



# CONCRETE CANVAS®

Concrete on a Roll

## CHEMICAL RESISTANCE



RAIL



ROAD



MINING



PETROCHEM



AGRO



UTILITIES



PUBLIC WORKS



DEFENCE



DESIGN



SHELTER



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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

## 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™
<b>Acid</b>	Mean Strength (MPa)	6.07	4.45	5.57
	<b>Retained Strength (%)</b>	<b>107%</b>	<b>115%</b>	<b>111%</b>
<b>Alkaline</b>	Mean Strength (MPa)	6.92	3.84	4.62
	<b>Retained Strength (%)</b>	<b>121%</b>	<b>99%</b>	<b>92%</b>
<b>Hydrocarbon</b>	Mean Strength (MPa)	9.93	5.86	8.31
	<b>Retained Strength (%)</b>	<b>115%</b>	<b>99%</b>	<b>103%</b>

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



Cert No. 7495  
ISO 9001

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BICS Laboratories Ltd, Unit 2, Little John Mill, Oak Hill Road, Brighouse, West Yorkshire, HD6 1SN  
Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



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## TEST RESULTS CONCRETE CANVAS LTD P.O NO: TBA

Contract Ref: N/A

Material: 5mm Concrete Canvas CC5

Test Methods: BS EN 14414:2004 - Chemical Resistance &

Concrete Canvas Test Procedure 01 - Bending Strength

Report Ref No: BS-J861/a

Dates Tested: 23/05-25/07/2014

Parameter						MEAN	Std Dev
<b>Sample ID: Control Sample {Coated Edges}</b>							
<i>Test Conditions: None</i>							
Specimen ID	21	38	42	29	13		
Ave. Width mm	39.96	39.52	39.54	39.96	39.45	<b>39.69</b>	<b>0.25</b>
Ave. Thickness mm	4.84	4.85	4.93	4.83	4.80	<b>4.85</b>	<b>0.05</b>
Load at First Crack N	32.2	44.1	31.3	37.9	31.5	<b>35.4</b>	<b>5.6</b>
Bending Strength MPa	5.16	7.11	4.89	6.11	5.20	<b>5.69</b>	<b>0.91</b>
<b>Sample ID: Acid Exposed Sample {Coated Edges}</b>							
<i>Test Conditions: Method A, hydrolysis under acidic conditions, start pH 1.0, 50° C for 56 days</i>							
Specimen ID	3	17	19	18	12		
Ave. Width mm	41.80	41.62	40.56	40.28	38.83	<b>40.62</b>	<b>1.19</b>
Ave. Thickness mm	5.13	4.94	5.13	5.24	5.48	<b>5.18</b>	<b>0.19</b>
Load at First Crack N	40.6	46.2	38.4	44.1	51.5	<b>44.2</b>	<b>5.1</b>
Bending Strength MPa	5.53	6.81	5.38	5.99	6.64	<b>6.07</b>	<b>0.64</b>
						<b>Retained Strength %</b>	<b>107</b>
<b>Sample ID: Basic Exposed Sample {Coated Edges}</b>							
<i>Test Conditions: Method B, hydrolysis under basic conditions, start pH 13.0, 50° C for 56 days</i>							
Specimen ID	46	44	48	41	23		
Ave. Width mm	40.16	39.70	39.46	39.71	39.70	<b>39.75</b>	<b>0.26</b>
Ave. Thickness mm	4.95	4.90	4.85	4.79	4.86	<b>4.87</b>	<b>0.06</b>
Load at First Crack N	40.5	44.6	47.1	42.8	42.1	<b>43.4</b>	<b>2.5</b>
Bending Strength MPa	6.17	7.02	7.62	7.06	6.73	<b>6.92</b>	<b>0.53</b>
						<b>Retained Strength %</b>	<b>121</b>

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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

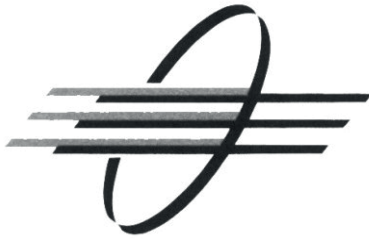


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Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



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## TEST RESULTS CONCRETE CANVAS LTD P.O NO: TBA

