CONCRETE CANVAS®

Concrete Impregnated Fabric

1511.EN.CP

MADE IN UK

CONCRETECANVAS

GABION CASE STUDIES

RAIL ROAD MINING PETROCHEM AGRO UTILITIES MUNICIPAL DEFENCE DESIGN

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

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CONCRETE CANVAS

GABIONS

Concrete Canvas® is a Geosynthetic Cementitious Composite Mat (GCCM), part of a revolutionary new class of construction materials. It is a flexible, concrete impregnated fabric that hardens on hydration to form a thin, durable, water proof and fire resistant concrete layer. Essentially, it's concrete on a roll. The material is predominantly used for erosion control applications such as ditch lining and slope protection, offering a faster, more cost effective alternative to conventional concrete.

Concrete Canvas® User Benefits

Rapid Install
CC can be laid at a rate of 200sqm/hour, up to 10 times faster than conventional concrete solutions. CC has a working time of 2 hours after hydration and can be installed in wet weather conditions, reducing programme disruption.

Easy To Use
CC is available in man portable rolls for applications with limited access. The concrete is pre-mixed so there is no need for mixing, measuring or compacting. Just add water.

Low Project Cost
The speed and ease of installation mean CC is more cost-effective than conventional concrete, with less logistical complexity.

Eco-Friendly
CC is a low mass, low carbon technology which uses up to 95% less material than conventional concrete for many applications. Up to 200sqm can be delivered on a single pallet; enough to replace two full mixer trucks.

Concrete Canvas® Key Properties

Erosion Protection
CC prevents surface erosion from weathering and has twice the abrasion resistance of OPC.

Conforms To Profile
CC has excellent drape characteristics, allowing the material to conform to the organic profile of a ditch making it more homogeneous with the surrounding environment.

Plant Not Required
CC can be supplied in man portable rolls eliminating the need for plant on site and allowing for installation in areas with restricted access. Prior to hydration, CC layers can be cut to length using basic hand tools, eliminating wastage.

Reduced Maintenance
CC acts as an effective weed inhibitor, preventing costly maintenance required for unlined ditches.

Ageing
Moss can grow on the fibrous top surface of CC resulting in it 'greening over', helping the ditch to blend in with its surroundings. CC has a minimum design life of 50 years when installed correctly.

The following pages contain a collection of case studies highlighting the advantages of using Concrete Canvas® GCCM to cover gabions.

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Concrete Canvas® Gabion Reinforcement

Concrete Canvas® GCCM* (CC) can be used to rapidly repair damaged and unstable gabion walls to provide long-term protection. CC can also be used to upgrade new or existing structures to provide a durable solution that will last for decades. CC can be rapidly applied by hand with no specialist equipment. CC is delivered in man portable lengths that are easily fixed to the gabion structures. Once hydrated, CC hardens to form a strong, durable, fire proof surface that protects and holds the structure together.

Features of CC Gabion Reinforcement

1. Prevents loss of fill if the geo-textile is degraded by UV degradation, weathering, vandalism and/or enemy fire in military applications.

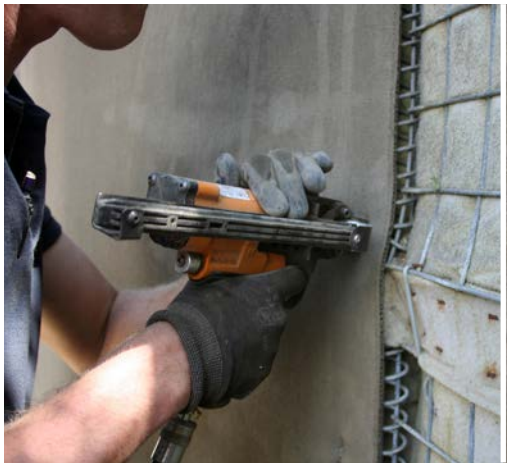
2. Securely ties together multi-level gabion walls preventing movement.

