

Harlequin[®]
MANUFACTURING FOR TOMORROW

PUMP STATIONS

INSTALLATION AND
OPERATING INSTRUCTIONS



An environmental asset

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Harlequin Pump Station Overview:



Figure 1: Pump Station Mini



Figure 2: 800LT Pump Station



Figure 3: 1100LT Pump Station



Figure 4: 1550LT Pump Station

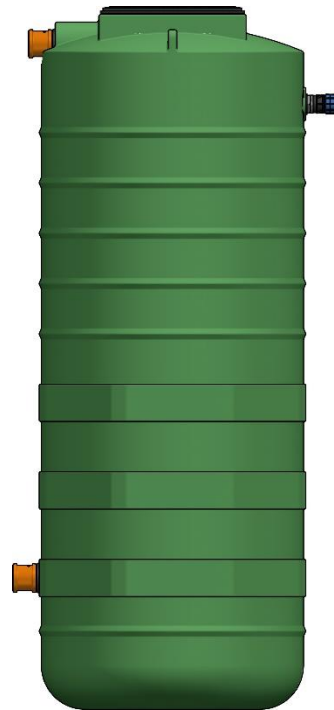


Figure 5: 3200LT Pump Station

System	PE.	Install Depth	Width	Total Cap.	Single Pump	Twin Pump	Water/ Effluent	Sewage	Grinder
Mini	N/A	1700MM	Ø 600MM	450LT	●		●	●	
800LT Pump Station	5 PE.	1225MM	Ø 1000MM	820LT	●	●	●	●	●
1100LT Pump Station	7 PE.	1645MM	Ø 1000MM	1140LT	●	●	●	●	●
1550LT Pump Station	10 PE.	1625MM	Ø 1200MM	1605LT	●	●	●	●	●
3200LT Pump Station	21 PE.	3205MM	Ø 1200MM	3340LT	●	●	●	●	●

