CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2018
DateRun:	03/26/2018
Experimenters:	George Liang, Vinh Tran
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Aluminum, Plastic
PartType:	Coupon
Contaminants:	Dirt
Cleaning Methods:	Manual Wipe
Analytical Methods:	Gravimetric, Visual
Purpose:	To evaluate the supplied product for car wheel dirt removal from aluminum and plastic surfaces following GS 35 methodology.
Experimental Procedure:	Supplied products were diluted to a concentration of 4oz of cleaners to 1 gallon of tap water at room temperature. Pre-weighed aluminum and plastic coupons were soiled with 0.5 grams of vehicle dirt contaminant (Bike Dirt Soil: 16% w/w, Super White Multi-Purpose Lithium Grease: 45% w/w, and Used Motor Oil 39% w/w) using a hand held swab. Once dirtied, the aluminum and plastic coupons were re-weighed again to obtain initial weights of the contaminants. Three of the same type of coupons were placed into a Gardner Straight Line Washability unit. A Wypall X60 reinforced wipe was attached to the cleaning sled and soaked with one spray of the diluted cleaning solutions. Each coupon was sprayed two times 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). Substrates air dried for one hour, the substrates were re-weighed again to obtain the final weights of contaminants removed and used to calculate for the cleaner's efficiencies. Visual observations were made on the coupons for spotting and filming following the general guidelines set forth in the CSPA DCC 09A. Filming is best recognized as "haziness" or overall "milkiness", while streaking is best identified as dried droplets or "spotting", usually found strung together into thin white lines. Each coupon was evaluated separately for filming and streaking, (i.e., product residues without added soil), according to a scale of "1" to "7".

Filming	**Streaking**
7= high filming	7= high streaking poor (performance)
1= no visible filming	1= no visible streaking (excellent performance)

Results:

Cleaner	Substrate	Initial wt. of Cont. (g)	Final wt. of Cont. (g)	Cont. Removed (%)	Avg. Cont. Removed (%)	Overall Avg. Cont. Removed (%)
Alpha Chemical Wheel Guard 1	Aluminum	0.4996	0.0321	93.57	92.96	95.58
		0.4989	0.0435	91.28		
		0.5052	0.0302	94.02		
	Plastic	0.5009	0.0152	96.97	98.20	
		0.4969	0.0093	98.13		
		0.5538	0.0027	99.51		
Alpha Chemical Wheel Guard 2	Aluminum	0.4976	0.0498	89.99	91.14	94.09
		0.4974	0.0399	91.98		
		0.4973	0.0425	91.45		
	Plastic	0.5498	0.0131	97.62	97.03	
		0.5271	0.0246	95.33		
		0.4811	0.0089	98.15		
Alpha Chemical Wheel Guard 3	Aluminum	0.5023	0.0352	92.99	92.70	95.31
		0.5026	0.0485	90.35		
		0.5029	0.0263	94.77		
	Plastic	0.5095	0.0278	94.54	97.92	
		0.5109	0.0019	99.63		
		0.4961	0.0021	99.58		

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From the gravimetric results, there was not a lot of significant difference between the overall percent average contaminant removed between the three cleaners: Alpha Chemical Wheel Guard 1, Alpha Chemical Wheel Guard 2, and Alpha Chemical Wheel Guard 3; with respective efficacies of 95.58%, 94.09% and 95.31%. All three cleaners were more effective in removing the contaminant from plastic substrates as compared to aluminum substrates. In conclusion, the most effective cleaner would be listed in the following order with the most effective to the least effective: Alpha Chemical Wheel Guard 1; Alpha Chemical Wheel Guard 3; Alpha Chemical Wheel Guard 2.

