PLUMBING

Above & Underground Drainage System

BS EN 1329/1401

TetraFlow®
Quality is Our Profession

VODA PIPES
Committed to Product Development

VODA drainage systems include an extensive range of SWV pipes and fittings for commercial, industrial, housing and public sector development.

VODA drainage systems include both solvent welded and push fit types applicable for wide and comprehensive range of the benchmark for quality product innovation and outstanding services.

COMPLETE SOLUTIONS

With the wide range of pipes and fittings covering the size range from 56mm up to 400mm, VODA now offers the most complete choice for its customers. The product range covers all the items required to complete any domestic and industrial drainage system.

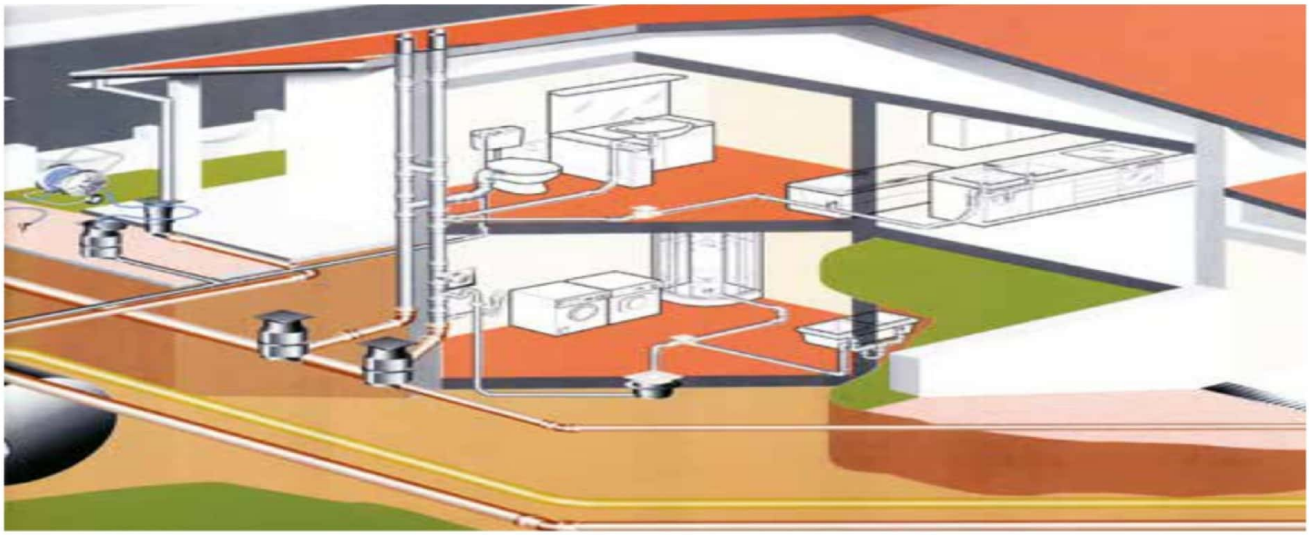
VODA soil and drainage system is fully compatible with its above the ground and underground systems. This enables integrated above and below ground drainage systems to be designed specified, and supplied from a single reliable source with confidence.

KITE MARKED FITTINGS

VODA drainage systems are manufactured according to the latest European Standards, and are subject to very strict quality policy which enabled VODA systems to be approved by the most prestigious international Institutes.

VODA underground and above ground drainage fittings are approved by the BSI and are awarded the Kite Mark quality certificate where applicable.

BSEN 1329 BSEN 1401-01



NEW EUROPEAN STANDARDS (EN STANDARDS)

VODA uPVC drainage pipes and fittings are manufactured and tested in accordance with the new British - European Standards BS EN which have replaced the old British Standards for drainage applications. The new BS EN standards cover all the sizes and applications of the BS Standards.

BS EN 1329 : 2000

Applies to uPVC piping systems for soil and waste discharge (low and high temperature) within the building structure. This standard replaces the British Standards BS 5255 and BS 4514.

BS EN1401-1:1998

applies to uPVC piping systems for underground drainage and sewerage. This standard has replaced most of BS 4660 and all BS 5481.