Single Pump Systems

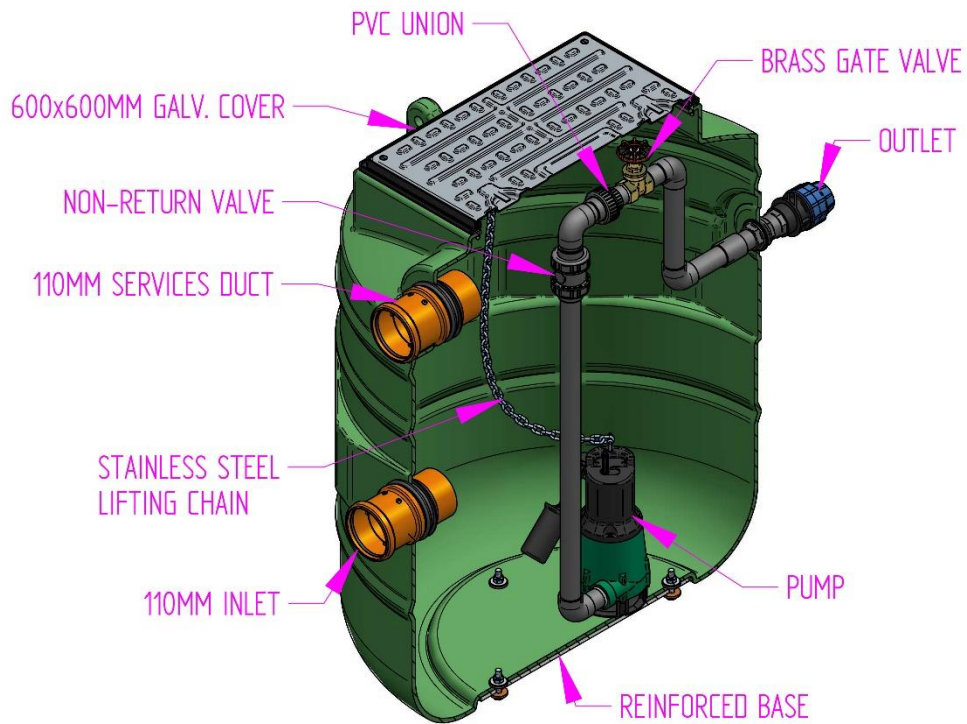


Figure 6: 800LT Pump Station

Twin Pump Systems

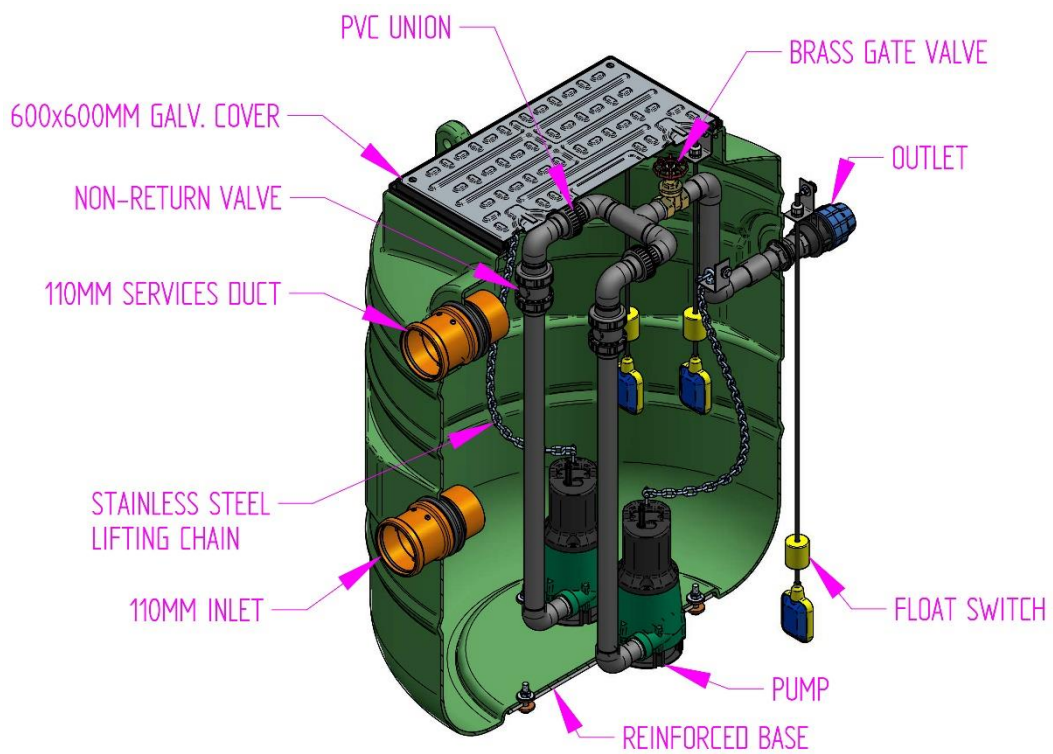


Figure 7: 800LT Twin Pump Station

Introduction

General Information

Introduction

It is strongly recommended that you read all sections of this manual before installing and operating your new Harlequin Pump Station. Some installation and operation requirements are specific to Pump Station products and it is important to familiarise yourself with these.

This information is supplied as a best practise guide and it is the responsibility of the user/installer to verify that it is used appropriately for the ground and load conditions.

Installation of the equipment should only be undertaken by a qualified specialist who is covered with professional indemnity insurance.

End-user responsibilities

It is the end-user's responsibility to ensure that their system complies with statutory requirements and does not cause pollution to the environment. Guidance can be found at Planning & Building Control departments as well as environmental agency offices regarding statutory obligations.

A professional consultant (architect/consulting engineer/drainage consultant) with experience in off-mains systems should be appointed to carry out a detailed site assessment evaluation and design of the groundworks. In addition, the following requirements must be met:

- ***The tank must be installed, operated and maintained in accordance with the requirements of this document***

Harlequin Pumps Stations are designed to collect and pump effluent, treated or wastewater where gravity drainage is not possible. When the pump is activated the contents are then discharged to a higher- level point such as a sewer.

In all cases, approval should initially be sought through the local authority Building Regulator. It may also be necessary to obtain the consent of:

- The Environment Agency (EA - England and Wales)
- The Scottish Environment Protection Agency (SEPA - Scotland)
- Environmental Protection Agency (EPA - Ireland)
- The Northern Ireland Environment Agency (NIEA)

Health and Safety

The advice given in this document is provided with your safety in mind. This document should be retained for future reference and remain in the household should a new occupier take ownership. The following health and safety guidelines should always be strictly adhered to in relation to the operation and maintenance of any Pump Station. It is important that:

- ***All electrical work is carried out by a qualified electrician***
- ***All plumbing work is carried out by a qualified plumber or groundworks engineer***
- ***All maintenance activities include appropriate measures to safely isolate electrical and water sources.***

At all times, safe working practices should be observed and adopted to avoid accident and injury when working with the equipment.

- The site should preferably be fenced off to prevent unauthorised access, particularly for small children
- Where applicable control panel housing should always be kept closed when in operation
- The manhole covers should never be removed and left unattended, even during service visits
- The control panel housing contains electrics operating at 240v. All equipment must be isolated before any maintenance is carried out
- Misuse can lead to serious injury and damage to the plant
- Protective clothing and gloves should always be worn and careful attention paid to personal hygiene, especially if there is any potential contamination with sewage products
- Medical attention must be sought if a user is feeling unwell after coming into contact with wastewater products.

Leaving the tank unattended during servicing should be strictly discouraged in accordance with the health and safety procedures.

Warning: Wastewater treatment processes can produce hazardous gas concentrations even when vessels are fully drained. Never enter vessels without appropriate training and protective equipment.

Maintenance

It is important to note that it is the end user's responsibility to ensure that maintenance is performed on the system at the appropriate period. Maintenance will ensure good operation and avoid breakdown which could lead to environmental pollution. Environmental enforcement agencies responding to pollution will hold the owner of the system responsible for ensuring compliance with any consent parameters imposed on the site.

The Maintenance and Service requirements for the Pump Station products are listed from Page 12 of this document. The Warranty for the product will be dependent on all the installation and servicing guidelines being followed.

