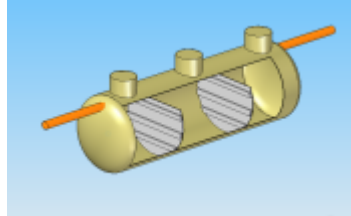


DO NOT place the manway covers of the tank(s) below ground level.  
Stormwater or ground water must never enter the system.  
Manholes covers not supplied.

Tanks must be lockable and the area fenced off to prevent unauthorized access to the tank.  
Installation, pipework, plumbing, lockable manhole cover, wiring and fencing are the customer's responsibility.  
Vents are to be provided by the customer.

### Section 1.

Systems comprise in general 1, 2 or 3 tanks. Single tank systems may have internal dividers, creating chambers within the tank.

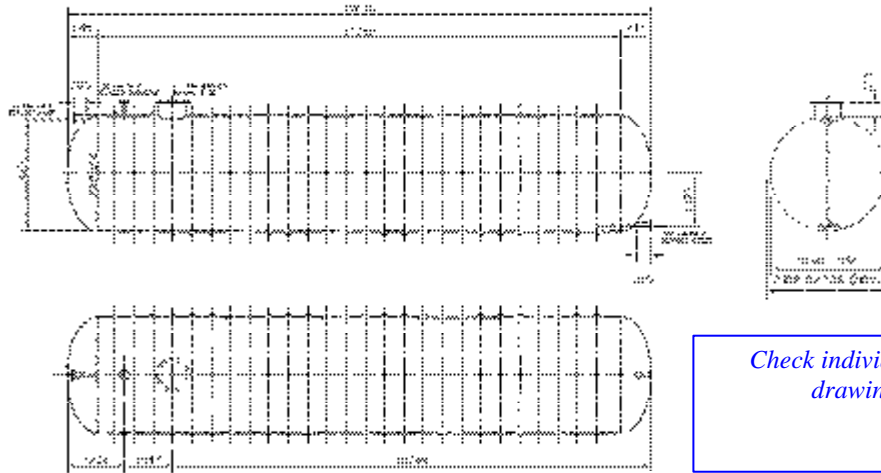


### Section 2.

External dimensions: Dia in meters x Length in meters

Total excavation: {Dia + 1m} x {Length + 1m}

Excavation depth: Dia of tank + shaft height (1m supplied as std) + 0.15mm.



### Section 3.

#### Installation guidelines for GRP cylindrical underground tanks.

##### System orientation.

Your system may be constructed from 1 or more tanks depending on the requirement. The orientation of the tanks in general will be in series, however other orientations are also possible. Always refer to the manual supplies with your system.

**Note:** These are guidelines only. The on site works are to be completed by the customer or contractor (customer that purchased the system from Killarney Plastics Ltd, its subsidiaries or distributors) who will have total responsibility for the installation of the tanks. Please follow all Health & Safety instructions in this leaflet and also in the manual supplies with the system and also all Health & Safety Legislation that is currently in practice in the country of installation.

**Note:** The instructions in this handbook are for guidance only. Standard site and EU Health & Safety rules and regulations will always apply. Killarney Plastics Ltd, accept no responsibility for incorrect off loading or installation of the systems.

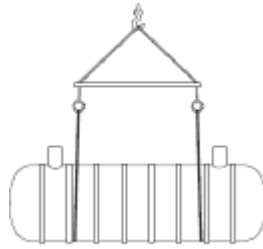
We recommend that when the system arrives on site that it is inspected for damage, from miss-handling etc. If any damage is seen or suspected, please notify us immediately, as problems cannot be rectified easily after installation. Suitably sized equipment will be required to excavate the hole and to crane the system into place. Once a suitable site has been chosen and excavated the following steps must be followed along with the complete installation instructions:

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 Tel: +353 (0) 64 32421. Ext 128 Fax: +353 (0) 64 22686. Email: [info@kmggroup.eu](mailto:info@kmggroup.eu) web: [www.kmggroup.eu](http://www.kmggroup.eu)  
 VAT No: IE 4547159 B Company Reg No: 75014

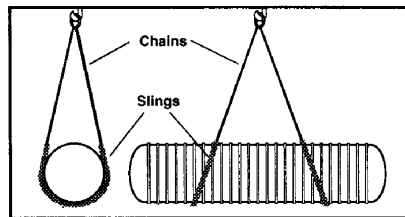
When installation is completed and the system filled with water and is plumbed to the relevant sewers etc, the electrical installation must be completed. Only then, can Killarney Plastics Ltd call back to commission the system (if commissioning is required).