Contract Ref: N/A

Material: 8mm Concrete Canvas CC8

Test Methods: BS EN 14414:2004 - Chemical Resistance &

Concrete Canvas Test Procedure 01 - Bending Strength

Report Ref No: BS-K221/a

Dates Tested: 12/09-11/11/2014

Parameter MEAN Std Dev

### Sample ID: Control Sample {Coated Edges}

Test Conditions: None

BICS Sample Ref: 01

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}

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

BICS Sample Ref: 03

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}

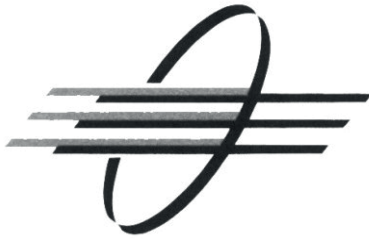
Test Conditions: Method B, hydrolysis under basic conditions, start pH 13.0, 50° C for 56 days

BICS Sample Ref: 04

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

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## TEST RESULTS CONCRETE CANVAS LTD P.O NO: TBA

Contract Ref: N/A

Material: 13mm Concrete Canvas CC13

Test Methods: BS EN 14414:2004 - Chemical Resistance &

Concrete Canvas Test Procedure 01 - Bending Strength

Report Ref No: BS-K221/a

Dates Tested: 12/09-11/11/2014

Parameter MEAN Std Dev

### Sample ID: Control Sample {Coated Edges}

Test Conditions: None

BICS Sample Ref: 02

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}

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

BICS Sample Ref: 05

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}

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

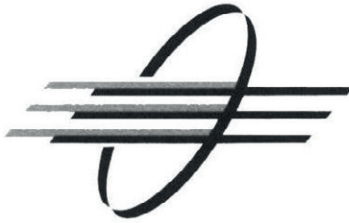
BICS Sample Ref: 06

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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Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030





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## TEST RESULTS CONCRETE CANVAS LTD P.O NO: TBA

Contract Ref: N/A

Material: 5mm Concrete Canvas CC5

Test Methods: BS EN 14414:2004 - Chemical Resistance &

Concrete Canvas Test Procedure 01 - Bending Strength

Report Ref No: BS-J444/d

Dates Tested: 01/08-01/10/2013

Parameter MEAN Std Dev

### Sample ID: Control Sample

BICS Sample Ref: 07

Test Conditions: None

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

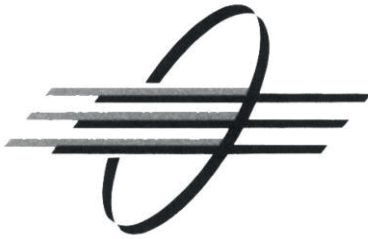
BICS Sample Ref: 16

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

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

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## TEST RESULTS CONCRETE CANVAS LTD P.O NO: TBA

Contract Ref: N/A

Material: 8mm Concrete Canvas CC8

Test Methods: BS EN 14414:2004 - Chemical Resistance &

Concrete Canvas Test Procedure 01 - Bending Strength

Report Ref No: BS-J444/d

Dates Tested: 01/08-01/10/2013

Parameter MEAN Std Dev

### Sample ID: Control Sample

BICS Sample Ref: 08

Test Conditions: None

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

### Sample ID: Solvation Sample

BICS Sample Ref: 17

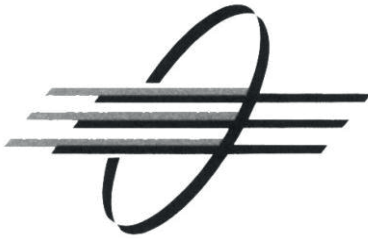
Test Conditions: Method C, solvation/swelling (35% diesel, 35% paraffin & 30% lubricating oil), 50° C for 56 days

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

Retained Strength % **99**

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## TEST RESULTS CONCRETE CANVAS LTD P.O NO: TBA

Contract Ref: N/A

Material: 13mm Concrete Canvas CC13

Test Methods: BS EN 14414:2004 - Chemical Resistance &

Concrete Canvas Test Procedure 01 - Bending Strength

Report Ref No: BS-J444/d

Dates Tested: 01/08-01/10/2013

Parameter MEAN Std Dev

### Sample ID: Control Sample

BICS Sample Ref: 09

Test Conditions: None

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

### 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

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

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