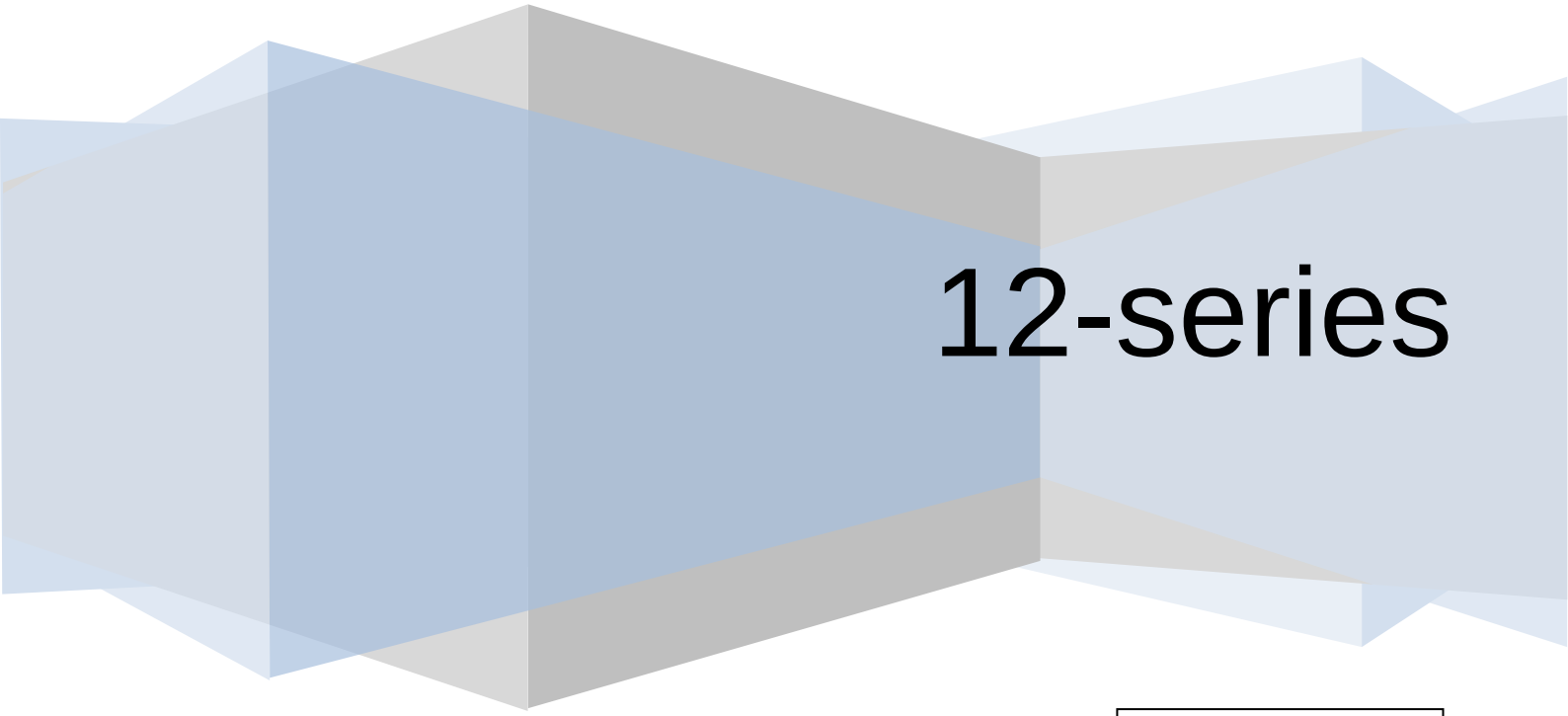
Installation & Maintenance Instructions

For domestic rainwater harvesting systems – direct pressure version



12-series

As at 18th January 2016

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:

health & safety …

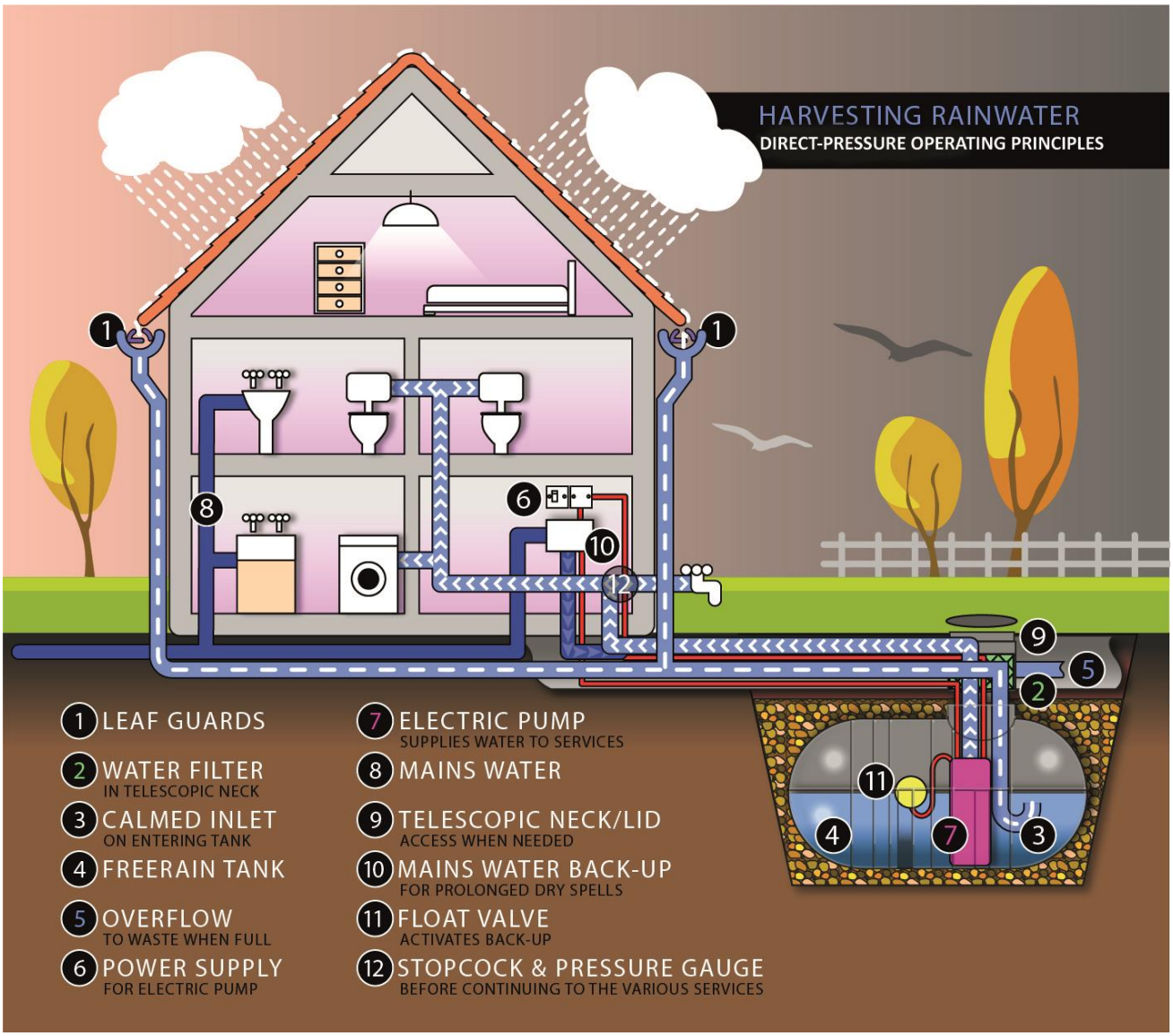
4. All Health & Safety precautions applying to such works are to be implemented, with risk assessments and method statements being prepared.

