



Kingfisher
Direct Ltd

Installation Instructions

For “Rain King” rainwater harvesting
systems for garden irrigation

12-series

introduction

receipt of goods ...



1. Deliveries to site will be organised in conjunction with Site Agents to ensure that arrangements have been made for their safe receipt; Site Agents are advised to ensure that all goods are thoroughly checked on receipt against delivery documentation as items later reported as missing or damaged cannot be replaced and will need to be re-ordered.



2. It should particularly be noted that the condition of the tank becomes the responsibility of the Site Agent once unloading from the delivery vehicle commences.

installation overview ...

3. If supervising the installation of a RWH system for the first time, it should be planned to undertake the work in the following stages:

- ⇒ Review general operating principles *see page-3*
- ⇒ Components supplied *see page-4*
- ⇒ The pump *see page-4*
- ⇒ Filter options & specifications *see page-5*
- ⇒ Tank options & specifications *see page-7*
- ⇒ Tank connections *see page-9*
- ⇒ **Installing the tank:**
 - ✓ Preliminaries *see page-10*
 - ✓ Tank handling (NB: Read before unloading) *see page-10*
 - ✓ Installation overview *see page-11*
 - ✓ Precautions *see page-12*
 - ✓ Step-by-step installation guide *see page-12*
- ⇒ Installing the other components: *see page-15*
- ⇒ Using the system:
 - ✓ System layout *see page-16*
 - ✓ Safety *see page-16*
 - ✓ Routine maintenance *see page-17*
 - ✓ Fault-finding *see page-17*
- ⇒ Freerain contact details & terms of business *see page-18*

health & safety ...

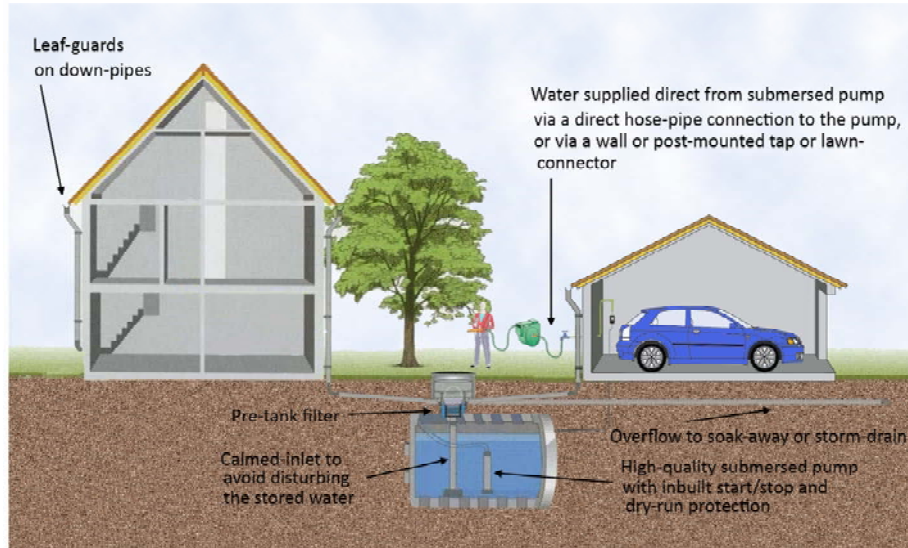


4. All Health & Safety precautions applying to such works are to be implemented, with risk assessments and method statements being prepared.
5. Freerain will provide on request example generic risk assessments and method statements.

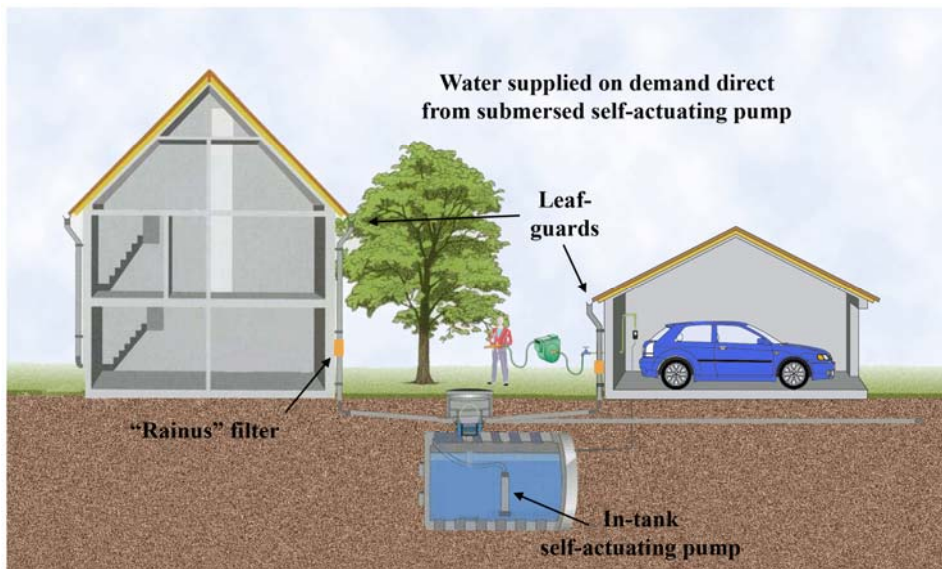
operating principles ...

collecting the water ...

