CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2005
DateRun:	09/06/2005
Experimenters:	Jason Marshall
ClientType:	Environmental Service Firm
ProjectNumber:	Project #1
Substrates:	Wood
PartType:	Coupon
Contaminants:	Coatings
Cleaning Methods:	
Analytical Methods:	Performance Test
Purpose:	To determine the coefficient of friction for additional floor finishes.

Experimental Procedure:

Control of Moisture Content and Temperature
The moisture content at the time of testing will influence results due to the hydroscopic nature of the base materials. Therefore, efforts must be taken to ensure that the moisture content and temperature remain constant during the evaluation period. Ideally, the sample floor should be kept at 65+/-1% relative humidity and 68+/-6 F.

During laboratory testing, conditions were slightly drier, 40% relative humidity, but the temperature was within the given temperature range ~70 F).

Sample Preparation
The flooring material supplied was Hardwood flooring made from Red Oak. The boards were ¾" thick, 2 ¼" wide and cut into 8" sections. Some pieces of the flooring had to be sanded prior to making initial thickness readings to remove residual packing tape adhesive. With the boards cut into 8" coupons, three readings were made using a Brown & Sharpe Micrometer to measure each coupons initial board thickness. Each reading was made to 0.001" and the three values were averaged to give a baseline thickness for the coupons. In addition to the thickness baseline, baselines were established for Gloss, Coefficient of Friction, Impact, Small Area Loads. Procedures for each baseline measurements followed the procedures to be outlined.

Following the establishment of the baselines, three coupons were coated with a supplied floor finish according to the manufacturers' specifications. The finish was applied using a 1" Pure Bristle 1500 paint brush. To ensure consistent coating application, the finish was leveled off using a 10 mils Precision Gage & Tool Co Dow Film Caster. Three coats were used for each floor finish as this was common number of coating layers suggested by the various manufacturers. Each coating layer was allowed to dry for 2 hours prior to the application of the next coat. Completed coupons were allowed to sit for a minimum period of 24 hours before performance evaluations were conducted.

Coefficient of Friction
The ASTM specified apparatus was replaced with an IMASS, Inc SP-102B-3M90 Slip/Peel Tester (Figure 1). Two types of friction coefficients were measured using this instrument. The first, Static CoF, was determined by obtaining the force required to move the specimen from a stationary position. The second, Sliding CoF (or Kinetic), was found by measuring the average force required to maintain movement at a certain rate. Measured forces will have peaks and valleys in the amount of force needed to keep moving. Average these values results and dividing by the weight of the object will result in the desired coefficient.

Figure 1. IMASS Slip/Peel Tester

The Slip/Peel tester was first adjusted to ensure that the device was properly calibrated for the sled weight being used. A coupon was then placed and clamped onto the bed of the device. The speed of the bed was set to 45"/min. The instrument records two values, the peak, the valley and calculates the average. The device was run three times per coupon for measuring the Static CoF and three times to measure the Kinetic CoF. Each coupon's value was averaged and then the values for each finish (three coupon averages) were averaged to get one value for the Static Coefficient of Friction and one value for the Kinetic Coefficient of Friction. These values for coated samples were compared to the CoF for the same uncoated coupons.

Coefficient of Friction = Ratio of tractive (pulling) force to the normal force (sled weight): CoF = F/N = (Tractive force)/(Normal Force) = (meter reading)/(sled weight)

Results:

Initial CoF		Static			Kinetic	
Coupon #	Peak	Valley	Average	Peak	Valley	Average
A	806	614	654	721	634	674
	796	641	662	751	652	693
	811	640	670	749	643	688

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B	832	663	678	692	647	670
	813	649	669	694	644	670
	820	657	676	684	652	666
C	838	597	628	657	598	620
	849	607	635	646	575	618
	793	603	620	649	594	620
J	848	646	649	705	624	645
	752	639	644	681	622	642
	763	636	647	657	624	638
K	784	586	602	577	517	559
	758	564	571	583	550	569
	780	552	570	572	537	552
L	779	593	615	662	563	588
	797	577	600	625	569	588
	730	564	590	634	569	589

Averages CoF

Kiilto					
Static			Kinetic		
Peak	Valley	Average	Peak	Valley	Average
804	632	662	740	643	685
822	656	674	690	648	669
827	602	628	651	589	619
818	630	655	694	627	658

Kiilto + Primer					
788	640	647	681	623	642
774	567	581	577	535	560
769	578	602	640	567	588
777	595	610	633	575	597

Direct Comparison for All Products Tested

Final - Initial	Static			Kinetic		
	Peak	Valley	Average	Peak	Valley	Average
Capitol Polyurethane Gloss	136	182	216	248	212	223
Pro Finisher Water Based Polyurethane for floors	381	65	183	317	74	156
Pro Finisher Water Based Sanding Sealer	-8	43	62	77	46	54
Quide SA Aqua Deva Metro	24	25	48	52	36	49
Capitol Hydro 202 Satin	348	331	398	477	349	419
SafeCoat BP Satin	158	40	78	114	63	71
SafeCoat BP Gloss	306	103	212	414	169	238
Kiilto	-337	-266	-268	-277	-254	-271
Kiilto + Primer	63	-31	71	123	-50	48

Summary:

Conclusion: The Kiilto was the only product to make the flooring more slippery than the flooring without any coatings.