

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004
 DateRun: 03/08/2004
 Experimenters: Jason Marshall
 ClientType: Manufacturer of Ceramic Capacitors
 ProjectNumber: Project #1
 Substrates: Ceramics
 PartType: Coupon
 Contaminants: Inks
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric
 Purpose: To evaluate past cleaners on last supplied contaminant

Experimental Procedure: Seven cleaners were selected from the laboratories database of past testing based on supplied data from client. Four aqueous based cleaners were diluted to 10% using DI water in 250 ml beakers. Three semi-aqueous products were used at full strength also in 250 ml beakers. An eighth product was added as the client's current cleaner and diluted to 10%. All eight products were heated to 130 F on a hot plate. Twenty-four preweighed ceramic coupons were coated with client supplied dye, Magnaflux Zyglo Penetrant ZL-60D (8042-47-5, 69227-21-0, 68131-40-8, 37311-02-7, 37251-67-5, 52232-09-4, 111-05-7, 75-28-5). The dye was applied directly to the coupon surface using a swab and then weighed a second time. Three coupons were cleaned in each solution for 5 minutes using stir-bar agitation. Coupons were rinsed in tap water for 15 seconds at 120 F, followed by air blow off at room temperature for 30 seconds. Once dry, coupons were weighed a final time and efficiencies for each cleaner were calculated.

Results: Seven of the eight products removed over 92% of this contaminant using immersion cleaning for five minutes. The other product removed just under 80%. The table below lists the amount of contaminant added, the amount remaining after cleaning and the efficiencies for each coupon cleaned.

| Cleaner | Initial wt | Final wt | % Removed |
|------------------|------------|----------|-----------|
| Liquinox | 0.0835 | 0.0031 | 96.29 |
| | 0.0354 | 0.0010 | 97.18 |
| | 0.0343 | 0.0007 | 97.96 |
| SC Aircraft | 0.0620 | 0.0006 | 99.03 |
| | 0.0334 | 0.0004 | 98.80 |
| | 0.0655 | 0.0018 | 97.25 |
| Micro 90 | 0.0579 | 0.0043 | 92.57 |
| | 0.0547 | 0.0006 | 98.90 |
| | 0.0649 | 0.0090 | 86.13 |
| Aquavantage 1400 | 0.0574 | 0.0018 | 96.86 |
| | 0.0469 | 0.0023 | 95.10 |
| | 0.0880 | 0.0082 | 90.68 |
| E3HB | 0.0692 | -0.0001 | 100.14 |
| | 0.0635 | 0.0004 | 99.37 |
| | 0.0688 | 0.0001 | 99.85 |
| Aeromaster | 0.0404 | 0.0067 | 83.42 |
| | 0.0464 | 0.0063 | 86.42 |
| | 0.0474 | 0.0149 | 68.57 |
| Ink Zapper | 0.0972 | 0.0006 | 99.38 |
| | 0.0588 | 0.0006 | 98.98 |
| | 0.0871 | 0.0005 | 99.43 |
| DBE 6 | 0.0587 | 0.0009 | 98.47 |
| | 0.0508 | 0.0011 | 97.83 |
| | 0.0864 | 0.0008 | 99.07 |

Summary:

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|----------------------|----------------------|---------------|--------------------|-------------------|----------------------|
| Substrates: | Ceramics | | | | |
| Contaminants: | Inks | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |

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|------------------------------------|---|-----|-------|-------------------------------------|--|
| Alconox Inc | Liquinox | 10 | 97.14 | <input checked="" type="checkbox"/> | |
| Gemtek Products | SC Aircraft & Metal Cleaner Super Concentrate | 10 | 98.36 | <input checked="" type="checkbox"/> | |
| International Products Corporation | Micro 90 Conc. | 10 | 92.54 | <input checked="" type="checkbox"/> | |
| Brulin Corporation | Aquavantage 1400 | 10 | 94.21 | <input checked="" type="checkbox"/> | |
| Metabolix Inc | Metabolix E3HB | 100 | 99.79 | <input checked="" type="checkbox"/> | |
| Buckeye International | Aeromaster | 10 | 79.47 | <input type="checkbox"/> | |
| Vertec BioSolvents | Ink Zapper | 100 | 99.26 | <input checked="" type="checkbox"/> | |
| Invista S.a.r.l | Flexisolv DBE 6 ester | 100 | 98.46 | <input checked="" type="checkbox"/> | |

Conclusion:

Since seven of the eight products removed over 92% of the contaminant using immersion cleaning only, ultrasonic testing will not be performed. Piloting of cleaning products on actual parts should be conducted in order to verify results found in the laboratory setting.