REPORT NUMBER SY 4201

SLIP RESISTANCE CLASSIFICATION OF NEW PEDESTRIAN SURFACES APPENDIX A: WET PENDULUM TEST TO AS/NZS 4586:2004

SY 4201-1
Concrete Paver 600mm x 400mm
Untreated

SY 4201-2
Concrete Paver 600mm x 400mm
Sealed with "Enhance Plus"

SY 4201-3
Concrete Paver 600mm x 400mm
Sealed with "Stainproof"

In Confidence to:
Drytreat Pty Ltd
December 2007

CSIRO

Industrial Research Services

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Registered Testing Authority - Building Code of Australia

18 December 2007 Our Ref. ES13 / 1000 03/0212

TEST REPORT No. SY4201-1

Requested by:	DryTreat
On (date):	18 December 2007
Manufacturer:	Unknown
Product Desc.:	Concrete Paver 600mm x 400mm
	Unsealed
Sampling details:	
Where:	Delivered
Date:	18 December 2007
By whom:	Courier
How (methods):	N/A

This test report consists of 3 pages

SUMMARY OF SLIP RESISTANCE TESTS PERFORMED:

		Result	Class
AS/NZS 4586:2004	Slip resistance classification of new pedestrian surface materials		
	Appendix A: WET Pendulum (Four S slider):		
	Mean BPN:	67	V

In order to interpret the classifications, please refer to Standards Australia Handbook 197, An Introductory Guide to the Slip Resistance of Pedestrian Surface Materials, which recommends minimum classifications for a wide variety of locations.

It is important to realise that test results obtained on unused factory-fresh samples may not be directly applicable in service, where proprietary surface coatings, contamination, wear and subsequent cleaning all influence the behaviour of the pedestrian surface.

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REPORT NO: SY4201-1
ISSUE DATE: 18 December 2007
MANUFACTURER: Unknown
PRODUCT DESC: Concrete Paver 600mm x 400mm
Unsealed

SLIP RESISTANCE CLASSIFICATION OF NEW PEDESTRIAN SURFACE MATERIALS

WET PENDULUM TEST METHOD

TEST CARRIED OUT IN ACCORDANCE WITH
AS/NZS 4586:2004 (Appendix A)

Test Date: 18 December 2007

RESULTS: Location: North Ryde Slip Resistance Laboratory

Rubber slider used: Four S
Conditioned with grade P400 paper, dry

Sample: Unfixed
Cleaning: Acetone
Temperature: 23°C

Pendulum Friction Tester: Stanley (S/N: 9234, calibated 13/6/05)
Test conducted by: Hugh McMullen

	Specimen 1	2	3	4	5
Last 3 swings	**70**	**68**	**69**	**65**	**66**
	70	**67**	**69**	**65**	**66**
	70	**67**	**68**	**64**	**66**
Averages	**70**	**67**	**69**	**65**	**66**

Mean BPN : 67

CLASS : V

Where products are to be used in wet barefoot areas, it is more appropriate to test to Appendix C of AS/NZS 4586 (which is technically equivalent to DIN 51097).

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REPORT NO: 4201-1
ISSUE DATE: 18 December 2007
MANUFACTURER: Unknown
TILE DESC: Concrete Paver 600mm x 400mm
Unsealed

Date and Place 18 December 2007, North Ryde, NSW

Name, Title and Signature:

Hugh McMullen.

HUGH MCMULLEN
Laboratory Manager

Tel: 61 2 94905414
Fax: 61 2 94905555
Email: Hugh.McMullen@csiro.au

Consulting services are available if further detailed analysis of the test results are required.

