

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2015
 DateRun: 04/17/2015
 Experimenters: George Liang
 ClientType: Cleaner Manufacturer
 ProjectNumber: Project #1
 Substrates: Glass/Quartz, Chrome
 PartType: Coupon
 Contaminants: Films, Soaps
 Cleaning Methods: Manual Wipe
 Analytical Methods: Gravimetric, Visual
 Purpose: To evaluate supplied products for glass cleaning using manual cleaning

Experimental Procedure: Supplied products were diluted with room temperature water to the requested dilution. Preweighed glass, chrome and mirror coupons were coated with SSL Soil 2 (Glass soap scum: Water 51.5%, Hair gel 25.6%, Toothpaste 10.4%, Shaving cream 5.3%, Hair spray 3.7% and Spray deodorant 3.5%) 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 (SLW) unit. A Wypall L20 reinforced wipe was attached to the cleaning sled and soaked with 1 spray of cleaning solution. Each coupon was sprayed 1-3 times with the same cleaning solution. The solution was allowed to penetrate for 30 seconds followed by cleaning in the SLW unit for 5 cycles (~10 seconds). At the end of the cleaning, coupons were wiped once with a dry paper towel. Final weights were measured and efficiencies recorded. Visual observations were made on the coupons for spotting and filming following the general guidelines set forth in the CSPA DCC 09A. Filming is best recognized as "haziness" or overall "miliness", while streaking is best identified as dried droplets or "spotting", usually found strung together into thin white lines. Each coupon was evaluated separately for filming and streaking, (i.e., product residues without added soil), according to a scale of "1" to "7" where;

Filming Streaking

1 = high filming 1 = high streaking (poor performance)

7 = no visible filming 7 = no visible streaking (excellent performance)

Chemistries Evaluated: WC-3, Great Value; Windex

Results:

| Cleaner | Initial wt | Final wt | % Removed |
|---------------|------------|----------|-----------|
| WC-3 - Mirror | | | |
| | 0.0332 | 0.0016 | 95.18 |
| | 0.0382 | 0.0011 | 97.12 |
| | 0.0507 | 0.0020 | 96.06 |
| WC-3 - Glass | | | |
| | 0.0263 | 0.0009 | 96.58 |
| | 0.0574 | 0.0000 | 100.00 |
| | 0.0547 | 0.0003 | 99.45 |
| WC-3 - Chrome | | | |
| | 0.0479 | 0.0006 | 98.75 |
| | 0.0387 | 0.0004 | 98.97 |
| | 0.0322 | 0.0006 | 98.14 |
| WC-5 - Mirror | | | |
| | 0.0367 | 0.0007 | 98.09 |
| | 0.0213 | 0.0005 | 97.65 |
| | 0.0347 | 0.0007 | 97.98 |
| WC-5 - Glass | | | |
| | 0.0282 | 0.0009 | 96.81 |
| | 0.0234 | 0.0001 | 99.57 |
| | 0.0425 | 0.0010 | 97.65 |
| WC-5 - Chrome | | | |
| | 0.0441 | 0.0020 | 95.46 |
| | 0.0454 | 0.0010 | 97.80 |

CLEANING LABORATORY EVALUATION SUMMARY

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|----------------------|--------|--------|--------|
| | 0.0442 | 0.0005 | 98.87 |
| Great Value - Mirror | | | |
| | 0.0408 | 0.0035 | 91.42 |
| | 0.0458 | 0.0009 | 98.03 |
| | 0.0563 | 0.0023 | 95.91 |
| Great Value - Glass | | | |
| | 0.0580 | 0.0026 | 95.52 |
| | 0.0488 | 0.0000 | 100.00 |
| | 0.0507 | 0.0005 | 99.01 |
| Great Value - Chrome | | | |
| | 0.0444 | 0.0033 | 92.57 |
| | 0.0509 | 0.0010 | 98.04 |
| | 0.0508 | 0.0014 | 97.24 |
| Windex - Mirror | | | |
| | 0.0402 | 0.0013 | 96.77 |
| | 0.0420 | 0.0008 | 98.10 |
| | 0.0377 | 0.0013 | 96.55 |
| Windex - Glass | | | |
| | 0.0522 | 0.0017 | 96.74 |
| | 0.0405 | 0.0007 | 98.27 |
| | 0.0373 | 0.0006 | 98.39 |
| Windex - Chrome | | | |
| | 0.0441 | 0.0010 | 97.73 |
| | 0.0558 | 0.0008 | 98.57 |
| | 0.0531 | 0.0012 | 97.74 |