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PROPERTIES OF VODA PIPE SYSTEMS

Corrosion Resistance
VODA uPVC Pipe & Fittings do not corrode and are totally unaffected by acids, alkalis and electrolytic corrosion from any source. They are non-conductors and totally resistant to all types of galvanic and electro mechanical influences which might corrode it. In this respect they outclass any other pipes material including stainless steel. In fact uPVC, is totally unaffected to any type of corrosion caused by water.

Light in Weight Easy and Quick to Ins
VODA Pipes are only about 1/5 the weight of an equivalent cast iron pipe and from 1/3 to 1/4 the weight of an equivalent cement pipe. Thus the cost of transportation and installation is cut down enormously.

Excellent Hydraulic Characteristics
VODA uPVC Pipes have extremely smooth bore due to which frictional losses are at minimum and flow rates are at the highest possible than any other pipe material.

Long Service Life
Since plastic does not corrode and is resistant to most chemicals, the pipe does not lose strength due to either sewer gas corrosion or external galvanic soil conditions. The design of the pipe allows for a long-term deflection of 7.5% without failure or damage.

Flexible & Resistance to Breakge
The flexible nature of VODA uPVC, pipes means that unlike, cement or cast iron pipes, they are not liable to beam failure and thus can more readily accommodate axial deflection due to the solid movement or due to settlement of structures to which the pipes are connected.

Resistance to Biological Growth
Due to smoothness of inner surface of VODA uPVC Pipes, they prevent algae, bacteria and fungi formation inside the pipe.

Effect of Frost
Frost does not affect the performance of the system. However, impact strength is reduced during sub-zero temperatures.

Effect of Solar Radiation
Prolonged exposure to sunlight may cause the color to fade over time. We would however not expect this to seriously affect the performance of the system. It is advisable to protect the exposed parts by painting with any exterior water based paint.

Thermal Expansion
Coefficient of linear expansion 0.08mm/℃. Temperature raise i.e. 1.6mm per 2m length for a temperature raise of 10℃. An allowance is made for expansion of pipes and fittings in each socket.

Water Resistance
VODA Pipes have excellent resistance to abrasion, gouging and scouring, superior to that of most common piping materials. These are up to 2.5 times more resistant to abrasions when compared to steel.

Coefficient of Friction
When piping systems are designed one of the main concerns is flow rate and pressure. Plastic Pipes provide smoother wall surfaces that reduce fluid friction and resistance to flow. This hydraulic smoothness inhibits slime build-up in sewers and virtually eliminates tuberculation and encrustation in water distribution mains. The end results are significantly lower maintenance costs, more efficient initial pipeline design, and superior performance over the lifetime of the pipe.

Longer Lengths
VODA Pipes are typically supplied in lengths of 4M, however can be supplied in other lengths as required. This reduces the number of joints required as compared with other pipe products.

Flame Resistance
uPVC Pipe is difficult to ignite and will not continue burning in the absence of an external ignition source. This spontan ignition temperature is 450℃.

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ABOVE GROUND & BELOW GROUND SIZES RANGE

uPVC Soil, Waste and Above Ground Discharge System

VODA Soil, Waste and Above Ground Drainage pipes and fittings are manufactured according to the latest European Standard BS EN 1329-1 from grey unplasticised polyvinyl chloride uPVC in sizes 56mm to 200mm.
VODA Soil, Waste and Above Ground Drainage systems are available in two options:

1. Solvent Welding Type: with sizes from 56mm up to 200mm.

2. Rubber Ring (Push Fit) Type: with sizes from 56mm up to 200mm.

Both options are suitable for domestic drainage and particular requirements of commerical, industial and public installations.

uPVC Pipes for Above Ground Drainage as per BSEN 1329-1.