6. The Rain King garden irrigation systems are designed to harvest a substantial amount of water maintained at good quality by using an underground storage tank; they are also designed to be relatively straightforward to install. The schematic below illustrates the layout of a typical system employing an in-tank pre-storage filter:



7. When desired, installation can be simplified still further by inserting filters in the down-pipe(s), as illustrated below, thus eliminating entirely the need to disturb existing drainage runs:



Points to Note:



1. The main storage tanks need to be able to overflow to soak-away or storm-drain which must be adequate to cope with the rate of flow to avoid contaminated water back-flowing into the storage tank



2. Supply to services must be via dedicated pipe-work, which must not in any way be cross-connected to the mains water-supply pipe-work

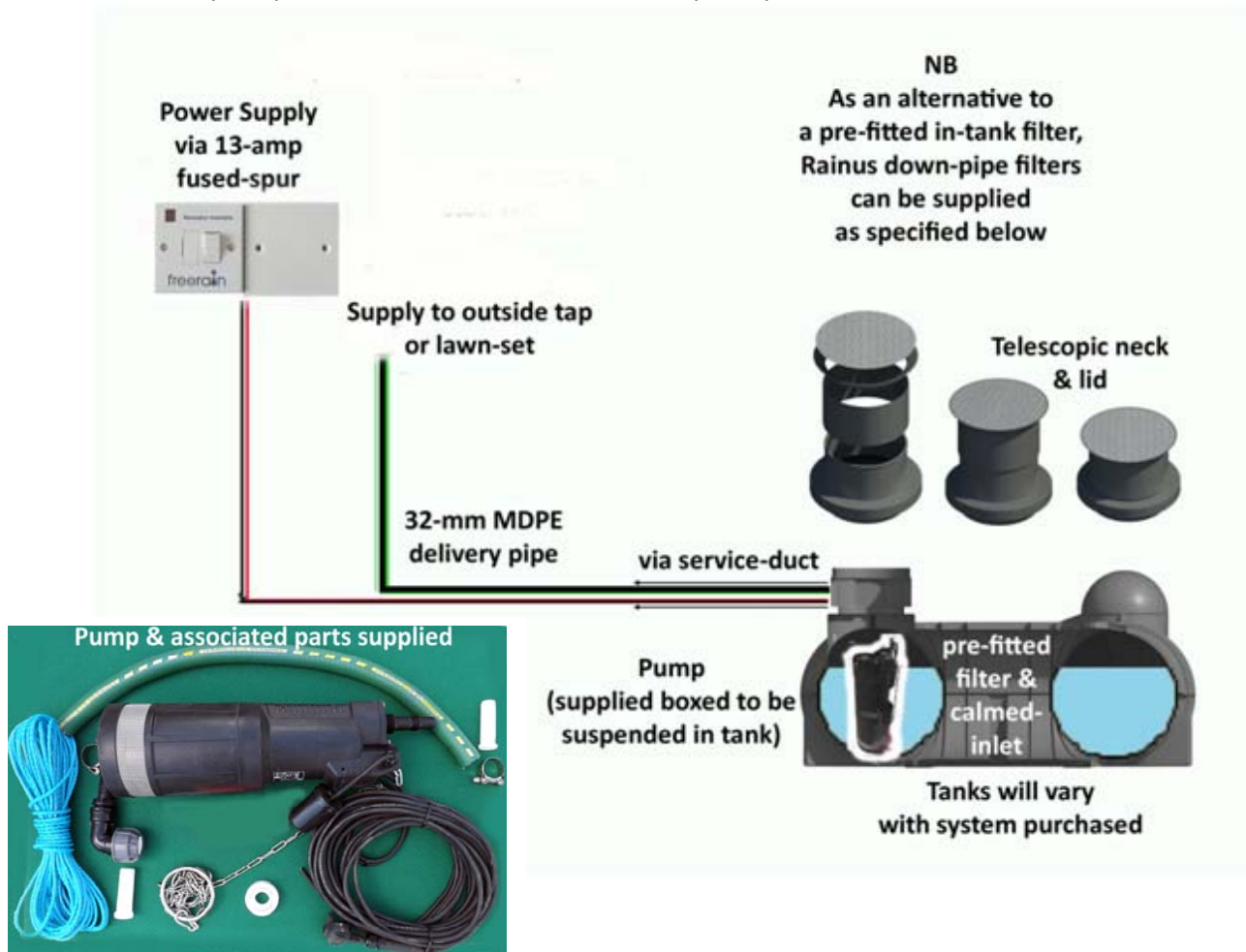


3. Garden irrigation systems would not normally be provided with a mains top-up device as this makes them subject to hosepipe bans; please discuss with our Sales team if for project-specific reasons mains top-up is required.

components supplied

schematics layout ...

8. The diagram below shows the typical schematic layout of a Rain King system, and can be used to identify the parts that have been delivered with your system:



the pump ...

9. The standard pumps supplied with Freerain domestic systems are DAB Divertron 1000-M submersible pumps, the key features of which are:
- ⇒ Built-in integrated electronics designed to automatically start and stop the pump
 - ⇒ Equipped with in-built dry-run protection
 - ⇒ Built-in non-return valve
 - ⇒ Power & Performance:
 - ✓ Required – 230V, 50-Hz
 - ✓ Output – 0.55kW, 0.75-HP
 - ⇒ Installation:
 - ✓ Chain-suspended from the neck of the tank
 - ✓ Pre-measured to provide 150-mm clearance between pump and tank-base



Filter options & specifications ...

Compact Filter

The Compact filter is one of the most popular in the Freerain range, being particularly useful when there is a requirement for minimum/zero invert level drop between the inlet and the outlet.

