

PLANNING MANUAL

Valid as of 1 July 2018

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1 History of development

1.1 Know-How Installed

Ever since the company was founded in 1874, the name Geberit has stood for quality, easy installation and technical competence. This is no surprise. The application of our comprehensive knowledge enables us to recognise and benefit from improvement potentials in optimal fashion. It is on this basis that Geberit achieves innovations which optimise synergies and performance throughout the entire system. This approach results in extremely reliable, integrated systems which are rapid and easy to install and which set new benchmarks for the sanitary and plumbing industry.

1.2 History of Geberit HDPE Sovent

Geberit HDPE Sovent was developed in 1959 by Fritz Sommer, the respected director of a vocational school in Bern, Switzerland. Sommer wanted to substantially improve the performance of drainage systems so that there was no need for a separate ventilation pipe and the dimensions of the stack could be reduced.

A ten-storey hydraulic testing tower was built in Bern to prove the performance of the Geberit HDPE Sovent. In the 1960s and 1970s, the system was subjected to additional in-depth testing, not only in private but also in government test installations in New York, Tokyo, Paris and Stockholm, as the result of which it gained wide recognition due to its innovative design.

2 Basic information

2.1 Drainage

2.1.1 Falling velocity in stacks

The maximum falling velocity in stacks is attained after a height of 35 m and is approx. 13 m/s. Due to friction losses and the air resistance in the stack, the falling velocity does not exceed this value.

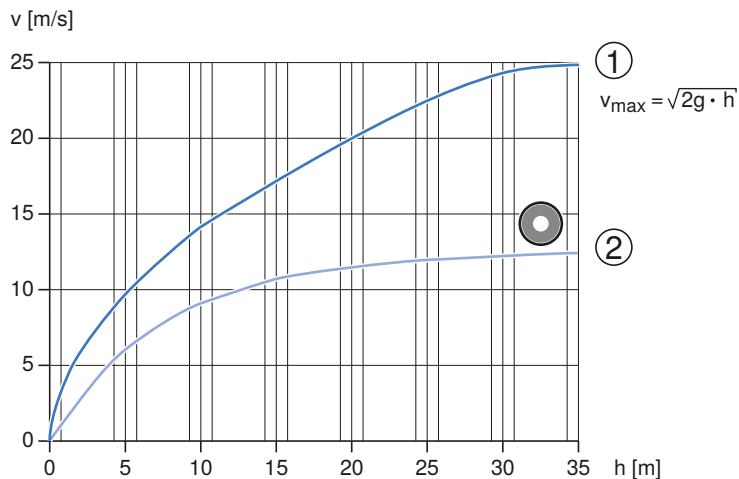


Figure 1: Theoretical falling velocity and falling velocity in stacks

- v Falling velocity [m/s]
- h Height of fall [m]
- 1 Theoretical falling velocity
- 2 Falling velocity in stacks (water film with air column)

2.1.2 Discharge unit (DU)

The DU (discharge unit) is a measure of the amount of waste water which drains from a sanitary appliance. 1 DU corresponds to a waste water volumetric flow rate of 1 l/s.

Local standards must be taken into account when determining the discharge unit. Examples of the discharge units in accordance with DIN EN 12056-2:2001-01 are stated in the following:

Table 1: Discharge units (DU) in accordance with DIN EN 12056-2:2001-01

Symbol	Sanitary appliance	DU
	Washbasin, bidet, urinal	0.5
	Shower without congestion	0.6
	Bathtub	0.8
	Kitchen sink	0.8
	WC (6 or 7 l) / WC (9 l)	2.0/2.5
	Squatting pan	2.5

2.1.3 Drainage factor K

The drainage factor K is a measure of the simultaneous drainage of sanitary appliances that are connected to a stack. A factor of 0.5 for private housing or offices, for example, takes into account the fact that water is not flowing through all branch discharge pipes into the stack at the same time.

DIN EN 12056-2:2001-01 and SN 592000:2012 recommend the following drainage factors K:

Table 2: Drainage factors in accordance with DIN EN 12056-2:2001-01 and SN 592000:2012

Frequency of use and building type	K
Irregular use: e.g. residential buildings, guest houses/inns, offices	0.5
Regular use: e.g. hospitals, schools, restaurants, hotels	0.7
Frequent use: e.g. public toilets, shower rooms	1.0
Special use: e.g. laboratories	1.2

2.1.4 Maximum waste water load of underground and collector pipes

DIN EN 12056-2:2001-01 defines the maximum waste water load of underground and collector pipes depending on the filling level and slope. The following tables list the values for filling levels of 50 % and 70 %.

Table 3: Maximum waste water load in l/s for underground pipes or collector pipes at a filling level of 50 % in accordance with DIN EN 12056-2:2001-01

Slope J								Pipe dimension ø [mm] / DN
1 % (1 : 100)	1.5 % (1 : 66)	2 % (1 : 50)	2.5 % (1 : 40)	3 % (1 : 33)	3.5 % (1 : 28)	4 % (1 : 25)	5 % (1 : 20)	
2.5	3.1	3.5	4.0	4.4	4.7	5.0	5.6	110/100
4.1	5.0	5.7	6.4	7.1	7.6	8.2	9.1	125/125
7.7	9.4	10.9	12.2	13.3	14.4	15.4	17.2	160/150
14.2	17.4	20.1	22.5	24.7	26.6	28.5	31.9	200/200
26.9	32.9	38.1	42.6	46.7	50.4	53.9	60.3	250/250
48.3	59.2	68.4	76.6	83.9	90.7	96.6	108.4	315/300

Table 4: Maximum waste water load in l/s for underground pipes or collector pipes at a filling level of 70 % in accordance with DIN EN 12056-2:2001-01

Slope J								Pipe dimension ø [mm] / DN
1 % (1 : 100)	1.5 % (1 : 66)	2 % (1 : 50)	2.5 % (1 : 40)	3 % (1 : 33)	3.5 % (1 : 28)	4 % (1 : 25)	5 % (1 : 20)	
4.2	5.1	5.9	6.7	7.3	7.9	8.4	9.4	110/100
6.8	8.3	9.6	10.8	11.8	12.8	13.7	15.3	125/125
12.8	15.7	18.2	20.3	22.3	24.1	25.8	28.8	160/150
23.7	29.1	33.6	37.6	41.2	44.5	47.6	53.3	200/200
44.9	55.0	63.6	71.1	77.9	84.2	90.0	100.7	250/250
80.6	98.8	114.2	127.7	140.0	151.2	161.7	180.8	315/300

2.1.5 Maximum admissible flow rate in stacks

The dimensions of the single-branch discharge pipes, the collector branch pipes, the underground pipes or collector pipes are selected as for conventional drainage, in accordance with the applicable country-specific standards and regulations.

The maximum admissible flow rate Q_{\max} in the stack is used as the relevant key figure for dimensioning stacks. This figure is calculated according to the following formula:

$$Q_{\max} = K \cdot \sqrt{\sum DU}$$

Q_{\max} Maximum admissible flow rate

K Country-specific drainage factor (standard residential and office building construction = 0.5)

$\sum DU$ Sum of discharge units DU

3 Product description

3.1 Overview

Geberit HDPE Sovent is a flow-optimised inlet fitting made of high-density polyethylene, which enables an economical and space-saving configuration of stacks in tall buildings.

The special design of the fitting and patented Geberit SuperTube technology produces a continuous column of air in the stack. The discharge rate of the stack increases as a result of the continuous column of air, meaning that there is no longer any need to install a ventilation pipe running in parallel and the stack dimensions can be smaller in many applications.



A continuous column of air facilitates pressure compensation and increases the discharge rate.

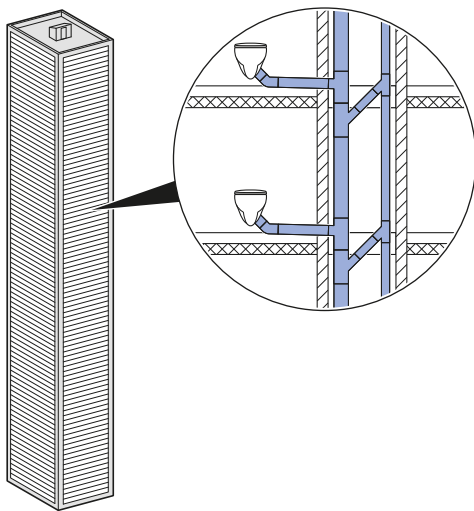


Figure 2: Conventional drainage of high-rise buildings with an additional ventilation pipe (secondary ventilation)

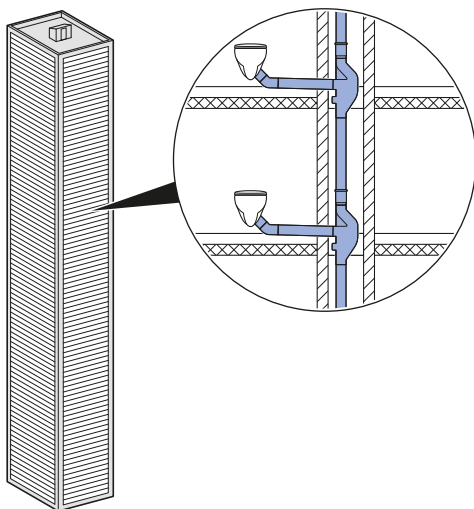


Figure 3: Drainage of high-rise buildings with Geberit HDPE Sovent

The Geberit HDPE Sovent fittings are available in the dimensions of d110 and d160.

The Geberit HDPE Sovent fitting d110 is equipped with the Geberit SuperTube technology. For changes in pipe direction in the dimension d110, the bends Geberit BottomTurn bend and Geberit BackFlip bend are additionally available, which are also equipped with the Geberit SuperTube technology. The fitting d110, in combination with the two bends, forms the Geberit SuperTube system.

