

# 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.

## Bronze Welding and Brazing

### **Sifbronzing**

For successful 'bronze welding' or 'sifbronzing', parts must be clean and for optimum strength a 60 – 90 vee preparation is required. Using leftward welding technique, the parts should be heated with an oxidising flame to a 'dull red', before introducing the Sifbronze rod and flux. Overheating must be avoided, as this will lead to porosity and inferior work.

It is essential that the joint faces are tinned. A drop of Sifbronze appears to collapse and spread across the metal face. If the drop stays as a globule, the metal is either too hot, too cold or dirty. The gap between the tinned faces is now filled with a weave action. It may be necessary to carry out further 'weld runs', building up the joint.

Sifbronze flux plays an important role not just cleaning the metal, but it covers the weld pool surface, preventing further oxidation of the molten bronze.

### **Bronze welding cast iron**

Prior to 'welded fabrications', engineers would use cast iron to produce a whole range of products from small domestic items (mangles, mincers, mowers) to large industrial parts (agricultural equipment, civil engineering brackets and fixings, cylinder blocks, machine tool frames etc). Cast iron is a very hard, but brittle material, which can be easily machined.

Since it is brittle, there is a tendency for it to fracture, especially if a part is subjected to a sudden impact, such as a casting being dropped on a protruding fixing lug or bracket. A repair of this nature does not require a colour match, so oxy-acetylene sifbronzing (or bronze welding) will be considered. The joint must be prepared by grinding back the surface and producing a 'vee' preparation if the material is thick.

The first task is to seal the carbon into the cast iron, by 'buttering' both faces of the joint. This is done by using brazing rod (Sifbronze No 1) and standard Sifbronze flux, to cover each face with a layer of brazing material. Next, the two parts are positioned so that the joint can be completed by bronze welding between the two 'battered' faces.

This produces a strong joint, which is very visible, unless dressed and painted. The process does not require the parts to be pre-heated, as necessary when full fusion welding cast iron.

### **Brazing copper to copper**

Copper to copper joints produced with SIFCUPRON, do not require the addition of flux, as the phosphorus provides a self-fluxing action. It is necessary for the parts to overlap with a joint gap of 0.05 to 0.12mm. The gap should not exceed 0.4mm

As copper is a very good thermal conductor, the heat must be applied quickly, taking great care not to overheat and cause embrittlement. If joint strength and ductility are important, Sifcupron No 17-2Ag or 17-5Ag should be used in preference to No 17. Sifcupron No 17-15Ag is more tolerant if joints are not close fitting.

On occasions, there is the need to braze copper to brass (perhaps a brass flange to a copper pipe). Provided it is a suitably designed joint, a copper/phos alloy with an inclusion of silver (such as Sifcupron No 17-2Ag) will be ideal. However in order to get the alloy to bond with the brass, it is necessary to use a flux, such as Sifsilcopper or Sifbronze.

Sifcupron is not suitable for brazing nickel alloys, ferrous metals or where the joint is subject to hot sulphurous gases or oxidising atmosphere above 200°C.

### **Silver Soldering**

As with all brazed joints, preparation and cleaning of the workpiece is essential to produce a successful joint. When silver soldering, lap type joints (rather than butt) are preferred and the recommended clearance is 0.04 to 0.15mm.

Apply SIF Silver Solder flux to both joint faces before assembling the parts. Using a neutral flame, heat assembly quickly and evenly, avoiding overheating the silver solder (wipe rod on joint rather than melting it directly in the flame). Use in a well ventilated area and be aware of health and safety procedures.

To silver solder stainless, a high silver content alloy is required (such as SIF Silver Solder No 43 – 55% Ag Cd free) and a suitable flux (SIF Flux – Silver Solder). Alternatively, a 'nickel bronze' brazing rod such as Sifbronze No. 2 together with 'Tool Tipping / Brazing Stainless' flux (note: do NOT use Stainless flux as it is for gas welding of stainless).

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