TECHNICAL DESIGN GUIDE

HepVO®

PLUMBING

Hygienic Self Sealing Waste Valves

Prevents the escape of foul sewer air from waste discharge systems.

Actively maintaining a pressure equilibrium in soil and waste installations.

HepVO is a self sealing valve designed to close the waste connection below a sanitary appliance to prevent the escape of foul sewer air into the dwelling.

HepVO actively eliminates negative pressure within the waste system by opening and allowing in fresh air until a state of equilibrium with atmosphere is reached. This means that venting of the waste system, or the inclusion of air admittance valves in the waste system is no longer necessary.

The HepVO valve means enhanced plumbing design and system efficiency, without compromising performance or risking the escape of foul air into the living space from the drain or sewer.

HepVO is a self sealing valve designed to close the waste connection below a sanitary appliance to prevent the escape of foul sewer air into the dwelling and thereby complies with the requirements of **BS 5572**: 1994 Code of practice for Sanitary pipework and Document H of the Building Regulations 1985 'Drainage and Waste Disposal'.

Extensive testing has shown that the HepVO valve performs under everyday conditions in which traditional water sealed traps are prone to failure.

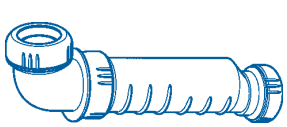
The HepVO valve will perform under back pressures which are 10 times greater than those experienced in a typical soil and waste system.

The HepVO Range - Product Selector

The HepVO valve can be installed vertically or horizontally (with an adaptor) and is available in 32mm and 40mm.
Material: Polypropylene **Colour:** White **Certification:** Watermark Certificate Number 042/97 - Revision 1, June 1998

Universal Compression Outlet

Nominal Diameter mm	32	40
HepVO Waste Valve		
Hygenic Self Sealing Waste Valve 	✓	✓

Nominal Diameter mm	32	40
HepVO 87½° Knuckle Adaptor		
Use with HepVO valve for horizontal applications  	✓	✓

Nominal Diameter mm	32	40
HepVO Running Adaptor		
Use with HepVO waste valve when installing in a pipe run  	✓	✓

HepVO - Design and Performance

Foul Air: The importance of exclusion
It is a **mandatory requirement** of the Building Regulations (see Approved Document H.1) that a foul water drainage system shall be **adequate**. In the view of the Secretary of State the requirement of Approved Document H.1 will not be met if the drainage system does not **'prevent foul air from the drainage system from entering the building under working conditions'**.

Single stack soil and waste discharge systems, as described in **BS 5572**: 1994 Code of practice for Sanitary pipework will be subject to negative and positive pressures as water is discharged from associated sanitary appliances. These pressure fluctuations may result in self siphonage, induced siphonage or compression. Fig. No.'s 1, 2 & 3.

Fig. No. 1 **Self Siphonage**

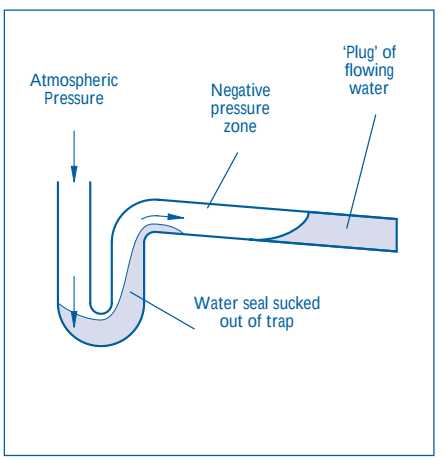


Fig. No. 2 **Induced Siphonage**

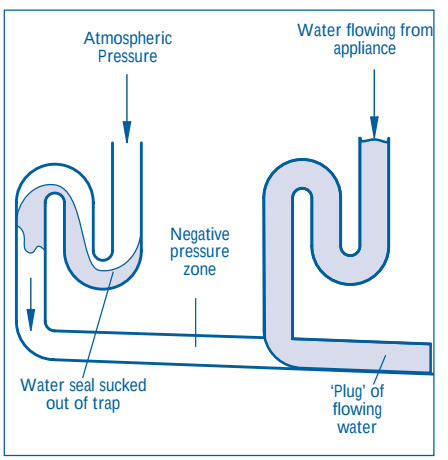
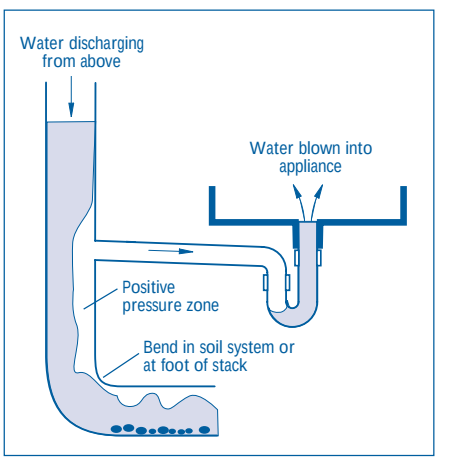