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REPORT NO: 4201-1 Addendum
ISSUE DATE: 18 December 2007
MANUFACTURER: Unknown
PRODUCT DESC: Concrete Paver 600mm x 400mm
Unsealed

DETERMINATION OF Rz SURFACE ROUGHNESS

(Using a Taylor-Hobson Surtronic 10 Rz roughness meter using a 0.8mm cut off length)

Test Date: 18 December 2007

RESULTS

Location: Slip Resistance Laboratory

	Rz values
1	39.5
2	35.9
3	32.2
4	31.5
5	23.8
6	30.9
7	33.5
8	56.2
9	26.2
10	31.6

Surface Roughness (Rz) mean = 34.1 microns

BS 7976:2002, Pendulum Testers, requires a different test foot preparation (lapping paper) for pedestrian surfaces that have a Rz roughness of less than 15 microns. This lapping paper tends to reduce the pendulum result, sometimes appreciably. CSIRO recommends the use of this procedure (CSIRO COF1) as an adjunct to AS/NZS 4586. It helps to discriminate among products that have marginal wet slip resistance and to identify those that may be dangerous if wet.

The measurement of the various aspects of surface roughness is complex given the number of potential roughness parameters. While there is still some uncertainty as to exactly what type of roughness needs to be measured, peak-to-trough roughness (Rz) gives a useful guide to the likely slip resistance in wet conditions. Research has suggested that hard floors need to have a slightly higher Rz roughness than polymeric floors for the same degree of safety in wet conditions, but whatever flooring material is used an Rz roughness value of at least 10 microns is required where wet slip resistance may be required. In circumstances where wetness is normal or expected, this figure should be increased by a factor of 2 or more.

Greater peak surface roughnesses are likely to be required where floors slope or where the floor is likely to become contaminated with high viscosity liquids.

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Registered Testing Authority - Building Code of Australia

18 December 2007 Our Ref. ES13 / 1000 03/0212

TEST REPORT No. SY4201-2

Requested by:	DryTreat
(on date):	18 December 2007
Manufacturer:	Unknown
Product Desc.:	Concrete Paver 600mm x 400mm Sealed with "Enhance Plus"
Sampling details:	
Where:	Delivered
Date:	18 December 2007
By whom:	Courier
How (methods):	N/A

This test report consists of 3 pages

SUMMARY OF SLIP RESISTANCE TESTS PERFORMED:

		Result	Class
AS NZS 4586:2004	Slip resistance classification of new pedestrian surface materials Appendix A: WET Pendulum (Four S slider): Mean BPN:	66	V

In order to interpret the classifications, please refer to Standards Australia Handbook 197, An Introductory Guide to the Slip Resistance of Pedestrian Surface Materials, which recommends minimum classifications for a wide variety of locations.

It is important to realise that test results obtained on unused factory-fresh samples may not be directly applicable in service, where such factors as surface coatings, contamination, wear and subsequent cleaning all influence the behaviour of the pedestrian surface.

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REPORT NO: SY4201-2
ISSUE DATE: 18 December 2007
MANUFACTURER: Unknown
PRODUCT DESC: Concrete Paver 600mm x 400mm
Sealed with "Enhance"

SLIP RESISTANCE CLASSIFICATION OF NEW PEDESTRIAN SURFACE MATERIALS

WET PENDULUM TEST METHOD

TEST CARRIED OUT IN ACCORDANCE WITH
AS NZS 4586:2004 (Appendix A)

Test Date: 18 December 2007

RESULTS: Location: North Ryde Slip Resistance Laboratory
Rubber slider used: Four S
Conditioned with grade P400 paper, dry

Sample: Unfixed
Cleaning: Acetone
Temperature: 23°C

Pendulum Friction Tester: Stanley (S/N: 9234, calibated 13/6/05)
Test conducted by: Hugh McMullen

	Specimen 1	2	3	4	5
Last 3 swings	**69**	**66**	**65**	**65**	**64**
	69	**66**	**65**	**65**	**64**
	69	**66**	**64**	**65**	**62**
Averages	**69**	**66**	**65**	**65**	**63**

Mean BPN : 66

CLASS : V

Where products are to be used in wet barefoot areas, it is more appropriate to test to Appendix C of AS/NZS 4586 (which is technically equivalent to DIN 51097).

