# CLEANING LABORATORY EVALUATION SUMMARY

| | |
|---|---|
| SCL #: | 2023 |
| DateRun: | 04/19/2023 |
| Experimenters: | Amelia Wagner |
| ClientType: | Lab |
| ProjectNumber: | Project #8 |
| Substrates: | Stainless Steel |
| PartType: | Coupon |
| Contaminants: | Greases, Lubricating/Lapping Oils, Oil |
| Cleaning Methods: | Immersion/Soak |
| Analytical Methods: | Gravimetric |
| Purpose: | To evaluate the effectiveness of SB-33 (a D limonene and Dimethyl Glutarate mixture) and SB-10 (a t-butyl acetate and Benzyl benzoate mixture) in removing several production oils and greases from stainless steel coupons as a potential replacement for TCE unheated immersion cleaning method. |
| Experimental Procedure: | Three stainless steel coupons were used for each of the five soils being tested for a total of 15 coupons. The initial weights of each coupon were recorded. The bottom third of every coupon was soiled by applying the corresponding soil with a swab. The dirty weights of each coupon were then recorded. The coupons were then subjected unheated immersion in SB-33 and SB-10 with the stir bar at 200rpm for 15 mins. After the coupons were cleaned, they dried with a heat gun for about 2 minutes each. The next morning, the clean weights of each coupon were taken |

| Soil | Use | CAS |
|---|---|---|
| Milform OAK 7a International | Stamping and drawing fluid | 64742-53-6 / 68909-65-9 |
| Milform Oak 529 | Evaporative lubricant | 68551-17-7 / 123-95-5 / 127087-87-0 |
| Milform Oak 15a | Metalworking oil | 64742-44-5 / 64742-52-5 / 64742-55-8 |
| Milform Oak 15c | Metalworking oil | 64742-52-5 / 64742-53-6 |
| M4 | | |

Results:

| Cleaner | Soil | Initial wt of cont. | Final wt of cont. | %Cont Removed | % AVG | % Overall |
|---|---|---|---|---|---|---|
| SB-33 | Oak 7a international | 0.0716 | 0.0041 | 94.27 | 86.83 | 83.01 |
| | | 0.0736 | 0.0049 | 93.34 | | |
| | | 0.1441 | 0.0391 | 72.87 | | |
| | M4 | 0.5475 | 0.0036 | 99.34 | 99.15 | |
| | | 0.4997 | 0.0000 | 100.00 | | |
| | | 0.4923 | 0.0093 | 98.11 | | |
| | Oak 15c | 0.0693 | 0.0248 | 64.21 | 86.85 | |
| | | 0.1046 | 0.0027 | 97.42 | | |
| | | 0.1296 | 0.0014 | 98.92 | | |
| | Oak 15a | 0.2135 | 0.0038 | 98.22 | 97.85 | |
| | | 0.1782 | 0.0057 | 96.80 | | |
| | | 0.1484 | 0.0022 | 98.52 | | |
| | Oak 529 | 0.0047 | 0.0027 | 42.55 | 44.38 | |
| | | 0.0213 | 0.0128 | 39.91 | | |
| | | 0.0144 | 0.0071 | 50.69 | | |
| SB-10 | Oak 7a international | 0.1011 | 0.0961 | 4.95 | 9.41 | 34.83 |
| | | 0.1007 | 0.0981 | 2.58 | | |
| | | 0.1044 | 0.0828 | 20.69 | | |
| | M4 | 0.4988 | 0.1493 | 70.07 | 79.38 | |
| | | 0.6742 | 0.1689 | 74.95 | | |
| | | 0.4094 | 0.0281 | 93.14 | | |
| | Oak 15c | 0.0991 | 0.0974 | 1.72 | 22.60 | |

# CLEANING LABORATORY EVALUATION SUMMARY

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 0.1588 | 0.1070 | 32.62 | | |
| | | 0.1446 | 0.0962 | 33.47 | | |
| | Oak 15a | 0.1992 | 0.0927 | 53.46 | 43.72 | |
| | | 0.1788 | 0.1127 | 36.97 | | |
| | | 0.1505 | 0.0892 | 40.73 | | |
| | Oak 529 | 0.0287 | 0.0187 | 34.84 | 19.05 | |
| | | 0.0314 | 0.0258 | 17.83 | | |
| | | 0.0269 | 0.0257 | 4.46 | | |

Summary:

| **Substrates:** | Stainless Steel |
|---|---|
| **Contaminants:** | Greases, Lubricating/Lapping Oils, Oil |

| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
|---|---|---|---|---|---|
| TURI Cleaning lab | SB-33 | 100% | 87.00 | ☑ | on soil Oak 7A |
| TURI Cleaning lab | SB-33 | 100% | 99.00 | ☑ | on soil M4 |
| TURI Cleaning lab | SB-33 | 100 | 87.00 | ☑ | on soil Oak 15 C |
| TURI Cleaning lab | SB-33 | 100 | 98.00 | ☑ | on soil Oak 15 A |
| TURI Cleaning lab | SB-33 | 100 | 44.00 | ☐ | on soil Oak 529 |
| TURI Cleaning lab | SB-10 | 100 | 9.00 | ☐ | on soil Oak 7A |
| TURI Cleaning lab | SB-10 | 100 | 79.00 | ☐ | on soil M4 |
| TURI Cleaning lab | SB-10 | 100 | 23.00 | ☐ | on soil Oak 15 C |
| TURI Cleaning lab | SB-10 | 100 | 44.00 | ☐ | on Oak 15 A |
| TURI Cleaning lab | SB-10 | 100 | 19.00 | ☐ | on soil Oak 529 |

Conclusion:

SB-33 is an effective alternative to TCE in removing all of the soils except for Oak 529 using unheated immersion. SB-10 is not an effective cleaner in removing any of the soils, except for M4, using unheated immersion.