

Sanitary pipework and foul drainage

We can distinguish between two systems of drainage: 'foul' and 'surface water' consisting of above-ground and underground elements.

- Foul drainage carries the used water from sanitary appliances e.g. toilets, sinks, basins, baths, showers, bidets, dishwashers, washing machines, etc. A sanitary pipework is an above-ground pipework, while the underground pipework is foul drains and sewers.
- Surface water drainage carries rainwater from roofs, gardens, patios, driveways, etc. We can distinguish between roof drainage carrying water away with the system of gutters and rainwater pipes and the underground pipework known as surface water drains and sewers.

In this article, we will focus mainly on sanitary pipework and we will introduce the foul drainage, which will be described in depth in the next month edition. The detailed advice on how to comply with the Building Regulations you will find at Approved Document H.

Sanitation systems are the main components of the domestic plumbing system. Sanitary appliances include WC, washbasin, bath, shower, bidet, sink, washing machine, etc. The sanitary pipework it has to be ad-

equately designed and installed to ensure all wastage will be safely disposed and no odour occurs.

Pipes are required to be appropriately sized to allow the flow of water, minimise the risk of blockage and to allow air movement. Sanitary pipework should be dismantled easily in case of blockages. The main drainage pipes are made of PVC plastic. For the WC a 110mm diameter pipe is required. Basin and bidets require 32mm pipes, while baths, showers, sinks, washing machines, etc. require 40mm pipes.

Moreover, sanitary pipework has to be ventilated to stop odour from the pipework and drains from escaping into the building. It can be done by a extending a branch ventilating pipe to the outside (external air) by at least 3m to the side of any opening into the building or by 0.9m above. Another option is to extend a branch ventilating pipe to a ventilating stack (ventilated branch system) or internally by use of an air admittance valve. The ground floor appliances may be connected directly to the drain without ventilating pipe if the whole drainage system is already ventilated.

All the pipes have to be laid out to a slope so that the water will be able to drain away minimising blocking the pipe with dirt or debris (*diagram*).

The sewage from toilets and the wastewater from baths, sinks, wash basins and washing machines are called foul water. The wastewater is directed via U-bend traps to underground pipes (normally 100 to 150 mm diameter) and inspection chambers.

There are various types of layout for the foul drainage pipework in the property:

1. When the toilet waste runs separately into a vertical soil pipe (normally 150 mm diameter) connected directly to the underground pipes. This soil pipe may be outside or inside the property. The sanitary wastage runs into a trapped gully at ground level. (common in buildings built before 1950s) It is a two pipe system.
2. The so called single-stack waste system when all the sewage is directed towards the single soil pipe, with a possible exception being the kitchen sink, which may drain via a gully. It can be used with 100 mm diameter stack for buildings up to 5-storey height.
3. If all types of sewage is discharged into

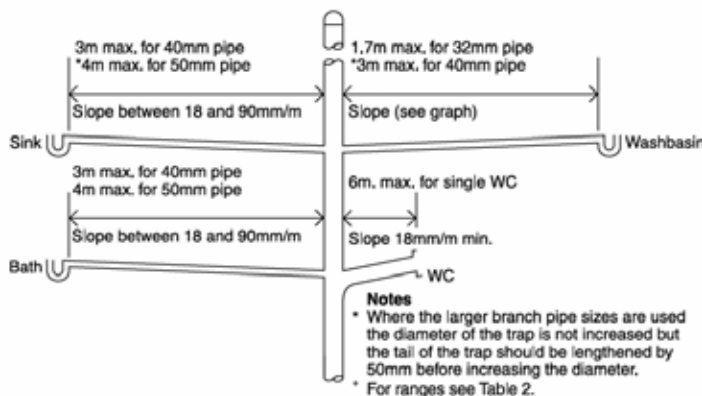
a common sewer or into same waste disposal system it is a one pipe system.

More than one gully and both layouts may occur in larger buildings, where the foul water is discharged to public or private sewers. Sometimes the foul water may flow to a septic tank or cesspit.

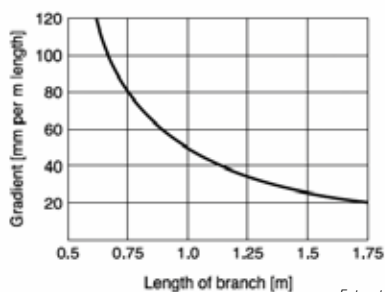
A sanitary system consists of horizontal branches; vertical stacks; a building drains inside the building, drain, sewer to the point of disposal. Drains must be pitched to maintain the flow. The proper size of pipes can be determined by estimation of the number of sanitary units and the pitch of the pipe. The DFU values are assigned to determine the size of the drainage system.