The key technical characteristics of the filter are:

- ✓ Connection capacity for roof areas up to 150 m²
- ✓ All connections DN 100 (110mm OD).
- ✓ No height difference between inlet and outlet.
- ✓ Mesh size of filter cartridge 0.7 x 1.7 mm.

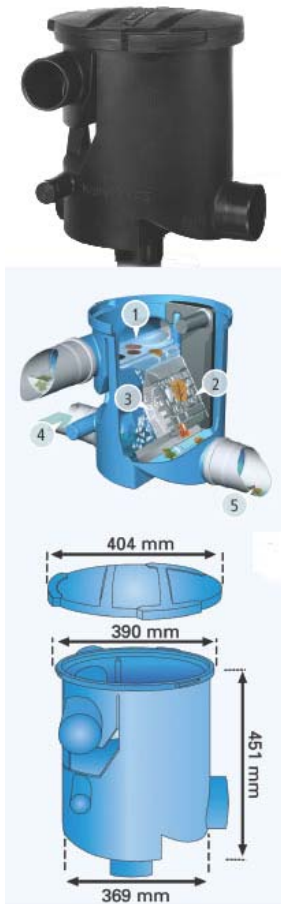


PF Filter

For flow-rates associated with larger roofs, or where an invert drop across the filter is desirable, we specify use of the PF filter which works on similar principles to the Compact filter.

The key technical characteristics of the PF filter are:

- ✓ Connection capacity after DIN 1986 for roof areas up to 200 m².
- ✓ All connections DN 100.
- ✓ Small height difference of 66 mm between rainwater inlet and waste water outlet.
- ✓ Mesh size of filter cartridge 0.7 x 1.7 mm.



VF-1 Filter

Included in the range of filters most likely to be used on domestic-scale projects, the VF-1 filter would be most likely to be specified to complement the larger tanks in the Freerain range. The key technical characteristics of the VF1-filter are:

- ✓ Suitable for connection to roof areas up to 500 m².
- ✓ Height difference between inlet and outlet 300 mm.
- ✓ Suitable in-tank installation as shown below
- ✓ Or can be provided with its own neck for installation pre storage tank



Rainus Filter

As shown in the schematic above, the Rainus filter is ideal for fitting to smaller systems without disturbing existing drainage. Installation is simple, whilst maintenance involves no more than sliding out and cleaning the filter unit periodically.

The filter is suitable for installation on 65mm square or 68mm round down pipes; the unit weighs 2.0-kg, other key characteristics being:

- ✓ Size - approx 505 mm high and 170 mm wide
- ✓ Depth - between pipe and wall is 22 cm
- ✓ Housing material – ABS (*Acrylonitrile butadiene styrene*)
- ✓ Filter sieve - Stainless steel, with mesh size - 0.7 x 1.7 mm

Each unit will handle water from 90-m² of roof, filtering it by:

- ✓ Slowing its flow by baffles in the housing, then calming it in a small sump; the water then weirs over the sump lip, and is distributed evenly across the primary cascade, the first cleaning step.
- ✓ The primary cascade filters out any large or coarse particles, such as leaves and moss; behind the primary cascade is a fine secondary filter.
- ✓ Cleaned rainwater then continues through the down-pipe to the storage tank
- ✓ Filtered matter is ejected from the front of the filter



Colour options
Black
Brown
Grey



tank sizes & specifications ...

tank options & specifications ...

Technical Data:

- Nominal contents – 1,800-litres
- Nominal weight – 85-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 2,600-litres
- Nominal weight – 120-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 3,400-litres
- Nominal weight – 155-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 4,400-litres
- Nominal weight – 200-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 5,200-litres
- Nominal weight – 240-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 5,200-litres
- Nominal weight – 245-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 6,800-litres
- Nominal weight – 350-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 6,800-litres
- Nominal weight – 355-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 8,400-litres
- Nominal weight – 387-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 8,400-litres
- Nominal weight – 392-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

Technical Data:

- Nominal contents – 10,000-litres
- Nominal weight – 466-kgs
- Single-piece construction

Accessories:

- 200-kg & 600-kg lockable safety lid
- Telescopic neck extensions

Tanks are designed to take a range of filters & fittings to your precise requirements