Fig. No. 3 **Compression**

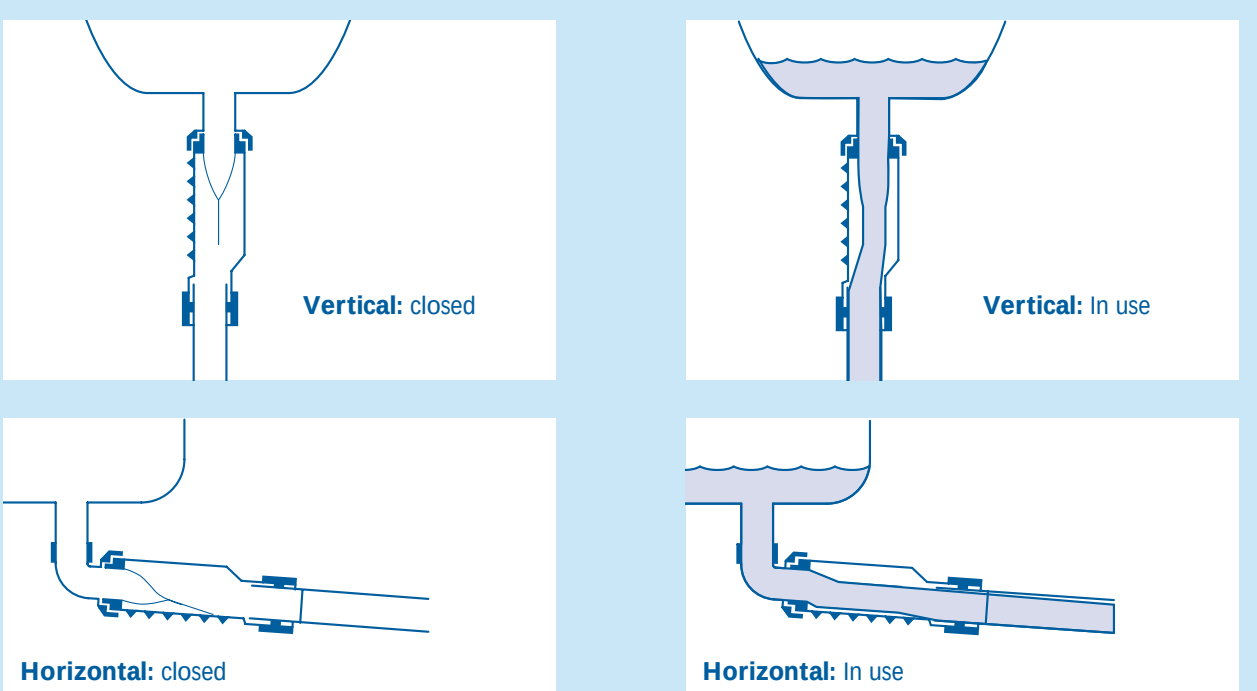


If the single stack system is designed **strictly in accordance** to the guidance in **BS 5572** then these positive and negative pressure fluctuations can cause water trap seal reduction, for example, reducing a wash hand basin trap from 75mm to 25mm. Systems which deviate from the regulations will be subject to greater pressure fluctuations which commonly result in *water displacement* out of the trap allowing foul air to enter the building.

Foul sewer air is undesirable and must not be tolerated. A water seal trap which is not protecting people from the entry of sewer air can be identified by either a **Gurgling Noise** and/or a **Foul Drain Smell**.

HepVO : A Barrier between the Living Space and the Drainage System
The HepVO self sealing valve opens under the water pressure of an appliance emptying and closes to form a tight seal after the appliance has discharged under normal atmospheric conditions Fig. No. 4.

Fig. No. 4 **Operation of HepVO**



HepVO - Design and Performance - *continued*

The performance of the valve in excluding foul air is **unaffected** by those pressures normally found in domestic and commercial soil and waste systems. HepVO removes the risk of the escape of foul sewer air, that exists when using conventional traps, and exposure to environments which can be polluted by foul sewer air, entering through the waste system. In addition HepVO will not tolerate or support microbial growth of a fungal, bacterial or viral nature.