### Transportation, unloading and storage of tanks

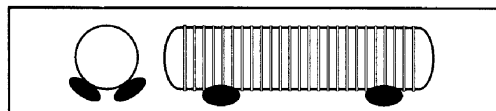
1. Always set the tanks on flat smooth ground free from debris etc. Tanks may be required to be tied down and chocked to prevent movement.
2. Tank dimensions vary – please consult the drawings accompanying the system.
3. Tanks must be held down during transportation using nylon straps, do not use cables or chains to hold tanks
4. Do not over tighten straps to cause deformation of the tank shell
5. Tanks are best lifted by crane and webbing lifting straps – do not use chains or wire ropes in contact with the tank.
6. Killarney Plastics Ltd recommends the use of a lifting beam for tanks longer than 8 meters.



7. Smaller tanks may be lifted with other suitable site equipment but greater care is needed to control the lift and to ensure the tank is not damaged.



8. Move tanks only by lifting and setting, do not drag or roll
9. Do not drop or roll tanks from truck
10. Place tanks carefully onto a smooth level even surface, free from rocks, large stones or other debris that could cause point loads.
11. Chock tanks using tyres, sandbags or similar to prevent rolling



12. In high wind conditions, consideration should be given to strapping down the tanks to prevent damage

### Pre-Installation Inspection

- Tanks should be subject to a visual inspection prior to installation
- Special consideration should be given to strap positions
- Any damage should be notified to the delivery driver and to Killarney Plastics Ltd
- Do not attempt to carry out any un authorised repairs, as this will invalidate the warranty on the tank
- Check for, fractures to the shell or ribs, de laminations, scratches or abrasions deeper than 1.5mm, stress cracks or star crazing

### Excavation Size

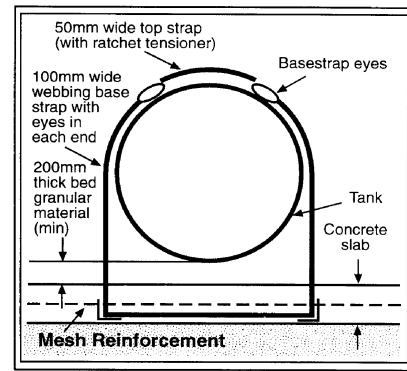
Installation depends on on-site conditions, water, slopes, location etc. Excavation should be planned with due regard to Health and Safety requirements, and should be either shored or battered back to a “safe” angle. The excavation should allow a minimum 450 mm clearance between tank sides and ends and the excavation wall or face of shoring. 450 mm minimum is also required between adjacent tanks. Unstable ground with excessive sand, peat swamps etc may require larger excavations.

### Buoyancy & Anchoring

Killarney Plastics Ltd always advise that tanks are anchored, however this and all site civil works is the responsibility of others on site. One of two methods are advised:

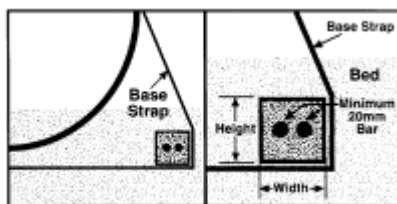
#### A) Reinforced Concrete Anchor Slab

Reinforced concrete anchor slab of minimum thickness 200 mm, sized to cover the excavation area. The slab should incorporate webbing anchor straps.



#### B) Concrete Deadman Anchors

These are concrete beams used to anchor the underground tank to help prevent it from floating in the event of a high water level in the excavation. Deadman anchors are sufficiently reinforced concrete beams running the length of the tank, and are situated on the excavation bottom and connected with straps running across the top of the tank. The weight of the backfill material over the Deadman, provides additional anchoring. (Section as shown below. Use webbing anchor straps as illustrated below).



Tank Diameter mm	Minimum Height mm	Width mm
1800	300	300
2500	300	300
3000	300	450
<b>4000 Deadman size</b>	200	900

**Note:** Deadman should not lie in the tanks shadow.

### **Holding down straps:**

At least two hold down straps must be used when a tank is to be anchored. Depending on the tank diameter and length, more straps may be required. Depending on the tank type, there may not be ribs. Always consult the on site civil engineer. Straps must be located next to ribs on the tanks with ribs and can be placed anywhere on the tanks without ribs. All hardware and anchor points are the responsibility of the installer, and must be of sufficient strength. All exposed metal on hold down straps, turnbuckles and or threaded rod must be of a sufficient grade of non corrosive materials to ensure a life long anchoring of the tank(s). The straps must be anchored into the slab or Deadman. Anchoring hardware is the responsibility of the installer. The straps must be tightened until snug, but not to deflect the tank.



