

**SPECIFICATIONS**

**CEMSEAL SMT**  
**○ STORMWATER MANAGEMENT**

**1 GENERAL**

All work in this Section shall comply with the requirements of the Contract Documents. Supply and install stormwater percolation tanks as shown on the drawings or specified herein.

**2 MATERIALS**

The stormwater management system shall include stormwater percolation tanks with non-woven geotextile filter fabric.

**2.1 Stormwater Percolation Tank**

The stormwater percolation tanks shall be pre-fabricated percolation tanks supplied by Cemseal Industries Sdn Bhd (Tel: +607-558 3320, Fax: +607-556 9127, E-mail: info@cemseal.com.my) or approved equivalent.

GENERIC SPECIFICATION

The stormwater percolation tanks shall be high strength and modular, assembled from interconnecting panels manufactured from 100% recycled plastics with Singapore Green Label certification.

The percolation tanks have surface perforations not exceeding 20 mm to prevent entry of large fill aggregate. They shall have good resistance to petroleum-based chemicals and naturally occurring soil chemicals.

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Typical properties of the percolation tank are:

<b>PROPERTY</b>	<b>VALUE</b>
Material	Polypropylene
Dimensions: VT 250	500 (L) x 560 (H) x 250 (W) mm
VT 550	500 (L) x 560 (H) x 500 (W) mm
VT 840	745 (L) x 395 (W) x 425 (H) mm
VT 880	790 (L) x 745 (W) x 425 (H) mm
Volume : VT 250	0.07 m <sup>3</sup>
VT 550	0.14 m <sup>3</sup>
VT 840	0.125 m <sup>3</sup>
VT 880	0.25 m <sup>3</sup>

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**2 MATERIALS**

**2.1 Stormwater Percolation Tank (cont'd)**

<b>PROPERTY</b>	<b>VALUE</b>
Weight : VT 250	~3.0 kg
VT 550	~4.0 kg
VT 840	~8.5 kg
VT 880	~13.0 kg
Compressive strength (unconfined)*:	
: VT 250	≤ 9.0 t/m <sup>2</sup>
VT 550	≤ 10.0 t/m <sup>2</sup>
VT 840	≤ 27.0 t/m <sup>2</sup>
VT 880	≤ 12.0 t/m <sup>2</sup>
Biological / chemical resistance	Unaffected by moulds and algae, soil-borne chemicals, bacteria and bitumen

*Note : \* Using Factor of Safety 1.5*

**2.2 Geotextile Filter Fabric**

Unless otherwise specified, the geotextile filter fabric where shown on the drawings or required to filter sand and soil from the percolation tanks shall be a non-woven geotextile of polypropylene material with at least 130 g/m<sup>2</sup> density.

**3 EXECUTION**

- 3.1** The proprietary materials specified herein shall be provided / installed in accordance to the project requirement as approved by the Superintending Officer.
- 3.2** Proprietary materials supplied shall be identified clearly with the product name and description. Packaged materials shall be stored in manufacturer's wrappings and containers with the manufacturer's labels and seals intact
- 3.3** Prior to installation, the Contractor shall submit Method Statements and / or Shop Drawings for the installation of the percolation tanks. The latter shall be on at least A3 size paper or larger and in a CAD-recognisable format.
- 3.3** Excavate the pipe trench and lay the inlet pipe to the required fall and install silt traps in appropriate locations in the pipe run.

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### **3 EXECUTION**

- 3.4** Excavate the hole or trench to the required dimensions to receive the percolation tanks modular units and any other external inspection chambers and / or silt traps.
- 3.5** Ensure that the base plan dimensions of the excavated hole allow sufficient working space for the installers to manoeuvre the percolation tanks and geotextile into position.
- 3.6** Ensure that the base of the excavation is smooth and level, batter back the sides of the excavation to a safe angle and ensure that safe access is provided for the installers.
- 3.7** Remove any soft spots from the excavation and replace with compacted granular material.
- 3.8** Lay 100 mm coarse sand bedding to the base of the excavation and level.
- 3.9** Lay the geotextile over the sand bedding and up the sides of the excavation with minimum 200 mm overlap joints between strips.
- 3.10** Ensure there is a minimum 200 mm over-run of geotextile at the end of each percolation tank unit.
- 3.11** Inspect geotextile for damage.
- 3.12** For rainwater harvesting system, install geomembrane / pond liner on site and ensure that all welds are tested. Apply a second (inner) protection geotextile inside the geomembrane / pond liner.
- 3.13** Assemble the percolation tanks in accordance to the manufacturer's instructions.
- 3.14** For CEMSEAL VERSITANK 880, individual tanks shall be able to interlock along connecting edges to form a continuous entity for added rigidity and strength.
- 3.15** Assemble the percolation tanks modular units to the configuration required and place on the geotextile.
- 3.16** Form hole(s) in side or top of the percolation tank unit using the required diameter hole saw to receive the inlet pipe (and outlet / inspection pipe if required). Insert tank connector and using geotextile form a wrap around apron of tank connector spigot and secure using tape. Ensure a minimum 50 mm of spigot remains exposed.
- 3.17** Continue with the geotextile encapsulation of the percolation tanks.