Excessive positive pressures will be relieved by air bubbles escaping through any WC water seal within the system. However should *abnormally excessive* internal pressures exceed 500mm water gauge (0.5 bar) then the valve element of HepVO will invert indicating system failure. This would allow water to backfill the appliance, thereby giving *an important safety warning* that blockage of the drainage system had occured, in much the same manner as a traditional trap.

HepVO - Applications

HepVO actively eliminates negative pressure within the waste system by opening and allowing in fresh air until a state of equilibrium with atmosphere is reached.

More commonly, in the case of negative pressures the HepVO valve is designed to open in order to equalise negative pressures by admitting fresh air into the system, and subsequently closing to reseal the waste system and prevent foul air release.

Where there is a waste branch which enters the stack above the WC branch, HepVO will provide an air inlet and no air admittance valve is required.

The *dual function* that the HepVO valve performs in:-

(i) preventing the entry of foul sewer air

(ii) actively eliminating negative pressure

means that **venting** of the waste system, in a single stack soil system, is *no longer necessary* and the practice of fitting **Air Admittance Valves** to a soil and waste system is also *unnecessary*.

Note: Care should be taken to ensure that the underground drainage system is not completely sealed. Natural open ventilation is required at the head of each main drain run and/or at every tenth dwelling.

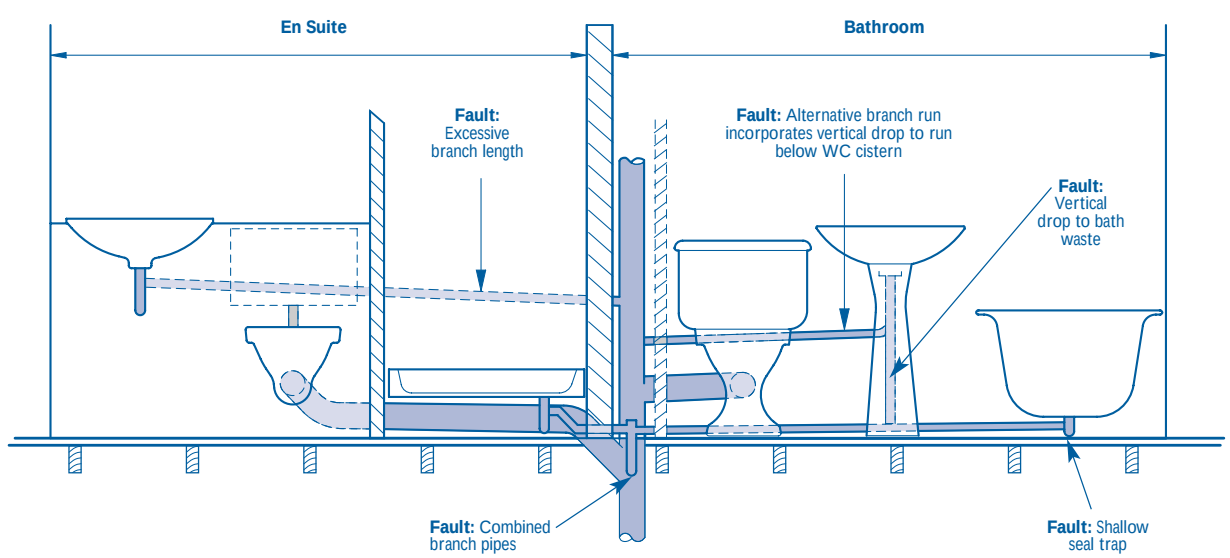
HepVO in the Bathroom

Typically, house designs are becoming more creative and complex to meet the needs of todays specifiers, in doing so they create greater potential within the system for pressure fluctuations and trap failure.

Example: Adjacent bathroom and en-suite

In this design (Fig. No. 5) a conventional water seal trap would be liable to failure as a result of pressure fluctuations. Use of the HepVO valve in this design would relieve negative pressure changes and maintain an effective seal between each waste appliance and the drainage system.

Fig. No. 5 **Problems leading to Trap failure within a typical Bathroom and Ensuite Arrangement**
Installation requirements often dictate pipework is outside the design limitations of **BS 5572**



The above faults provide the potential for water seal trap depletion.

HepVO Standards and Approvals

HepVO when installed in accordance with manufacturers recommendations will ensure that installations comply with the requirements of **BS 5572**: 1994 Code of practice for Sanitary pipework and Document H of the Building Regulations 1985 'Drainage and Waste Disposal' with respect to seal integrity.

