CONCRETE CANVAS®

Concrete Impregnated Fabric

1712.01.EN

MADE IN UK

CCHYDRO™

Concrete Impregnated Containment

RAIL · ROAD · MINING · PETROCHEM · AGRO · UTILITIES · PUBLIC WORKS · DEFENCE · DESIGN · SHELTER

GROUND ENGINEERING AWARDS 2017
Winner
Technical Innovation Award

ice Institution of Civil Engineers award winner 2017
ICE Wales Cymru Project Awards
Innovation Award
ICE Wales Cymru Awards 2017

THE SUNDAY TIMES FAST TRACK 100 2014 Virgin
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
50th ANNIVERSARY
2012 R&D 100
Award winner
R&D Magazine

Material ConneXion® MEDIUM AWARD MATERIAL of the YEAR
2009 Winner
Material Connexion Medium Award
Material of the Year

07
D&AD Yellow Pencil Award
Winner
Product Design

www.concretecanvas.com

CC HYDRO™

Concrete Impregnated Containment

What is it?

CC Hydro™ is a revolutionary new containment product from Concrete Canvas Ltd. It combines the company's concrete impregnated fabric technology with a high impermeability, chemically resistant geomembrane backing. The geomembrane provides a high performance liner with a testable joint for quality assured containment applications. The liner incorporates a hi-visibility welding strip allowing joints to be thermally bonded with a double-track or triple-track air channel for on-site testing.

The flexible concrete impregnated fabric, hardens on hydration, to provide long term protection to the geomembrane from puncture, abrasion, weathering and UV degradation. This hard armour concrete surface effectively removes the need for concrete, soil or aggregate top cover, normally required with conventional liner systems. CC Hydro™ is available in 2 thicknesses; CCH5™ and CCH8™ (5 and 8mm) for a wide range of containment applications.

CC Hydro™ User Benefits

All-In-One Solution

CC Hydro™ combines the impermeability of a containment liner with the hard armour protection and durability of concrete, reducing install times and simplifying logistics.

No Top Cover

CC Hydro™ does not require a protective top cover. This removes the need for additional excavation, the treatment of contaminated arisings and the import of costly fill material.

Maintains Volume Capacity

CC Hydro™ can be laid directly onto existing profiles without loss of volume capacity for refurbishment projects, providing significant overall time and cost savings.

Reduced Life-Cycle Costs

CC Hydro™ provides effective weed suppression eliminating the ongoing maintenance cost of soil covered systems. CC Hydro™ also reduces the end-of-life costs associated with treatment of any contaminated top cover.

CC Hydro™ Key Properties

High Impermeability

CC Hydro™ has excellent impermeability and has been independently tested to BS-EN-1377 to have a hydraulic conductivity better than $1x10^{-12}$ m/s.

Durable

CC Hydro™ has a hard armour surface, protecting the geomembrane liner from puncture, abrasion, weathering, burrowing animals and UV degradation.

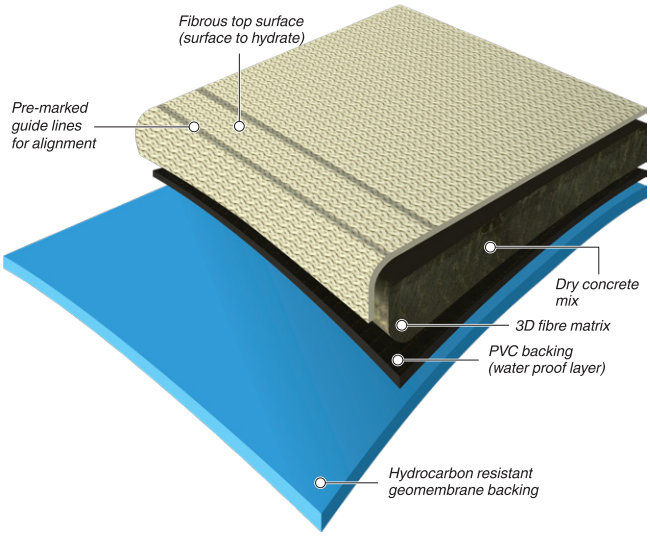
Chemical Resistance

CC Hydro™ has been shown to have excellent resistance to a wide range of chemical reagents, including hydrocarbons, digestates and acidic leachates.

Testable Joints

CC Hydro™ incorporates a high-visibility welding strip, allowing the joint to be thermally bonded with a double-track or triple-track air channel for fast and simple on-site pressure testing.

