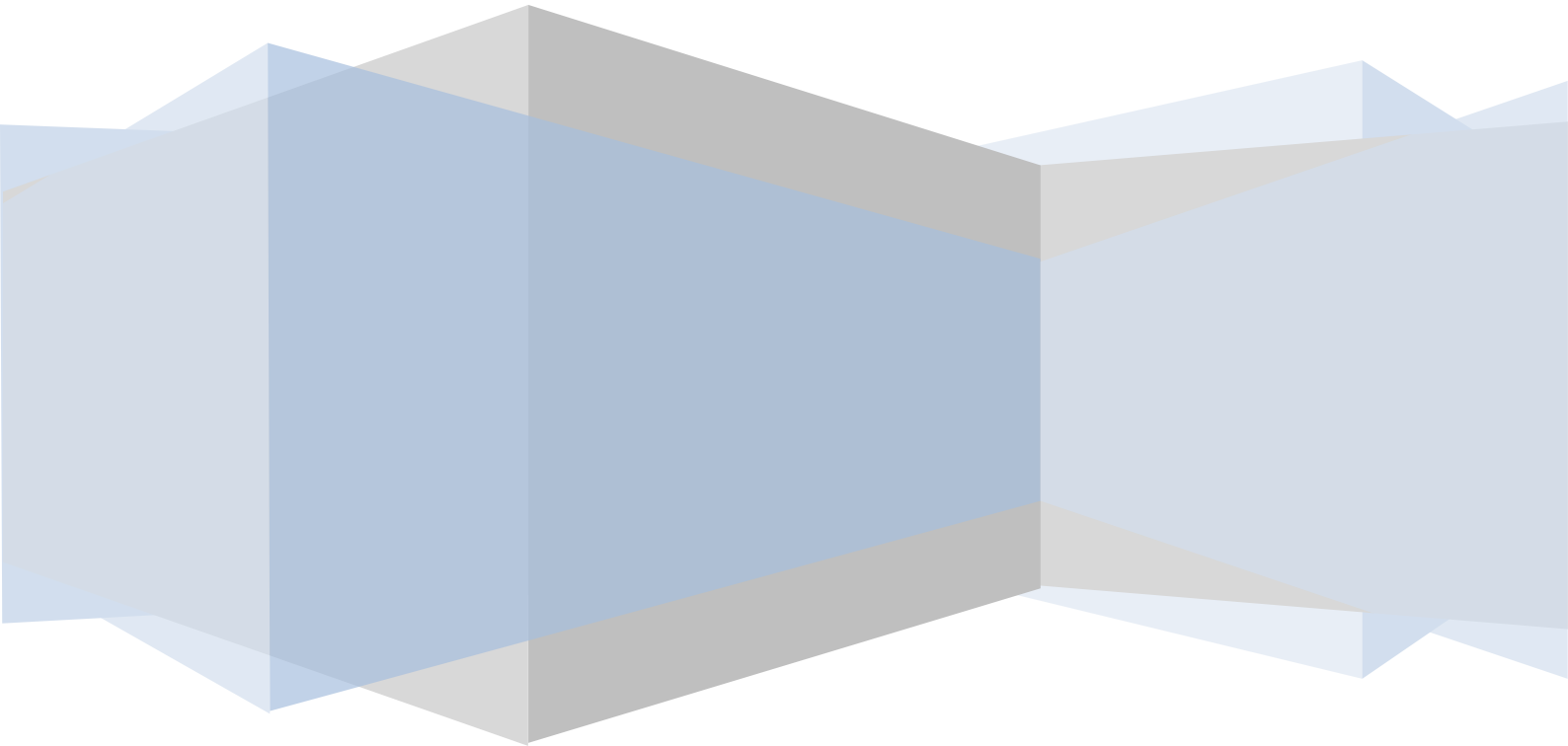
TANKS DIRECT

Technical Specification

For domestic rainwater harvesting systems



About rainwater harvesting …

introduction …

1. Mains-water supplies throughout large areas of England are under serious stress, a position predicted to deteriorate in the future due to population growth and the need to build a large number of new homes. Apart from economising methods, rainwater harvesting (RWH) is one of the most straightforward ways of helping to mitigate this problem.

2. RWH is the collection and storage for subsequent use of rainwater that otherwise would have been lost to soak-aways or the surface water drain.

3. Harvested rainwater is naturally soft, and compared to mains water is also slightly acidic; collection is usually from the roof of a building, being passed through a particle filter before entering a storage tank. Leaf-guards are also recommended at the top of rainwater down-pipes.

4. Harvested rainwater can be substituted for mains water for most applications not requiring wholesome water, such as toilet flushing, clothes washing, vehicle washing and garden irrigation.

General Principles

5. Rainwater harvesting systems must be properly designed (to BS 8515) and be properly installed in accordance with the manufacturer's instructions.

6. It is recommended that systems be installed by fully qualified personnel, the main trades involved being ground-works (for installation of the storage tank and associated connections to underground pipe-work), and plumbing (nearly all of the remaining work); a professional electrician is also required to provide a power supply and make electrical connections.

7. Prior to installation a risk assessment is to be carried out and if, as is usual, an underground storage tank is to be installed, it is good practice (and may be a local byelaw) to contact the local authority building regulations department for advice and approval (if needed).

No connection of a RWH system is to be made to the mains water supply, other than as specified by the manufacturer. In particular, no cross-connection is to be made between the rainwater and mains water as this is prohibited by Water Regulations, and a public health hazard could result.

