

Pedestrian Slip Resistance Testing to AS/NZS 3661.1: 1993 for Resene Paints Limited

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Date: October 1999
Reference: 99-527914.92-527915.01
Status:

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Wellington Mail Centre
WELLINGTON

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1. MATERIALS TESTED

Nine samples, each comprising five specimens were prepared and supplied by the client for testing. Details are shown in the table below. Five samples were tested wet and dry and four samples were tested dry only at the client's request.

2. TESTS USED AND BASIS FOR INTERPRETATION

The testing that was applied was in accordance with the joint Australian and New Zealand standard AS/NZS 3661.1 : 1993 "Slip Resistance of Pedestrian Surfaces, Part 1 Requirements". The scope of the standard states that these test methods are 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. The test method is selected on the basis of whether the material is to be used in either a wet or dry area. The client requested that the material be tested for both the wet and dry condition. The test methods are set out in Appendices A and B of the standard, namely the pendulum friction tester for the wet condition and the floor friction tester for the dry condition. A brief description of these instruments is as follows.

The TRRL Pendulum (pendulum friction tester) has a rigid swinging arm approximately 450 mm long which contacts the surface with a spring loaded slider about 75 x 20 mm in size, at a speed of about 2 m/sec. This slider is of a specially designed rubber material (Simulated Standard Shoe Sole, the 4S rubber) so that the instrument delivers, as far as possible, a response which is representative of a "typical" pedestrian wearing suitable footwear. This instrument is regarded as equating the action of pedestrians running, hurrying or turning abruptly as, when wet, it replicates the aquaplaning effect which is particularly pronounced on smooth or highly glazed surfaces.

The BCRA Tortus (floor friction tester) drags a 9 mm cylindrical rubber slider, again the 4S rubber, across the test surface at a much reduced speed of 17 mm/sec. This instrument is regarded as equating the action of pedestrians moving slowly or cautiously across the surface and tends to exclude aquaplaning effects on wet surfaces.

The Standard defines wet areas as all external areas plus those internal pedestrian surfaces that are normally wet during use. It further states that water must be excluded from all dry areas, for instance by appropriate design. In its notes, the Standard envisages that regulatory authorities may specify the areas required to be slip resistant and whether they are to be considered "wet" or "dry".

The results described within this test report are for the materials submitted by the client for testing. For example with the paint/grit combination samples, an important factor is the quantity of paint used and the depth of grit embedment. The client should determine the extent to which the submitted materials are representative of the batch or variations from batch to batch from the supplier's quality assurance procedures.

Note that factors such as wear, contamination or cleaning procedures may alter the surface properties and consequently the slip resistance of these materials.

3. FRICTION REQUIREMENTS OF SURFACES

Friction requirements of surfaces as defined in AS/NZS 3661.1 are:

Coefficient of Friction – Wet: When tested in accordance with the method set out in Appendix A, the pedestrian surface shall have a mean coefficient of friction of not less than 0.4 and no specimen in that sample shall be less than 0.35.

Coefficient of Friction – Dry: When tested in accordance with the method set out in Appendix B, the pedestrian surface shall have a mean coefficient of friction of not less than 0.4 and no specimen in that sample shall be less than 0.35.

Note: It would generally be expected that surfaces which have been shown to comply with the wet requirement would also comply with the dry requirement.

Ramps and Other Sloped Areas

For all sloped or graded surfaces with a gradient not less than 2%, the minimum required value for the coefficient of friction of either wet or dry surfaces as specified above shall be increased in accordance with the following equation, expressed to an accuracy of 0.01:

$$\mu_m = \frac{100\mu + M}{100 - M\mu}$$

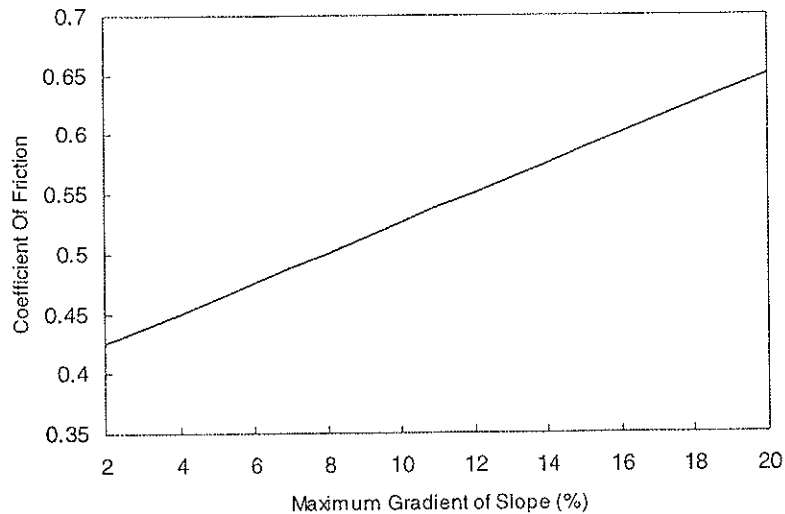
where μ_m = coefficient of friction required for a sloped surface
 μ = coefficient of friction obtained on a horizontal surface
 M = maximum gradient of slope, in percent

