1.2.1 The stack with the akavent aerator

If the water flow wasn't controlled by the akavent aerators it would increase in speed until sufficient air resistance would flatten out the water and form a complete blockage of the pipe (terminal velocity). This can cause significant positive and negative pressures ahead and behind the flow. This siphonage and/or blowback can cause trap seal failures.

In an akavent system the formation of a solid "hydraulic plug" is eliminated allowing greater flow of air. Because of this airway there is a balance between the pressures in the stack. The water will cling to the wall and go downward in a swirling motion leaving the open airway in the centre of the pipe. The pressure difference stays well within the limit of +/- 30 mbar (see illustration 1.2.1). The stack stays in one line.

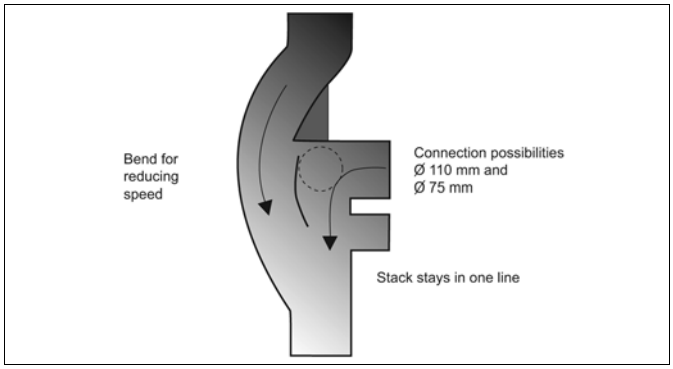

Illustration 1.2.1 Principle akavent aerator

In a standard stack connection the flow in the branch and the flow in the stack will influence each other. In the akavent aerator the branch is connected to a separate chamber that provides an easy jointing with the downwards flow in the stack. By a continuous open connection to the stack the pressure is always in balance and the branches can be longer without a pressure relief line.

The main dimensions of the akavent can be found in the chapter product range.

1.2.2 Connections with the Akatherm snap-socket

For making the connections the Akatherm snap-socket is recommended. This unique plug-in socket with an extra snap-ring provides the following extras:

- Pull-tight connection if the snap groove is made into the connecting pipe.
- Centring the pipe in the ringseal thus preventing "hanging" of the pipe onto the seal.
- Scraping the pipe for dirt so it will not reach the ring seal.

The top connection, to the stack, is made with a snap expansion socket, that is able to cope with the expansion of the PE pipe (see illustration 1.2.2). The other connections, the branches, will be made with the standard snap-socket (see illustration 1.2.3).

Illustration 1.2.2 Akatherm snap expansion socket

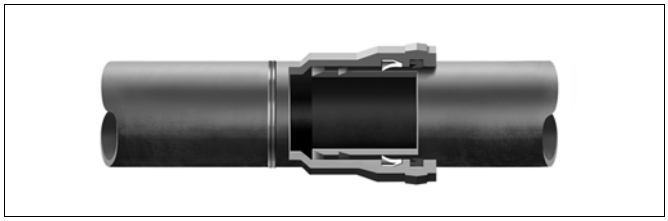

Illustration 1.2.3 Akatherm snap-socket

1.2.3 Basic guidelines for designing an Akatherm soil and waste system for high-rise

The dimensioning of the branch size is done according to local standards. The diameter of the stack is chosen according to table 1.2.1.

Maximum capacity akavent system		
	110	**160**
d_1	110 mm	160 mm
d_{design}	101,6 mm	147,6 mm
Combined flow	7,6 l/s	14,1 l/s
WC per stack	50	160
WC per floor	8	22

Table 1.2.1 Maximum load akavent stack

Akavent stacks must not reduce in size in any direction except for where vent interconnection allows for the vent size to be increased or manifolding at a first floor level (see illustration 1.2.4 and 1.2.5).