HepVO functions without the use of water, and complies with all other relevant functional requirements of **BS 3943**: Specification for plastics waste traps.

HepVO is certified by WIMLAS; certificate number **042/97**, to be a satisfactory means of excluding foul air from a building within a single stack drainage system.

BBA Certification is applied for.

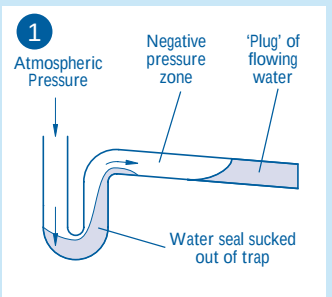
HepVO - Benefits

Water Seal Weaknesses

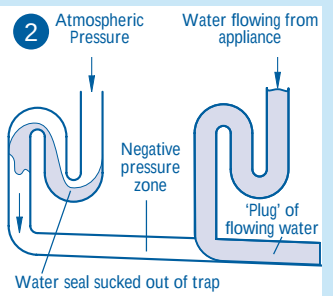
The HepVO valve does not rely on water to protect the dwelling from the entry of foul sewer gases and will not fail under any of the conditions shown below in Fig. No. 6.

Fig. No. 6 **10 Potential Reasons for Trap failure**

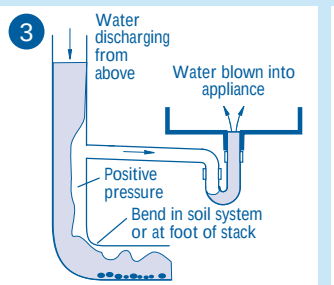
Self Siphonage



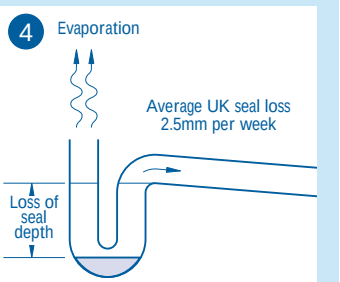
Induced Siphonage



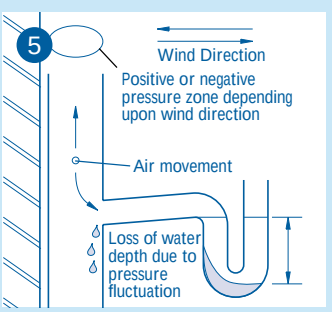
Compression



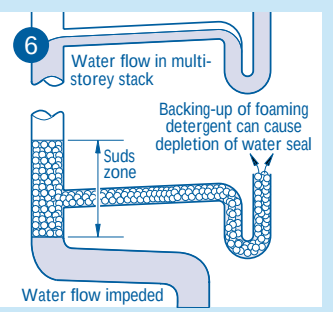
Evaporation



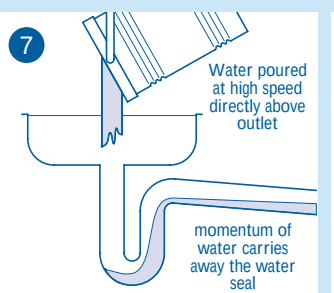
Wind Effect (wavering out)



