



CONCRETE CANVAS SHELTERS™

DEPLOYMENT METHOD STATEMENT

CCS25 / CCS50

BRIT
INSURANCE
DESIGN
AWARDS
2011

2010 Brit Insurance
Design Award & Exhibition

IN
DE
X:

2007 Finalist
Design to Improve Life Award



2007 Winner
D&AD Yellow Pencil Award
Product Design



2005 Winner
Saatchi & Saatchi
World Changing Ideas Award

CCS Summary

Concrete Canvas Shelters (CCS) are rapidly deployable hardened shelters that require only water and air for construction. When deployed, CCS are durable hardened buildings with 2 lockable double doors and a sterilisable internal liner. The expected lifespan is 10+ years in all conditions. There are two CCS variants, the CCS25 and the CCS50 with footprints of 25sqm and 50sqm respectively. Deployment of a CCS25 requires 2 people and takes approx. 1 hour. Deployment of a CCS50 requires 2 people and takes approx. 2 hours. Shelters are ready for use in 24 hours and can be earth bermed for additional force protection or thermal insulation.

CCS Deployment Summary

CCS are deployed in four stages; Delivery, Inflation, Hydration and Setting.

1

Delivery

- Site Preparation
- Positioning CCS
- Dragging out CCS (CCS50 only)



2

Inflation

- Attach Inflation and Controller Units
- Inflation
- Unfolding Footings
- Pegging



3

Hydration

- Hydrate CCS in alternate quarters
- Re-wet after 1 hour in hot climates



4

Setting

- CCS Opening
- Burying Footings (optional, recommended)
- Cutting AC ports (optional)
- Earth berming (optional)



Equipment List

CCS are entirely prefabricated and supplied with the inflation equipment and ground pegs required for deployment.

Once the sealed CCS package is opened, the deployment process becomes time critical so ensure that you have all the equipment ready and have access to power and a water supply prior to starting.

Supplied Equipment

(Bracketed figures denotes CCS50 quantities)

- CCS : Supplied in polyethylene, airtight, water proof, rot proof sack within ISPM15 heat treated timber/ply panel crate.
- Deployment instructions : English only.
- Inflation Unit with filter : 110V or 240V as supplied.
- Control Unit.
- Digital pressure gauge.
- 16 (30) off 750mm steel ground pegs.
- Safety knife.
- 3 (4) off 2T loading straps.
- (1) off tow rope with karabina attachments.

Required Equipment

- >3T rated forklift with 1.8m forks / heavy lifting equipment.
- 2 off sledgehammers.
- 1000L (2000L) of water : sea water may be used.
- Water pump fitted with >10m hose and spray nozzle : recommended water flow 30L/min.
- Uninterrupted 6 amp power supply for 24 hours.
- Crowbar.
- (Vehicle with towbar or 3T rated standing winch with ground mount)

Optional Equipment *

- 16 (28) off 150mm Ø10mm self tapping anchor bolts for deployment on rock/concrete
- Water soluble accelerant sachet.
- Polyurethane sealant for sealing between multiple shelters

**Contact Concrete Canvas Ltd. for information specific to your deployment requirements.*

Positioning the CCS Package

Remove the lid of the CCS crate with a crowbar (Fig. 2) and remove the inflation equipment and pegs.

Position the 3(4) lifting straps evenly along the fork lift tines when lifting the CCS out of the crate (Fig. 3).

Note the 'Inflation End' marked on the crate. The shelter will unfold away from the Inflation End (Fig. 4).

Position the package by locating the feet of the lower door frame (Inflation End) where the front door of the deployed shelter is required. The front door of the deployed shelter will be in the same location as these feet are in the current folded state.

Remove the CCS plastic packaging with the safety knife provided. Be careful not to cut the white lining of the shelter. If possible, remove the lifting straps.

Fig. 2



Fig. 3



Fig. 4



Unfolding a CCS50 package

A vehicle is required to unfold a CCS50 before beginning inflation. Remove the CCS packaging and attach the tow rope to the top door frame feet (using the supplied karabinas) and to the vehicle (Fig.5). Slowly drag the CCS50 out in a straight line until it is fully unfolded ensuring that the shelter unfolds over the drag strip attached (Fig. 6). The drag strip is a 10m length of sacrificial material that prevents the shelter snagging during dragging out.