3.2 Structure

3.2.1 Geberit SuperTube

Geberit SuperTube comprises:

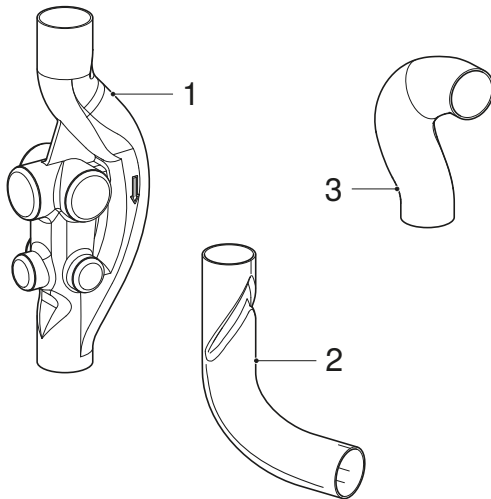


Figure 4: Structure of Geberit SuperTube

- 1 Geberit HDPE Sovent fitting d110, art. no. 367.614.16.1
- 2 Geberit HDPE BottomTurn bend d110, art. no. 367.615.16.1
- 3 Geberit HDPE BackFlip bend d110, art. no. 367.616.16.1

Geberit SuperTube is an optimised flow guidance system developed by Geberit, which ensures a continuous column of air in the stack and significantly increases the discharge rate of the fittings.

Geberit HDPE Sovent fitting d110

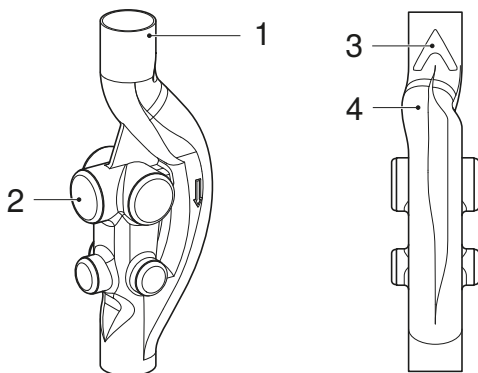


Figure 5: Structure of the Geberit HDPE Sovent fitting d110

- 1 Stack connection
- 2 Branch pipe connection, 6-way, sealed at the factory
- 3 Flow divider
- 4 Swirl zone

Geberit HDPE BottomTurn Bend d110

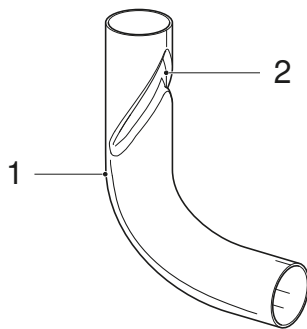


Figure 6: Structure of the Geberit HDPE BottomTurn bend d110

- 1 Guide channel
- 2 Flow divider

Geberit HDPE BackFlip Bend d110

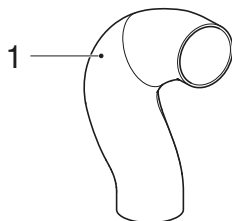


Figure 7: Structure of the Geberit HDPE BackFlip bend d110

- 1 Swirl zone

3.2.2 Geberit HDPE Sovent fitting d160

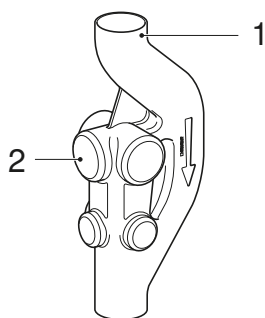


Figure 8: Structure of the Geberit HDPE Sovent fitting d160, art. no. 369.001.16.1

- 1 Stack connection
- 2 Branch pipe connection, 6-way, sealed at the factory

3.3 Application range

Geberit HDPE Sovent is used for an economical and space-saving configuration of stacks in buildings with more than 5 floors (high-rise buildings).

Geberit HDPE BottomTurn bend and Geberit HDPE BackFlip bend can be used only in conjunction with the Geberit HDPE Sovent fitting d110 and the drainage systems Geberit HDPE or Geberit Silent-db20.

3.4 Function

3.4.1 Geberit HDPE Sovent fittings

Hydraulic pressure compensation in a stack system is an extremely complex matter. Each stack concept is characterised by individual properties. The capacity of the stack and ventilation system is dependent on the flow capacity of the appliances, their simultaneous drainage pattern, the branch fitting inlet configuration and the drainage concept of the building. Overpressure and negative pressure in a drainage system must be limited in order to ensure the water seal in the trap.

Very high negative pressure values can arise in conventional main vent stacks. The negative pressure arises due to unfavourable flow behaviour between the stack and the branch discharge pipe. This unfavourable flow behaviour leads to a hydraulic blockage in the stack that prevents the air from circulating.

The Geberit HDPE Sovent fittings prevent a hydraulic blockage from forming in the stack. Because of the fact that the stack flow is guided around the point of connection, the incoming waste water has time to switch to the vertical direction so that it flows in a parallel direction when it meets the waste water in the stack flow. This minimises the collision turbulences of the two waste water flows and therefore reduces the pressure fluctuations in the system. Guiding the stack flow around the point of connection also causes the flow velocity to decrease which limits the kinetic pressure. In addition, the partition in the Geberit HDPE Sovent fittings prevents foam, dirt particles or splash water from getting into the branch discharge pipe.

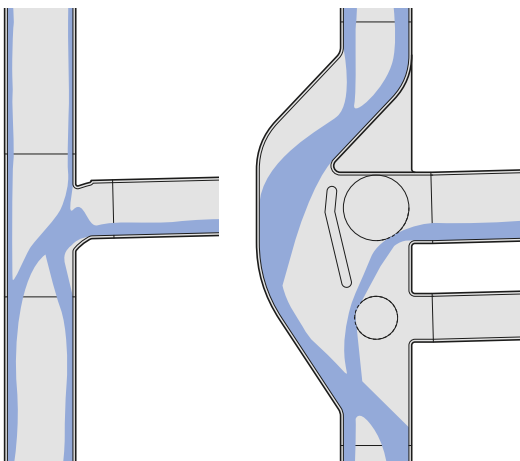


Figure 9: How the Geberit HDPE Sovent fittings function in comparison to conventional main vent stacks

3.4.2 Geberit SuperTube

Geberit HDPE Sovent Fittings and bends with Geberit SuperTube technology also stand out due to their patented, flow-optimised design.

The flow-optimised design in the Geberit HDPE Sovent fitting d110 is comprised of a flow divider and a swirl zone. The flow divider adjusts the flow of the water and supports functional stability in the system. The swirl zone creates a rotating movement that allows the water to flow along the pipe wall, which produces a continuous column of air. This effect increases the discharge rate of the fitting by more than 30 % (from 8.7 l/s to 12 l/s).

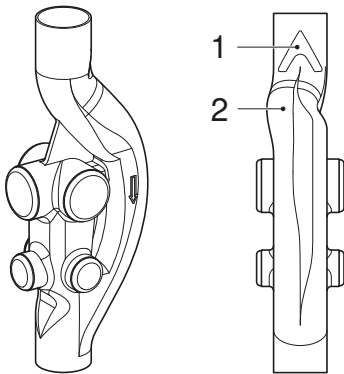


Figure 10: Geberit SuperTube technology components on the Geberit HDPE Sovent fitting d110

- 1 Flow divider
- 2 Swirl zone

3.5 Technical data

3.5.1 The load bearing capacity of Geberit HDPE Sovent in comparison to conventional stack versions

Stacks with Geberit HDPE Sovent have a higher load bearing capacity than conventional stacks with main or secondary ventilation with the same dimensions. The following table shows the maximum load of Geberit HDPE Sovent in DU compared to conventional stack versions.

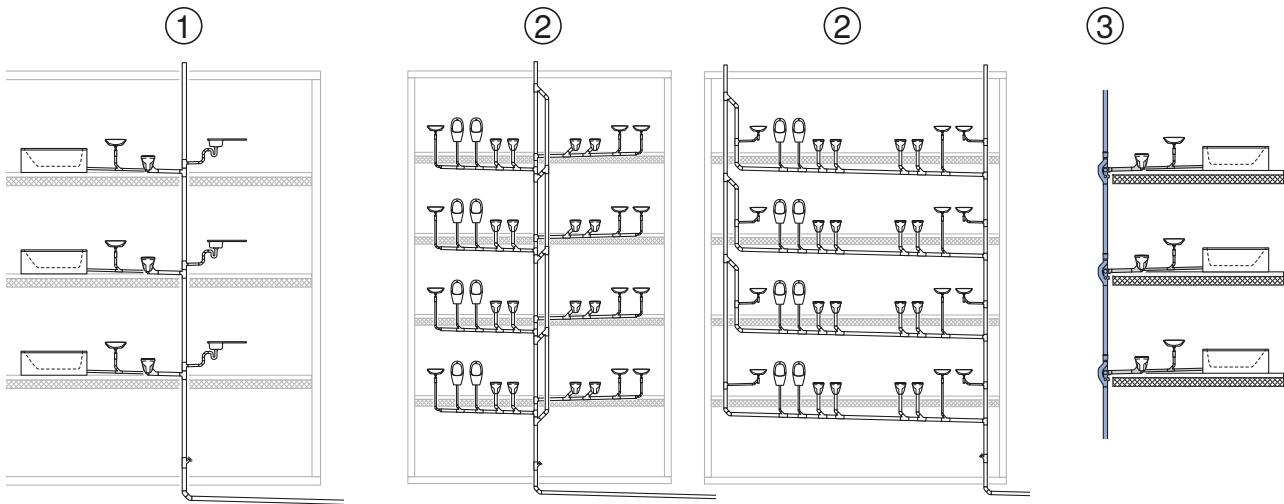


Table 5: The load bearing capacity of Geberit HDPE Sovent in comparison to conventional stack versions

No.	Drainage system	Dimension d	Dimension d of the secondary ventilation	Maximum load in DU (K = 0.5)	Maximum load in l/s
1	Stack vent system with 88.5° branch fitting	110	–	64	4.0
		125	–	135	5.8
		160	–	361	9.5
1	Stack vent system with 88.5° branch fitting swept entry	110	–	108	5.2
		125	–	231	7.6
		160	–	615	12.4
2	Secondary ventilation system, direct or indirect, with 88.5° branch fitting	110	56	108	5.2
		125	75	231	7.6
		160	90	615	12.4
2	Secondary ventilation system, direct or indirect, with 88.5° branch fitting swept entry	110	56	185	6.8
		125	75	400	10.0
		160	90	1037	16.1
3	Geberit HDPE Sovent	110	–	576	12.0
		160	–	1156	17.0

3.6 Standards and tests

3.6.1 Standards

The Geberit HDPE Sovent fitting is a special fitting that is based on the requirements of the Swiss standard SN 592000:2012.