Normal Size (mm)	W.T.(mm)	0.D.(mm)		Wall Thickness (mm)	
		min	max	min	max
56	3.00	55.80	56.05	3.00	3.50
82	3.00	82.00	82.30	3.00	3.50
110	3.20	110.00	110.30	3.20	3.80
160	3.20	160.00	160.40	3.20	3.80
200	4.90	200.00	200.50	4.90	5.60

Underground Drainage & Sewerage System

VODA Underground Drainage and Sewerage System is manufactured from unplasticised polyvinyl chloride uPVC Material.
VODA Underground Drianage System is available in two options:

1. Solvent Welding Type: with sizes from 110mm to 400mm.

2. Rubber Ring (Push Fit) Type: with sizes from 110mm to 400mm.

VODA underground uPVC pipes and fittings are maunfactured according to the latest European Standard BS EN 1401:

Mean Outside Diameter		SN 2 SDR 51		SN 4 SDR 41		SN 8 SDR 34	
min	max	e_{min}	$e_{m,max}$	e_{min}	$e_{m,max}$	e_{min}	$e_{m,max}$
110	110.3	-	-	3.2	3.8	3.2	3.8
160	160.4	3.2	3.8	4.0	4.6	4.7	5.4
200	200.5	3.9	4.5	4.9	5.6	5.9	6.7
250	250.5	4.9	5.6	6.2	7.1	7.9	8.3
315	315.6	6.2	7.1	7.7	8.7	9.2	10.4
*355	355.7	7.0	7.9	8.7	9.8	10.4	11.7
400	400.7	7.0	8.9	9.8	11.0	11.7	13.1

BS EN 1329/1401

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JOINTING METHOD

Jointing Techniques

Solvent Cement Jointing

To achieve effective reliable joints:

1. Cut the pipe at right angle using appropriate cutter or saw.


2. Chamfer the pipe and remove the burrs.


3. Clean the pipe and fitting with dry cloth and apply the cleaning fluid to the outside surface of the pipe and the inside surface of the fitting.

4. Apply thin layer of solvent cement to the mating surfaces using suitable brush.


5. While the solvent cement is still wet, insert the pipe inside the fitting until it reaches the socket end. It is recommended to twist the pipe a 1/4 turn whi le inserting it inside the fitting for better distribution of the cement.


6. Wipe the excess cement and leave the joint to dry.

Note:

Applying excessive quantity of solvent cement should be avoided as it creates pool of cement on the internal surface of the pipe that will continue to corrode the surface and weaken the pipe and fitting. It may cause the joint to fail at high pressure.

BS EN 1329/1401

Push Fit Jointing

1. Cut the pipe at right angle using appropriate cutter or saw.


2. Chamfer the pipe and remove the burrs and filings.
3. Clean the pipe and fitting with dry cloth.

4. Apply thin layer of appropriate lubricant on the rubber ring using suitable brush.

5. Inser the pipe inside the fitting until it reaches the socket end, then withdraw the pipe 5 - 10mm (depending on the size) to allow for expansion / contraction.

6. Wipe the excess lubricant.

Cutting The Pipes

While cutting VODA uPVC pipes, the following instructions should be followed:

* Appropriate pipe cutter or saw should be used.
* Cut pipes square and perpendicular to its axis.
* After cutting pipes, remove all burrs form the cut end, and bevel the sharp cutting edge.

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SUPPORT AND EXPANSION GUIDE

Support and Expansion

1. All pipe work must be adequately supported whether vertical or horizontal.

2. Plastic pipework expands and contracts with changes in temperature - whether ambient temperature or form the nature of the discharge throught the pipework. Expansion joints must therefore be provided to accommdate such thermal movement.

3. Horizontal pipework requires more frequent support than vertical pipework (for example, soil stocks)

4. Suitable sound absorbing brackets with rubber lining should be used to support pipes. Those brackets must be dimensionally compatible to the pipe diameter. The fixed bracket creates fixed point in the pipe system.

5. With fixed brackets the pipe or fitting can not be moved through the bracket after screws are tightened. In order to prevent sliding down of vertical pipes, each individual pipe must be secured on one point by a fixed bracket.

6. Every horizontally installed pipe should always be fixed with one fixed bracket. All remaining pipe brackets in horizontal as well as in vertical installation must be tightened in such a way to allow sliding.

7. Pipe brackets should not be installed in areas of diameter reduction and change of directions in the system, this is required to allow for the thermal expansion.

8. Pipe brackets should be fixed on building materials with high strength in order to assure strong and durable pipe fixing.

