

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004

DateRun: 05/06/2004

Experimenters: Jason Marshall

ClientType: Tool Manufacturer

ProjectNumber: Project #1

Substrates: Steel

PartType: Coupon

Contaminants: Oil

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate successful products on second supplied contaminant

Experimental Procedure: Nine cleaners were selected based on client request for vapor degreasing solvents. All products were used heated to 96 F on a hot plate in 250 ml beakers. The process utilized no water rinse and only used ambient air to dry the parts. Twenty-seven preweighed steel coupons were coated with Rochester Midland RI780 rust preventative (80252-41-3, 95-63-6) using a hand held swab. The oil was then heated with a Master Appliance Heat gun at 300 F for 10 minutes. After cooling to room temperature, a second weighing was performed to determine the amount of soil that was added. Three coupons were cleaned in each solution for 5 minutes with minimal stir-bar agitation. After drying, coupons were weighed a final time to determine the cleaning efficiency of each product.

Results: All nine products removed over 90% of the soil during the five minutes. Four of the products removed over 97%. The table lists the amount of soil added, the amount remaining and the efficiency for each coupon.

| Cleaner | Initial wt | Final wt | % Removed |
|----------------|------------|----------|-----------|
| Ak 225 | 0.0378 | 0.0014 | 96.30 |
| | 0.0284 | 0.0021 | 92.61 |
| | 0.0531 | 0.0017 | 96.80 |
| Vertrel CCA | 0.0303 | 0.0005 | 98.35 |
| | 0.0273 | 0.0015 | 94.51 |
| | 0.0647 | 0.0016 | 97.53 |
| Flux Remover C | 0.0241 | 0.0023 | 90.46 |
| | 0.0728 | 0.0007 | 99.04 |
| | 0.0824 | 0.0019 | 97.69 |
| HFE 7200 | 0.0411 | 0.0012 | 97.08 |
| | 0.0753 | 0.0003 | 99.60 |
| | 0.0731 | 0.0005 | 99.32 |
| Ensolv | 0.0300 | 0.0032 | 89.33 |
| | 0.0566 | 0.0000 | 100.00 |
| | 0.0459 | 0.0022 | 95.21 |
| Ensolv A | 0.0387 | 0.0016 | 95.87 |
| | 0.0652 | 0.0014 | 97.85 |
| | 0.0465 | 0.0011 | 97.63 |
| Metalnox M6960 | 0.0261 | 0.0025 | 90.42 |
| | 0.0413 | 0.0044 | 89.35 |
| | 0.0352 | 0.0016 | 95.45 |
| Solvon PB | 0.0341 | 0.0018 | 94.72 |
| | 0.0497 | 0.0001 | 99.80 |
| | 0.0282 | 0.0003 | 98.94 |
| Solvon IP | 0.0425 | 0.0012 | 97.18 |
| | 0.0210 | 0.0006 | 97.14 |
| | 0.0272 | 0.0009 | 96.69 |

Summary:

| | | | | | |
|----------------------|----------------------|---------------|--------------------|-------------------|----------------------|
| Substrates: | Steel | | | | |
| Contaminants: | Oil | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |

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|-------------------------------|---------------------|-----|-------|-------------------------------------|--|
| AGA Chemical | AK 225 | 100 | 95.23 | <input checked="" type="checkbox"/> | |
| DuPont | Vertrel CCA | 100 | 96.79 | <input checked="" type="checkbox"/> | |
| Micro Care | Flux Remover C | 100 | 95.73 | <input checked="" type="checkbox"/> | |
| 3M | HFE 7200 | 100 | 98.67 | <input checked="" type="checkbox"/> | |
| Enviro Tech International Inc | Ensolv | 100 | 94.85 | <input checked="" type="checkbox"/> | |
| Enviro Tech International Inc | Ensolv A | 100 | 97.12 | <input checked="" type="checkbox"/> | |
| Kyzen Corporation | Metalnox M6960 | 100 | 91.74 | <input checked="" type="checkbox"/> | |
| Poly Systems USA Inc | Solvon Kreussler PB | 100 | 97.82 | <input checked="" type="checkbox"/> | |
| Poly Systems USA Inc | Solvon Kreussler IP | 100 | 97.00 | <input checked="" type="checkbox"/> | |

Conclusion: All nine products will be tested on the third soil under the same conditions.