Because the Geberit HDPE Sovent fitting is a special fitting, it has not yet been included in every national standard.

All of the pipes and connections attached to a stack with Geberit HDPE Sovent fittings are subject to the regulations of the respective locally applicable standards. The drainage system must therefore be installed in accordance with these regulations. For the stack itself and for the transition of the stack into the collector pipe, Geberit specifies technical parameters which must be adhered to.

The fittings Geberit HDPE Sovent d110, Geberit HDPE BottomTurn bend and Geberit HDPE BackFlip bend have a new Geberit SuperTube technology. Because it is a new, innovative system, it is not in conformance with local standards or DIN EN 12056-2:2001-01.

3.6.2 Tests

Geberit HDPE Sovent has been tested by national test institutes alongside conventional drainage systems. Performance and function of the Geberit HDPE Sovent are documented in the following test reports.

The hydraulic performance and function of fittings with the Geberit SuperTube technology has been confirmed by a test report issued by TÜV Rheinland LGA Products. TÜV Rheinland LGA Products is an independent, internationally recognised test organisation with headquarters in Nuremberg, Germany.

Test reports for Geberit SuperTube

Germany:	TÜV Rheinland LGA Products	Test report 7313368-01 Test report Geberit SuperTube technology (in preparation)
United Kingdom:	BBA	Test report 92/2796 Test report Geberit SuperTube technology (in preparation)
France	CSTB	Test report 14/16-2201

Test reports for Geberit HDPE Sovent fitting d160

Germany:	TÜV Rheinland LGA Products	Test report 7311212-01
United Kingdom:	BBA	Test report S1/47721

4 Planning

4.1 Planning rules in accordance with Geberit and DIN EN 12056-2:2001-01

4.1.1 Basic rules

When planning discharge pipes with Geberit HDPE Sovent fittings, the following points need to be taken into account in addition to the generally applicable rules for planning discharge pipes:

- Geberit HDPE Sovent fittings should be installed where conventional branch fittings are found in conventional stacks.
- Every stack planned with Geberit HDPE Sovent fittings must be individually ventilated through the roof, without reducing the pipe cross-section.
- The respective planning rules for Geberit HDPE Sovent must be observed for the transition of the stack into a horizontal collector pipe or for the design of a stack offset.

4.1.2 Overview of the pipe sections and rules

Geberit SuperTube pipe sections and rules

The following graphic provides an overview of the pipe sections of a discharge pipe with Geberit SuperTube and the rules which must be observed for these pipe sections.

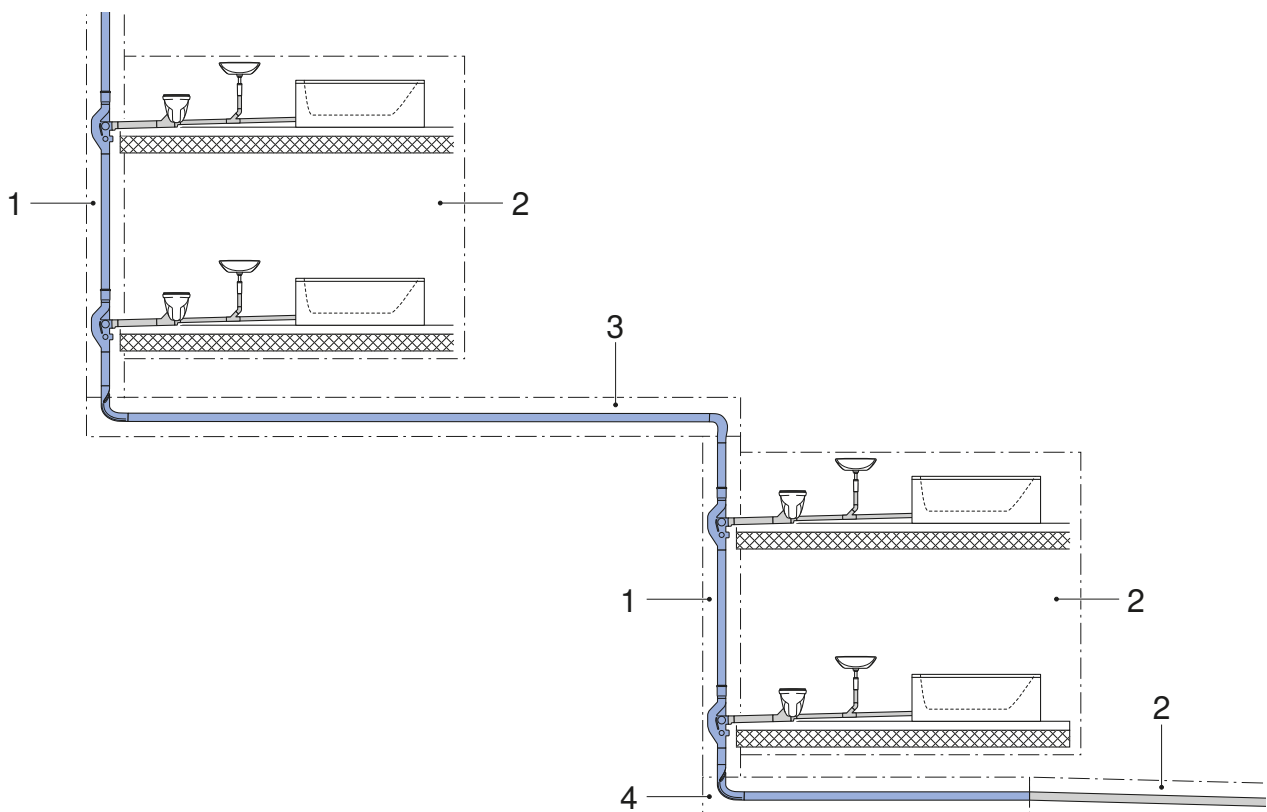


Figure 11: Discharge pipe with Geberit SuperTube: pipe sections and rules

- 1 Stack: planning in accordance with the rules for Geberit HDPE Sovent fittings
- 2 Branch discharge pipes, collector pipe: planning in accordance with local standards or DIN EN 12056-2:2001-01
- 3 Stack offset: planning in accordance with the rules for Geberit SuperTube
- 4 Transition to the collector pipe: planning in accordance with the rules for Geberit SuperTube

Geberit HDPE Sovent d160 pipe sections and rules

The following graphic provides an overview of the pipe sections of a discharge pipe with Geberit HDPE Sovent d160 and the rules which must be observed for these pipe sections.

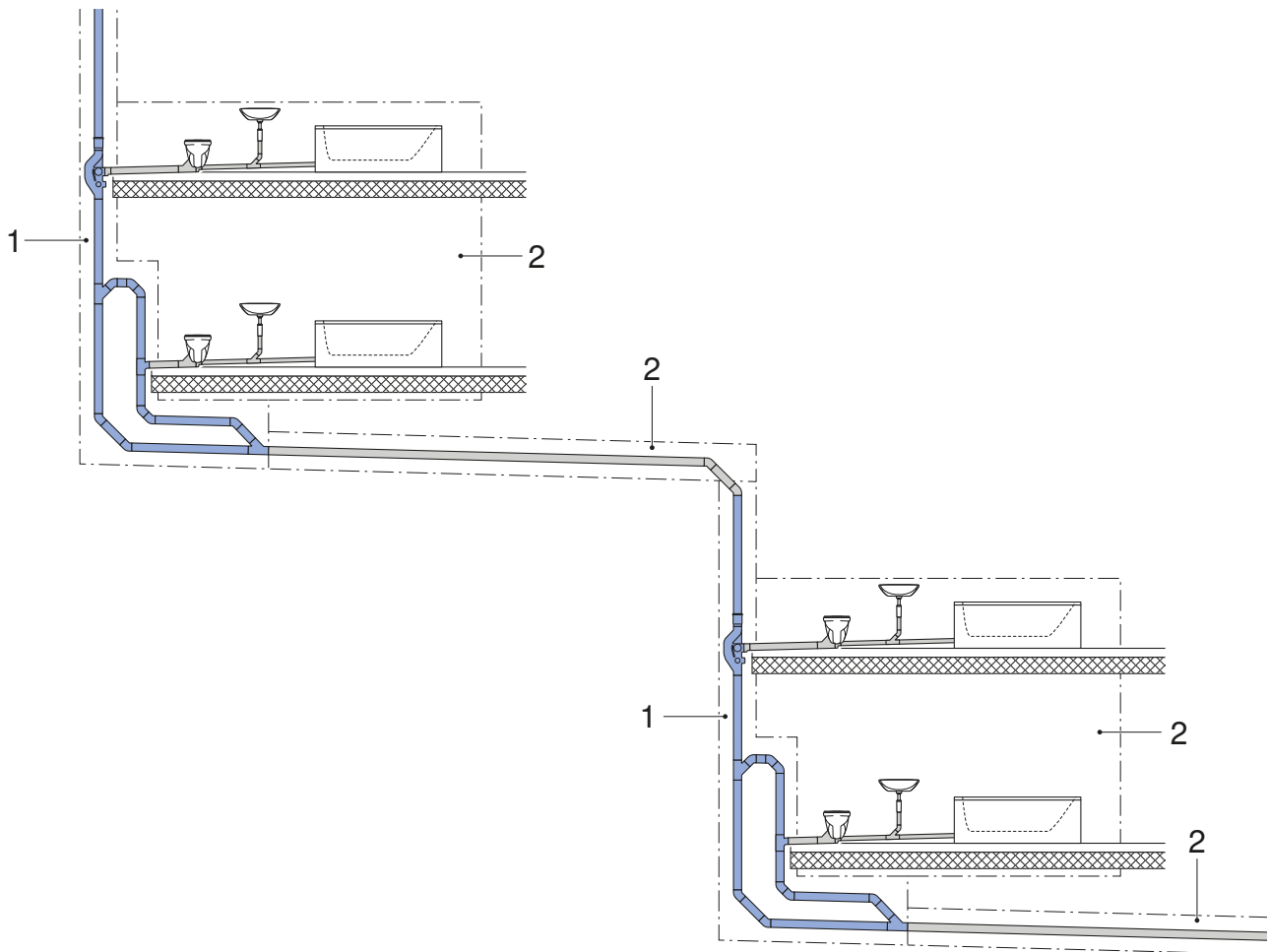


Figure 12: Discharge pipe with Geberit HDPE Sovent d160: pipe sections and rules

- 1 Stack with transitions to the stack offset and collector pipe: planning in accordance with the rules for Geberit HDPE Sovent fittings
- 2 Branch discharge pipes, stack offset, collector pipe: planning in accordance with local standards or DIN EN 12056-2:2001-01

