

BICS Laboratories Ltd

Reliable testing, Superior service

T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-T331/a

Report Date 05/11/2021

Client Concrete Canvas Ltd

Address Cowbridge Road, Talbot Green, Pontyclun, Mid Glamorgan, CF72 8HL

Contact Marcin Kujawski

Contract Reference N/A

Client PO/Ref No 6983

Material Tested Concrete Canvas

Date Received 28/06/2021

Sample IDs CCX-M, Roll No: CX0210210608M-01

Tests Requested Resistance to Roots - PD CEN/TS 14416:2014*

Prepared by:

David Smith
Technical Co-ordinator

Approved by:

Shazeena Iqbal
Technical Director

Samples tested as received. Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.

Tests marked # have been subcontracted, and are UKAS accredited. Tests marked ^F are accredited under the company's UKAS Flexible Scope.

This test report is in a condensed format, complete test details available upon request.
This test report may not be reproduced other than in full, except with prior written approval.

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



BICS Laboratories Ltd

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

GEOSYNTHETICS TEST RESULTS CONCRETE CANVAS LTD

Contract Ref: N/A
Material: Concrete Canvas

Report Ref No: BS-T331/a
Dates Tested: 16/09-05/11/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: CCX-M, Roll No: CX0210210608M-01

BICS Sample Ref: 1

Resistance to Roots (PD CEN/TS 14416:2014*)

Nominal Barrier Thickness: 11mm

Method

Three samples of the Root Barrier were placed in soil into which seeds of lupin were sown. The seeds were grown for 6 weeks (under a dual spectrum 600W grow lamp) and then examined to see whether the barrier had been penetrated by the roots of the young plants.

Results

The exposed top side and the underside of the Root Barrier have been inspected. Photographs have been taken to show the top and underside surface of the test samples. The roots have not penetrated through the Root Barrier.

Photographs



Sample 1



Sample 2



Sample 3

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



BICS Laboratories Ltd

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

GEOSYNTHETICS TEST RESULTS CONCRETE CANVAS LTD

Contract Ref: N/A
Material: Concrete Canvas

Report Ref No: BS-T331/a
Dates Tested: 16/09-05/11/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: CCX-M, Roll No: CX0210210608M-01

BICS Sample Ref: 1

Resistance to Roots (PD CEN/TS 14416)*

Specimen 1

Visual Assessment

The roots have not penetrated the specimen. The photographs show the underside of the sample and the roots at the top of the barrier interface.

Conclusion

The sample has resisted root penetration under the conditions of PD CEN/TS 14416:2014*



Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



BICS Laboratories Ltd

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ

T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

GEOSYNTHETICS TEST RESULTS CONCRETE CANVAS LTD

Contract Ref: N/A

Material: Concrete Canvas

Report Ref No: BS-T331/a

Dates Tested: 16/09-05/11/2021

TEST METHOD

TEST SPECIMEN NUMBER

MEAN

Std Dev

1 2 3 4 5 6 7 8 9 10

Sample ID: CCX-M, Roll No: CX0210210608M-01

BICS Sample Ref: 1

Resistance to Roots (PD CEN/TS 14416)*

Specimen 2

Visual Assessment

The roots have not penetrated the specimen. The photographs show the underside of the sample and the roots at the top of the barrier interface.

Conclusion

The sample has resisted root penetration under the conditions of PD CEN/TS 14416:2014*



Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



BICS Laboratories Ltd

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

GEOSYNTHETICS TEST RESULTS CONCRETE CANVAS LTD

Contract Ref: N/A
Material: Concrete Canvas

Report Ref No: BS-T331/a
Dates Tested: 16/09-05/11/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: CCX-M, Roll No: CX0210210608M-01

BICS Sample Ref: 1

Resistance to Roots (PD CEN/TS 14416)*

Specimen 3

Visual Assessment

The roots have not penetrated the specimen. The photographs show the underside of the sample and the roots at the top of the barrier interface.

Conclusion

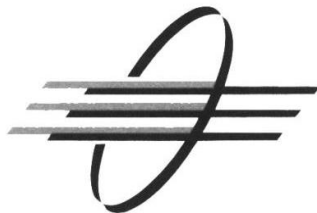
The sample has resisted root penetration under the conditions of PD CEN/TS 14416:2014*



Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



BICS Laboratories Ltd

Reliable testing, Superior service

T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-T331/c

Report Date 05/11/2021

Client Concrete Canvas Ltd

Address Cowbridge Road, Talbot Green, Pontyclun, Mid Glamorgan, CF72 8HL

Contact Marcin Kujawski

Contract Reference N/A

Client PO/Ref No 6983

Material Tested Concrete Canvas

Date Received 28/06/2021

Sample IDs CCX-U, Roll No: CX0210210608U-01

Tests Requested Resistance to Roots - PD CEN/TS 14416:2014*

Prepared by:

David Smith
Technical Co-ordinator

Approved by:

Shazeena Iqbal
Technical Director

Samples tested as received. Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.

Tests marked # have been subcontracted, and are UKAS accredited. Tests marked ^F are accredited under the company's UKAS Flexible Scope.

This test report is in a condensed format, complete test details available upon request.
This test report may not be reproduced other than in full, except with prior written approval.

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



BICS Laboratories Ltd

10 Owlter Ings Road, Brighouse, West Yorkshire, HD6 1EJ
T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

GEOSYNTHETICS TEST RESULTS CONCRETE CANVAS LTD

Contract Ref: N/A
Material: Concrete Canvas

Report Ref No: BS-T331/c
Dates Tested: 16/09-05/11/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: CCX-U, Roll No: CX0210210608U-01

BICS Sample Ref: 3

Resistance to Roots (PD CEN/TS 14416:2014*)

Nominal Barrier Thickness: 11mm

Method

Three samples of the Root Barrier were placed in soil into which seeds of lupin were sown. The seeds were grown for 6 weeks (under a dual spectrum 600W grow lamp) and then examined to see whether the barrier had been penetrated by the roots of the young plants.

