



LILO UNDERGROUND RAINWATER & STORMWATER TANKS

RAINWATER, STORMWATER DETENTION AND RETENTION
INSTALLATION INSTRUCTIONS & TECHNICAL INFORMATION



Table of contents

1. INTRODUCTION, FILL MATERIALS & GENERAL NOTES ON SAFETY	1-4
1.1 Selecting the right system	5
2. INSTALLATION CONDITIONS	6
3. TECHNICAL DATA	7
4. TANK ASSEMBLY	7
5. INSTALLATION AND ASSEMBLY	8
5.1 Construction site	8
5.2 Trench	8
5.21 Slope Embankment,	9
5.22 Ground water	9
5.23 Installation adjacent to traffic	9
5.24 Installation connection of several tanks.....	9
5.3 Insertion and filling	10
5.4 Plumbing connections	10
5.5 Class D Installation	11
6. ASSEMBLING THE TELESCOPIC DOME SHAFT	12
6.1 Assembling the Telescopic dome shaft	12
6.2 Installation of pedestrian dome shaft	12
6.3 Installation of car dome shaft	12
7. ASSEMBLY OF THE EXTENSION RISER	13
8. INSPECTION AND SERVICING	13
9. MINIMAX PRO FILTER	14
9.1 Filter Components	14
9.2 Filter Specifications	14
10. PICTORIAL INSTALLATION GUIDELINES	16-17
11. INSTALLER SUPPORT SERVICES	18
12. CUSTOM MADE TANKS	18
13. STORM WATER DETENTION SYSTEMS	19
14. STORM WATER RETENTION SYSTEMS	20-21
15. ORIFICE FORMULA & FLOW CALCULATIONS	22
16. VOLUME MEASUREMENTS	23
17. PRODUCT CERTIFICATION	23

Garantia Lilo Storm Water Detention & Retention Installation & Maintenance Instructions

The Garantia Lilo is made in Australia and is suitable for under deck, semi submerged and below ground installations. Ready-made packages are offered in 10,000L 6000L, 5000L, 3,000L & 1,500L in both pedestrian and car options. Larger size systems are available.

Certified to AS/NZ 4766, AS/NZS 1546.1

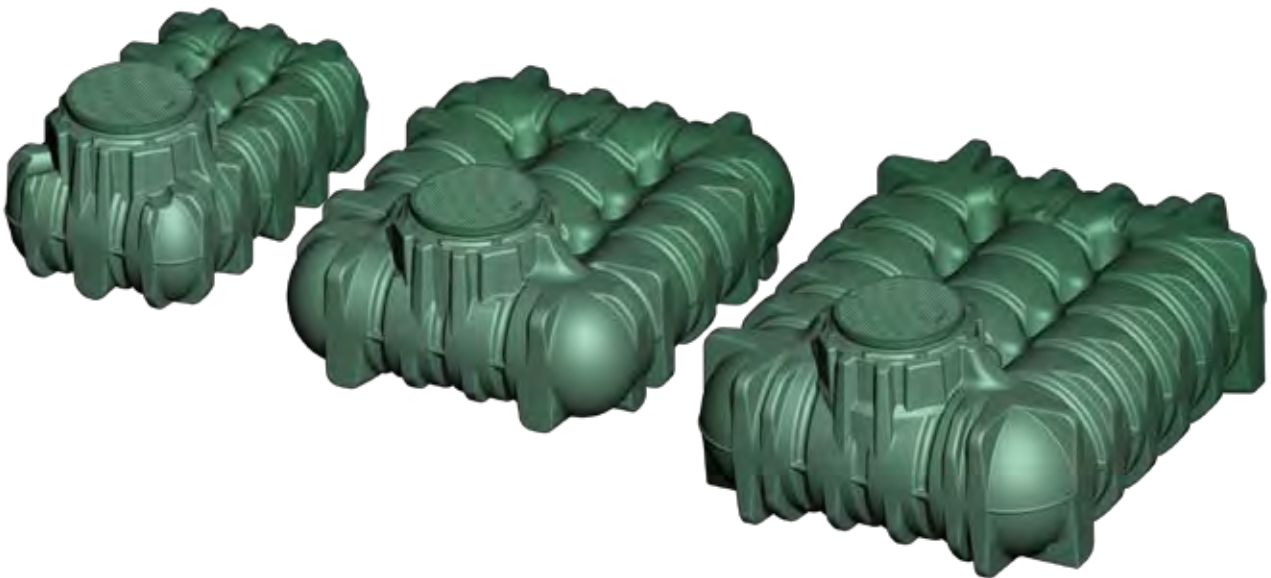
Certified to Quality standard ISO9001-2015

The points described in these instructions must be observed under all circumstances.

All warranty rights are invalidated in the event of non-observance.

The tank must be checked for any damage prior to insertion into the trench under all circumstances.

Retention & Detention



Garantia Lilo Fill Material

Backfill Materials

7mm Minus (preferred)

Washed Sand



100mm compacted, hole base – 20mm type B crush rock



100mm “Compacted” Hole Base

20mm Type B Crushed Rock
(porous)



Wrong Backfill – Non Porous Materials (Do Not Use)

Builders Sand, Clay, Cement, Types C & D Crushed Rock, and any other non porous or water holding soils. Incorrect soils used may “void warranty”.



1. General Notes

Safety

As Occupational Health and Safety legislation differs in each state and territory, it is necessary to refer to all relevant Occupational Health and Safety legislation, regulations and Australian Standards in your state or territory at all times during installation, assembly, servicing and repair of the Garantia Lilo storage tank systems.

Current statutory regulations and all relevant Australian standards shall be taken into consideration at all times. The system and any of its individual parts must be installed by a licensed person. Installation by a nonlicensed person may void warranty.

The entire system must be shut down before any maintenance can be undertaken. Once any maintenance is completed the tank must be properly sealed/locked by means provided with the tank to prevent future unauthorized entry.

Garantia offers a wide range of accessories which all match each other. The use of non Garantia accessories may lead to the voiding of warranty and any subsequent claims of liability from any resulting damages.

Identification of water pipes and outlets

All service water pipes and outlets leading from the Garantia water tank should be identified in accordance with AS/NZS3500.1:2003-Section 9 and other relevant local plumbing regulations to avoid inadvertent connection with the drinking water supply.

In order to avoid the wrong connection between the drinking water and the rain water pipe work, all conduits and tapings of rain water have to be marked clearly with "RAINWATER" in writing and be in accordance with local standards.

All non-drinking tank water outlets connected to a retention tank should be clearly marked "RAINWATER" and we recommend they be installed with vandal proof taps. Depending on local laws, rain water may or may not be suitable for human consumption and/or use for personal hygiene. The mixture of rainwater and surface stormwater should be avoided in retention systems.

Maintenance

In the event of work needing to be carried out inside the tank, as Occupational Health and Safety legislation differs in each state and territory, reference should be made to confined spaces legislation in your state or territory.

Site

As Occupational Health and Safety legislation differs in each state and territory, reference should be made to excavation and trenching legislation in your state or territory with respect to the use of excavation equipment and relevant trenching legislation in reference to shoring, battering and depth specific regulations.

Lifting of Tanks

Occupational Health and Safety legislation and regulations differ in your state and territory, therefore reference should be made to your state or territory legislation when lifting, handling or moving of Garantia water tanks.

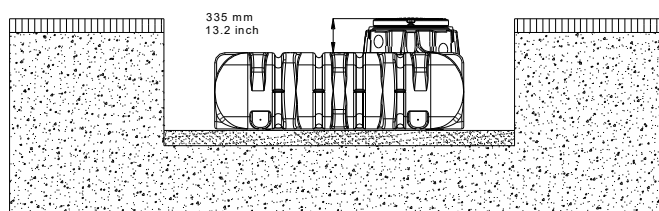
1.1 Selecting the Right System

To Select Your System you need to know the following:

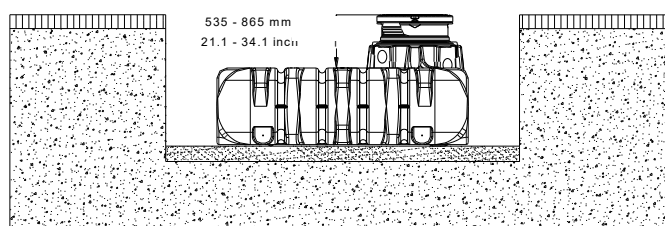
1. **Detention or Retention?**
2. **Required volume of the system?**
3. **Discharge flow rate or orifice size?**
4. **Depth of invert level or legal point of discharge?**

2. Installation conditions

Approved earth coverage height with GARANTIA PE-lid in green areas.