4.1.3 Stack

Load on a stack with Geberit HDPE Sovent fittings

One of the first steps in the planning of a Geberit HDPE Sovent stack is to determine the amount of waste water. All DUs of the appliances must be taken into account for this purpose and included in the configuration of the stack with Geberit HDPE Sovent.

A maximum flow rate of 12 l/s is permitted for stacks with Geberit HDPE Sovent fittings d110 and 17 l/s for stacks with Geberit HDPE Sovent fittings d160. The stack with the stack vent must be implemented completely with d110 or d160.

Table 6: Maximum waste water load of stacks with Geberit HDPE Sovent

Product	Maximum waste water load	Maximum load in DU (K = 0.5)	Pipe dimension with stack vent through the roof
Geberit HDPE Sovent fitting d110	12 l/s	576	ø 110 mm / DN 100
Geberit HDPE Sovent fitting d160	17 l/s	1156	ø 160 mm / DN 150

If the waste water load of stack d110 is greater than 12 l/s, one of the following measures must be planned:

- Use further stacks and distribute the connections accordingly (A, B).
- Use a stack d160 (C, maximum 17 l/s).

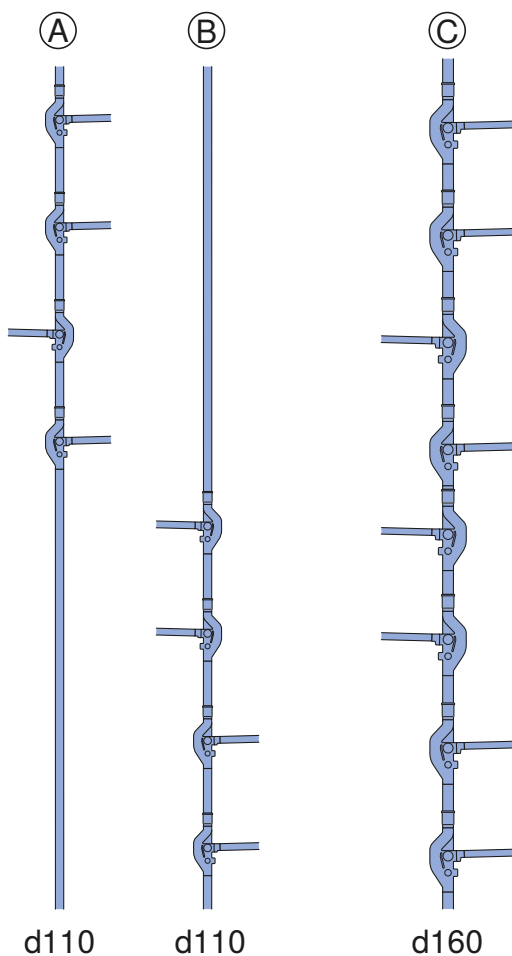


Figure 13: Stacks with Geberit HDPE Sovent with a waste water load greater than 12 l/s

Installing Geberit HDPE Sovent fittings in the stack

A Geberit HDPE Sovent fitting must be installed at every floor connected to the stack.

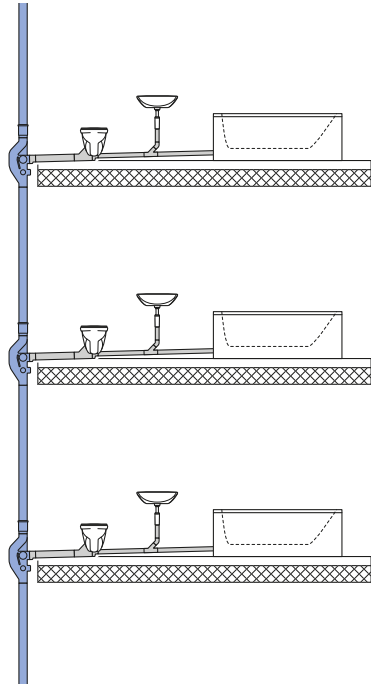


Figure 14: Installing one Geberit HDPE Sovent fitting per floor connection

Combinations of connections diagonally opposite one another must be avoided.

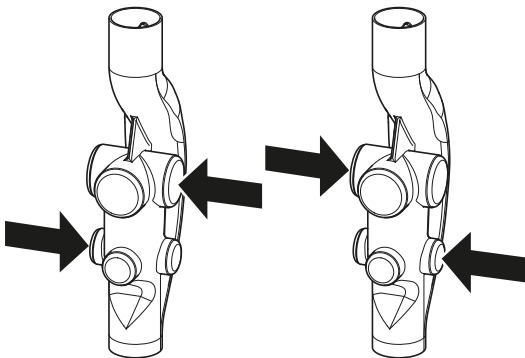


Figure 15: To be avoided: connections diagonally opposite one another

Mixed installation

Only Geberit HDPE Sovent fittings of the same dimension may be installed in a stack. All branch discharge pipes must be connected to the stack through Geberit HDPE Sovent fittings.

The following are not permitted:

- mixed installations of Geberit HDPE Sovent fittings d110 and d160 in the same stack
- mixed installations of Geberit HDPE Sovent fittings with Geberit corner branch fittings or swept-entry corner branch fittings in the same stack

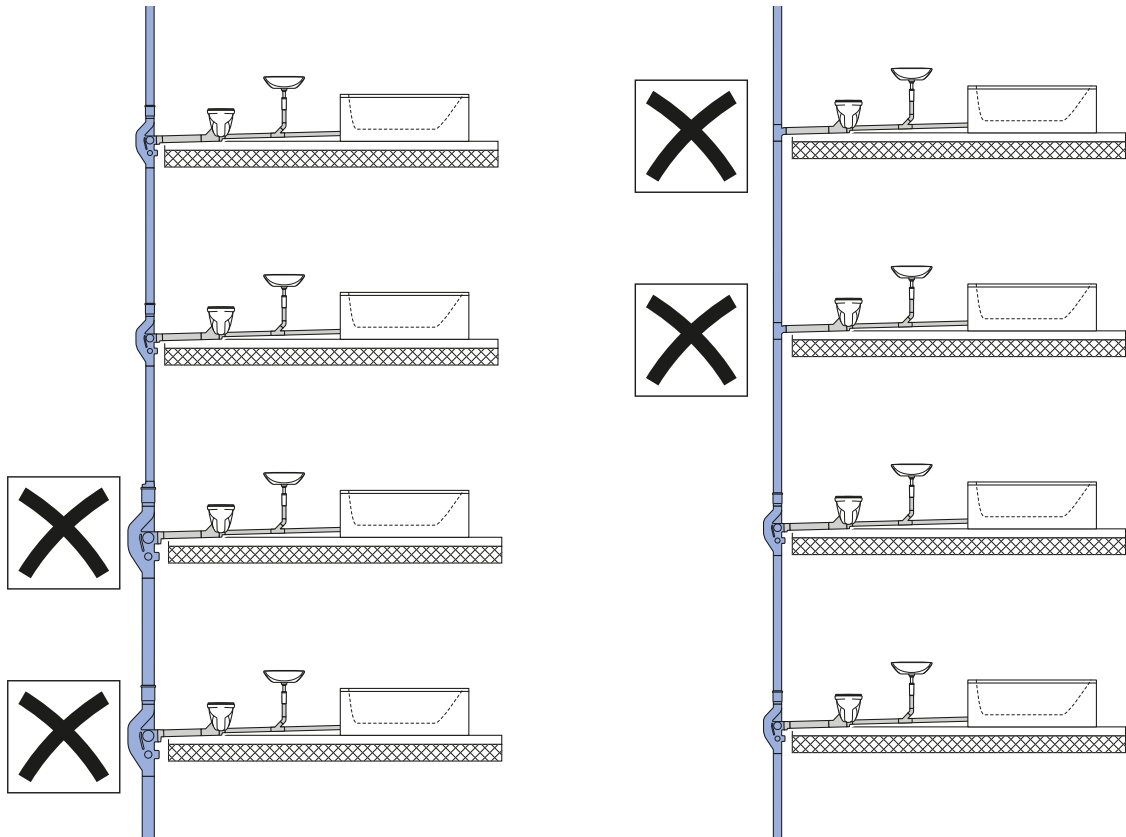


Figure 16: Not permitted: mixed installations of Geberit HDPE Sovent fittings of different dimensions and branch fittings in a stack

Additional stack connectors

Normally, all water-bearing pipes are connected to the Geberit HDPE Sovent fitting. An exception to this is condensation pipes. Condensation pipes can be connected to the stack between two Geberit HDPE Sovent fittings when the following condition is met:

- The branch discharge pipe has a maximum dimension of $d63$ mm.