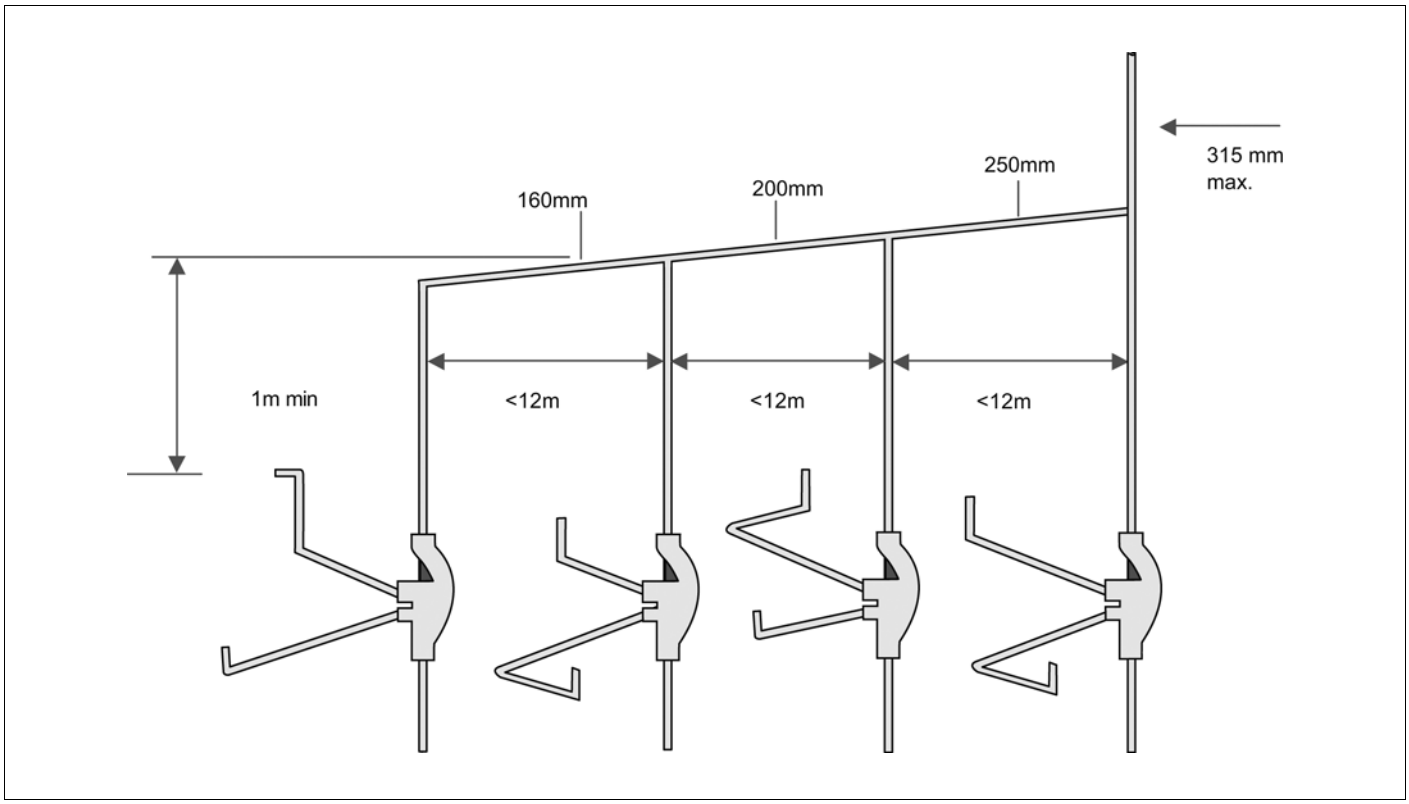

Illustration 1.2.4 Manifolding of stack vents

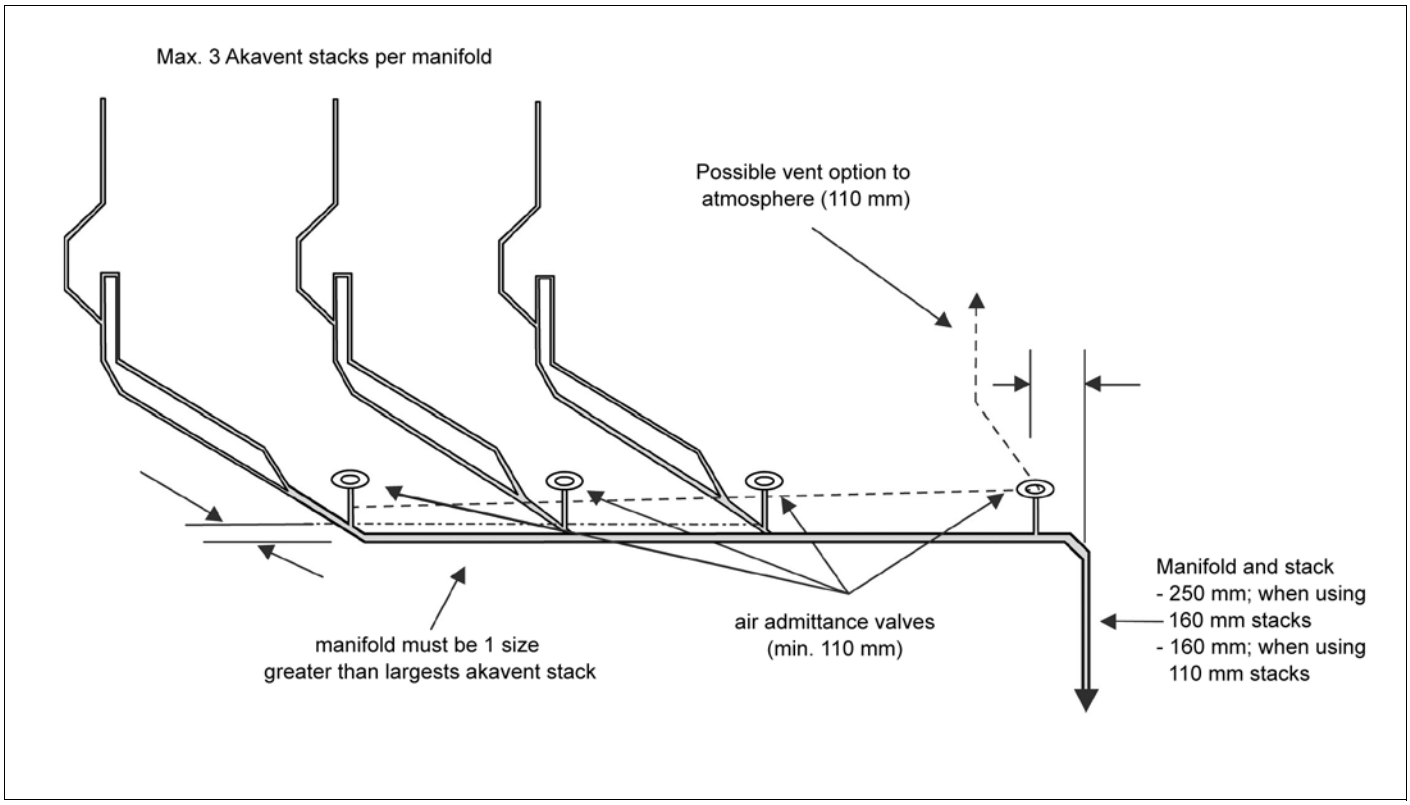

Illustration 1.2.5 Manifolding of stacks in ground/first floor ceilings

An akavent aerator is required at each floor level that receives a soil or waste branch.

A double inline offset is required where the distance between any two akavent aerators or an akavent aerator and a de-aerator exceeds 5 meters (see illustration 1.2.6).