Fig. 5



Fig. 6



Attaching the Inflation and Control Units

Unfold the Inflation tube and attach the Inflation Unit to the shelter using the Clamping Band (Fig. 8).

Attach the Control Unit to the Inflation Unit and plug in the Pressure Feedback Tube as indicated (Fig. 9).

Fig. 7



Fig. 8



Fig. 9



Inflating the CCS

Plug in and set the Inflation Unit to "Inflation" using the Control Unit. The CCS will begin to unfold (Fig.9).

CAUTION (CCS25 Only) : Ensure the area on the far side of the shelter is clear as the door frame is heavy and will fall here as the shelter unfolds.

As the CCS unfolds, position a person on each door set to assist the unrolling of the sides. This will not require much force (Fig. 11).

Fig. 10



Fig. 11



Positioning the CCS footings from under the inflated CCS

Once the ridge of the shelter is fully formed (Fig. 12), set the Control Unit to “Pegging Pressure”. At this stage the footings should be pulled out from under the shelter (Fig. 13).

The footings should rest on the ground around the entire perimeter with the white peg marks just above ground level (Fig. 14).

Fig. 12



Fig. 13



Fig. 14



Pegging the perimeter of the CCS

The CCS is now ready to be pegged down around its perimeter. Starting from the centre of the shelter, drive in ground pegs on both sides and work outwards toward each door frame. Ensure the pegging is done symmetrically side-to-side and end-to-end. Hammer each peg vertically through the white target marks (Fig. 18) and ensure that each footing is pulled out so that the sides of the shelter are vertical. (Fig.15)

Once the peg enters the ground, pull it out to 30° from the vertical and hammer the peg in. (Fig.16). The pegs must be hammered into the ground until the hook lies over and compresses the joint next to it. The hook of the peg should be parallel to the side of the shelter. (Fig.17 and Fig. 19)

Once all the pegs are in, turn the Control Unit to "Setting Pressure". The shelter should now be taught and have the correct shape. This pressure must be maintained until the CCS has hardened (a minimum of 12 hours after hydration).