Regulations and Guidelines

The following documents provide guidance on the requirements of design and installation of Pump Stations.

Publicly available guidance documentation

- Environment Agency Pollution Prevention Guidelines Part 4 (PPG4: 2006)

- Northern Ireland Environment Agency Water (Northern Ireland) Order 1999 (97.5%)
- Building Control Regulations 2010, part H Drainage and Waste Disposal, 2015 edition
- British Water Flows and Loads – 4, Code of Practice

Relevant British design and testing standards

- BS EN 12050
- BS EN 12056-4
- BS EN 752-6

Design features

The tanks have moulded-in lifting slots for use during handling and installation. NB: *only to be used when the tank is empty.*

Secure pedestrian duty manhole covers are supplied as standard to comply with statutory regulations.

The tanks have an engineered flat base for stability during transportation and storage prior to installation.

Tank sizes and construction

The Harlequin Pump Station is produced in five sizes – 450 Litres (Mini), 800 Litres, 1100 Litres, 1550 Litres and 3200 Litres - and are rotationally moulded in tough polyethylene which offers a very high level of impact resistance.

All Pump Stations ranging from 800 Litres – 3200 Litres are available in single or twin pump configurations for rainwater, effluent or sewage. Mini Pump Stations are only available as single pump systems. All pumps are supplied with lifting chains and heavy-duty grinder pumps are fitted onto guiderails as standard.

See below for tank dimensions for each Harlequin Pump Station:

Harlequin Mini Pump Station:

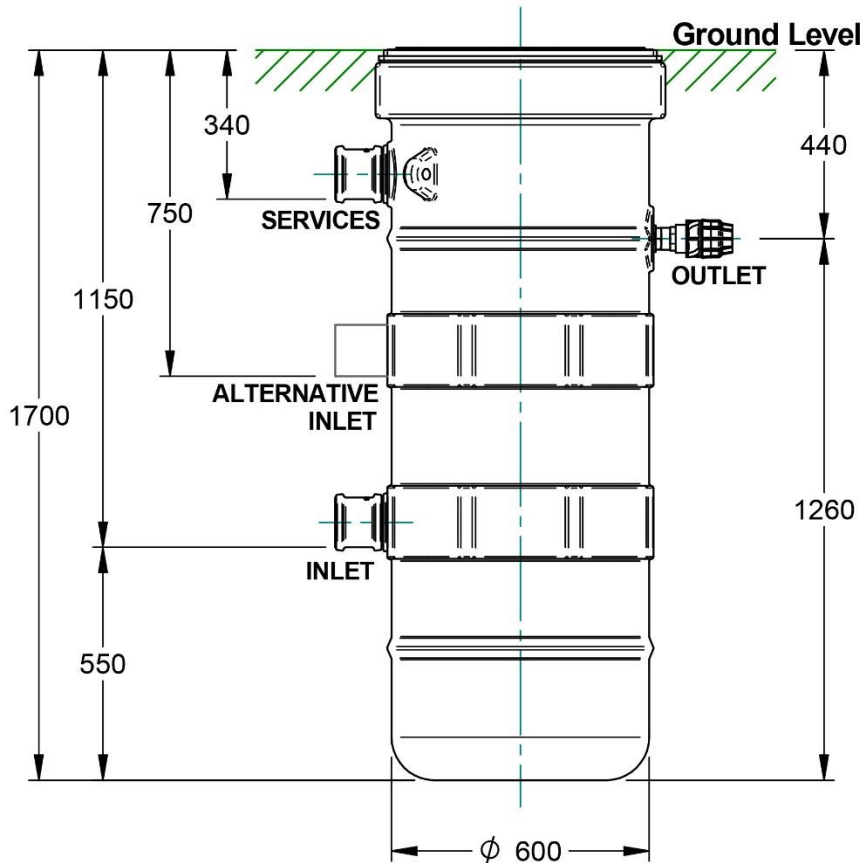


Figure 8: Mini Pump Station dimensions

Harlequin 800 Litre Pump Station:

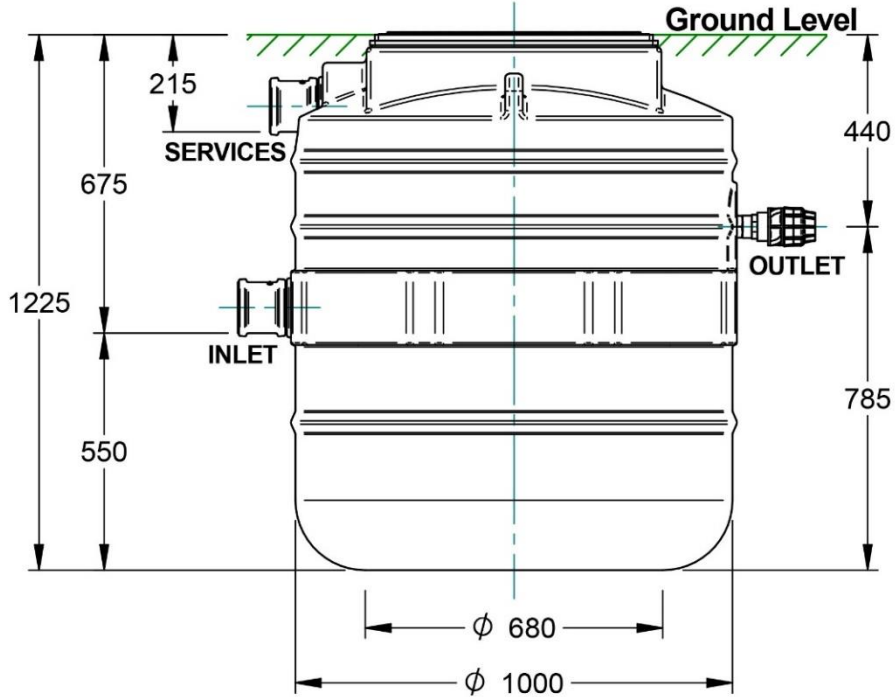


Figure 9: 800LT Pump Station dimensions

Harlequin 1100 Litre Pump Station:

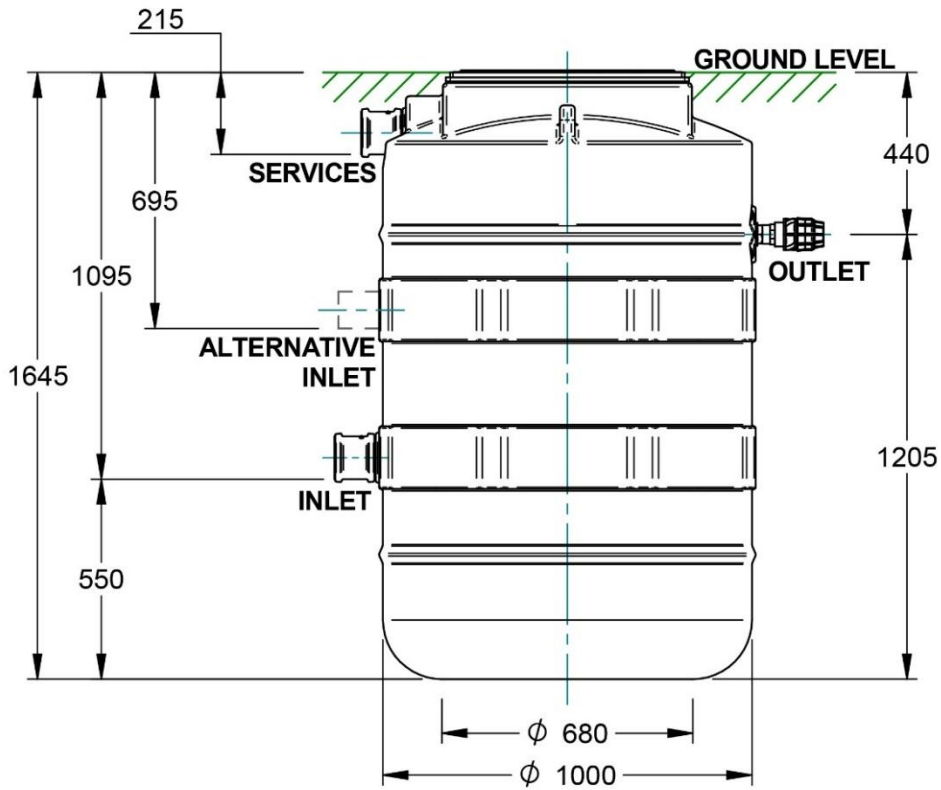


Figure 10: 1100LT Pump Station dimensions

Harlequin 1550 Litre Pump Station:

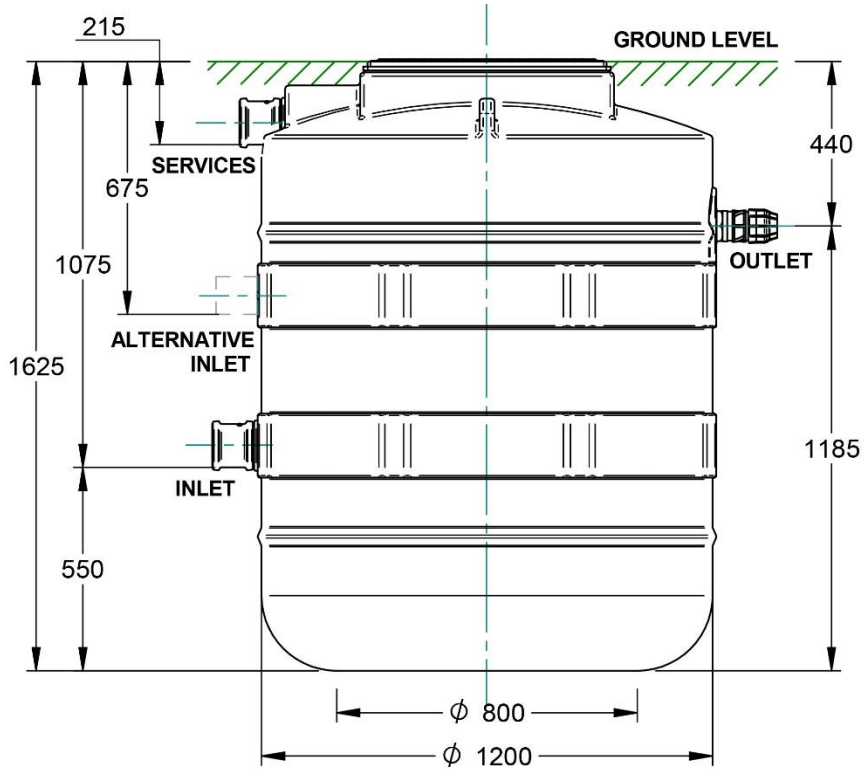


Figure 11: 1550LT Pump Station dimensions

Harlequin 3200 Litre Pump Station:

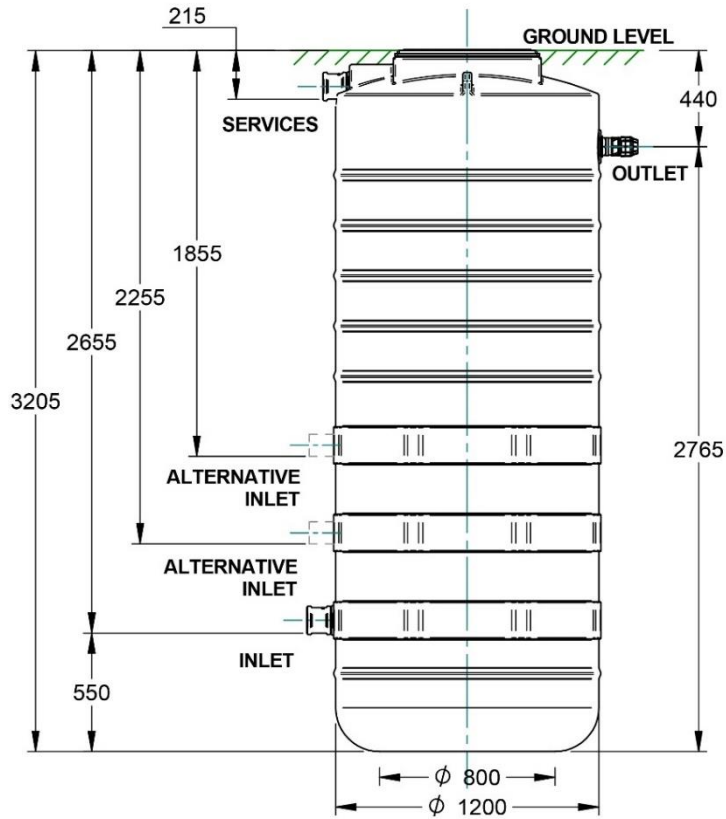


Figure 12: 3200LT Pump Station dimensions

Storage and Handling

Prior to installation tanks should be set on a smooth level base and securely tied or propped to prevent them from overturning and causing damage or injury.

Handling

The rotationally moulded polyethylene tanks should be handled by crane or other designated and suitably rated lifting equipment using the moulded lifting slots provided (only when empty). Please contact Harlequin if you require specific product drawings and dimensions of your product.

Harlequin Manufacturing Ltd can accept no responsibility for incorrect offloading or installation. The contractor is responsible for offloading all items of equipment with due regard to the following:

- DO NOT use chains or wire ropes.
- DO NOT lift the tank if it contains any water.
- DO NOT subject the tank to sharp impacts.
- DO check that all items delivered correspond with the delivery note.

When working in deep excavation, make sure that all necessary safety precautions are taken to ensure the stability of the excavation and provide safe working conditions for site personnel. The only time anyone needs to be working at the bottom of the excavation is when levelling the base and ensuring that the first backfill is correctly placed.

Plant Siting

Pump Stations serving single dwellings should be sited a minimum of 7m from any habitable buildings and as far away as possible. This should be increased to a minimum of 25m if serving more than one building. Some local authorities will permit significantly closer installation for single houses, however this may vary from area to area.

Local building control office advice should always be sought through planning permission, where required.

For installation, consider the space required on site to allow an excavator to operate; for the removal of soil, delivery of concrete, etc. For maintenance, consider the access space required for a sludge emptying tanker. Maximum distance of 20m is needed to ensure hose length is sufficient.

Approval for the tank position should always be sought from the controlling authority at an early stage and planning signed off by the local authority building inspector prior to installation.

Superimposed loads/protected areas

Harlequin does not recommend that superimposed loads, such as vehicles, be allowed within 3m of any part of the tank.

The tank should not be situated close to a driveway or roadway, or anywhere there is a risk of it being subjected to additional superimposed loads.

If vehicular or other superimposed loads are required to come within the protected area a qualified civil/structural engineer must be employed to design the installation. This design must prevent loads being transmitted onto the tank.

Harlequin Tanks may not cover the warranty for the tank body under superimposed load conditions; this responsibility must be covered by the civil/structural engineer. It is thus a requirement that the installation is signed off by this third party engineer.

