

Diamond (DMS/DMS-IPC/DMC)

sewage treatment plant



Installation Manual



INSTALLATION INSTRUCTIONS

INDEX

			Page
1.HEALTH AND SAFETY	1.1	United Kingdom Health and Safety at Work Act 1974	3
	1.2	Leptospirosis	3
	1.3	Sensible precautions	3
	1.4	Vaccinations	3
2.PRE-INSTALLATION CONSIDERATIONS			3-5
3.HOW THE DIAMOND WORKS			5
4.DELIVERY	4.1	Off-loading	5
	4.2	Extent of supply	6
	4.3	Bolts/bolt strips (DMC units only)	6
	4.4	Lifting and moving	6
5.CIVIL INSTALLATION	5.1	Before commencing civil installation	6-7
	5.2	WPL Sample chambers	7
	5.3	WPL Invert and body extensions	7-8
	5.4	DMS Tank installation (includes IPC models)	8-9
	5.5	DMS Air pump housing installation	9
	5.6	DMC Tank installation	10
	5.7	DMC Air pump kiosk installation	10-11
6.INTEGRAL PUMP CHAMBER	6.1	Description of DMS-IPC models	11
	6.2	Installing an IPC extension kit/diffuser pipe (optional)	11-12
	6.3	IPC Electrical connections	12
	6.4	IPC Testing (also see section 8)	12-13
7.ELECTRICAL INSTALLATION DMS/DMC AIR BLOWERS			12-13
8.COMMISSIONING	8.1	Inside the Diamond tank	13
	8.2	Air pump housing/kiosk	13
	8.3	After switching on the power	13
Diamond DMS and DMC Tank Dimensions			14
Air pipe duct cutting template (DMS units only)			15

Typical Equipment and Materials Required for Installation (not supplied by WPL)

Excavation and lifting	
An excavator (JCB or similar) with sufficient reach to attain depth required	
Slings and shackles for lifting	
Backfilling	
Backfill material	
Adequate supply of water to ballast the tank during backfilling	
Hose and Electrical	
Hose duct pipework – rigid or flexible	
Electrical cabling – armoured or ducted – 2.5mm ² twin and earth	
1 x IP55 rated outdoor double socket with RCD	
1 x 3 pin plug fused at 13 amps	
Miscellaneous	
1 x tube of acrylic or polyurethane mastic	
1 x aerosol of expanding polyurethane foam – to seal hose and cable ducts	

WPL strongly recommends installation is carried out by a suitably qualified and experienced installer. A qualified civil engineer should be consulted for advice if required.

1.HEALTH AND SAFETY

1.1. United Kingdom Health and Safety at Work Act 1974

Section 6a of this act requires manufacturers to advise their customers on safety and handling precautions to be observed when operating, maintaining and servicing their products.

The user's attention is drawn to the following:

All the sections of this manual must be read before working on the equipment.

Suitably trained and qualified personnel must carry out the installation.

Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.

The lids have been tested with a load at 1.0Kn/ m2 and will withstand accidental passage. They are not designed as pedestrian walkways.

Refer to WPL Ltd for any further technical advice or product information.

1.2. Leptospirosis

The following is extracted from a health-warning card supplied to all WPL staff.

It is the client's responsibility to ensure that all necessary protective clothing/equipment is available.

There are two types of Leptospirosis that affects people in the UK:

- Weil's disease. This is a serious infection transmitted to humans by contact with soil, water or sewage that has been contaminated with urine from infected rats.
- Hardjo-type Leptospirosis, which is transmitted from cattle to humans.

Typical symptoms for both diseases start with flu-like illness with a persistent and severe headache, muscle pains and vomiting. Jaundice appears about the fourth day of illness.

The bacteria can enter your body through cuts and scratches and through the lining of the mouth, throat and eyes.

1.3. Sensible precautions

After having worked with sewage or with anything contaminated with sewage, wash your hands and forearms thoroughly with soap and water. If your clothing or boots are

contaminated with sewage then wash them thoroughly after use.

Take immediate action to wash thoroughly with clean water any cut, scratch or abrasion of the skin immediately prior to applying any protective covering.

Do not handle food, drink or smoking material without first washing your hands. If you display the symptoms described after coming into contact with sewage, report to your doctor immediately advising them of the circumstances.

1.4. Vaccinations

To avoid illness, it is recommended that site personnel have the following vaccinations. WPL recommends you consult your doctor regarding any additional vaccinations which may also be appropriate.

- Hepatitis A
- Hepatitis B
- Polio
- Tetanus
- Typhoid/Cholera – probably carried out as a child

2.PRE-INSTALLATION CONSIDERATIONS

This section is a guide and as such does not cater for every situation that may be experienced during installation.

WPL assumes that the installer/end user has ensured that all necessary permissions have been sought and granted, and that all installation procedures will be carried out observing the requirements of the Health & Safety at Work Act involving good building and sound civil engineering practice.

Please ensure that due consideration/appropriate action has been given/taken regarding the following:

- Planning permission, Building Regulations and other regulating or interested parties.
- Environment Agency (or other regulator) consent to discharge/Environmental Permit.
- The legal responsibility for the plant as far as operation and maintenance and ongoing discharge is concerned.

Note – Failure to comply with any regulation may result in pollution, odour, nuisance and health hazards which may lead to legal action.

- The size of the plant relevant to the number and type of people that will be using it, e.g. domestic, light industrial, etc.. Consideration should be given to any unusual conditions such as B&B accommodation, special laundry requirements and frequent entertaining.

Note – The following key points should have been taken into consideration when the plant was specified and sized using the latest version of the British Water Flows and Loads. Please ensure that they are also taken into account prior to commencing installation.

WASTE DISPOSAL UNITS (WDU) – The Diamond plant should have been sized taking into account the use of a WDU in the property as it increases biological loading. **Advice** – It is advisable to limit the use of the WDU to ensure the plant operates efficiently.

Raw or uncooked foods should not be put through the WDU and ideally disposed of in a composter.

If the use of a WDU was not included in the sizing of the plant then it is advised that the WDU is not used.

WATER SOFTENERS – The Diamond plant should never be connected to a property using a water softener as the salt will significantly reduce the performance of the plant. **Advice** – Never use a Water Softener with a Diamond plant. If the use of a Water Softener is present in the property then it is advised that the Water Softener is disconnected. The use of a Magnetic or Electric Scale Reducer may be an alternative to a Water Softener as long as it does not use salt or chemicals but homeowners are advised to seek the advice of a specialist.