*Where there are no ribs, place the straps as in photo 1 on left.*

### **Primary Backfill Specification**

Primary Backfill material should be free-flowing granular material and can be:

#### ***Rounded Pea Gravel:***

Minimum particle size 3mm, maximum 18 mm, compacted to a relative density of >70%

Or

#### ***Crushed or Processed Stone:***

Minimum particle size 3 mm, maximum 12 mm, compacted to a relative density of >40%

No more than 5% may pass a 2.36 mm sieve size. Bedding Depth should be minimum 300 mm below the tank (200 mm if Reinforced Concrete Anchor Slab). Dry Gravel density must be at least 1500 kg/m<sup>3</sup>.

Compaction should be by lightweight rollers or vibratory plate compactor until “traffic” depth has been achieved. Compact evenly around the turret extensions to reduce risk of distortion.

Tanks must be installed with Primary Backfill only within the region immediately surrounding the tanks. This Primary Backfill must extend a minimum of 450mm outward from the tank sides and ends, except directly beneath the tank where the backfill may be reduced to 300 mm

The following materials are approved as Primary Backfill:

#### **Pea Gravel**

Naturally rounded aggregate with particle size not less than 3 mm and not greater than 18 mm. Gravel shall be clean and free flowing, free from large rocks, dirt, sand, roots, organic materials or debris. Upon screening analysis the backfill material shall have no more than 5% by weight passing 2.36 mm Sieve

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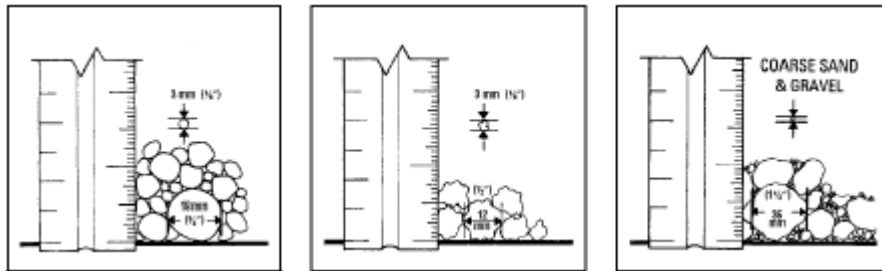
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### Crushed Stone

Crushed stone or gravel with particle size not less than 3 mm and not greater than 12 mm Aggregate shall be clean and free flowing, free from large rocks, dirt, sand, roots, organic materials or debris. Material should be washed or screened to remove fine particles . Upon screening analysis the backfill material shall have no more than 5% by weight passing 2.38 mm Sieve Use of other than specified backfill and bedding materials will void the tank warranty.

NOTE: All backfill material shall be free of ice and snow at time of installation.

Backfill material shall not be frozen or contain lumps of frozen material at any time during placement.



**Pea Gravel**

**Crushed Stone**

**Secondary Backfill**

### Secondary Backfill Specification

Secondary backfill shall not be used adjacent to the tank Secondary Backfill may be used only at a distance of 450mm from the tank walls. The following are approved as Secondary Backfill materials:

#### Coarse Sand or Gravel

Coarse sand or gravel containing rocks no larger than 36 mm on largest dimension. Backfill shall be clean and free flowing, free from dirt, clay, fine sand, roots, organic materials or debris. Upon screening analysis this backfill material shall have no more than 5% by weight passing 0.075mm Sieve. During placement this backfill material must be compacted to 95% Relative Compaction

#### Select Native Backfill

Clean native backfill, or clean selected backfill, containing rocks no larger than 36 mm on largest dimension. This material must be compacted to 95% Relative Compaction The quality of this backfill material shall be such that it exhibits an ultimate bearing strength in excess of 170 kPa in the compacted state.

#### Note :

The use of geo textile barrier fabrics surrounding the Primary Backfill material is considered good installation practice. The fabric must be chosen to allow the flow of water in and out of the excavation but to prevent the movement of fine soil particles into the Primary Backfill material.

