CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2010
DateRun:	04/12/2010
Experimenters:	Jason Marshall, Junhee Cho
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Oil
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric
Purpose:	To evaluate second supplied product for Green Seal GS 34 degreasing standard.

Experimental Procedure:

Two types of soils were prepared individually. The first soil, maintenance soil, consisted of 10 grams of carbon black, 10 grams iron oxide, 100 ml WD-40, 100 ml hydraulic oil, and 100 ml gear oil. Each component was placed in a 750 beaker and mixed for 20 minutes at room temperature using a magnetic stirrer. The second soil, production soil, was made by mixing 200 ml Quench Oil and 200 ml cutting oil for 20 minutes at room temperature using a magnetic stirrer in a second 750 ml beaker.

Approximately 100 mg of each soil was applied to a precleaned and preweighed stainless steel coupon onto one side only with a handheld swab. No soil was applied to the two control coupons. The maintenance soil for all three coupons was baked in an oven for 30 minutes at a temperature of 40° C (105 F). For the production soil, all three coupons were baked in an oven for thirty minutes at 105° C (220 F). The coupons were then allowed to cool to room temperature and weigh a second time (soiled mass = B).

One cleaning product was diluted to 34:1 (~2.9%). The solution was preheated to 40 C (105 F). Four 600 mL beakers were filled with enough fresh degreaser solution to completely submerge the coupons in the degreasing solution without any overflow. The four beakers were suspended in the heated tank and allowing the temperature in the cleaning bath and beakers to equilibrate.

Each coupon was suspended in a beaker, allowing the entire contaminated surface to be submerged in the cleaning solution. The coupons were washed for 20 minutes using immersion cleaning only. The washing was followed by two rinse steps. The coupons were drained for 30 seconds prior to each rinse step. For each rinse step a 20-minute soak was utilized. After the two rinse steps, all coupons were first allowed to air dry for 30 minutes and then dried in an oven at 105° C for 30 minutes. The coupons were then cooled to room temperature and final weights were measured (mass of the coupon after cleaning = C).

The control coupons were examined to determine if there were any visible signs of corrosion. Next, the control coupon was weighed to determine if there was any lost mass, which might occur if corrosion was in progress; or gained mass, which might occur if the degreaser had left a residue on the coupons. The following equation was applied: [MCC - MCB] < 0.1 mg (which is the maximum balance error).

Where: MCC = mass of the control coupon after washing and rinsing
MCB = mass of the control coupon before washing and rinsing

For the cleaned coupons, the amount of residual soil per surface area was calculated, using the following formula: RS = (C-A)/ Ar
Where: RS = amount of residual soil (mg/m2)
C = mass of the coupon after cleaning
A = initial coupon mass
Ar = surface area = 0.0040 m2

If the average residual maintenance soil loading, and the average residual performance soil loading are each less than 2,000 mg/m2, the degreaser meets the cleaning performance criteria.

Results:

The supplied cleaning product was successful at removing the Maintenance and Process soils using immersion cleaning at 130 F. Efficiencies were calculated to be in the table lists the weights of the coupons and the calculated RS values.

DeltaGreen maintenance soil

				mg/m2	mg
DeltaGreen maintenance soil	Initial wt	Cont. wt	Clean wt.	Residual Contamination	Mass difference control
M1	62.5339	62.6369	62.5341	50.0	
M2	62.7244	62.8130	62.7246	50.0	
M3	62.4236	62.5091	62.4239	75.0	
MC	62.6410	62.6411	62.6410		0.0000
Average				58.3	

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DeltaGreen process soil					
P1	62.6826	62.7816	62.6831	125.0	
P2	62.7833	62.8722	62.7833	0.0	
P3	62.6991	62.7843	62.6995	100.0	
PC	62.7503	62.7502	62.7502		-0.0001
Average				75.0	

Summary:

Substrates:	Stainless Steel				
Contaminants:	Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
DeltaGreen LLC	DeltaGreen Concentrate All Purpose and Degreaser	6	99.71	☑	Average removal rate 66.7 mg/m2

Conclusion:

The supplied cleaning product was success on both of the soils with an overall average removal rate (67.2 mg/m2) was under the Green Seal GS 34 requirement of 2000 mg/m2 using immersion cleaning. The product will next be evaluated for the oil water separation portion of the standard.