SURFACE RUN-OFF/STORMWATER – The Diamond plant should never be connected to guttering and drainage collecting stormwater and/or surface water run-off from hard standings and surfaces. **Advice** – Surface/stormwater should always be discharged to a storm drain which is excluded from the wastewater stream from the property.

LAUNDRY – The Diamond plant should have been sized taking into account the actual laundry carried out at the property as the laundry detergents/chemicals effect the performance of the plant.

Advice – Changes to the amount of laundry or the type/number of washing machines in use may affect the performance of the plant. Contact WPL for advice.

SWIMMING POOLS/HOT TUBS – The Diamond plant should never be connected to swimming pools, hot tubs etc. as they will contain chlorine which will significantly reduce the performance of the plant.

Advice – Consider separate treatment or disposal of backwash waters from ancillary equipment such as types or filtration and disinfectant removal in pools and hot tubs.

GREASE FROM KITCHENS – The Diamond plant should be protected from grease and fats if installed in a property or commercial premises where catering is provided. **Advice** – All commercial catering applications require the installation of adequately sized grease separators, removal or retention systems up-stream of the Diamond plant and it is advisable to check that this provision has been made prior to installing the Diamond plant.

- Costs, legal implications and siting in consideration to shared systems.

- The whereabouts of wells, bore holes and springs used as sources of potable water; existing non-mains sewerage systems and soakaways; water courses, ponds and lakes and designated protected areas.

- The whereabouts of other services, pipes, cables, ducts, etc..

- Local ground conditions e.g. is specialist knowledge of civil engineering required to cater for unusual soil conditions such as underground rivers, running sand, chemicals in the soil, etc.

- Sites which are close to trees (particularly willows) or shrubs. This is not recommended as roots may invade the joints of the tank. If necessary, the excavation should be lined with a root proof membrane prior to backfilling.

- The water table at the time of installation. Specialist knowledge is required when installing in an excavation that allows water to enter.

- The water table in winter. Special consideration should be given to installations that will be subject to high water table pressure or flood conditions. The treatment plant will need to be installed so that it cannot “float” out of the ground and provision made for continued discharge of treated effluent, should the discharge pipework/soakaway be under water.

Note – failure to maintain the ability to discharge may result in pollution, odour, nuisance and health hazards which may lead to legal action. WPL cannot be held responsible for failure to discharge due to poorly designed, constructed or positioned soakaways and discharge pipework systems.

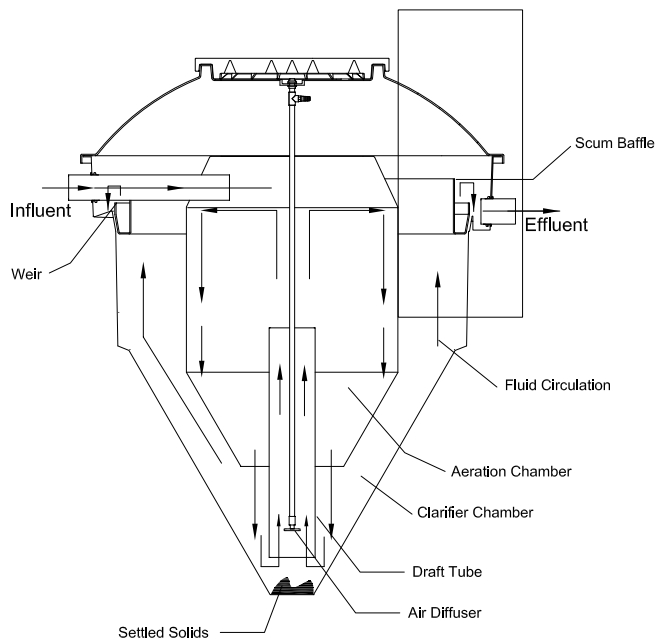
- The plant must be sited within 30m of heavy vehicle access for de-sludging. The plant should, where possible, be sited above the high water table mark and above or beyond the flood plain. See items above and accompanying note. The plant should be sited as far from the habitable parts of the dwelling as possible. Many local authorities recommend 7m as a minimum, but easements are possible for smaller sites.

- No special provision is made for venting the treatment plant Building Regulations stipulate that the drainage system must be vented. This can be via the vent pipe attached to the building, or by additional venting (high or low level) off of the inlet or outlet pipework or the sample chamber.

- A safe and adequate sampling point is usually a requirement of the Environmental Regulator. This can be an off the shelf item or constructed using standard drainage components. Open pipe discharges to ditches, watercourses, etc. through pipework of less than 5m in length, do not require a sampling point if the effluent can be sampled from the end of the pipe.

- WPL recommends a qualified electrician (see Electrical Installation section) should undertake the electrical installation. A safe and reliable power supply is required at all times as the air blower is required to run continuously.
- Before carrying out any work, electrical equipment must be securely isolated
- Sewage gases are potentially explosive and toxic. DO NOT enter any of the below ground compartments of the Diamond unless properly qualified and trained to do so.
- Temporary barriers and warning signs should be erected around any excavations, open covers or manholes, in particular warning of deep water in the tanks.
- Any visiting personnel must report to site office or householder on arrival and fully acquaint themselves with safety regulations applicable.

3.HOW THE DIAMOND WORKS



- The Diamond system consists of two treatment chambers in a single tank. The centre aeration chamber is a circular tank with a sloped, open bottom, which empties into the bottom of the outer clarifier chamber. Located in the centre of the aeration chamber is a 200mm diameter draft tube, which extends towards the bottom of the clarifier.
- Air is released at the bottom of the draft tube through a disc plate diffuser and as the diffused air rises in the draft tube, it causes an upward flow of process fluid. This draws the settled solids from the bottom of the clarifier up through the draft tube where they are discharged at the surface of the aeration chamber. The design of the draft tube ensures continuous and complete

mixing of oxygen with the sewage, allowing for the growth of various aerobic organisms that biologically degrade the wastewater contaminants.

- Gravity causes the aerated solids to settle back to the bottom of the tank where they are drawn back up again through the draft tube. As raw sewage enters the aeration chamber, it displaces biological solids from the aeration chamber to the clarifier.
- Quiescent conditions in the clarifier allow the digested solids to settle to the bottom of the clarifier where they are again returned back to the aeration compartment. The clarified (treated) effluent flows slowly up through the clarifier and over a weir that extends around the periphery of the tank.
- The effluent collects in an outer trough where it discharges through a 110mm-pipe connection using a gravity discharge. A scum baffle, located inside the overflow weir, prevents floating solids from passing over the weir. An integral pump chamber can be specified and supplied if a pumped discharge is required.