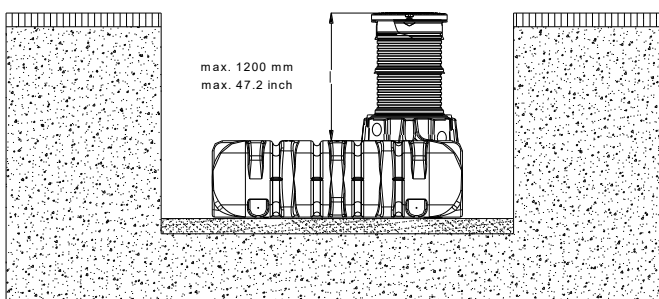


Feasible earth coverage height with GARANTIA extension riser and PE-lid in green areas.



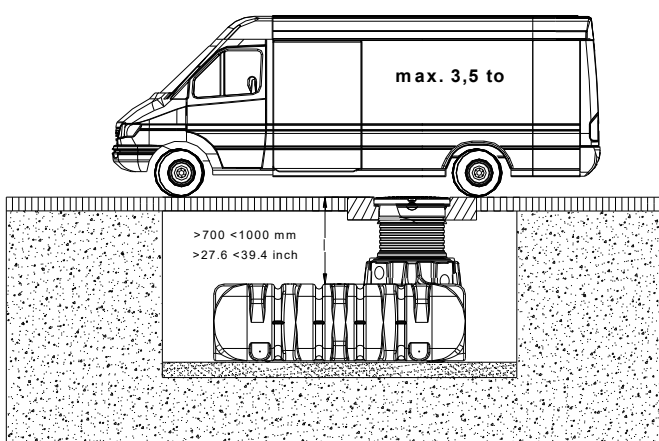
Maximum allowed earth coverage height with second GARANTIA extension riser as adapter or extension and PE-lid.

(in green areas only – not under areas used by passenger cars)



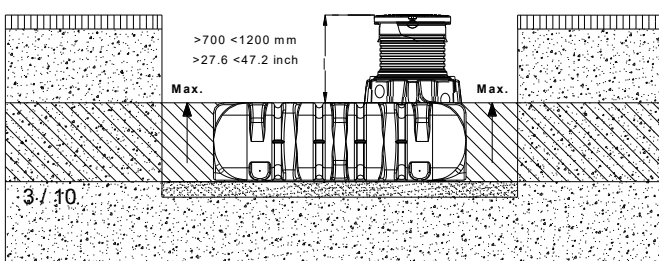
Allowed earth coverage height with GARANTIA extension riser and passenger car module with cast iron cover (class B) in areas used by passenger cars (max. total load 3.5 ton).

(without groundwater and stratum water)



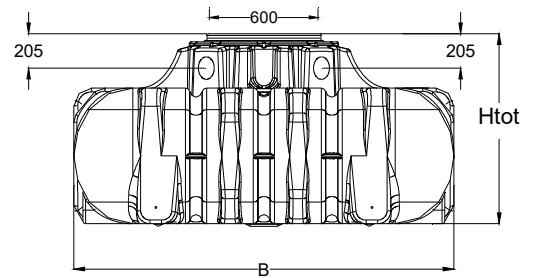
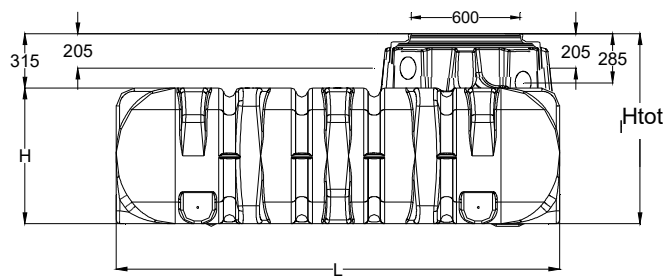
Allowed earth coverage heights on installation in groundwater – the hashed area specifies the permissible immersion depth for the tank.

(not under areas used by passenger cars)



3. Technical Data

Lilo Tank with Telescopic Shaft & Lid



Garantia Lilo Tank	1500 Litres	3000 Litres	5000 Litres	6000 Litres (2 x 3000L)	10,000Litres (2 x 5000L)
Weight	82 kg	180 kg	250 kg		
L	2100 mm	2450 mm	2890 mm		
W	1250 mm	2100 mm	2300 mm		
H	700 mm	735 mm	950 mm		
Htot*	1015 mm	1050 mm	1265 mm		
Minimum Hole Size (L x W x H)	2300 x 1450 x 1155mm	2650 x 2300 x 1190mm	3090 x 2500 x 1405mm	2650 x 4900 1190mm	3090 x 5300 1405mm

Htot*: Total height

4. Tank Assembly

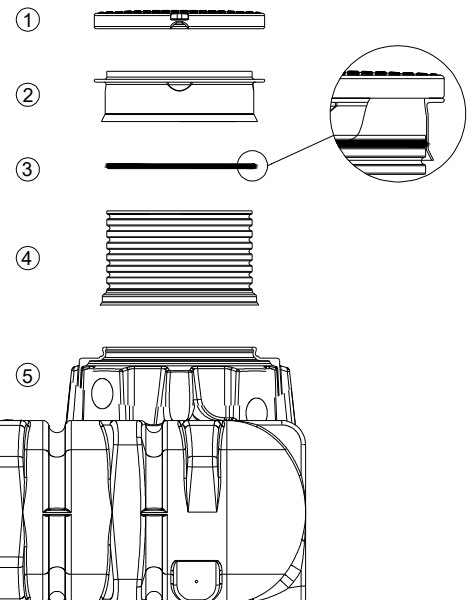
① Cover (PE Cover or Car Modul)

