

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2010

DateRun: 08/05/2010

Experimenters: Jason Marshall, Timothy Weil

ClientType: Cleaner Manufacturer

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Hucker's Soil

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric, Visual

Purpose: To retest supplied solvents for all purpose testing using manual wiping.

Experimental Procedure: The two supplied solvent were used at full strength and at a 50:50 mix with each other. Solvents were compared with Dowanol DPM - dipropylene glycol methyl ether.

Prewieghed stainless steel coupons were coated with Hucker's Soil Formulation (Jiffy Creamy Peanut Butter 9.2%, Salted Butter 9.2%, Arrowhead Mills stone ground wheat flour 9.2%, Egg Yolk 9.2%, Evaporated milk 13.8%, Distilled water 45.8%, Printer's ink with boiled linseed oil 0.9%, Shaws saline solution 2.7%) using a handheld swab and allowed to dry for 24 hours at room temperature. The contaminated coupons were weighed again to determine the amount of soil added.

Three coupons were placed into a Gardner Straight Line Washability unit. A Kimberly-Clark Wypal reinforced paper towel was attached to the cleaning sled and soaked with 5-7 sprays of cleaning solutions. Each coupon was sprayed 7-10 times with the same cleaning solution. The cleaning unit was run for 20 cycles (~33 seconds).

At the end of the cleaning, coupons were observed visual to determine soil removal and/or residue levels. Coupons were then weighed to calculate soil removal amounts. Following this first final weight, coupons were wiped once with a dry paper towel and then weighed on last time to assess the amount of residue and overall efficiencies. A second soil consisting of DCC 17 soil (Mix lard, vegetable oil, vegetable shortening and carbon black) was applied to the same coupon types and cleaned in the same manner as the Hucker's soil.

Results: Each of the solvents tested left some residue behind following cleaning. The DPM had the least residue remaining. The 50:50 mix had the most residue. The SG 21000D had slightly less than the SG 22002D. Visually, all four cleaners had removed all of the soil during the manual cleaning. The low efficiency results obtained in previous trials was due to the residue left after cleaning.

| Cleaner   | Initial wt | Final wt | % Removed | Visual Rank |
|-----------|------------|----------|-----------|-------------|
| SG21000D  |            |          |           |             |
|           | 0.0239     | 0.0570   | -138.49   | 2           |
|           | 0.0227     | 0.0546   | -140.53   |             |
|           | 0.0313     | 0.0589   | -88.18    |             |
| SG2200SD  |            |          |           |             |
|           | 0.0363     | 0.0590   | -62.53    | 3           |
|           | 0.0374     | 0.0819   | -119.11   |             |
|           | 0.0303     | 0.0746   | -146.20   |             |
| 50:50 mix |            |          |           |             |
|           | 0.0247     | 0.0817   | -230.77   | 4           |
|           | 0.0392     | 0.0802   | -104.59   |             |
|           | 0.0354     | 0.0724   | -104.52   |             |
| DPM       |            |          |           |             |
|           | 0.0363     | 0.0144   | 60.33     | 1           |
|           | 0.0359     | 0.0282   | 21.45     |             |
|           | 0.0381     | 0.0249   | 34.65     |             |

## With Wipe

| Cleaner  | Initial wt | Final wt | % Removed |
|----------|------------|----------|-----------|
| SG21000D | Wipe       |          |           |
|          | 0.0239     | 0.0020   | 91.63     |
|          | 0.0227     | 0.0027   | 88.11     |

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|           |        |        |       |
|-----------|--------|--------|-------|
|           | 0.0313 | 0.0015 | 95.21 |
| SG2200SD  | Wipe   |        |       |
|           | 0.0363 | 0.0017 | 95.32 |
|           | 0.0374 | 0.0041 | 89.13 |
|           | 0.0303 | 0.0027 | 91.09 |
| 50:50 mix | Wipe   |        |       |
|           | 0.0247 | 0.0055 | 77.73 |
|           | 0.0392 | 0.0035 | 91.07 |
|           | 0.0354 | 0.0072 | 79.66 |
| DPM       | Wipe   |        |       |
|           | 0.0363 | 0.0020 | 94.49 |
|           | 0.0359 | 0.0017 | 95.26 |
|           | 0.0381 | 0.0019 | 95.01 |

Summary:

|                      |                      |                 |                    |                                     |                         |
|----------------------|----------------------|-----------------|--------------------|-------------------------------------|-------------------------|
| <b>Substrates:</b>   |                      | Stainless Steel |                    |                                     |                         |
| <b>Contaminants:</b> |                      | Hucker's Soil   |                    |                                     |                         |
| <b>Company Name:</b> | <b>Product Name:</b> | <b>Conc.:</b>   | <b>Efficiency:</b> | <b>Effective:</b>                   | <b>Observations:</b>    |
| Segetis              | Segetis SG21000D     | 100             | 91.65              | <input checked="" type="checkbox"/> |                         |
| Segetis              | Segetis SG22002D     | 100             | 91.85              | <input checked="" type="checkbox"/> |                         |
| Segetis              | Segetis SG21000D     | 50              | 82.82              | <input type="checkbox"/>            | 50:50 mix with SG22002D |
| Dow Chemical Company | Dowanol DPM          | 100             | 94.92              | <input checked="" type="checkbox"/> |                         |

Conclusion:

The supplied solvents and the DPM comparison product were found to be successful in removing the Hucker's soil using manual cleaning accompanied with a final dry wipe. The dry wipe was needed to remove the residue that remained from the cleaning solvents.