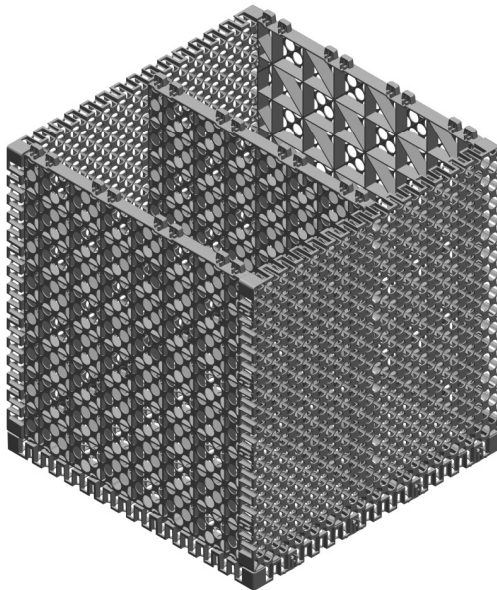
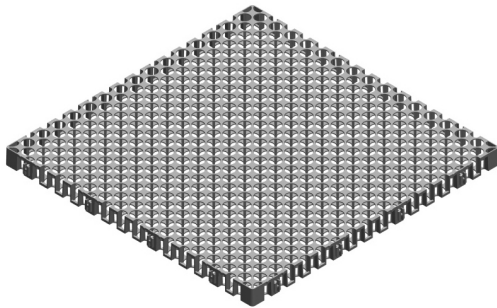
## **SPECIFICATIONS**

### **3 EXECUTION**

- 3.18** Connect inlet / outlet / vent pipe and inspection chambers using appropriate adaptors.
- 3.19** Backfill around excavation using approved materials and compact in layers of 300 mm. The first 500 mm of any installation should be compacted by hand.
- 3.20** Use a coarse sand protection layer over the top of the percolation tanks and geotextile and then backfill to the required depth using approved base materials. If the area is to be trafficked, or where the area is to be landscaped, then as-dug material may be used provided sharp or large solid matter is removed.
- 3.21** The area should then be compacted using suitable compaction equipment.

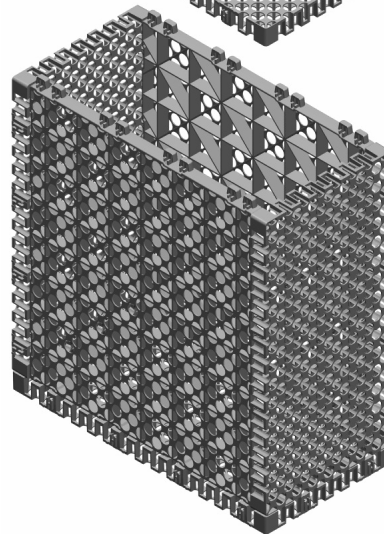
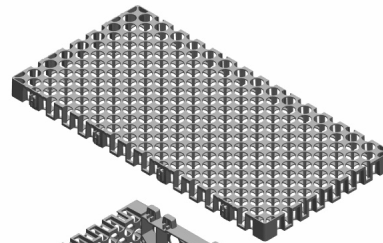