4.DELIVERY

4.1 Off-loading

Off-loading will only be at the nearest roadway to site that is suitable for heavy goods vehicles. If there are electrical cables overhead, ensure that there is adequate clearance or that the power is turned off. For off-loading from a lorry mounted with a crane, there needs to be a firm area for the stabilisers, the total width being a minimum of 4.6m (15 feet).

If the nearest road access for a heavy goods vehicle is not adjacent to the site, it is the responsibility of the purchaser to arrange transport from the road to the site. If in doubt, contact WPL as soon as possible with any queries.

Inspect the unit for any damage before placing on the ground. The unit should only be placed on level ground with no sharp stones, bricks, etc as they may damage the unit.

All electrical equipment must be stored in dry, condensation free conditions until required.

4.2 Extent of supply

See the delivery note for full details. The standard unit comes with the following:

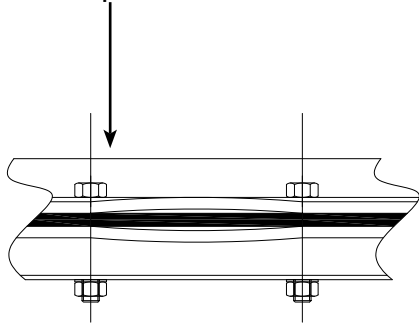
- The Diamond tank
- The air pump housing/kiosk with alarm beacon

Inside kiosk:

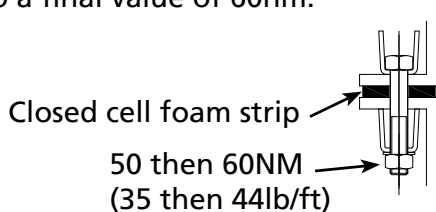
- Air pump, hose and hose clips
- Installers Pack containing the installation manual
- Homeowners Pack - THIS CONTAINS IMPORTANT INFORMATION AND MUST BE GIVEN TO THE HOMEOWNER. Contains User Guide/Operation and Maintenance Manual, Maintenance Log Book, Warranty Information and Building Regulation stickers.

4.3 Bolts/bolt strips – DMC units only

Due to the settling of the joints during transportation of the unit, the bolts may become loose and need tightening. It is important that the bolt strips are not overtightened and pinch the foam strip as this can cause leaks.

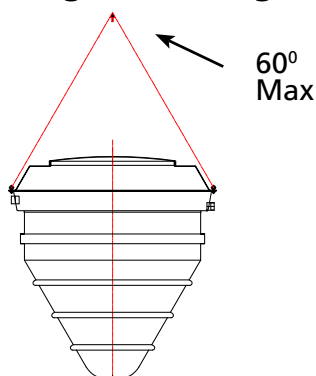


Tighten all bolts in the metal strips to 50nm to ensure all the foam is compressed, then tighten up to a final value of 60nm.



Silo bolts (with no metal strips) around the top of the unit should only be tightened to 30nm.

4.4 Lifting and moving



- Lifting eyes are provided around the top flange of the unit for the attachment of suitable straps of equal length. These should create an angle of no greater than 60° to the top of the unit to avoid excessive loads on the sides of the structure. (See diagram.)

- DO NOT attempt to lift the unit if it contains water.

- DO NOT walk on the smooth surfaces of the units with muddy boots, as this will scratch the surface.

- When moving across rough ground, great care should be taken to avoid increased loads due to sudden movement of the unit.

5. CIVIL INSTALLATION

WPL strongly recommends installation is carried out by a suitably qualified and experienced installer. A qualified civil engineer should be consulted for advice if required.

5.1 Before Commencing Civil Installation

All installation procedures should be carried out observing the requirements of the Health and Safety at Work Act and involve good building practice. During the course of installation the following should be considered and a qualified engineer consulted when:

• Pipework gradients

Ensured that there is sufficient fall (gradient) from the dwelling to the invert level (depth below ground) of the inlet pipe. A fall of between 1:40 and 1:100 is usually required to give a self-cleansing velocity that prevents blockages in the pipes.

The fall for drainage field soakaway pipework should be no steeper than 1:200 and should be constructed using RIGID, smooth bore, perforated or slotted pipe. Under no circumstances should flexible, corrugated, land drainage pipe be used.

• High Water Tables

Installing in an excavation that allows water to enter. High ground water table or flood conditions will cause problems during installation and may affect the plant during de-sludging. Backfill instructions follow.

• Base Construction

Both the base on which the tank sits and the backfill material must support the tank when full and not allow it to sink.

• Backfill Material

In some circumstances it is possible to backfill with a granular material such as pea shingle. However, due to variations in ground conditions, WPL strongly recommends that all DMS models are installed in a dry, lean concrete (RC25 mix with a 20 slump) to approximately 150mm below the lid. If in any doubt, contact a civil engineer.

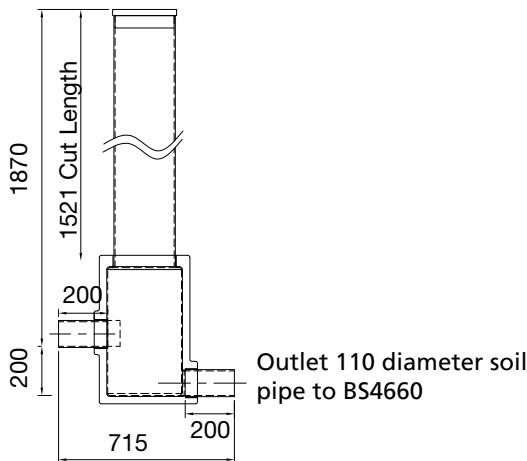
All DMC models must always be installed in dry lean concrete mix as above.

For installations in a high water table or clay soiled areas backfill with a dry, lean concrete mix as above.

If in any doubt consult a qualified civil engineer.

Under no circumstances should the backfill material be vibrated to achieve compaction and the backfill pour must not outpace the ballasting of the tank with water. Backfill outside can only equal the level of the water inside.

5.2 WPL Sample Chambers



• Position the sampling chamber as close to the outlet of the treatment plant as possible, but no more than 5m away. The sampling chamber should incorporate a large enough drop to allow a sample vessel to be filled with flowing water. See diagram for an indication of dimensions.

5.3 INVERT TURRET AND BODY EXTENSIONS

The Diamond plant may be supplied factory fitted with an optional invert extension (either as a turret or body extension on DMS models, or as a turret extension on DMC models) if specified when ordered.

