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CONCRETE CANVAS®

Concrete Impregnated Fabric

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Winner
Technical Innovation Award

Innovation Award
ICE Wales Cymru Awards 2017

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16th fastest growing
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2014 Queen's Award
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2013
Macrobert Award
Finalist

2013 Innovation Award Winner
Railtex Exhibition

2012 R&D 100
Award winner
R&D Magazine

2009 Winner
Material Connexion Medium Award
Material of the Year

D&AD Yellow Pencil Award
Winner
Product Design

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Concrete Canvas® GCCM



What is it?

Concrete Canvas® is part of a revolutionary new class of construction materials called Geosynthetic Cementitious Composite Mats (GCCMs). 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. Concrete Canvas® GCCM (CC) allows concrete construction without the need for plant or mixing equipment: just add water.

CC consists of a 3-dimensional fibre matrix containing a specially formulated dry concrete mix. A PVC backing on one surface of the CC ensures the material is completely water proof. CC can be hydrated either by spraying or by being fully immersed in water. Once set, the fibres reinforce the concrete, preventing crack propagation and providing a safe plastic failure mode. Concrete Canvas® GCCM is available in 3 thicknesses: CC5™, CC8™ and CC13™, which are 5, 8 and 13mm thick respectively.

Concrete Canvas® GCCM User Benefits

Rapid Install

CC can be laid at a rate of 200m²/hour, up to 10 times faster than conventional concrete solutions.

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.

Lower Project Costs

The speed and ease of installation mean Concrete Canvas® GCCM 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.

Concrete Canvas® GCCM Key Properties

Water Proof

The PVC backing on one surface of the CC ensures that the material has excellent impermeability.

Strong

The fibre reinforcement prevents cracking, absorbs energy from impacts and provides a stable failure mode.

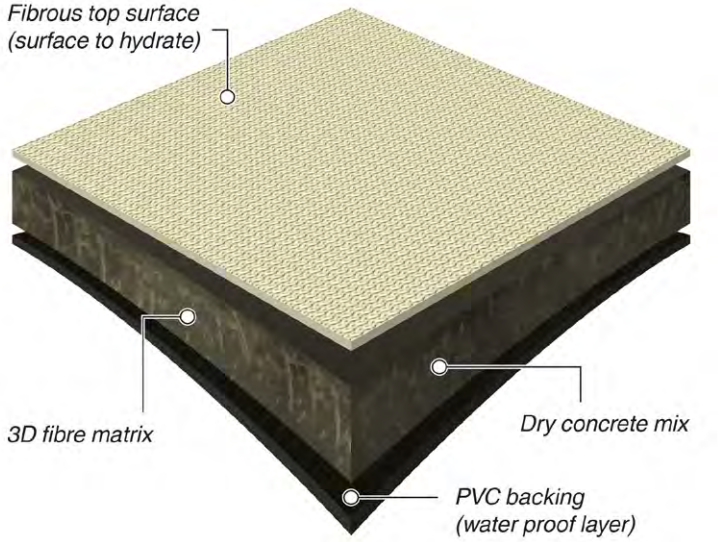
Durable

CC is twice as abrasion resistant as standard OPC concrete, has excellent chemical resistance, good weathering performance and will not degrade in UV.

Flexible

CC has good drape characteristics and will closely follow the ground profile and fit around existing infrastructure. Unset CC can be cut or tailored using basic hand tools.

Concrete Canvas® GCCM section





Batched rolls



Bulk roll

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CONCRETE CANVAS®

Concrete Canvas® GCCM Applications

Channel Lining

CC can be rapidly unrolled to form a ditch or channel lining. It is significantly faster, easier and less expensive to install than conventional concrete channel lining and requires no specialist equipment. The matting can be laid at a rate of 200m^2 per hour by a 3 person team.





Slope Protection

CC can be used to protect slopes as a replacement for shotcrete and steel mesh. It is typically faster to install, more cost effective, requires less specialist plant equipment, and eliminates the risks associated with shotcrete rebound and debris.





Bund Lining

CC provides a cost-effective alternative for lining secondary containment bunds. It acts as an effective weed suppressant, reducing maintenance costs as well as providing additional levels of impermeability and fire protection. Its ability to be installed quickly reduces time on site, whilst the availability of man-portable rolls allows for installation in areas with reduced access.



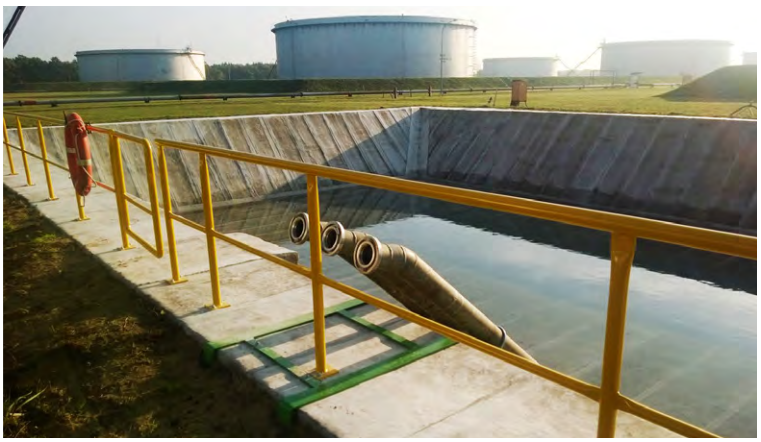
Remediation

CC can be used to rapidly reline and refurbish existing concrete structures suffering from environmental degradation and cracking.

Culvert Lining

CC can be used as a cost-effective alternative to bitumen spraying or re-building damaged culverts, whilst offering a durable means of providing erosion protection.





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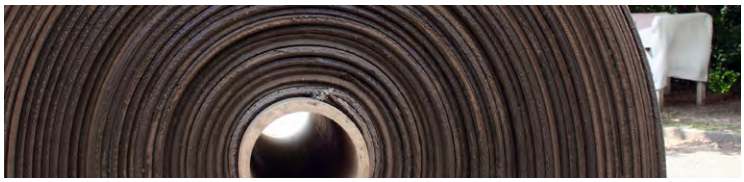
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DATA SHEET

Concrete Canvas® GCCM Material Data



Concrete Canvas® GCCM Physical Properties*

Product	Nominal Thickness (mm)	Batch Roll Size (m²)	Bulk Roll Size (m²)	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) (g/cm³)	Density (set) (kg/m³)
	EN1849 (Mean)	EN1849 (Mean)	
CC5™	7	1.43 - 1.54	+30-35%
CC8™	12	1.43 - 1.54	+30-35%
CC13™	19	1.43 - 1.54	+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

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

Flexural strength to ASTMD8058 (initial crack)
- 1 day mean flexural strength (MPa) (1s.f.) 4.0

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) ±20°C 200 Cycles

Freeze-Thaw testing (BS EN 12467:2004) ±50°C 100 Cycles

Soak-Dry testing (BS EN 12467:2004) 50 Cycles

Heat-Rain testing (BS EN 12467:2004) 50 Cycles

Water impermeability (BS EN 12467:2004) Passed**

Other

Abrasion Resistance (ASTM C-1353)
Approx 7.5x greater than 17MPa OPC (mm/1000 cycles) 0.15

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

Coefficient of Thermal Expansion
α (mm/mk) = 0.012-0.015

Permissible Shear & Velocity CC8™ (ASTM D-6460)
- Shear (Pa) 575
- Velocity (m/s) 8.62

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

Concrete Canvas Ltd.
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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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