② Telescopic attachment

③ Telescopic conical nipple

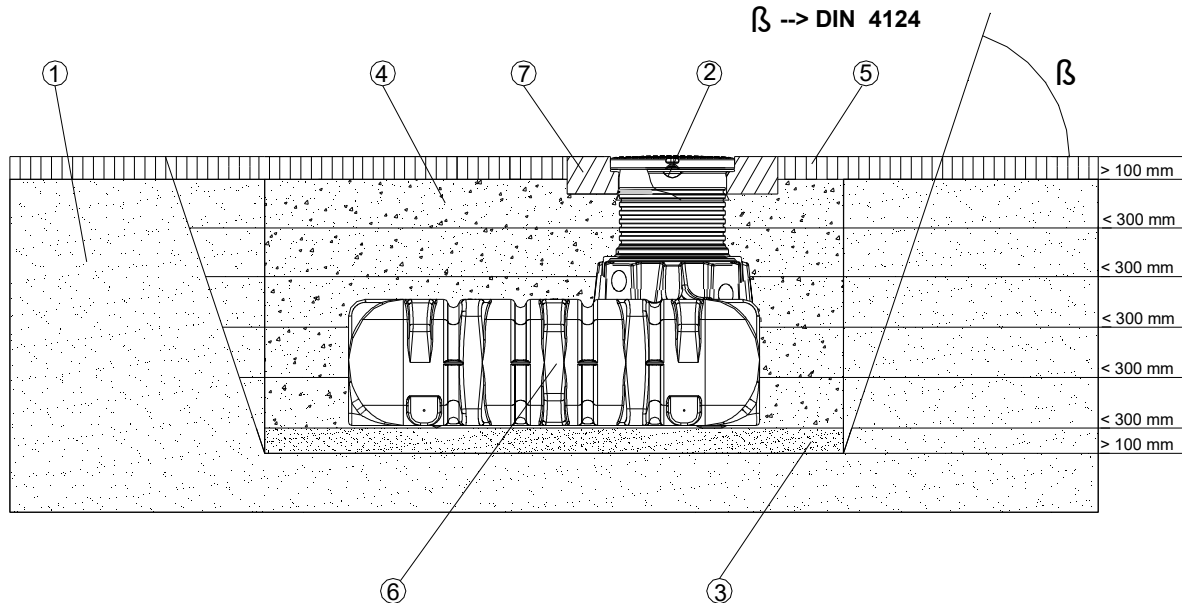
④ Dome shaft

⑤ Li-Lo Rainwater Underground Tank



5. Installation and Assembly

- | | |
|--|--|
| ① Subsoil | ⑤ Covering layer |
| ② Telescopic dome shaft | ⑥ Li-Lo Rainwater Underground Tank |
| ③ Compacted foundation | ⑦ Concrete layer for surfaces used by passenger cars |
| ④ Surrounding (round-grained gravel, max. grain size 8/16) | β --> DIN 4124 from 1250 mm depth of the trench |



5.1 Construction site pre-check

The following points should be clarified before installation commences:

- The structural suitability of the ground (geotechnical report recommended)*
- Maximum groundwater levels which occur and drainage capability of the subsoil
- Types of load expected, for example: traffic loads
- Location of all underground services

* A geotechnical report conducted by civil testing engineers is strongly recommended to determine the physical characteristics of the subsoil before installation/excavation commences. For setback distance from neighbouring boundary and any buildings, please contact local council.

5.2 Trench

To ensure that sufficient space is available for working, the base area of the trench must exceed the dimensions of the tank by > 100 mm on each side; the distance from solid constructions must be more than the depth of the trench away from the structure.

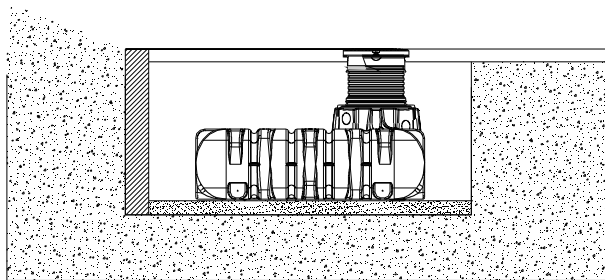
If the depth of the trench is > 1250 mm an embankment must be designed according to meet all safety standards. The construction site must be level and must guarantee sufficient load-bearing capacity.

The depth of the trench must be sized, so that the maximum earth coverage (see point 2 – installation conditions) above the tank is not exceeded.

A layer of compacted, Type B Crushed Rock (porous round-grain gravel grain size 8/16, thickness approx. 100 - 150 mm) is applied as the foundation. See Page 2.

5.2.1 Slope, embankment, etc.

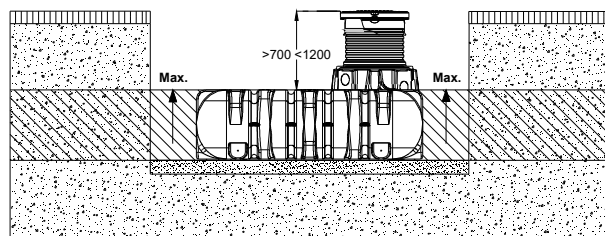
On installation of the tank in the immediate vicinity (< 5 m) of a slope, earthen mound or slope, a statically calculated supporting wall must be erected to absorb the soil pressure. The wall must exceed the dimensions of the tank by at least 500 mm in all directions, and must be located at least 1000 mm away from the tank.



5.2.2 Groundwater and cohesive (water-impermeable) soils (e.g. clay soil)

If it is anticipated that the tanks will be immersed deeper into the groundwater than is shown in the adjacent figure, sufficient dissipation must be ensured. (See table for max. immersion depth).

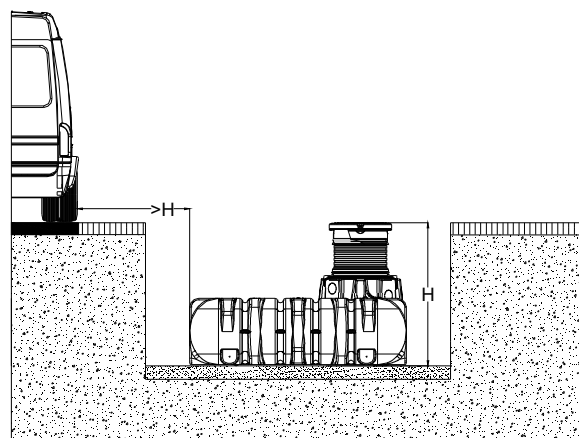
Dissipation of the drainage water (e.g. via an annular drainage system) is recommended in the case of cohesive, water-impermeable soils.



1600L -> 700mm / 3000L -> 735mm / 5000L -> 950mm

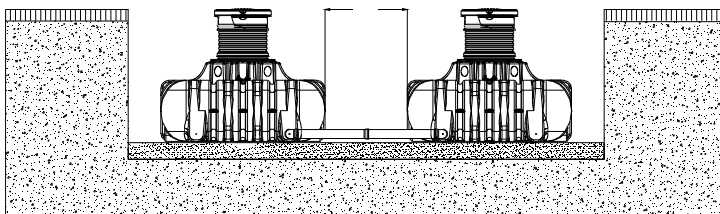
5.2.3 Installation adjacent to surfaces used by vehicles

If the underground tanks are installed adjacent to surfaces which are used by heavy vehicles weighing over 3.5 ton, the minimum distance away from these surfaces is at least the depth of the trench.



5.2.4 Connection of several tanks

Two or more tanks are connected via the assembly surfaces by means of GARANTIA special seals and basic pipes (to be provided at construction site).



The connecting holes must be pre-cut using "only" the special Garantia 124mm hole saw. The distance between the tanks must be a minimum 500mm. The pipes must project at least 100mm inside the tanks.
Note: Connected tanks must be ordered with the Pre Drilled Holes and interconnecting tank seal.

**Use a 40mm pressure pipe (or equivalent approved pipe) for air balance pipe between tanks.
DN 50mm seal provided.**

5.3 Insertion and filling

The tanks must be inserted, impact-free, into the prepared trench using suitable equipment. To avoid deformities, the tank is to be 1/3 filled with water before undertaking any backfilling.

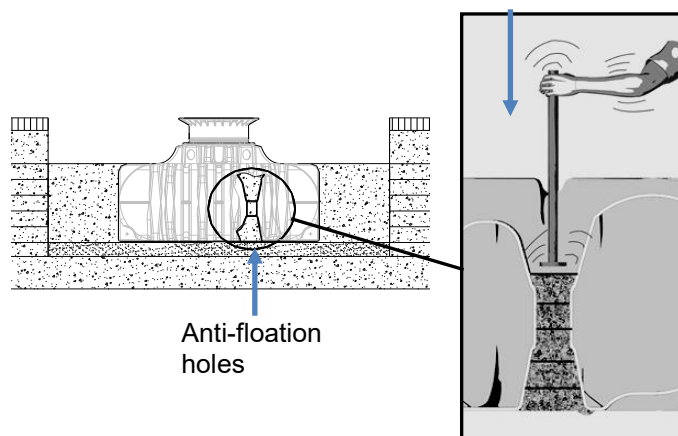
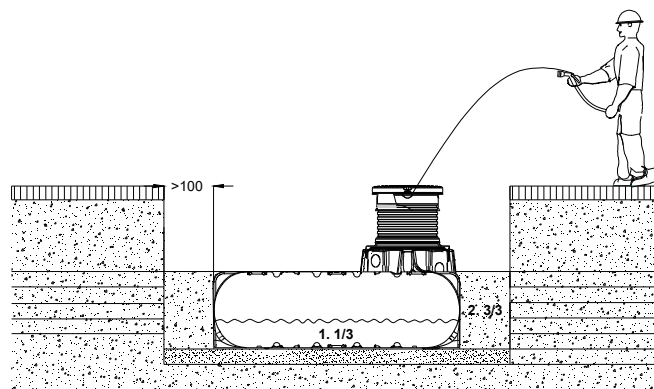
Ensure minimum distances between trench wall (100mm) and between tanks (500mm).