### Burial depth & cover

Minimum Cover mm		
Tank Diameter mm	With Live load	Without Live load
1800	900	500
2500	900	500
3000	1000	500
4000	1200	500

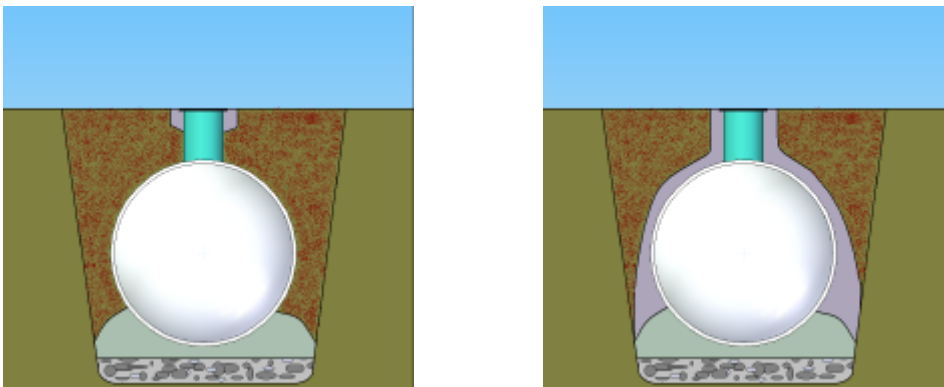
The minimum cover with live load can be reduced by using a reinforced concrete slab above the tank. These tanks are designed to be installed below ground and completely surrounded with Granular Material. Generally, the depth from finished ground level to the top crown of the main shell should be no more than 2 meters. This may vary dependant upon ground water conditions. Deeper inverts may be accommodated on a standard shell providing the water table level does not exceed 2 meters above the top crown of the main shell. For deeper burial with high water table conditions heavy duty shells are available. Should you be in any doubt regarding suitable shell application please call Killarney plastics Ltd. If the tank is installed outside these parameters it may suffer irreparable damage.

### Control of Groundwater

Tanks must not be subjected to buoyant forces during installation, taking account of ground water levels and surface water run-off, and their accumulation in the tank pit, even if tanks are anchored.

The excavation area should be adequately properly drained, in order to permanently remove ground water from the proximity of the tank (or tanks). This is critical in order to avoid flotation of the tanks. Incorrectly installed tanks that move, rotate or float may be damaged, and Killarney Plastics Ltd, will not be liable for this damage. The excavation should be maintained dry by pumping or whatever suitable means until the cover depth reaches 300mm minimum above the tank.

Alternatively, fill the tank with water as ballast after backfill until it has reached the top of the tank. If water filling is carried out during backfilling, water level inside tanks must not exceed the level of backfill material outside the tank.



### **Installation guidelines.**

- All installations must be “Fit for purpose” to suit the on-site conditions, which will vary from site to site. This is the responsibility of the customer.
- Never roll the tanks. Tanks are to be lifted into position in accordance with this leaflet.
- It is imperative that the installation instructions are followed to prevent system failure.
- A dry site is one where the water table never rises higher than the base of the unit.
- A Wet Site is one where the water table may rise higher than the base of the TRI-CEL unit.
- Dig a hole circa 1.0m larger than the system in plan. The unit shall be installed at the required depth to accommodate incoming pipe work.
- Remove any soft spots or boulders of any significant size from the base of the excavation. It is imperative the base is flat and level.
- Ensure that the sides of the excavation are free from large or sharp boulders. A level graded base is then formed using sand binding.
- Excavation and anchorage provision in accordance with preceding information in this leaflet.
- Ground water must be pumped to give a dry excavation
- Place bedding material as described in preceding information.
- Ensure material is clean and contains no oversize material.
- Lift tank(s) into position and align as required for connecting pipe work, access shafts, etc. Ensure that the correct orientations are achieved of the system, which may contain 1, 2, 3 or more tanks.
- Ensure that each tank is 100% dead level, and that inlet / outlets are in the correct orientations.
- Secure anchor straps.

### ***Again check that the tanks are dead level.***

- Connect any low-level pipe work, as required.
- Ballast the tank with water.
- Mount and seal any turret extensions.
- Commence backfilling in layers approximately 300mm, ensuring tank and any pipework is properly “haunched”.
- Continue backfilling with select material evenly around the tank to at least 300mm above the tank top, connecting any high-level pipe work, as required.
- Backfill evenly to grade using the same primary backfill material, or select secondary backfill material or road base material
- Compaction should be by lightweight rollers or vibratory plate compactor until “traffic” depth has been achieved
- Compact evenly around the turret extensions to reduce risk of distortion.
- Cut turret extensions to length and fit manhole cover and frame.
- Important - Ensure that No surface loadings are transferred from the cover direct to the tank. Cover frame construction should allow movement.
- Position the Kiosk as per manual, in general, at a close proximity to the turret of “Tank B”.

### **Additional requirements for wet sites.**

- A concrete installation may be required, or more Deadman Anchor straps may be required
- Water should be removed as much as possible from around the tanks using piped drains.
- Excavate as above.
- Pump out the excavation, maintaining at water free.
- Install as above.

