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

Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

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

'∴anufacturer:

Unknown

⊃roduct Desc.:

Concrete Paver 600mm x 400mm

Unsealed

Sampling details:

Where:

Delivered

Date:

18 December 2007

By whom:

Courier

How (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 unless it is done under our own supervision. CSIRO cannot accept responsibility for deviations in the manufactured quality and performance of the arciduct. 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 to 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 recent 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/NZS 4586:2004

Slip resistance classification of new pedestrian surface materials Appendix A: WET Pendulum (Four S slider):

Mean BPN:

67

V

- reporter to interpret the classifications, please refer to Standards Australia Handbook 197, An Introductory Guide to the Slip Essistance of Pedestrian Surface Materials, which recommends minimum classifications for a wide variety of locations.
- s important to realise that test results obtained on unused factory-fresh samples may not be directly applicable in service, where extracted surface coatings, contamination, wear and subsequent cleaning all influence the behaviour of the pedestrian surface.



Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

REPORT NO:

SY4201-1

ISSUE DATE:

18 December 2007

MANUFACTURER: PRODUCT DESC:

Unknown

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

Page 2 of 3

RESULTS:

Location:

North Ryde Slip Resistance Laboratory

Rubber slider used: Four S

Conditioned with grade P400 paper, dry

Sample: Cleaning: Unfixed Acetone

Temperature: 23°C

Pendulum Friction Tester: Stanley (S/N: 9234, calibated 13/6/05)

Test conducted by: Hugh McMullen

	Specimer 1	n 2	3	4	5
Last 3 swings	70 70 70	68 67 67	69 69 68	65 65 64	66 66
Averages	70	67	69	65	66

Mean BPN: 67

CLASS:

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).



Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

REPORT NO:

4201-1

Page 3 of 3

SSUE DATE:

18 December 2007

MANUFACTURER:

Unknown

TILE DESC:

Concrete Paver 600mm x 400mm

Unsealed

ugh M' Mullen.

Date and Place

18 December 2007, North Ryde, NSW

Name, Title and Signature:

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.



Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

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 value:
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.



Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

Registered Testing Authority - Building Code of Australia

1E December 2007

Our Ref. ES13 / 1000 03/0212

TEST REPORT No. SY4201-2

Pequested by:

DryTreat

ir cate):

18 December 2007

Manufacturer:

Unknown

Product Desc.:

Concrete Paver 600mm x 400mm

Sealed with "Enhance Plus"

Sampling details:

∴ nere:

Delivered

Date

18 December 2007

∃. .vhom:

Courier

= ○ w (methods): N/A

inelresults reported relate only to the sample(s) tested and the information received. No responsibility is taken for the accuracy of the sampling tiess it is done under our own supervision. CSIRO cannot accept responsibility for deviations in the manufactured quality and performance of the .Vhile CSIRO takes care in preparing the reports it provides to clients, it does not warrant that the information in this particular report will zeroes 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 and the interest of any other person on the basis of the information contained in the report or any opinions expressed in it. The reproduction of this test read to a poly 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:

÷5 NZS 4586:2004

Slip resistance classification of new pedestrian surface materials

Appendix A: WET Pendulum (Four S slider):

Mean BPN:

66

Result

V

Class

inter to interpret the classifications, please refer to Standards Australia Handbook 197, An Introductory Guide to the Slip Figure 19 stance of Pedestrian Surface Materials, which recommends minimum classifications for a wide variety of locations.

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



Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

PEPORT NO:

SY4201-2

18 December 2007

SSUE DATE:

Unknown

==CDUCT 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

÷ 5 NZS 4586:2004 (Appendix A)

Test Date: 18 December 2007

= ESULTS: Location:

North Ryde Slip Resistance Laboratory

Rubber slider used: Four S

Sample: Unfixed

Cleaning: Temperature:

Acetone 23°C

Conditioned with grade P400 paper, dry

Page 2 of 3

Fendulum Friction Tester: Stanley (S/N: 9234, calibated 13/6/05)

Test conducted by: Hugh McMullen

	Specime	n			
	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

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



CSIRO

Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

₽EFORT NO:

4201-2

18 December 2007

Page 3 of 3

ESLEDATE:

VANJEACTURER: Unknown Concrete

Concrete Paver 600mm x 400mm

Sealed with "Enhance"

Date and Place

18 December 2007, North Ryde, NSW

Name. Title and Signature:

₩UGH **MCMULLEN** Lappratory Manager

Te 61 2 94905414 =a: 61 2 94905555

E ~ a : Hugh.McMullen@csiro.au

Jugh McMullen

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

Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia

CSIRO

Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web; http://www.cmmt.csiro.au

FEFORT NO: ISS E DATE: 4201-2

18 December 2007

M'-`\J=ACTURER:

Unknown

FFCCUCT 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

Addendum

FESULTS

Location:

Slip Resistance Laboratory

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

Rz values

Surface Roughness (Rz) mean = 29.6 microns

27.1

E 1776:2002, 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 accres ably. CSIRO recommends the use of this procedure (CSIRO COF1) as an adjunct to AS/NZS 4586. It helps to c seeminate 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. z e a co-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 chisafety 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 terrime contaminated with high viscosity liquids.



Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

Registered Testing Authority - Building Code of Australia

IE December 2007

Our Ref. ES13 / 1000 03/0212

TEST REPORT No. SY4201-3

₹etuested by:

DryTreat

A IBLE

18 December 2007

Mar Liabturer:

Unknown

Product Desc.:

Concrete Paver 600mm x 400mm

Sealed with "Stainproof"

Sameing details:

i√, nere

Delivered

_ a '÷

18 December 2007

≞, ingm:

Courier

-: . ~ethods): N/A

Freme table is reported relate only to the sample(s) tested and the information received. No responsibility is taken for the accuracy of the sampling where is come under our own supervision. CSIRO cannot accept responsibility for deviations in the manufactured quality and performance of the process of takes care in preparing the reports it provides to clients, it does not warrant that the information in this particular report will be the memory 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 the information on the basis of the information contained in the report or any opinions expressed in it. The reproduction of this test is a sutherised 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

₱5 \IS 4586:2004

Slip resistance classification of new pedestrian surface materials Appendix A: WET Pendulum (Four S slider):

Mean BPN:

68

V

► Contents Interpret the classifications, please refer to Standards Australia Handbook 197, An Introductory Guide to the Slip

Season tends of Pedestrian Surface Materials, which recommends minimum classifications for a wide variety of locations.

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



CSIRO

Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

REFORT NO:

SY4201-3

Page 2 of 3

SSUE DATE:

18 December 2007

MAN FACTURER:

Unknown

₹ COLOT 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

♣5 `.⊒5 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: Cleaning:

Unfixed Acetone

Cleaning: Acetor Temperature: 23°C

Pendulum Friction Tester: Stanley (S/N: 9234, calibated 13/6/05)

Test conducted by: Hugh McMullen

	Specime	n			
	1	2	3	4	5
_ast 3 swings	68	69	68	67	72
_	67	69	68	68	70
	67	69	68	69	69
∸. era ges	67	69	68	68	70

Mean BPN: 68

CLASS:

V

- ÷ :	÷	5100	aucts	are	to b	e us	sed i	in w	et t	paret	oot	are	eas,	it is	mor	e a	ppro	priate	to:	test t	o A	Append) xib	of	AS/NZ	ZS 4	4586
- :	-	: :e	cnni	cally	equ	ival	ent t	to Di	IN :	5109	7).																



Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

EFORT NO:

4201-3

BSUE DATE:

18 December 2007

≛``JFACTURER: Unknown

MLE DESC:

Concrete Paver 600mm x 400mm

Sealed with "Stainproof"

Dare and Place

18 December 2007, North Ryde, NSW

La = ∃ tie and Signature:

LIGH MCMULLEN accratory Manager

E11294905414 E11294905555

-ugh McMullen@csiro.au

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

Page 3 of 3



Manuf. & Materials Technology, 14 Julius Ave (Riverside Corp. Park), North Ryde, NSW, 2113, Australia Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 Email: tiles@csiro.au Web: http://www.cmmt.csiro.au

CSIRO

4201-3

EFOFT NO: Suedate:

18 December 2007

MANUFACTURER:

Unknown

FOOLOT 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

Addendum

ESLITS

_ocation:

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

race Roughness (Rz) mean = 32.5 microns

TETE 1002 Pendulum Testers, requires a different test foot preparation (lapping paper) for pedestrian surfaces in a least roughness of less than 15 microns. This lapping paper tends to reduce the pendulum result, sometimes were at a CSIRO recommends the use of this procedure (CSIRO COF1) as an adjunct to AS/NZS 4586. It helps to the test 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 matters. In lie there is still some uncertainty as to exactly what type of roughness needs to be measured, experience in roughness (Rz) gives a useful guide to the likely slip resistance in wet conditions. Research has egipted that hard floors need to have a slightly higher Rz roughness than polymeric floors for the same degree is about most sometimes, but whatever flooring material is used an Rz roughness value of at least 10 microns where wet slip resistance may be required. In circumstances where wetness is normal or expected, this are about the noreased by a factor of 2 or more.

ea at least surface roughnesses are likely to be required where floors slope or where the floor is likely to each table had nated with high viscosity liquids.