

Ant Hire
SOLUTIONS

MANHOLE BASE
CONSTRUCTION



VERTFORM®
USER GUIDE

anthire.co.uk

TEL: 0333 567 3192

WHAT IS VERTFORM®?

Designed and developed by Ant Hire Solutions, Vertform® is a totally unique system that allows manhole inverts to be constructed quickly, safely and easily by unskilled teams.

Vertform® is proven to produce exceptional results, delivering a durable, high-quality finish in the shortest possible timeframe.

Each complete Vertform® set provides you with the components needed to create a watertight manhole in one operation, achieving any angle up to 90°.

BENEFITS OF VERTFORM®

- Construction takes place in a single operation, requiring no granolithic benching or time-consuming sealing
- Simple system and easy-to-follow instructions eliminate the need for skilled labour
- Suitable for pipes between 375mm and 1,800mm
- Pre-formed components ensure the correct invert profile
- Reduces the need for confined space working
- Reusable, economical components
- Can be installed from just 45 minutes
- Provides an excellent-quality finish.

APPLICATIONS

Vertform® has the flexibility to create manhole inverts for multiple connections and pipe diameter changes:

- 3 and 4-way connections
- landing areas
- lateral connections
- pipe diameter changes
- manhole access - double step irons, walkways or toeholds

Further information about Vertform® can be found on the Ant Hire Solutions website and in our explainer video at www.anthire.co.uk/product-category/manhole-base-construction/



We have created this user guide to enable contractors to use the Vertform[®] system and its accessories to its full potential.

THE EXCAVATION

- The manhole excavation should be deep enough to give a minimum of 225mm clearance below the underside of the product pipe.
- If the ground conditions are very wet, a submersible pump placed in a corner of the excavation inside a spare piece of pipe, will control any ground water.
- Pipe bedding can be placed on the floor of the excavation to improve working conditions
- There is no need to cast a concrete base prior to building the manhole as this will be achieved when using the Vertform[®].

PRECAST CONCRETE CHAMBER RINGS

- Chamber ring diameters should be as specified in 'Sewers for Adoption'; smaller or larger rings may be used in certain situations.
- Small chamber rings limit the length of channel and the angle of direction change that can be achieved. The short channel length restricts the number of angle components that can be fitted. On straight channels this has little effect.
- Oversize chamber rings will require additional short straight sections of Vertform to be added to the set for straight and shallow angle channels in order to accommodate the extra distance between stub pipes.
- On long channels, care must be taken to prevent uplift of the shutter when vibrating the concrete. Strutting from the manhole shoring (using a manhole box/manhole brace) can help this. Alternatively the shutter can be weighted with sand bags or similar.

POSITION OF BOAT SECTIONS

- The long straight boat sections should be placed into the product stub pipe. These sections have no corresponding vertical components and, if used in the main channel, will not allow the shutter to be completed. If used they must be removed and replaced with the short straight sections which do have vertical components.
- On tight angles, 90° bends etc, where length of channel is tight, it may be beneficial to replace the long boat with a short straight in the stub pipe; this will help with removal as the channel will be turning straight after the product pipe. The short straight sections will not be required in the main channel since it will be formed with all angle components.



BACK DROP MANHOLE

- The bend on the connecting pipe to the main channel should be securely mounted on a suitable plinth with the connecting pipe cut and trimmed to a good fit against the Vertform® shutter. Care should be taken when placing and vibrating the concrete.



SINGLE & MULTIPLE CONNECTIONS

LATERAL CONNECTIONS (150MM – 300MM)

The lateral connector fixing tongue is positioned in the nearest convenient joint between components prior to tightening the bolts; this may be in vertical or horizontal joint.

The product pipe ends should be trimmed to give a good fit against the shutter panel and can be sealed with shuttering tape to guard against concrete entering the side connecting pipe.



OPEN CHANNEL FORMER

- This component is used to form a 150mm lateral connection with an open channel to facilitate inspection and jetting purposes. They are available in straight and 45° as well as left and right hand options.
- The fixing clamp can be positioned anywhere on the top flange of the vertical components.
- The jaws are then opened to clamp the former to the shutter and sealed with shuttering tape to guard against concrete entering the channel.



STOP-END U BOARD

- The U board is a 18mm thick ply board used to close the end of the Vertform when it is being applied in a channel with only 1 main pipe.
- A size of 2/3mm less than the cross section profile of the shutter enables easy removal when stripping.
- It is fixed to the Vertform by 2 bolts using the top holes on the last vertical sections, the holes in the ply board are slotted to give adjustment. The bolt heads are to face the concrete.
- Any small connecting pipes 225mm diameter or less can be butted against the board and anchored accordingly with pre-cut plywood discs to suit the internal diameter of the pipe.
- On large diameters a strut should be used from the board to a suitable point to prevent any deflection from the weight of the concrete. Care must also be taken to ensure that the free end of the shutter does not lift when using the concrete vibrator.



SIDE CONNECTIONS

- 3 or 4 way connections of pipes of the same diameter, place the side connection components into the side connection and push them into the pipe clear of the area of the main channel. The main channel should then be built with the side connection pieces pulled out and up tight against the main channel components before finishing building the sides.
- For side connections of pipes of a smaller diameter, the vertical sections will need to be made in ply since the GRP components may not be high enough. Timber battens should be in place on the side connection components to attach the ply vertical sections.
- Suitable cross strutting between the panels will be required.



ACCESS

BOX-OUT FRAME

- These are used in shallow manholes where it is not possible to stand to create a walk way from the chamber ring to the channel.
- There are 2 sizes:
 - small for pipe diameters up to 750 mm
 - large for 800 mm upwards
- The box out frame is fixed to the shutter in the required position with the two angle pieces. These should then be positioned under the top flange of the relevant vertical panel and tightened with the spinner nuts.
- Plywood will be required to be cut to suit, creating a box (2 sides/back/base) with the back narrower than the front to enable stripping. The sides will need to be the same profile as the Vertform® - use a section of the Vertform® as a guide to scribe onto the ply wood.
- This will enable the step irons in the chamber rings to be continued down into the created walkway.



