CONCRETE CANVAS®
Concrete on a Roll

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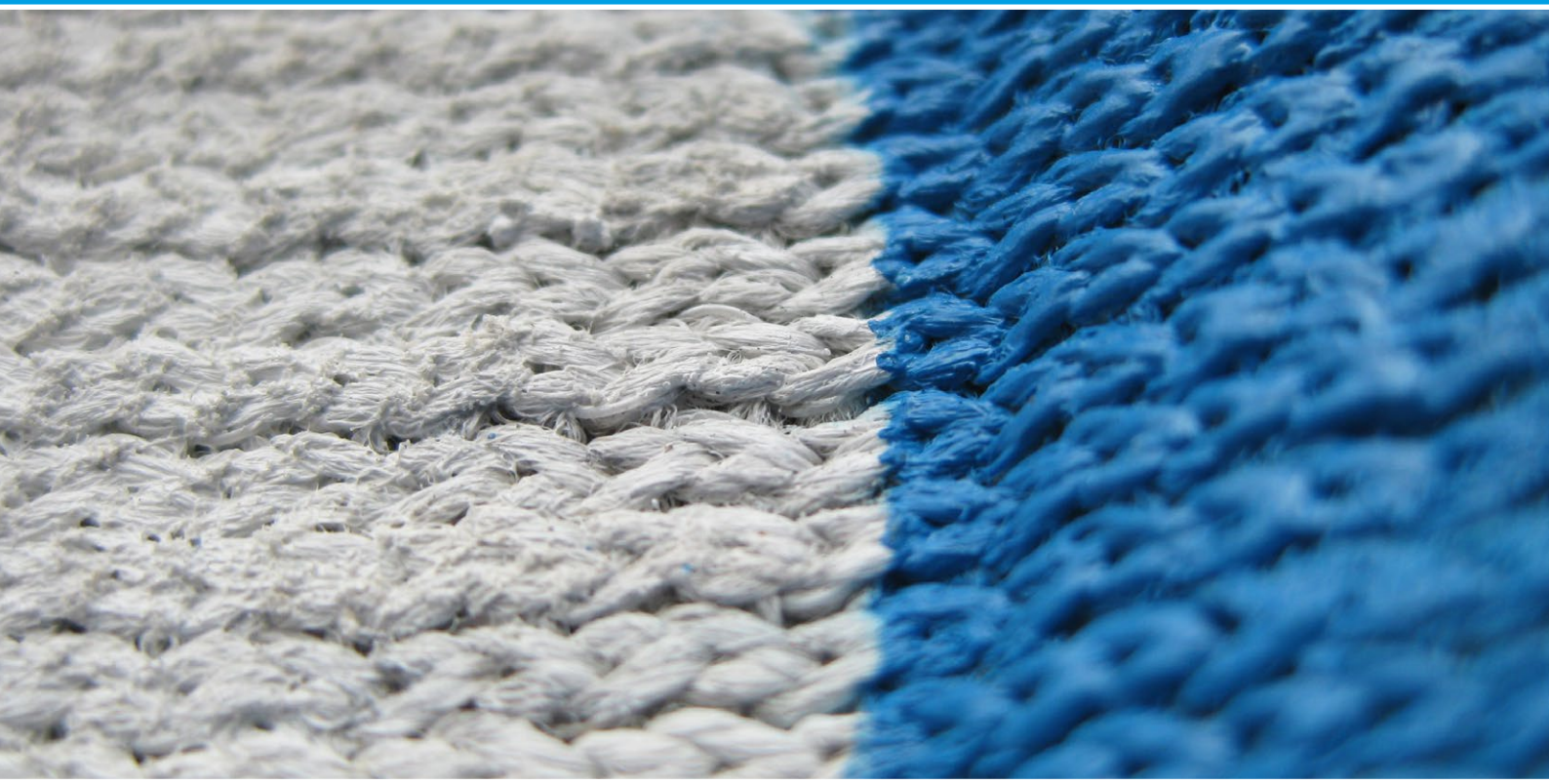

CONCRETE CANVAS®

Concrete on a Roll

FREQUENTLY ASKED QUESTIONS

The Queen's Awards for Enterprise: International Trade 2019

Board of Trade Winner 2018

Winner Technical Innovation Award

Innovation Award ICE Wales Cymru Awards 2017

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FREQUENTLY ASKED QUESTIONS

What is Concrete Canvas® GCCM?