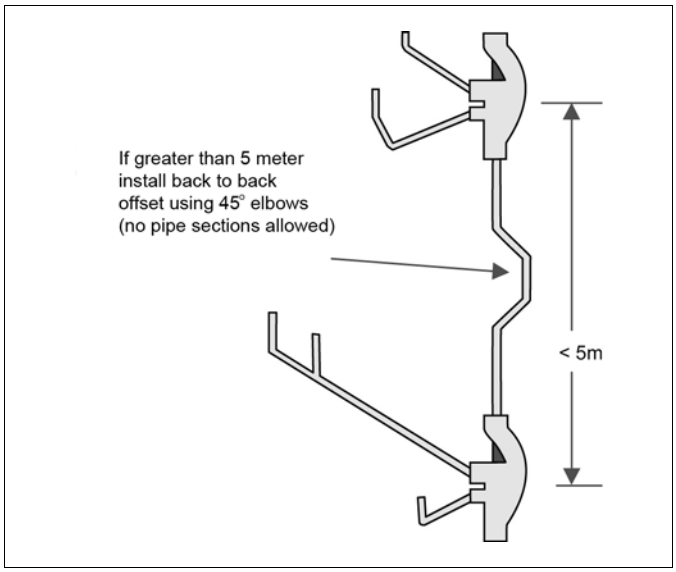

Illustration 1.2.6 Distance between akavent aerators

Any stack offset greater than 45° will require a pressure relief vent (see illustration 1.2.7).

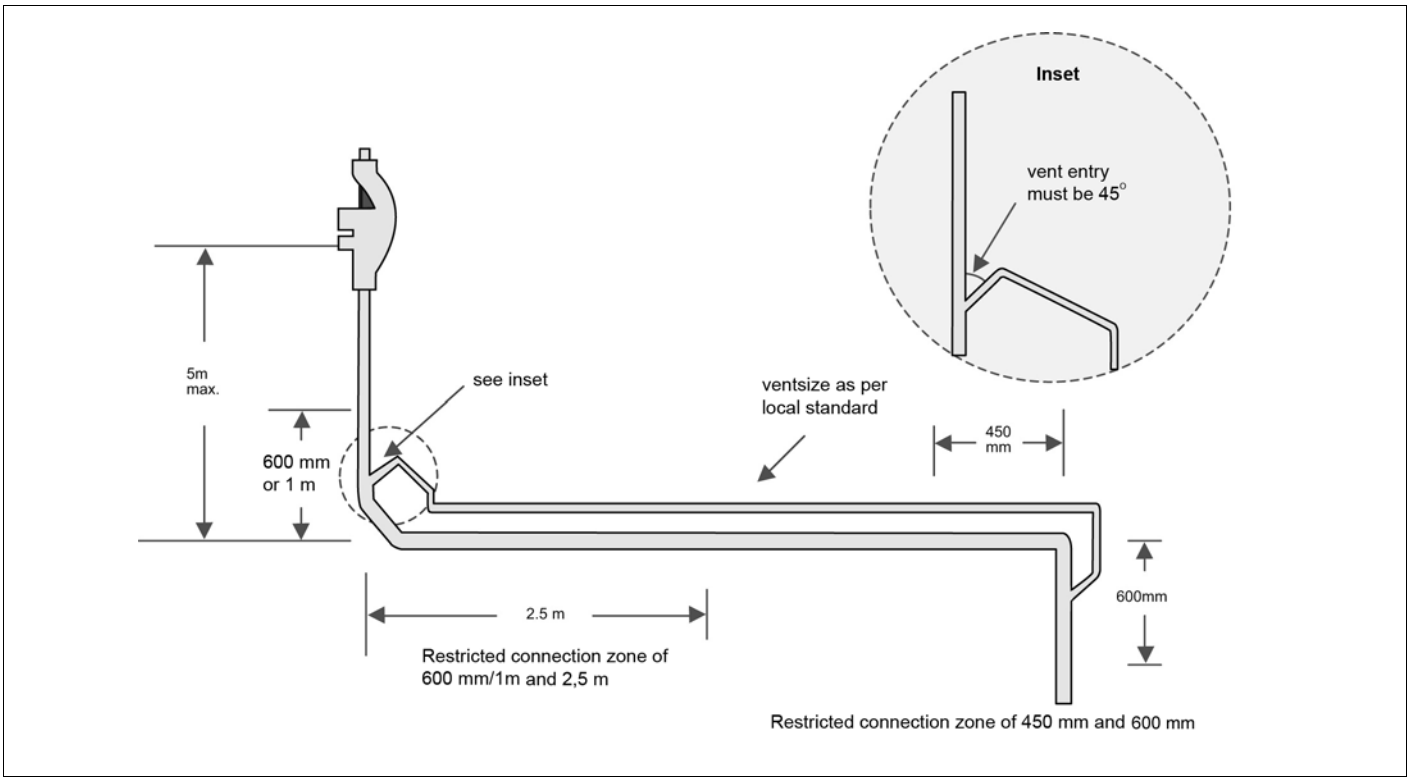

Illustration 1.2.7 Pressure relief vent at a stack offset >45°

Minimum grade of all stack offsets must be 1,5°.

No connection shall be made in the following situations (see illustration 1.2.7):
- In the stack above graded offsets within 600 mm of a bend when the stack exceeds no more than 15 m above the offset.
- In the stack 1 m of a bend when the stack exceeds more than 15 m above the offset.
- In the stack within 600 mm of the bend below graded offsets.
- Within the graded offset 2.5 m of the upper bend or 450 mm of the lower bend.

The main service drain at the base of the building must be sized in accordance with local standards.

The stack size of an akavent system must be continued on when passing through the roof to form the vent except where interconnection of stack vents occur.

Interconnection of stack vents may occur 1 m min above the highest flood rim level of the highest fixture for termination above roof level at a common point by increasing the size of the vent by one HDPE pipe size downstream of each the interconnection junction (see illustration 1.2.8).

The maximum number of stacks that can be interconnected is 5 x 110 mm stacks or 4 x 160 mm stack, which gives a greatest diameter of vent terminating through the roof being 315 mm.

Stack vents may offset above the highest fixture but must be increased by 1 HDPE pipe size when the horizontal exceeds 12 m (see illustration 1.2.8).

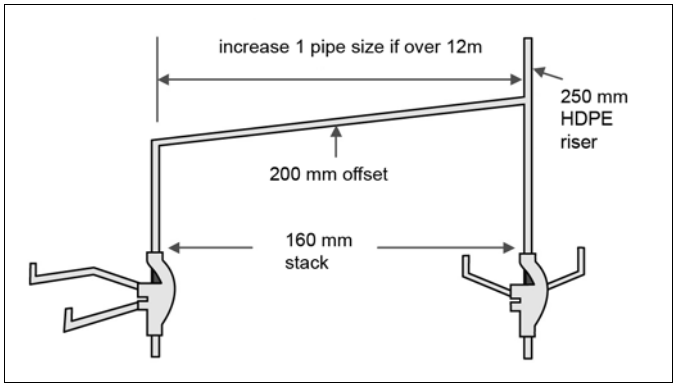

Illustration 1.2.8 Stack offset

De-aerators

An akavent de-aerator must be installed at the base of any vertical stack before it is connected to the main drain servicing the stack (see illustration 1.2.9). The maximum distance from the de-aerator to the closest aerator or double offset must not exceed 5 m (see illustration 1.2.6).
The pressure relief line on a de-aerator shall run a minimum distance of 2.5 m from the centreline of the stack to the centre of the relief vent inlet junction. No connection can be made into the relief vent pipe. No connections can be made to the de-aerator base pipe within 2.5 m of the stack base.

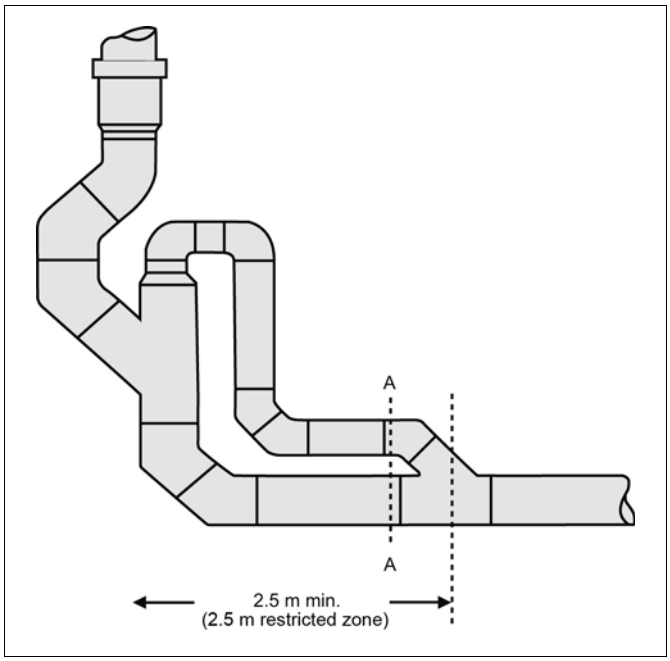

Illustration 1.2.9 De-aerator assembly

Pressure relief lines for de-aerators can run parallel to the base of the de-aerator as long as the bottom of the vent is not lower than the centreline of the base (see illustration 1.2.10).

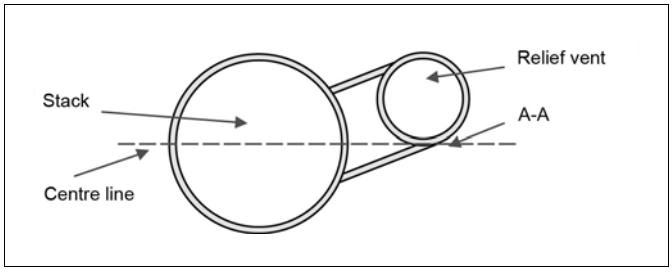

Illustration 1.2.10 Pressure relief lines for de-aerators

Branch drains

The maximum length for a 100 mm un-vented branch is 9 m to the trap weir. Smaller sizes are 4.5 m maximum to the weir.

Except for the connection of 3 WCs per un-vented branch the branch drain loadings for each un-vented branch (maximum 2 branches per aerator) is as per local standard.
When there is a need for 3 x 90° changes in direction of any branch the bend closest to the stack must be made using 2 x 45° bends. If more than 3 major changes in direction are required all but the bend closest to the fixture will be made of 2 x 45° bends.
When a riser to a fixture exceeds 1 m in height the change of direction at the riser base must be made using 2 x 45° bends or an offset no longer than 300 mm. Risers must not exceed 1.5 m.
Bidets and basins discharge pipe with an outlet of 40 mm shall not exceed 2.5 m in length.

All junctions on branches must enter at 45° through an oblique junction.

If there is a need to extend the length of branch drains past the specified length it is possible to vent this fixture back to the akavent stack using existing plumbing practices.

Where branch relief vents are required to enter an akavent stack they must enter downwards at 45° with the highest section of vent being a point higher than the flood rim level of lowest fixture on the that floor level (see illustration 1.2.7).

Branch drains cannot enter an akavent aerator as opposed "back to back" connections (see illustration 1.2.12).

All WCs must be connected to the branch by 110 mm pipe.

1.2.4 Fixing system

For fixing the Akatherm soil and waste system for high rise to the building structure the standard guidelines for fixing apply. The akavent aerator needs to be fixed to the building on the top and bottom with an anchor bracket.