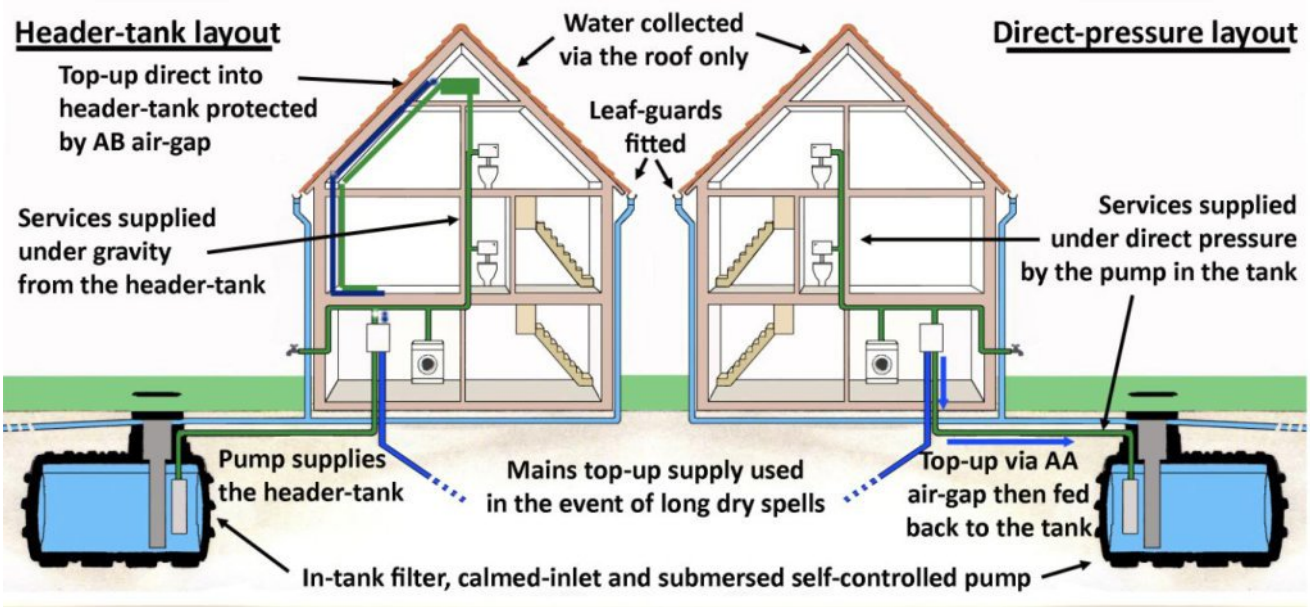
Typical System Yields & Matching Tank Sizes

Roof –m²	Local rainfall in mm per year *(exact tank-match yield shown in red)*					Tank Match
	500	600	700	800	900	
60	27,000	32,400	37,800	43,200	48,600	1,800-L
80	36,000	43,200	50,400	57,600	64,800	
100	45,000	54,000	63,000	72,000	81,000	2,600-L
120	54,000	64,800	75,600	86,400	97,200	
140	63,000	75,600	88,200	100,800	113,400	3,400-L
160	72,000	86,400	100,800	115,200	129,600	4,400-L
180	81,000	97,200	113,400	129,600	145,800	5,200-L
200	90,000	108,000	126,000	144,000	162,000	6,800-L

operating principles …

system Components …

8. The diagrams below shows the schematic layouts of typical “Direct Pressure” and “Header-Tank” systems



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. **Mains water supply to provide top-up, when needed, must be via a Class-AA tun-dish air-gap in a direct-pressure system, or a Class-AB air-gap in a header-tank**
3. **Supply to services must be via dedicated pipe-work; which must not be cross-connected to the mains pipe-work**

working principles – direct pressure …

9. 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.

10. Collection from a conventional roof is recommended, avoiding “green” and sedum roofs wherever possible. 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.

11. 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.

12. 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.

13. 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

14. 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.

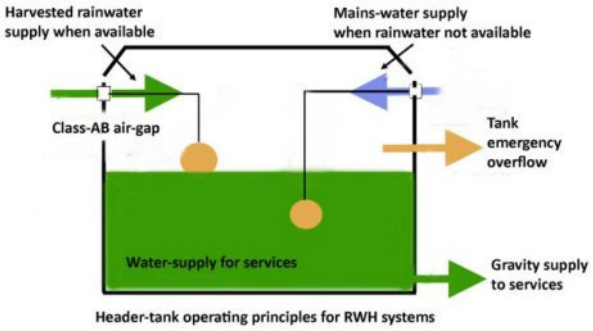
15. Conversely, in dry spells the tank contents may be in danger of becoming exhausted and need to be supplemented by mains water to ensure continuity of supply to the services. This too is sensed by the Control Unit which then activates a solenoid to allow mains water to enter the tank via a Class-AA 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 available to harvest the next rainfall.

irrigation-only systems …

16. These operate on the direct-pressure principle noted above, but are not usually fitted with a mains-water backup as this would make them subject to hose-pipe bans. Further information is provided in the Technical Specification for the Freerain Rain King series of systems

working principles – header-tanks …

17. Many of the working principles of direct pressure systems apply equally to header-tank systems; the main differences between the systems being:



Header-tank operating principles for RWH systems

- The services are fed from the reservoir of water held in the header-tank, rather than direct from the pump in the main storage tank
- The water level in the header tank is maintained in one of two ways:
  - By the activation of the pump in the main storage tank
  - By direct top-up from the mains water supply if the tank has run dry

18. Most header tanks used in RWH systems work on the basis of two water-levels in the tank, both controlled by their own float-valves. The upper level is maintained by pumping water from the main storage cistern unless that source of water has been exhausted; when this occurs, the water in the tank then drops to the second (lower) level at which stage mains water is allowed to enter the tank direct. Contact between the mains water and the harvested rainwater already in the tank is prevented by a Class-AB air-gap between the two.

the choice is yours …

19. A very significant feature of header-tank systems is that they continue to provide water to the services they supply during temporary power-cuts, or if the pump is unserviceable; the Freerain header-tank also incorporates an energy-saving device (Patent Pending). However, sometimes these benefits are offset by house-design features that cannot accommodate a header-tank; the head of pressure may also be insufficient to operate some clothes washing machines.

