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CCX™ GCCM

What is it?

CCX™ is part of a revolutionary class of construction materials called Geosynthetic Cementitious Composite Mats and Barriers (GCCM/Bs). It is a flexible, concrete filled geosynthetic, that hardens on hydration to form a thin, durable, water proof concrete layer. Essentially, it's concrete on a roll. CCX™ allows concrete installation without the need for plant or mixing equipment while also reducing vehicle movements and contractor burden. Simply unroll and just add water.

CCX™ consists of two interconnected layers of geotextile that encapsulate a specially formulated dry concrete mix. An LLDPE geomembrane backing ensures the material has very high impermeability. CCX™ can be hydrated either by spraying or by being fully immersed in water. Two variants of CCX™ are currently available: CCX-M™ & CCX-B™ (see back page for further details).

Benefits of CCX™ as a Canal Liner

Composite Solution

CCX™ combines the impermeability of a geomembrane with the protection and durability of concrete. CCX™ can be installed as rapidly as conventional geosynthetics and 24 hours from hydration will cure to create a hard-wearing concrete canal lining which is ready to use.

Reduced Down-time

The speed of installation and high early strength gain means that canal down-time is minimised compared to existing concrete covered geomembrane and lining methods. In critical canal infrastructure, where maintenance shut-down periods are fixed, this allows for much greater areas to be lined or repaired.

Accommodating Ground Movement

Over time conventional concrete canal lining can often suffer from widespread cracking due to differential ground movement. This can lead to significant seepage losses, cause under-mining and, in the worst instances, complete channel collapse. CCX™ can accommodate a high level of differential ground movement due to the fibre reinforcement imbedded within the CCX™ structure. This prevents crack propagation and allows for local deformation whilst retaining high levels of impermeability.

Low Logistical Footprint

CCX™ has an un-hydrated unit weight of 16kg/m² compared to ~220kg/m² for 10cm of cured concrete. This means it is typically more than 10x more efficient in terms of the logistical footprint, requiring fewer trucks and reducing operational overheads.

Properties of CCX™

High Impermeability

CCX™ has an LLDPE geomembrane backing ensuring the material has very high impermeability, significantly reducing or eliminating seepage losses.

Durable

CCX™ has a high degree of durability with abrasion resistance more than 3.5 times that of standard OPC concrete.

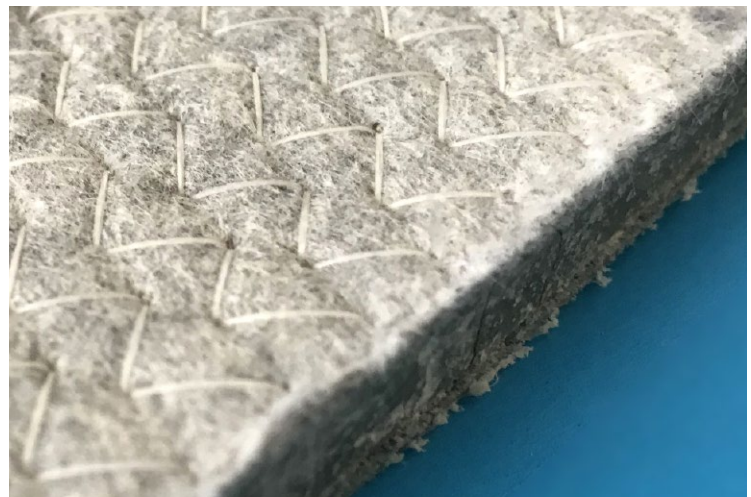
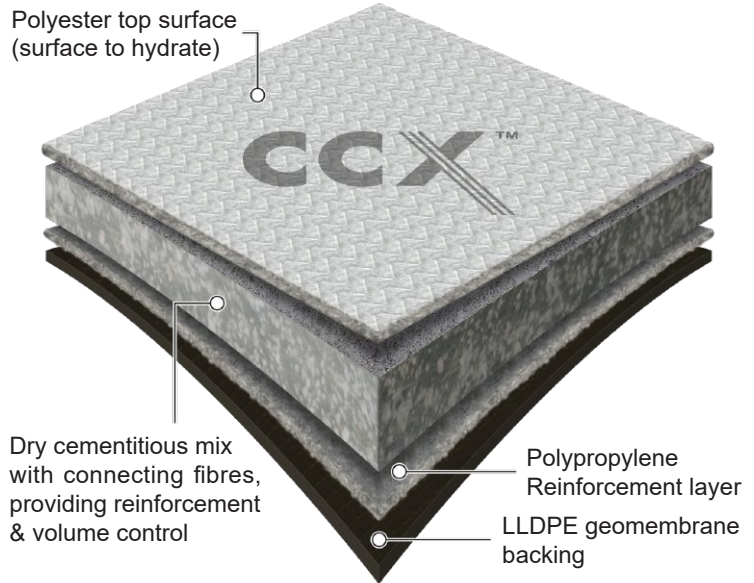
Long-term Performance

CCX™ has very good long-term performance with a life expectancy in excess of 50 years.

Lower Carbon

CCX™ is a carbon efficient concrete solution that offers significant embodied carbon reduction compared to conventional concrete linings.

