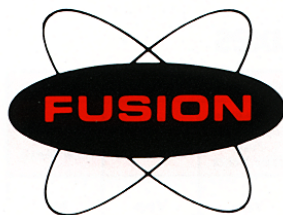


**TREATING METALS  
FOR BRAZING  
WITH**

**FUZE-CLEAN  
METAL PREPARATION  
CHEMICALS**



**FUSION INCORPORATED**

# The Brazing Process

## Precleaning of Metals

It is mandatory that all metals be completely clean prior to brazing. Oils, greases and soils at the joint area will prevent the proper flow and adhesion of the filler metal to the base metals. To remove these residues, solvent degreasing is an effective method. However, many local, state and federal regulations preclude the use of solvents due to disposal problems. Today, water based cleaning procedures are recommended.

The following dry powder compound is supplied by Fusion for precleaning:

- Fuze-Clean AB – heavy duty cleaner for aluminum and brass.

Fuze-Clean AB is prepared by adding water in the ratio of 8 (dry or by weight) ounces per gallon of water at 150°-180°F.

## Postcleaning of Metals

With the Fusion Paste Process, controlled heat is applied to the base metals, causing the flux to release first, followed by filler metal which flows into the joint area. Upon cooling, the separate base metals are joined.

At the same time, the flux cools to form a ceramic-like residue at the joint area. Almost always, this residue is not water soluble and can be accompanied by a blackened heat scale. This scaling is a carbonization product attributed to impurities in the metals and/or heating gases. It is the result of excessive brazing temperatures over an extended time. Improperly positioned burners (gas/air, gas/O<sub>2</sub>) or induction heating can both cause scaling.

It is suggested that all residues and heat scale be removed before further part processing. Leak testing, especially, should not be done until all flux residue is removed. Hard baked flux can seal off a leak condition which could surface later in service.

## Fuze-Clean FS

Fuze-Clean FS is a dry powder consisting of acid salts, wetting agents, sequestering agents and ferrous metal inhibitors which are dissolved in water. This compound quickly and effectively removes and dissolves flux residues and heat scale on both ferrous and nonferrous metals after brazing. Fuze-Clean FS eliminates the rust and heat scale. There are no changes in critical part dimensions even after a few hours immersion.

Fuze-Clean is prepared by adding to water in the ratio of 10 (dry or by weight) ounces to the gallon at 165°-180°F. Heat is necessary for the following techniques:

- Quench a hot metal joint into the solution.
- Introduce a cooled joint into a heated bath of the solution.
- Introduce a cooled joint into an ultrasonic unit.

The solution should not be wiped or sprayed on since it requires intimate contact of the cleaning solution with the residues to be effective.

## **Use as a Quench**

The quench method involves placing the hot metal part into a solution of Fuze-Clean FS immediately after brazing. A chemical reaction occurs between the metal's heat and the solution, removing residues and heat scale.

As a rule of thumb, roughly 50% of the heat is dissipated within the first 15-20 seconds after the removal of the heat source, depending on the part mass. This is about the time the joint has turned from cherry red to black.

On an automatic Fusion machine, the parts can be unloaded directly into the solution after the final heat station. Ideally, the solution is held in a polyethylene or polypropylene container lined with a 316 stainless steel wire mesh basket. The heat from the metal parts will maintain the temperature between 165°-180°F. Once the basket is filled with parts it should be thoroughly water rinsed. Advantages of the quench method are:

- Minimal part handling; brazing and cleaning are handled in one step
- More complete and faster chemical action due to the higher temperature
- Energy efficiency since brazing heat is used.

## **Use in a Heated Bath**

When quenching is impractical due to large parts or multiple joints, you may be advised to immerse the cooled parts into a heated solution of Fuze-Clean FS. The solution concentration is also 10 ounces to the gallon at 165°-180°F. Immersion time varies between 1-3 minutes or more depending on the degree of flux residue and heat scale. Again, a through water rinse is necessary.

## **Use in a Ultrasonic Unit**

If the size and condition of your braze joints allows, ultrasonics is a very effective means of removing flux residues and heat scale. Mixing Fuze-Clean FS in the concentration of 2-4 ounces per gallon of water at about 120°F for a few minutes, will result in a very clean part. Of course, a thorough water rinse is necessary.

## **Electric Immersion Heaters**

To heat a solution of Fuze-Clean FS, we recommend using an electric immersion heater with a ceramic sheath for optimum efficiency and longevity. Also, the unit should have a low watt density of 18-20 watts per square inch of heater surface.

This type of unit takes longer to heat the solution, but will resist corrosion on the surface at elevated temperatures. If connected to a timer, it could begin operation a few hours before work begins, permitting the temperature to reach desired levels.

## **Tanks**

The container used in a quench operation is generally (polyethylene or polypropylene) plastic. Smaller containers are recommended so there is a minimum volume to heat and the solution can be changed.

For a heated bath, the tank should be molded polyethylene or 316 stainless steel. When fabricating a tank, use 316 stainless steel welding rod to prevent pinholes from developing at the weldments.

The tank and fittings of an ultrasonic unit should be 300 or 400 grade stainless steel.

## Solution Maintenance & Disposal

For best results, the pH range of a fresh Fuze-Clean FS solution is 0.5 to 2.5. Although these pH levels are low, the solution is nontoxic and non-corrosive. As the solution is used, the pH rises due to chemical activity and contamination from the flux and heat scale.

Periodic additions of Fuze-Clean FS powder will maintain the solution at optimum strength. Changing the quench daily is recommended.

In a heated tank, the amount and frequency of additions depends on the parts volume, solution volume and condition of the brazed parts.

While a spent solution of Fuze-Clean FS may still have a pH level on the acid side, it eventually becomes too dirty to be effective. To dispose of the solution, it must be neutralized to a pH of about 7 with alkaline materials (i.e. soda ash, sodium bicarbonate, etc.) It can then be disposed to the sewer if local, state and federal regulations permit.

## Other Available Products...

- **Solution Indicator Reagent** – Changes colors at different pH levels to indicate solution strength.
- **Rust Inhibitors** – Neutralize metal surfaces with a coating to resist oxidation and corrosion.
- **Flux Detection Kit** – Tests cleanliness of joint area before and after the flux removal procedure.

## Summary

- **Fuze-Clean AB:** Powder, cleaner for oil, grease, soils aluminum, brass, pre-cleaner, 8 oz/gal., 150-180°F time depending on the contaminate.
- **Fuze-Clean FS:** Powder, de-fluxer, heat scale, light rust on ferrous and non-ferrous materials, 10 oz/gal, 165°-180°F.
- **Fuze-Clean S:** Liquid, flux residue cleaner ferrous and non-ferrous cold cleaning room temperature helps prevent copper re-oxidation.

## Safety Equipment

Face shield, rubber gloves, apron, shoe spats.

## Clean Up

Adding sodium carbonate (baking soda) 10 oz per gallon or to a pH of 7 to a Fuze-Clean product will neutralize this acidity. Before sending to drain, consult local, city, county and federal waste water regulations for your area.

For additional information contact Fusion Incorporated:



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