Installation Instructions

Before any tank is installed, appropriate ground condition checks should be made to determine the soil constitution, position of the water table and any flood possibility in the area.

Installation of all Harlequin Pump Stations require a minimum 300mm concrete backfill all around the tank. Figure 13 (see below) highlights a typical installation of a Harlequin Pump Station and the installation measurements which are required. Failure to follow the guidance instructions during installation may render the warranty null and void.

Modifying the tank invert depth

The maximum invert depth can be increased using 1 riser. Risers for a Harlequin Pump Station are 600mm x 600mm and 300mm in depth to ensure access to the manhole lid of the tank.

Maximum invert is 3M.

Failure to adhere to these design parameters may cause severe structural damage to the tank and will render any warranty null and void.

Electrical power requirements

Power requirement is single phase 240V, through a 3-core steel wired armoured (SWA) cable. Refer to the Control Panel specification supplied with your unit for the specific power ratings to size the electrical cable but 1.5mm is usually adequate. The supply to the unit should be by means of a dedicated circuit with isolation and protection devices consistent with the requirements for fixed equipment and in accordance with the latest regulations. The electrical installation of this equipment must only be carried out by a fully qualified electrician.

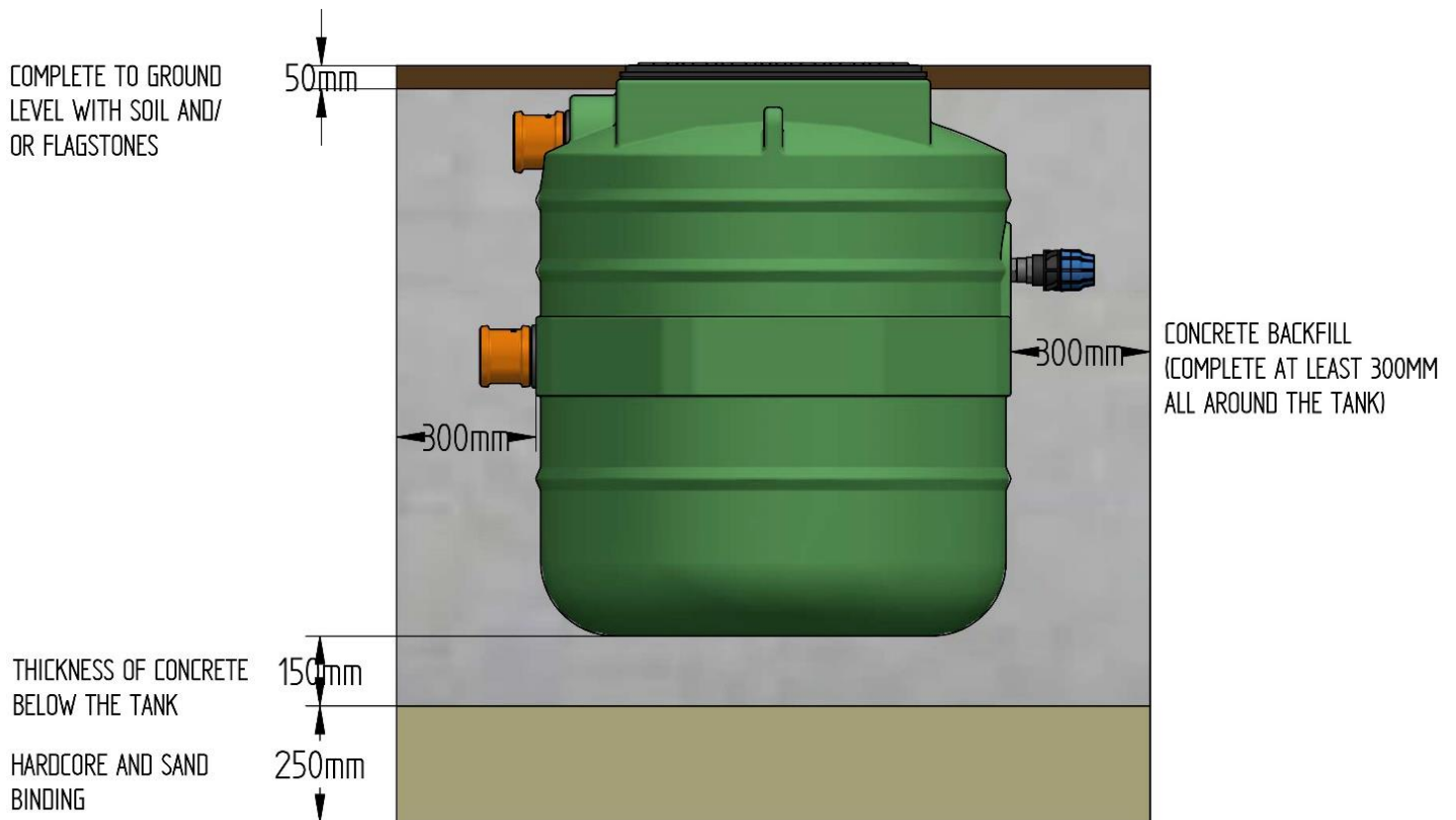


Figure 13: 1550LT Pump Station dimensions

Pump Specification

Harlequin Pump stations are fitted with a submersible pump and are available in single or twin pump configurations for rainwater, effluent or sewage. All pumps are connected to a lifting chain and grinder pumps are fitted with an additional guide rail. Your new Pump Station will have either a 1,5" or 2" outlet depending on the pump you require:

Pump	1.5" Outlet	2" Outlet
Water/Effluent	●	
Sewage (Vortex)		●
Grinder		●

Grinder Pumps

Pump Station models ranging from 800 Litres to 3200 Litres are all available in grinder pump configurations. As standard Grinder pumps come fitted with a 2" quick discharge coupler and stainless-steel guide rails and lifting chains.