### Section 4

#### Access Shaft Extensions

Loose shafts should be sealed using silicon sealant / sikaflex or similar prior to installation to prevent ingress of groundwater under high water table conditions. It is the contractors responsibility to ensure a watertight seal.

#### Ventilation

Ventilation is crucial to the system. Prior to installing the system, great care must be given, on how to provide adequate ventilation. As sites differ, advice is available from BS8301, BS6297, EPA Wastewater Treatment Manuals 1999, and the manufacturer.

#### Kiosks, cabinets or housings:

Monitoring equipment, alarms, blowers or pumps if supplied, may be placed into a separate Kiosk, cabinet or housing. These cabinets can be fitted with visual / audio / alarms along with other equipment. If so, a mains supply may be required. Only a qualified and competent person should attempt to do this wiring. This is not the responsibility of Killarney Plastics Ltd. Only appointed personnel are allowed to hold a key this cabinet or kiosk. Mains must be disconnected before maintaining the system. The cabinet or Kiosk should be fenced off in a lockable compound along with the Tri-Cel underground system.

#### Cabinet or Kiosk location & installation

Your system may comprise of 1 or more tanks. The cabinet should be located not more than 7 meters from the system (15m for rainwater harvesting systems). The base of the cabinet may have an opening dia 110mm to accommodate the PVC pipe work, which will terminate here.

110mm PVC pipework must be run from a turret to the Kiosk. This pipe will need rope laid inside it in order to pull through the braided PVC pipe required to transfer air from the blower to the manifold in chamber 2. Run the pipework from the 110mm connection on the turret going into the base of the cabinet. The cabinet or Kiosk is normally laid in wet cement. Ensure that the Kiosk is placed dead level in the cement. Do not cover the door opening. Alternatively, the kiosk can be rawl bolted to a concrete plinth.

#### Fencing.

Once the system has been completely installed, we recommend that a suitable fenced area should be constructed to ensure that access is restricted to the system and kiosk. Access must be restricted to suitable trained personnel only. Access for maintenance or de-sludging must be available. Local authority / government regulations, must be adhered to in relation to fence specifications and design.

### Section 5

#### Electrical Installation of the unit (where required).

**Note:** All electrical work to be carried out by competent person using suitable materials for the application. Electrical work must be carried out strictly to the manufacturer's instructions and to 'The National Rules For Electrical Installations' (ETCI) published by the 'Electro-Technical Council Of Ireland'

- The cable armor must be properly bonded to the main earth at the premises.
- If a control panel with alarm is supplied, please refer to the manufacturer for further details.

**Electrical drawings will accompany each Tri-Cel system that required an electrical connection.**

#### Alarm options.

Various alarm systems, to a variety of different standards & specifications are available from the manufacturer. Please consult with KMG Killarney Plastics Ltd, in order to get an alarm system that will suit your requirements.

### Section 6

#### Plumbing the system.

Competent ground-works site personnel should connect the plumbing to the system.

### Section 7

#### System start-up

See commissioning & maintenance of the system.

### Section 10

#### Safety Precautions.

Safety is paramount, and "best practices" should be followed at all times in relation to wastewater treatment plants. Health & Safety legislation must be followed at all time.

- Protective clothing / gloves should be worn at all times. Always remove contaminated clothing and protective equipment after working with sewage treatment systems.
- Wash hands and face prior to eating, drinking or smoking.
- Adequate first aid boxes should be present.
- When working with machinery / electrical equipment, proximity of water should be noted. Equipment should not be wet when working with it.
- A second person should be present when carrying out non-routine maintenance.
- The distribution box should be designed (& constructed by the builder) to facilitate sampling and inspection without placing personnel at risk.
- Only qualified personnel should carry out electrical repairs.
- Great care should be taken when handling sludge.
- Always lock the cover of the system.

Disused or abandoned tanks should be demolished, filled in or sealed so that accidental entry is impossible.

### Section 11

#### Terms & Conditions:

Subject to Killarney Plastics Ltd standard terms and conditions, available on request.

#### Note:

Killarney Plastics Ltd. believe that the information contained in this brochure is accurate, and is printed for information only. No warrants, express or implied, are contained therein, nor does any legal liability attach to Killarney Plastics Ltd. for any reason whatsoever. Property rights of the subject belong to Killarney Plastics Ltd., and transfer of these rights is not granted by possession of this document.

In accordance with Killarney Plastics Ltd normal policy of product development, this specification is subject to change without notice. October 2006.

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April 2008