9. It is recommended that only steel brackets (ie. not plastic brackets) be used on interior soil stacks which are subjects to fire regulations.

10. Any point where pipework passes through a floor or wall and is made as a fire stop, it must be treated as a fixed point for the purpose of determining positions of expansion joints.

SUPPORT DISTANCES		
	Maximum Support Distance	
	Vertical	Horizontal
Pipe Size - Soil, WASTE & Went		
56 mm	2 m	1 m
82 mm	2 m	1 m
110 mm	2 m	1 m
160 mm	2 m	1.2 m

Expansion in uPVC Pipes
The PVC piping systems expand and contract with change in temperature, both from ambient temperature and form the temperature of the fluid passing through the pipework.

The following sections explain the techniques of estimating and treating the expansioin in PVC pipes.

Calculation of Expansion
The co-efficient of linear expansion of PVC pipes is relatively small compared to other plastic materials. However, the effects of thermal expansion in the system should be compensated wherever necessary.

The thermal expansion in PVC straight sections can be calculated using the belwo formula:

$$\Delta L = \alpha \times L \times \Delta T$$

Where:

ΔL = expansion (mm)

α = co-efficient of linear expansion (mm/m/°C) = 0.08

L = length of the pipe (m)

ΔT = temperature difference (°C)

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TESTING & HANDLING

Testing - Flow Prevention

Drainage installations should be tested for leaks and defects in new installations and whenever the existing installation is altered, extended or repaired.

All new installations or modified portions should be left uncovered until the testing is successfully completed and approved.

Drainage systems are commonly tested by water and in some cases air test is done.
The following are some guidelines for testing drainage systems, while the local codes of practice for each country should be also noted and applied.

Water Test

* All pipe ends and connections must be plugged using suitable testing plugs.
* Install vertical pipe length to the drain to provide the neccessary testing water head.
* Fill the system with water to maximum height of 3m(30 kPa).
* The maximum head at the lower parts of the system should never exceed 4.0m, therefore in case of steep gradients the system should be tested in sections.
* The filled system should be left 2 hours under testing, during which the system should be inspected by measuring the drop in water height.
* The pipe work should be inspected for any leakage and all defected installations should be repaired and tested again.

Good Site Pratice

Handling

* Take all reasonable care when handling uPVC, particularly in very cold conditions when the impact strength of the material is reduced.
* Do not throw or drop pipes, or drag them along hard surfaces.
* In case of mechanical handling, use protective slings and padded supports. Metal chains and hooks should not make direct contact with the pipe.

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On-site Storage

* Stack pipe lengths:
* either on a flat base
* or on a level ground
* or on 75mm x75mm timber at 1m max, centers.

* Provide side support with 75mm wide battens at 1m centers.

* Maximum stack (normal conditions): seven layers high.

* Ideally, stacks should contain one diameter pipe size only, Where this is not possible, stack largest diameter pipes at base of stack, Small pipes may be nested inside larger pipes.

* If stored in the open for long periods or exposed to storng sunlight, cover the stack with opaque sheeting.

* Store fittings under cover. Do not remove from cartons or packaging until required.

* Store solvent cement and cleaning fluid in a cool place out of direct sunlight and away from any heat source.

Storage in Hot Climates

* Ultra-violet light can affect pipes and fittings: pipe colour may change and rubber seals may be degraded

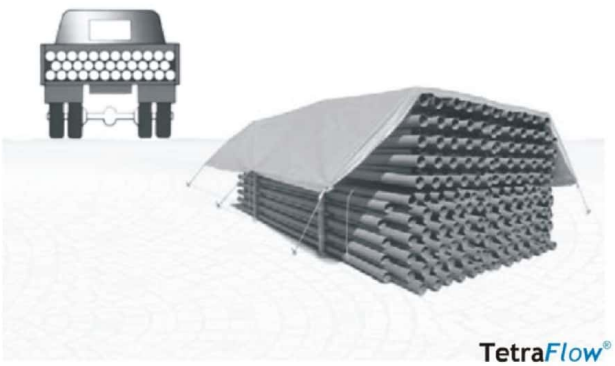
* Accordingly:

  * Store all materials in well-ventitated, shady conditions
  * do not expose to direct sunlight
  * keep fittings in original packaging until rquired for use

* Maximum stack (hot conditions) six layers high.