5. Generic examples of risk assessments and method statements cab be provided on request.

operating principles …

system components …

6. Understanding the operating principles of RWH systems is essential to ensure their successful installation; the diagrams below shows the typical schematic layout of a rainwater harvesting system which supplies water under pump pressure direct from the water storage tank, usually referred to as a “direct pressure” system:



Points to Note:

1. **The main storage tanks need to be able to overflow to a 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. **Mains water supply to provide top-up, when needed during long dry spells, must be via a Class-AA tun-dish air-gap in a direct-pressure system**
3. **Supply to services must be via dedicated pipe-work; which must not be cross-connected to the mains pipe-work**

working principles …

7. Domestic systems must use only the property roof for collecting the rainwater which is then stored in an underground tank to provide non-wholesome water for toilet flushing, clothes washing machines, and the outside tap.

8. Collection from a conventional roof is recommended, avoiding “green” and sedum roofs. The roof water is channelled through the normal guttering and down-pipe arrangements, before being brought into a single drainage pipe underground which feeds into the storage tank.

9. In accordance with the requirements of BS 8515, the water is filtered before entering the storage tank to remove solid particles, usually using a stainless-steel filter installed in the neck of the tank. This filter requires cleaning every 3 months to maintain its efficiency. Failure to do so will possibly lead to progressive clogging of the filter, causing incoming water to be lost direct to the overflow, rather than entering the tank.

10. Having passed through the filter, the water is introduced into the tank via a calmed inlet designed to smoothly introduce the fresh and highly oxygenated rainwater into the bottom of the tank. This helps to avoid stagnation at the lowest level, and assists maintenance of the quality of the water stored in the tank.

11. The stored water is then supplied to the non-wholesome services on-demand; this demand is sensed, by either a Control Unit or the pump itself, which activates the durable electric pump in the tank to meet the demand. When the demand for the water supply ends, this too is sensed and the pump stops. Under this “direct pressure” arrangement, the pump is effectively linked direct to the service concerned

12. In periods of prolonged rain, the storage tank will become full and overflow through the connection provided to the surface water management arrangements for the project (ie soak-away, storm drain or attenuation system) and be protected from back-filling by a back-flow prevention valve if connected to a sewer. As the water storage tank may already be full when a heavy downpour is experienced, the whole of the tank volume cannot be taken into account when making the attenuation calculations for the project.

13. Conversely, in dry spells the tank contents may be in danger of becoming exhausted and need to be supplemented by mains water to ensure continuity of supply to the services. This too is sensed by the Control Unit which then activates a solenoid to allow mains water to enter the tank via a Class-AA air-gap; this prevents direct contact between the wholesome and non-wholesome pipe-work/water. Only a limited amount of water is introduced in this way, so leaving the maximum possible capacity for the next rainfall.

irrigation-only systems …

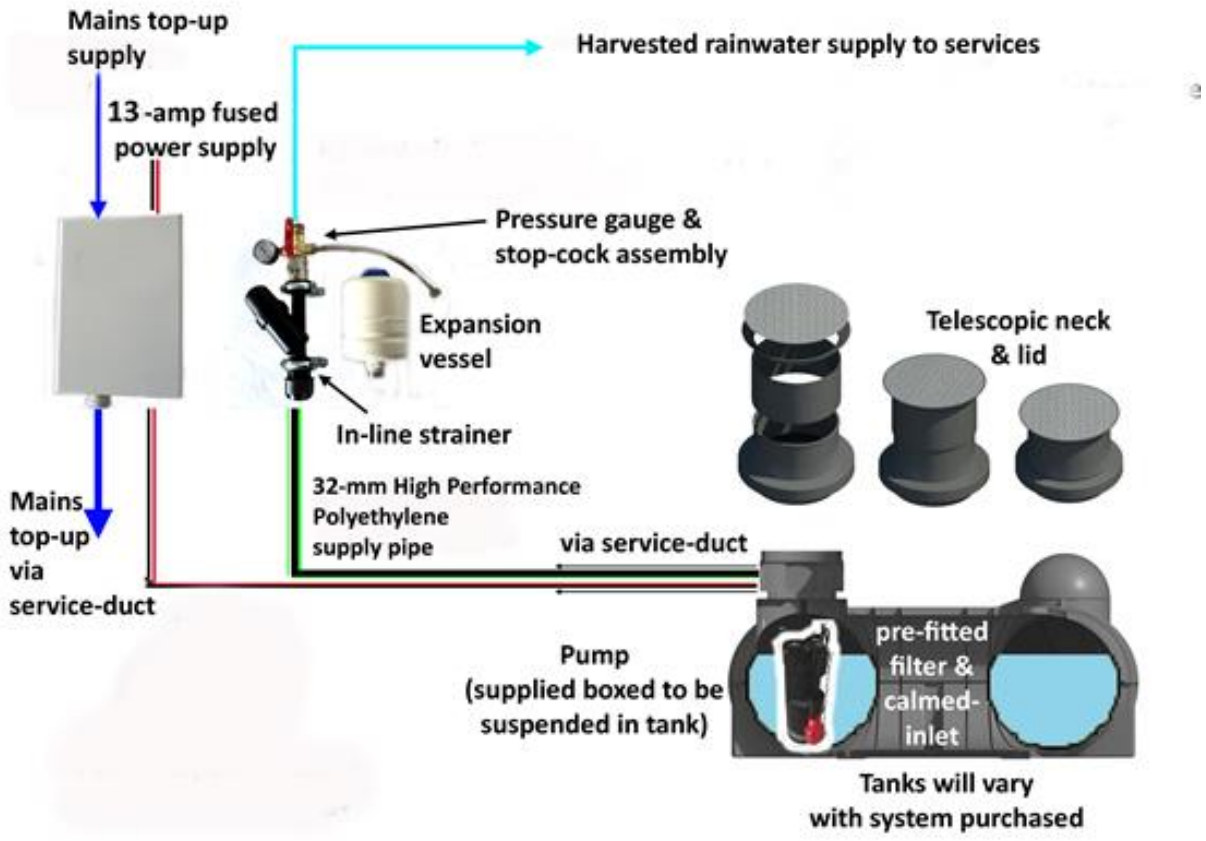
14. Direct pressure systems are also used when systems are purchased solely for garden-irrigation purposes.