Twin Pump Systems

Harlequin Pump Station models ranging from 800 Litres to 3200 Litres are available in twin pump systems. Each twin pump system is supplied with three separate float switches which operate the submersible pumps:

1. Pumps Off switch
2. Duty pump on switch
3. Alarm on

As the water level rises in the tank body, the float will rise above the pump handle and activate the pump. The pump will then switch off when the water level drops again. The high-level floats are attached to a bracket on the top of the main body of the tank which are connected to the submersible pumps. This switch activates the alarm in the control panel and is designed to only be triggered when the water level rises towards the top of the tank (failure of the pump). If the alarm activates while the pump is operating, the float has been installed too low.

Twin Pump systems are designed to operate by alternating the two pumps. Once a pump cycle is complete the other pump then becomes the duty pump, this remains the case until the float is activated again. If the duty pump fails for any reason the standby pump will then become the duty pump.

During transport, all float switches are attached around the top of the tank underneath the manhole lid by cable ties, these will need installed after shipping.

Please check the operation of all floats when installing.

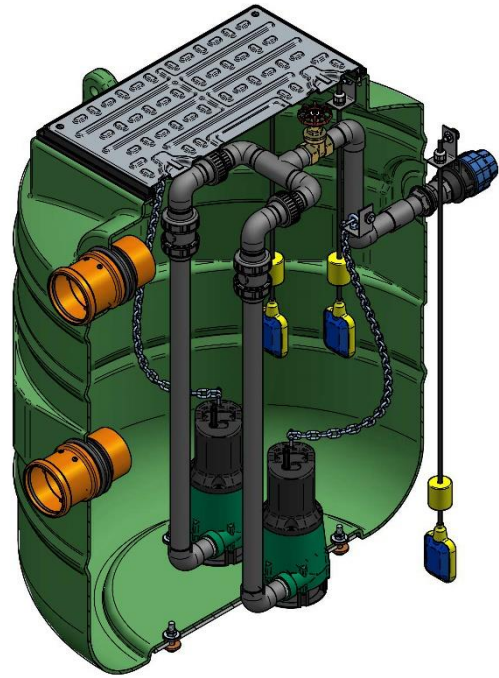


Figure 14: 800LT Pump Twin Pump Station

Control Panel

Control panels are provided as standard for all Harlequin Twin Pump Stations, they are installed to control the three float switches in the system.

When a control panel is set to 'auto' this means the operation of your pump station will be carried out by the float switches. Once the level rises in the tank a float switch will be triggered, which will then activate the pump. This will allow your pump to run and discharge until the liquid level has returned below the level of the initial float switch.

Your control panel will alternate the duty pump between discharge cycles. If for any reason both pumps fail, and the liquid level reaches maximum capacity the alarm float switch will be triggered. You will be alerted if there is a fault by a beacon in your control panel. It is important to note that your alarm can also be triggered if the volume of liquid entering the tank exceeds the capacity of the pump.

Control panels will require a reset if the alarm in your tank has been activated and the problem has been resolved.

Electricians should refer to all wiring diagrams when installing your control panel.

Ventilation

It is important that a specific air venting point is provided by the installer to allow the system to freely vent and disperse gas. This should be achieved through the installation of a soil stack running to the top ridge of the dwelling(s), this must not terminate at eave height. The air from the system must be allowed to freely vent back to

the inlet pipe from the tank to this soil stack. The internal pipe work of the tank allows ventilation from the tank body to the inlet pipe work. The soil stack can usually be installed through vertical extension of the dwelling's wastewater pipe where it leaves the building.

Operating Instructions

Process description

Pump Stations work as an intermediate storage collection and transfer system which discharge effluent, treated or wastewater to a higher level. Once the contents of the tank reach a specific level, a float switch is triggered which activates a duty pump. Pump Stations are normally installed in locations of low-lying ground with the purpose to transfer and discharge to a higher-level sewer system or local drain.

Pump Stations work in a continuous cycle and the process of collecting, transferring and discharge of its contents are run by the internal float switches. Once the tank has been emptied and discharged the cycle will continue.

Twin pump configurations are available which alternate which pump is the duty pump. These systems will allow your station to have a backup pump.

