

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2024

DateRun: 11/06/2024

Experimenters: Tatyanna Moreland Junior, Amelia Wagner, Rachael Rososky

ClientType: Brass Instrument Manufacturer

ProjectNumber: Project #3

Substrates: Brass

PartType: Coupon

Contaminants: Buffing/Polishing Compounds, Greases, Lubricating/Lapping Oils, Oil

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To test the efficacy of several solvents and aqueous cleaners in removing three types of soils from brass coupons.

Experimental Procedure: Three brass coupons were used per each soil for each of the cleaners tested. Each coupon was weighed with a mass balance scale and had their initial weights recorded. Each coupon was then soiled with one of the three soil, Slide Gel no. 7, American Lapping compound, or Honing oil, by applying an equal amount of each soil to the bottom third of each coupon with a swab. The coupons were then weighed again and had their dirty weights recorded. Coupons were cleaned in groups of three. The coupons were subjected to 30 mins of heated immersion at 130F with a stir bar set to 300 rpm. After removing the coupons from immersion, the coupons were immediately rinsed by holding the coupons under a stream of room temperature tap water for 30 seconds. The residual water was then removed from each coupon using an air blowoff method to dry the coupons. After the coupons were dried, their final weights were recorded.

Results:

| Cleaner | Soil | Initial wt of cont. | Final wt of cont. | %Cont Removed | % AVG | % Overall |
|---|---------------------------------|---------------------------|-------------------------|------------------|--------|-----------|
| Methyl Acetate 100% | Slide Gel No.7 | 0.0872 | 0.0033 | 96.2156 | 77.39 | 21.01 |
| | | 0.0183 | 0.0022 | 87.9781 | | |
| | | 0.0371 | 0.0193 | 47.9784 | | |
| | American Lapping Compound | 0.0262 | 0.0286 | -9.1603 | -8.57 | |
| | | 0.0614 | 0.0635 | -3.4202 | | |
| | | 0.0175 | 0.0198 | -13.1429 | | |
| | Honing Oil | 0.0134 | 0.0142 | -5.9701 | -5.78 | |
| | | 0.0114 | 0.0124 | -8.7719 | | |
| | | 0.0192 | 0.0197 | -2.6042 | | |
| Dipropylene Glycol Methyl Ether 100% | Slide Gel No.7 | 0.0389 | 0.0132 | 66.0668 | 66.76 | 78.45 |
| | | 0.0762 | 0.0085 | 88.8451 | | |
| | | 0.0238 | 0.0130 | 45.3782 | | |
| | American Lapping Compound | 0.0408 | 0.0020 | 95.0980 | 85.29 | |
| | | 0.0223 | 0.0021 | 90.5830 | | |
| | | 0.0161 | 0.0048 | 70.1863 | | |
| | Honing Oil | 0.0229 | 0.0029 | 87.3362 | 83.29 | |
| | | 0.0329 | 0.0056 | 82.9787 | | |
| | | 0.0132 | 0.0027 | 79.5455 | | |
| Emerald ICP 1 5% | Slide Gel No.7 | 0.0526 | 0.0261 | 50.3802 | 52.74 | 63.69 |
| | | 0.0216 | 0.0108 | 50.0000 | | |
| | | 0.0166 | 0.0070 | 57.8313 | | |
| | American Lapping Compound | 0.0251 | 0.0193 | 23.1076 | 32.57 | |
| | | 0.0109 | 0.0058 | 46.7890 | | |
| | | 0.0241 | 0.0174 | 27.8008 | | |
| | Honing Oil | 0.0344 | -0.0014 | 104.0698 | 105.76 | |
| | | 0.0467 | 0.0000 | 100.0000 | | |
| | | 0.0159 | -0.0021 | 113.2075 | | |
| BG clean 402 10% | Slide Gel No.7 | 0.0302 | 0.0162 | 46.3576 | 73.81 | 100.45 |
| | | 0.0199 | 0.0029 | 85.4271 | | |
| | | 0.0502 | 0.0052 | 89.6414 | | |
| | American Lapping Compound | 0.0177 | 0.0052 | 70.6215 | 64.09 | |

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|---------------------|---------------------------|--------|--------|----------|--------|-------|
| | | 0.0199 | 0.0061 | 69.3467 | | |
| | | 0.0216 | 0.0103 | 52.3148 | | |
| | Honing Oil | 0.0345 | 0.0000 | 100.0000 | 163.45 | |
| | | 0.0108 | 0.0113 | 204.6296 | | |
| | | 0.0098 | 0.0084 | 185.7143 | | |
| Propylene Carbonate | Slide Gel No.7 | 0.0533 | 0.0142 | 73.3583 | 58.80 | 72.28 |
| | | 0.0575 | 0.0385 | 33.0435 | | |
| | | 0.0750 | 0.0225 | 70.0000 | | |
| | American Lapping Compound | 0.0892 | 0.0323 | 63.7892 | 57.49 | |
| | | 0.1114 | 0.0300 | 73.0700 | | |
| | | 0.0660 | 0.0425 | 35.6061 | | |
| | Honing Oil | 0.0142 | 0.0001 | 100.7042 | 100.56 | |
| | | 0.0149 | 0.0000 | 100.0000 | | |
| | | 0.0101 | 0.0001 | 100.9901 | | |

Methyl Acetate began to evaporate at 130F, as this is very close to the boiling point.

Summary:

| Substrates: | | Brass | | | |
|----------------------|---|---|-------------|--------------------------|--|
| Contaminants: | | Buffing/Polishing Compounds, Greases, Lubricating/Lapping Oils, Oil | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Alfa Aesar | Methyl Acetate | 100% | 21.01 | <input type="checkbox"/> | |
| Dow Chemical Company | Dipropylene Glycol Methyl Ester | 100% | 78.45 | <input type="checkbox"/> | American Lapping Compound 85.29% Honing Oil 83.29% |
| Hubbard Hall Inc | Emerald IC P 1 | 5% | 63.69 | <input type="checkbox"/> | Honing Oil 105.76% |
| Amiran BioChemicals | BG-Clean 402 | 10% | 100.45 | <input type="checkbox"/> | Slide Gel no. 7 73.81% American Lapping Compound 64.09% Honing Oil 163.45% ? |
| Fisher Scientific | Propylene carbonate 99.5% (CAS: 108-32-7) | 100% | 72.28 | <input type="checkbox"/> | Honing Oil 100.56% |

Conclusion:

None of the cleaners tested were effective in removing all three soils.

Propylene Carbonate was very effective in removing honing oil from brass. Emerald ICP 1 was very effective in removing honing oil from brass. Dipropylene Glycol Methyl Ether was somewhat effective in removing the american lapping compound and honing oil from brass.

The American lapping compound seems to be the most difficult soil to remove, and often ends up absorbing the cleaner increasing the final weights.