CCX™ GCCM/B section



Close up of CCX™ top surface



Deployment of CCX™ bulk roll

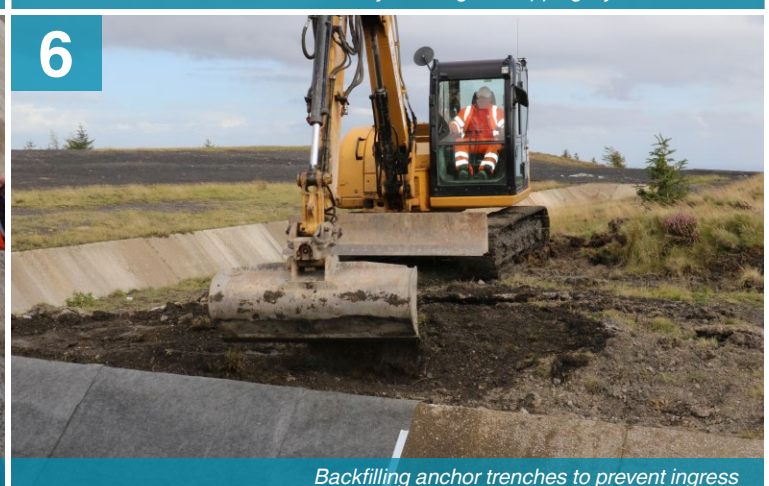
CCX™ GCCM Applications

Canal Lining & Remediation

CCX™ can be rapidly unrolled to line existing or new earth canals as well as remediating existing concrete canals. It is significantly faster, easier and more cost effective to install than conventional lining methods.

The LLDPE water resistant geomembrane backing to CCX™ ensures the material has very high impermeability. The composite concrete top cover provides a high degree of long-term durability.

As a result, CCX™ is the ideal solution for lining and remediation of channels and irrigation canals, increasing their operational life and reducing water seepage losses.



CCX™ Properties

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Pre-set

Pre-set	Test Method	Unit	Typical Values	
			CCX-M™	CCX-B™
Physical Properties				
Total Thickness	BS EN 1849-2 / ASTM D5199	mm	10	11
Membrane Thickness	BS EN 1849-2 / ASTM D5199	m	0.3	1.0
Roll Width		m	1.9	
Mass per Unit Area	BS EN 1849-2 / ASTM D5993	kg/m²	15.5	16
Density	BS EN 1849-2 / ASTM D5993	kg/m³	1500 - 1600	
Density Increase on Curing		% Increase	20	
Other Properties				
Tensile Strength of Geomembrane Barrier	EN ISO 527-4	kN/m	N/A	12.5 (CD)
Working Time from Hydration		Minutes	<30	

Post-set

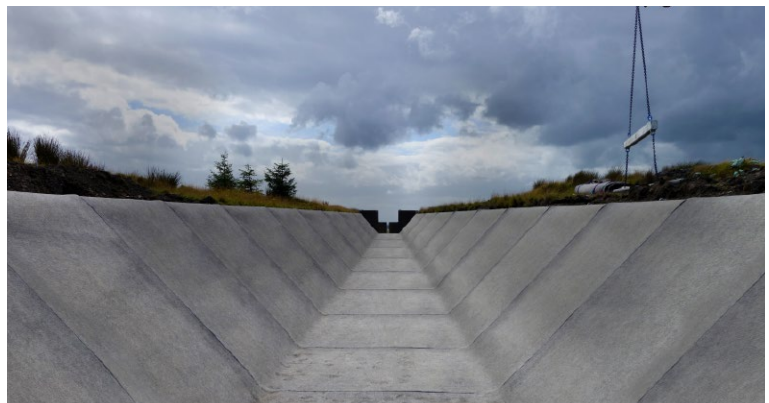
(Hydrated by full immersion in accordance with ASTM D8030)

Post-set <small>(Hydrated by full immersion in accordance with ASTM D8030)</small>	Test Method	Unit	Typical Values	
			CCX-M™	CCX-B™
Mechanical Performance				
Compressive Strength of Cementitious Material				
- 24 Hour	ASTM D8329	MPa	50	
- 28 Day	ASTM D8329	MPa	80	
Flexural Strength at 24 Hours from Hydration				
- Initial Flexural Strength	ASTM D8058	MPa	>6.0	
- Initial Flexural Strength	ASTM D8058	N/m	>4000	
- Final Flexural Strength	ASTM D8058	MPa	>10.0	>13.0
Tensile Strength at 24 Hours from Hydration				
- Initial Break (MD)	ASTM D4885	kN/m	11	
- Maximum Break (MD)	ASTM D4885	kN/m	>35	>45
Hydraulic Performance				
Abrasion Resistance - 28 Day (cementitious barrier depth of wear)	ASTM C1353	mm/1000 Cycles	0.3	

CCX™ is available in 2 variants:

CCX-M™ has a 0.3mm LLDPE geomembrane coating on the rear surface. It is designed to be used for smaller channels, with a low water head, or in applications where water impermeability is less critical. CCX-M™ is classed as a GCCM (Geosynthetic Cementitious Composite Mat).

CCX-B™ has a 1.0mm LLDPE geomembrane coating on the rear surface, which can be thermally welded and pressure tested to create a fully impermeable joint. It is designed to be used on larger channels, with greater water head or in applications where water impermeability is critical. CCX-B™ is classed as a GCCB (Geosynthetic Cementitious Composite Barrier).



Information is provided based on current test data and may be subject to change as new information becomes available. The versatile nature of CCX™ 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 CCX™ material use in a particular application.

