

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2020

DateRun: 10/15/2020

Experimenters: Nicole Kebler

ClientType: Bolt, Screw & Nut Manufacturer

ProjectNumber: Project #1

Substrates: Aluminum

PartType: Coupon

Contaminants: Greases

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate the effectiveness of cleaners/solvents for the removal of grease on aluminum substrate for 24-hour unheated immersion.

Experimental Procedure: Four of eight cleaning products were diluted with tap water at room temperature to vendor recommended concentration. Three cleaning products were used at the recommended 100% dilution and the solvent option was also used at 100% for industrial testing; all cleaners and solutions were measured for 200 mL. Pre-weighed aluminum coupons were coated over 1/3 of the surface with grease that has been provided by the company by using a metal spatula; three coupons were used for each cleaner/solvent. They were allowed a 24-hour dry time at room temperature; their dirty weights were recorded. The coupons were immersed in the cleaners/solvents at room temperature for 24-hours then were taken out and placed on trays with paper towels; they were left to dry for 24 hours. Final weights and observations were recorded and evaluated.

Cleaners/Solvents used:

1. Liquinox (1%)
2. Dimethyl Glutarate (100%)
3. Mirachem (20%)
4. Metalnox (100%)
5. Micro 90 (1%)
6. Smart Solve (100%)
7. SC-Aircraft (5%)
8. Ozzy Juice 3 (100%)

Results: Removal was seen for Dimethyl Glutarate, Metalnox, Smart Solve, SC-Aircraft and Ozzy Juice. Metalnox was over 50% removal but grease that was left on the coupon hardened and was difficult to remove. Smart Solve was also over 50% removal. The coupon deteriorates when left in Micro 90 at 1% for 24 hours; coupons were destroyed and the percentage removal shows weight lost.

| Solvent/ Cleaner | initial weight of soil | final weight of soil | % Removal | Average |
|-------------------------------|------------------------------|----------------------------|--------------|---------|
| Liquinox 1% | 0.5234 | 0.5009 | 4.30 | 4.31 |
| | 0.6426 | 0.6129 | 4.62 | |
| | 0.6719 | 0.6450 | 4.00 | |
| Dimethyl Glutarate 100% | 0.4548 | 0.3306 | 27.31 | 29.99 |
| | 0.8017 | 0.4582 | 42.85 | |
| | 0.5917 | 0.4745 | 19.81 | |
| Mirachem 20% | 0.8699 | 0.8670 | 0.33 | 2.19 |
| | 0.9730 | 0.9407 | 3.32 | |
| | 0.6113 | 0.5934 | 2.93 | |
| Metalnox 100% | 0.5268 | 0.1306 | 75.21 | 60.16 |
| | 1.1302 | 0.6341 | 43.90 | |
| | 0.6818 | 0.2633 | 61.38 | |
| Micro 90 1% | 0.6699 | 0.6509 | 2.84 | -51.54 |
| | 0.7701 | 0.7222 | 6.22 | |
| | 0.5944 | 1.5673 | -163.68 | |
| Smart Solve 100% | 1.1647 | 0.9291 | 20.23 | 56.05 |
| | 0.6869 | 0.0059 | 99.14 | |
| | 0.8449 | 0.4328 | 48.78 | |
| SC-Aircraft 5% | 1.5931 | 0.5808 | 63.54 | 21.03 |

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|------------|--------|--------|-------|-------|
| | 0.7455 | 0.7493 | -0.51 | |
| | 0.7039 | 0.7036 | 0.04 | |
| Ozzy Juice | 0.7000 | 0.3617 | 48.33 | 46.71 |
| 3 100% | 0.8333 | 0.5392 | 35.29 | |
| | 0.9857 | 0.4288 | 56.50 | |

Summary:

| | | | | | |
|------------------------------------|-----------------------------------------------|---------------|--------------------|--------------------------|----------------------|
| Substrates: | | Aluminum | | | |
| Contaminants: | | Greases | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Alconox Inc | Liquinox | 1 | 4.31 | <input type="checkbox"/> | |
| Fisher Scientific | Dimethyl glutarate (CAS: 1119-40-0) | 100 | 29.99 | <input type="checkbox"/> | |
| Mirachem Corporation | Mirachem 500 | 20 | 2.19 | <input type="checkbox"/> | |
| Kyzen Corporation | Metalnox M6960 | 100 | 60.16 | <input type="checkbox"/> | |
| International Products Corporation | Micro 90 Conc. | 1 | -51.51 | <input type="checkbox"/> | |
| Gemtek Products | SC Aircraft & Metal Cleaner Super Concentrate | 5 | 21.03 | <input type="checkbox"/> | |
| Chem Free Corporation | SW-3 Ozzy Juice (Improved Low Odor) | 100 | 46.71 | <input type="checkbox"/> | |

Conclusion:

There was some removal of grease from the coupons, but it was not over 80% effective, additional testing is required. Next steps are to add agitation via stir-bar for 15 minutes, 30 minutes, and 1-hour intervals. Metalnox will be taken out of evaluation because of the hardening of grease when coupons were left in for 24 hours. Super Solve will take its place and will be evaluated at 50% concentration. Micro 90 1% will not be evaluated for times lasting over 1 hour due to its reaction with aluminum seen at 24 hours.