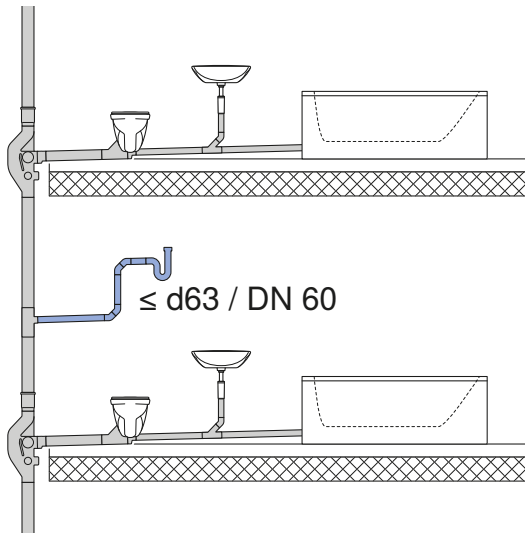


Figure 17: Connection of a condensation pipe $\leq d63$ to the stack between two Geberit HDPE Sovent fittings

Admitting and venting air in stacks

Each stack with Geberit HDPE Sovent fittings must be individually ventilated through the roof.

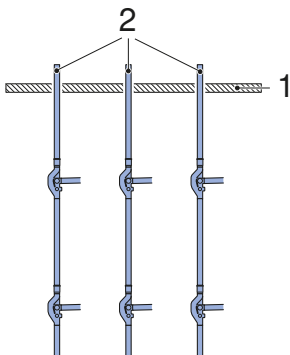


Figure 18: Individual ventilation of stacks with Geberit HDPE Sovent fittings

- 1 Building roof
- 2 Ventilation pipe

If combined ventilation is planned for several stacks, a ventilation collector pipe must be configured in accordance with the applicable local standards and regulations. If the corresponding information is missing, a ventilation collector pipe can be set up in accordance with the following rules:

- A maximum of three stacks can be combined.
- The dimension of the ventilation collector pipe must be increased for each additional stack connector in accordance with the following diagram.

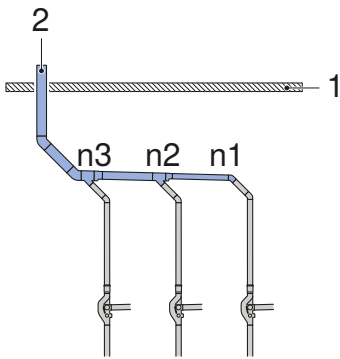


Figure 19: Collective ventilation of stacks with Geberit HDPE Sovent fittings

- 1 Building roof
- 2 Ventilation collector pipe
- n1 Dimension of stack 1
- n2 Dimension of stack 2
- n3 Dimension of stack 3

Table 7: Dimensioning of ventilation collector pipes

Product	Dimension n1	Dimension n2	Dimension n3
Geberit HDPE Sovent fitting d110	ø 110 mm / DN 100	ø 160 mm / DN 150	ø 200 mm / DN 200
Geberit HDPE Sovent fitting d160	ø 160 mm / DN 150	ø 200 mm / DN 200	ø 250 mm / DN 250

Air admittance valves must not be used for stacks with Geberit HDPE Sovent fittings as they can have a negative impact on the discharge capacity of the stack.

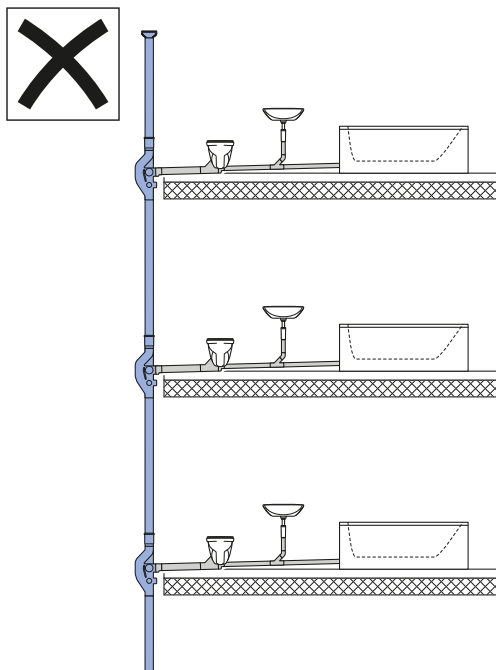


Figure 20: Not permitted: air admittance valves in stacks with Geberit HDPE Sovent fittings

Geberit HDPE Sovent uses the flow-optimised geometry to prevent inadmissible overpressures and negative pressures which impair the correct function of the drainage system. Additional pressure compensation by installing so-called de-aerator valves is not necessary.

4.1.4 Branch discharge pipes

Configuration of branch discharge pipes

The branch discharge pipes must be configured in accordance with the applicable local standards and regulations or based on DIN EN 12056-2:2001-01. These prescribe the diameter as well as the maximum length of the branch discharge pipe.

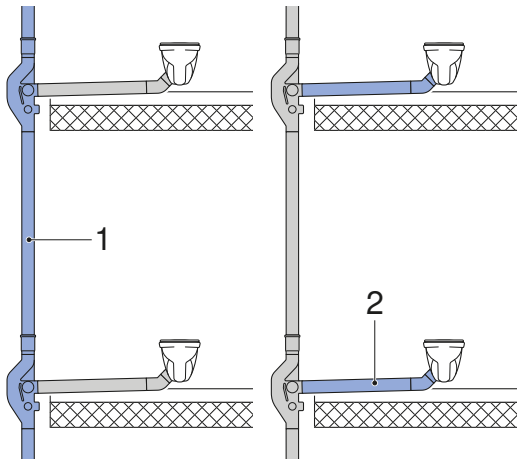


Figure 21: Scope of the branch discharge pipes compared to the stack

- 1 Stack: planning in accordance with the rules for Geberit HDPE Sovent fittings
- 2 Branch discharge pipe: planning in accordance with local standards or based on DIN EN 12056-2:2001-01

Ventilation of branch discharge pipes

The maximum length of ventilated branch discharge pipes as well as the configuration of the ventilation pipe are laid out in the applicable local standards and regulations and must be followed accordingly.

Branch ventilation pipes can be connected directly to the stack according to the following diagram.

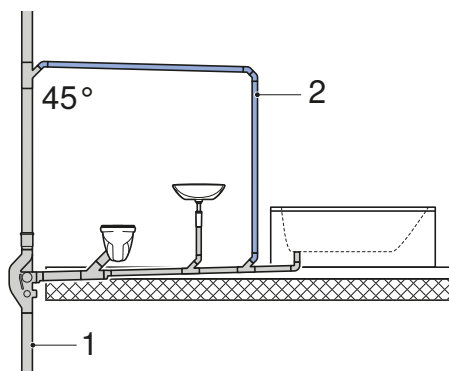


Figure 22: Connection of a branch ventilation pipe to the stack

- 1 Stack in accordance with rules for Geberit HDPE Sovent fittings
- 2 Branch discharge and branch ventilation pipes according to local standards

Recommended discharge pipe, example 1

In accordance with DIN EN 12056-2:2001-01/SN 592000:2012, the following branch discharge pipe **without secondary ventilation system** is recommended.

Max. permissible DU values	Greatest single DU	DN	Geberit d in mm
1.0	0.5	56	56
2.0	1.0	60	63
3.0 ¹⁾	1.5	70	75
6.5 ²⁾	2.0	90	90
15.0	2.5	100	110

¹⁾ Maximum of two valves with 0.8 DU

²⁾ Maximum of two WCs with 2.0 DU (6-litre flush)

Recommended discharge pipe, example 2

In accordance with DIN EN 12056-2:2001-01/SN 592000:2012, the following branch discharge pipe **with secondary ventilation system** is recommended.

Max. permissible DU values	Greatest single DU	Branch fitting ventilation pipe d in mm	DN	Geberit d in mm
2.0	0.5	56	56	56
3.0 ¹⁾	1.0	56	60	63
4.5	1.5	56	70	75
9.0 ²⁾	2.0	56	90	90
25.0	2.5	56 ³⁾	100	110

¹⁾ Maximum of two valves with 0.8 DU

²⁾ Maximum of two WCs with 2.0 DU (6-litre flush)

³⁾ When $DU < 25$, the diameter of the branch fitting ventilation pipe is d56. When $DU > 25$, the diameter of the branch fitting ventilation pipe is d63.

4.1.5 Overview of stack offset

The planning and design of a stack offset in stacks with Geberit HDPE Sovent fittings depend on the following parameters:

- type of fitting/system: Geberit HDPE Sovent d110 or d160 or Geberit SuperTube
- length of stack offset
- branch discharge pipes after the stack offset
- flow rate in the stack

These parameters result in 9 installation situations, for which various planning rules must be observed in terms of the stack offset:

Table 8: Stack offset installation situations in stacks with Geberit HDPE Sovent fittings

Fitting/system	Length of stack offset	Branch discharge pipe	Flow rate	Pipe diameter
Geberit HDPE Sovent	Up to 1 m	With branch discharge pipe after the stack offset	12 l/s (d110)	d110
			17 l/s (d160)	d160
Geberit SuperTube	1-6 m	With branch discharge pipe after the stack offset	12 l/s	d110
	Greater than 6 m	With branch discharge pipe after the stack offset	Up to 4.4 l/s ¹⁾	d110
			Greater than 4.4 l/s ¹⁾	d160 or 2x d110
		Without branch discharge pipe after the stack offset	Up to 4.4 l/s ¹⁾	d110
	Greater than 7.1 l/s ¹⁾	4.4-7.1 l/s ¹⁾	d125	
Greater than 7.1 l/s ¹⁾		d160		
Geberit HDPE Sovent	1-2 m	With branch discharge pipe after the stack offset	17 l/s	d160
	Greater than 2 m	With branch discharge pipe after the stack offset	17 l/s	d160

¹⁾ With a slope of 3 % and a filling level of 50 %

4.1.6 Geberit HDPE Sovent d110 or d160 stack offset up to 1 m

A stack offset of up to 1 m can be installed without requiring any further measures. Bends up to a maximum of 45° must be used for changes in pipe direction.