20. To give buyers complete freedom of choice to meet their own needs, Freerain direct pressure and header tank systems are identically priced.

Tanks … sizes & specifications …

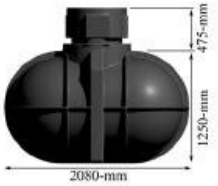
Technical Data:

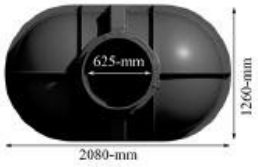
- Nominal contents – 1,800-litres
- Nominal weight – 85-kgs
- Single-piece construction

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

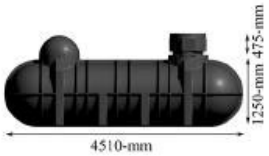
Technical Data:

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

Accessories:

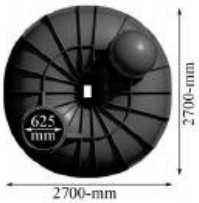
- *200-kg & 600-kg lockable safety lid*
- *Telescopic neck extensions*

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



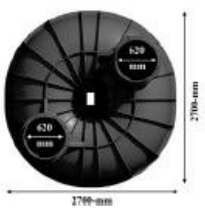
Accessories:

- *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



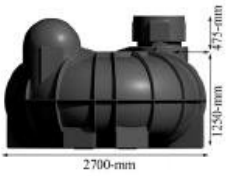
Accessories:

- *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:

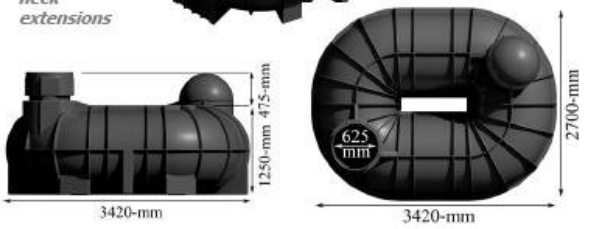
- Nominal contents – 6,800-litres
- Nominal weight – 350-kgs
- Single-piece construction



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



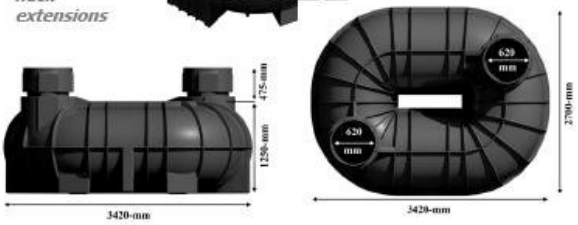
Technical Data:

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

Accessories:

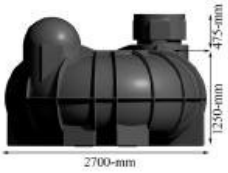
- *200-kg & 600-kg lockable safety lid*
- *Telescopic neck extensions*

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



Technical Data:

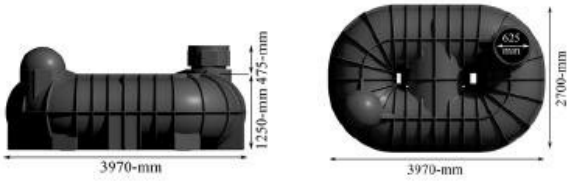
- Nominal contents – 8,400-litres
- Nominal weight – 387-kgs
- Single-piece construction



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



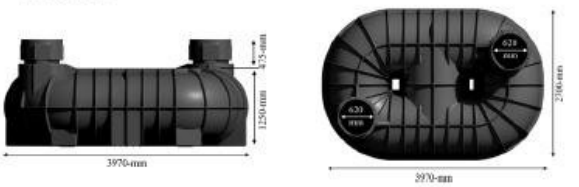
Technical Data:

- 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



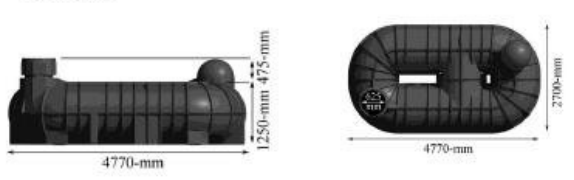
Technical Data:

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

Accessories:

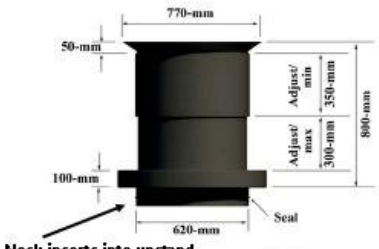
- *200-kg & 600-kg lockable safety lid*
- *Telescopic neck extensions*

