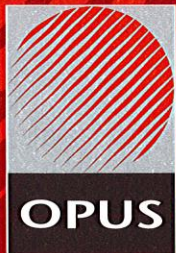




*Opus Research Test Report 13-57920.07*

# **Pedestrian Slip Resistance Testing for Timspec.**





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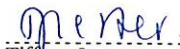
# **Pedestrian Slip Resistance Testing for Timspec.**

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Date: 4 November 2013  
Reference: 527920.07  
Status: Final

Client: Timspec  
P.O Box 27 496  
Mt Roskill  
Auckland 1440

Contact: Johnny Dobbyn  
Phone: 09 620 0260

## **1 INTRODUCTION**

Slip testing was carried out on the timber samples supplied by the client.

## **2 TESTS CARRIED OUT 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". This standard has been superseded, but it is still called for by the Building Code. 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 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 client requested that the samples be tested for the wet condition. The test method is set out in Appendix A of the Standard, namely the use of the pendulum friction tester for the wet condition. A brief description of the instrument 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 20mm in size, at a speed of about 2m per 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 that is representative of a "typical" pedestrian wearing suitable footwear. This instrument is regarded as equating the action of pedestrians running, hurrying or turning abruptly.

Note that factors such as wear, contamination or cleaning procedures may alter the surface properties and consequently the slip resistance compared to that measured in this testing. Natural materials such as timber can be prone to the presence of algae and growth that can lower the slip resistance of the surface.

## **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 that have been shown to comply with the wet requirement would also comply with the dry requirement.

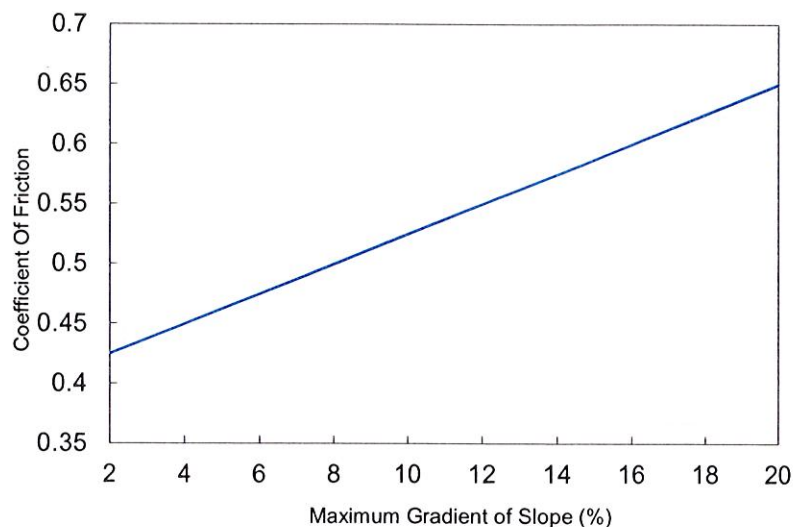
### Ramps and Other Sloped Areas

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  $\mu_m$  = coefficient of friction required for a sloped surface  
 $\mu$  = coefficient of friction obtained on a horizontal surface  
 $M$  = maximum gradient of slope, in percent

This equation is represented in graphical form below:



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 ( $\mu$ ) of no less than

$$\mu = 0.4 + 0.0125S$$

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

Test Report 13-527920.07a  <b>WET CONDITION PEDESTRIAN SLIP RESISTANCE TESTING:</b>		Timspec P.O Box 27 496 Mt Roskill Auckland 1440  Contact: Johnny Dobbyn Phone: 09 620 0260
Tested by Shirley Potter	Checked by Tiffany Lester	

