

5-27920.48 Slip Resistance Testing

1 Introduction

Ten samples of timber coating products were received from Resene on 22nd of May 2017. The coating products had been applied to a section of hardwood flooring with each sample measuring approximately 1,210 x 110 mm. All of the samples were tested in the dry condition to Appendix B of AS 4586¹. Additional testing in the wet condition to Appendix A of AS 4586 was also performed on five of the samples. This report gives the details and results of the slip resistance testing performed.

2 Dry Slip Resistance Testing

DRY CONDITION PEDESTRIAN SLIP RESISTANCE TESTING			
DESCRIPTION	RESENE PAINTS LTD		
Sampling	Ten individual samples of timber coating products were received from Resene Paints Ltd.		
TESTING			
Method	AS 4586 Slip resistance classification of new pedestrian surface materials Appendix B Dry Floor Friction Test Method		
Test and report	Iain McIver	Prepared for	Resene Paints Ltd
Review	Richard Jackett	Contact	Mark Glenny
Date of testing	06/06/17 – 09/06/17	Location	Opus Research, Petone
Slider	4S rubber slider (#96)	Conditions	19.6°C, 47% RH
AS 4586-2013 REPORTING			
Under AS 4586, each sample has the coefficient of friction measured over two 800 mm lengths. The readings for each of these measurements is reported along with average of the two, rounded to the nearest 0.05. The samples have been classified based on their measured coefficients of friction and Table 3 of AS 4586.			

¹ AS 4586-2013 Slip resistance classification of new pedestrian surface materials.

Slip Resistance Testing

DRY CONDITION RESULTS				
Sample number	Sample name	Coefficient of friction measured for each run	Coefficient of friction rounded to nearest 0.05	AS 4586 classification
1	ProSelect 2K Gloss	0.49,0.51	0.50	D1
2	ProSelect 2K Semigloss	0.46,0.43	0.45	D1
3	ProSelect 2K Satin	0.47,0.49	0.50	D1
4	ProSelect 2K Velvet	0.44,0.47	0.45	D1
5	ProSelect 2K Low Sheen	0.58,0.59	0.60	D1
6	ProSelect 2K Natural Low Sheen	0.72,0.75	0.75	D1
7	ProSelect 2K Ultra Matt	0.69,0.71	0.70	D1
8	ProSelect 1K Gloss	0.56,0.50	0.50	D1
9	ProSelect 1K Semigloss	0.53,0.47	0.50	D1
10	ProSelect 1K Satin	0.49,0.46	0.50	D1

3 Wet Slip Resistance Testing

WET CONDITION PEDESTRIAN SLIP RESISTANCE TESTING	
DESCRIPTION	RESENE PAINTS LTD
Sampling	Five individual samples of timber coating products were received from Resene Paints Ltd. The five samples tested were samples 1, 4, 5, 7 and 10.

TESTING			
Method	AS 4586 Slip resistance classification of new pedestrian surface materials Appendix A Wet Pendulum Test Method		
Test and report	Iain McIver	Prepared for	Resene Paints Ltd
Review	Richard Jackett	Contact	Mark Glenny
Date of testing	23/05/17 – 15/06/17	Location	Opus Research, Petone
Slider	4S rubber slider (#96)	Conditions	18.4-19.0°C, 41-45% RH

AS 4586-2013 REPORTING
AS 4586: 2013 requires that each specimen's mean BPN value is adjusted to a Skid Resistance Value (SRV). For the 4S rubber slider (#96) used, the BPN value is equal to the SRV. AS 4586: 2013 then requires reporting of the sample mean SRV and classification of that mean SRV using Table 2 of that Standard. All testing was performed along the length of the samples. Testing along the length of the sample, and the grain, is conservative. Although, in this case the grain of the timber was not perceptible to touch.

