

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004

DateRun: 05/13/2004

Experimenters: Jason Marshall

ClientType: Bicycle Manufacturer

ProjectNumber: Project #1

Substrates: Titanium

PartType: Coupon

Contaminants: Fluxes

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate cleaners on fifth supplied soil

Experimental Procedure: Five cleaners were selected from the previous trial and three additional products were include based on past flux removal. The five cleaners from the previous trials were aqueous based and were diluted to 5% using DI water in 600 ml beakers and heated to 120 F on a hot plate. The Bio T Max was used at full strength heated to 120 F, the Inproclean 4000 T was used at 10% at 120 F and the Beyond 2009 was used at full strength at room temperature.

Twenty-four preweighed titanium coupons were coated with client supplied Wolverine Ultra Flux (1332-77-0, 10043-35-3, 7789-29-9, 11128-29-3, 151-21-3), using a hand held swab and then heated with a Master Appliance Heat Gun at 500 F for 10 minutes. Coupons were allowed to cool and then weighed a second time to determine the amount of soil added. Three coupons were cleaned in each solution for 5 minutes using stir-bar agitation. Coupons were rinsed in tap water for 15 seconds at 120 F, followed by air blow off at room temperature. Once dry, coupons were weighed a final time and efficiencies for each cleaner were calculated.

Results: The five aqueous based products and the diluted Inproclean 4000 T removed over 98% of the flux. The other two semi-aqueous products had little success on the flux, removing under 65%. The table lists the amount of oil added, the amount remaining and the efficiency for each coupon.

| Cleaner | Initial wt | Final wt | % Removed |
|-----------------------------|------------|----------|-----------|
| SC Aircraft & Metal Cleaner | 0.6529 | 0.0007 | 99.89 |
| | 1.0526 | 0.0381 | 96.38 |
| | 0.8196 | 0.0014 | 99.83 |
| Micro 90 | 0.5006 | 0.0002 | 99.96 |
| | 1.2334 | 0.0000 | 100.00 |
| | 1.0463 | 0.0002 | 99.98 |
| Daraclean 282 GF | 1.0000 | -0.0001 | 100.01 |
| | 0.8427 | 0.0001 | 99.99 |
| | 0.7254 | 0.0003 | 99.96 |
| Inproclean 3800 | 0.5834 | 0.0062 | 98.94 |
| | 0.3333 | 0.0002 | 99.94 |
| | 0.5946 | 0.0004 | 99.93 |
| Beyond 2004 | 0.8883 | -0.0002 | 100.02 |
| | 1.1494 | 0.0002 | 99.98 |
| | 0.8821 | 0.0004 | 99.95 |
| Bio T Max | 0.7241 | 0.3693 | 49.00 |
| | 1.0461 | 0.6287 | 39.90 |
| | 1.4041 | 0.8040 | 42.74 |
| Inproclean 4000 T | 1.1783 | 0.0124 | 98.95 |
| | 0.6237 | 0.0057 | 99.09 |
| | 0.5770 | 0.0075 | 98.70 |
| Beyond 2009 | 0.4338 | 0.2126 | 50.99 |
| | 0.6664 | 0.2878 | 56.81 |
| | 0.6922 | 0.1863 | 73.09 |

Summary:

Substrates: Titanium

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| Contaminants: | | Fluxes | | | |
|------------------------------------|---|--------|-------------|-------------------------------------|---------------|
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Gemtek Products | SC Aircraft & Metal Cleaner Super Concentrate | 5 | 98.70 | <input checked="" type="checkbox"/> | |
| International Products Corporation | Micro 90 Conc. | 5 | 99.98 | <input checked="" type="checkbox"/> | |
| Magnaflux | Daraclean 282 GF | 5 | 99.99 | <input checked="" type="checkbox"/> | |
| Oakite Products | Inproclean 3800 | 5 | 99.60 | <input checked="" type="checkbox"/> | |
| Today & Beyond | Beyond 2004 | 5 | 99.99 | <input checked="" type="checkbox"/> | |
| Bio Chem Systems | Bio T Max | 100 | 43.88 | <input type="checkbox"/> | |
| Oakite Products | Inproclean 4000 T | 10 | 98.91 | <input checked="" type="checkbox"/> | |
| Today & Beyond | Beyond 2009 | 100 | 60.30 | <input type="checkbox"/> | |

Conclusion: Products will be tested on the remaining contaminant - permanent marker.