Once sufficient water is in the tank the surrounding trench is then filled with 7mm Minus in layers of 30 cm steps and is manually compacted. See page 2.

The individual layers as well as the anti-floatation holes (see pictures to the right) must be well-compacted by manual tamper.

Damage to the tank must be avoided during compaction. Mechanical compaction machines must not be used under any circumstances.

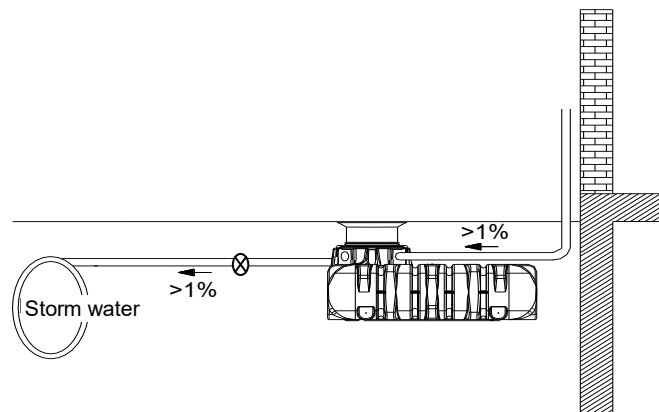
Note: The surrounding trench must be a minimum 100mm wider on all sides than the tank.



5.4 Plumbing connections

All feed and overflow pipes must be plumbed with a decline of at least 1% in the direction of flow (possible, subsequent settling must be taken into consideration in this case). If the tank overflow is connected to the public storm water, this must be protected against reflux by means of a Reflux Valve refer AS/NZS3500.1:2003

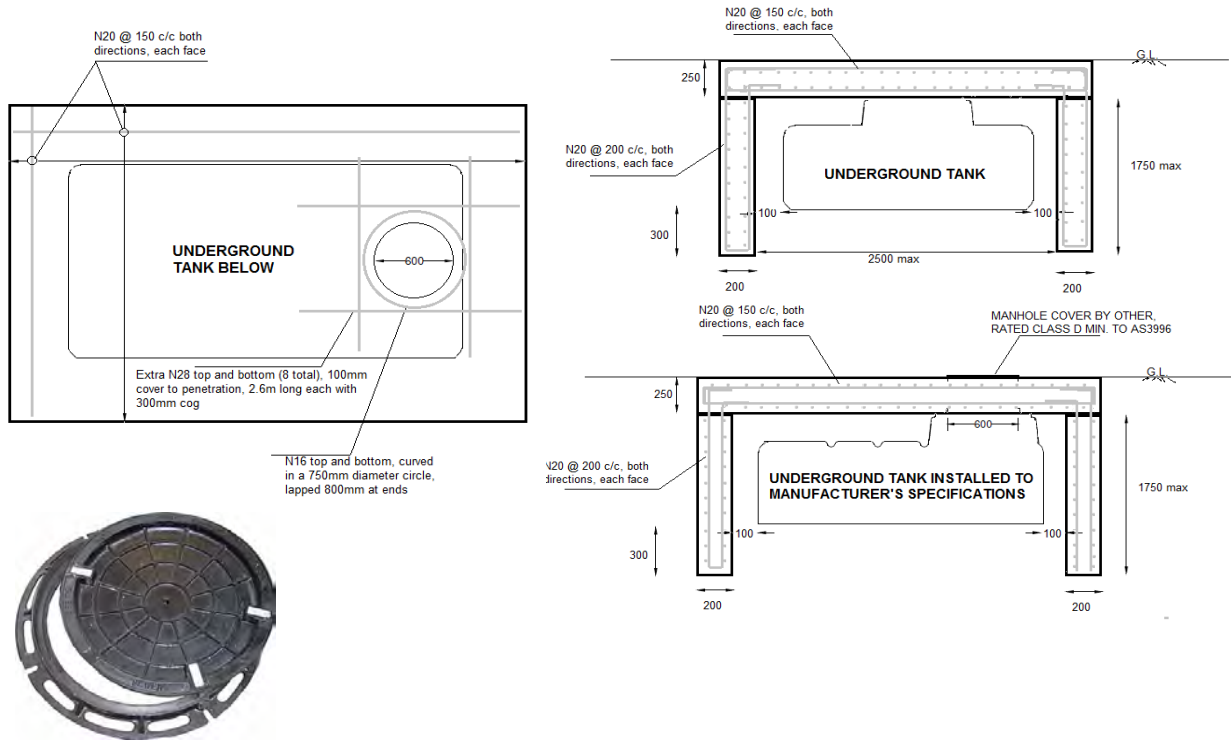
All suction, pressure and control lines must be routed inside an empty pipe, which must be routed as straight as possible, without bending, to the tank with a decline. Necessary bends must be formed using 45° moulded sections.



Important: The empty pipe must be connected to an aperture above the maximum water level.

5. Installation and Assembly - Class D Installations

5.5 Garantia Lilo – Class D Installation



Class D Lid Notes

Gatic (standards approved) 800mm round Class D Lid must be used to obtain the Garantia Lilo 12 Year Warranty in all Class D Installations. Installation must be as per the Gatic instructions. The Garantia Lilo Standard Lid is installed into the Garantia Lilo Tank underneath the Gatic Class D Lid.

Concrete Notes

- C1. All concrete workmanship to be in accordance with AS 3600
- C2. All concrete to have the following properties:
 - 32 mpa min cylinder compressive strength
 - 7mm min, 20mm max aggregate size 60mm slump
 - 400kg/m³ cement content (Shotcrete Mix)
- C3. All concrete to be cured by approved methods for min 7 days
- C4. All reinforcement shall be 'n' bars 500 mpa in accordance with as 4671.
- C5. All steelwork to be treated in accordance with BCA corrosion requirements.
- C6. Cover to reinforcement to be min 35mm from all faces.
- C7. Damp proof membrane to be used for surfaces in contact with soil
- C8. Steel reinforcement to be continuous at all locations, ensure minimum 50 x bar diameter lap at splices and corners.
- C9. Concrete admixtures may be used provided chloride ion Content from sources is < 0.4% of the mass of portland cement in the mix. Calcium chloride is not an acceptable admixture.

Foundation and Backfill Notes

- F1. All backfill to be compacted in max 300mm layers using clean, well graded sand or quarter minus. Sand penetrometer reading of at least 7 blows per 300mm. Compact natural sand to a depth of 600mm min below the bottom of the foundation.
- F2. Compaction to achieve an allowable bearing pressure of 200 kPa minimum. Under walls.
- F3. Ground water table has been assumed to be well below base of structure.

6. Assembly of the extension riser

For larger coverage heights an extension riser is needed. Insert the extension riser into the tank dome, (soft soap is needed) then into the highest groove of the extension riser inserted the profile seal and soap generously. Afterwards push the telescopic dome shaft into the extension riser and adjust it to the planned area surface.

1 x Extension Riser = max. earth-cover 955 mm (with standard lid and shaft)

respectively 1055 mm (with vehicle lid and shaft)

2 x Extension Riser = max. earth-cover 1200 mm (with standard lid and shaft)

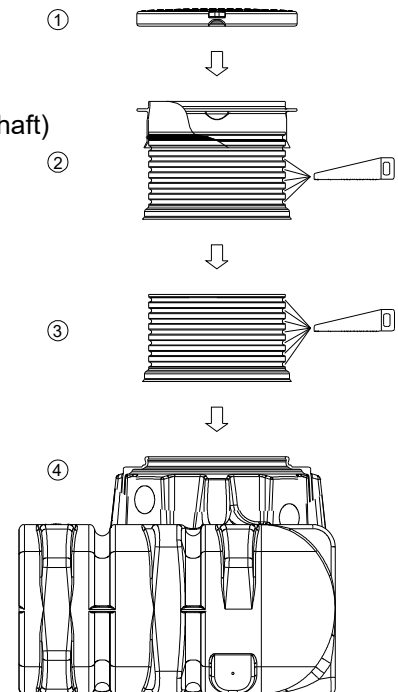
Only suitable for car with a suspended slab.