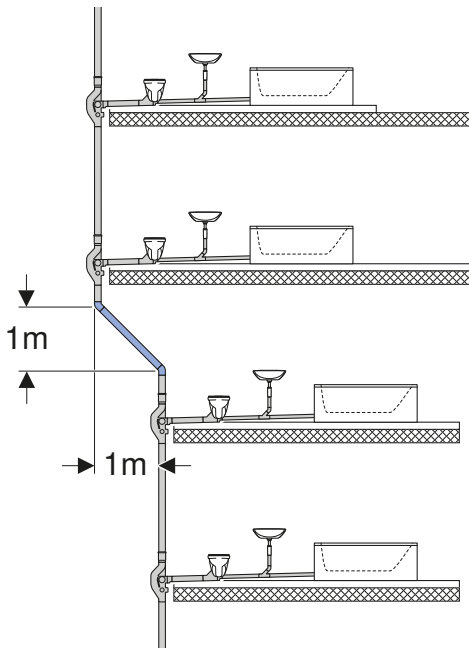


Figure 23: Structure of a stack offset with an offset of up to 1 m

If the stack offset is greater than 1 m, a branch ventilation pipe must be installed in the same way as the stack offset.

4.1.7 Geberit SuperTube stack offset greater than 1 m

Stack offset 1–6 m

For a flow rate up to 12 l/s (with a $\geq 0\%$ slope), the stack offset must be structured in accordance with the following diagram. Horizontal changes in pipe direction are not permitted.

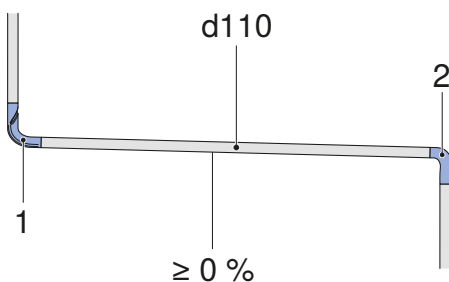


Figure 24: Structure of a stack offset 1–6 m in a stack with Geberit SuperTube

- 1 Geberit HDPE BottomTurn bend
- 2 Geberit HDPE BackFlip bend

Stack offset greater than 6 m with connection after offset, flow rate up to 4.4 l/s

At a flow rate of up to 4.4 l/s (with a 3 % slope and 50 % filling level), the stack offset must be structured as follows:

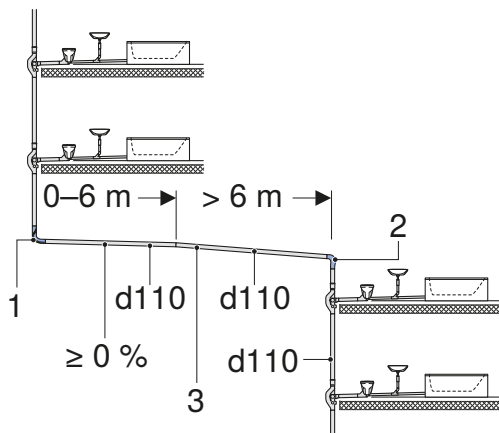


Figure 25: Structure of a stack offset greater than 6 m in a stack with Geberit SuperTube, with branch discharge pipe after stack offset, flow rate of up to 4.4 l/s (with 3 % slope and 50 % filling level)

- 1 Geberit HDPE BottomTurn bend
- 2 Geberit HDPE BackFlip bend
- 3 Slope in accordance with local standard or DIN EN 12056-2:2001-01

Stack offset greater than 6 m with connection after offset, flow rate greater than 4.4 l/s

At a flow rate greater than 4.4 l/s (with a 3 % slope and 50 % filling level), one of the following measures must be planned:

- Divide stack into two stacks with Geberit SuperTube.
- Use a stack with Geberit HDPE Sovent d160 (maximum 17 l/s).

Stack offset greater than 6 m without connection after offset, flow rate up to 4.4 l/s

At a flow rate of up to 4.4 l/s (with a 3 % slope and 50 % filling level), the stack offset must be structured as follows:

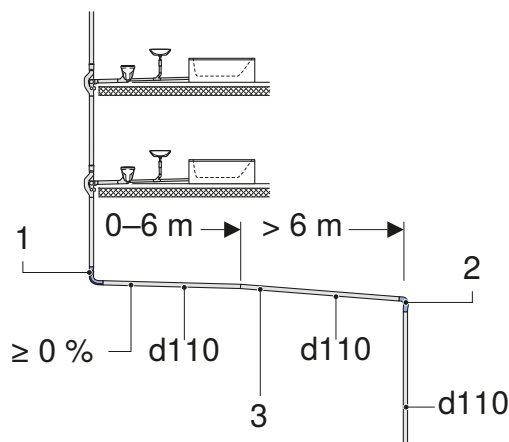


Figure 26: Structure of a stack offset greater than 6 m in a stack with Geberit SuperTube, without branch discharge pipe after stack offset, flow rate of up to 4.4 l/s (with 3 % slope and 50 % filling level)

- 1 Geberit HDPE BottomTurn bend
- 2 Geberit HDPE BackFlip bend
- 3 Slope in accordance with local standard or DIN EN 12056-2:2001-01

Stack offset greater than 6 m without connection after offset, flow rate 4.4–7.1 l/s

At a flow rate of 4.4–7.1 l/s (with a 3 % slope and 50 % filling level), the stack offset must be structured as follows:

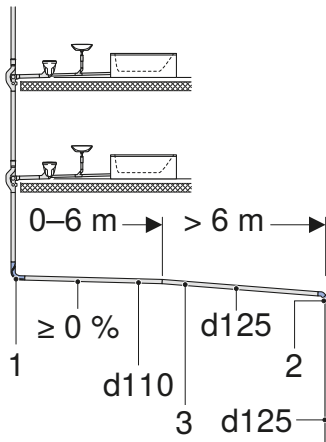


Figure 27: Structure of a stack offset greater than 6 m in a stack with Geberit SuperTube, without branch discharge pipe after stack offset, flow rate 4.4–7.1 l/s (with 3 % slope and 50 % filling level)

- 1 Geberit HDPE BottomTurn bend
- 2 2 x 45° bends
- 3 Slope in accordance with local standard or DIN EN 12056-2:2001-01

Stack offset greater than 6 m without connection after offset, flow rate greater than 7.1 l/s

At a flow rate greater than 7.1 l/s (with a 3 % slope and 50 % filling level), the stack offset must be structured as follows:

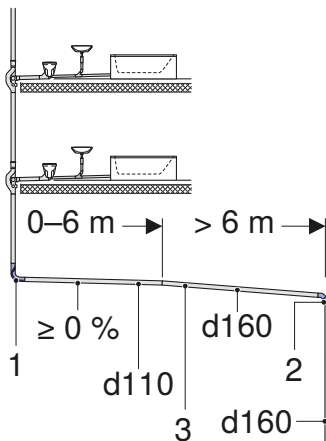


Figure 28: Structure of a stack offset greater than 6 m in a stack with Geberit SuperTube, without branch discharge pipe after stack offset, flow rate greater than 7.1 l/s (with 3 % slope and 50 % filling level)

- 1 Geberit HDPE BottomTurn bend
- 2 2 x 45° bends
- 3 Slope in accordance with local standard or DIN EN 12056-2:2001-01

4.1.8 Geberit HDPE Sovent d160 stack offset greater than 1 m

Stack offset 1–2 m

A stack offset of 1–2 m must be structured in accordance with the following diagram. A branch ventilation pipe d110 is required to relieve pressure.

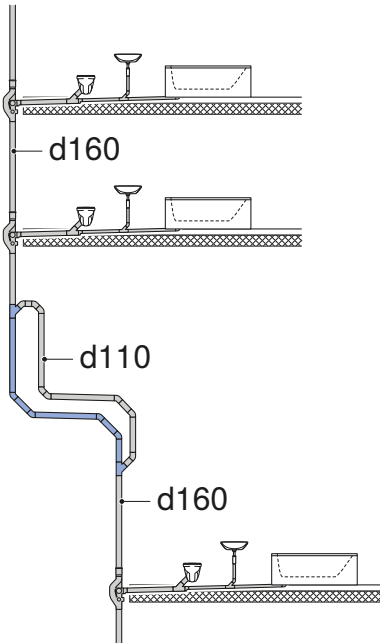


Figure 29: Structure of a stack offset 1–2 m in a stack with Geberit HDPE Sovent d160

Stack offset greater than 2 m

A stack offset greater than 2 m must be structured in accordance with the following diagram. A branch ventilation pipe d110 is required to relieve pressure.

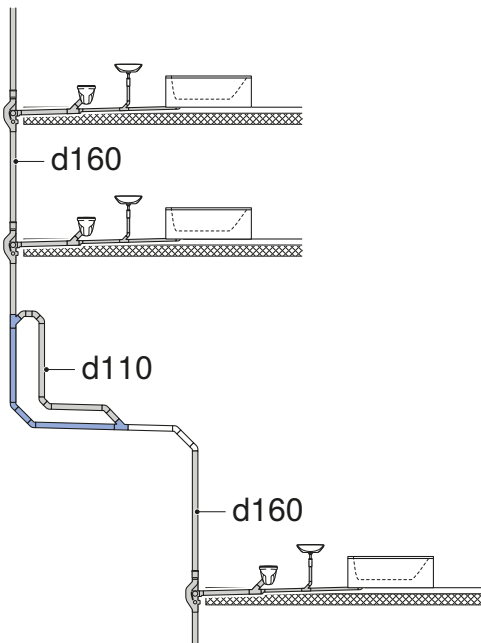


Figure 30: Structure of a stack offset greater than 2 m in a stack with Geberit HDPE Sovent d160

4.1.9 Installation of cleaning openings in the Geberit SuperTube stack offset

If a cleaning opening is provided in a stack offset, the opening can be placed in any position. Depending on the access pipe, the following distances from the ceiling should be taken into account:

Geberit HDPE access pipe 45°

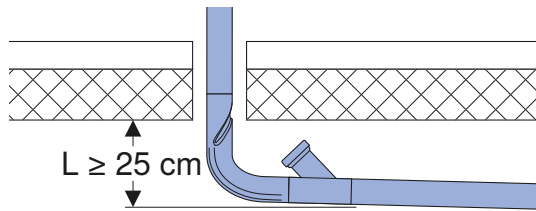


Figure 31: Distance of stack offset from the ceiling when installing a Geberit HDPE access pipe 45°

Geberit HDPE access pipe 90°

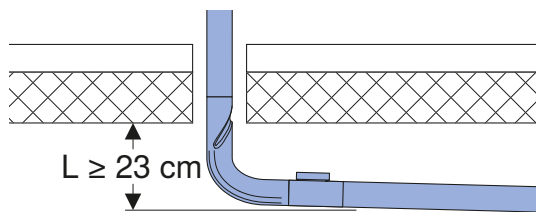


Figure 32: Distance of stack offset from the ceiling when installing a Geberit HDPE access pipe 90°

4.1.10 Zones without connections

Geberit SuperTube zones without connections

After a direction change, the zones without connections must be observed in accordance with the following diagrams:

Structure without connections into the stack offset:

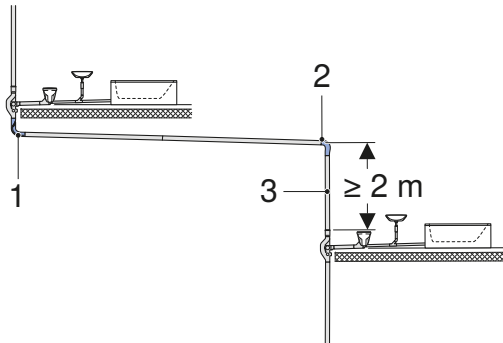


Figure 33: Zone without connections Geberit SuperTube with a stack offset without connections into the stack offset

- 1 Geberit HDPE BottomTurn bend
- 2 Geberit HDPE BackFlip bend
- 3 Zone without connection: upper edge of Geberit HDPE Sovent fitting up to pipe axis

Structure with connections into the stack offset:

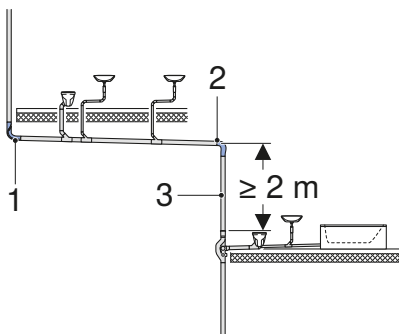


Figure 34: Zone without connections Geberit SuperTube with a stack offset with connections into the stack offset

- 1 Geberit HDPE BottomTurn bend
- 2 Geberit HDPE BackFlip bend
- 3 Zone without connection: upper edge of Geberit HDPE Sovent fitting up to pipe axis

Geberit HDPE Sovent d160 zones without connections

Before and after a direction change, the zones without connections must be observed in accordance with the following diagrams:

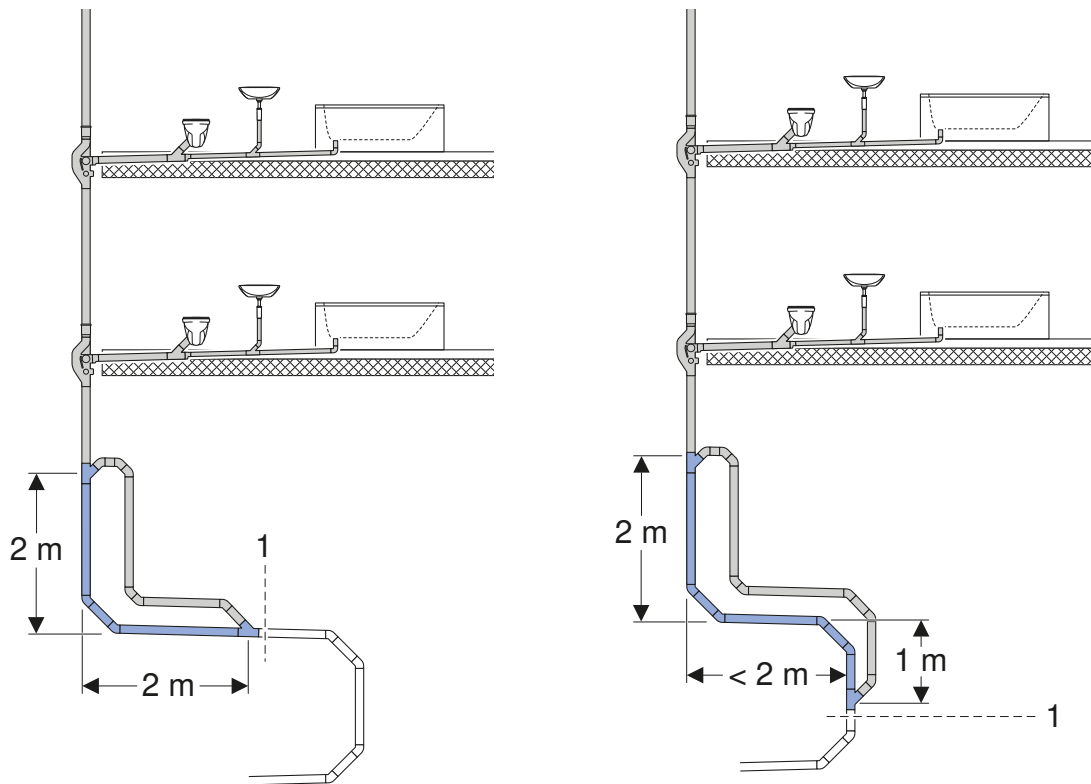


Figure 35: Zone without connections with a stack offset d160

1 Base of the pipe system with Geberit HDPE Sovent fittings

Zones without connections must be installed before the direction change into the underground pipe or the collector pipe if sanitary appliances are connected to the stack in order to prevent backing up. The sanitary appliances must be connected to a branch ventilation pipe d110.

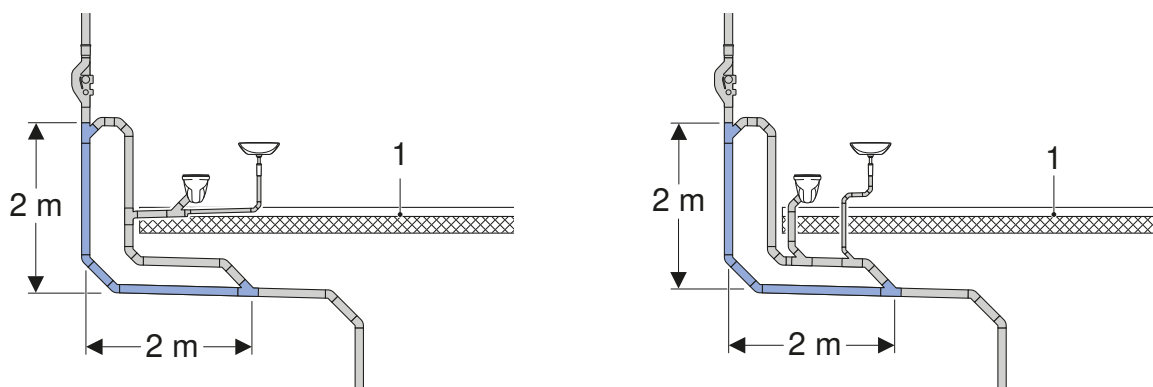


Figure 36: Zone without connections with a stack offset d160 with branch discharge pipes before the direction change into the underground or collector pipe

1 First floor

The subsequent pipe layout is planned in accordance with local standards.

4.1.11 Transition to the collector pipe

Geberit SuperTube transition to the collector pipe

For the transition of a stack with Geberit SuperTube to the collector pipe, a Geberit HDPE BottomTurn bend must be installed at the base of the stack. The connecting stack (maximum 6 m) is to be executed up to the system boundary without horizontal direction change.

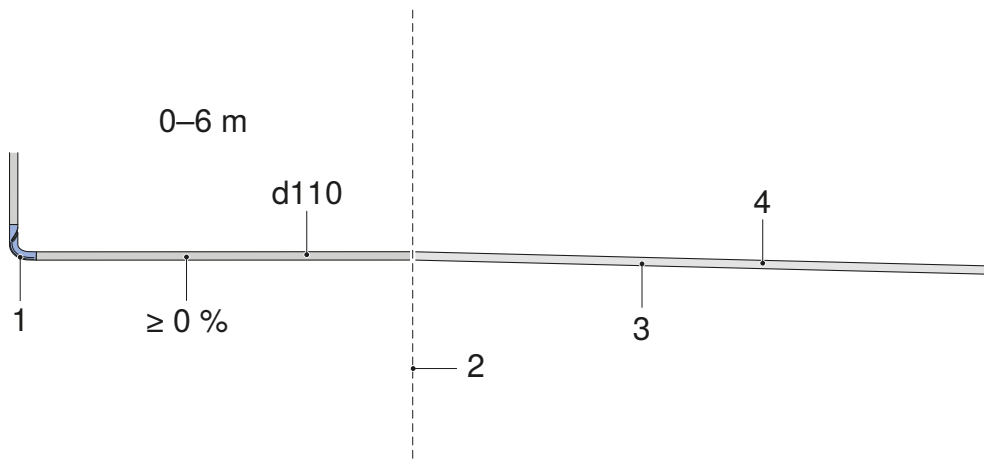


Figure 37: Transition of a stack with Geberit SuperTube to the collector pipe

- 1 Geberit HDPE BottomTurn bend
- 2 System boundary
- 3 Slope in accordance with local standard or in accordance with DIN EN 12056-2:2001-01
- 4 Dimensioning in accordance with local standard or in accordance with DIN EN 12056-2:2001-01

If several stacks with Geberit SuperTube are connected to one collector pipe, a Geberit HDPE BottomTurn bend must be installed at the base of each stack. The connecting stack (maximum 6 m) is to be executed up to the system boundary without horizontal direction change.