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



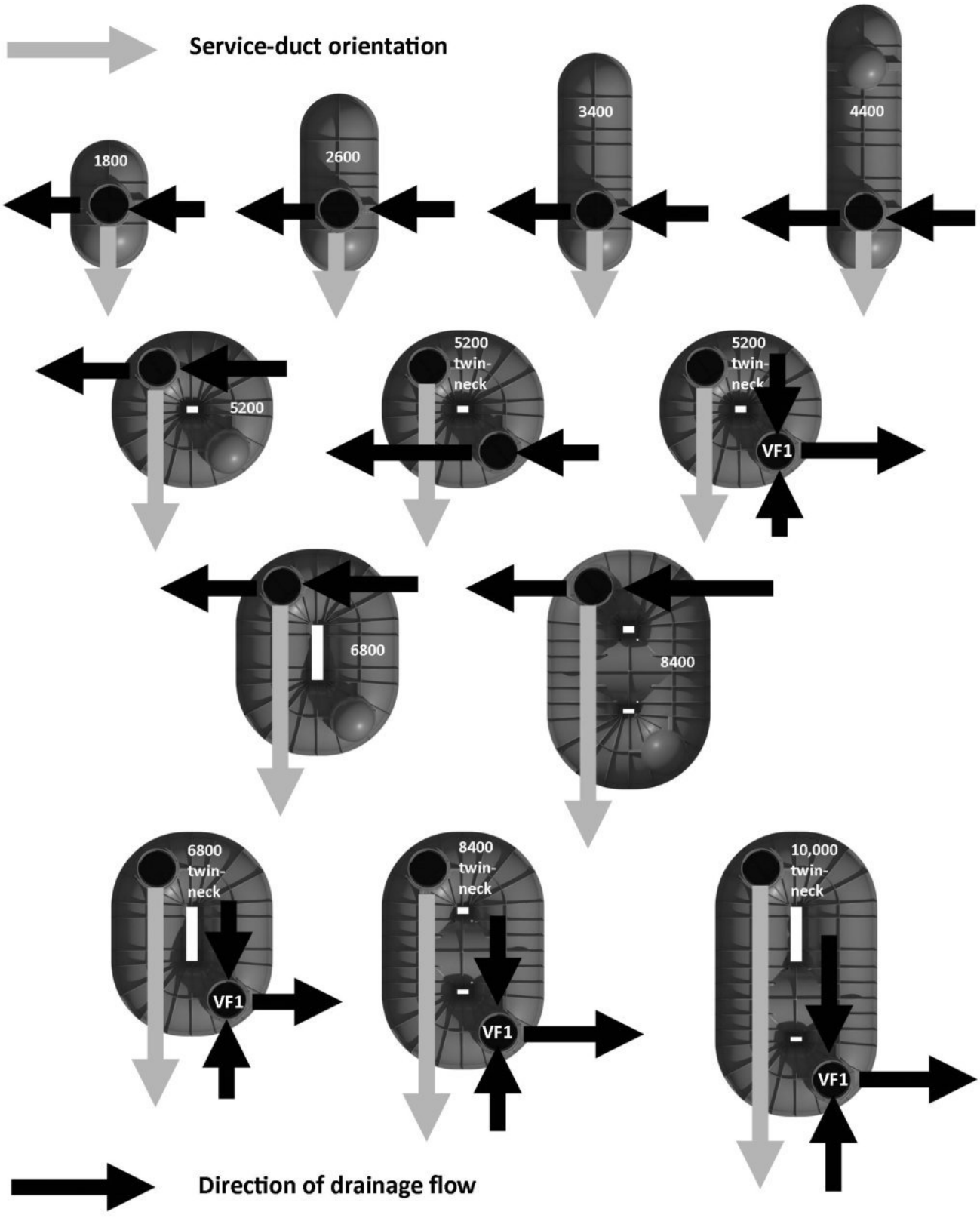
Technical Data:

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



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

Water tanks standard connection orientations …



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**

Filters & specifications …

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:

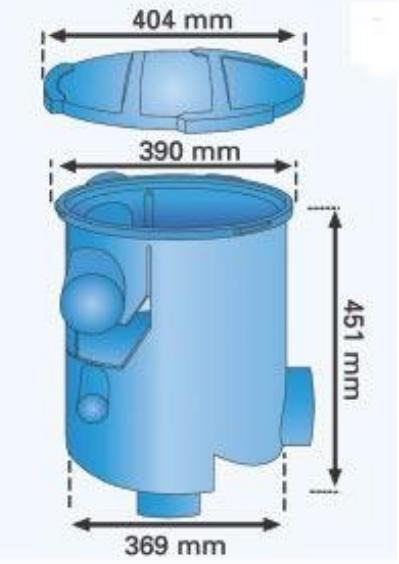
- Connection capacity for roof areas up to 150 m²
- All connections DN 100 (110mm OD).
- No height difference between inlet and outlet.
- Mesh size of filter cartridge 0.7 x 1.7 mm.