3. Prevents water ingress which causes the fill to slump due to water saturation and the migration of fines.

4. Gabions can be capped with CC to prevent the fill being blown by wind or rotor wash in military applications.

5. Can be painted to improve the appearance of gabions.

Applications Methods



Pneumatic Hogringing

A fast method of application, where a compressor and pneumatic tool are available.

Pigtail Fixing

Using factory-fitted ‘pig tail’ fixings, the CC can be rapidly clipped on to gabions in the field. Requires no equipment.

Wire Fixing

CC can be fixed to the spiral columns using wire. This method is versatile and requires no equipment.

*Geosynthetic Cementitious Composite Mat

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CONCRETE CANVAS

GABIONS

Project Info

- 01 / 03 / 2012
- CC13™ pre-cut bulk rolls
- Vertical hog-ringed double layers
- Derby, UK
- Jackson Civils
- A perimeter of gabion defences, installed to protect against flood waters from the River Derwent in Derby, required remediation work due to erosion, vandalism and degradation caused by UV exposure.

Completed CC lined gabion section

Degraded gabion flood defences, damaged from weathering and vandalism

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Dispensing 20m pre-cut rolls of CC13™ on site before cutting to length

Fixing CC to gabion structures using re-bar staples

Hog ringed CC layers

Flush seamed joints between hog ringed CC layers

Hydrated CC prior to backfilling toe anchor trench

Completed CC lined gabion section

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CONCRETE CANVAS

GABIONS

Project Info

- 01 / 06 / 2011
- CC8™ bulk rolls
- 565sqm
- Hog-ringed double layers
- Queensland, Australia
- Australian Army Engineers
- CC was chosen to cap a gabion wall system to prevent washout of material during inclement weather conditions.

Completed gabion capping

In June 2011, Concrete Canvas® GCCM* (CC) was chosen by the Australian Army to cap a gabion system they had installed in Queensland, Australia. The area is prone to heavy rain, extreme heat and winds reaching cyclone levels and this harsh weather had caused slump and fill washout from the gabions, reducing their effective operational lifespan.

565sqm of bulk roll CC8™ were delivered to site and cut to the required length using hand tools. Two lengths were laid on top of each gabion section, overlapped by 100mm, and secured to the gabion's steel mesh frame using hog rings. The CC was hydrated using a nearby water supply and hose equipment.

The Australian Army were very pleased with the end results, and were impressed at how quickly and easily CC was installed using only a small installation team, basic hand tools and water.

CC cap provides protection from inclement weather and high winds

*Geosynthetic Cementitious Composite Mat

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CONCRETE CANVAS

DATA SHEET

Concrete Canvas® GCCM Material Data

Concrete Canvas® GCCM Physical Properties*

Product	Thickness (mm)	Batch Roll Size (sqm)	Bulk Roll Size (sqm)	Roll Width (m)
CC5™	5	10	200	1.0
CC8™	8	5	125	1.1
CC13™	13	N/A	80	1.1

Product	Mass (unset) (kg/m²)	Density (unset) (kg/m³)	Density (set) (kg/m³)
CC5™	7	1500	+30-35%
CC8™	12	1500	+30-35%
CC13™	19	1500	+30-35%

Pre-Set Concrete Canvas® GCCM Properties

Setting

Working Time

1-2 hours subject to ambient temperature

CC will achieve 80% strength at 24 hours after hydration.

Method of Hydration

Spray the fibre surface with water until it feels wet to touch for several minutes after spraying.

Re-spray the CC again after 1 hour if:

- Installing CC5™
- Installing on a steep or vertical surface

Notes:

- An excess of water is always recommended. CC will set underwater and in seawater.
- CC must be actively hydrated. For example do not rely on rainfall or snowmelt.
- Use a spray nozzle for the best results (see CC equipment list). Do not jet high pressure water directly onto the CC as this may wash a channel in the unset CC.
- CC has a working time of 1-2 hours after hydration. Do not move or traffic CC once it has begun to set.
- Working time will be reduced in hot climates and increased in very cold climates.
- CC will set hard in 24 hours but will continue to gain strength over time.
- If CC is not sufficiently wetted, or dries out in the first 5 hours, the set may be delayed and strength reduced. If the set is delayed avoid trafficking the material and re-wet with an excess of water.