15. These operate on the same principles noted above, but are not fitted with a mains-water backup as this would make them subject to hose-pipe bans. Further information is provided in the garden-system installation manual.

system components

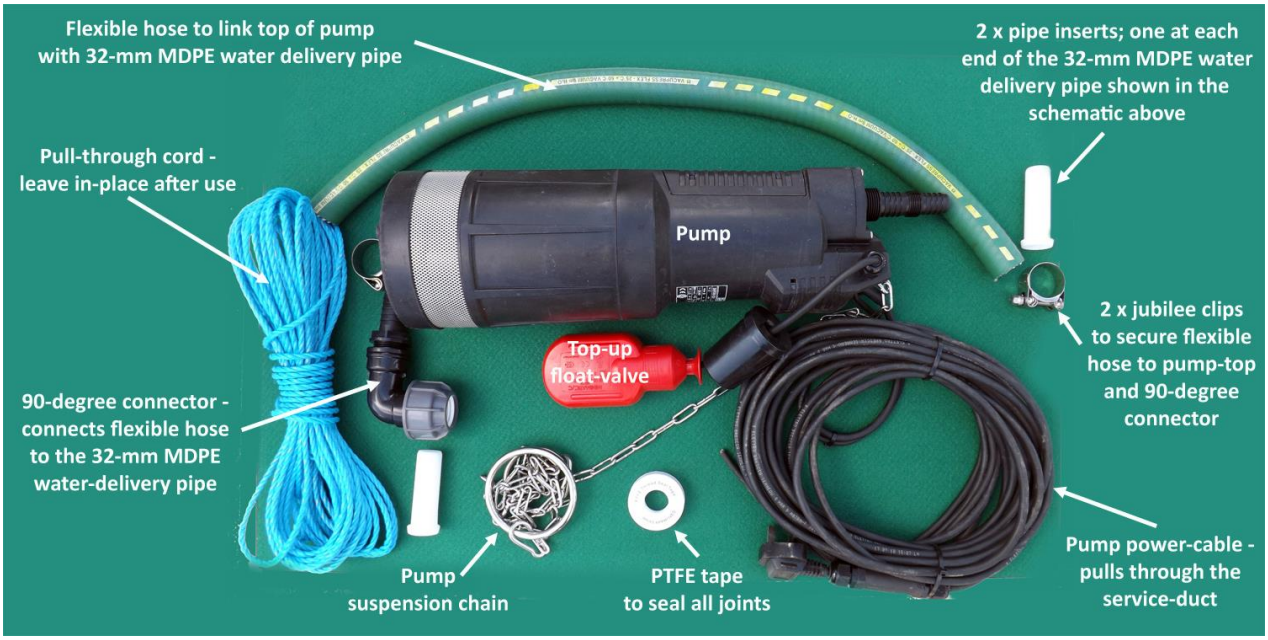
components & how they relate …

16. A schematic layout of the direct pressure system supplied is shown below; the diagram can also be used to check full delivery of all system components:



pump-fittings …

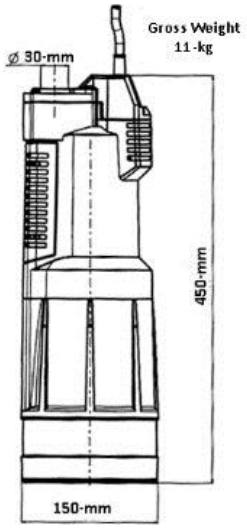
17. The fittings associated with the pump, and their purpose, is shown in the picture below, and should again be checked on delivery:

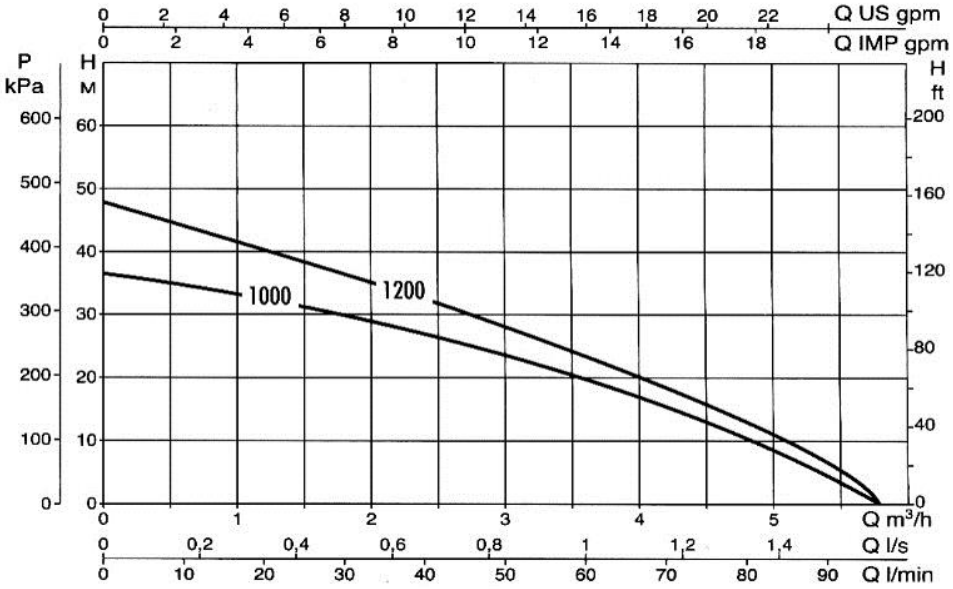


pump specification …

18. The standard pumps supplied with this system 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
- ⇨ Pre-fitted float valve:
  - ✓ Activates mains top-up on direct-pressure systems when needed during long dry spells
  - ✓ On header-tank systems, provides additional pump protection by cutting-off the power to the pump before its in-built protection becomes necessary
- ⇨ 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
- ⇨ Pump dimensions are show opposite, and performance shown below:





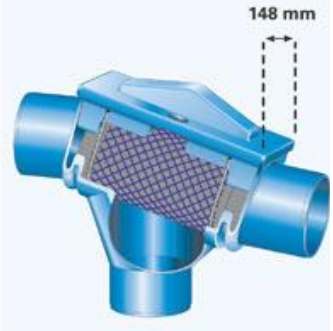
filter options (depending upon your order) …

Compact Filter

The Compact filter is one of the most popular in the 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.

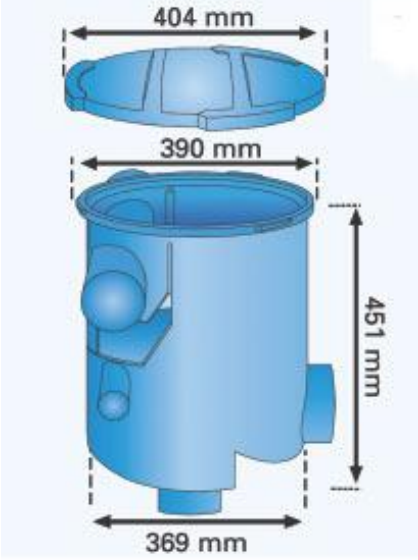


PF Filter

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

Completing 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 range.

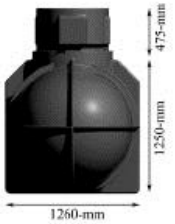
The key technical characteristics of the VF1-filter are:

- ✓ 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

tank sizes & specifications (depending on your order) …

Technical Data:

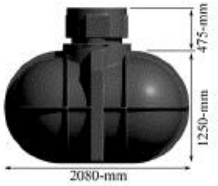
- Nominal contents – 1,800-litres
- Nominal weight – 85-kgs
- Single-piece construction

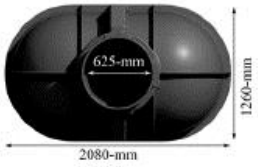


Accessories:

- *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

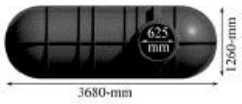
Technical Data:

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

Accessories:

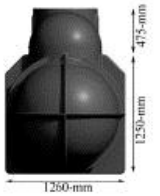
- *200-kg & 600-kg lockable safety lid*
- *Telescopic neck extensions*

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



Technical Data:

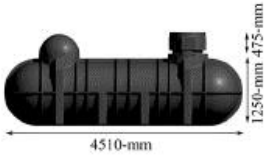
- Nominal contents – 4,400-litres
- Nominal weight – 200-kgs
- Single-piece construction

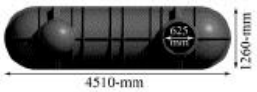


Accessories:

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

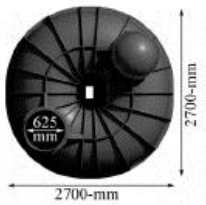
Tanks are designed to take a range of filters & fittings to your precise requirements





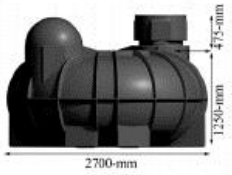
Technical Data:

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



Accessories:

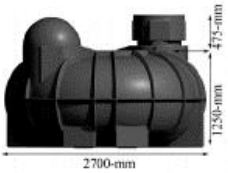
- *200-kg & 600-kg lockable safety lid*
- *Telescopic neck extensions*



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

Technical Data:

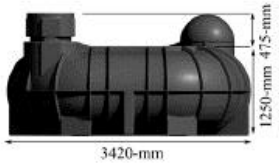
- Nominal contents – 6,800-litres
- Nominal weight – 350-kgs
- Single-piece construction

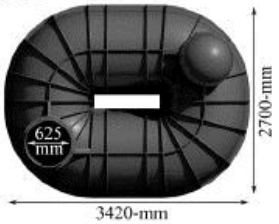


Accessories:

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

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





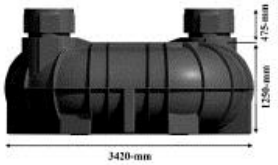
Technical Data:

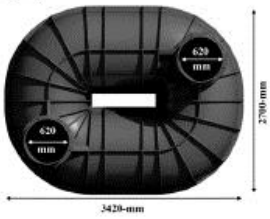
- Nominal contents – 6,800-litres
- Nominal weight – 355-kgs
- Single-piece construction

Accessories:

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

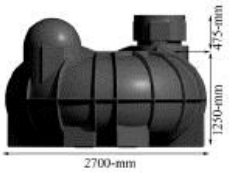
Tanks are designed to take a range of filters & fittings to your precise requirements





Technical Data:

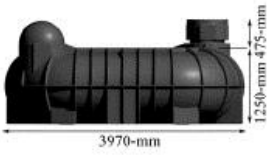
- Nominal contents – 8,400-litres
- Nominal weight – 387-kgs
- Single-piece construction

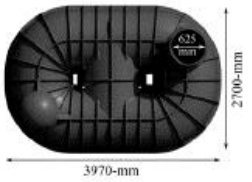


Accessories:

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

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





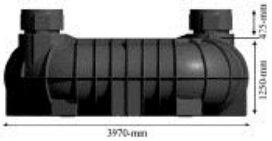
Technical Data:

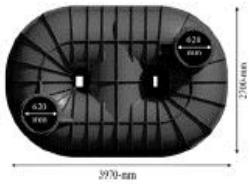
- Nominal contents – 8,400-litres
- Nominal weight – 392-kgs
- Single-piece construction

Accessories:

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

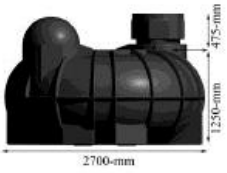
Tanks are designed to take a range of filters & fittings to your precise requirements