Streaking Visual Rating:					Filming Visual Rating:				
Cleaner: Alpha Chemical Guard 1					Cleaner: Alpha Chemical Guard 1				
Substrate: Aluminum				Overall Streaking Avg.	Substrate: Aluminum				Overall Filming Avg.
Tester 1	Tester 2	Tester 3	Streaking Avg.		Tester 1	Tester 2	Tester 3	Filming Avg.	
4.0	2.0	2.0	3.1	2.7	3.0	2.5	2.0	2.7	2.6
5.0	2.5	3.0			4.0	2.5	2.5		
4.5	3.0	2.0			3.0	2.5	2.0		
Substrate: Plastic					Substrate: Plastic				
Tester 1	Tester 2	Tester 3	Streaking Avg.		Tester 1	Tester 2	Tester 3	Filming Avg.	
3.0	2.0	2.0	2.2		2.5	4.0	3.0	2.5	
3.5	2.0	2.0			2.0	3.0	2.0		
1.5	2.0	2.0			1.5	3.0	1.5		
Cleaner: Alpha Chemical Guard 2					Cleaner: Alpha Chemical Guard 2				
Substrate: Aluminum				Overall Streaking Avg.	Substrate: Aluminum				Overall Filming Avg.
Tester 1	Tester 2	Tester 3	Streaking Avg.		Tester 1	Tester 2	Tester 3	Filming Avg.	
4.0	3.0	5.0	3.7	3.0	3.0	4.0	3.0	3.3	2.6
3.5	2.5	4.0			3.5	3.5	2.5		
4.0	2.5	5.0			4.0	3.0	3.0		
Substrate: Plastic					Substrate: Plastic				
Tester 1	Tester 2	Tester 3	Streaking Avg.		Tester 1	Tester 2	Tester 3	Filming Avg.	
2.0	2.0	2.5	2.2		2.0	2.0	1.5	2.0	
2.0	2.0	2.5			2.0	2.5	1.5		
2.5	2.0	2.5			2.5	2.5	1.5		
Cleaner: Alpha Chemical Guard 3					Cleaner: Alpha Chemical Guard 3				
Substrate: Aluminum				Overall Streaking Avg.	Substrate: Aluminum				Overall Filming Avg.
Tester 1	Tester 2	Tester 3	Streaking Avg.		Tester 1	Tester 2	Tester 3	Filming Avg.	
3.5	2.5	3.0	2.9	2.9	2.5	3.0	1.5	2.3	2.4
4.0	2.0	3.0			3.5	2.0	1.5		
3.5	2.0	3.0			3.0	2.0	1.5		
Substrate: Plastic					Substrate: Plastic				
Tester 1	Tester 2	Tester 3	Streaking Avg.		Tester 1	Tester 2	Tester 3	Filming Avg.	
2.5	2.5	3.0	2.9		2.5	3.0	1.5	2.4	
2.5	2.5	3.0			3.0	2.5	1.5		
3.5	3.5	3.0			3.0	3.0	2.0		

Filming is best recognized as "haziness" or overall "milkiness", while streaking is best identified as dried droplets or "spotting", usually found strung together into thin white lines.

From the streaking visual results, there was not a significant difference between the overall streaking averages between the three cleaners: Alpha Chemical Guard 1, Alpha Chemical Guard 2, Alpha Chemical Guard 3; with respective overall streaking ratings of 2.7, 3.0, and 2.9. There was more observed streaking on aluminum substrates than on plastic substrates.

Likewise, from the filming visual results, there was not a significant difference between the overall filming averages between the three cleaners: Alpha Chemical Guard 1, Alpha Chemical Guard 2, Alpha Chemical Guard 3; with respective overall streaking ratings of 2.6, 2.6, and 2.4. However, there was less observed difference between the filming of aluminum and plastic substrates when the parts where cleaned with Alpha Chemical Guard 1 and Alpha Chemical Guard 3. There was still more observed filming on aluminum substrates than on plastic substrates when the parts where cleaned with Alpha Chemical Guard 2.

Furthermore, these results are in congruent with the gravimetric results. The most effective cleaner would be listed in the following order with the most effective to the least effective: Alpha Chemical Wheel Guard 1; Alpha Chemical Wheel Guard 3; Alpha Chemical Wheel Guard 2.

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Summary:

Substrates:	Aluminum, Plastic				
Contaminants:	Dirt				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Alpha Chemical Services	Alpha Chemical Wheel Guard 1	4oz/ 1gallon	95.58	☑	
Alpha Chemical Services	Alpha Chemical Wheel Guard 2	4oz/ 1gallon	94.09	☑	
Alpha Chemical Services	Alpha Chemical Wheel Guard 3	4oz/ 1gallon	95.31	☑	

Conclusion:

All three cleaners were effective in removing the car wheel dirt contaminant on aluminum and plastic substrates. However, Alpha Chemical Wheel Guard 1 was observed to be slightly more effective in removing the contaminant.