as part of the combined WELDABILITY SIF product range.

The company has kindly offered to provide a series of technical advice documents for the welding sales engineer and AWD members, following the traditional SIFTIPS format which was originally started in 1932.

## TIG Brazing (Comments and a few Applications)

'TIG Brazing' can cover a wide range of applications, from the point of view of materials to be joined, joint design, one off special repair job to quantity production. Perhaps the title is a confusion of terms. Initial reaction is that TIG is a fusion welding process and brazing gets obscured with the thought of oxy-acetylene torches, flux powder etc. In practice, the heat source is the TIG arc but run on a low current so as not to melt the material with a suitable filler rod fed into the arc. This filler rod is quite different from conventional oxy-acetylene 'silicon bronze' brazing rod. As the TIG torch provides a protective gas shroud, there is no need for the addition of flux, as with the long established brazing process.

There are typically three different copper alloys filler rods to be considered for TIG Brazing:

### **Sifsilcopper No 968 (C9)**

Sifsilcopper No 968 conforms to BS2901 C9 and Din CuSi3, having a typical composition of 3% Silicon, 1% Manganese and balance Copper. It is available in diameters: 1.2, 1.6, 2.4 & 3.2mm and pack sizes 1.0, 2.5 & 7.5 kgs.

A customer was using Sifsteel A15 to complete TIG welds on sheet steel ducting, which was being joined to a square section frame. The initial problem was distortion due to heat build up and subsequent costs for heat treatment to remove stresses and dress the weld. TIG brazing with Sifsilcopper No 968 was suggested. The speed of operation is nearly twice as fast as welding, as the TIG arc has a temperature of approx 1400 °C and Sifsilcopper No 968 melting point is around 1000 °C, some 450 °C lower than Sifsteel A15. The speed of operation is very rapid.

Not only did the customer nearly halve his 'joining' time, but found there was only minimal 'after brazing' work to bring the components into an acceptable final condition for painting.

### **Procedure tips**

TIG brazing is relatively straightforward. The TIG torch needs a thoriated tungsten and dc current (torch +). Whereas TIG welding with say 1.6mm Sifsteel A15 would require 80-95 amps, TIG brazing will only require less than half that current, more in the order of 35-45 amps. As you can imagine, it is important for the welder to be comfortably positioned with regards to the parts being joined, so that the whole procedure can flow at a relatively fast rate. Maintaining torch and filler rod angles with respect to the workpiece is key, to prevent breakdown of the inert gas envelope to avoid atmospheric contamination of the joint.

### **Sifphosphor Bronze No 8 (C11)**

Sifphosphor Bronze No 8 conforms to BS 2901 C11 and Din CuSn6, having a typical composition of 7% Tin, balance Copper. It is available in diameters: 1.2, 1.6, 2.4 & 3.2mm and pack sizes 1.0, 2.5 & 7.5 kgs.

This filler rod is particularly useful where copper alloys are involved, if the joint is between dissimilar metals (e.g. copper/stainless), if the metal cannot be completely identified or if it is known to be difficult to weld but can be brazed.

As an example, a welder was required to repair an old exhaust manifold, which had been previously welded on a number of occasions where cracks had developed in and around the heat affected zone. Further efforts to TIG weld the material only led to burn through and further cracks. The exact composition of the metal was not known.

The solution was for the welder to try Sifphosphor Bronze No 8, working on ground out cracks and suitably reducing the current. The job was successful and the manifold went back into service.

### **Sifalbronze No 32**

Sifalbronze No 32 conforms to BS 2901 C13 and Din CuAl9Fe, having a typical composition of 10% Aluminium, 1% Iron, balance Copper. It is available in diameters: 1.6, 2.4 and 3.2mm and in 1.0, 2.5 and 7.5 kg packs.

This filler rod alloy has free flowing characteristics making it ideal for close fitting joints which one would expect to find in brazing operations.

An example here would be the fabrication of special bicycle frames from T45 (0.2% C, 0.2% Si, 1.5% Mn) Steel material. If the joints are of the type where tube fits into sockets or lugs, Sifalbronze No 32 is particularly ideal, as it has excellent 'wetting out' characteristics compared with the other alloys.

As Sifalbronze No 32 contains 10% aluminium, ac current is recommended with zirconiated tungsten.

### **General Hints**

Irrespective of the filler rod used, argon is the recommended shielding gas. Always remember that cleanliness of the workpiece is a priority for For first class results: remove any oxide or grease from the joint area.

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