

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2008
 DateRun: 03/13/2008
 Experimenters: Heidi Wilcox, Shweta Bansal
 ClientType: Electronics Manufacturer
 ProjectNumber: Project #1
 Substrates: Copper
 PartType: Coupon
 Contaminants: Cutting/Tapping Fluids
 Cleaning Methods: Mechanical Agitation
 Analytical Methods: Gravimetric
 Purpose: To evaluate products on second supplied cutting fluid

Experimental Procedure: Two new product samples of solvents were tested at room temperature for possible use as a substitute for the client's current process. Six preweighed coupons were coated with Master Chemical Corporation Trim Sol SF (8002-05-9, 61789-85-3, 68410-99-1, 68991-48-0, 68603-15-6) cutting fluid using a handheld swab. The contaminated coupons were weighed a second time to determine the amount of soil added. Three coupons were immersed into each cleaning solution and manual raised and lowered in the cleaning solution to provide mechanical agitation. After one minute of cleaning, the coupons were removed and dried for 30 seconds using compressed air at room temperature. Following air drying, the coupons were weighed a final time to determine the amount of soil remaining. Efficiency for each coupon was determined and average cleaning results for each product were calculated.

Results: Metalnox M 6381 removed over 99% of the cutting fluid within one minute. M 6310 removed approximately 85% of the cutting fluid within one minute. The table below lists the amount of oil added, the amount remaining and the efficiency for each coupon cleaned.

| Cleaner | Initial wt | Final wt | % Removed |
|----------------|------------|----------|-----------|
| Metalnox M6381 | 0.1912 | 0.0005 | 99.74 |
| | 0.1364 | 0.0000 | 100.00 |
| | 0.2414 | 0.0004 | 99.83 |
| Metalnox M6310 | 0.1141 | 0.0000 | 100.00 |
| | 0.1323 | 0.0200 | 84.88 |
| | 0.0976 | 0.0299 | 69.36 |

Summary:

| Substrates: | | Copper | | | | |
|----------------------|--------------------------------------|------------------------|-------------|-------------------------------------|---------------|--|
| Contaminants: | | Cutting/Tapping Fluids | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: | |
| Kyzen Corporation | Metalnox M6381 (For Comparison Only) | 100 | 99.86 | <input checked="" type="checkbox"/> | | |
| Kyzen Corporation | Metalnox M6310 (For Comparison Only) | 100 | 84.75 | <input checked="" type="checkbox"/> | | |

Conclusion: Both products may be used on supplied parts and then brought to the client for evaluation of the cleaning process.