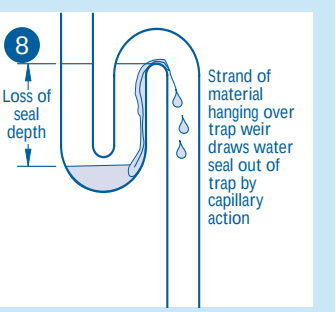
Foaming



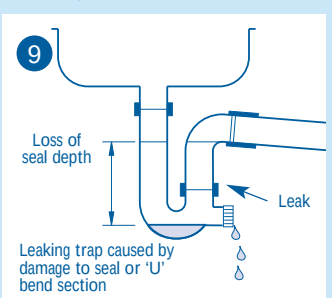
Momentum



Capillary Action



Leakage



Movement

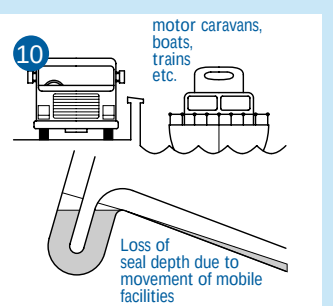
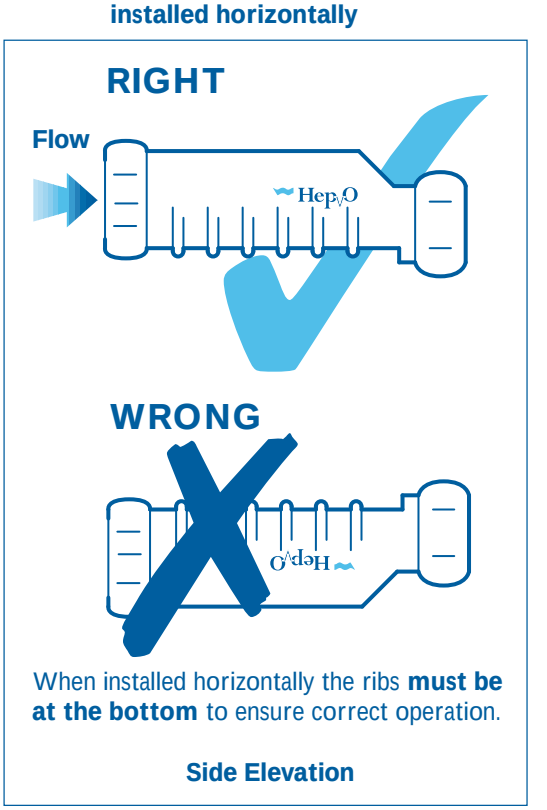


Fig. No. 7 HepVO **Orientation when installed horizontally**



When installed horizontally the ribs **must be at the bottom** to ensure correct operation.

Side Elevation

HepVO - Sitework

HepVO Inlet

The inlet is provided with a screwed cap, flanged tail and sealing ring, which are designed to connect to waste fittings conforming to **BS EN 274**, or **BS 3380**, or to a HepVO inlet adaptor.

Fixing

When fixed horizontally to an appliance outlet or to a sloping pipe, in order to prevent standing water and to provide a continuous fall, HepVO must be installed with the ribs underneath - Fig. No. 7.

Offer up the HepVO inlet to the threaded tail of the waste pipe and tighten the threaded cap by hand (check that the cap screws on square and does not 'cross-thread'), hand tight should be adequate. When the screwed cap is tight, proper seating should be obtained, and the HepVO body should be secure.

HepVO Outlet

The outlet is provided with a universal compression connection which is designed for use with **BS 5254** Polypropylene pipe, **BS 5255** ABS, MUPVC or polypropylene pipe, **BS 2871**: Part 1: Table X copper pipe, or equivalent imperial size copper pipe to **BS 659**.

Fixing

1. Cut the pipe to length, allowing for the full compression socket depth, (preferably using an appropriate pipe cutter).
2. Remove any 'swarf' from the end of the plastic pipe. Ream the copper pipe end to remove any 'burr', and file if necessary to remove any external sharp edges. Mark the socket depth on the pipe, and check that the pipe section to be jointed is free of any surface damage which may affect the joint seal.
3. Unscrew the cap from the HepVO outlet, and slide the cap and rubber seal onto the pipe. Fig. No. 8.
4. Insert the pipe end fully into the socket.
5. Slide the rubber seal and screwed cap up against the face of the socket, and tighten the cap by hand, (check that the cap is square to the body and does not 'cross-thread'), hand tight should be adequate to form a proper seal.

N.B DO NOT USE ANY JOINTING COMPOUND OR SEALANT ON THE HepVO INLET OR OUTLET CONNECTIONS.