If the plant has been supplied with the standard invert and a deeper invert is required, please contact WPL or your supplier as these can be supplied and fitted on site.

Note: If you have a Diamond DMS plant with an integral pump chamber (IPC) please see section 6 of this manual, if you require a body or turret extension to be fitted on site.

The following sizes are available:

Turret extensions dimensions

DMS2 & DMS3	DMS4 & DMS5	DMC6-9
190mm	200mm	100mm increments up to max. of 1200mm
280mm	300mm	
370mm		
460mm only		

Body extensions dimensions

Only available on **DMS** models in sizes from 200mm to 1000mm, in 100mm increments.

Do not stack turret extensions to increase the invert as this will adversely affect the serviceability of the unit.

Diagram showing Turret and/or Body Extensions on a DMS model

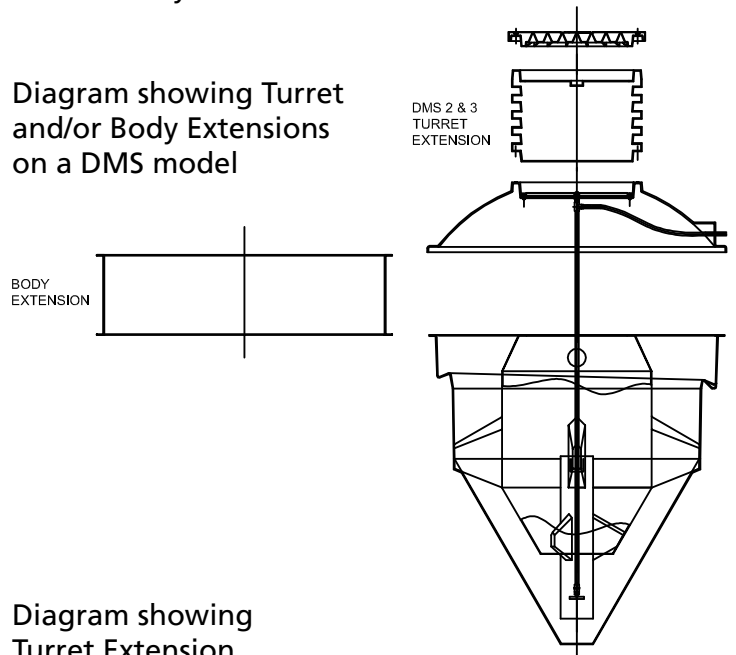
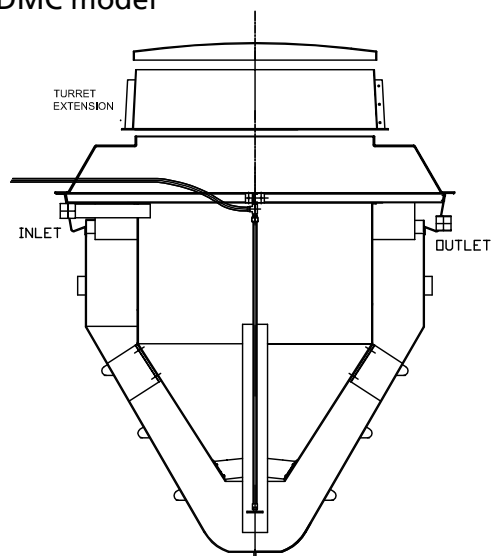


Diagram showing Turret Extension on a DMC model



DMS turret invert extension fitting

- Remove the access lid
- Place the turret extension over the opening of the cover and slide it down as far as it will go or until it rests on the cover dome. Using a spirit level, ensure that the turret extension is level.
- Drill through the cover using the holes in the side of the turret as a guide and secure using the nuts, bolts and washers supplied.
- Apply a bead of sealant where the turret and dome cover meet.
- Replace the lid and secure with the thumb bolts.

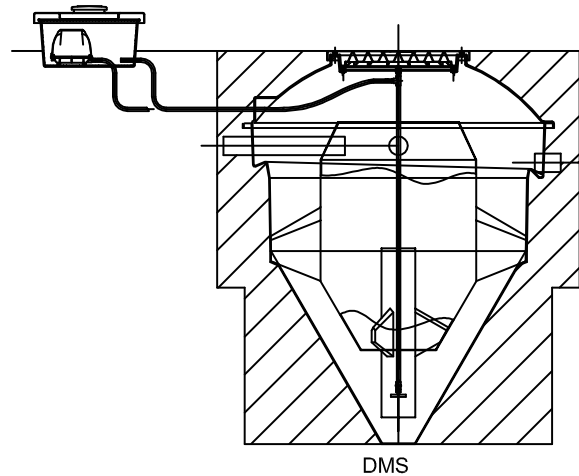
DMS body invert extension fitting

- Assemble the two halves of the body extension using the nuts, bolts and washers supplied and seal the vertical joint with a bead of sealant.
- Place the extension on top of the main body and gently clamp together. Drill eight equally spaced holes around the joining flange and secure with the nuts bolts and washers supplied.
- Place the dome cover, complete with lid, on top of the extension. Using the already drilled holes as a guide, drill through the top flange of the extension and refit the eyebolts.

DMC turret invert extension fitting (body invert extensions not available on DMC models)

- Remove the access lid
- Place the turret extension over the opening of the cover and slide it down as far as it will go or until it rests on the cover dome. Using a spirit level, ensure that the turret extension is level.
- Drill through the cover using the holes in the side of the turret as a guide and secure using the nuts, bolts and washers supplied.
- Apply a bead of sealant where the turret and dome cover meet.
- Replace the lid and secure with the thumb bolts.

5.4 DMS Tank installation (including IPC models)



- Excavate to the tank dimensions (see page 14) with minimum of 300mm clearance around the plant including underneath the base. A square, stepped excavation may be used due to the physical shape of the Diamond. Allow adequate clearance for all pipes and any other connectors to the unit.
 - Cast the concrete base ensuring that the slab is designed to support the unit in its normal operation (i.e. full of water). The base must be level and to the correct height to suit the inlet invert level required. Allow for initial set before positioning the unit.
 - Excavation must be kept dry during the installation and until the concrete has cured.
 - Lift the complete tank by the eyebolts and slowly lower the tank into the hole until the tank is resting in the bottom of the hole, ensuring that it is not sitting on any sharp or pointed material.
 - Roughly align the inlet and outlet pipes with their corresponding sewer connections.
 - Roughly level the tank, whilst running approximately 750mm of water inside the tank and 750mm of backfill around the tank. This will stabilise the tank.
 - Temporarily plug the outlet pipe.
 - Fill the effluent trough with water until it overflows the effluent weir.
 - Using the water in the tank as a guide, level the tank so the water is parallel with the top of the flange of the tank all the way round. Double check with a level across the top.
- Note** - An alternate installation method involves removing the dome cover and levelling across the top of the lower carcass.