Plant Start up

1. Once the tank is installed fill the tank with clean water.
2. Check the gasket seals around the tank while the tank is filling up to ensure there are no loose fittings which may cause any leaks.
3. Check the inlet and outlet pipes are installed correctly and are free from any blockages or obstructions.
4. Ensure all pipework is fitted correctly.
5. Ensure all float switches are connected correctly and are positioned at the right heights. Float switches should not be sitting on the base of the tank.
6. On twin pump systems ensure all float switches are hanging freely from the top of the tank and there are no tangled cables.
7. Test the operation of the float switches, this can be done by pushing the float down as the tank is emptying.
8. Check to ensure all the water has been discharged after the initial pump cycle.
9. Refit all manhole covers and lock if necessary.

General Maintenance

Warranty Provisions

The Pump Station will have a 2 year extended warranty (if the product is registered with Harlequin) that is valid from the date of sale – this warranty covers the body of the tank and ancillary equipment (excluding consumables), where a replacement will be delivered to site. This is subject to the tank being installed correctly according to the instructions listed in this guide and the servicing requirements being met. The warranty does not cover anything before or after the tank i.e. soak away, drainage, venting and it does not cover damage done to the plant by any other product within the system.

If a Harlequin Pump Station arrives on site damaged, it is to be reported by the end user / installer at the time of delivery/installation.

It is the installer's responsibility to check the tank internally for damage. It is also the installer's responsibility for the electrical supply, safety, connection, suitability and testing non-interference with other electrical systems as well as the ducting, hoses, venting and sealing.

DO NOT dispose of any household items into the drain system via a toilet or sink. Items such as wipes and nappies will cause severe damage to the pump and can cause your system to fail.

Maintenance Schedule:

Harlequin Pump Stations should be checked every 6 months. It is important to check for the following:

1. Sludge build up – Is there an excessive build up of sludge at the bottom of the tank?
2. Blockages – Are the inlet and outlet pipes clear of debris? (Remove any obstructions)
3. Control panel – If you have a control panel has it failed for any other reason than a mains power failure? (Is the warning beacon flashing)

24-monthly intervals

A full service on the system should be performed. The service should ensure that all aspects of the system are functioning correctly.

Particular areas of detail include:

- Checking tank for damage
- Checking the internal pipework
- Checking lid and gasket seals
- Checking electrical connections

Final Installation Check List

- Tank Installed the correct distance from property
- Tank installed on a flat concrete base
- Tank backfilled with concrete
- Customer has been advised on desludging and servicing of the tank
- Customer has been given copy of the Installation and Servicing Guide

Twin Pump Version:

- A secondary power supply for High level alarm (recommended)
- Float switch cables are free from any knots or tangles and hang freely from the top of the tank
- Ensure the submersible pump starts operating as the float rises above the pump
- Ensure the pump turns off as liquid level lowers below the top of the pump
- Ensure the high-level alarm operates if the water level rises

Fault Finding:

Symptom	Cause	Action (all work must be performed by a specialized company)
Strong smell	Air escaping from joints	Check connections and tighten them if necessary.
	The joints of the pipes are damaged	Check and replace the seals if necessary.
	High sludge level	Arrange a desludging of the tank.
	Pump malfunction	Ensure pump is working correctly
	Blocked pipework	Inspect the pipework for any blockages or debris and clear the pipes from any obstructions.
	Incorrect wiring	Contact a qualified electrician to check the wiring and the voltage line supplying the tank.
	Damaged delivery hose	Replace delivery hose or check to see if there are any blockages, kinks or bends in the hose.
	Pump Malfunction	Contact a qualified installer to inspect the pump.
	Deflective non-return valve	Check the internal pipework to ensure the non-return valve is free from any obstructions and has not been installed backwards. This is done by checking the arrow direction on the valve.
	Faulty impeller	Contact a qualified installer to inspect the impeller, it could be worn out, damaged for blocked with debris. Ensure pump is disconnected from power supply.
Irregular running of pump	Faulty or damaged float switch	Contact a qualified installer to inspect the pump, the float switch may need replaced.
	Float switch not activating	Floats on twin or single pump systems could be caught in the internal pipework. Check the floats are not tangled if so, then untangle the cables.
Pump will not start	Pump malfunction	Contact a qualified installer to inspect the pump for any damage or faults.
	Electrical fault	Contact an electrician to inspect the voltage line connected to the tank. If your tank has a control panel check to see if there is any moisture in it.
	Blown fuse	Replace the fuse
	Electrical fault to control panel	Inspect wiring in the control panel. Contact an electrician to check that there is a sufficient electrical connection to run the control panel.
Pump Station backs up and over fills above working water level	Faulty pump	Pump has malfunctioned, contact a qualified installer to inspect or replace the pump.
	Damaged float	Contact a qualified installer to inspect or replace the float.
	Deflective float switch	Inspect float switches to check if they are positioned correctly.
Pump will not turn off	Defective float switch	Inspect float switches to check if they are positioned correctly or tangled.
	Flow of influent is the same or greater than the discharge capacity of the pump	Contact a qualified installer, you may need a bigger pump.
Sounding alarm but system is still running	Defective float switch	Inspect the float switches for any tangles in the cables, a float switch could be caught/tangled and sitting in the ON position.
	Electrical fault	Contact an electrician to check the control panel for any damage.