Technical Data:

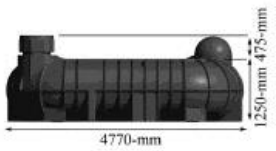
- Nominal contents – 10,000-litres
- Nominal weight – 466-kgs
- Single-piece construction



Accessories:

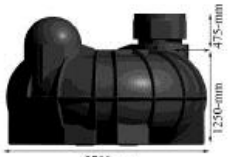
- *200-kg & 600-kg lockable safety lid*
- *Telescopic neck extensions*

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



Technical Data:

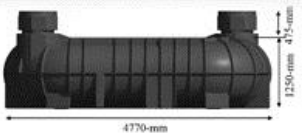
- Nominal contents – 10,000-litres
- Nominal weight – 466-kgs
- Single-piece construction

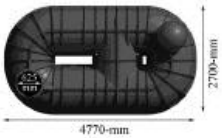


Accessories:

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

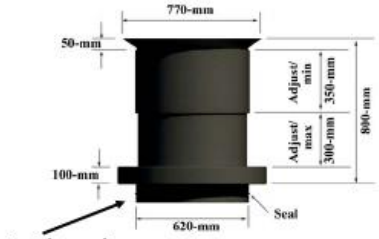
Tanks are designed to take a range of filters & fittings to your precise requirements





Technical Data:

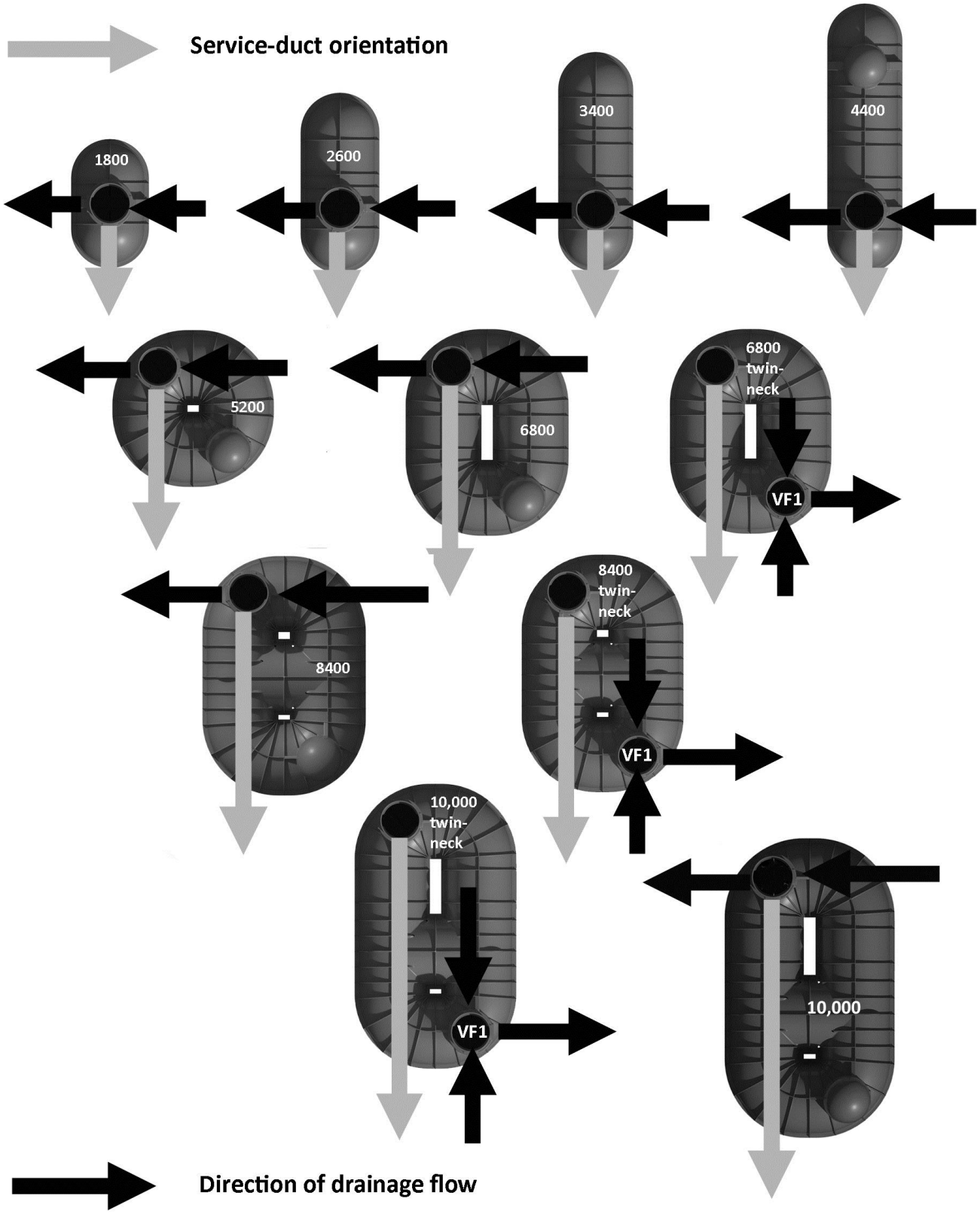
- Nominal weight excluding lid – 14 kgs
- Vertical adjustment – 300 mm
- Tilt adjustment - ±5°



Neck inserts into upstand on the tank here

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

Standard orientation of tank connections …



Buyer 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 …

19. 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.

20. 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

21. **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.

22. **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 …

23. 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.

24. 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 …

25. The system supplied includes tanks, per the specifications above, that have been specifically designed to store harvested rainwater

26. The tanks are designed to be installed in specific accordance with the instructions that follow; the civils design of a structural engineer is to be followed if any of the following tank installation conditions 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 in the <u>two</u> installation diagrams below

27. Installation in heavy clay soil or in areas that will experience high water-tables will also affect the installation as highlighted on the installation diagrams.