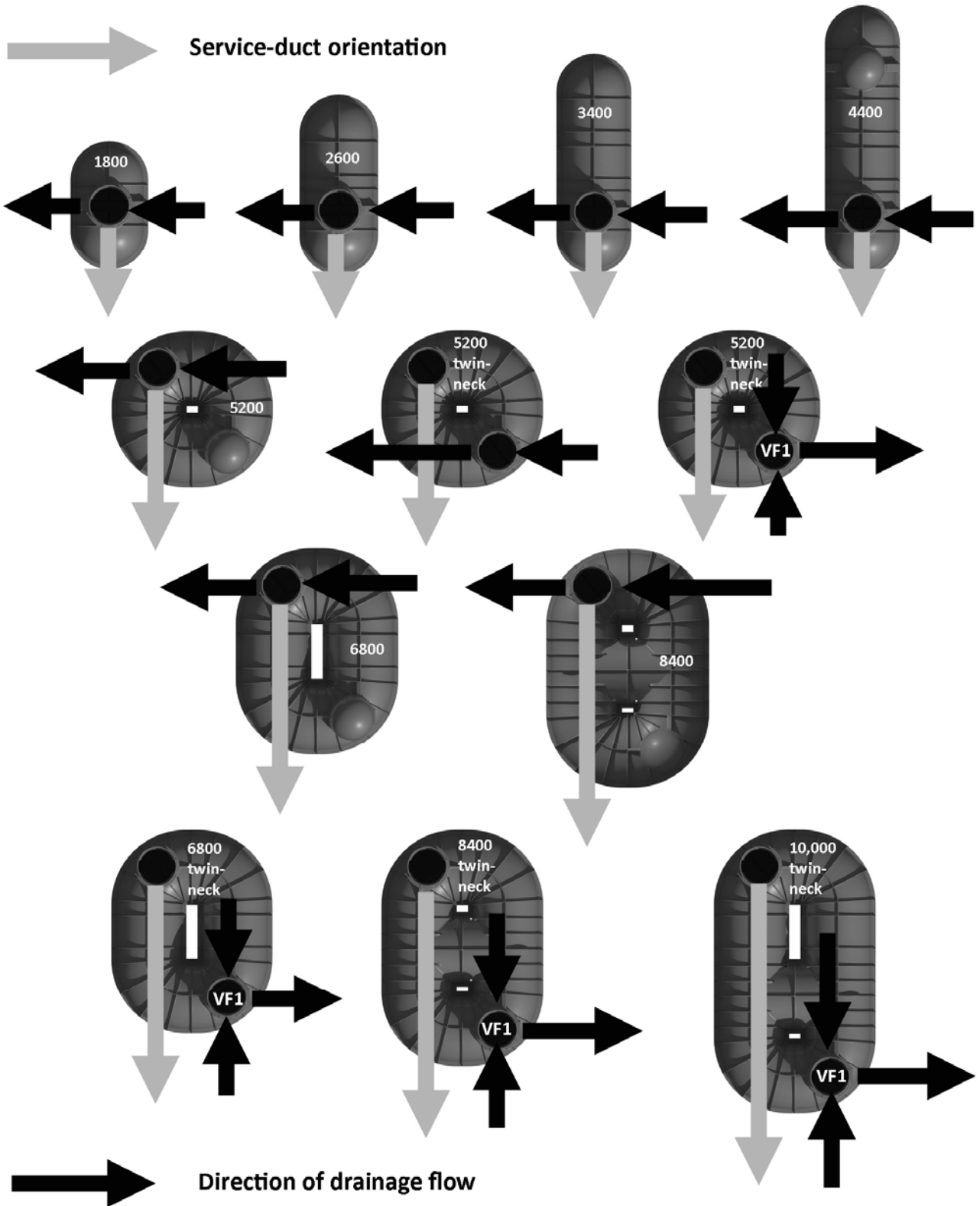
Technical Data:

- Nominal weight excluding lid – 14 kgs
- Vertical adjustment – 300 mm
- Tilt adjustment - $\pm 5^\circ$

Neck inserts into upstand on the tank here

NB: Top sliding section can be trimmed on site to reduce overall height dimension when necessary

drainage & service-duct connections



Notes:

1. Service-ducts need to be directly aligned with controls location
2. On direct-pressure systems, service-ducts must drain towards tank
3. Invert-drops across filters are CF-zero; PF-66mm; VF1-300mm



installing the tank

preliminaries ...

10. Responsibility for ordering the right tank for the project, and with the right connections to suit the drainage and service-duct connections to suit the underground works, lies with the Buyer.



11. The Site Agent is responsible for checking that the right tank has been delivered to site with all concerned knowing all the implications of its installation; these include factors such as:

- ⇒ Required capacity and any dimension constraints
- ⇒ Site access and routes to site
- ⇒ Filter and other fitments requirements
- ⇒ Orientation of connections, and any associated invert-level changes
- ⇒ Ground conditions, re: soil type, water table, contamination etc
- ⇒ Depth of excavation, adjacent structures, their foundations and proximity to utilities
- ⇒ Traffic-bearing characteristics
- ⇒ Topography (adjacent slopes and banks) and proximity to trees
- ⇒ Delivery timetables

12. **Delivery:** Timing of the delivery of the system will always be pre-agreed with the Site Agent and is usually timed to ensure that the tank can be down-loaded, transferred to plot, installed and back-filled with the minimum of delay.



13. **Accountability:** Responsibility for the tank passes to the Site Agent once unloading commences; it is therefore important that the buyer accepts the condition of the tank on arrival before they attempt to move or attach lifting equipment.

tank handling ...



14. Freerain tanks are designed to be lifted and manoeuvred only when empty; they are not therefore to be lifted when containing water under any circumstances as this will add considerable weight.



15. It is recommended that the tanks be unloaded from delivery lorries, moved around site, and lowered into their installed position by attaching lifting straps/chains and appropriately sized D-shackles to the lifting points provided, or by use of lifting straps around the whole tank; points to note are:

- ⇒ The centre of gravity of the tank needs to be established by trial & error before fully raising the tank
- ⇒ Chain lengths need to be adjusted so that the tank lifts horizontally
- ⇒ To stabilise the load when moving around site, guide-ropes should be attached to enable operatives to control load-swing from a safe distance

installation overview ...

16. Freerain systems include tanks that have been specifically designed to store harvested rainwater



17. The tanks are designed to be installed in specific accordance with the instructions that follow; the written instructions of a structural engineer are to be followed if any of the following tank installation abnormalities are present:

- ⇒ Trafficking by vehicles other than ride-on lawn-mowers
- ⇒ Closer than 4-metres to the foundations of another structure
- ⇒ Closer than 4-metres to an adjacent significant change in ground-level
- ⇒ Outside the depth parameters identified below



18. If site personnel are faced with any of the conditions noted above, they should seek supervisory advice before commencing tank installation.

