CONCRETE CANVAS®
Concrete on a Roll

1808.EN.TD
MADE IN UK

CONCRETE CANVAS®

Concrete on a Roll

CHEMICAL RESISTANCE

RAIL ROAD MINING PETROCHEM AGRO UTILITIES PUBLIC WORKS DEFENCE DESIGN SHELTER

2014 Fast Track 100 16th fastest growing company in the UK.

2014 Queen's Award for Enterprise in Innovation

2013 Macrobert Award Finalist

2013 Innovation Award Winner Railtex Exhibition

2012 R&D 100 Award winner R&D Magazine

2011 Expert's Choice Winner Most Innovative Product

2011 Brit Insurance Designs of the Year Nominee

2009 Winner Material Connexion Medium Award Material of the Year

2007 Winner D&AD Yellow Pencil Award Product Design

www.concretecanvas.com

CONCRETE CANVAS®

CHEMICAL RESISTANCE

Chemical Resistance

Based on testing to BS EN 14414:2004 "*Geosynthetics. Screening test method for determining chemical resistance for landfill applications*".

Concrete Canvas® GCCM* (CC) products have been independently tested by BICS Laboratories Ltd, UK to assess the performance of CC5™, CC8™ and CC13™ when immersed for 56 days in a range of chemicals at 50˚C. The test method used is based on BS EN 14414:2004, "Geosynthetics. Screening test method for determining chemical resistance for landfill applications".

The test method involves full immersion of sample bars (40x160mm) in the test chemical over a period of 56 days at an elevated temperature of 50˚C to accelerate any signs of deterioration. Following the 56 day immersion period, the samples are subjected to a 3-point bend test and the flexural strength results compared to a set of control specimens. Five samples of all 3 CC formats (CC5™, CC8™, CC13™) were tested against the following chemicals:

- Acid (pH 1.0)
- Alkaline (pH 13.0)
- Hydrocarbon (35% diesel, 35% paraffin & 30% lubricating oil)

Summary of Results

		CC5™	CC8™	CC13™
Acid	Mean Strength (MPa)	6.07	4.45	5.57
	Retained Strength (%)	**107%**	**115%**	**111%**
Alkaline	Mean Strength (MPa)	6.92	3.84	4.62
	Retained Strength (%)	**121%**	**99%**	**92%**
Hydrocarbon	Mean Strength (MPa)	9.93	5.86	8.31
	Retained Strength (%)	**115%**	**99%**	**103%**

CC products showed minimal or no loss of flexural strength following chemical immersion.

The results listed here should be used for indicative purposes only. Please contact Concrete Canvas Ltd with the specific nature of your application detailing the chemical composition and the environmental conditions under which the material will be used, in order that we can provide more information on the suitability of CC.

*Geosynthetic Cementitious Composite Mat

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REPORT

TEST REPORT

REPORT REFERENCE: BS-J861/a

Report Date	28/07/2014
Client	Concrete Canvas Ltd, Pontypridd, CF37 5SP
Contact	William Crawford
Contract Reference	N/A
Client PO/Ref No	TBA
Material Tested	5mm & 13mm Concrete Canvas
Date Received	23/05/2014
Sample IDs	CC5
Tests Requested	Chemical Resistance - BS EN 14414:2004

If you have any questions or require additional information, please do not hesitate to contact us.

Report Authorisation:

Clifford Butt
Managing Director
31/07/2014

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UKAS MANAGEMENT SYSTEMS 0026
Cert No. 7495
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TEST RESULTS
CONCRETE CANVAS LTD
P.O NO: TBA

Contract Ref: N/A **Report Ref No: BS-J861/a**
Material: 5mm Concrete Canvas CC5 **Dates Tested: 23/05-25/07/2014**
Test Methods: BS EN 14414:2004 - Chemical Resistance &
Concrete Canvas Test Procedure 01 - Bending Strength

Sample ID: Control Sample {Coated Edges}

Test Conditions: None

Parameter						MEAN	Std Dev
Specimen ID	21	38	42	29	13		
Ave. Width mm	39.96	39.52	39.54	39.96	39.45	**39.69**	**0.25**
Ave. Thickness mm	4.84	4.85	4.93	4.83	4.80	**4.85**	**0.05**
Load at First Crack N	32.2	44.1	31.3	37.9	31.5	**35.4**	**5.6**
Bending Strength MPa	5.16	7.11	4.89	6.11	5.20	**5.69**	**0.91**