- Continue backfilling around the tank as the water level in the tank rises. Stop backfilling just below the inlet and outlet connections.

- Make the inlet and outlet connections to the sewer pipes.

- If a “Body Invert Extension” is to be used, it should be fitted now (if not supplied factory fitted). See **Section 5.3**.

- Remove the template on page 15 and cut out the relevant sized hole for the hose ducting you are going to use.

- Select the location for the duct, place the template on the dome cover just above the flange and mark the hole. Using an appropriately sized hole saw with a long centre drill or a handheld jigsaw, cut out the hole.

- Pass the ducting into the hole so that approximately 50mm is inside the dome cover. Apply a 10mm bead of mastic inside and out to stick the duct to the dome cover and allow to cure.

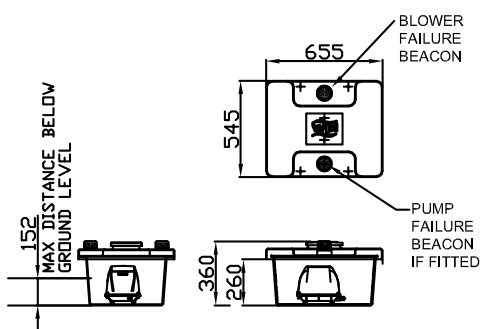
- If a “Turret Invert Extension” is to be used, it should be fitted now (if not supplied factory fitted). See **Section 5.3**.

- Place the dome cover on to the tank and reinstate the eyebolts; eyes downwards.

- Continue to backfill to level of app. 150mm and landscape up to ground level.

LEAVE THE UNIT FULL OF WATER.

5.5 DMS air pump housing installation



- Select a location for the air pump housing, in a shaded northerly aspect, which is easy to access for maintenance and avoids direct sun light (which may overheat the air pump), flora growth (which may restrict the ventilation), dust (which may clog the air filter) and flood water.

- Dig a narrow trench to a depth of app. 500mm, from the tank to the site of the air pump housing and lay the hose duct in it.

- Feed the hose through the duct.

- Cut a hole the diameter of the duct in either the bottom or the side of the air pump housing and pass the duct through the hole (see page 15).

- Apply a 10mm bead of mastic/silicon sealant inside and out to stick the duct to the housing. Allow to cure.

- Cut/drill another hole to suit the entry of the electrical cabling.

- Dig a hole approximately 100mm wider and longer than the housing and approximately 200mm deep.

- Put a 50mm layer of sand, sharp sand or dry lean mix concrete in the bottom of the hole and bed the housing onto it, ensuring that there is not a void underneath. Any void will amplify the noise of the air pump.

- Backfill around the housing with sand, sharp sand or dry, lean mix concrete.

Note - Please see Maintenance Log Book and User Guide/Operation & Maintenance Manual for more information on the following:

- Air blowers should only be allowed to draw-in clean uncontaminated ambient air
- Intake filter should be inspected/cleaned or replaced every 6 months
- Installation of a service kit (new valve boxes, diaphragms, filter element) should be every 18 months
- Operating pressure shall not be more than 200mbar
- Ambient air temperature should not exceed 38°C +10%

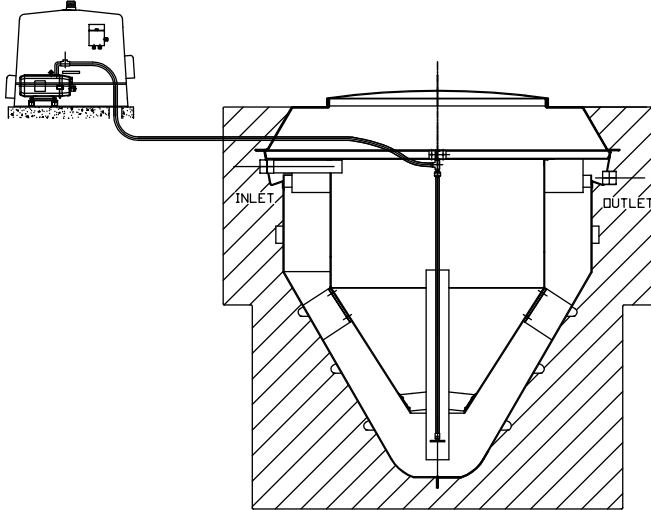
Hose connection to air pump & tank

- Connect the hose to the hose tail on the air distribution pipe in the centre of the tank and secure with hose clip supplied. Ensure there are no kinks in the lines. Cut the hose to length, connect to the hose tail on the air pump in the kiosk and secure with the hose clip supplied. Ensure that the hose does not bend sharply because it becomes warm during operation, softens and may deform at sharp bends.

- Fill each open end of the ducting with expanding foam to prevent rodent or insect ingress.

- Electrical connections – See **Section 7**.

5.6 DMC Tank installation

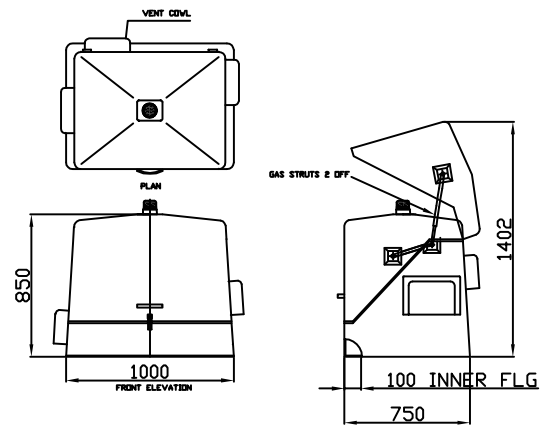


- Excavate to the tank dimensions (see page 15) with minimum of 300mm clearance around the plant including underneath the base. A square, stepped excavation may be used due to the physical shape of the Diamond. Allow adequate clearance for all pipes and any other connectors to the unit.
- Cast the concrete base ensuring that the slab is designed to support the unit in its normal operation (i.e. full of water). The base must be level and to the correct height to suit the inlet invert level required. Allow for initial set before positioning the unit.
- Excavation must be kept dry during the installation and until the concrete has cured.
- Ensure the surface of the concrete base is free of water, stones etc. On the concrete base lay a 125mm layer of the bedding backfill and lower the unit into correct position to suit pipe connections. It is important to put the first layer of backfill in position to ensure that the base of the cone and not the flange takes the full weight. Check the levels.
- Stabilise the unit in the excavated hole, taking care not to cause distortion of the unit. Fit temporary covers over all pipe connections. Commence filling unit with water to a level of 500mm.
- Commence backfilling to a level of app. 300-400mm. Stabilise and level the unit, ensuring correct orientation before continuing with water filling and backfilling with the relevant concrete mix. Ensure that water level remains at about 300mm above the backfill level until final pour. The back fill must be evenly placed around the unit at all times and worked by hand.