**SPECIFICATIONS**



**CEMSEAL VERSITANK 550**

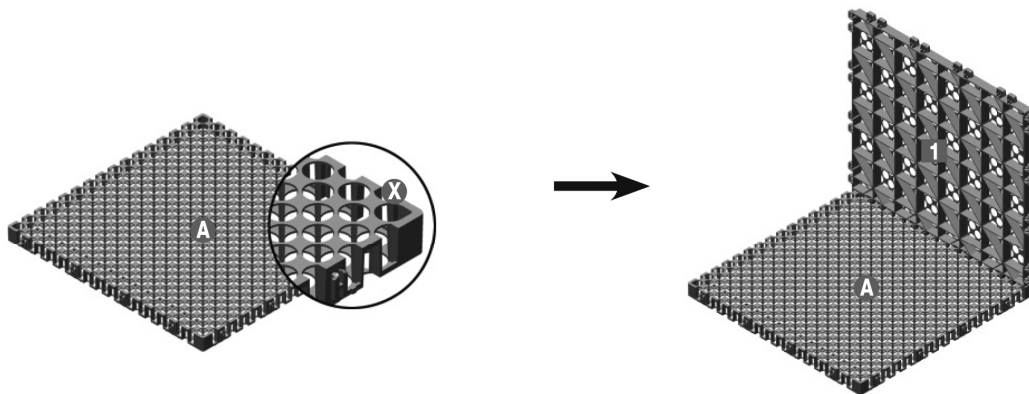
500(L) x 560(W) x 500(H) mm



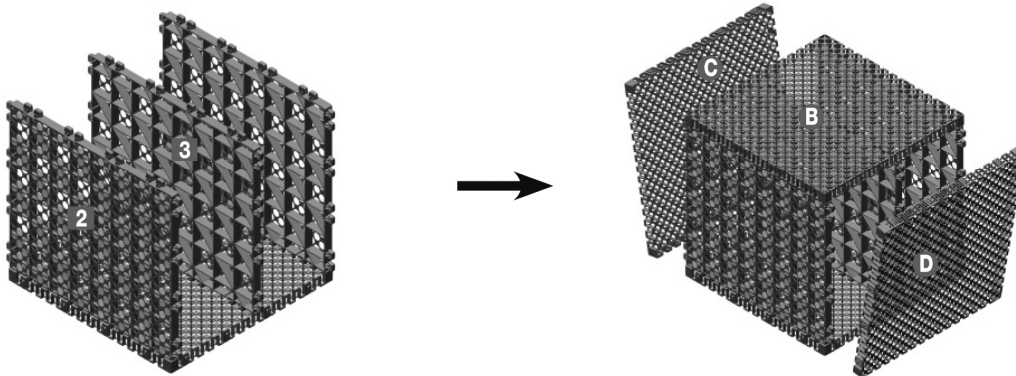
**CEMSEAL VERSITANK 250**

500(L) x 560(W) x 250(H) mm

## CEMSEAL VERSITANK 550 ASSEMBLY PROCEDURES



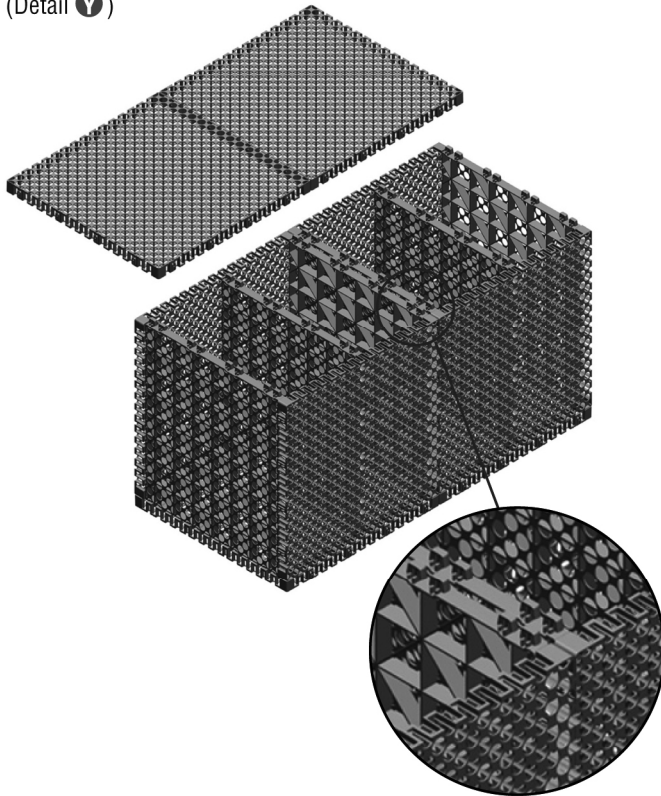
1. Select four VersiCell<sup>®</sup> panels.
2. Place VersiCell<sup>®</sup> panel **A** on a flat surface ensuring the sides with the large hole **X** in the corner faces upwards.
3. Place VC Stabilizer **1** onto VersiCell<sup>®</sup> panel **A**.
4. Push down to interlock the VC Stabilizer with the VersiCell<sup>®</sup> panel.



5. Similarly, interlock VC Stabilizers **2** and **3** into VersiCell<sup>®</sup> panel **A**.
6. If additional strength is required, four VC Stabilizers may be inserted into VersiCell<sup>®</sup> panel **A**.
7. Place VersiCell<sup>®</sup> panel **B** on VC Stabilizers **1**, **2**, and **3** ensuring the side with the large holes in each corner is facing inwards.
8. Push down to interlock VersiCell<sup>®</sup> panel with the VC Stabilizers.
9. Repeat for VersiCell<sup>®</sup> panels **C** and **D** ensuring the sides with the large holes in the corners are facing inwards.