Slip Resistance Testing

RESULTS: SAMPLE ONE – PROSELECT 2K GLOSS					
Test	1	2	3	4	5
Mean British Pendulum Number (BPN)	12	10	11	10	10
THE SAMPLE MEAN SRV IS 11 AND THE SAMPLE IS CLASSIFIED AS P0					

RESULTS: SAMPLE FOUR – PROSELECT 2K VELVET					
Test	1	2	3	4	5
Mean British Pendulum Number (BPN)	19	18	20	20	20
THE SAMPLE MEAN SRV IS 19 AND THE SAMPLE IS CLASSIFIED AS P1					

RESULTS: SAMPLE FIVE – PROSELECT 2K LOW SHEEN					
Test	1	2	3	4	5
Mean British Pendulum Number (BPN)	32	34	32	31	32
THE SAMPLE MEAN SRV IS 32 AND THE SAMPLE IS CLASSIFIED AS P2					

RESULTS: SAMPLE SEVEN – PROSELECT 2K ULTRA MATT					
Test	1	2	3	4	5
Mean British Pendulum Number (BPN)	44	44	45	46	45
THE SAMPLE MEAN SRV IS 45 AND THE SAMPLE IS CLASSIFIED AS P4					

RESULTS: SAMPLE TEN – PROSELECT 1K SATIN					
Test	1	2	3	4	5
Mean British Pendulum Number (BPN)	16	14	14	16	15
THE SAMPLE MEAN SRV IS 15 AND THE SAMPLE IS CLASSIFIED AS P1					

4 Summary

All ten samples of the coating products had their dry slip resistance measured as per Appendix B of AS 4586-2013. All ten products were found to have coefficients of friction in the dry condition of over 0.4 meaning all products were classified as D1 under the standard.

Five of the samples were further tested to measure their coefficient of friction in the wet condition as per Appendix A of AS 4586-2013. Classifications for the five samples tested in the wet condition were:

- Sample #1 - ProSelect 2K Gloss – P0
- Sample #4 – ProSelect 2K Velvet – P1
- Sample #5 – ProSelect 2K Low Sheen – P2
- Sample #7 – ProSelect 2K Ultra Matt – P4
- Sample #10 – ProSelect 2K Satin – P1

The results in this report are for the materials for the condition in which they were tested. Factors such as trafficking, wear, contamination, dirtying (even fine dust) and/or maintenance procedures may alter the in-service friction characteristics.

5 Additional Information

The following information is provided on an informative basis for users of the pedestrian slip resistance testing results. It is not intended to replace reading of any documents referred to.

5.1 AS 4586-2013

The slip resistance testing covered in this report has been performed in accordance with Australian Standard AS 4586-2013. Appendix A of this standard has been used for the wet slip resistance testing while Appendix B has been used for the dry slip resistance tests. Although this standard is not a current New Zealand standard, it is referenced in clause D1 of the New Zealand Building Code.

AS 4586 provides test methods stated as appropriate to determine the characteristics of surface materials either in the laboratory, under conditions in which the surface materials are intended to be installed, or in situ following installation; and provides those test methods for either testing for the wet condition or the dry condition. There is little or no correlation between a walking surface's pedestrian slip resistance performance in the dry condition and performance in the wet condition.

Classification of surfaces tested in the wet condition have been taken from Table 2 of AS 4586 which has been reproduced as Table 5.1 below. Classification of surfaces tested in the dry condition have been taken from Table 3 of AS 4586 which has been replicated as Table 5.2 below.

Table 5.1. Table showing the wet slip resistance classifications from AS 4586.

Classification of pedestrian surface materials according to the AS 4586 wet pendulum test		
Classification	Pendulum slip resistance value	
	Slider 96	Slider 55
P5	> 54	> 44
P4	45 – 54	40 – 44
P3	35 – 44	35 – 39
P2	25 - 34	20 - 34
P1	12 – 24	< 20
P0	< 12	

Table 5.2. Table showing the dry slip resistance classification from AS 4586.