① Telescopic dome shaft (can be inclined by 5°)

② Extension Riser

③ Tank to Dome Seal (profile seal)

④ Lilo Tank Dome



7. Inspection and servicing

The entire system must be checked for leaks, cleanliness and stability at least every three months.

The entire system should be serviced at intervals of approx. 5 years. In this case, all parts of the system must be cleaned and their function checked. Servicing should be carried out as follows:

- Drain the tank completely
- Clean surfaces and internal parts with water
- Remove all dirt from the tank
- Check that all internal parts are firmly seated.

8. Supra Internal Filter Package – Installation in Storm Water Retention System

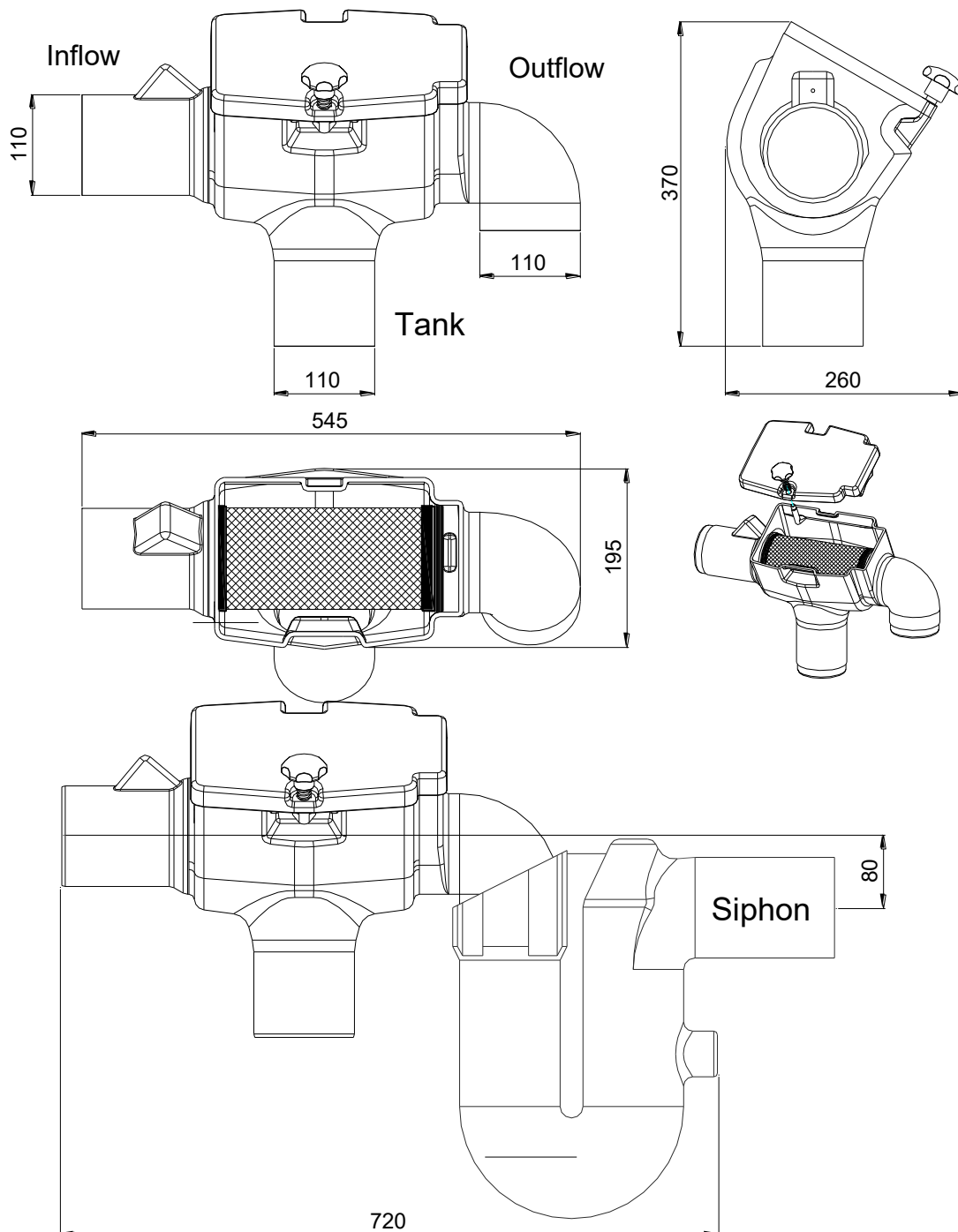
8.1. Supra Internal Filter consists of: (supplied)

- ⌚ The SUPRA®-Filter Internal is suitable for installation in a pilot shaft or in a cistern
- ⌚ The difference in height between the supply pipe and outlet is 80 mm
- ⌚ The filter is suitable for roof areas up to 350 m².
- ⌚ The mesh aperture in the filter cartridge is 0.5 mm.

