CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2011
DateRun:	09/08/2011
Experimenters:	Jason Marshall, Junhee Cho, Johnny Le
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Oil
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric
Purpose:	To evaluate fourth 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 100ml gear oil. Each component was placed in a 750 ml beaker and mixed for 20 minutes at room temperature using a magnetic stirrer. The second soil, production soil, was made by mixing 200ml 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 hand swab. No soil was applied to the control coupons. The maintenance soil for the first set of coupons was baked in an oven for 30 minutes at a temperature of 40° C (105 F). For the production soil, the second sets of 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).
Four products were used at room temperature. Four 500 mL beakers and four 400 ml beakers were filled with enough fresh cleaner solution to completely submerge the coupons in the degreasing solution without any overflow. 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 cooled to room temperature and final weights were measured (mass of coupons after cleaning = C).

The control coupons were examined to determine if there were any visible signs of corrosion. Next, the control coupons were weighed to determine if there was any loss of 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] < .1mg (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/s²)
C = mass of the coupon after cleaning
A = initial coupon mass
Ar = surface area = .00387 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 product was found to be effective at removing both soils under the described conditions. The follow up test for the Liquifix also showed effective removal of the maintenance soil.

Product - Soil	Clean-Cont	Cont-Initial	CEF	Clean-Initial	Residual	GS 34	
	MX2-MX3	MX2-MX1		MX3-MX1	mg/cm2	Ave CEF	Ave RC mg/m2
Zep Industrial Purpose Cleaner - maintenance soil							
	0.0168	0.0166	1.012	-0.2	-52	0.9271	404.82
	0.0183	0.0216	0.8472	3.3	853		
	0.0189	0.0205	0.922	1.6	413		
Zep Industrial Purpose Cleaner - production soil							
	0.0085	0.0085	1	0	0	0.9721	68.91

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	0.0087	0.0093	0.9355	0.6	155		
	0.0102	0.0104	0.9808	0.2	52		
Liquifix Multipurpose Degreaser Maintenance Soil							
	0.0257	0.0272	0.9449	1.5	388	0.914	90.96
	0.018	0.0203	0.8867	2.3	594		
	0.0193	0.0212	0.9104	1.9	491		

Summary:

Substrates:	Stainless Steel
Contaminants:	Oil

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Liquifix	Liquifix Multipurpose Degreaser	100	91.40	☑	
ZEP Manufacturing Company	Zep Industrial Purpose Cleaner	25	94.96	☑	

Conclusion: The supplied product surpassed the required performance level set by the GS 34 standard. The Liquifix multipurpose product met the required residual level for the maintenance soil.