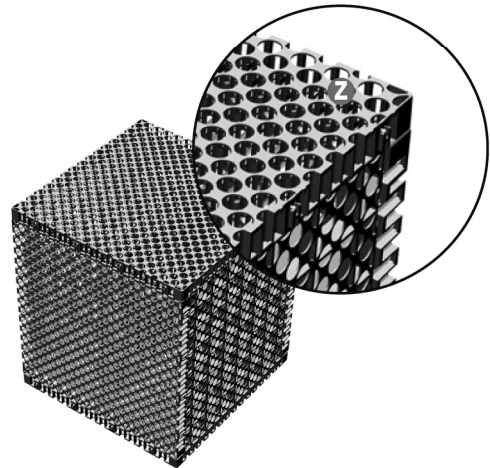
## CEMSEAL EXPANDABLE VERSITANKS

VersiTank<sup>®</sup> are expandable by pre-assembling the appropriate number of VersiCell<sup>®</sup> bottom panels before interlocking the VC Stabilizers into the bottom panels. Use 2 VC Stabilizers (one on each side) where the VersiCell<sup>®</sup> panels are joined. (Detail **Y**)

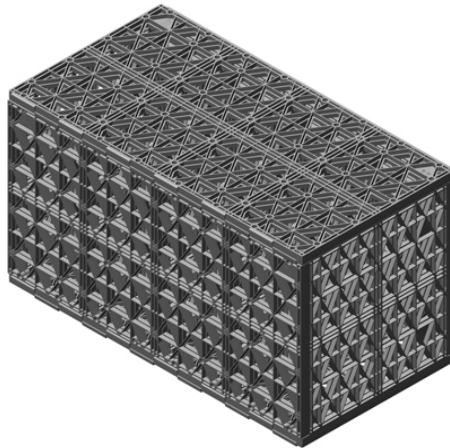


## CEMSEAL VERSITANK 550 ORIENTATION

Assembled VersiTank<sup>®</sup> should be placed with the side where VersiCell<sup>®</sup> extends to the edges facing upwards. (Detail **Z**)

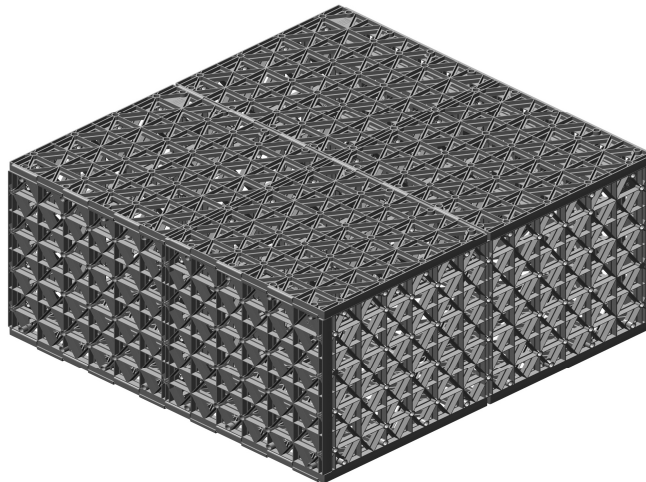


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**CEMSEAL VERSITANK 840**

**745(L) x 395(W) x 425(H) mm**

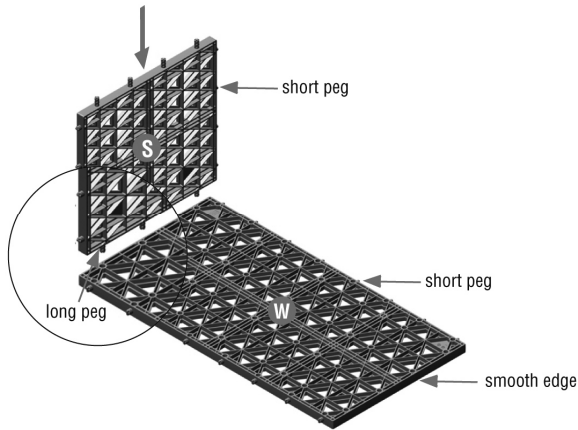


**CEMSEAL VERSITANK 880**

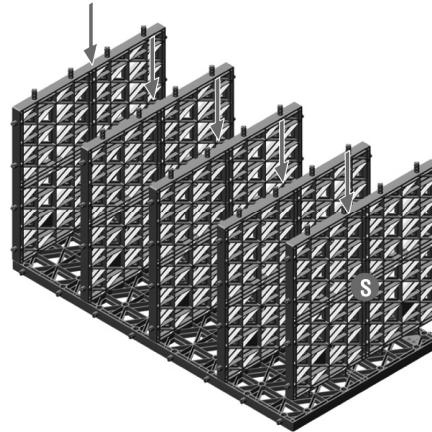
**790(L) x 745(W) x 425(H) mm**



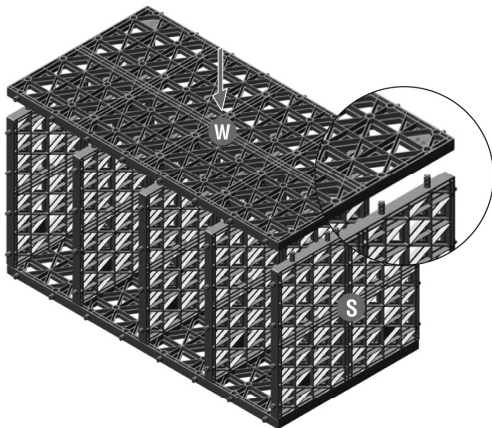
## CEMSEAL VERSITANK 840 ASSEMBLY PROCEDURES