Visual Analysis

| Cleaner | Coupon | F | S | F | S | F | S |
|----------------------|--------|---|---|---|---|---|---|
| WC-3 - Mirror | 18 | 3 | 5 | 3 | 3 | 4 | 4 |
| WC-3 - Mirror | 20 | 4 | 4 | 4 | 5 | 3 | 4 |
| WC-3 - Mirror | 21 | 3 | 2 | 3 | 2 | 3 | 3 |
| WC-3 - Glass | 41 | 2 | 2 | 2 | 2 | 2 | 3 |
| WC-3 - Glass | 1 | 2 | 2 | 2 | 3 | 2 | 3 |
| WC-3 - Glass | 8 | 1 | 2 | 1 | 2 | 2 | 2 |
| WC-5 - Mirror | 2 | 4 | 4 | 4 | 3 | 4 | 4 |
| WC-5 - Mirror | 9 | 3 | 4 | 2 | 3 | 3 | 3 |
| WC-5 - Mirror | 15 | 3 | 3 | 3 | 3 | 2 | 3 |
| WC-5 - Glass | 6 | 2 | 2 | 2 | 2 | 1 | 2 |
| WC-5 - Glass | 7 | 1 | 2 | 1 | 2 | 1 | 2 |
| WC-5 - Glass | 17 | 2 | 1 | 2 | 3 | 2 | 2 |
| Great Value - Mirror | 9 | 6 | 7 | 6 | 7 | 6 | 6 |
| Great Value - Mirror | 15 | 5 | 6 | 7 | 7 | 6 | 7 |
| Great Value - Mirror | 16 | 4 | 4 | 1 | 7 | 5 | 6 |
| Great Value - Glass | 5 | 4 | 3 | 4 | 6 | 3 | 4 |
| Great Value - Glass | 35 | 3 | 4 | 2 | 4 | 3 | 3 |
| Great Value - Glass | 36 | 2 | 2 | 2 | 2 | 3 | 2 |
| Windex - Mirror | 114 | 6 | 7 | 6 | 6 | 6 | 6 |
| Windex - Mirror | 2 | 5 | 6 | 3 | 5 | 4 | 5 |
| Windex - Mirror | 4 | 5 | 6 | 3 | 6 | 5 | 6 |
| Windex - Glass | 16 | 3 | 3 | 3 | 3 | 3 | 4 |
| Windex - Glass | 14 | 4 | 3 | 3 | 2 | 4 | 4 |
| Windex - Glass | 68 | 2 | 3 | 2 | 2 | 2 | 3 |

Average Observations

| Cleaner - Substrate | Average F | Average S |
|---------------------|-----------|-----------|
|---------------------|-----------|-----------|

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|----------------------|-----|-----|
| WC-3 - Mirror | 3.3 | 3.6 |
| WC-3 - Glass | 1.8 | 2.3 |
| WC-5 - Mirror | 3.1 | 3.3 |
| WC-5 - Glass | 1.6 | 2.0 |
| Great Value - Mirror | 5.1 | 6.3 |
| Great Value - Glass | 2.9 | 3.3 |
| Windex - Mirror | 4.8 | 5.9 |
| Windex - Glass | 2.9 | 3.0 |

Summary:

| | | | | | |
|-----------------------|-------------------------------------|---------------|--------------------|-------------------------------------|----------------------|
| Substrates: | Glass/Quartz, Chrome | | | | |
| Contaminants: | Films, Soaps | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Fisher Scientific | Absolute Ethanol | 0 | 0.00 | <input type="checkbox"/> | |
| Fisher Scientific | Absolute Ethanol | 0 | 0.00 | <input type="checkbox"/> | |
| ProNatural Brands LLC | WC 3 | 100 | 97.81 | <input checked="" type="checkbox"/> | |
| ProNatural Brands LLC | WC 5 | 100 | 97.76 | <input checked="" type="checkbox"/> | |
| Walmart | Natural Glass & Window Cleaner | 100 | 96.42 | <input checked="" type="checkbox"/> | |
| SC Johnson & Son Inc | Windex Glass & More Cleaner (Spray) | 100 | 97.65 | <input checked="" type="checkbox"/> | |

Conclusion:

Each of the cleaners exhibited the same level of soil removal for each surface, requiring a visual analysis to determine the optimal cleaner. Based on the filming and streaking table, we can see that Great Value was the highest performing mirror cleaner, followed by Windex and the WC formulations. For glass, Windex was the highest performing cleaner, followed by Great Value and the WC formulations.