Results

The exposed top side and the underside of the Root Barrier have been inspected. Photographs have been taken to show the top and underside surface of the test samples. The roots have not penetrated through the Root Barrier.

Photographs



Sample 1



Sample 2



Sample 3

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



BICS Laboratories Ltd

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

GEOSYNTHETICS TEST RESULTS CONCRETE CANVAS LTD

Contract Ref: N/A
Material: Concrete Canvas

Report Ref No: BS-T331/c
Dates Tested: 16/09-05/11/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: CCX-U, Roll No: CX0210210608U-01

BICS Sample Ref: 3

Resistance to Roots (PD CEN/TS 14416)*

Specimen 1

Visual Assessment

The roots have not penetrated the specimen. The photographs show the underside of the sample and the roots at the top of the barrier interface.

Conclusion

The sample has resisted root penetration under the conditions of PD CEN/TS 14416:2014*



Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



BICS Laboratories Ltd

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

GEOSYNTHETICS TEST RESULTS CONCRETE CANVAS LTD

Contract Ref: N/A
Material: Concrete Canvas

Report Ref No: BS-T331/c
Dates Tested: 16/09-05/11/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: CCX-U, Roll No: CX0210210608U-01

BICS Sample Ref: 3

Resistance to Roots (PD CEN/TS 14416)*

Specimen 2

Visual Assessment

The roots have not penetrated the specimen. The photographs show the underside of the sample and the roots at the top of the barrier interface.

Conclusion

The sample has resisted root penetration under the conditions of PD CEN/TS 14416:2014*



Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



BICS Laboratories Ltd

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk

GEOSYNTHETICS TEST RESULTS CONCRETE CANVAS LTD

Contract Ref: N/A
Material: Concrete Canvas

Report Ref No: BS-T331/c
Dates Tested: 16/09-05/11/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: CCX-U, Roll No: CX0210210608U-01

BICS Sample Ref: 3

Resistance to Roots (PD CEN/TS 14416)*

Specimen 3

Visual Assessment

The roots have not penetrated the specimen. The photographs show the underside of the sample and the roots at the top of the barrier interface.

Conclusion

The sample has resisted root penetration under the conditions of PD CEN/TS 14416:2014*



Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT

CCX-M® GCCM – 50 Year Durability Certificate

This document certifies that the following testing has been conducted on the CCX-M® Geosynthetic Cementitious Composite Mat (GCCM) material to determine its expected working life. GCCMs are unique construction products that combine geosynthetics and cementitious material. There are currently no test methods that determine the durability of a GCCM as a composite, so the product must be tested to existing geosynthetic and cementitious material standards to determine the durability of each component of the product individually. The following standards were used to determine the appropriate test methods and the relevant characteristics to assess:

Geosynthetic top surface layer: BS EN 13253:2016 Geotextile and geotextile related products – Characteristics required for use in erosion control works (coastal protection, bank revetments). B.4.2.1 Polyester (PET).

Cementitious material: BS EN 12467:2012+A2:2018 Fibre-cement flat sheets – Product specification and test methods. 5.2.2 Category A.

LLDPE backing layer: BS EN 16993:2018 Geosynthetic barriers – Characteristics required for use in the construction of storage lagoons, secondary containment (above and below ground) and other containment applications for chemicals, polluted water and produced liquids. A.5 Durability tests on GBR-P

Durability requirements	Method	Requirement	Result
Geosynthetic Top Surface: Resistance to Hydrolysis	BS EN 12447 112 days at 80°C	Retained Tensile Strength >50%	Pass
Cementitious Material: Freeze-Thaw	BS EN 12467:2012+A2:2018 100 cycles specified 250 cycles tested	Retained Initial Flexural Strength >75%	Pass
Cementitious Material: Warm Water	BS EN 12467:2012+A2:2018 56 days at 60°C	Retained Initial Flexural Strength >75%	Pass
Cementitious Material: Soak Dry	BS EN 12467:2012+A2:2018 50 cycles	Retained Initial Flexural Strength >75%	Pass
LLDPE Backing: Resistance to Leaching	BS EN 14415:2004 Method A Modified as per BS EN 16993:2018 56 days at 80°C	Retained Tensile Stress at Break and Retained Elongation at Break >75% OIT at 200C > 25min N/A*	Pass
LLDPE Backing: Resistance to Oxidation/Thermal Ageing	BS EN 14575:2005 180 days at 80°C	Retained Tensile Stress at Break and Retained Elongation at Break >75% OIT at 200C > 15min N/A*	Pass

Expected Working Life

Min 50 Years

Based on these test results, the CCX-M® GCCM, if designed, installed and maintained in accordance with our standard specification and installation guidance, can be expected to resist normal weathering for a minimum of a 50-year lifespan** for surface erosion control and weed suppression applications.

**Oxidative Induction Time Testing (OIT) assesses the duration at which the antioxidants in the polymer are used up and the polymer will become brittle. Considering the LLDPE backing to CCX-M® is extruded onto the material, the extension of the LLDPE is limited by the geosynthetics and cementitious material above (LLDPE can typically fail in excess of 400% strain whereas the cementitious material will crack at <0.1% strain). Therefore brittle failure of the LLDPE backing is not considered a realistic failure in GCCMs*

***At ambient temperature and excludes the effects of adverse loading and abrasion*