



# CONCRETE CANVAS®

Concrete on a Roll

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RAIL



ROAD



MINING



PETROCHEM



AGRO



UTILITIES



PUBLIC WORKS



DEFENCE



DESIGN



SHELTER



Winner  
Technical Innovation Award



Innovation Award  
ICE Wales Cymru Awards 2017



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



2009 Winner  
Material ConneXion Medium Award  
Material of the Year



D&AD Yellow Pencil Award  
Winner  
Product Design



## Concrete Canvas® GCCM

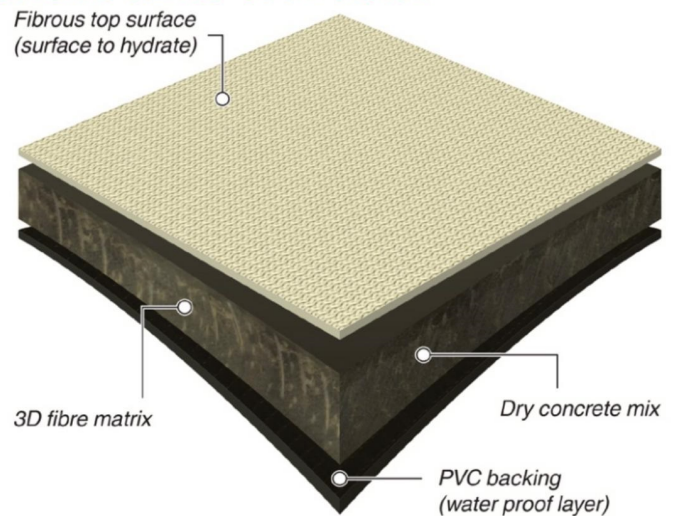


### What is it?

Concrete Canvas® is part of a revolutionary new class of construction materials called Geosynthetic Cementitious Composite Mats (GCCMs). It is a flexible, concrete filled geosynthetic, 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 section



## Concrete Canvas® GCCM User Benefits

### Rapid Install

CC can be laid at a rate of 200m<sup>2</sup>/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.



Batched rolls



Bulk roll

## 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 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<sup>2</sup> 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.





## Concrete Canvas® GCCM Physical Properties\*

Product	Nominal Thickness (mm)	Batch Roll Size (m <sup>2</sup> )	Bulk Roll Size (m <sup>2</sup> )	Roll Width (m)
CC5 <sup>TM</sup>	5	10	200	1.0
CC8 <sup>TM</sup>	8	5	125	1.1
CC13 <sup>TM</sup>	13	N/A	80	1.1

Product	Mass (unset) (kg/m <sup>2</sup> )	Density (unset) (g/cm <sup>3</sup> )	Density (set) (kg/m <sup>3</sup> )
	EN1849 (Mean)	EN1849 (Mean)	
CC5 <sup>TM</sup>	7	1.43 - 1.54	+30-35%
CC8 <sup>TM</sup>	12	1.43 - 1.54	+30-35%
CC13 <sup>TM</sup>	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<sup>TM</sup>
- 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 when 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%).

## 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 Hydron

## Post-Set Concrete Canvas® GCCM Properties

Hydrated by immersion in accordance with ASTM D8030

**Water:GCCM ratio of 0.33**

### Mechanical Performance

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

#### Compressive strength to BS EN 12390-3

Testing on cementitious mix at a water:powder ratio of 0.3 to correspond to GCCM hydration by immersion.

24 hour (MPa)	50
28 day (MPa)	80

#### Flexural strength to ASTM D8058 at 24 hours.

Mean (M.D.)	Initial Break (MPa)	Final Break (MPa)
CC5 <sup>TM</sup>	4.0	>10.0
CC8 <sup>TM</sup>	4.0	>6.0
CC13 <sup>TM</sup>	4.0	>6.0

#### Differential Ground Movement.

Strain prior to PVC failure (min 50mm per 1m width) >5%

### Environmental Durability

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**

**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

### Hydraulic Performance

#### Permissible Shear & Velocity CC8<sup>TM</sup>\*\* (ASTM D-6460)

- Shear (Pa)	575
- Velocity (m/s)	8.62

#### 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

### Other

#### Impact Resistance of Pipeline Coatings

ASTM G13 (CC13<sup>TM</sup> only) Passed

**Embodied CO<sub>2</sub>** to ISO 14040 and EN 15804 55%

Saving based on CC8<sup>TM</sup> Vs conventional concrete (cradle to gate)

#### Coefficient of Thermal Expansion

α (mm/mk) 0.012-0.015

#### Reaction to Fire; Euroclass B certification:

BS EN 13501-1:2007+A1:2009 B-s1, d0

#### Flame Resistance: MSHA ASTP-5011

Vertical and Horizontal Certification Passed

#### Life Span

Life expectancy of over 120 years tested under UK weather conditions