CC Hydro™ section



CC Hydro™ swatches

CC Hydro™ Bulk roll

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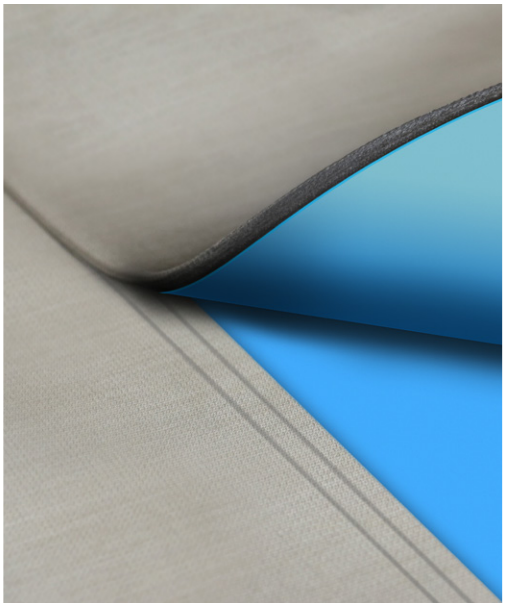
CC HYDRO™
Concrete Impregnated Containment

CC Hydro™ Applications

Bund Lining

CC Hydro™ can be used to provide a durable, chemically resistant, high impermeability liner for secondary containment applications. Combining the flexibility of a geomembrane with the hard armour protection of concrete, CC Hydro™ can be used for bund and berm lining across a wide range of sectors including petrochemical, anaerobic digestion and mine tailings. **Concrete Canvas Ltd currently supply 7 out of the top 10 oil and gas operators worldwide.**



Channel Lining

CC Hydro™ can be rapidly unrolled to provide a high impermeability channel, flume or canal lining for drainage, irrigation or hydroelectric schemes; providing flow characteristics similar to smooth concrete (manning's = 0.011) and abrasion resistance more than double that of standard concrete (OPC).

Lagoon Lining

CC Hydro™ provides a cost-effective primary containment solution for lagoon lining for water; providing excellent puncture resistance, UV protection and long term durability.

Other

CC Hydro™ can be used for a wide range of containment applications, whether it be new-build or the remediation of existing infrastructure.**

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CC HYDRO™
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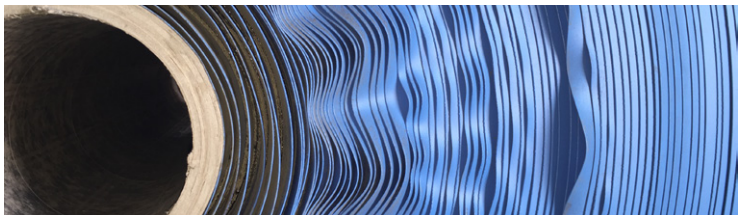
DATA SHEET

CC Hydro™ GCCB Material Data



CC Hydro™ GCCB Physical Properties*

Product	Nominal Concrete Thickness (mm)	Membrane Thickness (mm) EN1849	Total GCCB Thickness (mm) EN1849	Bulk Roll Size (m^2)	Roll Width (m)
CCH5™	5	1.14-1.26	6	150	1.0
CCH8™	8	1.14-1.26	9	100	1.0

Product	Mass (unset) (kg/m^2) EN1849 (Mean)	Density (unset) (g/cm^3) EN1849 (Mean)	Density (set) (g/cm^3)
CCH5™	8	1.43	+30-35%
CCH8™	13	1.43	+30-35%

Pre-Set CC Hydro™ GCCB 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 CCH5™
- Installing on a steep or vertical surface

Notes:
- An excess of water is always recommended. CC Hydro™ will set underwater and in seawater.
- CC Hydro™ must be actively hydrated. For example do not rely on rainfall or snowmelt.
- Use a spray nozzle for the best results (see CC Hydro™ equipment list). Do not jet high pressure water directly onto the CC Hydro™ as this may wash a channel in the unset CC Hydro™.
- CC Hydro™ has a working time of 1-2 hours after hydration. Do not move or traffic CC Hydro™ once it has begun to set.
- Working time will be reduced in hot climates and increased in very cold climates.
- CC Hydro™ will set hard in 24 hours but will continue to gain strength over time.
- If CC Hydro™ 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 CC Hydro™ GCCB 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 ASTM D8058
- 1 day mean Initial Crack (MPa) (1s.f.) 4.0
- 1 day mean Initial Deflection (mm) (1s.f.) 0.3-0.4
- 1 day mean Final Break (MPa) (2s.f.) 13.0

Puncture strength

	Static Puncture EN ISO 12236 (Mean Ultimate)	Dynamic Perforation EN ISO 14574 (Mean Ultimate)
CCH5™	3.6kN	6.9kN
CCH8™	4.45kN	11.1kN

Impermeability**

BS EN 1377 - Water (m/s) $7.5x10^{-13}$
BS EN 1377 - Diesel (m/s) $1.6x10^{-12}$
ASTM D-814 $<15g(h\text{-}m^2)$

Reaction to Fire

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

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

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

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

** CC Hydro™ should not be used for the primary containment of liquids that would be detrimental to the environment.

CE
Concrete Canvas Ltd.
CF37 5SP, United Kingdom
11
EN12467:2004
Concrete Canvas:
Fibre cement sheet
NT
Oversize sheets
Class 1, Category A
Reaction to Fire B-s1,d0

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