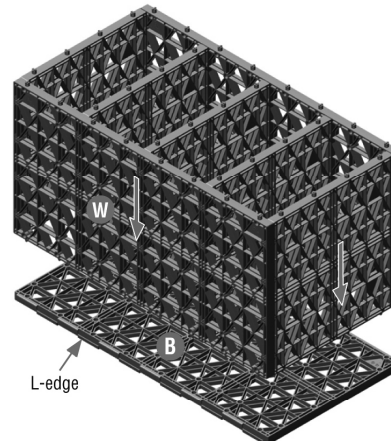
1. Insert Stabilizer **S** module into Wall **W** module



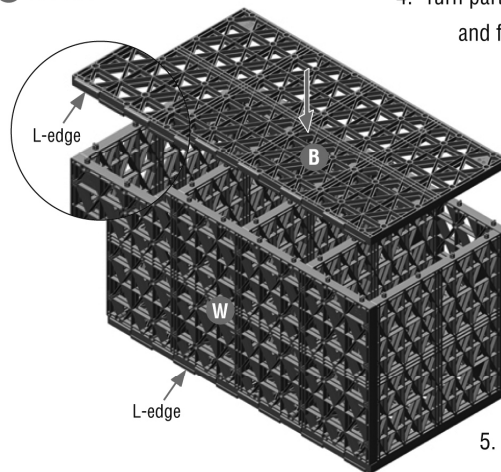
2. Repeat for remaining Stabilizer **S** modules



3. Fix remaining Wall **W** module



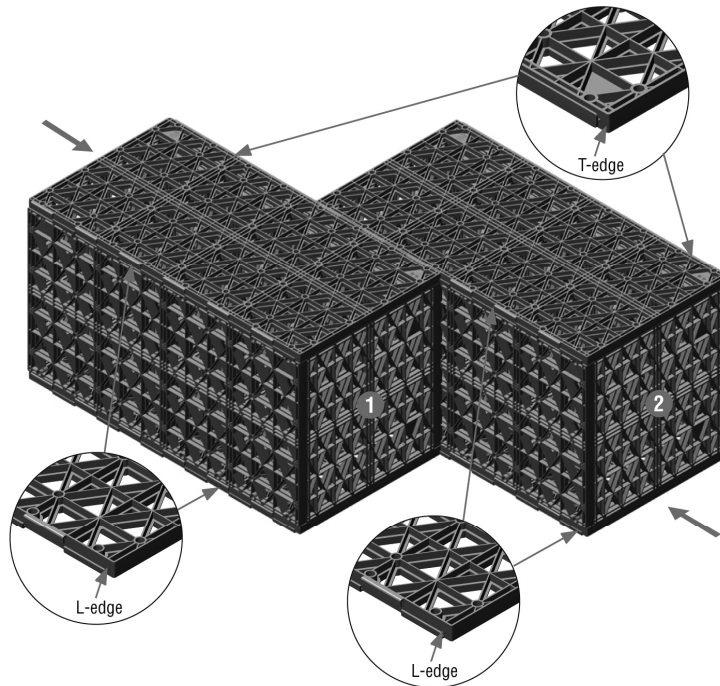
4. Turn partially assembled tank on its side and fix onto Base **B** module



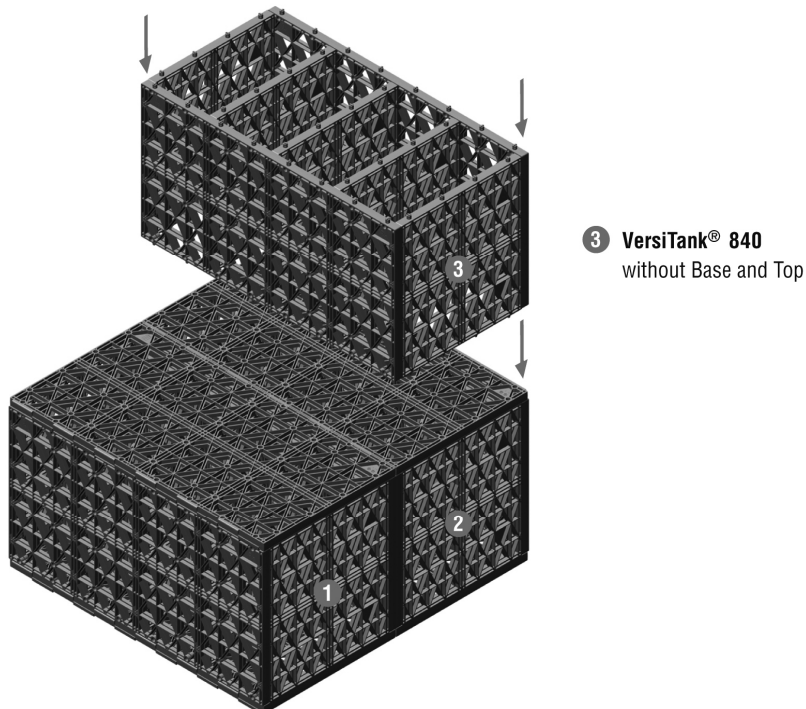
5. Fix Top **B** module with L-edge facing the same direction as in Base **B** module