<b>Sample</b>	Accoya Rough Sawn
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<b>Sampled by</b>	Client	<b>Client</b>	Timspec
<b>Number of specimens</b>	Five	<b>Material type</b>	Timber
<b>Specimen size</b>	160 x 250 x 25mm	<b>Manufacturer</b>	Accsys Technology
<b>Sample number</b>	7/13/12 (1-5)	<b>Common name</b>	Accoya
<b>Project number</b>	527920.07a	<b>Colour</b>	Natural
<b>Surface Coating:</b>	Raw uncoated	<b>Surface finish</b>	Rough sawn

<b>TESTING</b>			
<b>Test</b>	<b>AS/NZS 3661.1: 1993 Slip Resistance of Pedestrian Surfaces – Requirements Appendix A Method for the Measurement of the Coefficient of Friction of Wet Surfaces</b>		
<b>Preparation</b>	A4 for laboratory testing	<b>Date of test</b>	4.11.13
<b>Type of test</b>	Un fixed	<b>Location of test</b>	Opus Research
<b>Surface</b>	Wet	<b>Air temperature</b>	19°C
		<b>RH:</b>	59%

<b>TEST REQUIREMENTS</b>
AS/NZS 3661.1 requires that when tested wet the pedestrian surface shall have a mean coefficient of friction not less than 0.4, and no specimen in that sample shall have a mean coefficient of friction less than 0.35. Compliance with the slip resistant performance of NZBC D1.3.3(d) may be verified by referring to the acceptable solution (AS 1) of that clause which cites this test standard and acceptable values.  Further background to the testing and requirements is given on the preceding pages.

<b>TEST RESULTS</b>					
Specimen No.	7/13/12-1	7/13/12-2	7/13/12-3	7/13/12-4	7/13/12-5
Direction of test	Along	Along	Along	Along	Along
Mean coefficient of friction	0.47	0.45	0.49	0.49	0.47
<b>SAMPLE MEAN WET COEFFICIENT OF FRICTION</b>					<b>0.47</b>

<b>COMMENTS</b>
These results are only valid for this material for the condition in which it was received. Most surfaces wear under foot trafficking and the friction coefficient can change. Other factors, such as contamination, dirtying, or cleaning procedures, even fine dust, may also alter the surface properties and consequently its pedestrian slip resistance. Timber is typically prone to algal growth in exterior use which can affect the slip resistance.

Test Report 13-527920.07c  <b>WET CONDITION PEDESTRIAN SLIP RESISTANCE TESTING:</b>		Timspec P.O Box 27 496 Mt Roskill Auckland 1440  Contact: Johnny Dobbyn Phone: 09 620 0260
Tested by Shirley Potter	Checked by Tiffany Lester	

<b>Sample</b>	Ruffer head
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<b>Sampled by</b>	Client	<b>Client</b>	Timspec
<b>Number of specimens</b>	Five	<b>Material type</b>	Timber
<b>Specimen size</b>	193 x 300 x 20mm	<b>Manufacturer</b>	Accsys Technology
<b>Sample number</b>	7/13/14 (1-5)	<b>Common name</b>	Accoya
<b>Project number</b>	527920.07c	<b>Colour</b>	Natural
<b>Surface Coating:</b>	No coating	<b>Surface finish</b>	Ruffer head (small grooves)

<b>TESTING</b>			
<b>Test</b>	<b>AS/NZS 3661.1: 1993 Slip Resistance of Pedestrian Surfaces – Requirements Appendix A Method for the Measurement of the Coefficient of Friction of Wet Surfaces</b>		
<b>Preparation</b>	A4 for laboratory testing	<b>Date of test</b>	4.11.13
<b>Type of test</b>	Un fixed	<b>Location of test</b>	Opus Research
<b>Surface</b>	Wet	<b>Air temperature</b>	19°C
		<b>RH:</b>	59%

<b>TEST REQUIREMENTS</b>
AS/NZS 3661.1 requires that when tested wet the pedestrian surface shall have a mean coefficient of friction not less than 0.4, and no specimen in that sample shall have a mean coefficient of friction less than 0.35. Compliance with the slip resistant performance of NZBC D1.3.3(d) may be verified by referring to the acceptable solution (AS 1) of that clause which cites this test standard and acceptable values.  <b>Further background to the testing and requirements is given on the preceding pages.</b>