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Concrete Canvas® (CC) is part of a revolutionary new class of construction materials called Geosynthetic Cementitious Composite Mats (GCCMs). It is a flexible, concrete filled geosynthetic which hardens on hydration to form a thin, durable, waterproof and lower carbon alternative to conventional concrete. Essentially, it's concrete on a roll.

How does CC work?
CC is unrolled into position and secured in place. The material is then hydrated. There is a 2-hour working window before setting begins, and in 24 hours the material hardens to service performance specifications.

What applications is it currently used for?
Concrete Canvas® GCCM (CC) is typically used to replace conventional concrete for a wide range of erosion control and weed suppression applications. Typical examples include channel lining, slope protection, bund lining, remediation works, culvert lining, gabion covering and pipe protection. Our biggest markets are the Civil Infrastructure (principally road and rail), Mining, Petrochemical and Agricultural sectors.

How is CC manufactured?
CC is manufactured in our UK production plant using bespoke machinery designed by Concrete Canvas Ltd. A 3-dimensional synthetic fibre matrix is filled with a custom cement blend before a PVC coating is added to one side.

What is the lifespan of properly installed CC?
CC is BBA certified with durability in excess of 120 years when used for erosion control applications. For advice on specific climates please contact Concrete Canvas Ltd.

What is CC Hydro™ GCCB?

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CC Hydro™ (CCH) is the world's first all-in-one armoured impermeable liner, known as a Geosynthetic Cementitious Composite Barrier. CC Hydro™ (CCH) combines the concrete-filled geotextile technology of Concrete Canvas® with a highly impermeable, chemically resistant geomembrane liner. The liner incorporates a hi-visibility welding strip which allows joints to be thermally welded with a double-track or triple-track air channel for on-site testing.

How does CCH work?
CC Hydro™ is laid in the same way as Concrete Canvas® but the geomembrane liner is thermally welded along the overlaps for a fully impermeable joint. 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.

What applications is it currently used for?
CC Hydro™ GCCB (CCH) is typically used to replace conventional liner systems for a wide range of containment applications. Typical examples include bund lining, lagoon lining and tank lining and remediation. Our biggest markets for CCH are the Petrochemical and Oil & Gas sectors.

What is the lifespan of properly installed CCH?
CCH is BBA certified with durability in excess of 50 years when used for containment applications. For advice specific to your project, please contact Concrete Canvas Ltd.

Formats & Availability

In what formats are CC and CCH available?
CC can be supplied as either palletised bulk rolls or man-portable batched rolls. CC5™ bulk rolls are 200m^2, CC8™ are 125m^2 and CC13™ are 80m^2. CC5™ batched rolls are 10m^2 and CC8™ are 5m^2. Due to its relative weight, CC13™ is not available in batched rolls as standard. CCH is available in standard bulk rolls only.

What are the weights of the different thicknesses of CC?
Concrete Canvas® GCCM has nominal dry weights of 7kg/m^2, 12kg/m^2 and 19kg/m^2 for CC5™, CC8™ and CC13™ respectively.

What are the weights of the different thicknesses of CCH?
CC Hydro™ GCCB has nominal dry weights of 8kg/m^2 and 13kg/m^2 for CCH5™ and CCH8™ respectively.

Which countries are CC currently used in?
CC is currently used in over 80 countries around the world and exports make up over 80% of turnover. Outside of the UK, our biggest markets are Brazil, Japan, Russia, Australia, USA and India.

How should CC and CCH be stored prior to use?
CC should be stored under cover in dry conditions, away from direct sunlight and within the manufacturer's sealed packaging as supplied.

What is the shelf life of properly stored CC?
When stored in the manufacturer's packaging in the correct conditions, CC can be kept for up to 24 months from the manufacture date without significant degradation in performance. After the 24-month point, CC will continue to function but may take longer to reach the values specified on the *CC Data Sheet*.

What is the shelf life after opening CC?
The performance values of CC will start to decline once opened; the CC should, therefore, be used within a few days of opening to prevent any significant degradation. It is best practise to reseal any packaging after opening to extend this period as much as possible.

Are there different colours of CC available?
CC is stocked and supplied in its natural colour (mottled grey) as standard. There are a number of options for colouring CC including dying the surface fabric fibres or applying coloured surface treatments, such as painting the fibre surface of CC with

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a good quality exterior masonry paint. It is recommended to seek advice from a CC representative before painting or dying.