Note: VersiTank<sup>®</sup> 840 must be placed with Wall **W** modules positioned vertically.

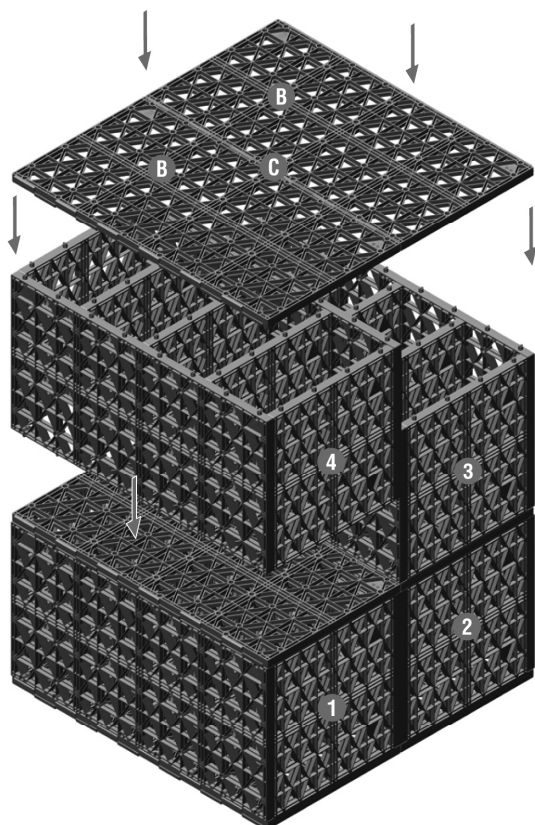
## CEMSEAL MULTIPLE VERSITANK 840



1. Join **VersiTank<sup>®</sup> 840 1** and **2** horizontally by sliding against each other.  
Repeat for additional tanks where required.



2. To join vertically, fix **VersiTank<sup>®</sup> 840 3** without Base and Top modules onto **VersiTank<sup>®</sup> 840 2**



**C** Top  
Assemble required size of Top by sliding the edges of **B** modules against each other

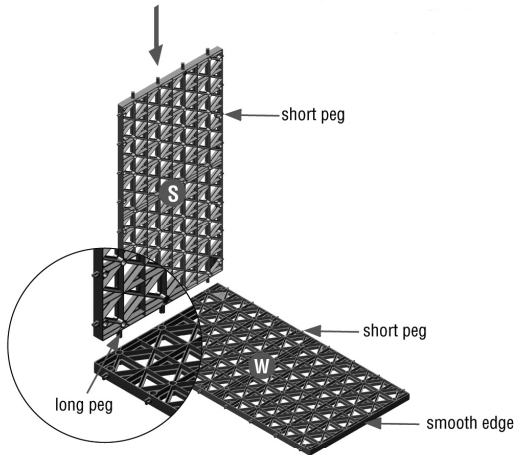
**3 4** VersiTank<sup>®</sup> 840  
without Base and Top

**1 2** VersiTank<sup>®</sup> 840

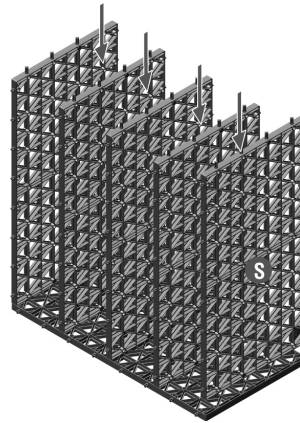
3. Fix VersiTank<sup>®</sup> 840 **4** onto VersiTank<sup>®</sup> 840 **1**  
Then fix Top **C** onto VersiTank<sup>®</sup> 840 **3** and **4**



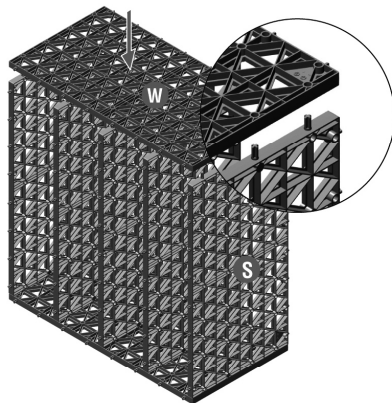
## CEMSEAL VERSITANK 880 ASSEMBLY PROCEDURES