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CSIRO

REPORT NO: 4201-2
ISSUE DATE: 18 December 2007
MANUFACTURER: Unknown
TILE DESC: Concrete Paver 600mm x 400mm
Sealed with "Enhance"

Date and Place 18 December 2007, North Ryde, NSW

Name, Title and Signature:

Hugh McMullen

HUGH MCMULLEN
Laboratory Manager

Tel: 61 2 94905414
Fax: 61 2 94905555
Email: Hugh.McMullen@csiro.au

Consulting services are available if further detailed analysis of the test results are required.

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REPORT NO: 4201-2 Addendum
ISSUE DATE: 18 December 2007
MANUFACTURER: Unknown
PRODUCT DESC: Concrete Paver 600mm x 400mm
Sealed with "Enhance"

DETERMINATION OF Rz SURFACE ROUGHNESS

(Using a Taylor-Hobson Surtronic 10 Rz roughness meter using a 0.8mm cut off length)

Test Date: 18 December 2007

RESULTS

Location: Slip Resistance Laboratory

	Rz values
1	31.2
2	34.1
3	32.0
4	25.3
5	22.6
6	33.6
7	27.8
8	37.7
9	24.6
10	27.1

Surface Roughness (Rz) mean = 29.6 microns

BS 7976:2002, Pendulum Testers, requires a different test foot preparation (lapping paper) for pedestrian surfaces that have a Rz roughness of less than 15 microns. This lapping paper tends to reduce the pendulum result, sometimes appreciably. CSIRO recommends the use of this procedure (CSIRO COF1) as an adjunct to AS/NZS 4586. It helps to discriminate among products that have marginal wet slip resistance and to identify those that may be dangerous if wet.

The measurement of the various aspects of surface roughness is complex given the number of potential roughness parameters. While there is still some uncertainty as to exactly what type of roughness needs to be measured, peak-to-trough roughness (Rz) gives a useful guide to the likely slip resistance in wet conditions. Research has suggested that hard floors need to have a slightly higher Rz roughness than polymeric floors for the same degree of safety in wet conditions, but whatever flooring material is used an Rz roughness value of at least 10 microns is required where wet slip resistance may be required. In circumstances where wetness is normal or expected, this figure should be increased by a factor of 2 or more.

Greater peak surface roughnesses are likely to be required where floors slope or where the floor is likely to become contaminated with high viscosity liquids.

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Registered Testing Authority - Building Code of Australia

18 December 2007 Our Ref. ES13 / 1000 03/0212

TEST REPORT No. SY4201-3

Requested by:	DryTreat
Date	18 December 2007
Manufacturer:	Unknown
Product Desc.:	Concrete Paver 600mm x 400mm Sealed with "Stainproof"
Sampling details:	
Where	Delivered
Date	18 December 2007
By whom	Courier
Prior methods):	N/A

The results reported relate only to the sample(s) tested and the information received. No responsibility is taken for the accuracy of the sampling where this is done under our own supervision. CSIRO cannot accept responsibility for deviations in the manufactured quality and performance of the product. While CSIRO takes care in preparing the reports it provides to clients, it does not warrant that the information in this particular report will be free of errors or omissions or that it will be suitable for the client's purposes. CSIRO will not be responsible for the results of any actions taken by the client or any other person on the basis of the information contained in the report or any opinions expressed in it. The reproduction of this test report is only authorised in the form of a complete photographic facsimile. Our written approval is necessary for any partial reproduction.

This test report consists of 3 pages

SUMMARY OF SLIP RESISTANCE TESTS PERFORMED:

		Result	Class
AS HB 4586:2004	Slip resistance classification of new pedestrian surface materials Appendix A: WET Pendulum (Four S slider): Mean BPN:	68	V

For information to interpret the classifications, please refer to Standards Australia Handbook 197, An Introductory Guide to the Slip Resistance of Pedestrian Surface Materials, which recommends minimum classifications for a wide variety of locations.