Are there different widths of CC available?
CC is supplied in standard widths of 1.0m for CC5™ and 1.1m for CC8™ and CC13™. Wide Rolls up to 3m (CC5™) and 3.3m (CC8™) can be manufactured to order. It is possible to produce narrower rolls but this would be subject to a minimum order quantity.

Can I order different lengths of material other than the standard bulk or batched lengths?
Yes, bespoke lengths can be supplied subject to a batching surcharge.

Where can I buy ancillary CC installation products?
Concrete Canvas Ltd can supply a range of ancillary products for CC installations including ground pegs and sealant.

Does Concrete Canvas Ltd have international distributors?
Yes. See the map on the *Contact Us page* on our website for details of who to contact to find your nearest distributor.

Are samples of CC available?
Yes. Concrete Canvas Ltd can supply small and large sample packs on request, which contain hardened swatches and unset A4 samples of each of the three material thicknesses. Due to the volume of requests for sample packs, a postage fee may apply.

What is the price of CC?
The price of CC is volume dependant and the price/m^2 drops when ordering large volumes. Contact your local Concrete Canvas Ltd rep for a quote specific to your requirements and delivery location.

Designing with CC

Which customers have previously specified CC for construction projects?
Customers include UK and national rail, highways and environmental agencies, major mining companies and 8 of the top 10 oil and gas companies in the world.

What is the difference between Slope Protection and Stabilisation, and can CC be used for these applications?
Slope protection is where the body of the slope is inherently stable but the surface of the slope is prone to erosion caused by weathering, surface run-off and environmental degradation. CC can be used for slope protection in this case.

Slope stabilisation is where the body of the slope is geotechnically unstable and is at risk of suffering from slip (where a mass of the slope collapses). In certain applications, CC can be used for structural slope stabilisation by combining it with flexible structural facings. In this case, the project should be designed by a geotechnical engineer. See *CC Installation Guide: Slope Protection* for more details.

What are the methods for joining layers of CC together?
The three most common methods are a screwed overlap joint; a screwed and sealed overlap joint; or a thermally bonded overlap joint. There are a number of other mechanical and non-mechanical methods which may be suitable for particular applications. Please see *CC User Guide: Jointing & Fixing* or contact Concrete Canvas Ltd for more details.

How waterproof is CC?
The level of waterproofing that materials provide is typically referred to in geotechnics using a measure of permeability called the k-value. CC has been tested to BS1377 and has an average k value of between 10^{-8} and 10^{-9} m/s, which is similar to clay; a range commonly referred to as being impervious.

The permeability of a CC lined structure can be adjusted by selecting an appropriate method for joining the material. Please see the *CC User Guide: Jointing and Fixing* document for more information.

If the overall impermeability is critical for your application, we would recommend the use of our CC Hydro™ material, which incorporates a high-performance containment geomembrane that is thermally welded with testable joints for quality assured containment applications. Please see the *CC Hydro Brochure* for more information.

Which thickness of CC should I specify?
It depends on the application. Consult the application table in the *CC User Guide: General* or contact Concrete Canvas Ltd directly for technical advice.

Is there a maximum inclination that CC can be installed onto?
CC can be installed vertically providing that the supporting surface is structurally stable.

At what intervals should CC be pegged down?
This is dependent on the application and the quality/ inclination of the substrate; as a guide, we recommend pegging in anchor trenches at 2m intervals and material overlaps (joints). In warm climate conditions, intermediate fixings are required at 3m intervals on exposed CC surfaces. Wind or Hydraulic shear forces may also require pegging to prevent movement of the CC. Consult the *CC/CCH Installation Guide: Bund Lining* and *CC Hydraulic Design Guidance Notes* documents for more information.

How does CC compare environmentally with conventional poured concrete ditch lining?
CC typically replaces 100-150mm of poured, sprayed or precast concrete, resulting in typical material savings of 95%. This directly results in a reduction on the carbon footprint of construction works. A recent Life Cycle Assessment found that CC8™ contains 45% of the embodied carbon when compared to a 150mm ST4 poured concrete channel before the transportation and installation carbon savings are also considered.

Has CC previously been granted EA (Environment Agency) approval for projects within the UK?
Yes. CC has been approved for use by the EA, SEPA and Natural Resources Wales on several projects. Case studies for these can

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be found on our website's *Downloads page*. Project approval is granted on a case-by-case basis.