Classification of pedestrian surface materials according to the AS 4586 dry floor friction test	
Classification	Floor friction tester mean value
D1	≥0.40
D0	<0.40

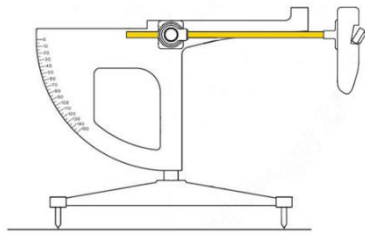
5.2 Tortus – Dry floor friction tester

The Tortus is a power-driven cart with a weighted foot that is suspended on a leaf-spring arrangement. The base of the foot is a 9 mm diameter rubber slider (IRHD hardness 96) which, during a run, drags on the test surface. As the cart crawls forward at 1 metre per minute, the foot is displaced backwards by the dragging action. This displacement of the foot is gauged providing a continuous trace of the dynamic coefficient of friction over the length of that run, which would typically be at least 800 mm. During the run the coefficient of friction is displayed via a needle display on the Tortus. Also, the output during the run is recorded to a computer for subsequent processing. On a computer, the recorded data is reviewed and a mean coefficient of friction determined for that run.

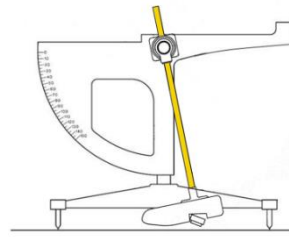
5.3 The British Pendulum Tester

The particular type of pendulum friction tester used in the testing reported here is known as a British Pendulum Tester or the Transport Road Research Laboratory (TRRL) portable skid-resistance tester. The pendulum friction tester has a rigid swinging arm, approximately 450 mm long, which contacts the test surface with a spring loaded rubber slider (about 75 mm by 20 mm) mounted on a weighted foot. The pendulum arm swings the foot downwards through 90°, so the foot strikes the test surface when the pendulum arm is near vertical. The pendulum arm length is set so the rubber slides along the test surface for a distance of between 125 and 127 mm, losing energy as it does so, that energy loss being related to the frictional resistance of the test surface. After sliding the rubber along the test surface, the pendulum arm then swings upwards alongside a British Pendulum Number (BPN) scale to provide a direct reading of the BPN. A higher BPN implies the surface has higher friction.

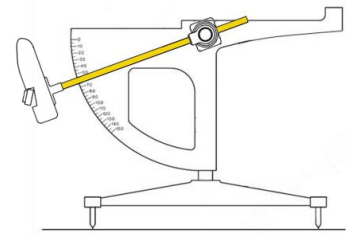
Slip Resistance Testing



Pendulum arm horizontal ready to start swing



Rubber slider on pendulum arm about to contact ground



Height of pendulum arm swing against numerical scale

For AS 4586: 2013 wet pendulum test method, there are two possible rubber slider types that can be used; Slider 96 or Slider 55 (number indicate the IRHD hardness).

Slider 96 is harder than Slider 55. Slider 96 was specifically developed as a standard simulated shoe sole rubber. It is considered to provide greater discrimination between smoother pedestrian surfaces.

Slider 55 is softer than Slider 96. It has traditionally been used for testing outdoor surfaces. The performance of this softer rubber slider is dependent on temperature. The wet floor test method in AS 4586: 2013 includes a table of temperature corrections for results obtained using the Slider 55.

For the wet pendulum test method, the rubber sliders are conditioned prior to testing of a sample. For the AS 4586: 2013 wet pendulum test method, the rubber slider is conditioned over Grade P 400 wet and dry abrasive paper followed by further conditioning over a 3 micron lapping film. The foreword to AS 4586: 2013 explains the lapping film conditioning enables better differentiation between pedestrian surfaces, particularly smoother surfaces.

Testing completed by:

Iain McIver
Engineering Scientist

Reviewed by:

Richard Jackett
Principal Engineering Scientist