



Important Notes:

1. This document provides the **minimum** requirements for correct installation of RainSafe chambers. All installers should be familiar with these guidelines. Failure to adhere to these guidelines may result in damage to the chambers and/or inadequate hydraulic or structural performance of the tank. Remediation after backfilling has been carried out is costly and time consuming.
2. These are guidelines only and the sequence of installation steps detailed in this document may need to be varied due to specific site constraints or requirements. Any deviation must be approved by CubicM3 but in general each of the steps detailed should be completed, irrespective of sequence. Inspection should be carried out before, during and after backfilling to confirm compliance and this should be recorded photographically.
3. Particular attention should be paid to the allowable construction vehicle loading table. Use of plant imposing loads in excess of the guidelines may result in damage to the chambers and/or reduced structural capacity of the tank.
4. Chambers and End Caps should be handled with due care and should be lifted off the stack, avoiding prying or impact from hard objects, and placed in position.



Contact us at: sales@cubicm3.com

Tank Excavation



Excavate tank bed and prepare sub-grade. Ensure bearing capacity of sub-grade meets design requirements.

Place Liner



Place non-woven geotextile or impermeable liner over prepared tank bed. Avoid wrinkles and ensure minimum joint overlaps are maintained. Install under-drains if required.

Place Bedding Stone



Place and compact tank bed of Remblai 20/40 or Clause 505 Type B clean, crushed angular stone to design depth (minimum 150mm).

Separator Row Base



Layout woven geotextile bed for Separator Row(s) ensuring continuous strip in place for full length

Position First Row



Place the first chamber and end cap of each Separator Row into position and connect to respective inlet pipe(s). The End Cap is cut to the required inlet pipes following the cut guides.

Build out Rows



Build out first row of chambers by overlapping end-corrugations as directed on the units. Build out remaining rows in tank in similar fashion and ensuring minimum spacing requirements are met.

Install End Caps



End Caps should be placed snugly over the ends of all completed chamber rows

Wrap Separator Row



Place a continuous strip of non-woven geotextile over the entire length of the Separator Row.

Install over-flows



If required in the approved design, over-flow connections/manifolds are connected through the upper cut-guides on the End Caps.

Correct Fill Material



Only Remblai 20/40 or Clause 505 Type B clean crushed angular stone, per the specification, may be used as bedding and fill material to avoid compromising structural and hydraulic performance.

Locking Fill



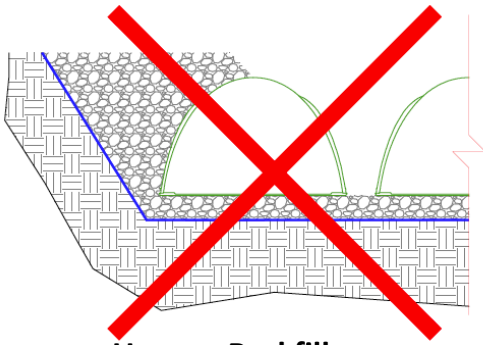
Initial fill stone should be placed carefully along the spine of each row allowing it to drop between the rows. This locks the chambers in place and prevents movement during filling.

Embedment Stone

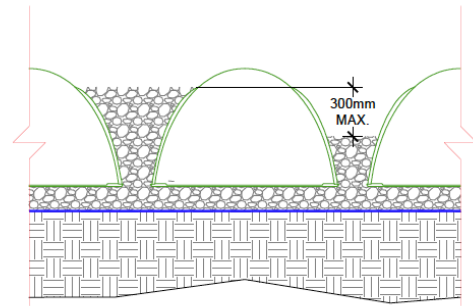


Once chambers are locked in, placement of fill stone can commence from the edges of the tank excavation. Equipment may only operate above the chambers per guidelines below.