Refer to the *Concrete Canvas Hydration Guide* for installation in low temperatures or drying conditions.

- Low Temperature Conditions occur the ground surface temperature is between 0 and 5°C and rising or is expected to fall below 0°C in the 8 hours following hydration.
- Drying Conditions occur when there is one or more of: high air temperature (>22°C), wind (> 12km/h), strong direct sunlight or low humidity (<70%).

Post Set Concrete Canvas® GCCM Properties

Based on Concrete Canvas GCCM ® hydrated in accordance with the Concrete Canvas® Hydration Guide.

Strength

Very high early strength is a fundamental characteristic of CC. Typical strengths and characteristics are as follows:

Compressive tests based on ASTM C109 – 02 (initial crack)
- 10 day compressive failure stress (MPa) 40

Bending tests based on BS EN 12467:2004 (initial crack)
- 10 day bending failure stress (MPa) 3.4

Tensile data (initial crack)

	Length direction (kN/m)	Width direction (kN/m)
CC5™	6.7	3.8
CC8™	8.6	6.6
CC13™	19.5	12.8

Reaction to Fire

CC has achieved **Euroclass B certification**:
BS EN 13501-1:2007+A1:2009 B-s1, d0

Flame Resistance: **MSHA ASTP-5011**
Vertical and Horizontal Certification Passed

Age Testing (minimum 50 year expected life)

Freeze-Thaw testing (ASTM C1185) 200 Cycles
Freeze-Thaw testing (BS EN 12467:2004 part 7.4.1) Passed
Soak-Dry testing (BS EN 12467:2004 part 5.5.5) Passed
Heat-Rain testing (BS EN 12467:2004 part 7.4.2) Passed
Water impermeability (BS EN 12467:2004 part 5.4.4) Passed**

Other

Abrasion Resistance (ASTM C-1353)
Approximately 7.5x greater than 17MPa OPC Passed

Manning's Value (ASTM D6460) n = 0.011

Root Resistance (DD CEN/TS 14416:2005) Passed

Chemical Resistance (BS EN 14414)
- Acid (pH 1.0) (56 day immersion at 50°C) Passed
- Alkaline (pH 13.0) (56 day immersion at 50°C) Passed
- Hydrocarbon (56 day immersion at 50°C) Passed
- Sulfate Resistance (28 day immersion at pH 7.2) Passed

Impact Resistance of Pipeline Coatings
ASTM G13 (CC13™ only) Passed

Permissible Shear & Velocity CC8™ (ASTM D-6460)
- Shear (Pa) 1200
- Velocity (m/s) 10.7

Product exceeded large scale testing capabilities and was not tested to failure.

To achieve these permissible values, the CC material must be properly anchored with a system designed to meet or exceed these values.

Other Information

* Occasionally there will be a Beam Fault (fabric imperfection under 100mm wide running across the width) in a Bulk Roll. This fault is unavoidable due to the manufacturing process and the fault will be clearly marked with a white tag, there will be a maximum of (1) one Beam Fault in any Bulk Roll. A joint may need to be made on site where there is a Beam Fault as the material at a fault will not reach the performance specified in this Data Sheet. The maximum un-useable material due to any Beam Fault will be 100mm. There are no beam faults in standard batched rolls.

* Indicative values

** For containment applications it is recommended to use CC Hydro™

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CE

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CF37 5SP, United Kingdom
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EN12467:2004
Concrete Canvas:
Fibre cement sheet
NT
Oversize sheets
Class 1, Category A
Reaction to Fire B-s1,d0

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