It is important to realise that test results obtained on unused factory-fresh samples may not be directly applicable in service, where pedestrian surface coatings, contamination, wear and subsequent cleaning all influence the behaviour of the pedestrian surface.

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REPORT NO: SY4201-3
ISSUE DATE: 18 December 2007
MANUFACTURER: Unknown
PRODUCT DESC: Concrete Paver 600mm x 400mm
Sealed with "Stainproof"

SLIP RESISTANCE CLASSIFICATION OF NEW PEDESTRIAN SURFACE MATERIALS

WET PENDULUM TEST METHOD

TEST CARRIED OUT IN ACCORDANCE WITH
AS/NZS 4586:2004 (Appendix A)

Test Date: 18 December 2007

RESULTS Location: North Ryde Slip Resistance Laboratory

Rubber slider used: Four S
Conditioned with grade P400 paper, dry

Sample: Unfixed
Cleaning: Acetone
Temperature: 23°C

Pendulum Friction Tester: Stanley (S/N: 9234, calibated 13/6/05)
Test conducted by: Hugh McMullen

	Specimen 1	2	3	4	5
Last 3 swings	**68**	**69**	**68**	**67**	**72**
	67	**69**	**68**	**68**	**70**
	67	**69**	**68**	**69**	**69**
Averages	**67**	**69**	**68**	**68**	**70**

Mean BPN : 68

CLASS : V

Where products are to be used in wet barefoot areas, it is more appropriate to test to Appendix C of AS/NZS 4586 (which is technically equivalent to DIN 51097).

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REPORT NO: 4201-3
ISSUE DATE: 18 December 2007
MANUFACTURER: Unknown
TILE DESC: Concrete Paper 600mm x 400mm
Sealed with "Stainproof"

Date and Place 18 December 2007, North Ryde, NSW

Name Title and Signature:

Hugh McMullen

HUGH MCMULLEN
Laboratory Manager

Tel: 61 2 94905414
Fax: 61 2 94905555
Email: Hugh.McMullen@csiro.au

Consulting services are available if further detailed analysis of the test results are required.

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CSIRO

REPORT NO: 4201-3 Addendum
SAMPLE DATE: 18 December 2007
MANUFACTURER: Unknown
PRODUCT DESC: Concrete Paver 600mm x 400mm
Sealed with "Stainproof"

DETERMINATION OF Rz SURFACE ROUGHNESS

(Using a Taylor-Hobson Surtronic 10 Rz roughness meter using a 0.8mm cut off length)

Test Date: 18 December 2007

RESULTS

Location: Slip Resistance Laboratory

	Rz values
1	27.4
2	38.1
3	25.4
4	30.5
5	37.0
6	30.7
7	35.3
8	42.4
9	31.9
10	26.0

Surface Roughness **(Rz) mean = 32.5 microns**

Since 2002 Pendulum Testers, requires a different test foot preparation (lapping paper) for pedestrian surfaces that have a Rz roughness of less than 15 microns. This lapping paper tends to reduce the pendulum result, sometimes significantly. CSIRO recommends the use of this procedure (CSIRO COF1) as an adjunct to AS/NZS 4586. It helps to differentiate among products that have marginal wet slip resistance and to identify those that may be dangerous if wet.

The measurement of the various aspects of surface roughness is complex given the number of potential roughness parameters. While there is still some uncertainty as to exactly what type of roughness needs to be measured, peak-through roughness (Rz) gives a useful guide to the likely slip resistance in wet conditions. Research has suggested that hard floors need to have a slightly higher Rz roughness than polymeric floors for the same degree of safety in wet conditions. but whatever flooring material is used an Rz roughness value of at least 10 microns is recommended where wet slip resistance may be required. In circumstances where wetness is normal or expected, this should be increased by a factor of 2 or more.

Even deeper surface roughnesses are likely to be required where floors slope or where the floor is likely to become contaminated with high viscosity liquids.