How does CC washout affect the alkalinity of watercourses during installation?
Concrete Canvas® uses a specialist high early strength cement with a limited alkaline reserve which is below the US Environmental Protection Agency limits. CC has been installed directly into live watercourses without the need for special environmental protection measures.

What fire protection does CC provide?
CC has achieved Euroclass classification B-s1, d0 and has passed the American MSHA (Mine Safety and Health Administration) fire testing for use in underground mining applications.

What level of chemical resistance does CC provide?
CC has excellent resistance to chemical attack, in particular sulphate attack, which means it is well suited for use in ground surfacing applications. The concrete we use is also much more resistant to chemical attack compared to ordinary Portland concrete. CC has passed acid (ph1), alkaline (ph13) and hydrocarbon immersion tests to BS14414.

Can CC be used for Trackway?
We do not recommend CC as a vehicle trackway in most circumstances. However, CC can be used as hard armour capping of ground to prevent dust generation, erosion and wash-out of fines. The load-bearing capacity of the trackway should be based on the surface modulus (CBR) of the ground which should be sufficient to support the requisite traffic loading. The CC should therefore only be used to provide surface erosion control rather than to increase the surface modulus of any given substrate. For this type of application, we would typically recommend 2 layers of CC13™ with an offset overlap and the 2 layers screwed together. It is not recommended to install CC in turning areas where axle loading can ruck the surface of the material.

Installing CC

Is it possible to lay CC in wet conditions?
Yes. Once wet, CC has a working time of approximately 1-2 hours in a UK climate.

Is it possible to lay CC in very cold conditions?
Yes. Warm water should be used for hydration and plastic sheeting should then be applied over the hydrated material until it has set. Consult the *CC & CC Hydro - Hydration Guide* for further instruction or contact Concrete Canvas Ltd directly. Generally, the same setting conditions that apply to conventional concrete pouring should be observed when installing CC.

Are there any special precautions to take when laying CC in very hot conditions?
Yes. Wherever possible it is advised to hydrate CC at dusk to avoid the water used for hydration evaporating in warm environments. In very hot conditions, it is advised to re-hydrate the material at 1-hour intervals for the first 5 hours.

How can I cut CC?
Before hydrating, unset CC can be cut using basic hand tools. It is recommended to use snap off disposable blades or handheld self-sharpening powered disc cutters. After CC has set, it can be cut using angle grinders, jigsaws with ceramic blades or good quality tile cutters.

Is it possible to over-hydrate CC?
One of the key features of CC is that the fixed internal volume and control during manufacture ensures void space is set within carefully prescribed bounds and subsequently limits the Water: Cement ratio achieved in the field. It is therefore not possible to over hydrate CC; it will set underwater and can, therefore, be installed in adverse weather conditions.

What happens if CC is under-hydrated?
The CC will not reach its full strength and the setting time may be delayed.

Will CC set underwater?
Yes. It will hydrate fully from immersion.

What water should be used to hydrate CC?
CC can be hydrated using saline or non-saline water. The water does not need to be potable.

How much water per m^2 of CC should be used for hydration?
The minimum ratio of water: CC is 1:2 by weight. For Example, CC8 weighs 12kg/m^2 and a minimum of 6 litres/m^2 is required for hydration. CC cannot be over hydrated so an excess of water is always recommended.

Is it possible to accelerate or retard CC's setting time?
Yes. When ordered in sufficient volumes, Concrete Canvas Ltd can accelerate or retard the setting times of CC to accommodate different environmental conditions and applications.

What Health and Safety precautions should I take when handling CC?
General PPE precautions should be taken; face masks, protective clothing and gloves should be worn when handling CC. CC does not contain measurable amounts of soluble chromium (VI) and is not classified as an irritant. Consult the CC & CCH (M)SDS document for more information.

Should CC be laid fibre or PVC surface facing upwards?
CC should be installed with the fibrous surface exposed. The fibre reinforced concrete layer will protect the PVC backing from weathering and UV damage.

Does CC require any post-installation maintenance?
Providing it is installed correctly, CC requires no regular post-installation maintenance.

How should CC be disposed of or demolished?
CC can be demolished using standard construction demolition equipment and disposed of in the same manner as conventional concrete waste.

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