Sample ID: Acid Exposed Sample {Coated Edges}

BICS Sample Ref: 01

Test Conditions: Method A, hydrolysis under acidic conditions, start pH 1.0, 50° C for 56 days

Specimen ID	3	17	19	18	12		
Ave. Width mm	41.80	41.62	40.56	40.28	38.83	**40.62**	**1.19**
Ave. Thickness mm	5.13	4.94	5.13	5.24	5.48	**5.18**	**0.19**
Load at First Crack N	40.6	46.2	38.4	44.1	51.5	**44.2**	**5.1**
Bending Strength MPa	5.53	6.81	5.38	5.99	6.64	**6.07**	**0.64**
					Retained Strength %	**107**	

Sample ID: Basic Exposed Sample {Coated Edges}

BICS Sample Ref: 02

Test Conditions: Method B, hydrolysis under basic conditions, start pH 13.0, 50° C for 56 days

Specimen ID	46	44	48	41	23		
Ave. Width mm	40.16	39.70	39.46	39.71	39.70	**39.75**	**0.26**
Ave. Thickness mm	4.95	4.90	4.85	4.79	4.86	**4.87**	**0.06**
Load at First Crack N	40.5	44.6	47.1	42.8	42.1	**43.4**	**2.5**
Bending Strength MPa	6.17	7.02	7.62	7.06	6.73	**6.92**	**0.53**
					Retained Strength %	**121**	

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REPORT

TEST REPORT

REPORT REFERENCE: BS-K221/a

Report Date	11/11/2014
Client	Concrete Canvas Ltd, Pontypridd, CF37 5SP
Contact	Marcin Kujawski
Contract Reference	N/A
Client PO/Ref No	TBA
Material Tested	8mm & 13mm Concrete Canvas
Date Received	12/09/2014
Sample IDs	CC8 & CC13
Tests Requested	Chemical Resistance - BS EN 14414:2004

If you have any questions or require additional information, please do not hesitate to contact us.

Report Authorisation:

Ryan Hackney
Laboratory Manager
11/11/2014

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Cert No. 7495
ISO 9001

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TEST RESULTS
CONCRETE CANVAS LTD
P.O NO: TBA

Contract Ref: N/A **Report Ref No: BS-K221/a**
Material: 8mm Concrete Canvas CC8 **Dates Tested: 12/09-11/11/2014**
Test Methods: BS EN 14414:2004 - Chemical Resistance &
Concrete Canvas Test Procedure 01 - Bending Strength

Sample ID: Control Sample {Coated Edges}

Test Conditions: None **BICS Sample Ref: 01**

Parameter						MEAN	Std Dev
Specimen ID	3	12	7	11	18		
Ave. Width mm	39.75	40.00	40.11	40.09	40.30	**40.05**	**0.20**
Ave. Thickness mm	8.58	8.69	8.43	8.64	8.89	**8.65**	**0.17**
Load at First Crack N	67.4	71.2	79.8	84.5	84.1	**77.4**	**7.7**
Bending Strength MPa	3.45	3.54	4.20	4.23	3.96	**3.88**	**0.37**

Sample ID: Acid Exposed Sample {Coated Edges}

BICS Sample Ref: 03

Test Conditions: Method A, hydrolysis under acidic conditions, start pH 1.0, 50° C for 56 days

Specimen ID	16	24	14	5	20		
Ave. Width mm	40.60	40.66	40.93	40.83	40.70	**40.74**	**0.13**
Ave. Thickness mm	9.06	9.05	8.98	8.71	8.89	**8.94**	**0.14**
Load at First Crack N	102.0	85.8	109.5	99.5	86.3	**96.6**	**10.3**
Bending Strength MPa	4.59	3.86	4.97	4.82	4.02	**4.45**	**0.49**
					Retained Strength %	**115**	

Sample ID: Basic Exposed Sample {Coated Edges}

BICS Sample Ref: 04

Test Conditions: Method B, hydrolysis under basic conditions, start pH 13.0, 50° C for 56 days