Fig. 15

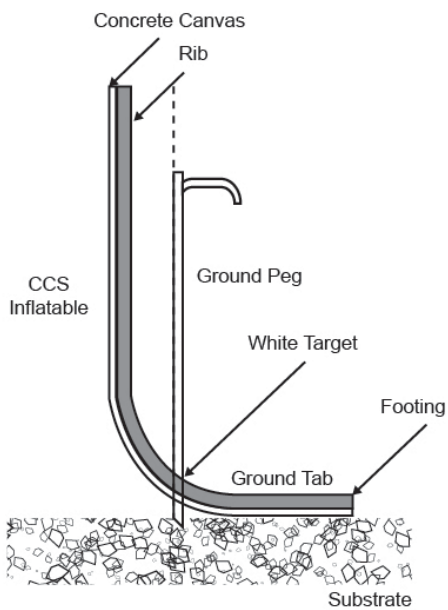


Fig. 16

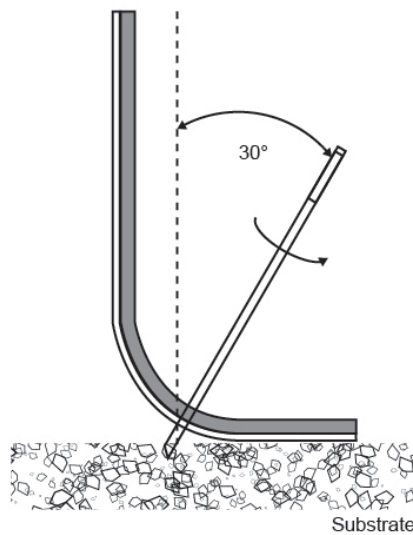


Fig. 17

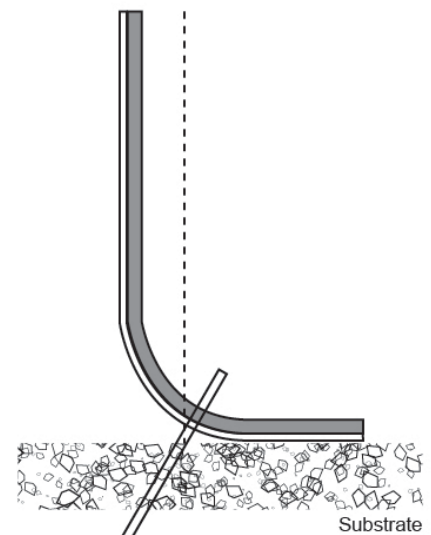


Fig. 18



Fig. 19



Hydrating the CCS

Divide the CCS into quarters and spray each evenly with water to hydrate the Concrete Canvas (CC). Seawater may be used. Use a spray nozzle : do not jet pressurized water onto the shelter.

Start at the top of each quarter and work downwards. Spray an area evenly until it is saturated. The material is fully saturated if it is still wet to touch after several minutes after spraying and water begins to run off the surface (Fig. 20).

Spray each quarter alternately, until a minimum of 1000 litres (CCS25) / 2000 litres (CCS50) of water has been used. CC cannot be over hydrated and an excess of water is always recommended where possible. Pay particular attention to the top of the CCS and joints. In a hot/dry climate it is necessary to re-spray the shelter after 1 hour.

Fig. 20



Fig. 21



Fig. 22



Opening of the CCS after the setting period

After 24 hours, detach the Inflation Unit and open the doors using the keys attached to the front panels. Remove the steel packing shims above and below the shoot bolts and cut the exposed white liner behind the doors leaving a 50mm border (Fig. 23). The Inflation Tube can be rolled up and placed under the door frame. The shelter is now ready for use.

AC Ducting / Ports

CCS have a manifold welded into the liner adjacent to each door frame for AC ducting. To access the manifold cut through the set Concrete Canvas at the white target points (Fig.24). Care should be taken not to damage the manifold underneath. Holes can be cut as required using an angle grinder or masonry drill to accept conduits for electrical/data cables. Do not cut through ribs.

Fig. 23



Fig. 24



Fig. 25



CCS Data Sheet

Concrete Canvas Shelters (CCS) are rapidly deployable structures that can be deployed by two people in less than 24 hours. There are two shelter sizes available, the CCS25 and the CCS50 with respective deployed areas of 25 and 50sqm. CCS are prefabricated structures consisting of Concrete Canvas fixed to an inflatable inner with integral steel door sets at each end. CCS are deployed in four stages; Delivery, Inflation, Hydration and Setting.

Pre-deployment (Crate) dimensions				
Unit	Length (m)	Width (m)	Height (m)	Weight (kg)
CCS25	2.61	2.30	1.13	1900
CCS50	2.90	2.24	1.70	3100

Post-deployment dimensions				
Unit	Length (m)	Width (m)	Height (m)	Internal Area (m ²)
CCS25	5.00	5.60	2.45	25.00
CCS50	9.50	5.60	2.60	50.00

General Specification			
Unit	Water Requirement (L)	Deployment Time (min)	Cot Space Available
CCS25	1000	60	4-6
CCS50	2000	120	8-10

Packaging

CCS are supplied in polyethylene, airtight, water proof, rot proof sacks within ISPM15 heat treated timber/ply panel crates.

Modularity

CCS structures are designed as part of a modular system; units can be docked together to create arrays of structures to suit operational requirements.

Inflatable Inner

Each CCS has a flame retardant reinforced polyethylene inflatable inner with internal hanging tabs (maximum load 20kg/tab). Disinfecting with high chlorine concentration will not damage the inner.

Door System

Each CCS has a vented entrance at each end with push to close latch inside and outside locking handles. The steel door blades have LPCB certification up to LPS 1175 SR3 and are fire rated up to 6 hours. Die cast zinc door latches.