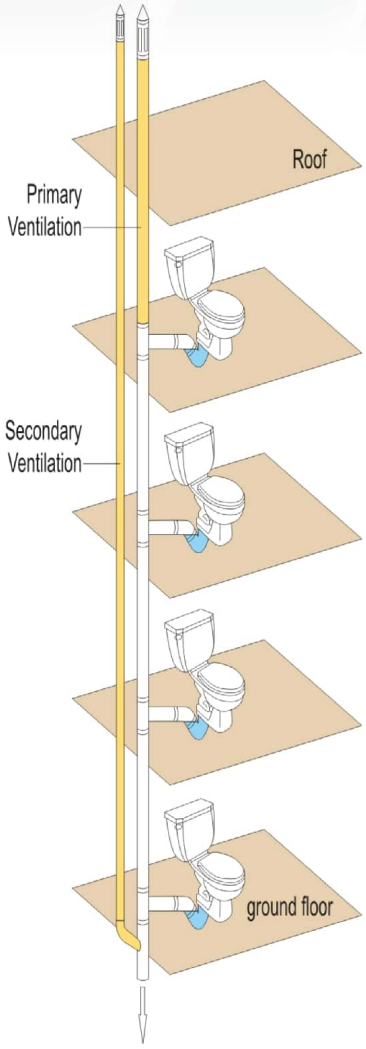
Transport

While transport, pipes should be arranged safely on trucks avoiding crossing, bending and over stacking.
The pipes should also be fully supported over their total lenght.

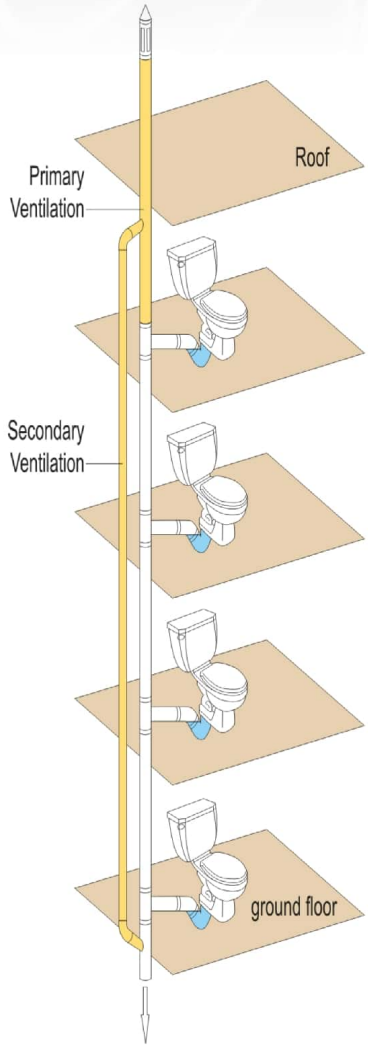


VENTILATION

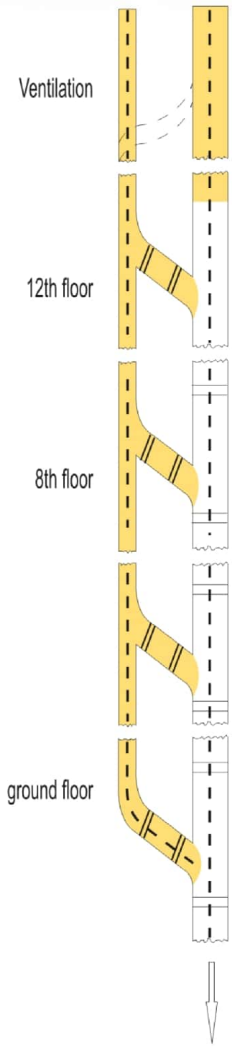
Ventilation is essential in every drainage system. In order to prevent traps being emptied by suction or pressure, both overpressure and underpressure should not exceed 300 Pa (30mm water column). Air should be able to escape form the system (venting) and to enter the system (admittance). A ventilated discharge pipe is used for this purpose.



Technique (1)



Technique (2)



Technique (3)

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