<b>TEST RESULTS</b>					
Specimen No.	7/13/14-1	7/13/14-2	7/13/14-3	7/13/14-4	7/13/14-5
Direction of test	Along	Along	Along	Along	Along
Mean coefficient of friction	0.38	0.37	0.37	0.37	0.38
<b>SAMPLE MEAN WET COEFFICIENT OF FRICTION</b>				<b>0.37</b>	

<b>COMMENTS</b>
These results are only valid for this material for the condition in which it was received. Most surfaces wear under foot trafficking and the friction coefficient can change. Other factors, such as contamination, dirtying, or cleaning procedures, even fine dust, may also alter the surface properties and consequently its pedestrian slip resistance. Timber is typically prone to algal growth in exterior use which can affect the slip resistance.  A single indicative test was carried out across a timber specimen it gave a wet coefficient of friction of 0.43

Test Report 13-527920.07d  <b>WET CONDITION PEDESTRIAN SLIP RESISTANCE TESTING:</b>		Timspec P.O Box 27 496 Mt Roskill Auckland 1440  Contact: Johnny Dobbyn Phone: 09 620 0260
Tested by Shirley Potter	Checked by Tiffany Lester	

<b>Sample</b>	European BSF (Band sawn face)
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<b>Sampled by</b>	Client	<b>Client</b>	Timspec
<b>Number of specimens</b>	Five	<b>Material type</b>	Timber
<b>Specimen size</b>	193 x 300 x 20mm	<b>Manufacturer</b>	Accsys Technology
<b>Sample number</b>	7/13/15 (1-5)	<b>Common name</b>	Accoya
<b>Project number</b>	527920.07d	<b>Colour</b>	Natural
<b>Surface Coating:</b>	No coating	<b>Surface finish</b>	Band sawn (notch profiled)

<b>TESTING</b>			
<b>Test</b>	<b>AS/NZS 3661.1: 1993 Slip Resistance of Pedestrian Surfaces – Requirements Appendix A Method for the Measurement of the Coefficient of Friction of Wet Surfaces</b>		
<b>Preparation</b>	A4 for laboratory testing	<b>Date of test</b>	4.11.13
<b>Type of test</b>	Un fixed	<b>Location of test</b>	Opus Research
<b>Surface</b>	Wet	<b>Air temperature</b>	19°C
		<b>RH:</b>	59%

<b>TEST REQUIREMENTS</b>
AS/NZS 3661.1 requires that when tested wet the pedestrian surface shall have a mean coefficient of friction not less than 0.4, and no specimen in that sample shall have a mean coefficient of friction less than 0.35. Compliance with the slip resistant performance of NZBC D1.3.3(d) may be verified by referring to the acceptable solution (AS 1) of that clause which cites this test standard and acceptable values.  Further background to the testing and requirements is given on the preceding pages.

<b>TEST RESULTS</b>					
Specimen No.	7/13/15-1	7/13/15-2	7/13/15-3	7/13/15-4	7/13/15-5
Direction of test	Along	Along	Along	Along	Along
Mean coefficient of friction	0.46	0.47	0.47	0.47	0.47
<b>SAMPLE MEAN WET COEFFICIENT OF FRICTION</b>					<b>0.47</b>

<b>COMMENTS</b>
These results are only valid for this material for the condition in which it was received. Most surfaces wear under foot trafficking and the friction coefficient can change. Other factors, such as contamination, dirtying, or cleaning procedures, even fine dust, may also alter the surface properties and consequently its pedestrian slip resistance. Timber is typically prone to algal growth in exterior use which can affect the slip resistance.  A single indicative test was carried out across a timber specimen it gave a wet coefficient of friction of 0.54