19. The tanks are designed to take pedestrian and light mower loading only, with a burial depth of between 500-mm and 1300-mm from the crown of the tank to finished ground level. The telescopic dome and neck extension are adjustable within its vertical and horizontal limits to assist with the finishing-off process; if tank cover of less than 775mm is required the neck extension can be trimmed on-site to achieve fit.

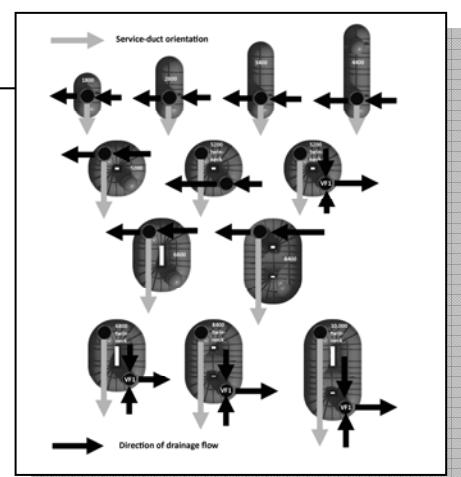
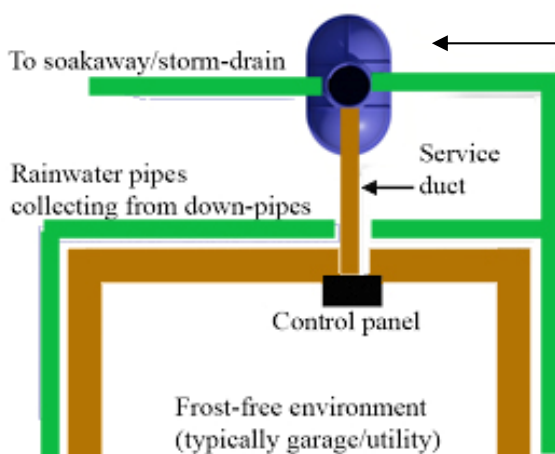
20. The customer may, if wished, substitute their own brick-construction manhole and cover provided these are so constructed that they do not transfer any weight onto the tank.

21. Pipe-falls must be a minimum of 1:100 in the direction of water-flow, ie rainwater delivery pipe and service duct towards the tank, and the overflow away from the tank

22. The installation of the rainwater storage tank, and its connection to the water-supply, water-overflow and service-duct pipes should be undertaken at the same time as the overall underground works for the project.



23. The tank should be aligned to provide the straightest possible service duct run between the tank and the Control Unit as other pipe-work and cabling etc need to be fed through this duct at a later stage; the figure below shows this ideal relationship (bearing mind the possible permutations thumb-nailed opposite)





24. The tank must be handled and installed strictly in accordance with the instructions at paragraph-26 above; once installed, the position of the tank is to be clearly marked and over-driving by vehicles within 4-metres of a tank edge is strictly forbidden.



25. All pipe-work associated with a rainwater harvesting system must be kept totally clear of site debris, to which end they must have sealed ends when being pulled through.



26. To prevent roof-water entering the tank prior to the system entering service, the in-tank filter is to be covered with polythene until the property is ready for occupancy; this cover is to be removed as a part of the commissioning process.

precautions ...

27. To ensure the integrity of the tank is not prejudiced during installation, and satisfactory subsequent operation of the complete system, the following precautions are to be strictly observed:

- ⇒ Allow the tank to settle onto the pea-gravel base under its own weight initially, and the weight of the water introduced into it
- ⇒ Care is to be taken to ensure that site debris/dust is not allowed to enter the tank during or after its installation
- ⇒ **Under no circumstances:**
 - ✓ **Tamp-down the infill with machinery**
 - ✓ **Tamp-down finished ground level with machinery**
 - ✓ **Drive vehicles over tanks installed as above**

step-by-step guide ...



28. The following is a step-by-step guide to the installation of the tank **when none of the abnormal conditions noted at paragraph-28 above are present:**

- ⇒ Arrangements should be made for the tank to be delivered, coincident with the day it is due to be installed; with this in mind, when delivery is expected ensure:
 - ✓ Suitable access and parking arrangements have been made for the delivery vehicle
 - ✓ Plant is available to unload the tank
 - ✓ A clear route has been designated between the delivery vehicle and the installation site
 - ✓ The installation site is level and clear of obstacles and site debris and, ideally:
 - ⇒ The water ingress pipe-work is complete and ready for connection
 - ⇒ The water overflow pipe-work is complete, ready for connection, and is itself connected to the surface water management system (soak-away, storm-drain or attenuation as appropriate)
 - ⇒ The service duct is ready for connection, complete with:
 - ☉ internal draw-cord provided; this should be left in-place on completion
 - ☉ 32-mm High Performance Polyethylene (HPP) delivery pipe, fed through, section by section, as the service duct is installed





⇒ Before starting the installation, confirm no added precautions (see paragraph-48 above) apply; ie, there is no requirement to:

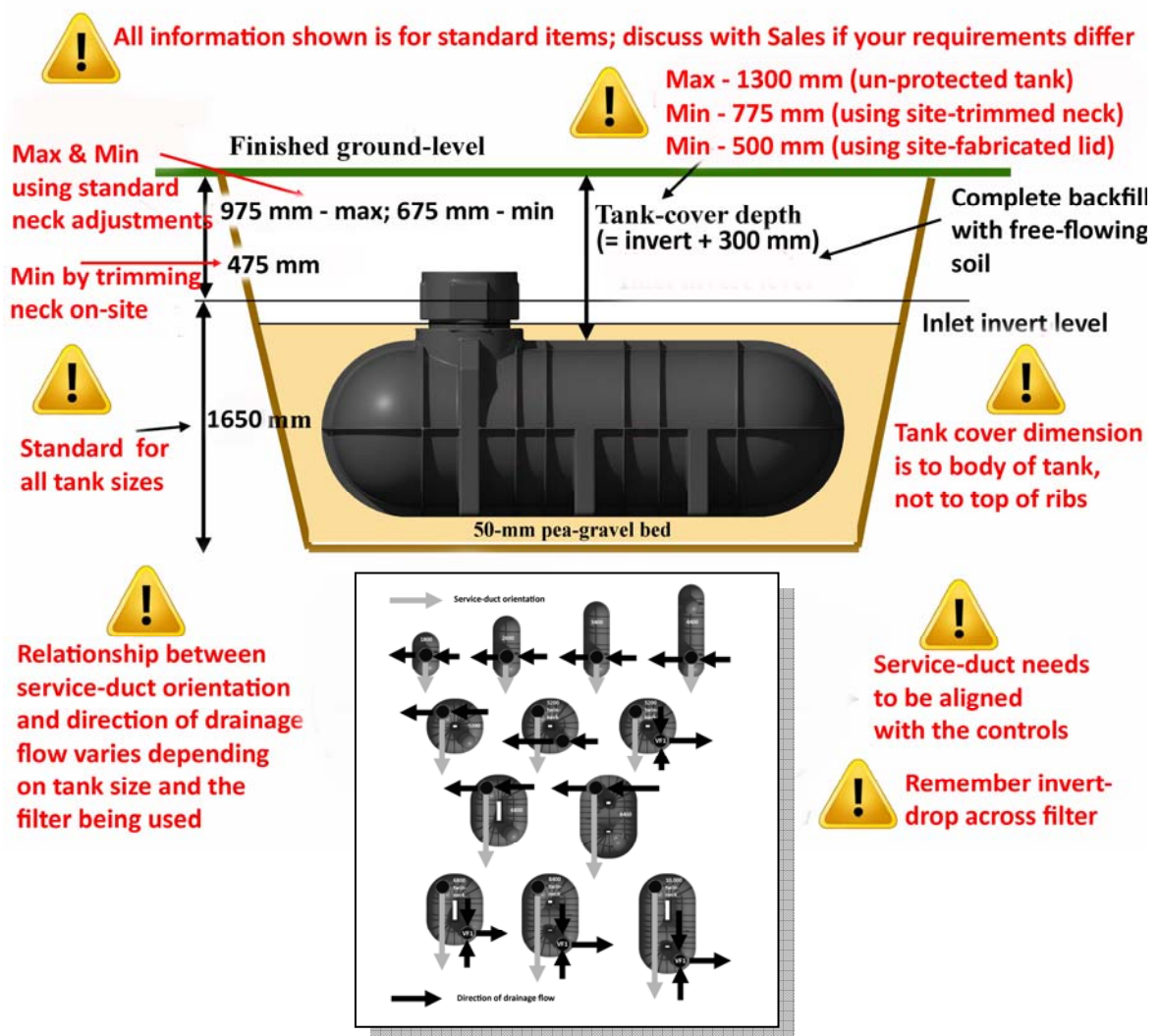
- ✓ Carry the weight of vehicular traffic (*in which case structural engineer's design required*)
- ✓ Install closer than 4-metres to adjacent foundations (*structural engineer needed*)
- ✓ Install adjacent to an earth bank or raised patio (*structural engineers needed*)
- ✓ Install with cover of less than 500-mm or more than 1300-mm (*structural engineer needed*)

⇒ Complete and sign-off risk assessment

⇒ Complete and sign-off the method statement



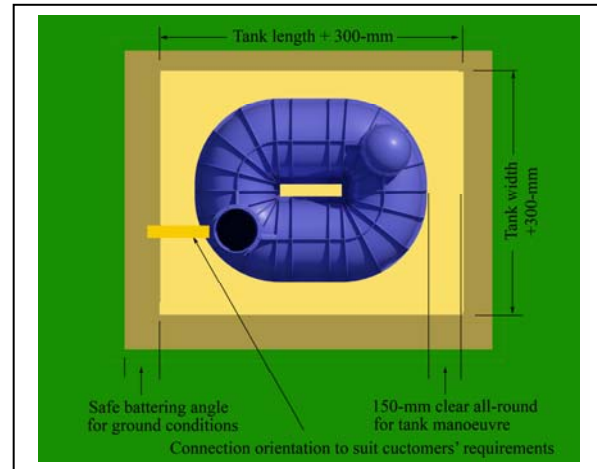
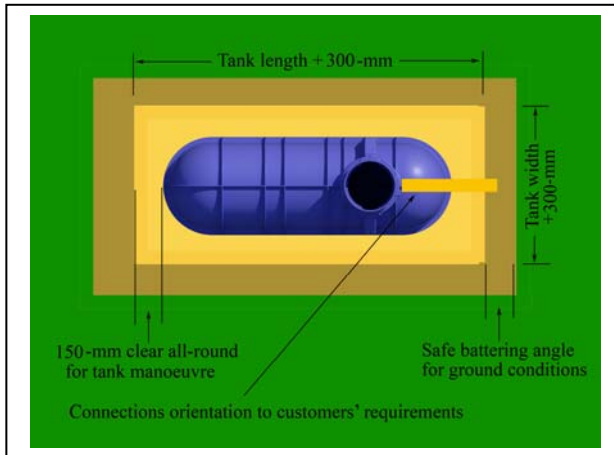
⇒ Calculate depth of dig with reference to the diagram below, **confirming minimum & maximum tank cover depth will not be exceeded; NB: all measurements to be taken from the rainwater inlet invert level**