Fig. No. 8 HepVO **Outlet Connection**

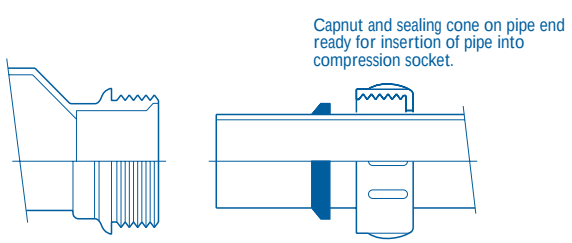


Fig. No. 9 **Dimensional Data**

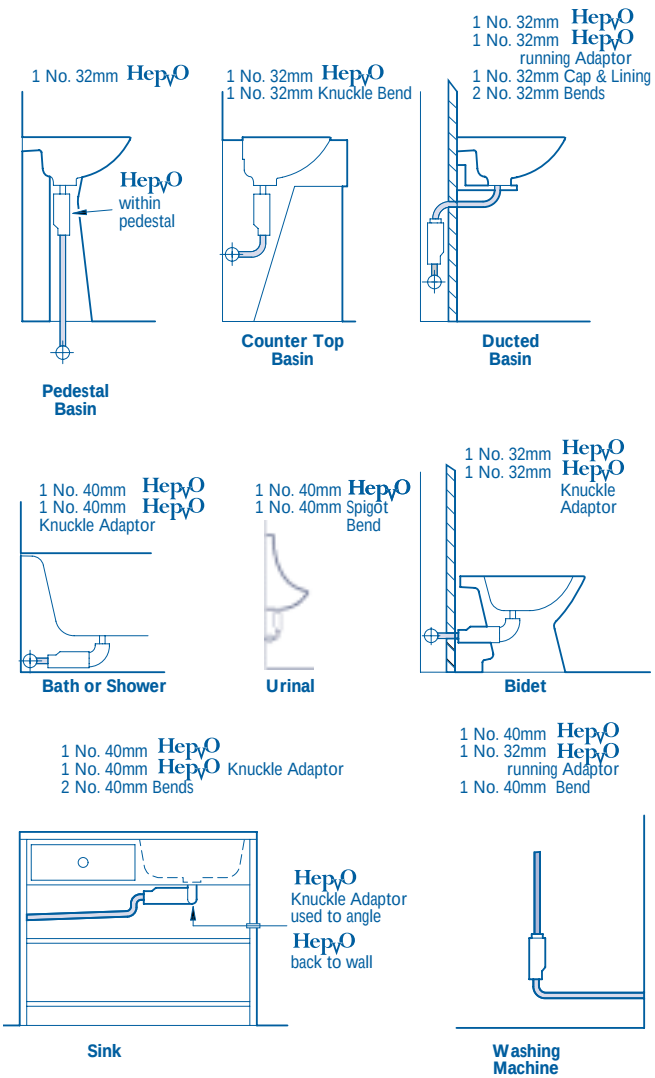
Principal Dimensions

Size	C	E	L	W	Z
32mm	8	171	208	211	40
40mm	5	171	208	213	40

Application

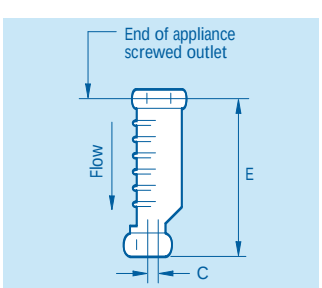
HepVO can be used on any waste appliance, the installation arrangement will depend on the dimensional design of the appliance and site constraints. Fig. No. 10 shows some of the mounting options for HepVO.

Fig. No. 10 HepVO **Mounting Options**

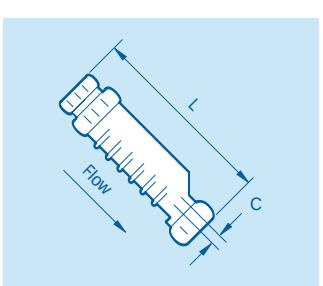


HepVO can be fixed directly to the waste outlet of an appliance, or by using the appropriate adaptor, mounted in the horizontal position either at the appliance or on the pipe.

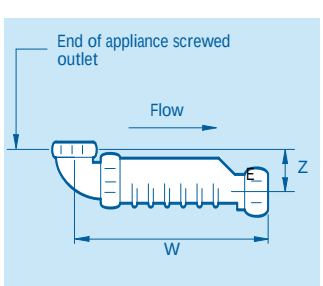
HepVO may be installed at any angle between vertical and horizontal.



a) Fixed vertically directly to appliance outlet



b) Fixed on a pipe at any sloping angle using inlet adaptor **Cat. No. BV3 or CV3** (available separately)



c) Fixed horizontally to appliance outlet using inlet bend adaptor **Cat. No. BV11 or CV11** (available separately)

Notes

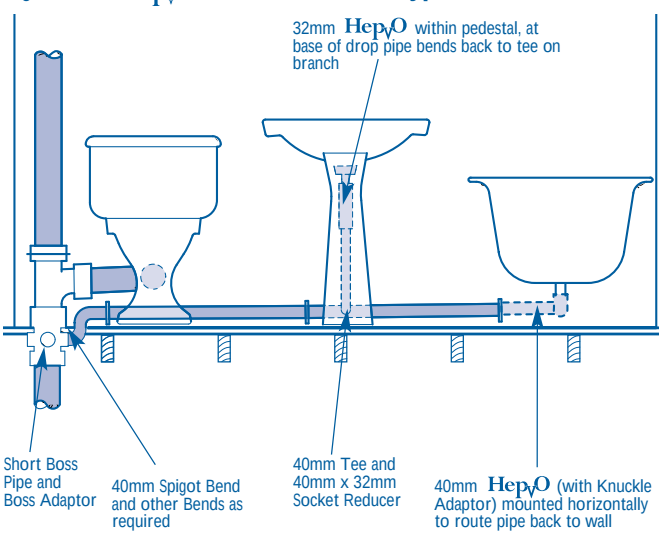
1. Dimensions are nominal and may vary slightly due to compression of the rubber seals.
2. When fixed to a pipe, it is recommended that HepVO should remain accessible.

