CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2015
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Experimenters:	Loc Nguyen, George Liang, Abigail Giarrosso, Rhoda Gindi
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Oil
Cleaning Methods:	Manual Wipe
Analytical Methods:	Gravimetric
Purpose:	To evaluate the efficiency one cleaner on GS 34 Soil-1 and GS 34 Soil- 2 from stainless steel coupons using immersion technique.
Experimental Procedure:	Twenty-Two sets of stainless-steel coupons were weighed, each set consist of three coupons. The first eleven sets were soiled with GS 34 Soil-1 and the other eleven sets were soiled with GS 34 Soil-2. Both soils were applied at the loading of ~100mg. The soiled coupons were oven dried for 30 minutes with 40 °C for GS 34 Soil-1 and 105 °C for GS 34 Soil-2. Dirty weights were recorded for all of coupons after 15 minutes of cooling. Three coupons were placed into a Gardner Straight Line Washability unit. A Wypall X60 reinforced wipe was attached to the cleaning sled and soaked with 1 spray of cleaning solutions. Each coupon was sprayed 1 time with the same cleaning solution. The solution was allowed to penetrate for 30 seconds followed by cleaning in the SLW unit for 20 cycles (~33 seconds). Final weights were recorded the following day. Efficiencies were calculated and recorded. Soil 1: Maintenance soil = 10 grams of carbon black, 10 grams iron oxide, 100 ml WD-40, 100 ml hydraulic oil, and 100 ml gear oil. Soil 2: Production soil = 200 ml Quench Oil and 200 ml cutting oil Chemistries evaluated: BioCircle_L; BioCircle_Ultra; BioCircle_Aero; BioCircle_CB 100; BioCircle_CB 100_ALU; BioCircle_UNO SF; Simple Green; Chem Free SW4; Aquantene 330; LPS T91; Keteca

Results:

Cleaner	Initial wt	Final wt	% Removed	% Average Removed
BioCircle_L soil 1				
	0.0943	0.0033	96.50	
	0.1119	0.0035	96.87	
	0.1080	0.0044	95.93	96.43
BioCircle_L soil 2				
	0.0981	0.0022	97.76	
	0.1003	0.0034	96.61	
	0.1046	0.0042	95.98	96.78
BioCircle_Ultra soil 1				
	0.0993	0.0035	96.48	
	0.1021	0.0066	93.54	
	0.0874	0.0035	96.00	95.34
BioCircle_Ultra soil 2				
	0.1123	0.0028	97.51	
	0.1031	0.0035	96.61	
	0.0967	0.0031	96.79	96.97
BioCircle_Aero soil 1				
	0.1134	0.0031	97.27	
	0.1004	0.0024	97.61	
	0.1074	0.0016	98.51	97.80
BioCircle_Aero soil 2				
	0.0910	0.0000	100.00	
	0.0966	-0.0026	102.69	
	0.0898	0.0035	96.10	99.60

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BioCircle_CB100 soil 1				
	0.0996	0.0036	96.39	
	0.1031	0.0033	96.80	
	0.1008	0.0038	96.23	96.47
BioCircle_CB100 soil 2				
	0.0835	-0.0024	102.87	
	0.0684	0.0015	97.81	
	0.0563	0.0010	98.22	99.64
BioCircle_CB100_ALU soil 1				
	0.0965	0.0029	96.99	
	0.0987	0.0029	97.06	
	0.0977	0.0031	96.83	96.96
BioCircle_CB100_ALU soil 2				
	0.0715	0.0050	93.01	
	0.0949	0.0039	95.89	
	0.0902	0.0110	87.80	92.23
BioCircle_UNO SF soil 1				
	0.0988	0.0045	95.45	
	0.1009	0.0045	95.54	
	0.0986	0.0043	95.64	95.54
BioCircle_UNO SF soil 2				
	0.0925	0.0010	98.92	
	0.0965	0.0040	95.85	
	0.2022	0.0049	97.58	97.45
Simple Green soil 1				
	0.0969	0.0048	95.05	
	0.0955	0.0072	92.46	
	0.0957	0.0019	98.01	95.17
Simple Green soil 2				
	0.1065	0.0033	96.90	
	0.1070	0.0022	97.94	
	0.1047	0.0013	98.76	97.87
ChemFree SW4 soil 1				
	0.0992	0.0018	98.19	
	0.0917	0.0019	97.93	
	0.1022	0.0005	99.51	98.54
ChemFree SW4 soil 2				
	0.1018	-0.0011	101.08	
	0.0980	-0.0023	102.35	
	0.0980	-0.0027	102.76	102.06
Aquantene 330 soil 1				
	0.0951	0.0049	94.85	
	0.1003	0.0059	94.12	
	0.1000	0.0049	95.10	94.69
Aquantene 330 soil 2				
	0.1000	0.0018	98.20	
	0.1011	0.0011	98.91	
	0.0992	0.0010	98.99	98.70
LPS 791 soil 1				
	0.0989	0.0041	95.85	
	0.0937	0.0041	95.62	

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	0.0967	0.0022	97.72	96.40
LPS 791 soil 2				
	0.0955	0.0039	95.92	
	0.0924	0.0033	96.43	
	0.0957	0.0033	96.55	96.30
Kreussler soil 1				
	0.0985	0.0014	98.58	
	0.0939	0.0006	99.36	
	0.1017	0.0006	99.41	99.12
Kreussler soil 2				
	0.0941	0.0011	98.83	
	0.0956	0.0007	99.27	
	0.0826	0.0003	99.64	99.25

Summary:

Substrates:	Stainless Steel
Contaminants:	Oil

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
J Walter Inc.	Bio Circle L	100	96.61	☑	
J Walter Inc.	Bio Circle Ultra	100	96.16	☑	
J Walter Inc.	Bio Circle Aero	100	98.29	☑	
J Walter Inc.	Bio Circle CB 100	100	94.60	☑	
J Walter Inc.	Bio Circle UNO SF	100	96.50	☑	
Environmental Inteligence	Simple Green Cleaner & Degreaser	100	96.52	☑	
Chem Free Corporation	SW-4 Ozzy Juice Degreasing Solution	100	100.00	☑	
Gray Mills	Aquatene 360	100	96.70	☑	
LPS Laboratories	T-91, Non Solvent degreaser	100	96.35	☑	
Kreussler	Kreussler K 4	100	99.19	☑	

Conclusion:

All cleaners were effective in soil removal of stainless steel coupons using manual wipe method. The most effective cleaner was ChemFree SW4 at removal efficiency of 98.54% and 102.06% on maintenance soil and production soil respectively. The least effective cleaner was Bio Circle CB100 ALU at 96.96% and 92.23% on maintenance soil and production soil respectively.