

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2002

DateRun: 08/07/2002

Experimenters: Jason Marshall

ClientType: Electronics Manufacturer

ProjectNumber: Project #2

Substrates: Aluminum

PartType: Coupon

Contaminants: Fluxes, Resins/Rosins, Solder

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate possible replacement cleaners for NPB in solder cleaning from electronics

Experimental Procedure: Eight products were selected from the laboratories database based on client information and past successful testing. The solutions were used at 68 F. The four semi-aqueous products were used at full strength and the aqueous based products were diluted to 10% in 600 ml beakers using DI water. Twenty-four preweighed coupons were coated with Alpha Metals 615 Flux (67-63-0, 8052-41-3, 8050-09-7) using a handheld swab and allowed to dry. Coupons were then reweighed. Three coupons were cleaned in each solution for 5 minutes using stir-bar agitation, then rinsed in tap water at 68 F for 15 seconds followed by an air knife drying for 30 seconds. Once dry, final weights were recorded and efficiencies were calculated.

Results: Five of the eight cleaners removed over 90% of the flux from the aluminum coupons using stir-bar agitation. Two removed between 85-90% and only Ozzy Juice SW 3 had difficulty removing the flux. Table 1 below lists the calculated efficiencies for each coupon cleaned.

Table 1. Calculated Efficiencies

| Cleaner | Initial wt of cont. | Final wt of cont. | %Cont Removed |
|------------------|---------------------|-------------------|---------------|
| Bio T Max | 0.0264 | 0.0017 | 93.56 |
| | 0.0613 | 0.0010 | 98.37 |
| | 0.0794 | 0.0008 | 98.99 |
| DBE 3 | 0.0983 | 0.0048 | 95.12 |
| | 0.1131 | 0.0124 | 89.04 |
| | 0.1167 | 0.0190 | 83.72 |
| DS 108 | 0.0706 | -0.0002 | 100.28 |
| | 0.1416 | 0.0011 | 99.22 |
| | 0.1045 | -0.0006 | 100.57 |
| Ionox HC 2 | 0.1485 | 0.0067 | 95.49 |
| | 0.0848 | 0.0022 | 97.41 |
| | 0.1057 | 0.0009 | 99.15 |
| Ozzy Juice SW3 | 0.1283 | 0.1186 | 7.56 |
| | 0.0837 | 0.0774 | 7.53 |
| | 0.1571 | 0.1527 | 2.80 |
| Armakleen E 2002 | 0.1277 | 0.0368 | 71.18 |
| | 0.1163 | 0.0142 | 87.79 |
| | 0.0778 | 0.0057 | 92.67 |
| SWR One | 0.1108 | -0.0004 | 100.36 |
| | 0.1123 | -0.0005 | 100.45 |
| | 0.0846 | -0.0008 | 100.95 |
| Beyond 2005 | 0.0911 | -0.0001 | 100.11 |
| | 0.1300 | 0.0004 | 99.69 |
| | 0.1038 | -0.0008 | 100.77 |

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| Summary: | Substrates: | Aluminum |
| | Contaminants: | Fluxes, Resins/Rosins, Solder |

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| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
|-------------------------|-------------------------------------|--------|-------------|-------------------------------------|---------------|
| Today & Beyond | Beyond 2005 | 10 | 100.19 | <input checked="" type="checkbox"/> | |
| Dysol | DS 108 Wipe Solvent | 100 | 100.03 | <input checked="" type="checkbox"/> | |
| Bio Chem Systems | Bio T Max | 100 | 96.97 | <input checked="" type="checkbox"/> | |
| Church & Dwight Co Inc. | Armakleen E 2002 | 10 | 83.88 | <input type="checkbox"/> | |
| SWR Corporation | SWR One | 10 | 100.58 | <input checked="" type="checkbox"/> | |
| Chem Free Corporation | SW-3 Ozzy Juice (Improved Low Odor) | 10 | 5.96 | <input type="checkbox"/> | |
| Kyzen Corporation | Ionox HC 2 | 100 | 97.35 | <input checked="" type="checkbox"/> | |
| Invista S.a.r.l | Flexisolv DBE 3 ester | 100 | 89.29 | <input type="checkbox"/> | |

Conclusion:

The top five cleaners will be used in the next trial using ultrasonic energy. Cleaning times will decrease to 2 minutes. All other parameters will be kept the same.