CONCRETE CANVAS®
Concrete on a Roll

2503.01.EN
MADE IN UK



CCX®
Innovation on a Roll

CCX-UTILITY® / CCX-MAT®

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CCX®
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CCX® GCCMs

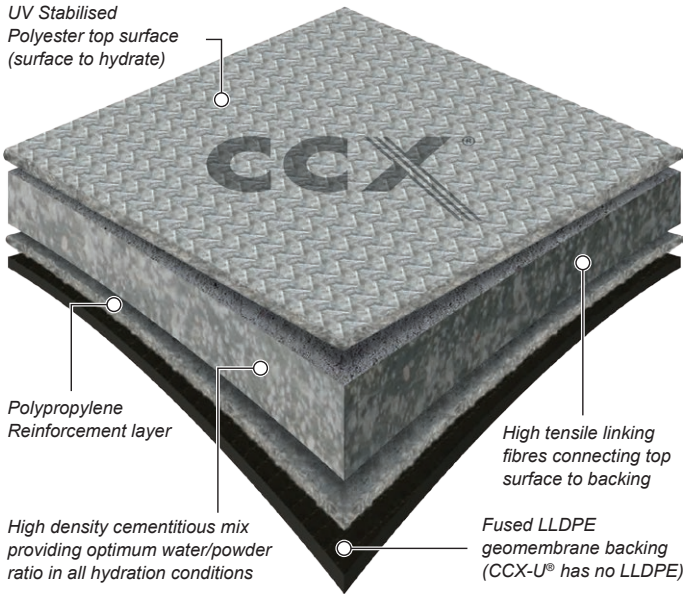
What is it?

CCX® is part of a revolutionary 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, concrete layer used for lining of uniformly graded channel and slope profiles. 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.

There are three variants of CCX®: CCX-UTILITY® (CCX-U®), for armouring applications, CCX-MAT® (CCX-M®) for erosion control applications & CCX-BARRIER® (CCX-B®) for certifiable containment applications (Coming Soon).

All CCX® products exceed the minimum Type II GCCM requirements of ASTM D8364 - Standard Specification for GCCM Materials.

CCX® Cross Section



Benefits of CCX-M® for Erosion Control

Rapid Installation

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

Reduced Seepage

Over time conventional concrete liners can suffer from widespread cracking due to differential ground movement, leading to significant seepage losses, undermining and, in the worst instances, complete channel collapse. CCX-M® can accommodate a high level of differential ground movement due to the fibre reinforcement imbedded within its structure. This limits crack propagation whilst retaining low levels of permeability.

Composite Solution

CCX-M® combines the low permeability of a geomembrane with the protection and durability of concrete. CCX-M® can be installed as rapidly as conventional geosynthetics and 24 hours from hydration will cure to create a hard-wearing concrete liner which is ready to use.

Low Logistical Footprint

CCX-M® has an un-hydrated unit weight of 14.5-15.5kg/m^2 compared to ~220kg/m^2 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-M®

Low Permeability

CCX-M® has an LLDPE geomembrane backing ensuring the material has very low permeability, significantly reducing or eliminating seepage losses.

Durable

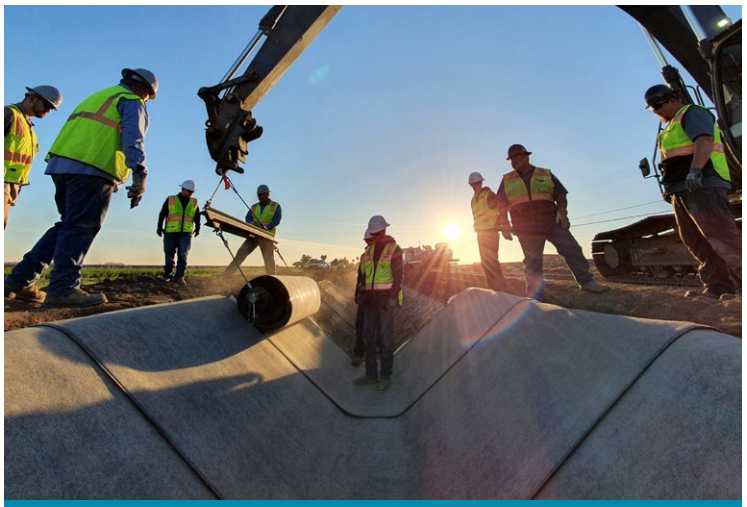
CCX-M® has a high degree of durability with abrasion resistance more than 3.5 times that of standard OPC concrete.