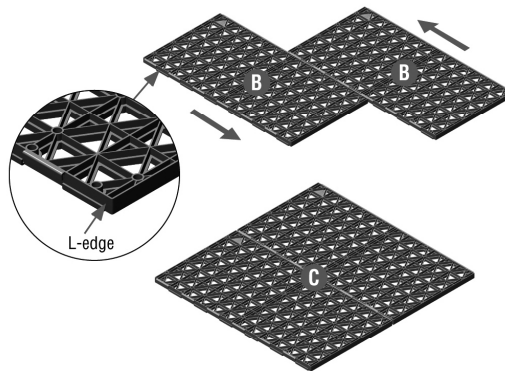
1. Insert Stabilizer **S** module into Wall **W** module



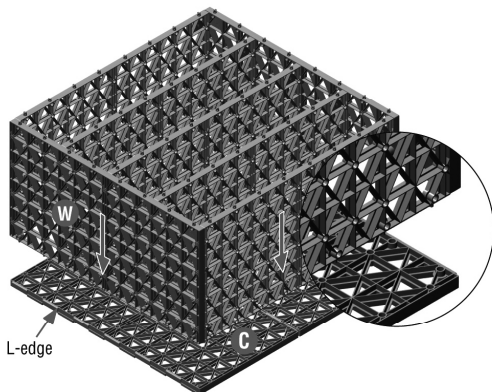
2. Repeat for remaining Stabilizer **S** modules



