Brazing of Tungsten Carbide

Precautions

Thermal expansion differentials can cause cracking of the carbide during brazing or later during grinding. Can be alleviated by using increased joint clearances so the thicker layer of filler metal can accommodate stress.
Free-flowing alloy SilBRAZE 55, SilBRAZE 45 can be used for small carbide pieces (up to 9mm long), larger pieces may require less free flowing alloys giving thicker joints (SilBRAZE 49, SilBRAZE 49LM or SilBRAZE 40) up to 19mm long, or up to 20x20. Alternatively trifoils. (SilBRAZE 40, SilBRAZE 49, SilBRAZE 49LM) up to 40x40 can be used.

The brazing alloy must melt by conduction from parts and not directly by the flame, otherwise inadequate wetting can result.

Fluxes

Tenacity 6 is the recommended flux for general carbide brazing. Other fluxes can sometimes be used for small piece brazing as their residues are more easily removed eg Tenacity 5, Tenacity 5A.

Alloys

SilBRAZE 49, SilBRAZE 40, SilBRAZE 55, SilBRAZE 45 shims or Trifoils of SilBRAZE 49, SilBRAZE 49LM and SilBRAZE 40.

Brazing methods in order of preference:

1. Induction
2. Fixed torch
3. Manual torch

Target brazing cycle : 15-25 seconds, to avoid flux exhaustion.

General procedure:

Cleaning: Grind to 0.1 mm depth shortly before brazing, alternatively if carbides are clean, abrading on abrasive cloth. Then degrease and keep clean till flux applied. Brazing alloy pieces must also be degreased after cutting. Excessively rough surfaces on the brazing face of the support member, eg as cast, will require more SBA.

Brazing:

heating should be directed mainly towards the support member ,usually the larger mass, and only as much heating of the carbide as necessary to achieve uniform temperature in both components. When the SBA melts, move the tips with a steel rod (puddling) to improve wetting of braze surfaces, apply top pressure to the tips (~20 psi) to expel flux pockets, keep pressure on as the SBA solidifies.

Brazing of Tungsten carbide tips to Cast iron holders

Use of trifoils helps in reducing the stress mismatch which results at the braze interface when carbides are brazed to ferrous alloy and the copper intermediate layer also helps in absorbing shocks in impact service loading