Long-Term Performance

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

Lower Carbon

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



Unrolling of CCX-M® into an irrigation canal



CCX-M® hydration taking place

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CCX™
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CCX® GCCM Applications

Bulk Water Infrastructure Lining & Remediation

CCX-M® can be rapidly unrolled to line earth canals as well as remediating existing concrete bulk water infrastructure. It is significantly faster, easier and more cost effective to install than conventional lining methods. The LLDPE geomembrane backing to CCX-M® ensures the material has very low permeability. The composite concrete top cover provides a high degree of long-term durability. As a result, CCX-M® is the ideal solution for the lining and remediation of channels and irrigation canals, increasing their operational life and reducing water seepage losses.

Slope Protection

CCX-U® is a variant of CCX® without an LLDPE backing. Whilst unsuitable for hydraulic applications such as channels, it may be used to line uniformly profiled slopes to counteract wind and rain erosion - see below.

Irrigation

CCX-M® can be rapidly unrolled to line uniformly profiled irrigation canals. Joints can be thermally bond or sealed with an adhesive then fixed with screws, to provide a low permeability lining solution.

view video



Drainage

CCX-M® can be rapidly unrolled to line a uniformly profiled channel. It is significantly faster, easier and less expensive to install than conventional concrete lined channels.

read case study



Slope Protection

CCX-M® can be rapidly unrolled to line uniformly profiled slopes. CCX-U® may be used as an alternative to CCX-M® where erosion protection is required to counteract wind or rain acting directly on the slope only, or to armour the side slopes of geomembrane lined lagoons.

view video



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CCX® Innovation on a Roll

DATA SHEET

CCX® Properties 2408.01.EN

Pre-set (Uncured)	Test Method	Unit	Typical Values	
			CCX-U®	CCX-M®
ASTM D8364 'Standard Specification for GCCM Materials' Classification				
GCCM/B Classification	ASTM D8364	Type	II	II
Dimensions				
Total Thickness	BS EN 1849-2	mm	10	10.3
Membrane Thickness	BS EN 1849-2	mm	N/A	0.3
Roll Sizes - W x L**	*	m	1.95 x 50	1.90 x 50
Area of CCX® per Roll	*	m^2	97.5	95
Physical Properties				
Mass per Unit Area	BS EN 1849-2	kg/m^2	13.5 - 15.5	14.0 - 15.5
Density	BS EN 1849-2	kg/m^3	1400-1600	
Density Increase on Curing	*	% Increase	20-25	
Other Properties				
Working Time from Hydration - refer to the CCX® Hydration Guide	*	Minutes	<30	

Post-set (Cured) - at 28 Days from Hydration Unless Specified (Hydrated by full immersion in accordance with ASTM D8030)	Test Method	Unit	Typical Values	
			CCX-U®	CCX-M®
Mechanical Performance				
Compressive Strength of Cementitious Mix (water/cementitious materials ratio to ASTM D8329)	ASTM D8329	MPa	60	70
Flexural Strength - at 24 Hours from Hydration				
- Initial Breaking Load	ASTM D8058	N/m	2500	
- Initial Flexural Strength	ASTM D8058	MPa	4	
- Final Flexural Strength (MD/CD)	ASTM D8058	MPa	6 / 4.5	10 / 6
Dynamic Puncture Resistance (depth of perforation)	BS EN ISO 13433	mm	0***	
Pyramid Puncture Resistance	BS EN ISO 14574	kN	15	
Differential Ground Movement (strain to exposure of geomembrane)	*	%	N/A	>10
Environmental Durability				
Freeze - Thaw Resistance - retained Initial Flexural Strength after 100 cycles	BS EN 12467	%	100	
Weathering (UV) Resistance - retained Initial Flexural Strength	BS EN 12224	%	90	
Microbiological Resistance - retained Initial Flexural Strength	BS EN 12225	%	85	
Permissible Long Term pH Immersion Range	*	pH	6-9	
Root Resistance	DD CEN/TS 14416	-	Passed	
Hydraulic Performance				
Abrasion Resistance - cementitious barrier depth of wear	ASTM C1353 / D8364	mm/1000 Cycles	0.2	
Manning's Roughness Coefficient - refer to CCX® Manning's test report	ASTM D6460	n	0.010-0.015	

The above values are typical and provide an indication of product performance based on testing by BICS Laboratories Ltd or TRI Environmental. Values marked with an asterisk (*) are based on Concrete Canvas Ltd laboratories internal assessments and testing. For design values, contact Concrete Canvas Ltd. **CCX® 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.

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.

Further Info | CCX® DoP | Sustainability

British Assessment Bureau — UKAS MANAGEMENT SYSTEMS 8289 — ISO 14001 ENVIRONMENTAL MANAGEMENT

British Assessment Bureau — UKAS MANAGEMENT SYSTEMS 8289 — ISO 9001 QUALITY MANAGEMENT

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