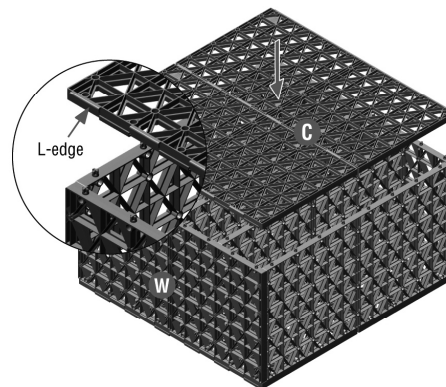
3. Fix remaining Wall **W** module



4. Assemble Base **C** by sliding the edge of one **B** module against another. Repeat for Top **C**



5. Fix onto Base **C**

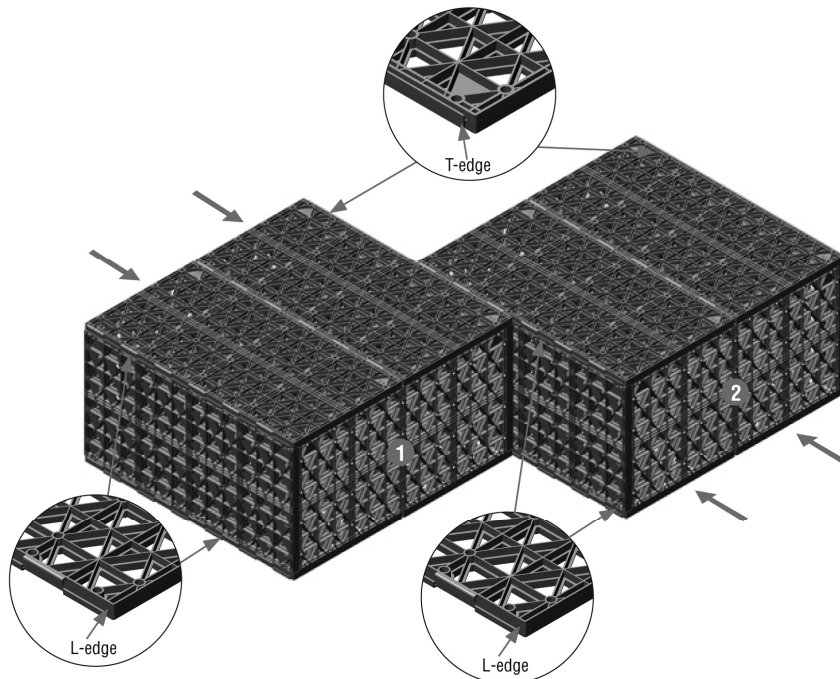


6. Fix Top **C** with L-edge facing the same direction **C** as in Base

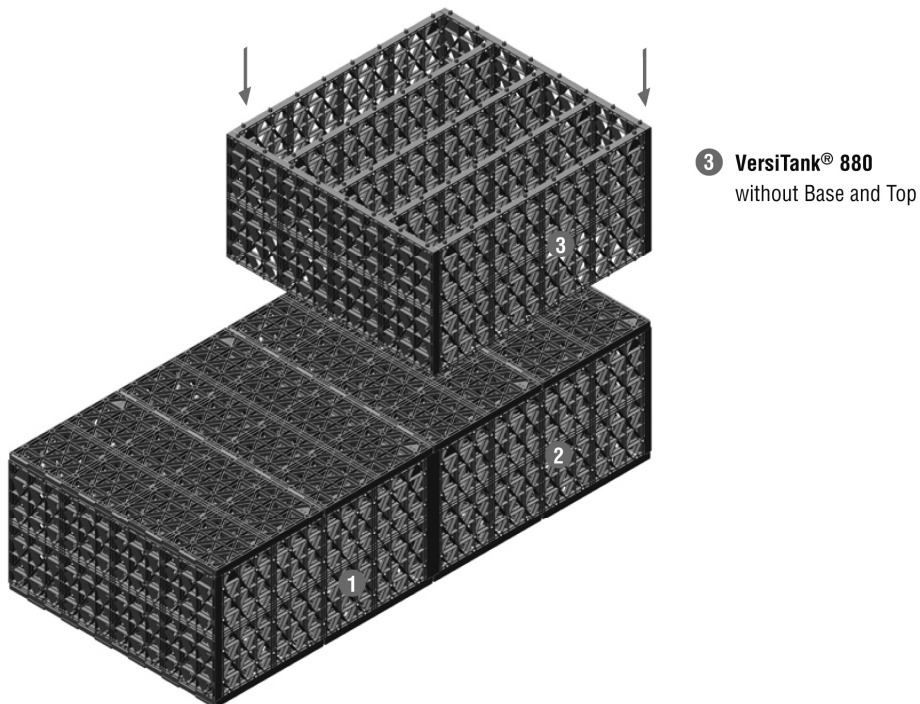
Note: VersiTank<sup>®</sup> 880 must be placed with Wall **W** modules positioned vertically.



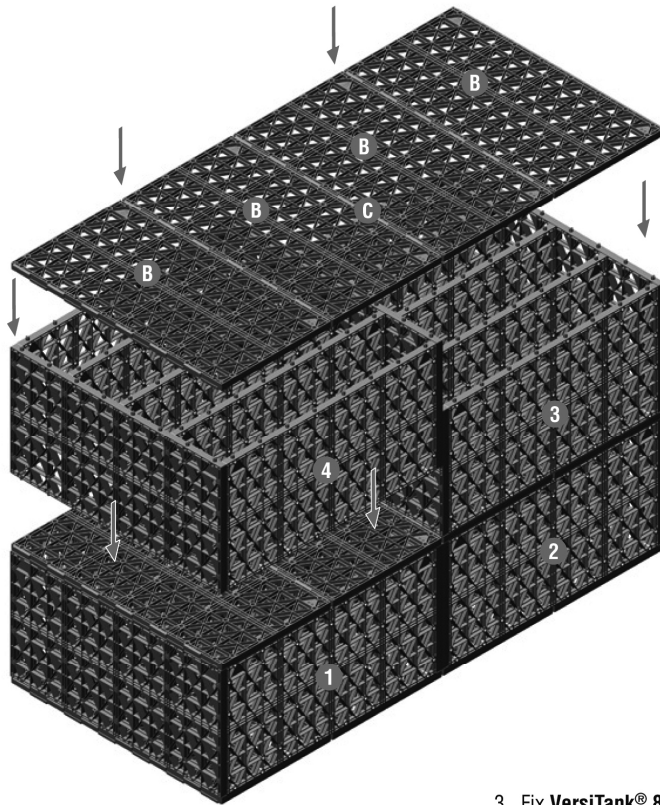
## CEMSEAL MULTIPLE VERSITANK 880



1. Join **VersiTank<sup>®</sup> 880** ① and ② horizontally by sliding against each other.  
Repeat for additional tanks where required.



2. To join vertically, fix **VersiTank<sup>®</sup> 880** ③ without Base and Top modules onto **VersiTank<sup>®</sup> 880** ②



**C** Top  
Assemble required size of Top by  
sliding the edges of **B** modules  
against each other

**3 4** VersiTank<sup>®</sup> 880  
without Base and Top

**1 2** VersiTank<sup>®</sup> 880

3. Fix VersiTank<sup>®</sup> 880 **4** onto VersiTank<sup>®</sup> 880 **1**  
Then fix Top **C** onto VersiTank<sup>®</sup> 880 **3** and **4**

**PROJECT REFERENCE**

HDB PUNGGOL EAST C11 & C12 *Housing Development Board*

JURONG CENTRAL PARK *National Park Board*

SINGAPORE FLYER *DPA*

THOMSON-WHITLEY FLYOVER CAPILLARY IRRIGATION *National Park Board*

THE SEAVIEW CONDOMINIUM *RSP Architects Planners & Engineers*

THE TRUMPH CONDOMINIUM *William Lim & Associates*

TOA PAYOH TOWN PARK *National Park Board*

EAST COAST PARK CARPARK C1 STORMWATER HARVESTING *National Park Board*

74 BELMONT ROAD *Lekker Design*

4 Ewart Park *ZAR Arkitek*