CONCRETE CANVAS®

Concrete on a Roll

2206.01.EN

MADE IN UK

CC HYDRO™

Containment on a Roll

The Queen's Awards for Enterprise: International Trade 2019

Board of Trade Winner 2018

Ground Engineering Awards 2017 — Winner Technical Innovation Award

ice award winner 2017 — ICE Wales Cymru Project Awards — Innovation Award ICE Wales Cymru Awards 2017

BBA Approval Inspection Testing Certification — Certificate 19/5685 — British Board of Agrément Certified

CPD Certified — The CPD Certification Service — Certified CPD Provider

igs — Corporate Member

Exporting is Great — Britain & Northern Ireland — Proud Supporter of Exporting is Great

RAIL ROAD MINING PETROCHEM AGRO PUBLIC WORKS UTILITIES DEFENCE DESIGN SHELTER

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CC HYDRO™

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 types; CCHT1™ and CCHT2™ 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

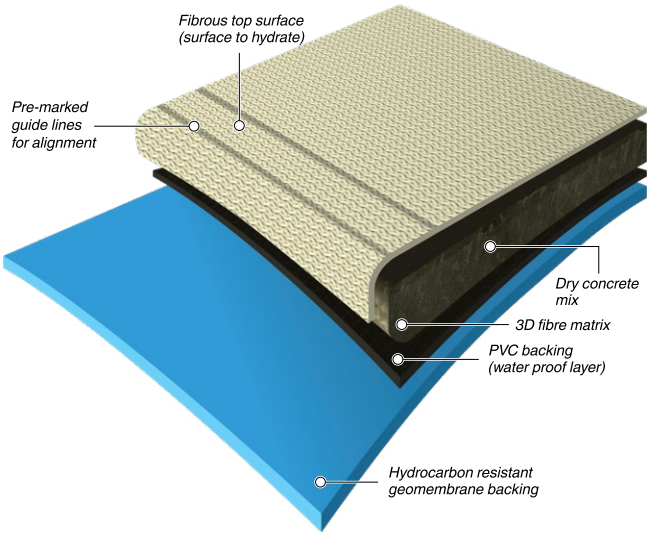
High Impermeability
CC Hydro™ has excellent impermeability and has been independently tested to BS EN 14150 to have a water permeability better than 1x10-11m/s.

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™ air-channel pressure testing

CC Hydro™ Bulk roll

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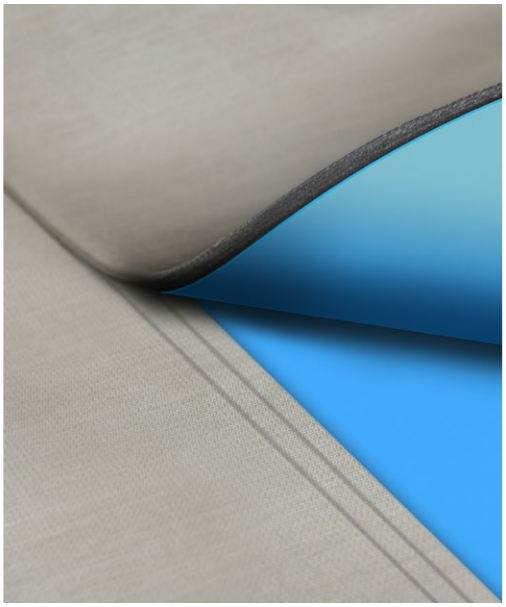
CC Hydro™ Applications

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) 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.

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CC HYDRO™ DATA SHEET

CC Hydro™ Properties 2206.01.EN

Pre-set (Uncured)	Test Method	Unit	Typical Values	
			CCHT1M	CCHT2™
ASTM D8364 'Standard Specification For GCCM Materials' Classification				
GCCM/B Classification	ASTM D8364	Type	I	II
Dimensions				
Total Thickness	BS EN 1849-2	mm	6	8
Bulk Roll Sizes*		m	1.0x150	1.0x100
Physical Properties				
Mass per Unit Area	BS EN 1849-2	kg/m²	9	13
Concrete Density	BS EN 1849-2	kg/m³	1550-1750	
Density Increase on Curing		% Increase	15-25	
Peel Strength - strength of internal linking fibres (MD)	BS EN ISO 13426-2	kN/m	4.0	4.5
Tensile Strength of Geomembrane Barrier MD/CMD (MARV)	BS EN ISO 527-4	kN/m	14/13	
Other Properties				
Working Time from Hydration (refer to the CC Hydro™ Hydration Guide)		Hours	1 to 2	

Post-set (Cured) - at 28 Days from Hydration unless specified (Hydrated by full immersion in accordance with ASTM D8030)	Test Method	Unit	Typical Values	
			CCHT1M	CCHT2™
Mechanical Performance				
Compressive Strength of Cementitious Mix (water/cementitious materials ratio to ASTM D8329)	ASTM D8329	MPa	60	
Flexural Strength - 1 Day - Initial Flexural Strength (MD)	ASTM D8058	MPa	>4.0	
Flexural Strength - 1 Day - Final Flexural Strength (MD)	ASTM D8058	MPa	>13	>13
Static Puncture Resistance (mean ultimate puncture force)	BS EN ISO 12236	kN	3.5	4.5
Dynamic Puncture Resistance (depth of perforation)	BS EN ISO 13433	mm	0**	
Pyramid Puncture Resistance	BS EN ISO 14574	kN	7.5	10
Differential Ground Movement (strain to PVC failure)		%	>15	
Coefficient of Thermal Expansion		α (mm/mk)	0.012-0.015	
Impermeability (Geomembrane Barrier)				
Water Permeability	BS EN 14150	m/s	1×10^{-11}	
Gas Permeability	ASTM D1434	$\frac{cm^3.cm}{cm^2.s.Pa}$	5×10^{-12}	
Environmental Durability (minimum 50 year expected life▲ - see BBA Certificate 19/5685)				
Chemical Resistance - Retained Initial Flexural Strength (MD)				
Method A - Acid (10% solution H_2SO_4)	BS EN 14414	%	>70	>70
Method B - Alkaline (saturated suspension $Ca(OH)_2$)	BS EN 14414	%	>100	>100
Method C - Solvation & Swelling (35% vol diesel, 35% vol paraffin, 30% vol lubricating oil HD30)	BS EN 14414	%	>100	>100
Method D - Synthetic Leachate	BS EN 14414	%	>100	>100
Root Resistance (refer to CC Root Resistance Testing)	DD CEN/TS 14416	-	Passed	
Flammability (refer to CC Hydro™ Fire Certification)	CAN/ULC-S668-12	-	Passed	
Hydraulic Performance				
Abrasion Resistance (cementitious barrier depth of wear)	ASTM C1353	mm/1000 Cycles	0.15	
Manning's Roughness Coefficient	ASTM D6460	n	0.011	

*Bulk Rolls are supplied by area so the listed length and width dimensions are typical values and tolerances are typically +5%/-2.5% .** Probe did not make a full penetration through the product, therefore the depth of penetration is zero. ***Data based on CCH5™ and CCH8™ from 2019. New test data pending ▲ 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 specifiedin this Data Sheet. The maximum un-useable material due to any Beam Fault will be 100mm.

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.

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 19/5685

ISO 9001 CERTIFIED UKAS British Assessment Bureau

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