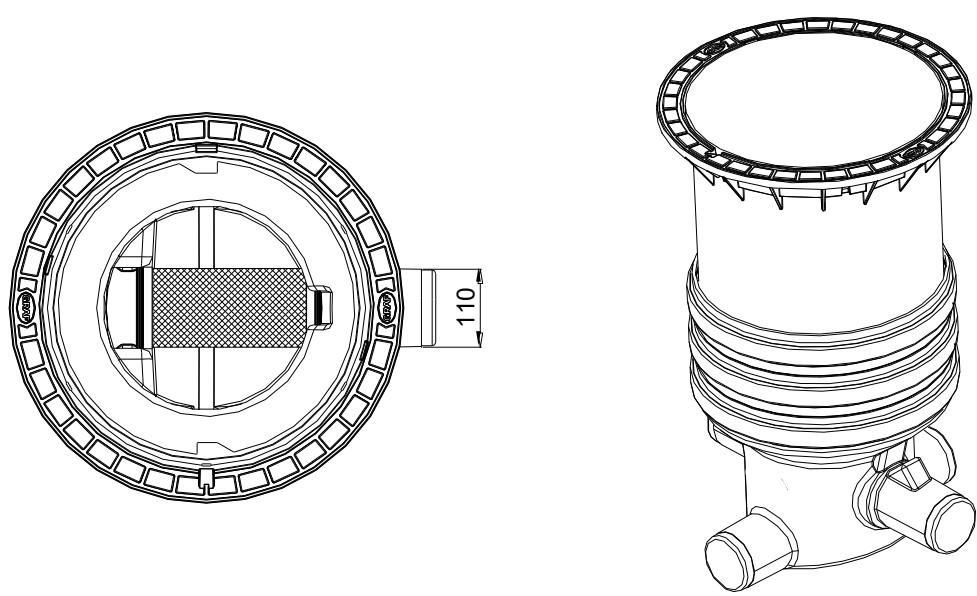
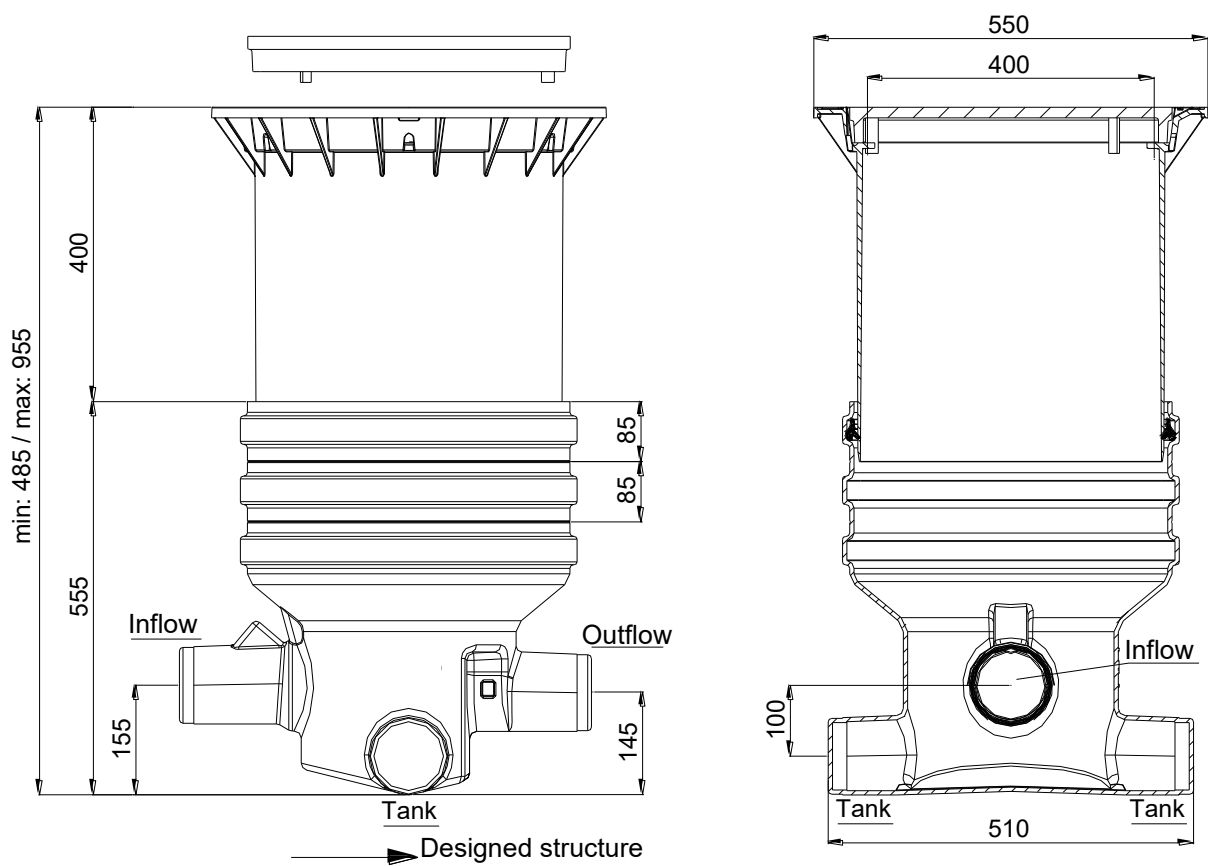
SUPRA®-Filter external pedestrian

- ⌚ The SUPRA-Filter External is suitable for installation underground prior to a cistern inlet.
- ⌚ The SUPRA-Filter External may only be installed in areas that are not traversed by traffic.
- ⌚ The difference in height between the supply pipe and outlet is 10 mm
- ⌚ Stepless installation depth from 570 mm to 1050 mm.
- ⌚ The filter is suitable for roof areas up to 350 m².

8.2. Technical Specifications



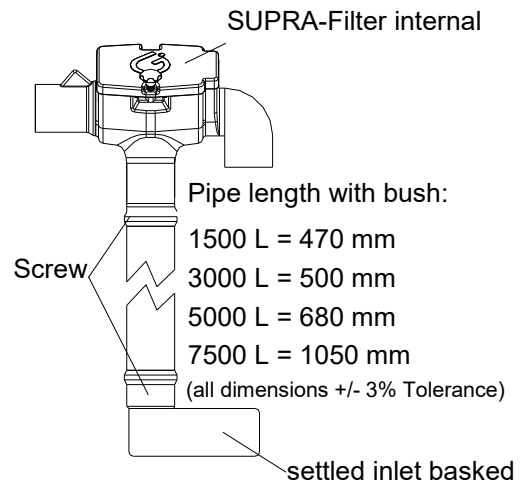
➡ Designed structure



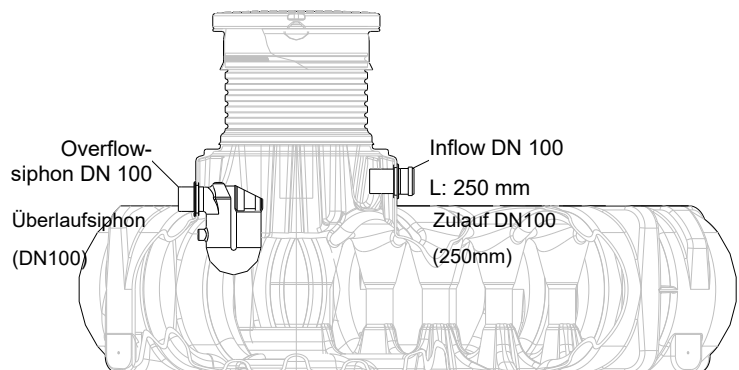
Installation and assembly

SUPRA®-Filter internal / Li-Lo underground tank

The SUPRA®-Filter Internal is prepared as shown in the adjacent depiction. The filter housing is connected via the on site installed canalisation pipe to the stabilising inlet well (included in the SUPRA add on packet). The couplings should be secured with commercial self tapping screws.

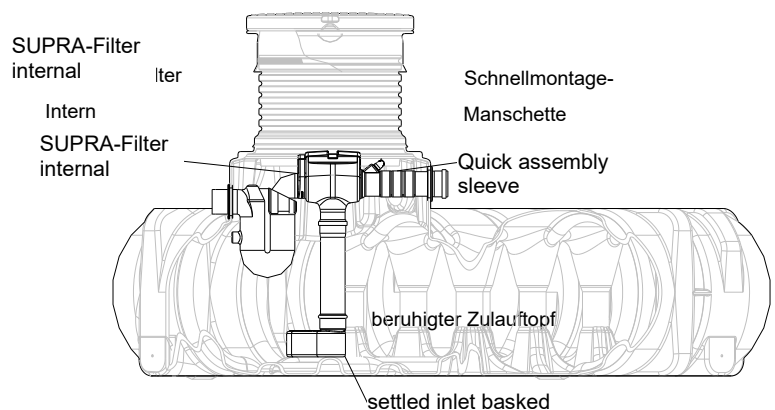


Following this a 250 mm long inlet pipe and an overflow siphon are pushed in to the Li-Lo underground tank until the end stop position as shown in the adjacent depiction.



Now the prepared SUPRA®-Filter internal is installed in the tank, the elbow of the overflow from the filter is also connected now to the siphon. The inlet pipe is so to position that it is flush with the filter inlet and then finally fixed in place with the quick assembly collar.

Under no circumstance may a mesh barrier to prevent small animals entering the tube be installed as this will eventually lead to a blockage from debris in the pipe.



10. Pictorial Installation of the Garantia Lilo Tanks for Storm Water



1. Dig excavation and provide 100-150mm of well compacted level base



2. Lift tank/s off truck using suitable lifting equipment



3. Use digger to lift tank/s into the hole

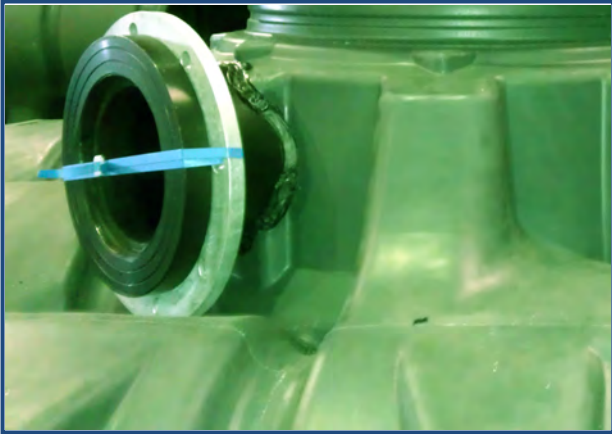


4. Back fill must be compactable porous with a maximum size of 7mm. Refer 5.3



5. Connect plumbing, 1/3 fill tank with water and then back fill. Refer 5.3

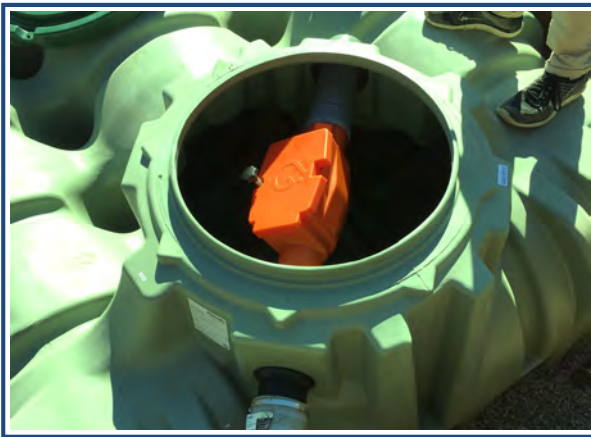
10. Pictorial Installation of the Garantia Lilo Tanks for Storm Water cont..