NB: Before commencing the dig, ensure invert-level + 300mm is not less than 500mm or more than 1300mm if the tank is to be unprotected.

⇒ Line-mark dig area, allowing for:

- ✓ Alignment of tank water entry and exit connections, and the service-duct connection (**NB: The service duct most slope towards the tank, not away**)
- ✓ (Tank plan-view dimensions) + (300-mm for tank manoeuvre/access) + (suitable allowance for battering depending on ground conditions)



- ⇒ Dig the excavation, anticipating that ground water ingress may be experienced in the process; if necessary, keep water interference to a minimum by use of a pump
- ⇒ Bed the bottom of the excavation with 50-mm of 10-mm washed pea-gravel
- ⇒ Position tank on the pea-gravel base, and check vertical and horizontal alignments between tank connectors and the drainage runs/service duct, allowing for 10-mm of tank settlement at the next step
- ⇒ Fill 1/3rd full of water to settle tank into the pea-gravel, and bring connectors and pipe-work into final alignment
- ⇒ Connect all pipe-work (ie rainwater-in, overflow-out, and service duct)
- ⇒ Install neck and seal the joints with a good bead of silicon sealant to avoid later ingress of ground-water; then fit lid to ensure that no backfill material can enter the tank
- ⇒ Backfill around and under the tank body and sides of the excavation with more 10-mm washed pea-gravel up to the level of the water inside the tank
- ⇒ Continue backfilling around and under the tank with pea gravel until the crown of the tank is covered with 50-mm of pea gravel
- ⇒ Continue filling the tank water, keeping pace with the backfill level up to the level of its inlet/outlet connections
- ⇒ Complete backfill to finished ground level with free-flowing material
- ⇒ Once the installation is complete and the tank connected:
 - ✓ Install filter (if not already installed)
 - ✓ Seal filter with strong polythene (to prevent roof water entering the tank until the whole system is ready to be handed-over to the end-user)
 - ✓ Secure the tank lid
 - ✓ **Mark out an exclusion zone 4-metres outside the original excavation footprint to prevent site vehicles accidentally driving over the tank during construction work**

installing the other components

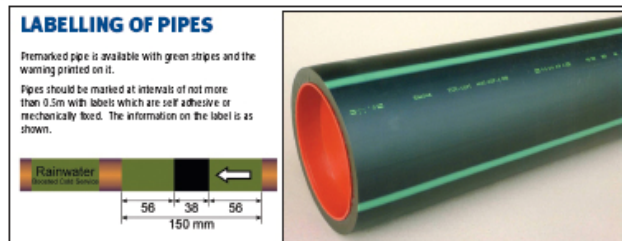
overview ...



29. The services to be supplied by this garden irrigation rainwater harvesting system are to be fed by pipe-work that is independent of the mains water system, with no interconnections between the two.

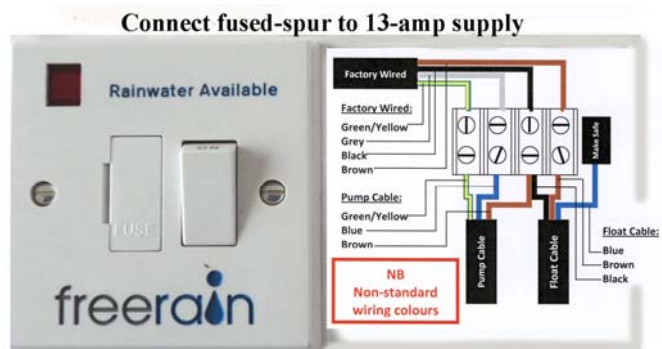
30. The pipework conveying rainwater underground outside a building, must be black High Performance Polyethylene (HPP) pipe-work marked with a green stripes along its length must be used in accordance with Annex-C to BS-8515.

31. The system includes a signage and pipe-marking pack which must be used appropriately throughout the system, per the examples below:



32. Other 1st fix tasks include making a 13-amp fused spur electrical and mains water supplies available for connection when the remainder of the components are installed.