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

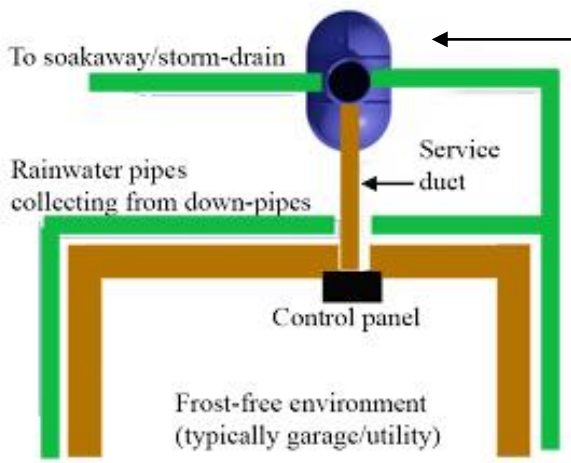
29. The tanks are designed to take pedestrian and light mower loading only, with the range of excavation depths shown in the installation diagrams below;

30. 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.

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

32. 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.

33. 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 shown opposite)



See standard orientation of connections on page-11 above

Any requirement for non-standard orientations must be signed-off at the time an order is placed

34. The tank must be handled strictly in accordance with the instructions at paragraphs-23 & 24 above, and installed in accordance with the step-by-step guide below; 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.

35. 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.

36. 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 …

37. 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:

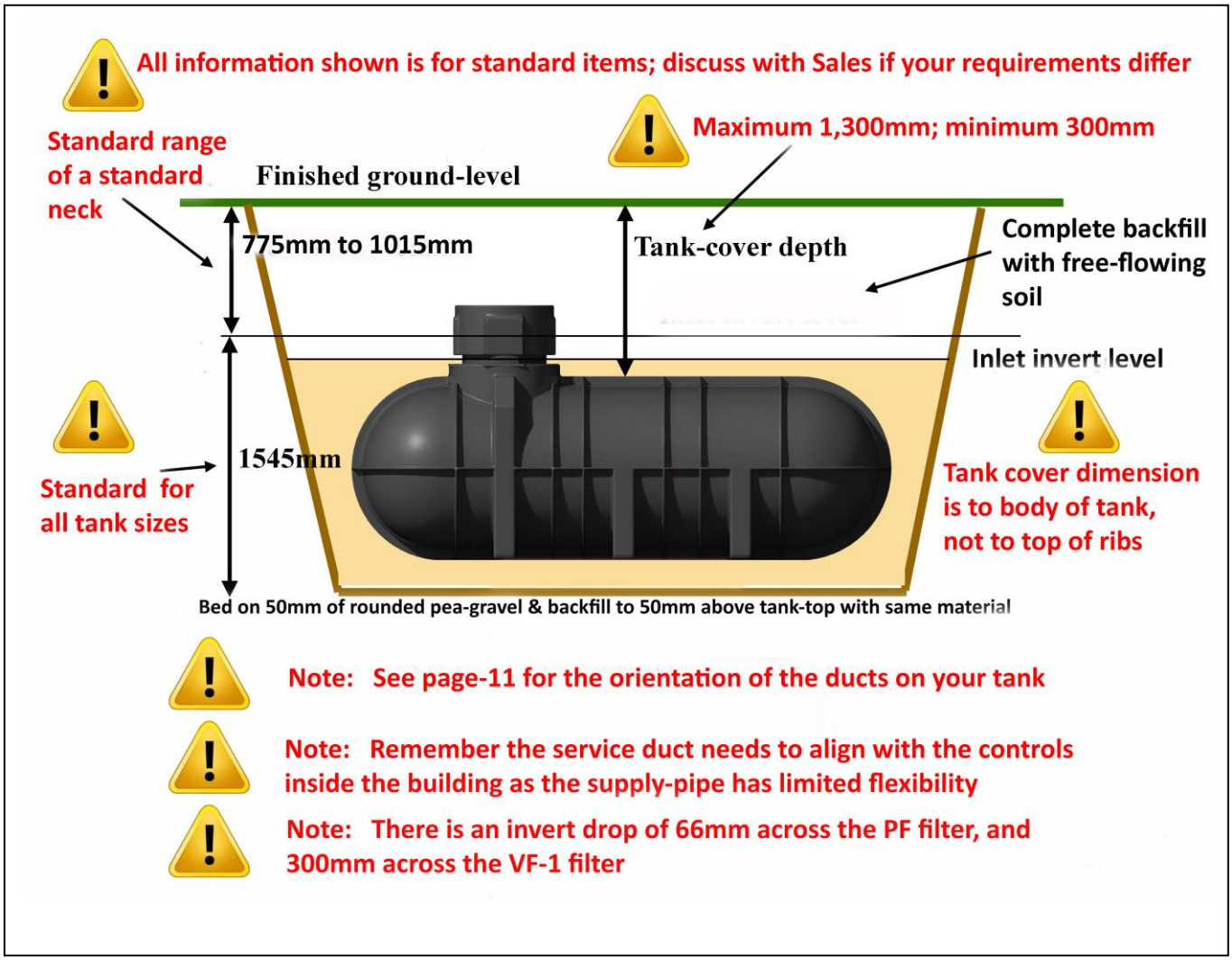
- ⇨ Allow the tank to settle onto the pea-gravel base under its own weight initially, and the weight of the water introduced into it
- ⇨ Care is to be taken to ensure that site debris/dust is not allowed to enter the tank during or after its installation
- ⇨ **Under no circumstances:**
  - ✓ **Tamp-down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

step-by-step guide …

38. The following is a step-by-step guide to the installation of the tank ***when none of the abnormal conditions noted at paragraphs 26 & 27 above are present***:

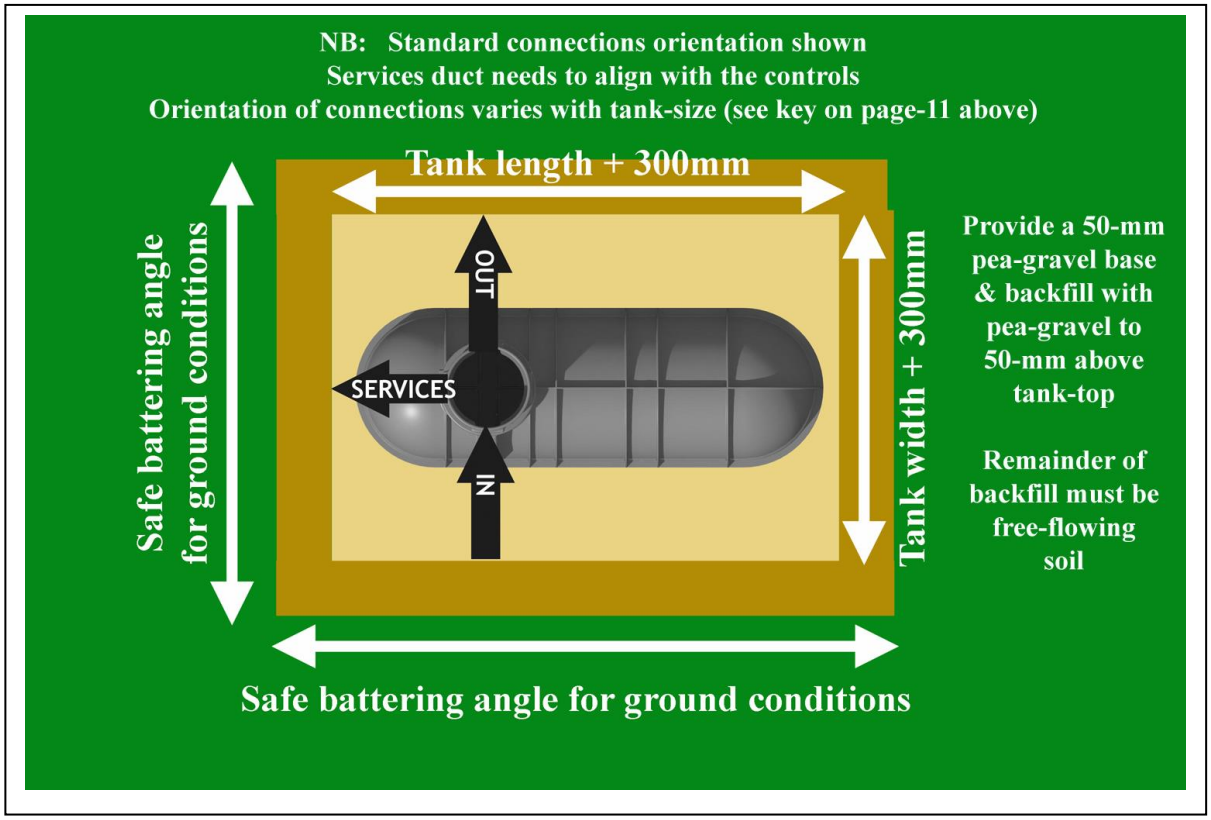
- ⇨ Arrangements should be made for the tank to be delivered, coincident with the day it is due to be installed; with this in mind, when delivery is expected ensure:
  - ✓ Suitable access and parking arrangements have been made for the delivery vehicle
  - ✓ Plant is available to unload the tank
  - ✓ 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, the instructions of a structural engineer must be followed, if any of the following apply:
  - ✓ Vehicular over-trafficking required
  - ✓ Closer than 4-metres to adjacent foundations, earth bank (above or below) or raised patio
  - ✓ Depth of installation, or constraints arising from clay soil or high water-table not in accordance with installation diagrams below
- Complete and sign-off risk assessment
- Complete and sign-off the method statement
- Calculate depth of dig with reference to the diagrams below
- ***Confirming minimum & maximum tank cover depth will not be exceeded***
- ***NB: All measurements (apart from the tank-cover dimension) are taken from the bottom edge of the rainwater inlet invert level as determined by the drainage plan***



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 must slope <u>towards</u> the tank on direct pressure systems to gravity-feed the mains-water top-up)**
  - ✓ (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; if the ground needs to be stabilised to provide a firm base for the tank, the excavation depth should be increased by 250-mm and replace with a mixture of hard-core and sand
- ⇨ 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**

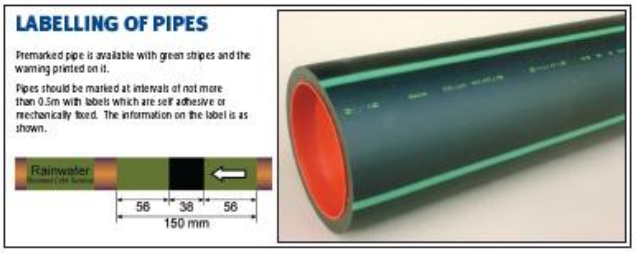
installing the other components

overview …

39. The services to be supplied by the rainwater harvesting system (usually the toilets, the clothes washing machine and the outside tap) are to be fed by pipe-work that is independent of the mains water system, with no interconnections between the two except via the air-gaps provided for top-up purposes. Also, "Fluidmaster" valves are to be fitted to all cisterns.

40. The pipe-work conveying rainwater inside a building should ideally be plastic and be installed and tested for air-tightness at the 1st-fix plumbing stage. Outside the building, 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.

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



42. Other 1st fix tasks include making a 10-amp fused spur electrical and mains water supplies available for connection when the remainder of the components are installed.

43. The 2nd fix work brings the system to a position where it is fully operational, and commissioned, ready to be handed-over.

44. 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.

general layout …

45. The general layout of the system components is repeated below for convenient reference:

installation sequence …

46. A typical installation sequence for the direct pressure systems will include:

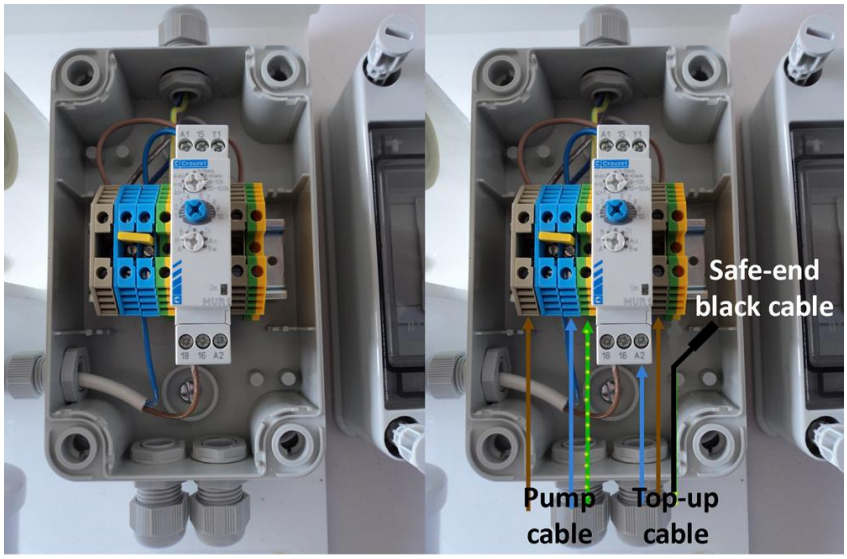
⇨ **<u>Preparatory:</u>**

- ✓ Positioning the top-up control box in a suitable location
- ✓ Positioning stop-cock, pressure gauge & in-line strainer cluster in required position (usually adjacent to the top-up control box position)
- ✓ Providing a 13-amp power supply connection to the control box
- ✓ Providing a mains-water supply connection to the control box