Port/Conduits/AC

Small openings for services can be cut or drilled into the Concrete Canvas shell. The inflatable inner has two manifolds for AC/Ducting access.

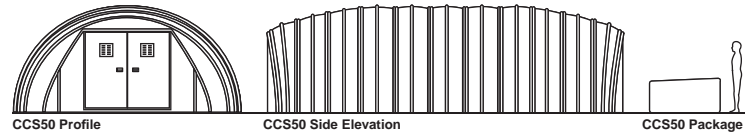
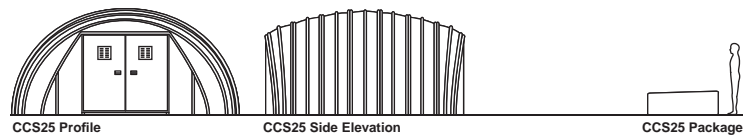
Disposal/Demolition

CCS can be demolished using basic tools. The thin walled structure has a very low mass leaving little material for disposal.

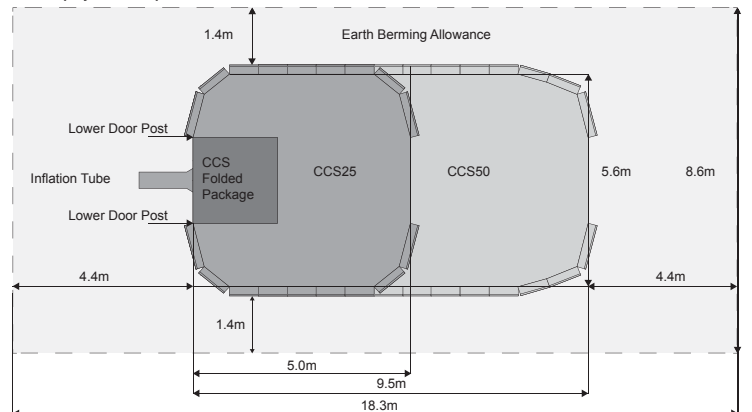
Requirements for deployment

Both CCS variants can be deployed by 2 people. A CCS50 will require a vehicle or winch to aid with the unfolding of the shelter prior to inflation. Each shelter is provided with the ground pegs required for inflation.

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CCS Deployment Footprints



Docked CCS barracks configuration

Site preparation

CCS do not require foundations or hard surfacing for deployment. However it is recommended that the site be relatively flat and with any protruding rocks or vegetation removed.

Inflation Unit

Each CCS shelter is supplied with a 110 or 240V filter fitted inflation unit and controller as required.

Design Life

CCS have a design life of over 10 years

CCS Demolition and Removal

CCS can be demolished using standard demolition heavy plant or manually using the following equipment. Ensure all demolition personnel are wearing appropriate PPE at all times.

Equipment Required

Angle grinder fitted with concrete cutting diamond disc
Sledgehammer
Crowbar
Safety Knife
Torque Driver

Demolition Procedure

1. Preparation

Empty shelter entirely of all furniture, hardware, lighting, data and power supply.

2. Remove Door Assemblies

Remove door leaves from door assemblies by unscrewing hinges from frame.

Remove door frames from shelter by unscrewing tech screws at top and sides of frame and cutting bottom door tab with safety knife.

3. Cut away Inner

With a safety knife, cut and remove inner ground sheet. Cut inner into strips either side of stapled hoop ribs and remove.

4. Remove CC hoops

Using a sledge hammer, proceed to collapse CCS hoops. Focus blows on the rib sections and work from the outside in until the hoops are flattened. Ensure that no personnel are within the shelter during this process.

Cut collapsed hoops into man portable sections with an angle grinder. You may need to cut remaining inner sections to separate hoops. Dispose of CC hoop sections as you would building rubble.

Remove ground pegs where possible with crow bar.

The structure has a very low mass leaving little material for disposal. The rubble can be crushed to provide aggregate fill and can be disposed of in the same manner as conventional concrete waste.



CCS16 Prototype Demolition



The information contained in this document is intended solely to provide general guidance on the deployment of Concrete Canvas Shelters to the reader, who accepts full responsibility for its use.

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