# CLEANING LABORATORY EVALUATION SUMMARY

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|---|---|
| SCL #: | 2002 |
| DateRun: | 09/30/2002 |
| Experimenters: | Jason Marshall |
| ClientType: | Cleaner Manufacturer |
| ProjectNumber: | Project #1 |
| Substrates: | Stainless Steel |
| PartType: | Coupon |
| Contaminants: | Paints |
| Cleaning Methods: | Manual Wipe |
| Analytical Methods: | Gravimetric |
| Purpose: | To perform follow up evaluation to determine source of poor performance |
| Experimental Procedure: | Surface Solutions Laboratory Modified procedure for ASTM D6189-97 Standard Practice for Evaluating the Efficiency of Chemical Removers for Organic Coatings (Copyright 2002 ASTM International, West Conshohocken, PA. All rights reserved. ) |

Summary of Practice
Test panels are coated and forced dry. The coatings remover is applied with a brush and the loosened coating is lifted with a plastic scrapper after a specified time. Coatings removal efficiency is determined and recorded using the rating scheme 5 to 0.

Testing Materials
Finishes - It is recommended to test coatings removers on a variety of finishes such as latex enamel, alkyd enamel, polyurethane, varnish, shellac and nitrocellulose lacquer or as agreed upon between the purchaser and the seller.
Wood test panels of solid wood or wood laminate such as birch plywood, fir, pine, oak or walnut. Smooth sawn panels of dimensions not less than 12 by 12 in and 5/16 in thick.*1

Panel Preparation
Wood Panel Preparation - Store the wood for a least 6 days under standard conditions as specified in Specification D 3924.
Sand the panels lightly with sandpaper (Very Fine Garnet Abrasive-Type Sandpaper, 240 to 220 grade).
*2 Coat one side of a panel with a test coating by any method specified in Practices D 823 to ensure uniform film thickness, using manufacturers' recommended coverage rate. Allow the coating to dry overnight under standard conditions.
Apply a second coat of the same type of coating using the same method.

*3 Force dry at 120 F overnight. Allow the panel to cool to ambient temperature.
Apply and dry a third coat of the same type of coating as in previous step.
*4

Procedure
Apply coating remover in accordance with the manufacturers' instructions, using a solvent resistant brush unless otherwise directed by the manufacturer. Stroke the surface in one direction only. Start the stopwatch after the panel has been fully coated. Leave the panel in the horizontal position during the test. Wait 15 minutes for solvent-borne removers and 60 minutes water-borne removers, or at times specified by the manufacturer for the type of coating being removed.*5
Scrape the surface with a plastic paint scraper to remove the coating without damaging the substrate.
*6 Rate the test panel for coating removal efficiency on a scale from 5 to 0 in accordance with the following:
Rating Amount of Coatings Removal %
5 100
4 75
3 50
2 25
1 10
0 0

Rate the effect of the coatings removal on the condition of the substrate on a scale from 5 to 0 in accordance with the following:
Rating Condition of Substrate
5 No effect
4 Very slight
3 Slight
2 Moderate
1 Considerable
0 Complete failure

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Note: Typical effects of coatings removal on wooden substrates include grain-raising and an increase in surface roughness.
Modification from ASTM Standard D6189-97

*1 Coupons size were decreased to 3" by 8" in order to obtain gravimetric weights
*2 After removing sanding dust, weigh coupons on an analytical balance to determine base-line weight.
*3 Second and third coatings were not forced dried using an oven as the space required for 36 coupons exceeded capacity of the lab's oven. Second coatings were dried for 20 minutes using a Master Appliance heat gun at 300 F and then allowed to dry for 7 at room temperature. Third coating was also dried using the heat gun for 20 minutes at 300 F but allowed to dry overnight.
*4 After final coating was applied and dried, a second gravimetric weighing was performed to determine the overall amount of coating applied to the test coupons.
*5 Time required for coatings removal via scraping was recorded. Maximum time for removing coating was set at 2 minutes.
*6 After cleaning was completed, a final weighing was performed to determine the amount of contaminant removed.

Note: Efficiencies were calculated by the following method: Subtract the final weight of contaminant from the initial weight of the contaminant. This value was then divided by the initial weight of the contaminant and multiplied by 100 to get percent removal or percent efficiency of the coatings remover.

Contaminants Applied: A: Paint - Glidden Paint Company Ultra Hide Alkyd semi gloss paint (136-52-7, 1317-65-3, 1332-58-7, 66402-68-4, 8052-41-3, 64742-88-7, 71-43-2, 13463-67-7, 68604-95-5, 66070-62-0, 67746-05-8)

Results:

Using the stainless steel coupon resulted in a closer comparison between the ASTM ranking and the gravimetric results. Also, coupons were subjected to an additional 10 minute soak to improve removal rates.

Take Off Green

| 1 hour | +10 min | ASTM Score 1 hour | ASTM +110 | |
|---|---|---|---|---|
| 92.33 | 99.95 | 4 | 5 | |
| 97.31 | 99.97 | 4.5 | 5 | |
| 95.75 | 99.99 | 4.25 | 5 | |
| 95.13 | 99.97 | 4.25 | 5 | Ave |

Summary:

| **Substrates:** | Stainless Steel | | | | |
|---|---|---|---|---|---|
| **Contaminants:** | Paints | | | | |
| **Company Name:** | **Product Name:** | **Conc.:** | **Efficiency:** | **Effective:** | **Observations:** |
| Vertec BioSolvents | Take Off Green | 100 | 99.97 | ☑ | |

Conclusion:

Take Off Green was successful in removing the paint from the stainless steel coupons.