CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2017

DateRun: 07/09/2017

Experimenters: George Liang, Vinh Tran

ClientType: Cleaner Manufacturer

ProjectNumber: Project #1

Substrates: Copper

PartType: Coupon

Contaminants: Coatings

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric

Purpose: The TURI's cleaning standard experimental procedure for varnish removal with the manual SLW machine was followed.

Experimental Procedure: The TURI's cleaning standard experimental procedure for varnish removal with the manual SLW machine was followed.

Soiling Process:

A set of pre-weighed copper coupons were soiled with 0.5 grams of Shellac amber varnish using a hand held swab. Another set of pre-weighed copper coupons were soiled with 0.5 grams of red lacquer using a hand held swab. After soiling the coupons with the respective soil, each coupon was re-weighed to determine the amount of contaminant added.

Cleaning Process:

Three copper coupons soiled with the same soil were placed into a Gardner Straight Line Washability unit. A Wypall X60 reinforced wipe was attached to the cleaning sled and soaked with 5 sprays of cleaning solution. Each coupon was sprayed 5 times with the same cleaning solution. Each cleaning solution was used at full concentration. The solution was allowed to penetrate/contact for 30 seconds followed by cleaning in the SLW unit for 20 cycles (~33 seconds). The cleaning process was repeated with 5 sprays and 20 cycles of manual cleaning until there was either an overall removal of 85% from the three coupons or until it had reached a total of 50 sprays of cleaner solution application. Thereafter, the amount of sprays was increased to 10 sprays per coupon and on the wipe and followed by the 20 cycles of manual cleaning after applying the cleaner. A new Wypall X60 reinforced wipe was used after every 20 cycles.

Efficacy Rating Process:

After cleaning, the coupons were left to sit at room temperature for a day before re-weighing the coupons for the amount of contaminants removed. The efficacy of a cleaner is measured by the amount of contaminated removed using gravimetric analysis. An effective cleaner is one that is observed to have an efficacy rating of 85% or higher. In addition, the amount of Wypalls, sprays, and cycles used was also recorded to measure the effectiveness of the cleaner.

Chemistries Evaluated: Quicksolv DMC; Acetone

Results: Table pertaining to the amount of contaminant added and removed using a gravimetric scale, to measure the efficacy of the respective cleaners.

Cleaner	Soil Type	Sprays	Cycles	Cont. Removed (%)	Avg. Cont. Removed (%)
Quicksolv DMC	Shellac Amber Varnish	25	100	100.08	99.71
				99.92	
				99.13	
	Red Lacquer	100	300	24.49	32.04
				38.96	
				32.66	
Acetone	Shellac Amber Varnish	25	100	74.48	70.53
				73.71	
				63.41	
	Red Lacquer	25	100	95.18	95.77
				96.90	
				95.22	

Summary:

Substrates:	Copper

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Contaminants:	Coatings				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
J.T. Baker	Acetone	100	95.77	☑	Shellac Amber Varnish 25 sprays; 70.53; Red Lacquer 95.77
Inventec Performance Chemicals	Quicksolv DMC	100	99.71	☑	Shellac Amber Varnish 99.71; Red Lacquer 32.04

Conclusion:

The sample cleaner, Quicksolv DMC, was more effective in removing amber varnish from the copper coupons as compared to Acetone. After 25 sprays and 100 cycles of manual cleaning, Quicksolv DMC removed 99.71% of the amber varnish as compared to 70.53% removed by Acetone.

For the removal of red lacquer contaminant from the copper surface, Acetone outperformed the Quicksolv DMC. After 25 sprays and 100 cycles acetone removed 95.77% of the red lacquer, whereas for Quicksolv DMC after 100 sprays and 300 cycles only 32.04 % of the red lacquer contaminant was removed. (Further cleaning of the red lacquer with Quicksolv DMC was discontinued after 100 sprays and 300 cycles because of the inefficient removal with this solvent.)