DOUBLE STEP FORMER

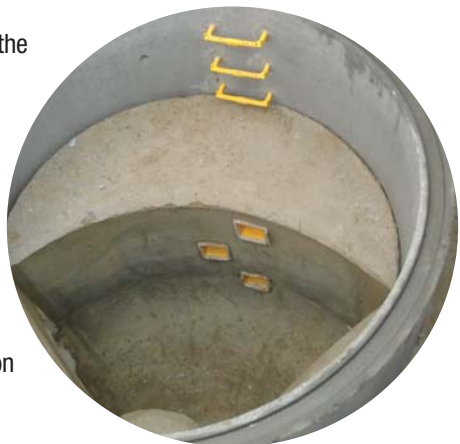
- The former creates a rebate 600 mm wide x 180 mm deep to accommodate double step irons.
- It is fixed to the outside of the shutter by means of a clamp which can be positioned where required by locating the clamp's 2 angle pieces under the top flange of a relevant vertical section and tightening the spinner nuts.
- The former is locked on the clamp by the steel bar inside the former using the clamping nut located on top of the clamp. Height adjustment is achieved with the other nut.
- For large diameter pipes an additional closure piece that will allow the rebate to extend to 150 mm above invert level will be required.
- If fixing the former on a curve, the straight ply closing board will need to be changed to the curved one.
- Tape the edge of the former where it touches the shutter to prevent concrete ingress. A punching may also be required to prevent the former moving away from the shutter until there is sufficient weight of concrete to keep it against the shutter.





TOE HOLDS

- 'Sewers for Adoption' states that channels above 600mm wide should have toe holds.
- Toe holds are fixed to the outside of the shutter with the fixing tool. Fixing tools come in two types:
 - horizontal for fitting to a horizontal joint
 - vertical for the vertical joint.
- These are fitted to the toe hold by locating the tool into the 2 recesses inside the unit and the tongue fitted through a suitable joint on the shutter before tightening the bolts.
- Toe holds should be placed approximately 200mm above and to the right or left of the previous one, usually for a maximum of 3 units.
- Always make sure that the embossed chevrons on the inside of the toe hold are on the bottom as this is the non slip grip.





OFF CENTRE PIPES

OFF CENTRE PIPES

- This can occur in two different forms:
 - when 2 pipes are supposed to meet on a common centre line but do not
 - when a pipe coming in at an angle does not conform to the centre line of the other pipe.
- For the first situation, this can be overcome by reversing the first angle section and placing the second angle section the opposite way, thus forming an S bend.
- The second example is resolved by setting the angle section to one end of the channel, ensuring the bend will not be in the centre of the channel.



TAPERS



GRP TAPERS

- Straight invert/invert tapers are available from 900mm pipe diameter to 450mm pipe diameter reducing 1 pipe diameter change per taper.
- Straight soffit/soffit (crown/crown) tapers are available from 900mm pipe diameter to 375mm pipe diameter reducing 1 pipe diameter change per taper.
- Angled 22.5° soffit/soffit tapers in left or right-hand bend from 600mm pipe diameter to 375mm reducing 1 pipe diameter change per taper.



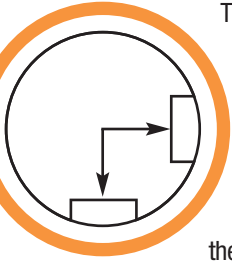
TIMBER TAPERS

- For large diameter pipes, or where there is a large size drop of the pipe or limited channel length, the tapers are supplied in timber.
- If there is a large fall across the manhole an invert adjusting piece can be made on request.
- Since the height of the side panels can vary, these panels must be cut from ply on site to suit the application.
- A timber batten will fix to the taper and timber pieces will attach to the end of the GRP panels with bolts. These are the fixing points for the ply side panels.
- Suitable cross strutting must be placed to prevent any deflection of the side panels by the pressure of the concrete.



RING SIZE

REQUIREMENTS



The required manhole ring size and the channel length this allows for each pipe size, as per 'Sewers for Adoption', are detailed below.

These sizes are sufficient to form bends in the channel up to 90°.

The stub pipes should enter the manhole chamber along the centre line (c) of the manhole ring to ensure sufficient length to accommodate the bend.

Channels on slight bends and straight sections can be easily achieved with the ring sizes provided.

| PIPE DIAMETER (mm) | RING SIZE (mm) | CHANNEL LENGTH (mm) |
|-----------------------|-------------------|------------------------|
| 375 | 1,500 | 1,300 = 650 c 650 |
| 450 | 1,500 | |
| 525 | 1,500 | |
| 600 | 1,500 | |
| 675 | 1,500 | |
| 700 | 1,500 | |
| 750 | 1,800 | 1,500 = 750 c 750 |
| 800 | 1,800 | |
| 900 | 1,800 | |
| 1,050 | 2,400 | 2,100 = 1,050 c 1,050 |
| 1,200 | 2,400 | |
| 1,350 | 2,700 | 2,250 = 1,125 c 1,125 |
| 1,500 | 3,000 | 2,500 = 1,250 c 1,250 |
| 1,800 | 3,600 | 3,000 = 1,500 c 1,500 |

Ant Hire
SOLUTIONS

Contact Ant Hire Solutions for more information about our Vertform® Manhole Base Construction solutions

• 0333 567 3192 • enquiries@anthire.com • anthire.co.uk

Ant Hire Solutions, Queen Street, Leeds LS10 1SL