



 **CCHYDRO™**  
Concrete Impregnated Containment



RAIL



ROAD



MINING



PETROCHEM



AGRO



PUBLIC WORKS



UTILITIES



DEFENCE



DESIGN



SHELTER





## What is it?

CC Hydro™ Geosynthetic Cementitious Composite Barrier (GCCB) is a revolutionary new containment product from Concrete Canvas Ltd. It combines the company's concrete filled geosynthetic 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 welded providing an air channel for on-site testing.

The flexible concrete filled geosynthetic, 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 14150 to have a water permeability better than  $1 \times 10^{-11}$  m/s.

### Durable

CC Hydro™ has a hard armour surface, protecting the geomembrane liner from puncture, abrasion, weathering, burrowing animals and UV degradation. CC Hydro™ is **BBA certified** with a durability in excess of 50 years\*.

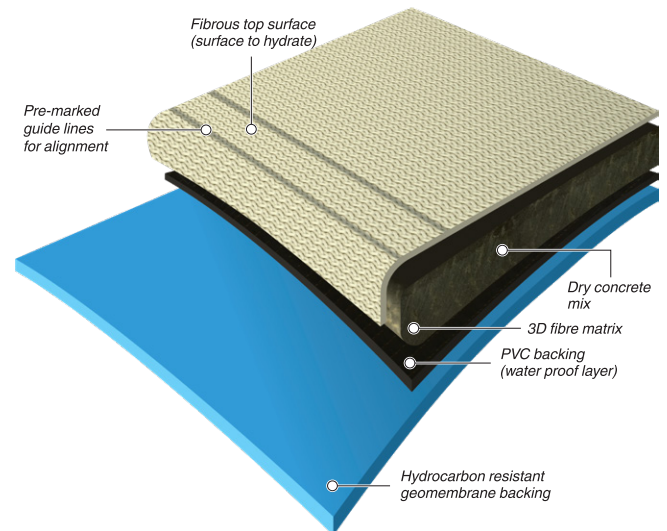
### Chemical Resistance

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 welded with an air channel for fast and simple on-site pressure testing and quality assurance.

## CC Hydro™ section



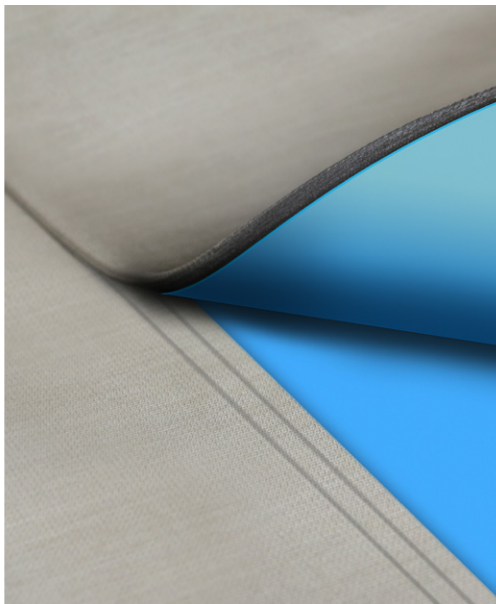


## CC Hydro™ Applications

### 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 (mannings' = 0.011) is 5 times as abrasion resistant as standard OPC concrete - please refer to CCH Data Sheet.

### Lagoon & Canal Lining

CC Hydro™ provides a cost-effective primary containment solution for lagoon and canal lining (for example, river diversions); 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, for example, storage tank base lining.

## CC Hydro™ Properties

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### Pre-set

	Test Method	Unit	Typical Values	
			CCH5™	CCH8™
<b>Physical Properties</b>				
<b>Total Thickness</b>	BS EN 1849-2	mm	6	9
<b>Bulk Roll Sizes</b>		m	1.0x150	1.0x100
<b>Mass per Unit Area</b>	BS EN 1849-2	kg/m <sup>2</sup>	8	13
<b>Concrete Density</b>	BS EN 1849-2	kg/m <sup>3</sup>	1430-1540	
<b>Density Increase on Curing</b>		% Increase	30-35	
<b>Other Properties</b>				
<b>Peel Strength</b> (strength of internal linking fibres)	BS EN ISO 13426-2	kN/m	4.0	4.5
<b>Tensile Strength of Geomembrane Barrier MD/CMD (MARV)</b>	BS EN ISO 527-4	kN/m	14/13	
<b>Working Time from Hydration</b> (refer to the CC Hydro™ Hydration Guide)		Hours	1 to 2	