DO NOT USE VIBRATING POKERS.

- If a "Turret Invert Extension" is to be used, it should be fitted now (if not supplied factory fitted). See **Section 5.5**.
- When the backfill is approximately 500mm below the lowest underground connections, pipe connections should be made. Provide a servicing duct for the air line connection to the unit. Fit ducting from the kiosk to the unit and at the point where the ducting meets the unit, drill or cut a hole to suit. Insert the ducting into the unit to a depth of 50mm. Where the duct meets the outer face of the unit put a polyurethane or acrylic mastic bead around the duct.
- Continue to fill with water to the working level of the tank and backfill to required level. LEAVE THE UNIT FULL OF WATER.

5.7 DMC Air pump kiosk installation



- Lay a concrete slab to suit the kiosk, above the adjacent surface water level (and the flood plain) to avoid surface water ingress. Provision for servicing ducts for air lines, cables and mains power should be made.
- Lay the ducting from the kiosk to the unit and mains.
- A mains electricity supply is required into the kiosk.
- Secure kiosk to the slab through the unistrut and seal to the concrete with mastic. Do not secure until the concrete slab has fully cured.

Hose connection to air pump & tank

- Connect the hose to the hose tail on the air distribution pipe in the centre of the tank and secure with hose clip supplied. Ensure there are no kinks in the lines. Cut the hose to length, connect to the hose tail on the air pump in the kiosk and secure with the hose clip supplied. Ensure that the hose does not bend sharply because it becomes warm during operation, softens and may deform at sharp bends.

- Fill each open end of the ducting with expanding foam to prevent rodent or insect ingress.

- Electrical connections – See **Section 7**.

6. DIAMOND DMS-IPC (INTEGRAL PUMP CHAMBER) MODELS

6.1 Description of Diamond IPC models

Diamond DMS models may be supplied with an optional, factory fitted "Integral Pump Chamber (IPC)" **if specified when ordered**.

The model number indicates whether an IPC is fitted as follows: DMS2-IPC, DMS3-IPC, DMS4-IPC, DMS5-IPC. (DMC models are not available with an IPC.)

Note - IPC's cannot be fitted to a standard Diamond DMS plant retrospectively/on-site.

A standard invert level will be supplied with any Diamond DMS-IPC model unless otherwise specified when ordered ie: with a body or turret extension. If a deeper invert is specified when ordered, then the IPC will be factory fitted accordingly, to suit the body or turret extension.

If you have a DMS-IPC model which has been specified and factory fitted with an Integral Pump Chamber, with the standard invert AND a deeper invert is subsequently required, please contact your supplier as a turret and/or body extension can be supplied and fitted on site.

When fitting a turret or body extension on site, you will require an extension kit for your Integral Pump Chamber and/or diffuser pipe, which can also be supplied and fitted on site. Please contact your supplier to order an extension kit from WPL.

Note: WPL recommends the maximum increased invert using a body extension is 500mm. Inverts deeper than 500mm restrict access to the IPC chamber for servicing and maintenance once installed. Contact WPL for advice. Installation instructions for both extension kits follow in this section of the manual.

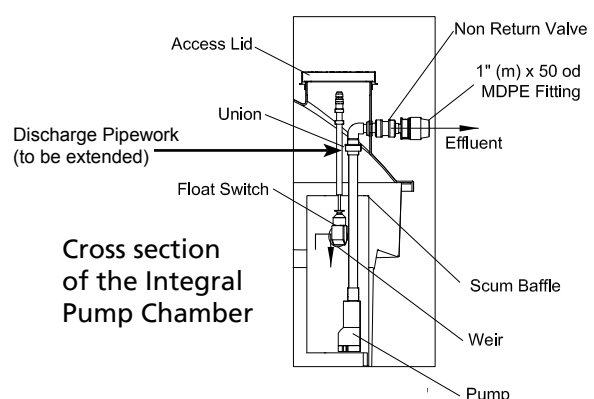
Note: IPC extension kits should be fitted by a competent person and WPL strongly recommends that all electrical connections are performed by a qualified electrician.

The standard Diamond Internal Pump Chamber consists of the following components:

- 1 - TOP1 240v, 0.25Kw pump, integral float switch, with stainless steel internals
 - External non return valve
 - 1" to "2 MDPE pipe connector
 - 1" PVC pipe and union (with O ring seal)
 - 1 - High level floatswitch and mounting tube
 - 1 - High level alarm beacon with 1m of lead and plug, (not fitted)
 - 1 – Junction box
- The IPC has been designed to take the Top1 range of pumps and to deliver up to 80 litres per minute of effluent at a head of 3.5m.
 - The unit has been developed to provide a means of delivery for treated effluent where the existing terrain and invert levels of the pipework prevent normal gravitational discharge. The unit is equipped with a non return valve to prevent backflow of pumped influent and a connection for 50mm MDPE pipe.
 - The pump operates automatically via the combined floatswitch and requires minimal maintenance.
 - A high level alarm (a red beacon mounted on the kiosk, in addition to the air blower alarm beacon) is supplied that will operate in the event of a high level within the pump chamber. The float is plugged into a 'switchbox' that operates the beacon when the high level float is operated.
 - IPC's are fitted with a foam seal and mastic bead around the underside of the dome cover.
 - All underground current carrying cables must be installed in a suitable conduit to protect the cable from damage.