7. Insert U shaped doubled sided tank to dome shaft seal. Refer to 6.1



8. Connect the detention/retention fitting. The plumber to supply and fit PVC outside of the tank.



9. Connect Minimax Pro Filter Package in Retention System and install pump and changeover device (Rain 2 Main)
Refer 9.1 – 9.7



10. Lube up rubber seal with liquid soap provided before inserting Shaft & Lid



11. Install Garantia Telescopic Shaft & Lid (man hole) to tank



12. Complete Landscaping

11. Installer Support Service

We have available Plumbing Product Specialists in each state to support installing contractors as required with advice on installation of Garantia Tanks & Filters.

Contact us for assistance, eg. technical support, design and drawings.

12. Customer Made to Suit Clients Needs

Connection options are available in 150mm, 225mm & 300mm.



Example of - Garantia Lilo with 225mm Welded in Flanges

Storm Water Detention & Retention

Technical Information

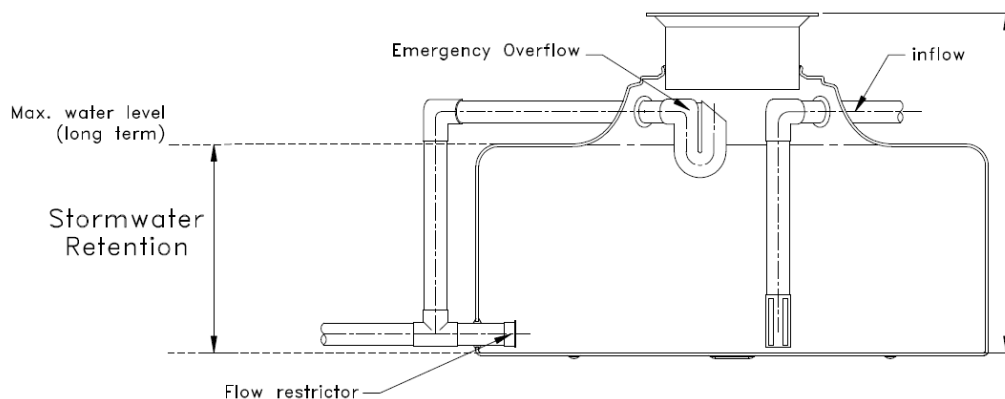
13. Storm Water Detention System

Due to its shallow excavation and strong construction, the Garantia Lilo underground tank is ideally suited as either a detention tank or a retention system.

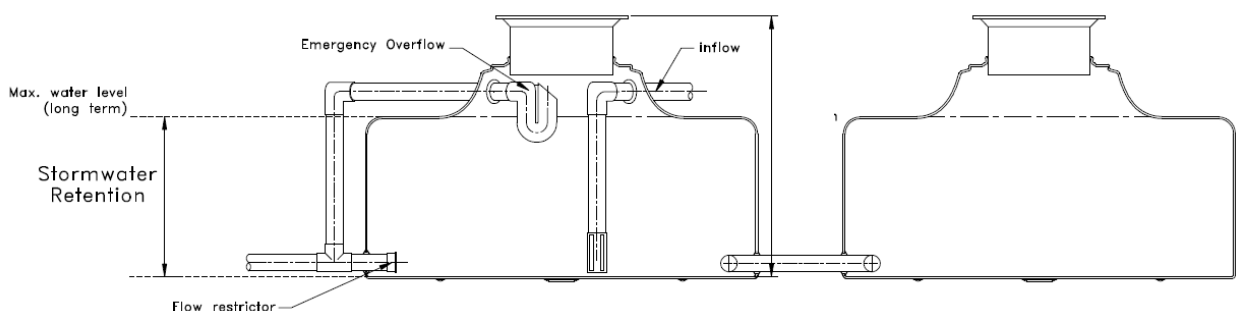
Detention Tank (*Detain*)

A detention tank is required by many councils and local authorities to capture and hold rain and storm water on the property and then slowly release it back into the storm water system to ensure flash flooding of stormwater drains does not occur. The council or authority will normally nominate the amount of water to be detained and the flow rate of the release of this water back into the storm water system.

Single Detention Tank



Two or More Detention Tanks



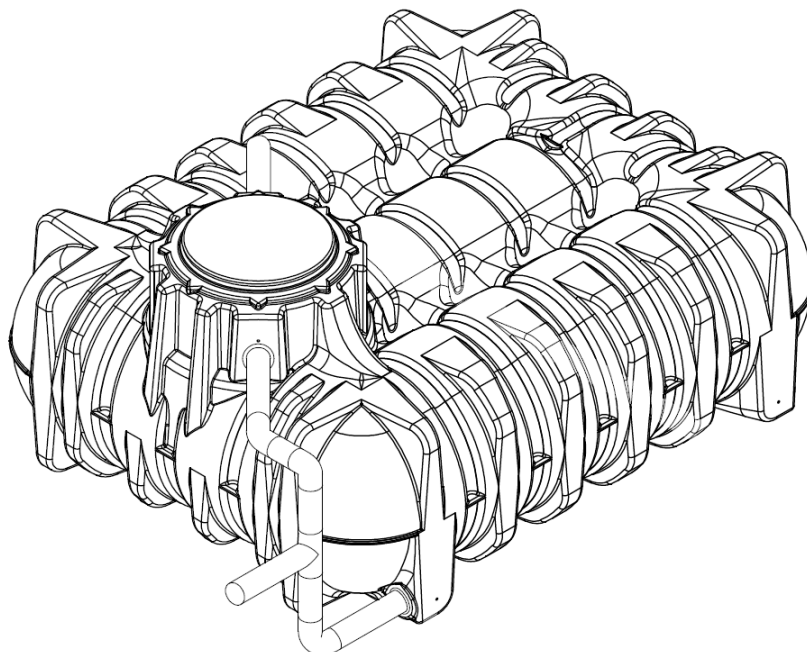
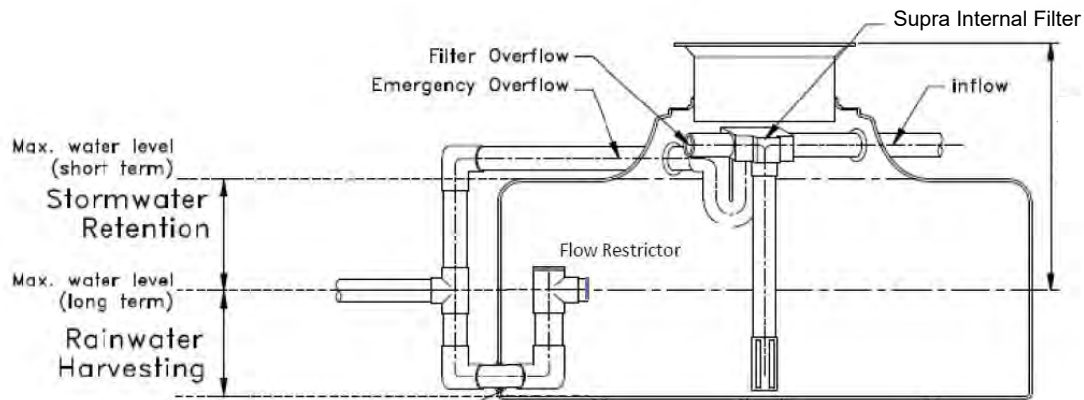
14. Storm Water Retention System

With a national focus on water savings by collecting rainwater, the installation of a rainwater detention - retention system coupled with a quality filtration system, enables clean quality rainwater to be collected in the Garantia Lilo Tank. The mixture of rainwater and surface stormwater should be avoided in retention systems.