HepVO - Sitework - *continued*

Waste pipes should have sufficient slope to convey the likely flow, but should not be less than 18mm/metre in accordance with **BS 5572**. When using HepVO, there is *no maximum slope limitation* which is often a restriction applicable to single stack waste systems.

As HepVO is unaffected by siphonage or compression, *combined waste piping* can be used to connect more than one appliance to the stack. Fig. No. 11 shows how HepVO can be used to simplify the plumbing to the typical bathroom, previously shown in Fig. No. 5.

Fig. No. 11 HepVO **Installation in a Typical Bathroom**



Any branch discharge pipes serving appliances not fitted with HepVO (eg. a range of W.C's) should be designed and installed in accordance with **BS 5572**.

Discharge stacks should continue to be sized, and vented where appropriate, in accordance with **BS 5572**.

HepVO - Testing & Maintenance

The following tests are relevant to any sanitary installation, and are not only applicable to installations where HepVO is incorporated.

Air Tests

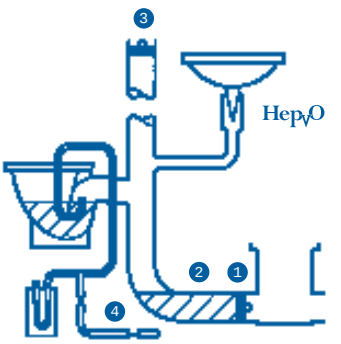
Sanitary installations should be air tested to 38mm water gauge for at least 3 minutes, in accordance with Building Regulations Approved Document H. Installations which incorporate HepVO can be tested in the normal manner, using standard test equipment, as shown in Fig. No. 10. Various sizes of expanding pipe stoppers (100mm or larger) are available from the Hepworth drainage range. Smoke producing equipment should **not** be used when testing plastics pipework.

Water Tests

Water testing the base of a discharge stack is recommended, especially where there are no appliances on the bottom storey, and where the stack is to be concealed. Testing is normally achieved by fixing a temporary expanding pipe stopper to the drain at the base of the stack, and filling the stack with water up to the flood level of the lowest sanitary appliance (providing that the test pressure does not exceed 6 metres water gauge for soil and waste products and 4 metres water gauge for drainage products). When performing a water test, it is recommended that the expanding pipe stopper is provided with a temporary strut (to prevent blow-out), and fitted with a drain valve.

Fig. No. 10 **Tests Methods**

Method 1

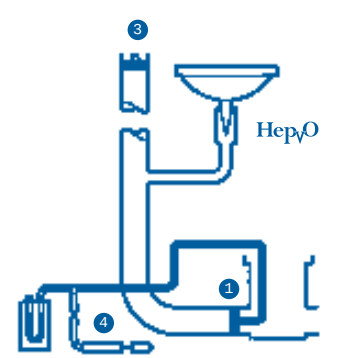


Waste appliances fitted with HepVO, all other traps full of water. Test hose connected via trap seal.

Method 2

Waste appliances fitted with HepVO, all other traps full of water. Test hose connected to base of stack.

Method 3



Waste appliances fitted with HepVO, no water seal traps installed. Test hose connected to base of stack.

Key

❶ Temporary expanding pipe stopper in drain at the base of the stack.

❷ Water filled behind stopper to confirm effective seal (optional).

❸ Temporary expanding pipe stopper in discharge stack (not necessary where air admittance valve is installed)

❹ Standard air testing kit comprising of air pump, test cock, 'U' gauge, test hose and hose tee piece.

Notes:

a An inflatable bag type pipe stopper may be used instead of an expanding pipe stopper at ❶, where appropriate.

b On multi-storey buildings it may be more convenient to test the stack in stages.

Performance Tests

Sanitary installations should be tested at simultaneous design flow conditions in accordance with **BS 5572**. Tests for self-siphonage and induced siphonage in branch discharge pipes where HepVO is fitted to each appliance are unnecessary. Other branch pipes and discharge stacks should be tested in accordance with Table 11 of **BS 5572**.