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:

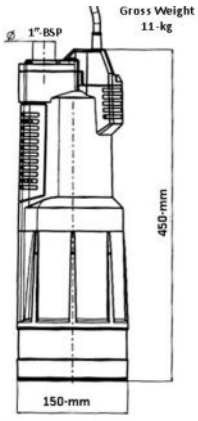
- Suitable for connection to roof areas up to 500 m².
- Height difference between inlet and outlet 300 mm.
- Suitable in-tank installation as shown below
- Or can be provided with its own neck for installation pre storage tank

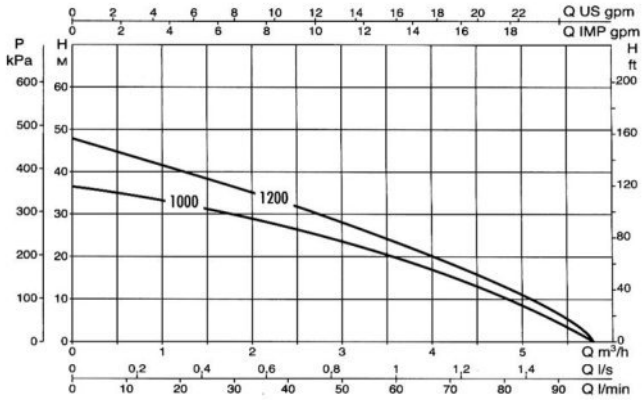
Pump specification …

21. The standard pumps supplied with 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
- 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:
  - Suspended by stainless-steel chain from the neck of the tank
  - Pre-measured to provide 150-mm clearance between pump and tank-base

22. Additional pump specification data is also shown below:

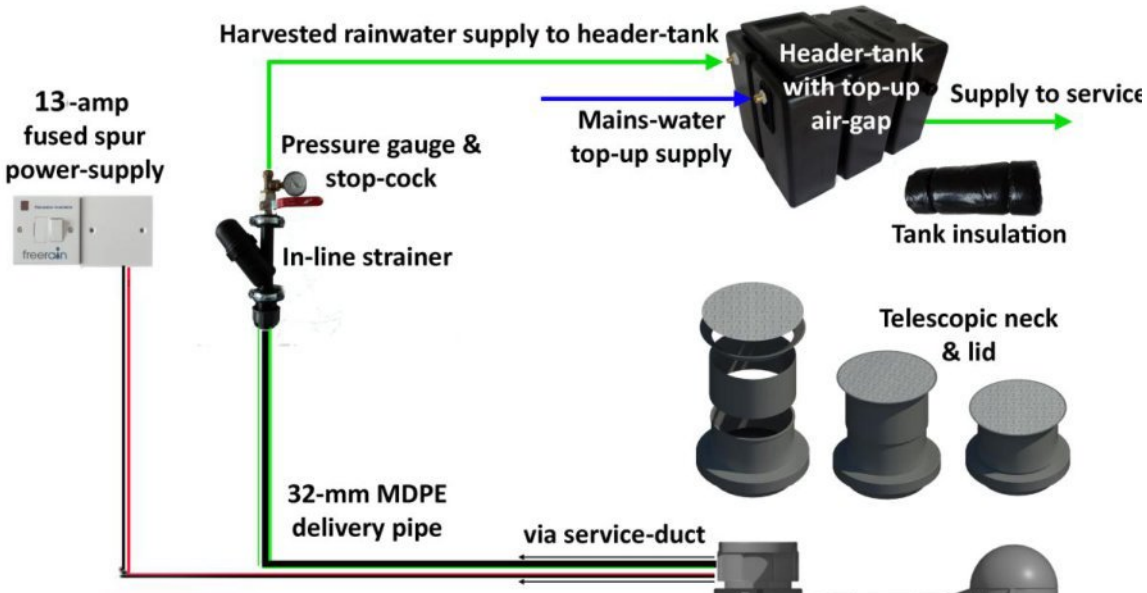




Operating system schematics …

Header-Tank Systems

Schematic Layout



Header-Tank Details

NB:

"Dead-leg" to be avoided by use of a check-valve

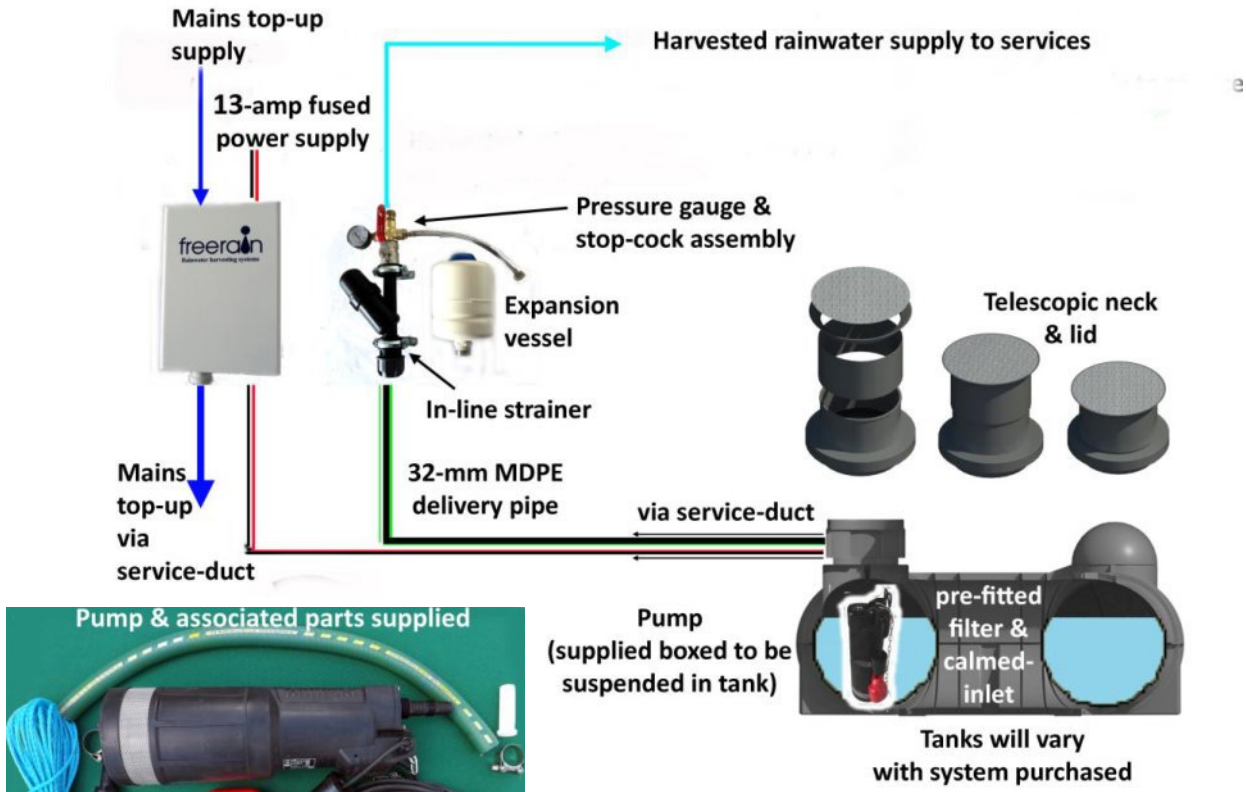
NB:

1. Insulation jacket must not obstruct air-gaps
2. Both warning overflows must be connected to outside waste

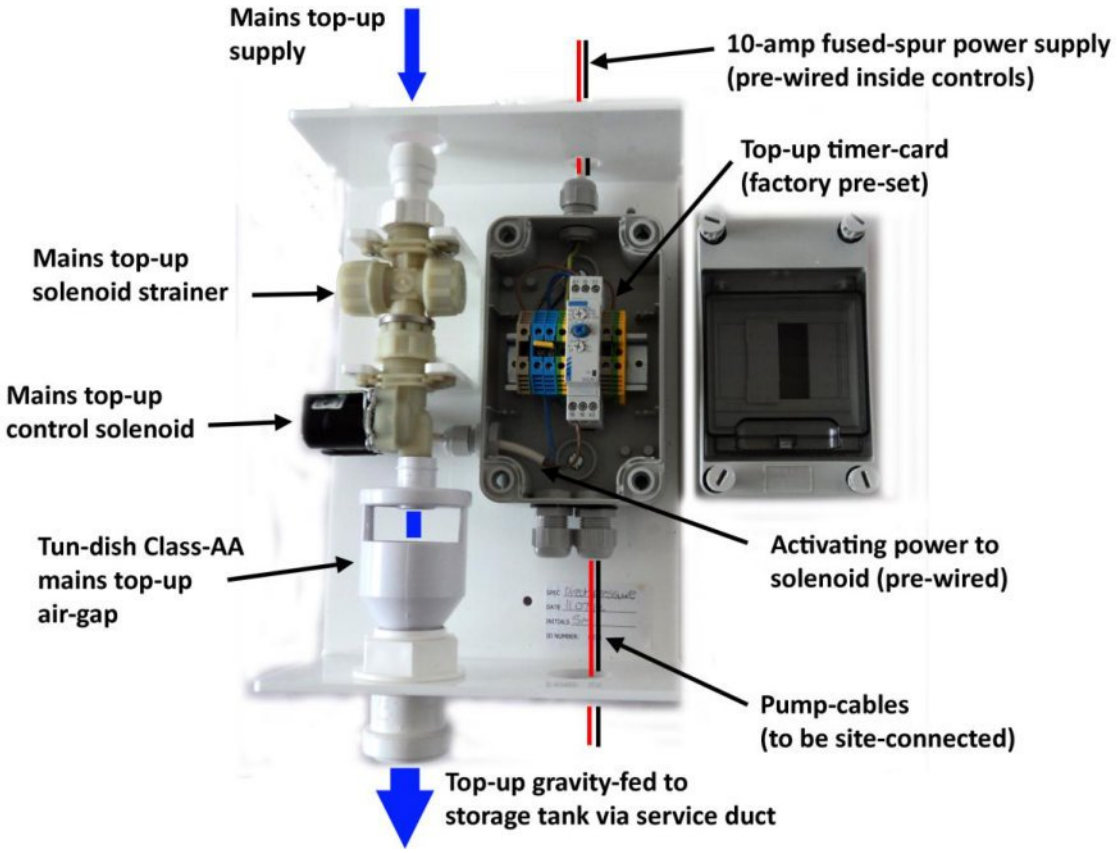
1. Harvested rainwater supply controlled by Fluidmaster float-valve in the tank
2. Floar-valve activation is delayed for the equivalent of several toilet-flushes to save pump energy-usage (mechanism Patent Pending)
3. When rainwater in the main storage cistern falls to a low level, the pump is disconnected from its power source and the consumer is notified by warning light on fused-spur
4. Services now run on mains-water top-up until rainfall restores level in main storage cistern

Direct-Pressure Systems

Schematic Layout



Mains Top-up Detail



Tank installation information

23. All installation calculations below are based upon the inlet invert, as measured from the bottom of the inlet pipe

24. It is essential that a service-duct be included in the design to accommodate the delivery-pipe, the pump power-cable, and in the case of direct-pressure systems the channel for the supply of mains top-up water