Sized and set up correctly the tank will *detain* a specific amount of water required by the council before letting it go slowly back into the storm water system. It will also provide the *retention* of a suitable amount of rainwater for use by the property owner. Thus replacing the need to buy an additional rainwater tank. The property owner can use this *retained* water for such purposes as flushing toilets, filling washing machines and watering gardens.

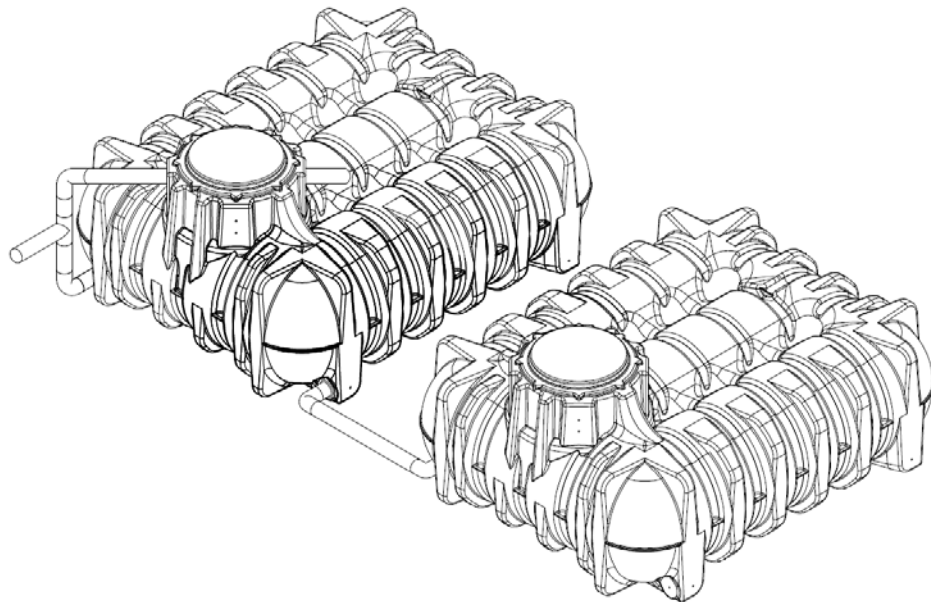
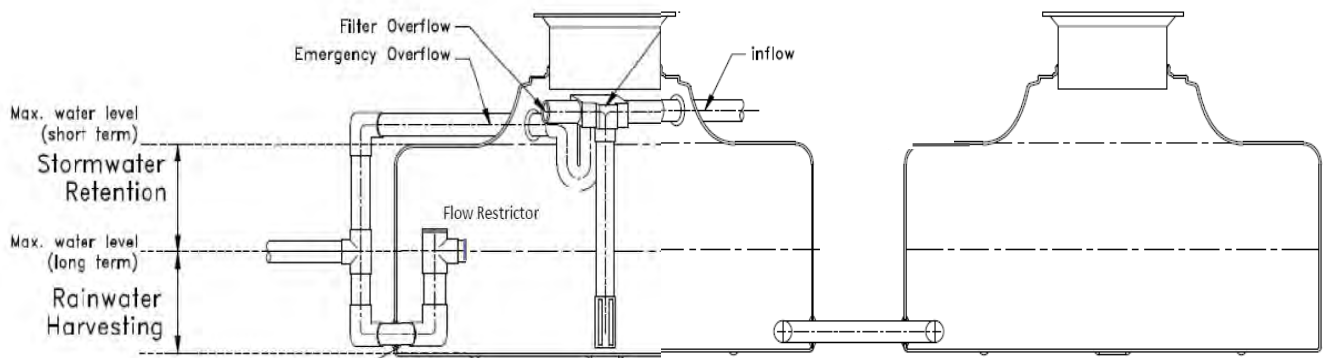
Typical Installation of Lilo as a Storm Water Retention System

Single Retention System (with Supra Filter Package)



14. Storm Water Retention – Twin Tank System

Two or More Retention (with Supra Filter Package)



Example of a Multiple Tank (6) Installation



15. Storm Water – Orifice Formula & Flow Calculations

Orifice Formula

Calculating the orifice formula is normally done by local councils and or engineers.

The calculations are done to ensure that the volume of water, coupled with the head of the water in the tank is matched with the orifice size to ensure the storm water entering back into the storm water system will be below its capacity limits.

$$V = 0.97 \times 0.97 \times A \times \sqrt{(2 \times 9.81 \times D)}$$

V = Volume flow rate

0.97 = Liquid coefficient of friction for water

0.97 = Correction value for round openings

A = Surface area of the orifice

(πR^2 – π being 3.1415 and R being 50% of the diameter of the orifice in metres)

9.81 = Gravity

D = Depth of water above the discharge hole in m

Orifice size	Area of orifice - πR^2	Depth of Orifice from top level (in metres)		
	EG: $3.1415 \times (0.0125 \times 0.0125)$ = 0.00049	0.3	0.5	1
		Flow Rate in Litres per second		
15	0.00018	0.4	0.5	0.7
*25	*0.00049	1.1	1.4	2.0
30	0.00071	1.6	2.1	2.9
35	0.00096	2.2	2.8	4.0
40	0.00126	2.9	3.7	5.2
45	0.00159	3.6	4.7	6.6
50	0.00196	4.5	5.8	8.2
55	0.00238	5.4	7.0	9.9
60	0.00283	6.5	8.3	11.8
65	0.00332	7.6	9.8	13.8
70	0.00385	8.8	11.3	16.0

*Example of Flow Calculations

To calculate the volume flow for a 1m Deep tank through a 25mm Orifice (R = 0.0125m):

$$V = 0.97 \times 0.97 \times (3.1415 \times 0.0125^2) \times \sqrt{(2 \times 9.81 \times 1)} \quad V = 0.9409 \times 0.00049 \times 4.4294$$

$$V = 0.002 \text{ m}^3/\text{sec}$$

$$V = 2 \text{ L/sec}$$

16. Storm Water – Volume Measurements



Volumetric measurements - Lilo



Water depth (From Tank Bottom)	1,500 L	3,000 L	5,000 L	Water Depth (From Tank Bottom)
0 mm				0 mm
100 mm	165 L	355 L	417 L	100 mm
200 mm	393 L	805 L	946 L	200 mm
300 mm	627 L	1,302 L	1,517 L	300 mm
400 mm	884 L	1,814 L	2,145 L	400 mm
500 mm	1,155 L	2,322 L	2,786 L	500 mm
600 mm	1,367 L	2,763 L	3,413 L	600 mm
700 mm	1,528 L	3,045 L	3,972 L	700 mm
800 mm	1,578 L	3,123 L	4,524 L	800 mm
900 mm	1,628 L	3,188 L	4,850 L	900 mm
1000 mm	1,675 L	3,237 L	4,893 L	1000 mm
1100 mm			4,958 L	1100 mm
1200 mm			5,004 L	1200 mm
1300 mm				1300 mm
1400 mm				1400 mm
1500 mm				1500 mm

Otto GRAF GmbH, 28.08.2012

Note: To check volume before installation, refer to chart above for the correct orifice height = volume of detention required in the tank.

Please note that systems larger than 10,000 litre can be achieved. Garantia are able to assist with calculations and drawings. Please contact us for this and any pumping equipment.

17. Product Certification

