

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1999
 DateRun: 04/28/1999
 Experimenters: Jason Marshall
 ClientType: Electron & Ion Technology Co
 ProjectNumber: Project #1
 Substrates: Stainless Steel
 PartType: Coupon
 Contaminants: Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric

Purpose: To determine the effectiveness of one cleaner requested by client at different concentrations.

Experimental Procedure: The one chemistry was made into 1, 3 and 5% solutions using DI water in 400 mL beakers. These solutions were then heated to 130 F on a hot plate. Nine preweighed coupons were contaminated with the metal working fluid supplied by the client. Coupons were weighed after contamination. Three coupons were cleaned in each solution for three minutes using stir-bar agitation, then rinsed for 30 seconds in a tap water bath at 120 F. Drying was performed using Master Appliance Corp, Hot-air gun model HG-301A at 500 F for one minute. Final weights were recorded and cleaning efficiencies were calculated.

SUBSTRATE MATERIAL: 304 Stainless Steel coupons

CONTAMINANTS: Metal working fluid (Hangsterfer's S-500CF_US)

Results: All three concentrations were very effective in removing the contaminant from the stainless-steel surface. Efficiencies ranged from 98.5 to 102%. It was noted that when the coupons were submerged into the rinse water, a noticeable amount of the cleaning solution was still on the coupon. The level was higher for the lower dilutions. Table 1 list the efficiencies for the three concentrations tested.

Table 1. Cleaning Efficiencies

| Brulin 815 GD | 1% | 3% | 5% |
|---------------|-------|--------|--------|
| Coupon 1 | 98.48 | 100.26 | 100.57 |
| Coupon 2 | 99.43 | 100.99 | 101.59 |
| Coupon 3 | 99.90 | 102.07 | 101.06 |
| Ave | 99.27 | 101.11 | 101.08 |
| Std Dev | 0.72 | 0.91 | 0.51 |

Table 2 compares the cleaning efficiencies of previously tested cleaners with Brulin 815 GD. The Brulin product performed better than all of the other cleaners at each concentration except at 1% where Warren chemical was slightly more efficient.

Table 2. Comparison of Average Cleaning Efficiencies

| Concentration | % by Volume | 1 | 3 | 5 |
|-----------------|---------------------|-------|-------|--------|
| Branson | GP | 98.43 | 99.54 | 100.24 |
| Warren Chemical | Sea Wash Dispersant | 100 | 100.3 | 100.07 |
| Matchless | MC 580 | 98.84 | 99.13 | 100.24 |
| Brulin | 815 GD | 99.27 | 101.1 | 101.1 |

Summary:

| Substrates: | | Stainless Steel | | | |
|----------------------|----------------|---|-------------|-------------------------------------|---------------|
| Contaminants: | | Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Brulin Corporation | Formula 815 GD | 1 | 99.27 | <input checked="" type="checkbox"/> | |
| Brulin Corporation | Formula 815 GD | 3 | 101.11 | <input checked="" type="checkbox"/> | |
| Brulin Corporation | Formula 815 GD | 5 | 101.08 | <input checked="" type="checkbox"/> | |

Conclusion: The Brulin product was determined to remove the contaminant at each of the three concentrations tested.