TRAPS - All points of discharge into the drainage system should be fitted with a trap (e.g. a water seal trap) to prevent odour from the system entering the building. Traps should retain a minimum seal of 25mm of water or equivalent. This table shows minimum trap sizes required for sanitary appliances. Traps are available as a low-level bath, shower traps, anti-siphon traps and "S" or "P" tubular traps. Traps should be installed immediately below the outlet and be easily accessible.

Branch connections



(a) Unvented branch connections to stacks



(b) Design curve for 32mm washbasin waste pipes

Extract from The Building Regulations 2010, Approved Document H, Diagram 3 p.9

DISCHARGE STACKS - it is the vertical collecting pipe that connects to the underground drain. All branch pipes connect to the central stack. All stacks should discharge to a drain. According to Building Regulations stacks for toilets should be not less than 50mm diameter, stacks serving closets with outlets less than 80mm should be not less than 75mm and stacks serving closets with outlets greater than 80mm should be not less than 100mm. The internal diameter of the stack should be not less than that of the largest trap or branch discharge pipe. For larger buildings, the maximum flow should be checked. From ground floor appliances a stub stack may be used that connect into a ventilated discharge stack or a ventilated drain (subject to some restrictions- see Approved Document H for details).

It is necessary to avoid cross-flow which can occur when two branches are installed opposite each other. The no connection zone is required. The parallel junction is required under the no connection zone.

The soil and waste stack shall be firmly attached to the wall with a minimum clearance of 25 mm from the wall. All stacks should be covered on top.

VENT STACK - A vertical piping to which connections are made from the discharge side of traps and through which gases, odour is removed.

BRANCH - Any piping fixture other than the main, riser, or stack.

BRANCH VENT - A vent connecting one or more individual vents with a vent stack.

DRAIN - receives the discharges from soil, waste, and sanitary systems and conveys it to the sewer

SEWER - sewer is the horizontal piping of a drainage system which receives the discharge from the drain and conveys it to a public or private sewer, cesspit or septic tank.

PIPES and JOINTS - there is a wide selection of materials available for sanitary and foul drainage. The appropriate method of joining applies to a particular product - PVCu soil pipes can be joined with a ring seal or can be solvent welded, while polypropylene waste pipes, PP acoustic soil and waste pipes are all push-fit jointed.

When the fall is not less than 20mm per m, horizontal drainage piping of 75 mm diameter and less is required. When the fall is not less than 10mm per diameter, horizontal drainage piping larger than 75 mm diameter shall be installed. The soil pipe conveying any solid or liquid filth to a drain shall be circular with a minimum diameter of 100 mm.

FLASH VALVE - a device installed on the sanitary appliances fixtures for the purpose of flushing.

Table 1 Minimum trap sizes and seal depths

Appliance	Diameter of trap (mm)	Depth of seal (mm of water or equivalent)
Washbasin ¹ Bidet	32	75
Bath ² Shower ²	40	50
Food waste disposal unit Urinal bowl Sink Washing machine ² Dishwashing machine ²	40	75
WC pan – outlet <80mm	75	50
WC pan – outlet >80mm	100	50

¹ The depth of seal may be reduced to 50mm only with flush grated wastes without plugs on spray tap basins.

² Where these appliances discharge directly to a gully the depth of seal may be reduced to not less than 38mm.

³ Traps used on appliances with flat bottom (trailing waste discharge) and discharging to a gully with a grating may have a reduced water seal of not less than 38mm.

Extract from The Building Regulations 2010, Approved Document H, Table 1 p.7

PUSHFIT SYSTEM PIPE	SOLVENT WELD SYSTEM PIPE	FOUL UNDERGROUND DRAINAGE
 <p>Soil Pipe 3 m Black (SP400)</p>	 <p>Plain Ended Olive Grey Pipe (SS300)</p>	 <p>320mm Chamber Base 2 Inlet (ETP369A)</p>
 <p>Soil Pipe 92.5deg Triple Socket Access Branch Black (SP413)</p>	 <p>92.5deg Triple Socket Branch Olive Grey - Boss 50 mm (SS310)</p>	
 <p>Soil Pipe Vent Terminal Black (SU219)</p>	 <p>Vent Terminal (SU219)</p>	 <p>Universal Drain Adaptor (ETP333UNI)</p>