Safe & Efficient Practices

Introduction

These guidelines summarise the basic principles underlying good silver brazing, silversmithing and soft soldering practice. Careful observation of these rules will allow the full potential of such alloys and fluxes to be realised, whilst restricting the hazards associated with their use to an absolute minimum.

RULE 1 – Be aware of potential hazards

Before carrying out any brazing, silversmithing or soldering operation, it is essential to consult the appropriate health and safety literature for each material being used.

RULE 2 – Ensure effective ventilation

A ventilation system of proven efficiency should be used to ensure that fume levels do not exceed the statutory requirements for any silver brazing alloy. The use of cadmium containing silver brazing alloy is severely restricted under Annex XVII of REACH (https://echa.europa.eu/substance-information/-/substanceinfo/100.013.770). Where cadmium-containing alloys are used, local exhaust ventilation is essential and should be supported by good general workshop ventilation. Never, under any circumstances, should an unprotected operator attempt to braze or heat material in confined spaces or under conditions of restricted ventilation – this also applies to protracted soft soldering operations. Crouching head down over the work piece is a dangerous practice and must be avoided.

RULE 3 – Use only clean parts

Parent metals must be clean and free from all forms of contamination such as scale, dirt, oil and grease etc. Failure to observe this precaution will result in unsound joints and could lead to unpleasant fuming. Electroplated parts should be treated with caution.

RULE 4 – Select the proper alloy

Ensure the alloy selected is suitable for the application involved by reference to the appropriate product literature. Check the identification on labels or packaging to verify that the correct alloy has been supplied and note any warning clauses.

RULE 5 – Select the matching flux

By reference to the appropriate alloy table, choose a flux which is compatible with the brazing alloy to be used. Never use a high melting point flux with a low melting point alloy, or vice versa.

For silver-bearing soft solders, chloride based fluxes are the preferred choice, particularly on stainless steel, although other alternatives may have to be employed for applications where corrosive fluxes are unacceptable. Care must be taken, however, to ensure that they have adequate life at the higher operating temperatures involved.

RULE 6 – Handle fluxes with care

Good housekeeping practice must be adopted when using fluxes, as they are toxic substances which must not be ingested. The use of barrier creams, gloves or other protective means is recommended to avoid prolonged skin contact.

RULE 7 – Use sufficient flux

It is essential that enough flux is used to give full protection to the joint area throughout the complete brazing cycle. Should the flux become prematurely exhausted, brazing alloy flow will be impaired and dewetting may occur. Heavy fumes will be evolved from any unprotected molten alloy surface exposed in this way.

With flux-coated rods, as the quantity of flux available is limited, every endeavour must be made to ensure its effective application to the joint area. Due to the high activity of the flux, its life is relatively short, so brazing should be carried out as rapidly as possible.

RULE 8 – Apply heat carefully

Heat the joint area generally, concentrating on the heavier sections to achieve an even heat pattern. Never attempt to melt the brazing or soldering alloy by direct application of a flame, but feed it into the joint itself when the proper temperature is attained. Overheating is bad practice and will not only result in inferior joints, but will produce heavy fuming from both flux and brazing or soldering alloy. Brazing temperatures should seldom need to exceed the alloy liquidus temperature by more than 50°C, and in the case of phosphorus brazing alloys will, in general, lie below rather than above the liquidus temperature. To assist in better judgement of temperatures, never braze in strong sunlight or other intense lighting conditions.

These comments also apply to flux-coated rods except that, as the temperature increases, a little flux should be ‘touched in’ to prevent excessive oxidation of the parent metals in the immediate joint area. Continue to heat as quickly as possible and apply the flux-coated rod as soon as the assembly reaches the brazing temperature.

When a silversmithing alloy is to be annealed, the workpiece should be heated evenly with a large bushy flame, first ensuring that it is correctly supported. Avoid overheating, as

this may give rise to incipient fusion (burning), the formation of excessive 'fire' layers and the evolution of fume in progressively increasing amounts. Allow to cool to black heat before quenching.

If silversmithing alloys are to be melted, temperatures should be limited to the minimum levels consistent with adequate fluidity. Overheating will result in the generation of excessive fume, as well as undesirable oxidation, gas pick up and shrinkage effects. Historically, some silversmithing alloys had cadmium added to improve ductility. It is imperative that the melting of cadmium-containing grades is never attempted unless the equipment is fitted with a local exhaust ventilation system of proven efficiency.

RULE 9 – If in doubt – seek advice

If, when carrying out any operation involving the use of silver brazing or soldering alloys, silversmithing alloys or fluxes, any abnormal or untypical effect occurs, (e.g. unusual fuming, etc.), or if any difficulty is experienced in their application, stop immediately and seek advice. It is dangerous to assume that health hazards are absent just because no immediate ill effects are experienced.