

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1995
 DateRun: 06/01/1995
 Experimenters: Donald Garlotta, Jay Jankauskas
 ClientType: Plating Job Shop
 ProjectNumber: Project #1
 Substrates: Aluminum, Brass, Copper, Steel
 PartType: Coupon
 Contaminants: Waxes
 Cleaning Methods: Mechanical Agitation
 Analytical Methods: Gravimetric
 Purpose: Daraclean 294xx results

Experimental Procedure: This trial is to determine the effectiveness of both Grace Daraclean 294xx and Grace Daraclean 283 in removing wax from various coupons. The Daraclean 294xx is a semi- aqueous terpene whereas the Daraclean 283 is an aqueous cleaner. The coupons were weighed prior to contamination and then dipped in a beaker of melted wax. Once the wax hardened the coupons were then weighed again. Cleaning was done in a beaker at 160 F with air sparging used as agitation for 15 minutes. The coupons were then rinsed for 5 minutes in a tap water rinse at 150 F. Drying was performed by running the coupons under air knives for 2 minutes and then placing the coupons in a convection oven set at 125 F for 90 minutes. The coupons were then left to cool overnight and then weighed the next morning. A total of four runs were performed for the Daraclean 294xx (one run for each different substrate).

Results: EXPERIMENTAL DATA LOG

GRAVIMETRIC ANALYSIS

| sample # and substrate | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|------------------------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| #5 Aluminum | 21.0724 | 21.8289 | 21.0752 | 0.7537 | 99.63% |
| #6 Aluminum | 21.0246 | 21.8274 | 21.0283 | 0.7991 | 99.54% |
| #7 Aluminum | 21.0166 | 21.4187 | 21.0205 | 0.3982 | 99.03% |
| #6097 Copper | 35.6108 | 36.5260 | 35.6148 | 0.9112 | 99.56% |
| #3658 Copper | 35.3669 | 36.1804 | 35.3678 | 0.8126 | 99.89% |
| #4076 Copper | 35.4092 | 36.2176 | 35.4113 | 0.8063 | 99.74% |
| #4317 Brass | 34.4331 | 35.2092 | 34.4330 | 0.7762 | 100.01% |
| #5370 Brass | 34.5389 | 35.7766 | 34.5381 | 1.2385 | 100.06% |
| #6077 Brass | 34.6109 | 35.5091 | 34.6073 | 0.9018 | 100.40% |
| #27 Steel | 188.2295 | 189.4184 | 188.2278 | 1.1906 | 100.14% |
| #10 Steel | 148.3131 | 149.4491 | 148.3130 | 1.1361 | 100.01% |
| #8 Steel | 152.5285 | 153.8135 | 152.5270 | 1.2865 | 100.12% |

The 294xx tends to foam up a little bit but did a very good job of removing the wax from the coupons. The worst removal was encountered on the Aluminum coupons whereas the best removal was on the steel coupons. Small little droplets of wax were noticed on the coupons, but this is believed to be caused by dragout from the cleaner solution due to the fact that some of these droplets were on areas of the coupons that were not contaminated with wax. Once the cleaner temperature reaches below 150 F the wax started to solidify thus reducing the cleaning efficiency.

Summary:

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|----------------------|--------------------------------|---------------|--------------------|--------------------------|----------------------|
| Substrates: | Aluminum, Brass, Copper, Steel | | | | |
| Contaminants: | Waxes | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Magnaflux | Daraclean 294 xx | 10 | 99.78 | <input type="checkbox"/> | |

Conclusion: Temperatures should be kept at least 160 F. The biggest problem that needs to be looked into is removing the wax from the cleaner bath to avoid drag out.