What Does HepVO Mean to the Professional Installer?

Installation Benefits

HepVO is a new concept in the prevention of foul air escaping into the building whilst actively eliminating negative pressure in soil and waste installations. It allows the designer to place a greater number of appliances together on fewer discharge pipes anywhere within the building without compromising the performance of the sanitary discharge system.

System Simplification - *Design Freedom and Economic Benefits*

Current regulations for waste system design set limits on length and gradient of pipes and the number of appliances which can be connected to a waste pipe in order to keep pressure fluctuations to a minimum, this may be rectified by the incorporation of vent pipes at appropriate design locations. The incorporation of HepVO increases the designers scope for the reasons listed below, whilst providing a good sanitary system offering a minimum resistance to flow, as stated in **BS 5572**: 1994 Code of Practice for Sanitary Pipework.

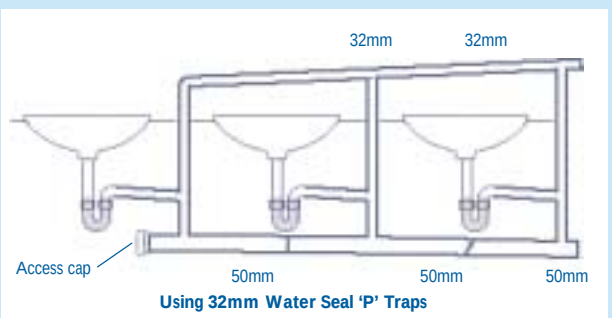
1. Full bore flow will no longer cause siphonage where HepVO is fitted to all appliances. Full bore flow provides better self cleansing which means that smaller diameter waste pipe branches can be considered in many applications.
2. Anti-siphon piping and valves are not required for waste appliances.
3. Auxiliary venting is not required for ranges of waste appliances.
4. No maximum limit on waste pipe slopes.
5. Branches connecting waste appliances to a common pipe do not need to be swept at 45 degrees.
6. Where necessary tight radius bends can be used, without fear of siphonage or compression.
7. Waste pipe configurations, such as parallel branches, will not cause siphonage or compression problems, therefore there is no need to increase pipe size.

System Simplification - *Time Saving*

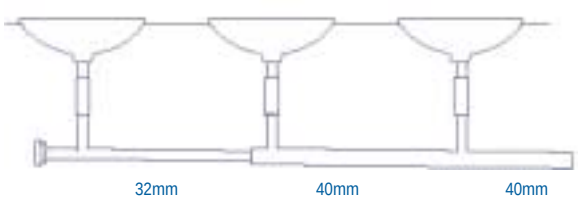
HepVO allows for simpler systems with less pipework and straight runs - Fig. No. 14.

On completion of the installation, there is no need to perform self siphonage and induced siphonage tests for branch discharge pipes from waste appliances.

Fig. No. 14 **Schematic View for 3 Basins**



Using 32mm Water Seal 'P' Traps



Using 32mm HepVO Waste Valve

System Simplification - *Space Saving*

Where required, the waste pipe can drop in a straight line from the appliance outlet which means that installation access for slimline pedestals is significantly enhanced - Fig. No. 12.

For kitchen sinks HepVO can be offset to the back wall after a short run of waste pipe from the appliance outlet which opens up the cupboard space below the sink - Fig. No. 13.

HepVO can be installed horizontally, by using the 90° adaptor, which avoids cutting the floor under baths and showers to accommodate the 'U' bend of a trap - Fig. No. 10 & 11.

Fig. No. 12

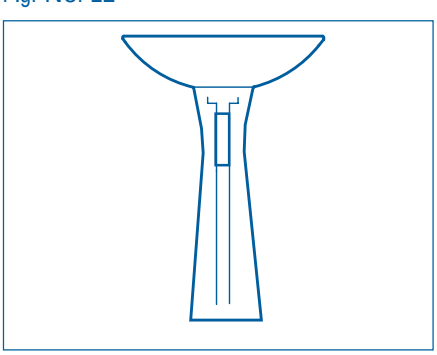
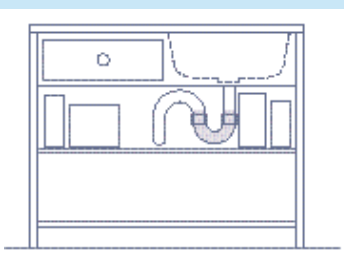


Fig. No. 13



Sink Cupboard with water seal trap

Sink Cupboard with HepVO installed horizontally