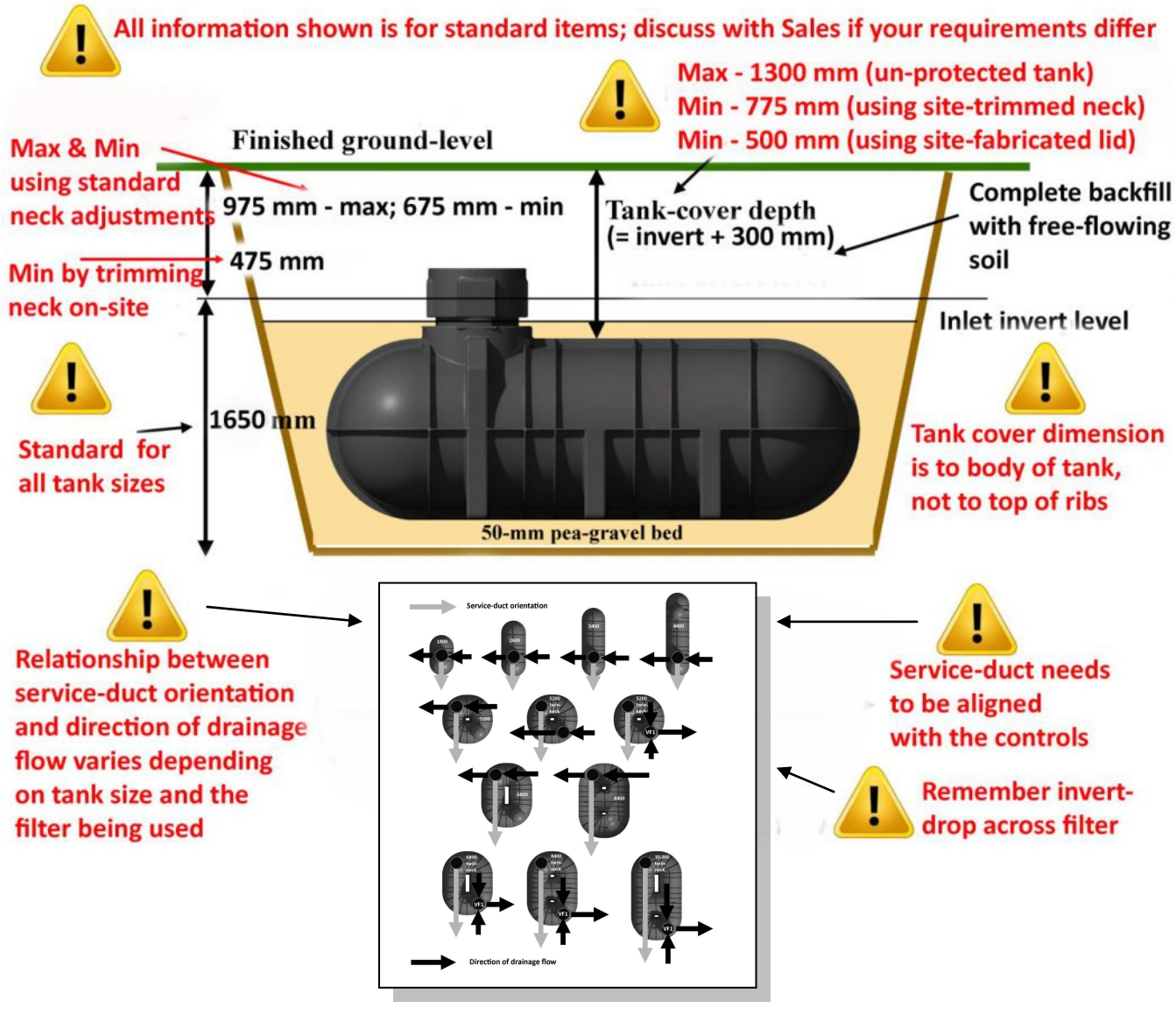
25. The 32-mm MDPE supply-pipe needs to be laid through the service-duct; to facilitate this, the tank needs to be orientated so that the service-duct connection points directly at position where the system controls are to be installed

26. This in turn fixes the orientation of the inlet and outlet of the storage tank which therefore need to be designed in to the overall drainage scheme, including any invert drop across the system filter

27. Our tanks are designed to be installed under pedestrian-only areas (such as lawns) under which circumstances the information supplied in the graphic below applies; please discuss with our Sales Team if the installation is:

- Going to be subject to vehicular traffic (heavier than a ride-on lawn-mower)
- Closer than 4-metres to nearby foundations (buildings or walls) or banked higher-ground

Installation Schematic



FREERAIN LTD TERMS & CONDITIONS OF BUSINESS

(These do not affect the customer's statutory rights)

Please note that all goods are provided on a supplied-only basis, to be installed as a working system by the customer or their agents; any faults arising from mis-installation or mis-handling are the responsibility of the installer. Our supplies are not subject to the CIS rules and no CIS deductions are therefore to be made to invoices

General Terms

NB: Breach of these conditions will invalidate the Warranty

The following applies only to the supply of goods (namely full or part rainwater harvesting systems); where a separate contract for the supply of services is required, such as for installation support and site visits etc, separate terms, conditions and charges will apply to that contract.

All goods provided under these terms & conditions are to be used in accordance with the associated Installation Manual, Users Manual, or other written instructions provided by the Company.

As an un-contracted service, the Company provides installers and users of the goods it supplies with a free telephone advice line; all telephone advice is provided in good faith but, if different/additional to written information contained in the Installation and Users Manuals, is only to be acted directly upon when followed-up by a written confirmation.

Quotations & Prices

Only our written quotations are to be used as a basis for ordering. The prices contained in our quotations are fixed for a period of 3-months from the date of issue, unless stated otherwise.

All quoted prices are exclusive of VAT, unless stated otherwise.