Specimen ID	6	21	23	15	17		
Ave. Width mm	40.72	40.16	40.12	40.22	40.32	**40.31**	**0.24**
Ave. Thickness mm	8.79	9.14	9.04	9.14	9.13	**9.05**	**0.15**
Load at First Crack N	96.5	82.5	100.7	65.6	76.0	**84.3**	**14.5**
Bending Strength MPa	4.60	3.69	4.61	2.93	3.39	**3.84**	**0.75**
					Retained Strength %	**99**	

CONFIDENTIAL TEST REPORT

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TEST RESULTS
CONCRETE CANVAS LTD
P.O NO: TBA

Contract Ref: N/A **Report Ref No: BS-K221/a**
Material: 13mm Concrete Canvas CC13 **Dates Tested: 12/09-11/11/2014**
Test Methods: BS EN 14414:2004 - Chemical Resistance &
Concrete Canvas Test Procedure 01 - Bending Strength

Sample ID: Control Sample {Coated Edges}

Test Conditions: None **BICS Sample Ref: 02**

Parameter						MEAN	Std Dev
Specimen ID	5	10	13	4	17		
Ave. Width mm	40.79	40.45	40.28	40.45	40.52	**40.50**	**0.19**
Ave. Thickness mm	12.84	12.79	12.79	12.91	12.55	**12.78**	**0.14**
Load at First Crack N	216.6	193.9	224.5	248.5	221.0	**220.9**	**19.5**
Bending Strength MPa	4.83	4.40	5.11	5.53	5.19	**5.01**	**0.42**

Sample ID: Acid Exposed Sample {Coated Edges}

BICS Sample Ref: 05

Test Conditions: Method A, hydrolysis under acidic conditions, start pH 1.0, 50° C for 56 days

Specimen ID	19	3	8	11	23		
Ave. Width mm	40.22	40.45	40.64	40.75	40.90	**40.59**	**0.26**
Ave. Thickness mm	11.76	12.89	12.60	12.66	12.28	**12.44**	**0.44**
Load at First Crack N	187.0	289.1	212.0	258.7	224.7	**234.3**	**40.1**
Bending Strength MPa	5.04	6.45	4.93	5.94	5.46	**5.57**	**0.64**
					Retained Strength %	**111**	

Sample ID: Basic Exposed Sample {Coated Edges}

BICS Sample Ref: 06

Test Conditions: Method B, hydrolysis under basic conditions, start pH 13.0, 50° C for 56 days

Specimen ID	16	1	7	14	9		
Ave. Width mm	40.62	40.73	40.28	40.52	40.12	**40.45**	**0.25**
Ave. Thickness mm	12.62	12.74	12.72	12.75	12.78	**12.72**	**0.06**
Load at First Crack N	183.1	204.5	195.7	207.1	218.7	**201.8**	**13.3**
Bending Strength MPa	4.24	4.64	4.50	4.72	5.01	**4.62**	**0.28**
					Retained Strength %	**92**	

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REPORT

TEST REPORT

REPORT REFERENCE: BS-J444/d

Report Date	21/10/2013
Client	Concrete Canvas Ltd, Pontypridd CF37 5SP
Contact	William Crawford
Contract Reference	N/A
Client PO/Ref No	TBA
Material Tested	5mm, 8mm & 13mm Concrete Canvas
Date Received	01/08/2013
Sample IDs	See Test Report
Tests Requested	Chemical Resistance - BS EN 14414:2004

If you have any questions or require additional information, please do not hesitate to contact us.

Report Authorisation:

Ryan Hackney
Laboratory Manager
21/10/2013

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TEST RESULTS
CONCRETE CANVAS LTD
P.O NO: TBA

Contract Ref: N/A **Report Ref No: BS-J444/d**
Material: 5mm Concrete Canvas CC5 **Dates Tested: 01/08-01/10/2013**
Test Methods: BS EN 14414:2004 - Chemical Resistance &
Concrete Canvas Test Procedure 01 - Bending Strength

Sample ID: Control Sample

BICS Sample Ref: 07

Test Conditions: None

Parameter						MEAN	Std Dev
Specimen ID	11	12	13	14	15		
Ave. Width mm	40.60	40.23	40.30	40.04	40.40	**40.31**	**0.21**
Ave. Thickness mm	4.97	4.89	4.96	4.97	4.99	**4.96**	**0.04**
Load at First Crack N	60	54	59	52	60	**57**	**4**
Bending Strength MPa	8.97	8.42	8.93	7.89	8.95	**8.63**	**0.48**

