

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1999
 DateRun: 11/03/1999
 Experimenters: Jason Marshall
 ClientType: Bellows Mfr
 ProjectNumber: Project #1
 Substrates: Brass
 PartType: Coupon
 Contaminants: Fluxes, Resins/Rosins
 Cleaning Methods: Ultrasonics
 Analytical Methods: Gravimetric

Purpose: To further evaluate cleaners using ultrasonic energy in conjunction with effective cleaners.

Experimental Procedure: Four products were selected based on the previous testing performed for the client. All four cleaners were diluted to 5% using DI water in 400 ml glass beakers. Two were also made into a 10 and 100% solution. All products were heated to 130 F on a hot plate. Table 1 lists the products evaluated and the corresponding concentrations.

Eighteen preweighed coupons were coated with the flux and heated to 100 F for one hour in an oven. After cooling to room temperature, a second weighing was performed to determine the amount of contamination present on each coupon. The cleaning solution 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. Three coupons were placed into the suspended beaker and cleaned for five minutes. Coupons were rinsed in DI water at 130 F for 30 seconds and dried using a Master Appliance Corp, Hot-air gun model HG-301A at 500 F for 30 seconds. Once the coupons returned to room temperature, final clean weights were recorded and cleaning efficiencies were calculated.

SUBSTRATE MATERIAL: Brass Coupons 260

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

CONTAMINATING PROCESS USED: Coupons coated using hand-held swab and then dried in an oven at 100 F for one hour.

Results: The use of ultrasonic energy greatly increased the efficiencies of all the solutions tested. Only one solution, Bio-T at 5% dilution had an efficiency lower than 95%. Table 2 lists the results for each cleaner and concentration.

Table 2. Cleaning Effectiveness

| | Armakleen | Safety Wash 5 | SW 10 | Bio-T 5 | Bio-T 100 | Inproclean |
|----------|-----------|---------------|--------|---------|-----------|------------|
| Coupon 1 | 100.06 | 97.58 | 99.85 | 71.97 | 100.09 | 100.27 |
| Coupon 2 | 100.00 | 91.38 | 100.00 | 44.69 | 100.00 | 95.61 |
| Coupon 3 | 99.76 | 96.47 | 99.61 | 18.37 | 100.22 | 99.78 |
| Average | 99.94 | 95.14 | 99.82 | 45.01 | 100.10 | 98.55 |

Summary:

| Substrates: | | Brass | | | | |
|-------------------------|-------------------|-----------------------|-------------|-------------------------------------|---------------|--|
| Contaminants: | | Fluxes, Resins/Rosins | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: | |
| Church & Dwight Co Inc. | Armakleen E 2002 | 5 | 99.94 | <input checked="" type="checkbox"/> | | |
| Emkay Chemical Company | Safety Wash CRC | 5 | 95.14 | <input checked="" type="checkbox"/> | | |
| Emkay Chemical Company | Safety Wash CRC | 10 | 99.82 | <input checked="" type="checkbox"/> | | |
| Bio Chem Systems | Bio T 300 B | 5 | 45.01 | <input type="checkbox"/> | | |
| Bio Chem Systems | Bio T 300 B | 100 | 100.10 | <input checked="" type="checkbox"/> | | |
| Oakite Products | Inproclean 4000 T | 5 | 98.55 | <input checked="" type="checkbox"/> | | |

Conclusion: All of the products tested were very effective in removing nearly all of the flux from the coupons. The increased concentrations for Safety Wash CRC and Bio-T 300 B proved to be as effective as the Armakleen and Inproclean 4000 T at 5%. These four solutions will be used to clean the supplied client parts.