



527920.07/2

# **Pedestrian slip resistance testing**

## **For Timspec**

## **Accoya coated with CD50 Extreme**

Prepared by Tiffany Lester

Reviewed by Vince Dravitzki

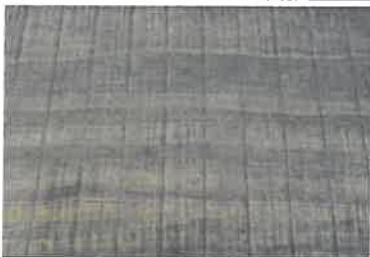
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Test Report 527920-07/2		
<b>WET CONDITION PEDESTRIAN SLIP RESISTANCE TESTING: ACCOYA COATED WITH CD50 EXTREME</b>		
Test operator	Tiffany Lester	Client: Timspec PO Box 27-496, Mt Roskill, Auckland 1440 Contact: Johnny Dobbyn
Report	Tiffany Lester	
Review	Vince Dravitzki	

<b>SAMPLE</b>		
	7/14/01	
<b>Sampling</b>	Five specimens supplied by client	
<b>Description</b>	Accoya timber substrate coated with CD50 Extreme described as a penetrating oil "Black ash" colour	
<b>Size</b>	195 mm wide, 21 mm thick, 280 – 300 mm long	

<b>TESTING</b>			
<b>Date of testing</b>	28 June 2014	<b>Air temperature</b>	21°C
<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>Slider</b>	4S rubber slider (#96)

<b>TEST REQUIREMENTS</b>
AS/NZS 3661.1 section 5.1.1 requires that when tested wet the pedestrian surface shall have a <b>mean coefficient of friction not less than 0.40</b> , 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 references this test standard and acceptable values.
Further background to the testing and requirements is given on following pages.

<b>RESULTS</b>					
<b>Specimen</b>	1	2	3	4	5
<b>Direction</b>	Across surface texture-lines, in the direction along the grain of the timber substrate				
<b>Mean coefficient of friction</b>	0.51	0.45	0.45	0.46	0.45
<b>SAMPLE MEAN WET COEFFICIENT OF FRICTION</b>					<b>0.47</b>

<b>COMMENTS</b>	
1	The results are only valid for the condition in which the sample was tested. Surfaces may wear under foot trafficking and other factors, such as contamination, weathering, dirtying, or cleaning procedures, may also alter the surface properties and consequently alter its pedestrian slip resistance.
2	Specimens 3 and 5 were also tested along the surface texture-lines, in the direction across the grain of the timber substrate. The mean coefficient of friction was 0.48 and 0.51 respectively.

## **This information is provided so as to direct users when using the pedestrian slip resistance testing results.**

### **AS/NZS 3661.1: 1993**

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 - Requirements". Though superseded as a Standard<sup>1</sup>, for verification of slip-resistance performance the New Zealand Building Code states measurement of the coefficient of friction shall be in accordance with AS/NZS 3661.1.

The scope of AS/NZS 3661.1: 1993 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 methods enable characteristics of surface materials to be determined in either wet or dry conditions. The wet condition shall be used for all external pedestrian surfaces and those internal pedestrian surfaces that have a reasonably foreseeable risk of the presence of wet substances such as water, grease and oil.

The test method for the wet condition is set out in Appendix A "Wet Pendulum Test Method". Testing for the wet condition uses a pendulum friction tester. The particular type of pendulum friction tester used is known as a British Pendulum Tester or the Transport Road Research Laboratory (TRRL) portable skid-resistance tester.

The test method is selected on the basis of whether the material is to be used in either a wet or dry area. The "Method for the Measurement of the Coefficient of Friction of Dry Surfaces" is set out in Appendix B of the standard. Testing for the dry surface condition uses the Tortus Floor Friction Tester.

### **The British Pendulum Tester**

The British Pendulum 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, and 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 a more slip resistant surface. From the BPN, the coefficient of friction can be calculated.

For AS/NZS 3661.1: 1993, the British Pendulum Test uses a rubber slider known as the Four S rubber slider (Slider #96) which is made of a standard simulated shoe sole rubber. With this rubber, the British Pendulum Tester delivers, as far as possible, a response that is representative of a "typical" pedestrian wearing suitable footwear. The test speed of the rubber slider over the test surface is approximately 2 m/s. People typically walk at speeds of 65 to 90 m/minute, about 1.0 to

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<sup>1</sup> AS/NZS 3661.1: 1993 has been superseded as a Standard in both New Zealand and Australia. In New Zealand, the current Standard for "Slip resistance measurement of existing pedestrian surfaces" is AS/NZS 4663: 2004 and the current Standard for "Slip resistance classification of new pedestrian surface materials" is AS/NZ 4586: 2004. In Australia, the current Standard for "Slip resistance measurement of existing pedestrian surfaces" is AS 4663: 2013 and the current Standard for "Slip resistance classification of new pedestrian surface materials" is AS 4586: 2013. The test methods in the current Australian Standards differ slightly from those in the current New Zealand Standards, which differ slightly from AS/NZS 3661.1: 1993.

1.5 m/s, so the instrument is regarded as equating the action of pedestrians walking in unconstrained level spaces, possibly hurrying a little or turning abruptly.

### Testing on ramps and other sloped areas

The British Pendulum Tester is capable of performing tests on steep gradients and in the presence of crossfall. On gradients, although the sliding length is slightly displaced from the central position, there is no change in the load between the rubber slider and the test surface and no appreciable change in the speed of sliding. Therefore, the British Pendulum Tester operates correctly whether tests are performed uphill or downhill.

The relationship between BPN and coefficient of friction is:

$$\mu = \frac{3 \times BPN}{330 - BPN}$$

where  $\mu$  is the coefficient of friction

*BPN* is the British Pendulum Number

### Friction requirements on sloped surfaces

The coefficient of friction required for a sloped surface is related to the coefficient obtained on a horizontal surface by:

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

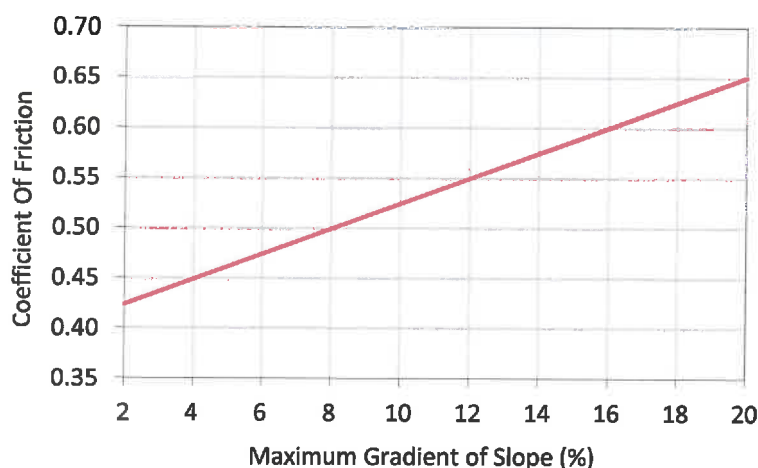
where  $\mu_m$  is the coefficient of friction required for a sloped surface

$\mu$  is the coefficient of friction obtained on a horizontal surface

*M* is 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.