

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2006
 DateRun: 09/11/2006
 Experimenters: Jason Marshall
 ClientType: Jewelry Mfr
 ProjectNumber: Project #1
 Substrates: Brass
 PartType: Coupon
 Contaminants: Oil
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric

Purpose: To evaluate selected alternatives to TCE for removing oil from brass using immersion cleaning.

Experimental Procedure: Six alternative products were selected from the lab's database of testing results based on supplied client information. Products were selected based on oil removal potential and compatibility with brass metal substrate. Each product was diluted to 5% in 250 ml beakers using DI water and heated to 130 F on a hot plate.

Eighteen preweighed coupons were coated with the supplied oil using a handheld swab after. Coupons were weighed a second time to determine the amount of oil added. Three coupons were cleaned in each solution for five minutes using minimal stir bar agitation. Coupons were rinsed for 15 seconds in a tap water bath at 120 F and dried using a dry compressed air for 30 seconds. Once dry coupons were weighed a final time and product efficiencies were calculated.

Results: All six products selected removed over 90% of the oil within 5 minutes of immersion cleaning. One product, Sea Wash Blue removed over 99%. It was noted that this product may have tarnished the brass coupons. The following table lists the amount of buffing compound applied, the amount remaining and the efficiency for each coupon cleaned.

| Cleaner | Initial wt | Final wt | % Removed |
|----------------------|------------|----------|-----------|
| Aquavantage 1400 | 0.0721 | 0.0008 | 98.89 |
| | 0.2329 | 0.0052 | 97.77 |
| | 0.1109 | 0.0066 | 94.05 |
| Surface Cleanse 930 | 0.1750 | 0.0134 | 92.34 |
| | 0.2261 | 0.0103 | 95.44 |
| | 0.2013 | 0.0086 | 95.73 |
| SeaWash Blue | 0.1913 | 0.0021 | 98.90 |
| | 0.1011 | 0.0015 | 98.52 |
| | 0.1031 | 0.0003 | 99.71 |
| Inproclean 3800 | 0.2779 | 0.0108 | 96.11 |
| | 0.1860 | 0.0146 | 92.15 |
| | 0.2444 | 0.0168 | 93.13 |
| Polyspray Jet 790 XS | 0.1899 | 0.0128 | 93.26 |
| | 0.2839 | 0.0148 | 94.79 |
| | 0.1220 | 0.0121 | 90.08 |
| Daraclean 283 | 0.1923 | 0.0081 | 95.79 |
| | 0.1953 | 0.0070 | 96.42 |
| | 0.2723 | 0.0100 | 96.33 |

Summary:

| | | | | | |
|------------------------------------|--|---------------|--------------------|-------------------------------------|----------------------|
| Substrates: | Brass | | | | |
| Contaminants: | Oil | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Brulin Corporation | Aquavantage 1400 | 5 | 96.90 | <input checked="" type="checkbox"/> | |
| International Products Corporation | Surface Cleanse Concentrated Neutral 930 | 5 | 94.50 | <input checked="" type="checkbox"/> | |

CLEANING LABORATORY EVALUATION SUMMARY

| | | | | | |
|-------------------------|----------------------|---|-------|-------------------------------------|-----------------------------|
| Warren Chemical Company | Sea Wash Blue | 5 | 99.04 | <input checked="" type="checkbox"/> | Possibly tarnishing coupons |
| Oakite Products | Inproclean 3800 | 5 | 93.80 | <input checked="" type="checkbox"/> | |
| US Polychem Corporation | Polyspray Jet 790 XS | 5 | 92.70 | <input checked="" type="checkbox"/> | |
| Magnaflux | Daraclean 283 | 5 | 96.18 | <input checked="" type="checkbox"/> | |

Conclusion: The six products will be retested at shorter cleaning time using ultrasonic energy.