Backfilling of Chambers

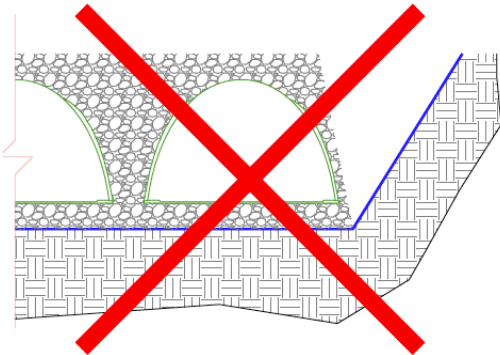


Uneven Backfill

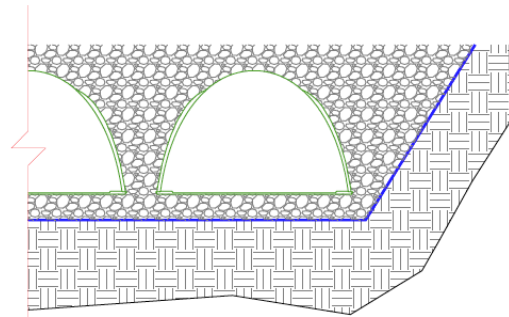


Even Backfill

Once rows are locked in place backfilling can commence. Fill stone should be placed and never dumped directly onto the tank. When placing stone, care must be taken to ensure that backfill around the chambers is placed evenly to avoid exerting excessive lateral loading on chambers as this could cause displacement or compromise structural capacity of the completed tank.



Perimeter not Backfilled



Perimeter fully Backfilled

Similarly, stone fill at the edges of the tank must be brought up evenly with rest of the tank ensuring that **the difference in levels from one row to the next never exceeds 300mm.**



Only once a **minimum cover of 150mm over the top of chamber** has been reached may equipment (<3.5t) be used to continue backfilling subject to limits in Table 2. Stone must be spread parallel to rows only.



Once fill stone reaches Top Water Level woven geotextile is to be placed over the tank. Minimum overlaps are required between adjacent strips and with side wall geotextile.

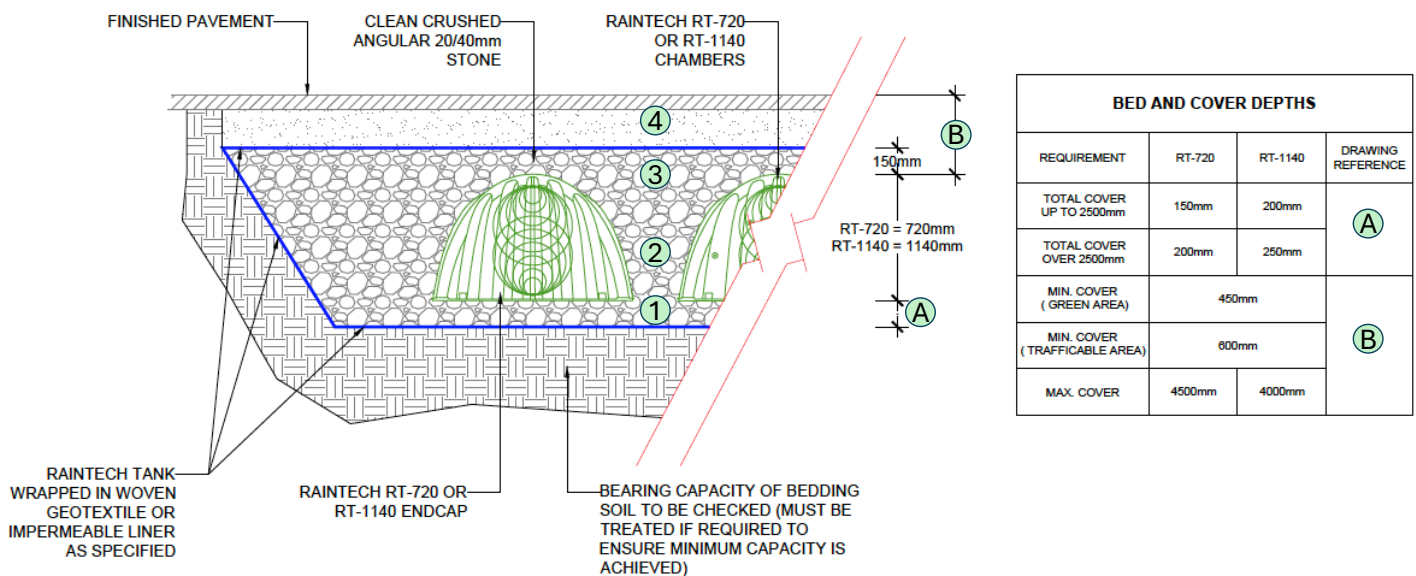
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Backfilling of Chambers

Table 1 – Fill Instructions (read in conjunction with. Figure 1)