Central Laboratories' Sample No.	Material Type	Material Name and Application Rate			Central Laboratories' Report No.
7/99/77	Waterborne	Lumbersider	12m ² /L		527914.92
		Lumbersider + 500g/L SRG	8m ² /L		
		Lumbersider	16m ² /L		
7/99/78	High Build Epoxy	Armourcote 510	6.9m ² /L	125μ DFT	527914.93
		Armourcote 510	6.9m ² /L	125μ DFT	
			Total:	250μ DFT	
7/99/79	High Build Epoxy	Armourcote 510 + 500g/L	3.5m ² /L	250μ DFT	527914.94
		SRG Industrial	Total	250μ DFT	
7/99/80	High Build Epoxy/ Urethane Acrylic	Armourcote 510 + 500g/L			527914.95
		SRG Industrial	3.5m ² /L	250μ DFT	
		Uracyl 403	10.0m ² /L	50μ DFT	
			Total	300μ DFT	
7/99/81	High Build Epoxy	Armourcote 512	7m ² /L	125μ DFT	527914.96
		Armourcote 512	7m ² /L	125μ DFT	
			Total	250μ DFT	
7/99/82	High Build Epoxy	Armourcote 512 + 500g/L			527914.97
		SRG Industrial	2.6m ² /L	250μ DFT	
7/99/83	Epoxy Urethane	ArmourTrack 790	7.0m ² /L	125μ DFT	527914.98
		ArmourTrack 790	7.0m ² /L	125μ DFT	
			Total	250μ DFT	
7/99/84	Epoxy Urethane	ArmourTrack 790			527914.99
		+ 500g/L SRG Industrial	3.6m ² /L	250μ DFT	
7/99/85	Urethane\Acrylic	Uracyl 403 + 500g/L SRG	11.6m ² /L	50μ DFT	527915.01
		Uracyl	17.0m ² /L	30μ DFT	
			Total	80μ DFT	

Wet
0.42
F
0.49
F
F
0.51
F
0.55
0.43



This equation is represented in graphical form following:



Coefficient of Friction Required for a Sloped Surface,
Calculated for $\mu = 0.4$

For example, a surface with a slope of 8% would require a coefficient of friction of 0.5.

Compliance with the slip resistant performance of NZBC D1.3.3(d) may be verified by confirming that the walking surface, under the expected conditions of use, has a coefficient of friction (μ) of no less than

$$\mu = 0.4 + 0.0125S$$

where S is the slope of the walking surface expressed as a percentage.

4. RESULTS

The results are shown in the following test reports No. 99.527914.92 – 527915.01

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PEDESTRIAN SLIP RESISTANCE TEST REPORT NO. 99-527915.01

Client: Resene Paints Limited
Client's Reference: Order No. 510219A
Sample No.: 7/99/85
Specimen Size: 300mm x 300mm
No. of Specimens Tested: 5

Tested By: *[Signature]*
Date: 6/10/99
Checked By: *[Signature]*
Date: 7/16/99

DESCRIPTION OF SAMPLE SUPPLIED BY CLIENT

Manufacturer: Resene Paints Limited Material Type: Urethane Acrylic
Substrate : Cement Fibre Board
Colour: Grey-Green
1st Coat: Uracryl 403 + 500g/L SRG 11.6m²/L 50µ DFT
2nd Coat: Uracryl 17.0m²/L 30µ DFT

METHOD

Tests were carried out according to AS/NZS 3661.1 : 1993 Slip Resistance of Pedestrian Surfaces, Part 1 – Requirements, Appendix A “Method for the Measurement of the Coefficient of Friction of Wet Surfaces” and Appendix B “Method for the Measurement of the Coefficient of Friction of Dry Surfaces”.

Type of Test: Unfixed Location of Test: Central Laboratories

Preparation for testing was carried out in accordance with:

- A4 preparation for laboratory testing
- A5 preparation for in situ testing

Air Temperature: 20°C

Relative Humidity: 54%

RESULTS

Appendix A : Wet Surfaces

Appendix B : Dry Surfaces

Specimen No.	Test Direction	Mean Coefficient of Friction	Specimen No.	Test Direction	Mean Coefficient of Friction
7/99/85 - 1	N/A	0.47	7/99/85 (1-5)	N/A	0.87
7/99/85 - 2	N/A	0.44	7/99/85 (1-5)	N/A	0.84
7/99/85 - 3	N/A	0.41	Sample Mean Coefficient of Friction: 0.85		
7/99/85 - 4	N/A	0.41			
7/99/85 - 5	N/A	0.41			
Sample Mean Coefficient of Friction: 0.43					

REQUIREMENTS

See Page 2 of test report, 99-527914.92 – 527915.01

Comments: