Unit 209: Drainage systems

Outcome 1 (part 1)

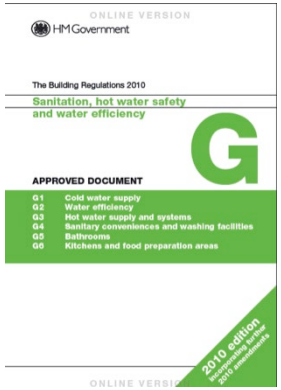
The requirements of drainage systems

Legislation and standards

Building regulations part H: drainage and waste disposal.

Building regulations part G: sanitation, hot water safety and water efficiency.

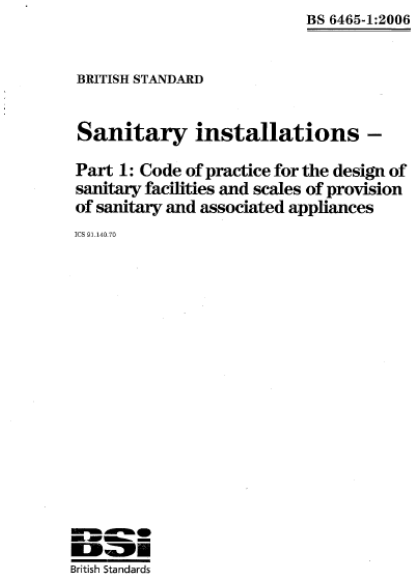
All drainage systems must comply with Building Regulations, as they are the statutory requirements in England and Wales (part N in Northern Ireland).



Legislation and standards

BS 6465: sanitary installations.

BS EN 12056: pt 1-5: gravity drainage systems – inside buildings.



BS 6465-1:2006

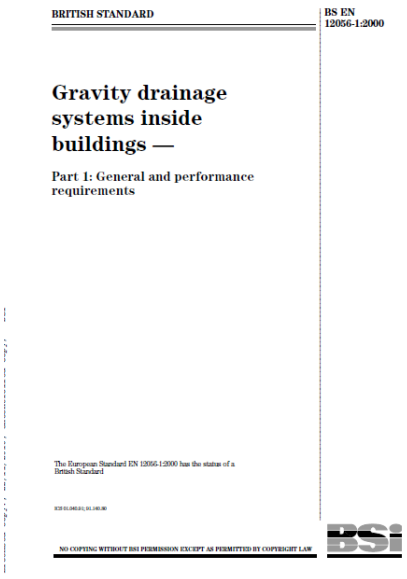
BRITISH STANDARD

Sanitary installations –

Part 1: Code of practice for the design of sanitary facilities and scales of provision of sanitary and associated appliances

ICS 91.140.70

BSI
British Standards



BRITISH STANDARD

BS EN 12056-1:2000

Gravity drainage systems inside buildings —

Part 1: General and performance requirements

The European Standard EN 12056-1:2000 has the status of a British Standard

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BSI

Legislation and standards

BS 8000: pt 13: good workmanship.

Manufacturers' instructions:
These vary and it is very important to follow them carefully.

Online resources:
http://osma.wavin.com
http://hepworth.wavin.com
http://www.hargreavesfoundry.co.uk/cast_iron_drainage
http://www.saint-gobain-pam.co.uk

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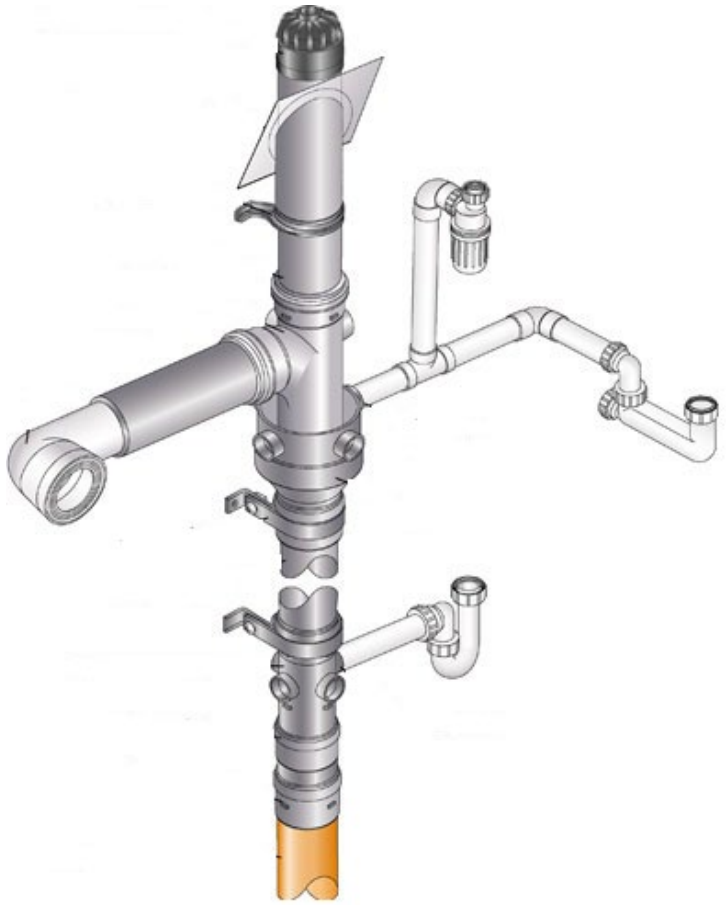
Types of systems

Drainage pipework systems take the solid and liquid wastes from the appliances and out of the dwelling. This has to be done safely and hygienically to avoid any health problems.

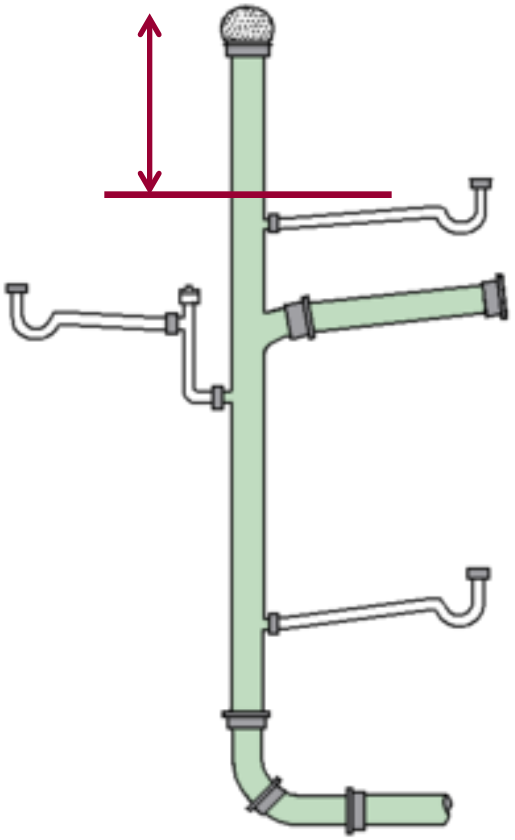
The waste product is discharged through a trap, down a discharge branch to a soil stack, and to the underground sewer.



Types of systems

Soil stack

A standard domestic stack has two sections:



1. The vent pipe

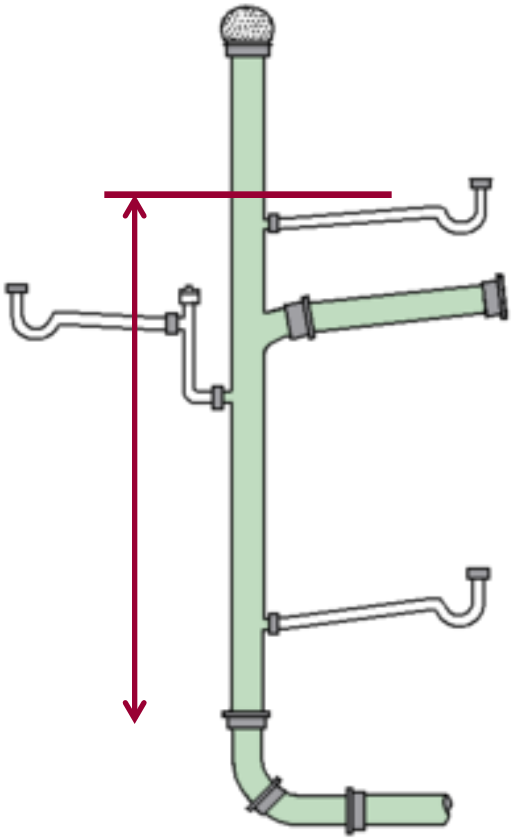
This is the upper, dry section of the stack, which allows air to enter the system to operate at atmospheric pressure. If this pressure were to vary, it could lead to trap seal loss, which would allow foul air to enter the dwelling.

Types of systems

Soil stack

2. The soil pipe
The lower, wet part of the stack that takes all the effluent away from the building.

All systems **must** comply with part H and BS EN 12056, which covers design, installation, testing and maintenance.



Types of systems

Compliance

1. Appliances, pipes and fittings shall comply with European standards.

2. Drainage shall be provided for all water supply points inside the building (to prevent flooding).

3. Appliances connected to the drainage system shall be installed with a trap to prevent foul air entering the building.

Types of systems

Compliance

4. The depth of water seal in a trap shall be no less than 50mm.
5. The waste pipe diameter and gradient must maintain a trap seal depth of at least 25mm after an appliance has been used.
6. The nominal diameter of the discharge pipe shall not be reduced in the direction of flow.
7. Where air admittance valves are used to vent drainage systems, they shall be adequately sized.

Types of systems

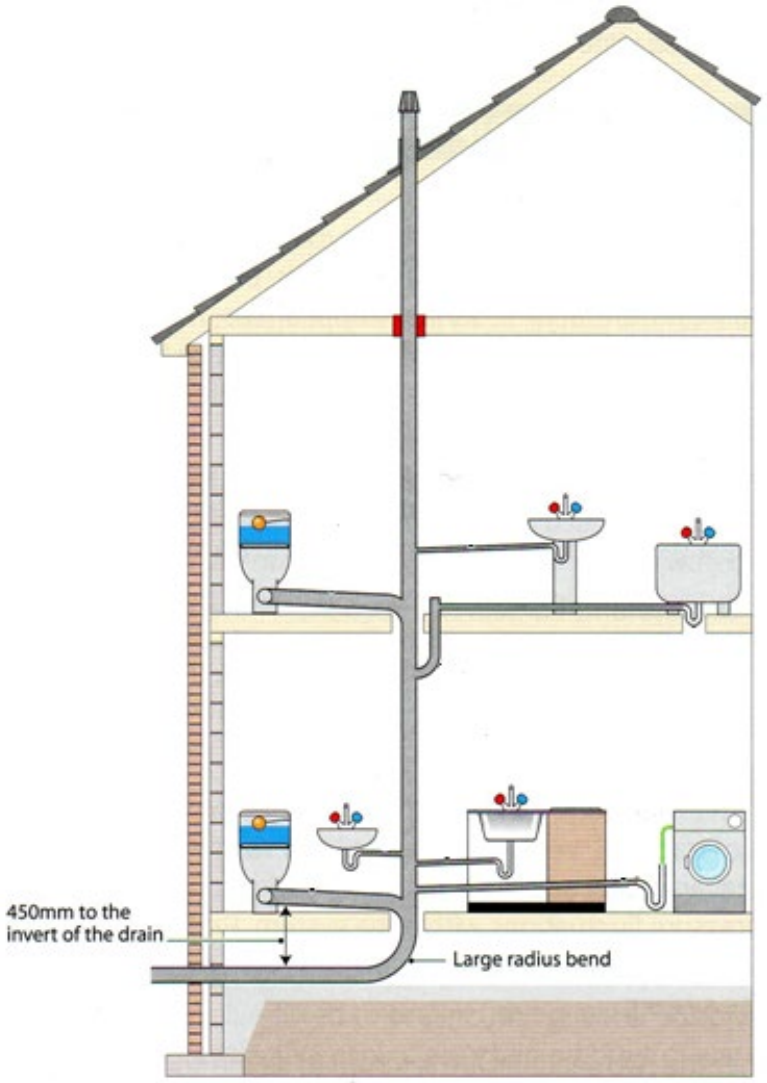
Primary ventilated stack

This is probably the most common type of domestic stack. It relies on the discharge branches from the appliances being closely grouped around the stack, and therefore does not require extra ventilation.

The soil stack is large enough to allow pressure fluctuations without affecting the trap seal loss in the system.

Types of systems

Primary ventilated stack



Types of systems

Primary ventilated stack

All discharge branches need a continuous fall away from the appliances towards the stack. This gradient should be a maximum of 5 degrees but ideally 2½ degrees, which will allow the water to maintain a **self-cleaning** velocity.

The self-cleaning velocity means that the liquid carries the solids as it flows, so reducing the risk of blockage.

Types of systems

Primary ventilated stack

Size of waste pipe for appliances, with maximum length and gradient.

Appliance	Waste size (mm)	Max length (m)	Gradient mm/m	Trap seal depth (mm)
WC	100 (adult) 75 (junior)	6.0	18	50
Basin or bidet	32	1.7	18-22	75
Washing machine/ dishwasher	40	3.0	18-90	75
Bath	40	3.0	18-90	50
Sink	40	3.0	18-90	75

Types of systems

Primary ventilated stack

The gradient does not alter if a junior WC with a 75mm waste is fitted to a 75mm discharge pipe, or an adult WC with a 100mm waste is fitted to a 100mm discharge branch.

Junior WCs are often installed at nursery schools and infant schools.

Types of systems

Primary ventilated stack

If an installation exceeds the maximum length stated, the next pipe size up should be used.

- 32mm would increase to 40mm
- 40mm would increase to 50mm

If multiple appliances are connected to a single discharge pipe, 50mm is the minimum that should be used.

Types of systems

Primary ventilated stack

At the base of a soil stack there needs to be a long radius bend installed. This allows the effluent to maintain its velocity when changing from a vertical to horizontal movement. (Some systems may have two 45 degree connectors instead of a long radius bend.)

Older systems did not have a long radius bend. This caused problems with compression or back pressure for the discharge.

Types of systems

Primary ventilated stack

Just above ground level, at the base of the stack, it is always good practice to position a roding access in case of any blockages.

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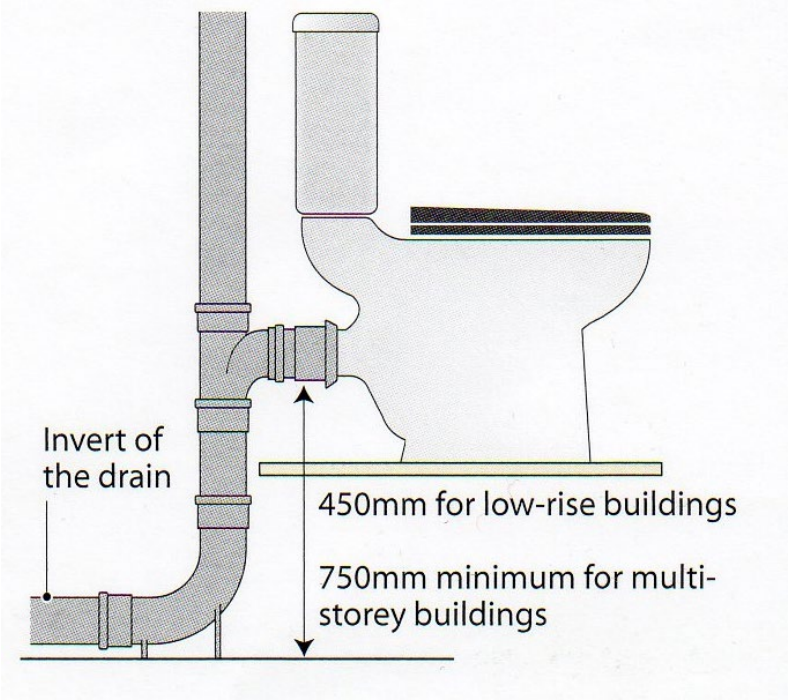
Types of systems

Primary ventilated stack

The lowest connection to the soil stack on low-rise buildings (two storeys) is 450mm from the drain invert level. This increases to 750mm for buildings up to five storeys.



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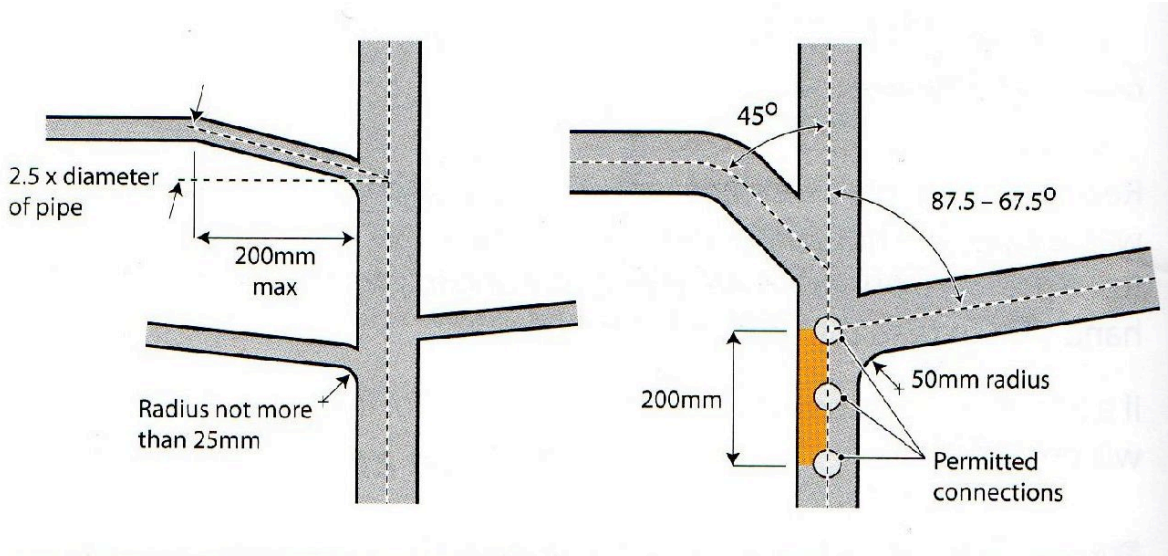
Types of systems

Primary ventilated stack

Branch connections to the soil stack should be made with a swept entrance or at an angle, to aid the flow of effluent.

Branch connections:

- up to 75mm diameter = 45^0 angle or 25mm radius
- over 75mm diameter = 45^0 angle or 50mm radius



Types of systems

Primary ventilated stack

The prevention of crossflow from one connection to another must be avoided, as this could cause trap seal loss and effluent crossflowing up the opposite connection.

Where an existing branch connection to a stack is between 82-160mm (eg WC) no other connection may be installed opposite for a vertical distance of 200mm downwards, to avoid crossflow.

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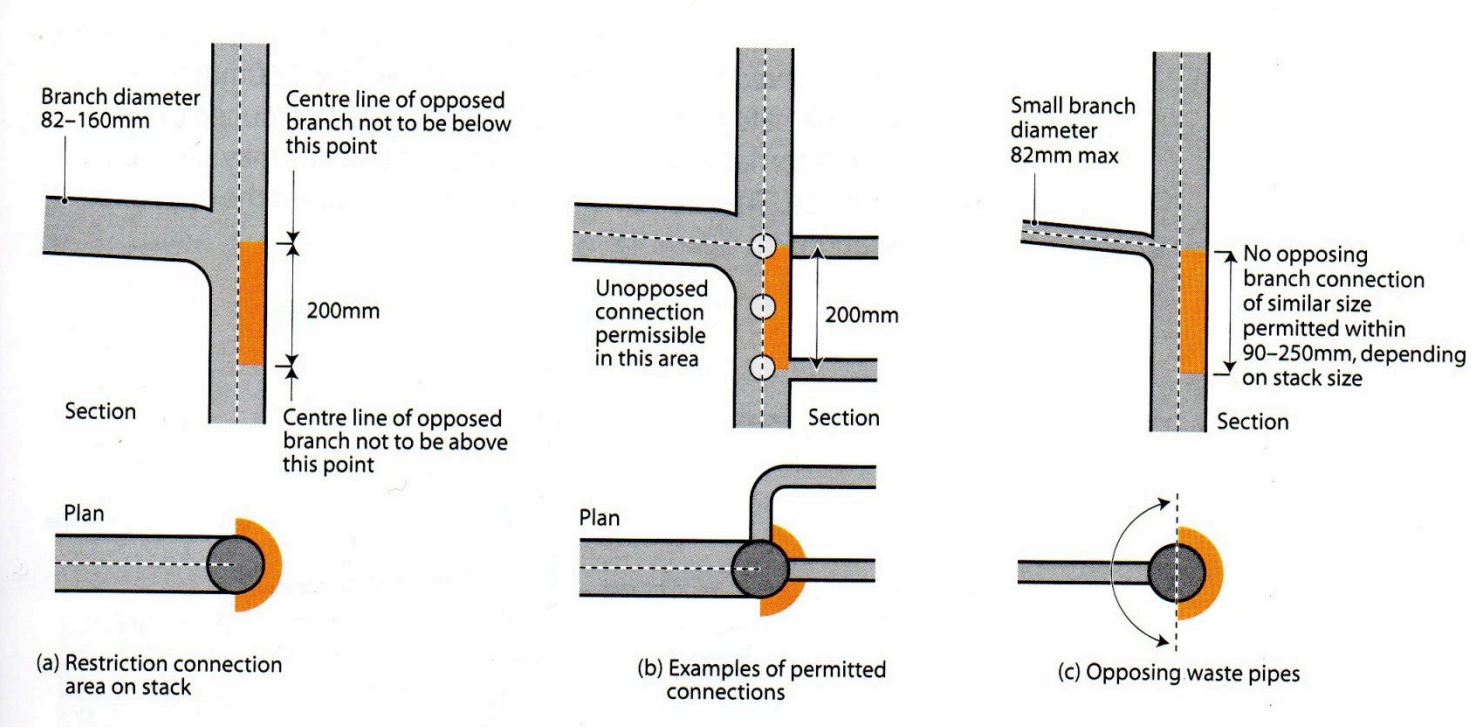
Types of systems

Primary ventilated stack

Prevention of crossflow

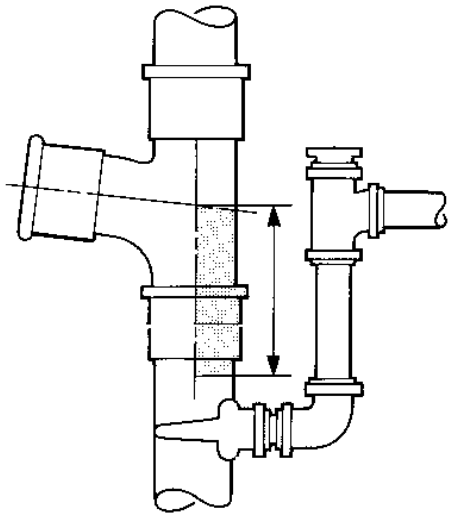


Types of systems

Primary ventilated stack

To overcome crossflow a parallel junction may be used. This allows for a connection to be made under the 200mm restriction.

The parallel junction is made of 50mm waste pipe and includes roding access and a strapped boss connection.



Types of systems

Primary ventilated stack

A soil stack can be located on an external wall of a property, or within the property.

Externally, all the connections and branches can be seen but internally the stack is normally enclosed in some duct work. This allows it to reach the loft area where it can either terminate or it can protrude out of the roof line.

Types of systems

Primary ventilated stack

If the soil stack is internal, in a building such as flats or maisonettes, there **must** be an intumescent collar installed between each living area. This is a fire break that restricts flames and smoke from travelling from one area to another.

Types of systems

Primary ventilated stack

When cutting any plastic material, always use a hole saw. This will enable you to connect a strapped boss for a parallel junction. These can be bought individually or in sets. Each hole saw screws and locks onto an arbour, which has a pilot drill attached.

Types of systems

Primary ventilated stack

Additional branch connections can be made to a soil stack in various ways:

- Strap boss
- Boss branch
- Collared boss
- Waste manifold

Types of systems

Primary ventilated stack

Strap bosses allow a waste pipe to connect directly to the soil stack. A hole is cut and the boss and strap is glued and tightened into position.

To maintain the 2½ degree gradient, the strap bosses have a top marked. The correct sized boss adaptor is then inserted to create the watertight seal. (Some boss straps are push fit.)

Types of systems

Primary ventilated stack

Boss branches also form an integral part of the main soil stack and allow a limited number of connections – either solvent welded or push fit.

Types of systems

Primary ventilated stack

Collared bosses are inserted into the main soil stack and increase the diameter of the main stack to allow the connections to be made. This also prevents crossflow.

These are commonly used internally, where multiple connections are required in one location, like a bathroom suite.

Types of systems

Primary ventilated stack

A waste manifold is similar to the collared boss and offers multiple connections in a restricted area whilst preventing crossflow. These are commonly used in bathrooms, where the soil stack is internal.

Types of systems

Primary ventilated stack

Access roding and clearance should always be allowed for in each discharge branch and also in the main soil stack.

Access socket

Access branch

Access bend

Types of systems

Primary ventilated stack

Access should also be provided above the spillover level of the highest appliance. This too allows for clearing any blockages should they occur.

Types of systems

Primary ventilated stack

There are times when a primary ventilated stack requires additional ventilations, due to the size of the system or the number of appliances discharging.

If this is the case, either a secondary ventilated stack or a ventilated branch system is installed.