⇨ **Plumbing:**

- ✓ Around top-up controls box (see diagram opposite):
  - ↳ Make good connection to the mains supply
  - ↳ Make good the mains top-up connection between tun-dish and the service-duct, using 32-mm grey waste pipe terminating 100-mm inside the duct ***(NB: Do <u>not</u> establish a pipe-work connection running all the way from the tun-dish back to the tank, as this will <u>not</u> work)***
- ✓ Around stop-cock cluster:
  - ↳ Connect 32-mm MDPE rainwater supply-pipe from main storage tank
  - ↳ Connect 15mm delivery pipe to supply the services
- ✓ Around the main underground rainwater storage tank:
  - ↳ Connect pump outlet to 32-mm MDPE rainwater supply-pipe in the service duct using flexible hose and fittings provided
  - ↳ Suspend pump in tank using pre-set chain provided
  - ↳ Pull top-up cable through the service duct
  - ↳ Pull pump power cable through the service duct (leaving cord in place for later use whenever needed)

⇨ **<u>Electrics:</u>** Connect the 13-amp supply, pump power cable and top-up cable as shown below:



Controls as pre-wired on delivery

On-site connections

⇨ **Plumbing:** Switch-on power, and check:

- ✓ All joints & pipe-work sound
- ✓ Pressure gauge reading 3-4 bars, and steady
- ✓ Water provided automatically to services when operated
- ✓ Pump is not running when there is no demand
- ✓ Pump dry-run operates (tested by slowly raising pump in the tank with outside tap running)
- ✓ Mains top-up operates (tested by slowly raising the top-up float-switch in the main storage tank until top-up activates)

commissioning

47. Commissioning is the final stage before the system is handed-over to the end-user and is shown to be functioning correctly; commissioning is intended to ensure:

- ⇨ The installation is complete and "Fluidmaster" valves fitted to cisterns
- ⇨ All connections to the mains water top-up unit are correct
- ⇨ The pump and associated fittings and cables are correctly positioned in the tank
- ⇨ Pump dry-run protection working (checked as explained above)
- ⇨ The filter is correctly housed
- ⇨ The mains back-up is functioning (checked as explained above)
- ⇨ The system is holding pressure
- ⇨ There are no leaks or weeps
- ⇨ The installation and user manuals are present for the end-user
- ⇨ On completion of the commissioning checks, the in-tank filter is to be lined with polythene to prevent rainwater entering the tank before the property is sold and occupied

48. Bearing in mind that by this stage much of the installation work may no longer be visible, there is the potential for tradesmen to satisfactorily test the system at the completion of their work, but for it to subsequently malfunction due to hidden defects arising during installation.

49. Typical examples of poor workmanship that are likely to cause subsequent operational problems, include:

- ⇨ Failure to fit leaf-guards to down-pipes, leading to a blockage of the pre-tank filter
- ⇨ Underground pipes being poorly joined, leading to the ingress of ground-water
- ⇨ Tank neck & lid assemblies being poorly sealed, again leading to the ingress of ground-water
- ⇨ Site dust/soil and debris being allowed to enter into the storage tank or drainage runs leading to poor water quality and premature pump failures
- ⇨ Failure to keep delivery pipes sealed during pull-through, leading to site debris gaining entry to the pipe
- ⇨ Surface water being allowed to enter the tank for a prolonged period (ie in excess of 20-days) and stagnating before the system enters regular service

50. This places a premium on good workmanship and supervision during the installation process to ensure:

- ⇨ No debris is allowed to enter the tank or any of the pipe-work
- ⇨ The tank and pipe-work are undamaged, and all connections are water-tight
- ⇨ Invert levels are correct, and backflow prevention valves are fitted in high water-table installations, or if the overflow is connected to a storm-drain
- ⇨ A filter cover is fitted until immediately before the system is handed-over to the end-user

using the system

handing-over …

51. The system is now ready to be signed-off by the commissioning tradesman, and handed-over to the client, covering all relevant points such as:

- ⇨ Demonstrating use of the equipment, and its controls
- ⇨ Explaining any system limitations/constraints
- ⇨ Identifying the major components, their inter-relationship and normal function
- ⇨ Explaining maintenance requirements
- ⇨ Running through the fault-finding guide
- ⇨ Providing system support contact information
- ⇨ The need to remove the filter seal when the property is about to be occupied
- ⇨ Providing the Safety File copies of the O&M Manual (commercial systems) or Installation & User Manuals (domestic systems)

Arrangements also need to be in place to ensure that the end-user receives an equally comprehensive hand-over.

… safety & access …

52. Proper risk assessments are to be made whenever maintenance work is undertaken on the system.

53. 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 …

54. 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 & mains top-up
- ⇨ No signs of leaks or weeps
- ⇨ No sign of wiring deterioration
- ⇨ Correct operating pressure
- ⇨ 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)
- ⇨ Tank contents matches contents gauge (if present) and the weather/usage pattern

… fault finding …

55. 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 and operation of the back-up***
- ⇨ **Pump inoperative**; ***may need replacing or re-setting (power "off"/"on")***
- ⇨ **Incorrect top-up** operation; ***check float-valve/sensor suspension and operate manually***
- ⇨ **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)***

… water quality …

56. The water appearing in toilet bowls should look clean/clear; as noted above, checking the quality of the water in the main storage tank is one of the requirements of periodic maintenance because:

    - ⇨ Poor quality water in the tank will provide poor quality water to the services which is unacceptable
    - ⇨ It may be an indicator of pre-tank filtration issues, which may additionally affect its efficiency at harvesting water
    - ⇨ Poor quality water may damage the pump, or reduce pump life

57. In the event of water-quality issues arising, potential causes include:

- ⇨ System continuing to harvest rainwater which remains unused during the period between installation and occupancy *(avoided by sealing the filter until the system is ready for use)*

- ⇨ Foreign matter being allowed to enter the tank during the construction process *(which must be avoided)*

- ⇨ Ground-water ingress *(avoided by sealing properly the neck shaft and all underground connections during installation)*

- ⇨ Back-flow from under-performing soak-aways *(avoided by installation of one-way valves on the over-flow)*

sales terms & conditions …

58. Please see attached