Orders

Orders are only accepted once we have issued confirmation of acceptance, and on the basis that all terms and conditions here set-out have been understood and accepted by the buyer.

Ordering

Written confirmations (letters, fax or e-mail) are required for all orders.

Technical Specification Changes

All specification changes are to be agreed in writing by both parties ahead of shipping.

Amendments

Any amendments to original quotation/order details are to be confirmed in writing by both parties.

Delivery Times & Arrangements

The delivery times relevant to your order will be as set out in our written quotation; we will use our best endeavours to meet precise delivery arrangements within the constraints of the stated delivery time, provided at least 5-working days notice is given.

Should, for reasons beyond Freerain Ltd control, delivery of goods does not take place as mutually arranged, Freerain Ltd will not be liable for any additional costs incurred by the client.

Cancellation of Orders

Orders may not be cancelled once it has been delivered fully or in part

In the event that an order (in full or in part) is cancelled after it has been placed but pre-delivery, the following cancellation charges will apply:

- ❑ 7.5% of the value of the order once it has been accepted by Freerain and confirmation sent to the buyer
- ❑ 15% of the value of the order where working drawings & installation manuals have been produced and sent
- ❑ 30% of the value of the order where signed drawings have been returned by the customer, and production has commenced
- ❑ 60% of the value of the order where the goods have been manufactured and are in-stock awaiting delivery instructions

Undeliverable goods

In the event goods are not able to be off loaded when delivered in accordance with the agreed arrangements, due to the client not being in a position to receive them, the client will be responsible for any storage, additional shipping/re-shipping costs, which arise.

Damages in Transit

All goods are to be unpacked on receipt and checked for damage in transit; any claims for replacement items are to be made within 48-hours of delivery. The customer copy of the Packing List needs to be signed and returned at this stage to validate the Warranty.

Responsibility for off-loading goods lies with the client and must be undertaken in accordance with the instructions provided; any damage arising during or subsequent to off-loading shall be the client's responsibility.

Returned goods

Shipping costs associated with the returning of goods is the responsibility of the customer, unless agreed otherwise. Should any parts become lost or damaged, it is the responsibility of the customer to use the appropriate service with insurance/protection.

Payment Terms

For orders less than £5,000 nett, pre-payment is required, unless agreed otherwise in writing beforehand and all invoices are to be settled in full ahead of shipping.

For orders greater than £5,000 nett or otherwise agreed credit account facilities are available, subject to prior checking by the credit control department.

Warranty

The warranty period starts on the date the goods are delivered to site. The Warranty is validated by completion and return of the second copy of the Packing List enclosed with the system or component(s) on delivery. The terms of the Warranty are:

i) All components are covered by a parts only guarantee from the time of delivery.

ii) Replacement parts will be provided in the event of failures in service, for the period as outlined below after the date of delivery. Replacement parts shall only be issued on return of the defective parts, unless agreed in writing.

- ❑ Full domestic systems – 24 months (see note v)
- ❑ External only (Gardening) systems – 12 months
- ❑ Commercial systems – 12 months
- ❑ All other system and parts - 12 months, unless stated at the time.

iii) Failures resulting from improper installation, misuse and/or with signs of physical mistreatment are not covered by the Warranty.

iv) Domestic systems are optimised to provide harvested rainwater to supply WC's throughout the house, outside tap functions and a washing machine situated on the ground floor. Other configurations/usages should perform equally well, but are not guaranteed.

v) Tanks made from polyethylene carry a 15-year warranty against failure caused by a manufacturing defect. To validate this warranty, the tanks must be used and installed fully in accordance with Freerain instructions which includes taking advice from a professional appointed structural engineer under the circumstances identified in the instructions. Claims made against this warranty are to be accompanied by a report supplied by a mutually agreed independent expert, whose fees will be paid by Freerain in the event that a manufacturing defect is shown to be the cause of any failure.

vi) Drinking water systems are subject to the separate mutually agreed "risk assessment" that form the contract under which these are supplied.

System Breakdowns

System breakdowns that cannot be rectified by the end-user with reference to the user guide and with telephone technical support from Freerain, will need to be attended to by the customer's agent (usually the original installer or appointed plumber). Freerain will assist the agent/plumber (via the telephone) to rectify the problem. Any defective parts will then be issued with reference to the terms of the warranty.

Commissioning

A commissioning request form must be completed and signed prior to any visit. System commissioning does not include labour or installation work.
Prior to our representative(s) arriving on site the system must be fully installed as per the written instructions provided. Should the system not be in a state of readiness for commissioning and/or where remedial works be required as a result of the initial report, additional charges may apply. Specific terms relating to a commissioning visit can be found on the commissioning request form and the commissioning report form.

Title

All goods shall remain the property of Freerain Ltd so long as any money is outstanding in relation to these or any other goods previously supplied.

Freerain Ltd reserve the right to recover any goods that have not been paid for in accordance with the account facilities provided, and the purchaser agrees to make such goods available for this purpose, and provide any access needed to effect recovery.

In the event a purchaser's standard documentation includes wording that may, or appear to, invalidate the above retention of title conditions, such contra-terms are rejected unless specifically agreed in writing.

Freerain Limited, Sylvan Way, Off Great North Road, Newark, Nottinghamshire NG24 3UT
Sales: 0845 1250 000 Tech: 0845 1270 001 Fax: 01636 894909 email: sales@freerain.co.uk web: www.freerain.co.uk
registered no. 3521704 VAT no. 706 4275 43
Registered Office: Millennium Green Business Centre, Rio Drive, Collingham, Newark, Notts NG23 7NB