

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2005
DateRun: 06/24/2005
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 hygroscopic 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 3/4" thick, 2 1/4" 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 coupon's 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: Product ID Products Tested:
1 Hydro 202 Satin
6 SafeCoat Satin
7 SafeCoat Gloss

| Uncoated | | | Static | | | Kinetic | |
|----------|----------|------|--------|---------|------|---------|---------|
| | Coupon # | Peak | Valley | Average | Peak | Valley | Average |

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| | | | | | | | |
|-------------------------|----|-----|-----|-----|-----|-----|-----|
| Capitol Hydro 202 Satin | 49 | 706 | 515 | 524 | 561 | 502 | 516 |
| | | 656 | 496 | 502 | 524 | 456 | 487 |
| | | 721 | 493 | 498 | 533 | 476 | 485 |
| | 50 | 781 | 499 | 532 | 535 | 489 | 512 |
| | | 681 | 498 | 519 | 531 | 485 | 512 |
| | | 688 | 497 | 515 | 525 | 491 | 506 |
| | 51 | 715 | 532 | 533 | 551 | 536 | 542 |
| | | 745 | 515 | 524 | 551 | 529 | 540 |
| | | 775 | 517 | 522 | 555 | 537 | 536 |
| SafeCoat BP Satin | 2 | 838 | 607 | 648 | 645 | 580 | 609 |
| | | 734 | 586 | 629 | 642 | 587 | 622 |
| | | 759 | 588 | 627 | 654 | 577 | 612 |
| | 3 | 833 | 612 | 619 | 627 | 590 | 597 |
| | | 798 | 578 | 593 | 594 | 578 | 584 |
| | | 813 | 577 | 590 | 600 | 568 | 583 |
| | 4 | 729 | 536 | 553 | 577 | 525 | 533 |
| | | 697 | 506 | 530 | 558 | 513 | 525 |
| | | 748 | 530 | 538 | 564 | 516 | 529 |
| SafeCoat BP Gloss | 11 | 777 | 538 | 624 | 647 | 538 | 614 |
| | | 769 | 528 | 613 | 642 | 545 | 616 |
| | | 807 | 542 | 610 | 639 | 541 | 614 |
| | 12 | 869 | 619 | 647 | 636 | 587 | 610 |
| | | 880 | 605 | 626 | 636 | 574 | 604 |
| | | 864 | 581 | 623 | 636 | 574 | 604 |
| | 13 | 771 | 548 | 566 | 563 | 526 | 537 |
| | | 698 | 551 | 562 | 551 | 520 | 528 |
| | | 744 | 536 | 561 | 554 | 521 | 538 |

Summary

| Averages | Static | | | Kinetic | | |
|----------|--------|--------|---------|---------|--------|---------|
| | Peak | Valley | Average | Peak | Valley | Average |
| 1 | 694 | 501 | 508 | 539 | 478 | 496 |
| | 717 | 498 | 522 | 530 | 488 | 510 |
| | 745 | 521 | 526 | 552 | 534 | 539 |
| | 719 | 507 | 519 | 541 | 500 | 515 |
| 6 | 777 | 594 | 635 | 647 | 581 | 614 |
| | 815 | 589 | 601 | 607 | 579 | 588 |
| | 482 | 345 | 356 | 374 | 343 | 351 |
| | 691 | 509 | 530 | 543 | 501 | 518 |
| 7 | 784 | 536 | 616 | 643 | 541 | 615 |
| | 871 | 602 | 632 | 636 | 578 | 606 |
| | 481 | 362 | 374 | 368 | 347 | 355 |
| | 712 | 500 | 541 | 549 | 489 | 525 |

Coated Results

| Coated | Coupon # | Static | | | Kinetic | | |
|-------------------------|----------|--------|--------|---------|---------|--------|---------|
| | | Peak | Valley | Average | Peak | Valley | Average |
| Capitol Hydro 202 Satin | 49 | 859 | 636 | 677 | 807 | 664 | 723 |
| | | 891 | 667 | 694 | 821 | 678 | 728 |
| | | 833 | 695 | 710 | 794 | 669 | 729 |
| | 50 | 1485 | 1024 | 1169 | 1228 | 986 | 1097 |
| | | 1261 | 1001 | 1126 | 1172 | 979 | 1084 |

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| | | | | | | | |
|-------------------|----|------|-----|------|------|-----|------|
| | | 1212 | 969 | 1097 | 1178 | 956 | 1079 |
| | 51 | 1021 | 765 | 877 | 996 | 869 | 947 |
| | | 1000 | 895 | 934 | 1100 | 928 | 1019 |
| | | 1037 | 891 | 965 | 1062 | 916 | 1000 |
| SafeCoat BP Satin | 2 | 829 | 603 | 628 | 646 | 571 | 589 |
| | | 750 | 502 | 621 | 804 | 582 | 607 |
| | | 813 | 434 | 620 | 658 | 572 | 599 |
| | 3 | 827 | 578 | 620 | 624 | 557 | 593 |
| | | 858 | 577 | 604 | 613 | 565 | 593 |
| | | 935 | 574 | 601 | 618 | 587 | 590 |
| | 4 | 936 | 571 | 613 | 625 | 550 | 581 |
| | | 885 | 554 | 589 | 657 | 544 | 574 |
| | | 812 | 547 | 584 | 664 | 545 | 571 |
| | | | | | | | |
| SafeCoat BP Gloss | 11 | 1036 | 605 | 749 | 940 | 619 | 759 |
| | | 834 | 708 | 735 | 855 | 604 | 761 |
| | | 1046 | 728 | 761 | 975 | 736 | 761 |
| | 12 | 988 | 569 | 783 | 1067 | 631 | 800 |
| | | 1184 | 553 | 789 | 1065 | 657 | 797 |
| | | 1227 | 564 | 789 | 1047 | 779 | 801 |
| | 13 | 920 | 577 | 714 | 977 | 582 | 730 |
| | | 1031 | 634 | 720 | 995 | 613 | 740 |
| | | 892 | 493 | 735 | 743 | 698 | 720 |

Summary

| Averages | Static | | | Kinetic | | |
|----------|--------|--------|---------|---------|--------|---------|
| | Peak | Valley | Average | Peak | Valley | Average |
| | | | | | | |
| 1 | 861 | 666 | 694 | 807 | 670 | 727 |
| | 1319 | 998 | 1131 | 1193 | 974 | 1087 |
| | 1019 | 850 | 925 | 1053 | 904 | 989 |
| | 1067 | 838 | 917 | 1018 | 849 | 934 |
| 6 | 797 | 513 | 623 | 703 | 575 | 598 |
| | 873 | 576 | 608 | 618 | 570 | 592 |
| | 878 | 557 | 595 | 649 | 546 | 575 |
| | 849 | 549 | 609 | 657 | 564 | 589 |
| 7 | 972 | 680 | 748 | 923 | 653 | 760 |
| | 1133 | 562 | 787 | 1060 | 689 | 799 |
| | 948 | 568 | 723 | 905 | 631 | 730 |
| | 1018 | 603 | 753 | 963 | 658 | 763 |

Summary:

Conclusion:

Both SafeCoat BP Gloss and Capitol Hydro 202 Satin had substantial increases to the static and Kinetic CoFs. These increase were similar to the increase for the Pro Finisher Water Based Polyurethane from the previous trial.