Zone	Material Location	Description	Compaction / Density Requirement	Placement Methods and Restrictions (see Table 2 for Maximum Loads)
①	Bedding Stone: Placed and compacted on non-woven geotextile and/or impermeable membrane (eg GCL) at base of tank	Remblai 20/40 or Clause 505 Type B - Clean, crushed, angular stone	Place and compact ^{2,3} in max 150mm layers; Note minimum bedding depth requirements in Fig 1 below	No specific RainSafe placement restrictions.
②	Surround Stone: Placed between and around chambers after they have been placed and connected	Remblai 20/40 or Clause 505 Type B - Clean, crushed, angular stone	Compaction not necessary	No equipment to be used on bare chambers. Material to be placed from off bed until min 150mm cover in place. No rollers allowed.
③	Initial Fill: Place on top of tank after cover geotextile in position for first 450mm of cover zone. Under paved areas sub-base may be used as part of Zone 3.	Granular, well-graded soil/aggregate with <35% fines. Minimum depth of 150mm of Remblai 20/40 or Clause 505 Type B for all situations.	Compaction only after minimum total depth over top of chambers is 300mm and in 150mm layers after that. Max roller gross weight of 6 tonnes with dynamic force not to exceed 90kN	Only equipment within Table 2 limits allowed over bed. Small equipment (<3.5t) allowed with min 150mm cover; dynamic roller with min 300mm. Must push/spread/roll parallel to chamber rows only.
④	Final Fill: balance of fill in the cover zone to underside of paving or topsoil in green areas. Pavement sub-base may be used.	Any soil/rock including site-won material, or pavement sub-grade as required per engineers' specification.	Prepare per site engineers' requirements subject to final surface design above tank.	Roller must travel parallel to rows until minimum of 900mm compacted cover in place.

Figure 1 – Fill Material Locations:



Notes for Table 1:

- 1.EN designations are listed for grading only. All Bedding and Surround stone must be clean, crushed, angular.
- 2.Compaction requirements for RainSafe chamber placement are met with 2 full passes with a vibratory compactor.
- 3.If vibratory compaction may compromise infiltration of tank bed, a flat surface may be achieved by raking or grading without mechanical compaction. For Special load designs in such circumstances please contact CubicM3 for guidance.

Backfilling of Chambers

Table 2 – Maximum Allowable Construction Loads:

Zone	Fill Depth over Chambers	Maximum Allowable Wheel Loads		Maximum Allowable Track Loads		Max Allowable Roller Loads
		Max Axle Load Kg (kN)	Max Wheel Loads	Track Width	Max Ground Pressure (kPa)	Max Drum Weight or Dynamic Force Kg (kPa)
Surround Stone	Up to 150mm	3,500 (35)	Not Allowed	Not Allowed	Not Allowed	NOT ALLOWED
	150mm to 300mm	7,000 (70)	Not Allowed	300 450 600 750	55 35 35 30	Drum weight not to exceed 1,350 kgs Max allowable pressure 55 kPa
Initial Fill Material	300mm To 450mm	15,000 (150)	7,000 (70)	300 450 600 750	100 75 60 55	Drum weight not to exceed 2,500 kgs Max allowable pressure 104 kPa
	450mm To 600mm Loose	15,000 (150)	7,000 (70)	300 450 600 750 900	110 80 65 55 50	Drum weight not to exceed 8,000 kgs Max allowable pressure 182 kPa
	450mm To 600mm Compacted	15,000 (150)	7,000 (70)	300 450 600 750 900	120 85 70 60 55	Drum weight not to exceed 10,000 Max allowable pressure 233 kPa
Final Fill Material	600mm To 900mm Compacted	15,000 (150)	7,000 (70)	300 450 600 750 900	165 115 90 75 65	17,500 (170)

Notes:

- 1. All spreading and rolling should take place parallel to the direction of rows up to minimum of 900mm total cover depth.**
- We recommend a minimum of 900mm stabilized cover material during the construction phase if general construction activities are expected to take place above the tank.
- During paving operations over the tank precautions should be taken to prevent rutting and ensure that a minimum cover of 450mm over the chambers is maintained at all times.
- Ground pressure for tracked dozers is the vehicle operating weight divided by the total contact area of the tracks. Excavators will exert higher pressure based on loaded bucket weight and boom extension.
- Tracked loads listed in Table 2 relate to vehicles traversing the tank only. **Tracked excavators should not operate over the tank until a minimum of 900mm cover is in place.**
- Storage of construction materials and spoil heaps should not be located above RainSafe tanks.
- For use of any equipment not mentioned in this document or for guidance on other specific loading cases please contact CubicM3 if required.