

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1999
 DateRun: 11/05/1999
 Experimenters: Jason Marshall
 ClientType: Bellows Mfr
 ProjectNumber: Project #1
 Substrates: Brass
 PartType: Part
 Contaminants: Fluxes, Resins/Rosins
 Cleaning Methods: Ultrasonics
 Analytical Methods: Visual

Purpose: To evaluate cleaning of supplied parts using previously successful cleaning products.

Experimental Procedure: Four products were selected based on the previous testing performed for the client. All products were heated to 130 F on a hot plate. Table 1 lists the products evaluated and the corresponding concentrations.

The cleaning solution/beaker was placed in a Crest 40 kHz ultrasonic tank model 4Ht 1014-6 filled with water heated to 130 F and degassed for five minutes. Two parts were placed into the suspended beaker and cleaned for five minutes. Rinsing used DI water at 130 F for 30 seconds. Drying took place in an oven at 240 F for 15 minutes. Parts were analyzed for appearance after cooling to room temperature.

SUBSTRATE MATERIAL: Brass parts-bellows
 CONTAMINANTS: Kester Solder 1544 Rosin Flux-(Ethanol CAS#64-17-5;2-Butanol CAS#78-92-2*;Modified Rosin CAS#8050-09-7)

Results: All four solutions were effective in removing bulk amounts of the flux. The surface of the bellows appeared to be brighter and free of contaminants. Table 2 lists the rankings of which cleaner made the parts look the best.

Table 2. Appearance After Cleaning

| Cleaner | Armakleen E 2002 | Bio-T 300 B | Inproclean 4000 T | Safety Wash CRC |
|----------------------|------------------|-------------|-------------------|-----------------|
| Ranking (1 Cleanest) | 3 | 2 | 4 | 1 |

All four cleaning solutions had liquid remaining inside the parts after the 15 minutes of drying. Bio-T 300 B had the least amount of solution based on tapping the parts on counter and observing the release of liquid.

Summary:

| | | | | | | |
|-------------------------|-----------------------|-------------------|--------|-------------|-------------------------------------|---------------|
| Substrates: | Brass | | | | | |
| Contaminants: | Fluxes, Resins/Rosins | | | | | |
| Company Name: | | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Church & Dwight Co Inc. | | Armakleen E 2002 | 5 | 3.00 | <input type="checkbox"/> | Rank |
| Bio Chem Systems | | Bio T 300 B | 100 | 2.00 | <input checked="" type="checkbox"/> | Rank |
| Oakite Products | | Inproclean 4000 T | 5 | 4.00 | <input type="checkbox"/> | Rank |
| Emkay Chemical Company | | Safety Wash CRC | 10 | 1.00 | <input checked="" type="checkbox"/> | Rank |

Conclusion: During the next test, Armakleen and Inproclean will be used at 10%, while the other two will be used at the present strength. Drying will be performed using a vacuum oven in an effort to eliminate the moisture. The use of a centrifuge may also help with drying the inside of the parts