CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2008
DateRun:	12/10/2008
Experimenters:	Jason Marshall
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Oil
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric
Purpose:	To evaluate supplied products for Green Seal GS 34 degreasing standard.

Experimental Procedure:

According to Green Seal, GS 34 is a procedure for evaluating the ability of a degreaser to remove soil and is based on ASTM G-122, (1996), MIL-PRF-87937C (DOD, 1997) and MIL-C-29602 (DOD, 1995).

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 5% and was used at 100%. The solutions were 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 = 0.0035 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 both concentrations in removing the maintenance soil and the process soil using immersion cleaning at 105F. Both soil cleaning had residual soil levels under the 2000 mg/m2 level. Efficiencies were calculated to be in the table lists the weights of the coupons and the calculated RS values.

STC 300 Degreaser - 5%

Coupon					

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	Initial mass of coupons -g (A)	Mass of coupon after - g soiling (B)	Mass of coupon after - g cleaning (C)	Residual soil (mg/ m2)	Mass difference control (mg)
M1	62.5021	62.6079	62.5089	1700	-
M2	62.7552	62.8466	62.7600	1200	-
M3	62.7803	62.8913	62.7818	375	-
MC		64.1101	64.1100	-	0.1000
Average				1092	
P1	63.8066	63.8969	63.8069	75	-
P2	62.841	62.9507	62.8419	225	-
P3	59.2956	59.3994	59.2959	75	-
PC		63.0445	63.0444	-	0.1000
Average				125	

STC 300 Degreaser - 100%

Coupon	Initial mass of coupons -g (A)	Mass of coupon after - g soiling (B)	Mass of coupon after - g cleaning (C)	Residual soil (mg/ m2)	Mass difference control (mg)
M1	62.7283	62.8340	62.7286	75	-
M2	62.691	62.7982	62.6921	275	-
M3	62.8281	62.9342	62.8281	0	-
MC		61.3451	61.3452	-	0.1000
Average				117	
P1	60.189	60.2886	60.1898	200	-
P2	63.7859	63.8894	63.7869	250	-
P3	62.5819	62.6881	62.5827	200	-
PC		64.0697	64.0698	-	0.1000
Average				217	

Summary:

Substrates:	Stainless Steel				
Contaminants:	Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Safe-Tee Chemical	STC 300 Degreaser	5	97.59	☑	Average RS 608 mg/m2
Safe-Tee Chemical	STC 300 Degreaser	100	99.50	☑	Average RS 167 mg/m2

Conclusion:

The supplied cleaning product at either dilution was success for the two soils and would meet the Green Seal GS 34 requirement of an average of 2000 mg/m2 for both soils using immersion cleaning. The same product will be evaluated for oil-water separation.