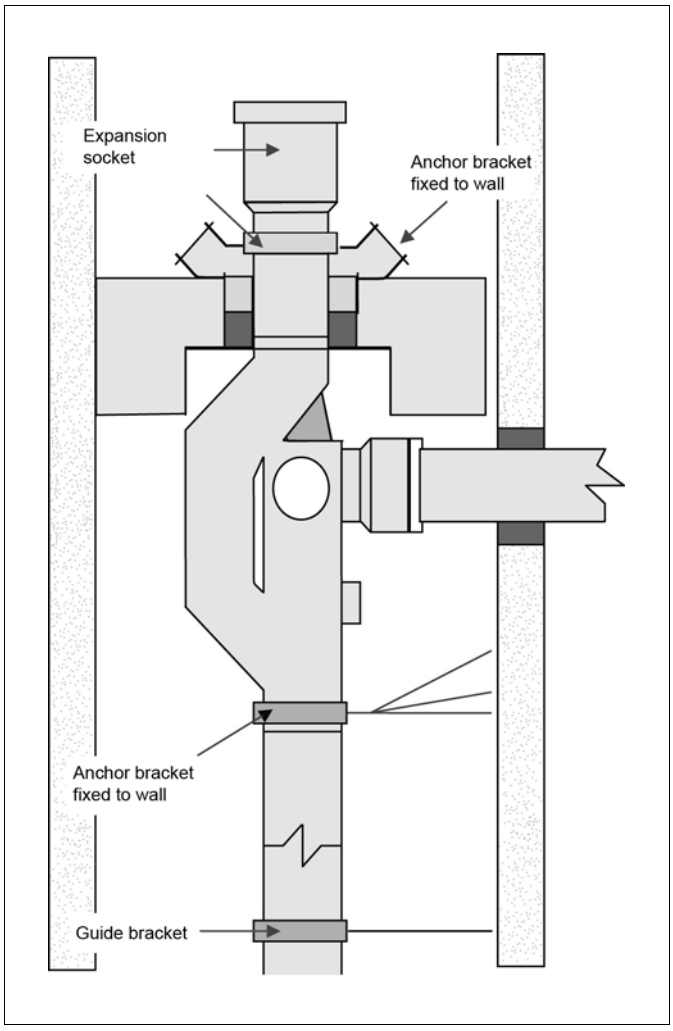

Illustration 1.2.11 Bracketing of an akavent aerator

1.2.5 Duct size

The minimal duct size that is needed for an akavent system can be found in table 1.2.2. The branch possibilities 1 and 3 are not to be used simultaneously for connecting soil and waste systems (see illustration 1.2.12).

		Duct size		
		only branche 2	branche 1 of 3	branche 2 and (3 or 1)
110	**A**	300 mm	350 mm	350 mm
	B	400 mm	350 mm	400 mm
160	**A**	270 mm	320 mm	320 mm
	B	400 mm	350 mm	400 mm

Table 1.2.2. Duct sizing

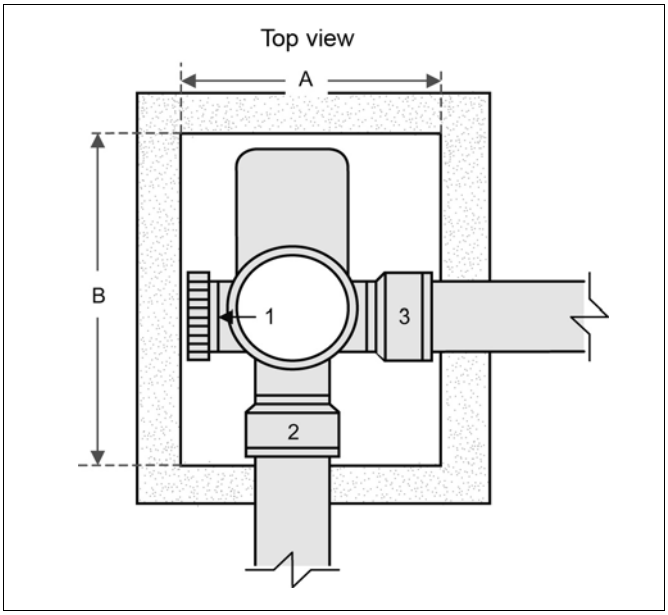

Illustration 1.2.12 Sizes service duct