Sample ID: Solvation Sample

BICS Sample Ref: 16

Test Conditions: Method C, solvation/swelling (35% diesel, 35% paraffin & 30% lubricating oil), 50° C for 56 days

Parameter						MEAN	Std Dev
Specimen ID	16	17	18	19	20		
Ave. Width mm	40.46	40.59	40.59	40.45	40.64	**40.55**	**0.09**
Ave. Thickness mm	4.84	5.00	4.84	4.86	4.90	**4.89**	**0.07**
Load at First Crack N	72	55	65	64	64	**64**	**6**
Bending Strength MPa	11.39	8.13	10.25	10.05	9.84	**9.93**	**1.17**
					Retained Strength %	**115**	

CONFIDENTIAL TEST REPORT

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TEST RESULTS
CONCRETE CANVAS LTD
P.O NO: TBA

Contract Ref: N/A **Report Ref No: BS-J444/d**
Material: 8mm Concrete Canvas CC8 **Dates Tested: 01/08-01/10/2013**
Test Methods: BS EN 14414:2004 - Chemical Resistance &
Concrete Canvas Test Procedure 01 - Bending Strength

Sample ID: Control Sample

BICS Sample Ref: 08

Test Conditions: None

Parameter						MEAN	Std Dev
Specimen ID	31	32	33	34	35		
Ave. Width mm	39.51	39.65	39.98	39.85	40.02	**39.80**	**0.22**
Ave. Thickness mm	8.25	8.54	8.26	8.47	8.27	**8.36**	**0.14**
Load at First Crack N	109	109	111	110	111	**110**	**1**
Bending Strength MPa	6.08	5.65	6.10	5.77	6.08	**5.94**	**0.21**

Sample ID: Solvation Sample

BICS Sample Ref: 17

Test Conditions: Method C, solvation/swelling (35% diesel, 35% paraffin & 30% lubricating oil), 50° C for 56 days

Specimen ID	36	37	38	39	40		
Ave. Width mm	39.74	39.39	39.87	39.92	39.81	**39.75**	**0.21**
Ave. Thickness mm	8.44	8.24	8.10	8.30	8.10	**8.24**	**0.14**
Load at First Crack N	107	117	107	98	97	**105**	**8**
Bending Strength MPa	5.67	6.56	6.14	5.35	5.57	**5.86**	**0.49**
					Retained Strength %	**99**	

CONFIDENTIAL TEST REPORT

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TEST RESULTS
CONCRETE CANVAS LTD
P.O NO: TBA

Contract Ref: N/A **Report Ref No: BS-J444/d**
Material: 13mm Concrete Canvas CC13 **Dates Tested: 01/08-01/10/2013**
Test Methods: BS EN 14414:2004 - Chemical Resistance &
Concrete Canvas Test Procedure 01 - Bending Strength

Sample ID: Control Sample

BICS Sample Ref: 09

Test Conditions: None

Parameter						MEAN	Std Dev
Specimen ID	46	47	48	49	50		
Ave. Width mm	40.01	40.27	40.37	39.95	39.87	**40.09**	**0.22**
Ave. Thickness mm	13.19	13.18	13.01	13.04	13.36	**13.16**	**0.14**
Load at First Crack N	420	356	366	376	349	**373**	**28**
Bending Strength MPa	9.05	7.63	8.03	8.30	7.36	**8.08**	**0.66**

Sample ID: Solvation Sample

BICS Sample Ref: 18

Test Conditions: Method C, solvation/swelling (35% diesel, 35% paraffin & 30% lubricating oil), 50° C for 56 days

Parameter						MEAN	Std Dev
Specimen ID	41	42	43	44	45		
Ave. Width mm	39.72	39.96	39.95	40.00	39.72	**39.87**	**0.14**
Ave. Thickness mm	13.00	13.44	13.64	13.55	13.44	**13.41**	**0.25**
Load at First Crack N	443	369	360	369	438	**396**	**41**
Bending Strength MPa	9.90	7.67	7.27	7.54	9.16	**8.31**	**1.16**
					Retained Strength %	**103**	

CONFIDENTIAL TEST REPORT