

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004
 DateRun: 04/20/2004
 Experimenters: Jason Marshall, Parvathy Vijayan Babu
 ClientType: Capacitor Manufacturer
 ProjectNumber: Project #1
 Substrates: Aluminum
 PartType: Coupon
 Contaminants: Oil
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric
 Purpose: To evaluate products on fourth supplied soil.

Experimental Procedure: Six products were selected based on client request for vapor degreasing solvents. Each product was used at full strength in a 250 ml beaker and heated to 96 F on a hot plate. Eighteen preweighed aluminum coupons were coated with the C.P. Hall Co. Plasthall ESO oil (8013-07-8) using a hand held swab. Coupons were weighed a second time to determine the amount of soil added to each coupon. Three coupons were cleaned in each solution for 5 minutes using stir-bar agitation. After cleaning parts were allowed to sit for 10 minutes for drying at room temperature. The coupons were weighed a final time and efficiencies were calculated.

Results: Five minutes of cleaning did not appear to provide enough cleaning time for this oil. Three products removed over 80% but less than 85% of the soil in five minutes. Two products (HFE 7100 & 7200) removed under 60%. The table shows the amount of soil added, the amount remaining and the efficiency for each coupon cleaned.

| Cleaner | Initial wt | Final wt | % Removed |
|-------------|------------|----------|-----------|
| HFE 7100 | 0.0913 | 0.0638 | 30.12 |
| | 0.2101 | 0.0712 | 66.11 |
| | 0.1712 | 0.0689 | 59.75 |
| HFE 7200 | 0.2600 | 0.0776 | 70.15 |
| | 0.2033 | 0.1045 | 48.60 |
| | 0.1624 | 0.0690 | 57.51 |
| HFE 71DE | 0.2856 | 0.0366 | 87.18 |
| | 0.1735 | 0.0442 | 74.52 |
| | 0.2198 | 0.0440 | 79.98 |
| AK 225 | 0.1733 | 0.0431 | 75.13 |
| | 0.2422 | 0.0176 | 92.73 |
| | 0.1711 | 0.0255 | 85.10 |
| Vertrel CCA | 0.2271 | 0.0516 | 77.28 |
| | 0.3007 | 0.0356 | 88.16 |
| | 0.2999 | 0.0318 | 89.40 |
| Vertrel MCA | 0.2571 | 0.0629 | 75.53 |
| | 0.2051 | 0.0472 | 76.99 |
| | 0.1928 | 0.0526 | 72.72 |

Summary:

| Substrates: | | Aluminum | | | |
|----------------------|---------------|----------|-------------|-------------------------------------|---------------|
| Contaminants: | | Oil | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| 3M | HFE 7100 | 100 | 52.00 | <input type="checkbox"/> | |
| 3M | HFE 7200 | 100 | 58.75 | <input type="checkbox"/> | |
| 3M | HFE 71DE | 100 | 80.56 | <input checked="" type="checkbox"/> | |
| AGA Chemical | AK 225 | 100 | 84.32 | <input checked="" type="checkbox"/> | |
| DuPont | Vertrel CCA | 100 | 84.95 | <input checked="" type="checkbox"/> | |
| DuPont | Vertrel MCA | 100 | 75.08 | <input type="checkbox"/> | |

Conclusion: Follow up tests will be conducted for all four contaminants using longer times. An attempt will be made to clean using vapor degreasing.

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