### Post-set

(Hydrated by full immersion in accordance with ASTM D8030. Water:GCCM ratio of 0.33)

	Test Method	Unit	Typical Values	
			CCH5™	CCH8™
<b>Mechanical Performance</b>				
<b>Compressive Strength of Cementitious Mix* - 24 Hour</b>	BS EN 12390-3	MPa	50	
<b>Compressive Strength of Cementitious Mix* - 28 Day</b>	BS EN 12390-3	MPa	80	
<b>Flexural Strength at 24 Hours from Hydration - Initial Break (MD)</b>	ASTM D8058	MPa	>4.0	
<b>Flexural Strength at 24 Hours from Hydration - Final Break (MD)</b>	ASTM D8058	MPa	>13	>13
<b>Static Puncture Resistance</b> (mean ultimate puncture force)	BS EN ISO 12236	kN	3.5	4.5
<b>Dynamic Puncture Resistance</b> (depth of perforation)	BS EN ISO 13433	mm	0*	
<b>Pyramid Puncture Resistance</b>	BS EN ISO 14574	kN	7.5	10
<b>Differential Ground Movement</b> (strain to PVC failure)		%	>15	
<b>Coefficient of Thermal Expansion</b>		α (mm/mk)	0.012-0.015	
<b>Impermeability (Geomembrane Barrier)</b>				
<b>Water Permeability</b>	BS EN 14150	m/s	1 x 10 <sup>-11</sup>	
<b>Gas Permeability</b>	ASTM D1434	$\frac{\text{cm}^3 \cdot \text{cm}}{\text{cm}^2 \cdot \text{s} \cdot \text{Pa}}$	5 x 10 <sup>-12</sup>	
<b>Environmental Durability</b> (minimum 50 year expected life - see BBA Certificate 19/5685)				
<b>Weathering Resistance</b> (refer to CC Hydro™ Weather Resistance)	BS EN 12467	-	Passed	
<b>Chemical Resistance - Retained Initial Flexural Strength (MD)</b>				
<i>Method A - Acid (10% solution H<sub>2</sub>SO<sub>4</sub>)</i>	BS EN 14414	%	79	85
<i>Method B - Alkaline (saturated suspension Ca(OH)<sub>2</sub>)</i>	BS EN 14414	%	132	138
<i>Method C - Solvation &amp; Swelling (35% vol diesel, 35% vol paraffin, 30% vol lubricating oil HD30)</i>	BS EN 14414	%	128	110
<i>Method D - Synthetic Leachate</i>	BS EN 14414	%	133	129
<b>Root Resistance</b> (refer to CC Root Resistance Testing)	DD CEN/TS 14416	-	Passed	
<b>Flammability</b> (refer to CC Hydro™ Fire Certification)	CAN/ULC-S668-12	-	Passed	
<b>Hydraulic Performance</b>				
<b>Abrasion Resistance</b> (cementitious barrier depth of wear)	ASTM C1353	mm/1000 Cycles	0.2	
<b>Manning's Roughness Coefficient</b>	ASTM D6460	n	0.011	
<b>Recommended Permissible Velocity</b> (intermediate fixings may be required - contact CC Ltd)		m/s	Application Dependent	<8.6

\* Cube testing at Water:Powder ratio of 0.3 to correspond to GCCM hydration by immersion to ASTM D8030 \* Probe did not make a full penetration through the product, therefore the depth of penetration is zero.  
\* When used for the primary containment on non pollutants and secondary containment of other liquids.

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.

CC Hydro™ should not be used for the primary containment of liquids that would be detrimental to the environment. Information is provided based on current test data and may be subject to change as new information becomes available. The versatile nature of CC Hydro™ means that all application conditions cannot be anticipated. Concrete Canvas Ltd makes no warranties and assumes no liability in connection with this information. Project specific testing may be required to determine the suitability for CC Hydro™ material use in a particular application.

