Fluxes & Fluxing

Brazing fluxes are proprietary formulations, some standard specifications which do exist are very general regarding compositions.
Of the constituents in AGR Matthey brazing fluxes, boron and fluorine compounds are the active deoxidizing constituents. The selection of a suitable flux has to take into consideration the active range of the flux relative to the melting range of the brazing alloy to be used. The flux must be active at least 50°C below the solidus and must remain active at least 50°C above the solidus of the brazing alloy. In addition to this, special fluxes are recommended for certain applications such as stainless steel and tungsten carbide brazing.

Flux Removal
5 reasons for removing residual flux after brazing:

1. Enable proper inspection of brazed joints
2. May be contributing to bonding of joint giving false impression of integrity.
3. May give incorrect conclusions on pressure/leak testing and after leaching out in service, cause service leaks.
4. Absorbs moisture promoting oxidation and corrosion.
5. Hinders painting, electroplating etc.

Flux removal should not be delayed beyond 24 hrs to avoid corrosion. Hot water rinse removes most residues. Tenacious flux is often an indication of overheating during brazing or using too little flux.
10% caustic soda immersion is necessary for residues of fluxes used in stainless steel and carbide brazing.
Acid pickling is not very effective in removing flux residues unless the residues are burnt or blackened. If pickling is necessary it should be carried out after flux residue removal. Cold 5% sulphuric acid can be used for more tenacious flux residues. Small addition of sodium dichromate accelerates action but care with metal etching.

Residues from SilBRAZE P alloys:
The greyish coloured residue of the slag left on the work-piece and the brazing alloy fillet does not subsequently cause corrosion and need not be removed. When a tenacious green residue is present after brazing this is a sign of excessively long brazing cycles, which have led to flux exhaustion. When SilBRAZE P alloys are used to braze brass or bronze, conventional borate fluxes have to be used as phosphorous does not dissolve zinc or tin oxide.

Testing for Residual Flux
Halide Tests: To ensure that residual halide-containing flux has been removed. If the flux is known not to contain fluorides, tests for chloride need not be made; if the flux is known not to contain fluorides, the test for fluorides need not be made. If tests indicate the presence of halides, parts must be subjected to additional cleaning and testing procedures until removal is complete.

1. Chlorides: Rinse the test area with 40 to 50 cc of hot (80°C approx) ASTM D 1193 Type IV water. Collect rinse water in a 100cc beaker and add 3 to 5 drops of concentrated nitric acid (sg 1.42) and 2 to 3 cc of 10% silver nitrate solution. Stir the contents and allow to stand for 5 to 10 minutes. A solution as clear as a blank of ASTM D1193 water treated in the same manner as the rinsings indicates the absence of chlorides. A white-to-grey precipitate or turbidity indicates the presence of residual chloride flux

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2. Fluorides: Rinse the test area with 200 cc of hot (80°C approx) ASTM D 1193 Type IV water. Collect rinse water in a 250cc beaker. Use approx 200cc of ASTM D1193 water as a comparison sample. Test both samples in accordance with ASTM D 1179. A higher concentration of fluoride in the rinse water than the comparison sample indicates the presence of fluoride containing residual flux.

Shelf Life of Fluxes

Under cool, dry conditions and with unbroken seals, flux powders should be satisfactory for a minimum of three years from date of supply and flux pastes for one year. After these times powders contain lumps due to settlement and paste may show signs of drying our but both should still braze satisfactorily. Once seals are broken it is recommended that powders be used within one year and pastes within 6 months of opening.