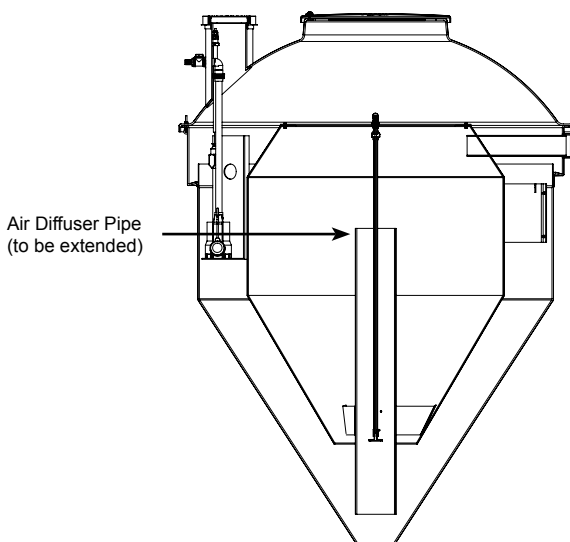
6.2 Installing the IPC Extension Kit (inc. extending the air diffuser pipe if required)

The following installation instructions should be followed to fit the IPC extension kit when a turret or body extension has been fitted on site to a standard invert IPC model:



- Remove the existing bulkhead fitting, union and elbow and fit the extension piece to the existing discharge pipework.
- Refit the bulkhead fitting, union and elbow as previous. Nb. When fitting the socket to the pipe use liquid soap or similar on the seal to assist with assembly/removal.
- The High Level Float switch is pre-installed, but check that the floatswitch makes contact when the water level is approximately 50mm below the top of the pump chamber.(ie the float is horizontal). Adjust the float as necessary.
- Double check to ensure the floatswitch on the pump is central within the pump chamber. The floatswitch on the pump should be adjusted so that the float will be free to rise with the level of water entering the pump chamber.

The following installation instructions should also be followed to extend the air diffuser pipe when a body extension has been fitted on site to a standard invert IPC model (not necessary when a turret extension only has been fitted):



- Undo diffuser pipe union and fit the extension piece to the diffuser pipe, then re-fit into the union.

6.3 IPC Electrical connections

WPL strongly recommend that all electrical connections are performed by a suitably qualified electrician.

- Install a suitable conduit/pipe to carry all wires from the pump and high level alarm floatswitch.
- Run a draw line through the conduit/pipe.
- Fit the conduit/pipe into the access pipe and down to the Diamond kiosk.
- Tie the draw line to the cables and pull the cables through the fittings, into the conduit/pipe and through to the kiosk.

- Bare the pump wires and connect into the junction box in the marked terminals
- Connect the floatswitch (for high level alarm supplied) to the junction box.
- Connect the mains supply from an RCD protected supply and turn on
- Plug the flying lead from the red beacon into the junction box

6.4 IPC Testing

To ensure that the system operates correctly WPL advise that the pump and high level alarm are tested BEFORE sewage is introduced into the unit.

- Fill the Diamond with water until it begins to enter the pump chamber.
- Continue filling until the floatswitch on the pump has reached the horizontal position.
- At this point the pump should operate.
- If the pump does not operate, continue adding water to ensure that the float is in its operating position.
- If the pump still does not operate check all connections, power supply and RCD.

Checking the high level alarm.

- Turn off the pump at the supply.
- Continue filling the Diamond until the water level in the pump chamber is approximately 70mm below the chamber top
- At this point the high level float should be horizontal and in its operating position, switching power to the alarm beacon on the kiosk, the red beacon will illuminate.
- If there is no alarm check all wiring connections and power supply.
- If the alarm operates with the float hanging down then it has been wired incorrectly.

In the event of an inoperable alarm or pump, contact WPL Service Department for on 023 9224 2600.

7.ELECTRICAL INSTALLATION DMS/DMC AIR BLOWERS

(Note - Prior to turning on the electrical supply to the air pump and before allowing sewage wastewater to enter the treatment plant, please carry out the checks in **Section 8.**)

- It is not feasible to state a specific installation arrangement due to the variance of sites and installation configurations. It is important therefore, that the electrical installation is carried out by a qualified electrician in accordance with the 17th or later edition of the Institute

of Electrical Engineers (I.E.E.) regulations, with appropriate current protection devices for the site configuration.

- The supply to the air pump housing/kiosk should have a dedicated circuit incorporating isolation and protection devices to the regulatory requirements of the I.E.E. An earth leakage circuit breaker is recommended and should be incorporated into the supply. A device with a 30mA maximum trip current is recommended.

- **Three Phase Connection – DMC units only**

Diamond systems are supplied with single phase electrics as standard. If a three-phase supply was specified and supplied for a DMC model, check the rotation of the air pump is correct when the power is switched on initially or following power failure. Incorrect rotation will cause damage if run for more than a brief check. This observation must be done with the hose disconnected from the air pump because if it runs backwards, liquid may be sucked from the tank and damage the air pump.

- See **Section 6.** for electrical connections for the Integral Pump Chamber.

8.COMMISSIONING

Prior to turning on the electrical supply to the air pump and before allowing sewage wastewater to enter the treatment plant, please check the following:

8.1. Inside the Diamond tank

- Check the security of the air diffuser – Unscrew the union on the vertical section of the rigid air pipe down leg, taking care not to lose the rubber 'O' ring inside the union. Lift out the down leg and check the plastic clips securing the rubber membrane to the diffuser body. Replace the down leg, ensuring that it goes back inside the draft tube. If the 'O' ring in the union is dry, moisten with a little water.

- Check the security of the air hose where it passes through the aeration chamber cross member – Tighten the lock nut with a suitable spanner if required, taking care not to over tighten.

- Check the security of the hose tail, flexible hose connection and hose clip – tighten as required, taking care not to over tighten.

- If the flexible hose is too long and sags, shorten it or secure it to the cross member with a suitable cable tie or similar.

- Remove any construction/installation debris from all areas of the tank.

- Check that the inside of any ducts are sealed with expanding polyurethane foam to prevent rodent/ insect entry.

8.2. Air pump housing/kiosk

- Check that the air pump housing/kiosk is secure and cannot be easily moved. Movement may cause damage to the electrical and hose connections.

- Ensure that the DMS air pump housing is well bedded, with no voids underneath. Any voids will allow the bottom of the housing to act as a resonance board and will amplify the sound of the air pump.

- Check that the inside of any ducts are sealed with expanding polyurethane foam to prevent rodent/insect entry.

- Check that the joint between the duct/cable entries where they pass through the bottom or the side of the housing, are sealed with a good quality sealant to prevent water ingress.

- Ensure that the inside of the housing is dry. Moisture may affect the electrical connections and cause nuisance tripping.

8.3. After switching on the power

- Listen to the air pump. It should hum quietly and vibrate slightly.

- Listen for air leaks. Tighten joints as required.

- Check the water turbulence in the aeration chamber; it should be as a Jacuzzi. The bubbles should break the surface in a circle and disperse outwards. The water may splash out of the aeration chamber. This is normal until the liquid thickens with age.