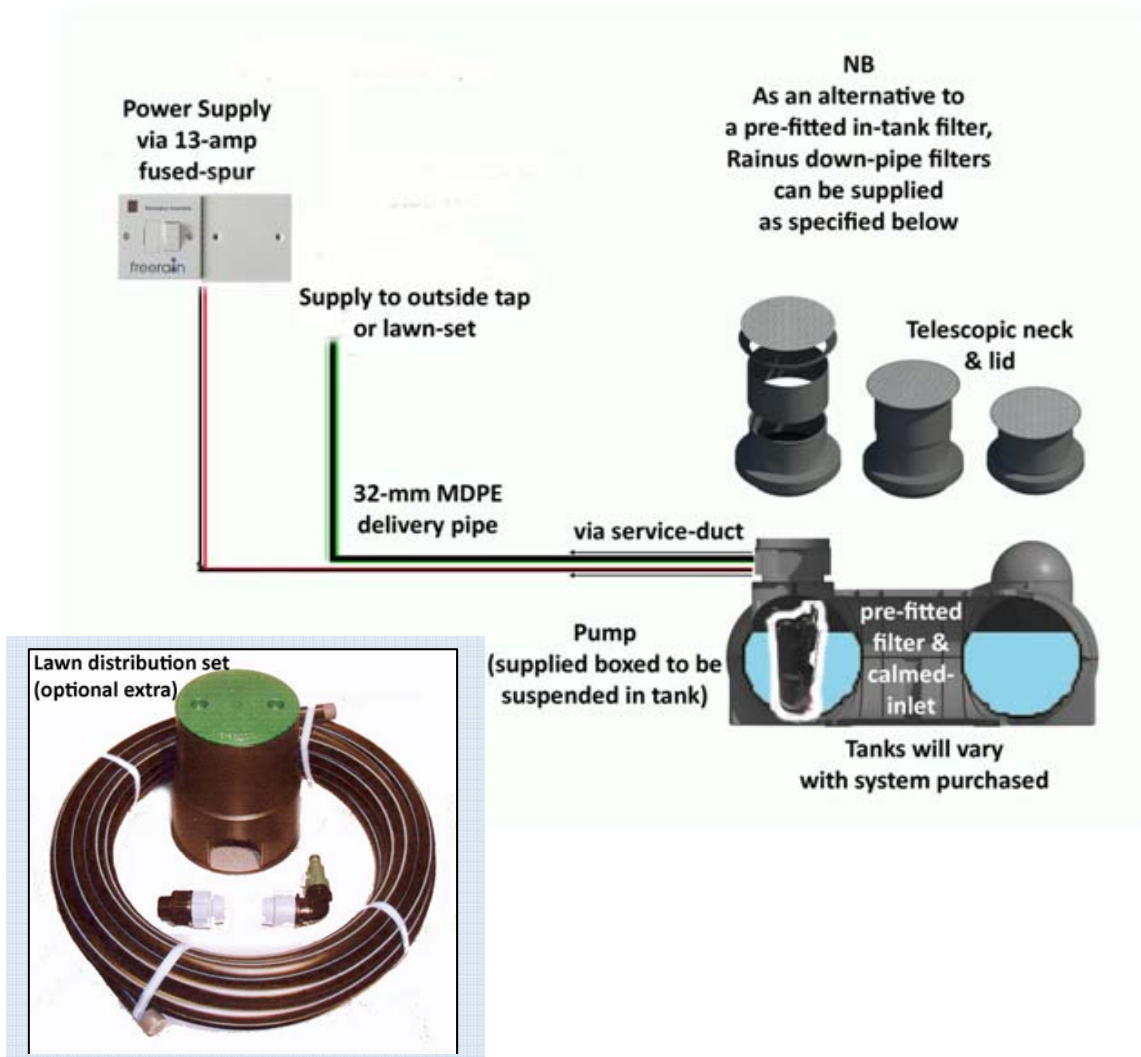
33. The 2nd fix work brings the system to a position where it is fully operational, and commissioned, ready to be handed-over; this includes making good the electrical connections as shown opposite.



34. The integrity of the services supply-side pipe-work is to be air-pressure tested, and all associated fixtures and fittings properly installed, before power is applied to the system.

system in-use ...

35. The Rain King garden irrigation system can be laid-out flexibly to suit the property concerned; however, the required arrangement/relationship of components needs to be as shown diagrammatically below:



... safety ...

36. Proper risk assessments are to be made whenever maintenance work is undertaken on the system.
37. For most of the checks to be made during routine maintenance and repair activities, electrical power will need to be “on”, and all system stop-cocks “open”; however, care must be taken to:



⇒ Isolate electrical power when appropriate to the work being undertaken



⇒ Close stop-cock and isolate the pump when plumbing connections need to be broken (during removal and cleaning of in-line strainer, for example); re-made connections are to be properly re-taped with PTFE, where appropriate

... routine maintenance ...

38. The routine maintenance requirements of the system is limited to a quarterly check of:

- ⇒ Whether the user has experienced any problems or unusual symptoms
- ⇒ The correct operation of services, including dry-run protection
- ⇒ No signs of leaks or weeps
- ⇒ No sign of wiring deterioration
- ⇒ Gutters clean, leaf filters in place, and pre-tank and in-line filters removed/cleaned
- ⇒ Good water quality in the main storage tank, and to services
- ⇒ No “tide-mark” in the neck of the tank to indicate over-filling (ie overflow failure)

... fault finding ...

39. If problems are being experienced, Freerain provide a help-line service during business hours on 0845-127-0001.

40. Generic reasons why systems may malfunction include:

- ⇒ **No power** supply to the system; *check fuses etc*
- ⇒ **No water** in the tank; *check pre-tank filter is clean & unobstructed*
- ⇒ **Pump inoperative**; *may need replacing or re-setting (power “off”/“on”)*
- ⇒ **Component failures**
- ⇒ **Pump “hunting”** (when services not being used); *weep or leak on the delivery side of the system (will shorten pump life and may cause it to fault-out)*
- ⇒ **Continuous pumping** (but no pressure to services); *delivery pipe split or disconnected from the pump (system needs to be switched-of as soon as detected to protect the pump and avoid energy waste)*