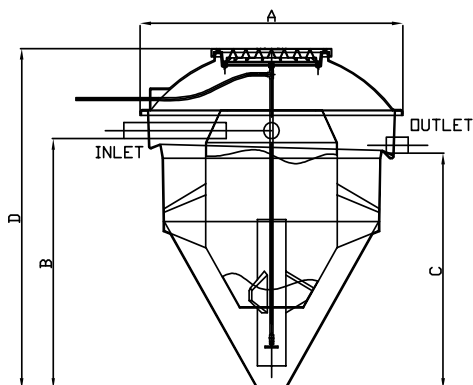
- Run some taps in the house and observe an inflow. Remove any debris brought in by the inflow.

- Continue running the taps until liquid is displaced to the outlet weir. Check that the overflow is fairly even around the tank.

- Replace all covers and secure.

Diamond DMS and DMC Tank Dimensions

Model	A - Max outside diameter	B - Height to inlet	**Standard Inlet invert depth	C - Height to outlet	D - In ground depth	Weight empty	Total capacity
*DMS2	1.85m	1.71m	618mm	1.61m	2.34m	154 Kg	2271 ltr
*DMS3	2.07m	1.84m	770mm	1.74m	2.62m	192 Kg	3028 ltr
*DMS4	2.1m	2.05m	742mm	1.93m	2.8m	210 Kg	3974 ltr
*DMS5	2.1m	2.05m	742mm	1.93m	2.8m	210 Kg	3974 ltr
DMC6	3.2m	2.78m	580mm	2.68m	3.35m	380 Kg	9056 ltr
DMC7	3.2m	2.78m	580mm	2.68m	3.35m	380 Kg	9056 ltr
DMC8	3.2m	3.14m	580mm	3.04m	3.7m	460 Kg	15038 ltr
DMC9	3.2m	3.14m	580mm	3.04m	3.7m	460 Kg	15038 ltr



All dimensions +/- 10mm tolerance

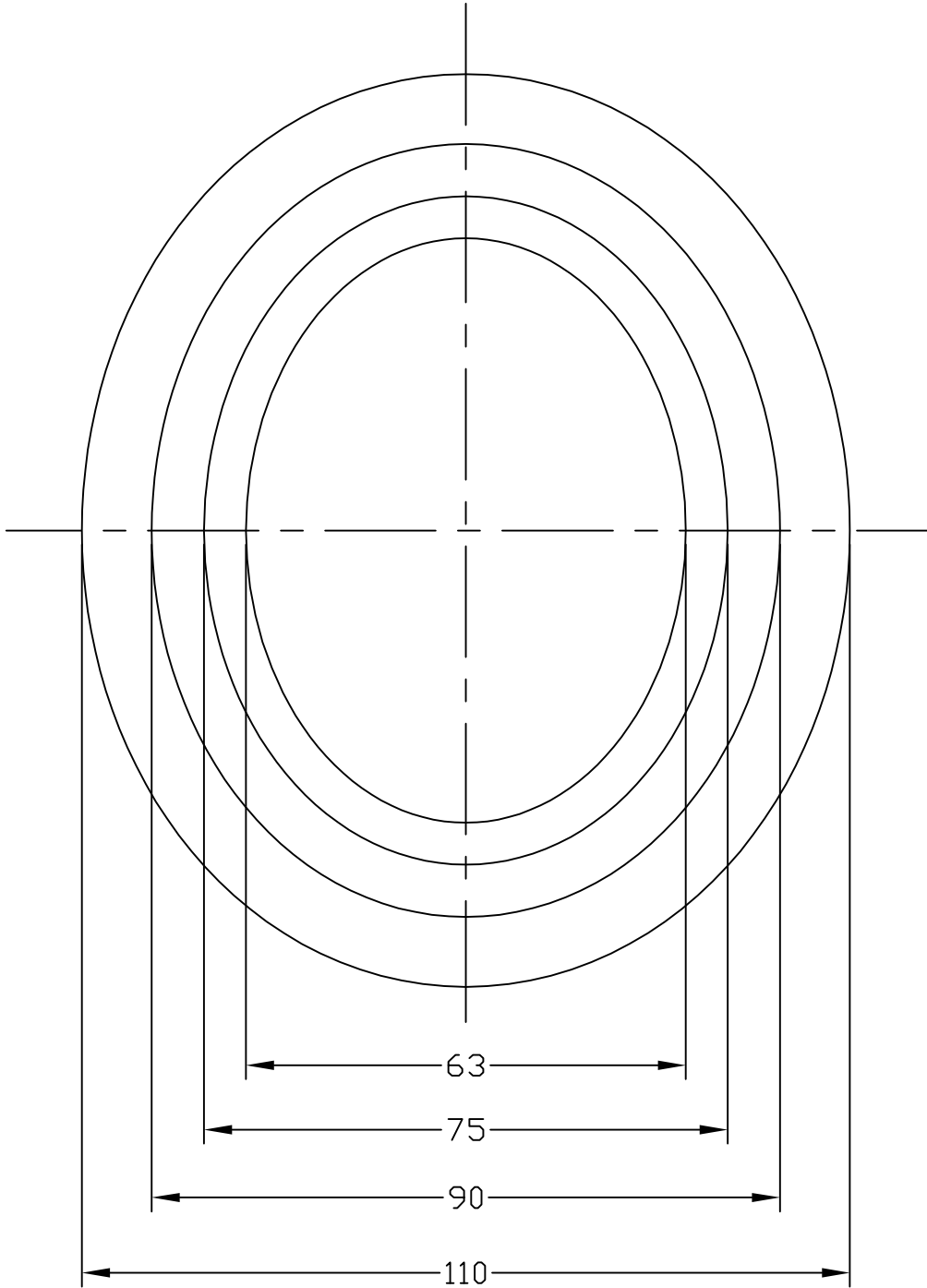
*Includes IPC Models

**A deeper invert may have been specified at time of ordering.

Check the specification of the model supplied for any deeper turret or body extensions. If you have not ordered a deeper invert and one is required contact your supplier or WPL Ltd on 023 9224 2624. See **Section 5.5** of this manual.

Air pipe duct cutting template
(DMS units only)

Cut page along the dotted line and remove from the manual





WPL Limited
Units 1 & 2 Aston Road
Waterlooville
Hampshire PO7 7UX
United Kingdom

Tel: +44 (0)23 9224 2600
Fax: +44 (0)23 9224 2624
email: enquiries@wpl.co.uk
www.wpl.co.uk