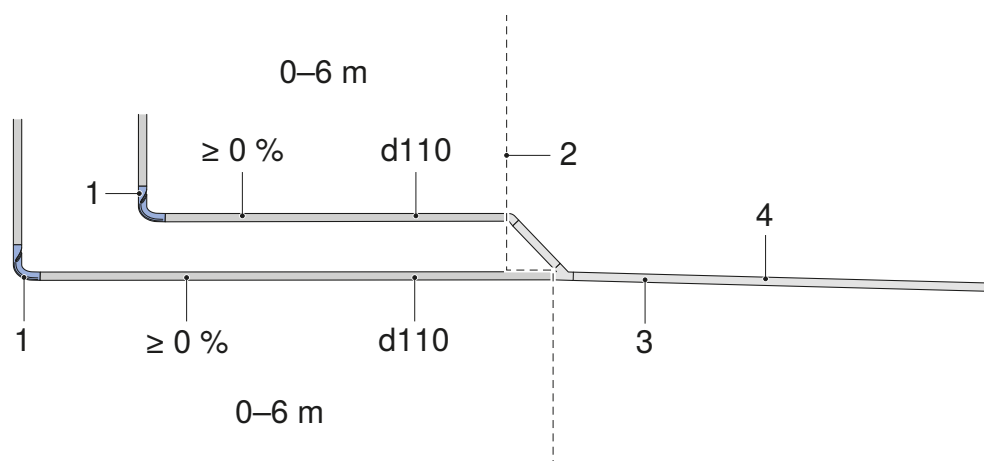


Figure 38: Connection of several stacks with Geberit SuperTube to the collector pipe

- 1 Geberit HDPE BottomTurn bend
- 2 System boundary
- 3 Slope in accordance with local standard or in accordance with DIN EN 12056-2:2001-01
- 4 Dimensioning in accordance with local standard or in accordance with DIN EN 12056-2:2001-01

Transition to the collector pipe Geberit HDPE Sovent d160

For the transition of a stack with Geberit HDPE Sovent fittings d160 to the collector pipe, a branch ventilation pipe d110 must be installed at the base of the stack to reduce any potential overpressure.

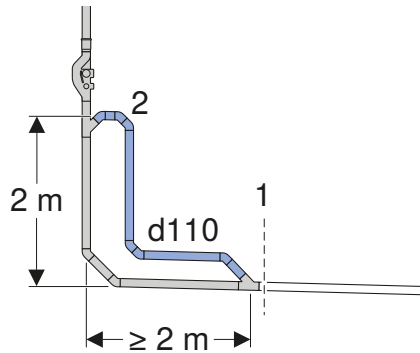


Figure 39: Transition of a stack with Geberit HDPE Sovent fittings d160 to the collector pipe

- 1 Base of the pipe system with Geberit HDPE Sovent fittings
- 2 Branch ventilation pipe for pressure relief

4.2 Dimensioning

4.2.1 Principles

The maximum admissible flow rate of a stack with Geberit HDPE Sovent fittings is:

- d110 (DN 100): 12 l/s
- d160 (DN 150): 17 l/s

If the flow rate in the stack falls below the maximum admissible flow rate, the stack can be dimensioned with the corresponding pipe diameter. If the flow rate exceeds the flow capacity, a second stack must be planned or the dimensions of stack d110 must be increased in size.

4.2.2 Sample calculations

Stack in residential building with 40 floors

Given:

- residential building with 40 floors
- two apartments per floor
- sanitary appliances per apartment:
 - 1 kitchen sink
 - 1 bathtub
 - 2 washbasins at 0.5 DU
 - 1 WC system 6 l
- drainage factor $K = 0.5$

Required:

- pipe dimension of the stack
- number of stacks

Solution:

1. Calculation of DU discharge units

Number	Sanitary appliance	DU
1	Kitchen sink	0.8
1	Bathtub	0.8
2	Washbasin at 0.5 DU	1.0
1	WC system 6 l	2.0
	Total per apartment	4.6
	Total per floor	9.2
	Total for residential building	368

2. Calculation of the flow rate (waste water load) in the stack

$$\begin{aligned}
 Q_s &= K \cdot \sqrt{\sum DU} \\
 &= 0.5 \cdot \sqrt{368} \\
 &= \mathbf{9.59 \text{ l/s}}
 \end{aligned}$$

3. Compare Q_s with $Q_{\text{max Sovent}}$

Q_s (9.59 l/s) is smaller than $Q_{\text{max Sovent d110}}$ (12 l/s).

Result

The residential building can be drained using **one** stack **ø 110 mm** (DN 100).

Stack in residential building with 120 floors

Given:

- residential building with 120 floors
- two apartments per floor
- sanitary appliances per apartment:
 - 1 kitchen sink
 - 1 bathtub
 - 2 washbasins at 0.5 DU
 - 1 WC system 6 l
- drainage factor $K = 0.5$

Required:

- pipe dimension of the stack
- number of stacks

Solution:

1. Calculation of DU discharge units

Number	Sanitary appliance	DU
1	Kitchen sink	0.8
1	Bathtub	0.8
2	Washbasin at 0.5 DU	1.0
1	WC system 6 l	2.0
	Total per apartment	4.6
	Total per floor	9.2
	Total for residential building	1104.0

2. Calculation of the flow rate (waste water load) in the stack

$$\begin{aligned}
 Q_s &= K \cdot \sqrt{\sum DU} \\
 &= 0.5 \cdot \sqrt{1104} \\
 &= \mathbf{16.6 \text{ l/s}}
 \end{aligned}$$

3. Compare Q_s with $Q_{\max \text{ Sovent}}$

Q_s (16.6 l/s) is greater than $Q_{\max \text{ Sovent d110}}$ (12 l/s) and smaller than $Q_{\max \text{ Sovent d160}}$ (17 l/s).

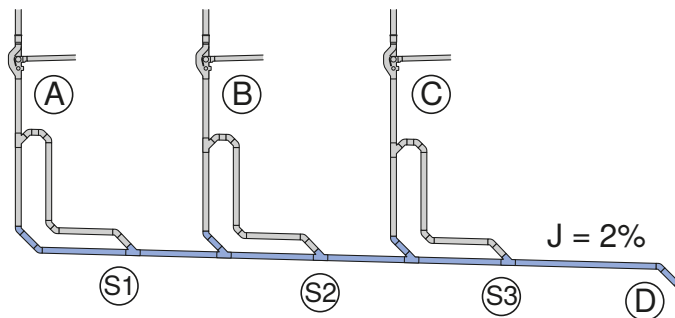
Result

The residential building must be drained using **two stacks $\varnothing 110 \text{ mm}$ (DN 100)** or with **one stack $\varnothing 160 \text{ mm}$ (DN 150)**.

Underground or collector pipe with several stacks

Given:

- building with three stacks \varnothing 160 mm (DN 150) with Geberit HDPE Sovent fittings d160



- A Stack A
- B Stack B
- C Stack C
- D Collector pipe
- S1 Section 1
- S2 Section 2
- S3 Section 3
- J Slope

- waste water load per stack:
 - stack A: $\Sigma DU_A = 800$
 - stack B: $\Sigma DU_B = 750$
 - stack C: $\Sigma DU_C = 820$
- filling level of the underground or collector pipe = 50 %
- slope of the underground or the collector pipe = 2 %
- drainage factor $K = 0.5$

Required:

- pipe dimension of the collector pipe (sections S1–S3)

Solution:

1. Calculation of the waste water load of sections S1–S3

$$S1 = K \cdot \sqrt{\Sigma DU_A}$$

$$= 0.5 \cdot \sqrt{800} = 14.1 \text{ l/s}$$

$$S2 = K \cdot \sqrt{\Sigma DU_A + \Sigma DU_B}$$

$$= 0.5 \cdot \sqrt{1550} = 19.7 \text{ l/s}$$

$$S3 = K \cdot \sqrt{\Sigma DU_A + \Sigma DU_B + \Sigma DU_C}$$

$$= 0.5 \cdot \sqrt{2370} = 24.4 \text{ l/s}$$

2. Calculation of the pipe dimensions of sections S1–S3

The pipe dimension of sections S1–S3 depends on the filling level and on the slope of the pipe. It is calculated in accordance with DIN EN 12056-2:2001-01, as shown in the following table:

Table 3: Maximum waste water load in l/s for underground pipes or collector pipes at a filling level of **50 %** depending on pipe dimension and slope in accordance with DIN EN 12056-2:2001-01

Slope J								Pipe dimension ø [mm] / DN
1 % (1 : 100)	1.5 % (1 : 66)	2 % (1 : 50)	2.5 % (1 : 40)	3 % (1 : 33)	3.5 % (1 : 28)	4 % (1 : 25)	5 % (1 : 20)	
2.5	3.1	3.5	4.0	4.4	4.7	5.0	5.6	110/100
4.1	5.0	5.7	6.4	7.1	7.6	8.2	9.1	125/125
7.7	9.4	10.9	12.2	13.3	14.4	15.4	17.2	160/150
14.2	17.4	20.1	22.5	24.7	26.6	28.5	31.9	200/200
26.9	32.9	38.1	42.6	46.7	50.4	53.9	60.3	250/250
48.3	59.2	68.4	76.6	83.9	90.7	96.6	108.4	315/300

Key:

1. Select column with the specified slope: 2 % column
2. Select the next greatest waste water value:
 - a) Section 1: calculated waste water value = 14.1 l/s
 - b) Section 1: next greatest waste water value: 20.1 l/s
 - c) Section 2: calculated waste water value = 19.7 l/s
 - d) Section 2: next greatest waste water value: 20.1 l/s
 - e) Section 3: calculated waste water value = 24.4 l/s
 - f) Section 3: next greatest waste water value: 38.1 l/s
3. Select the pipe dimension corresponding to the next greatest waste water value:
 - a) Section 1: ø 200 mm (DN 200)
 - b) Section 2: ø 200 mm (DN 200)
 - c) Section 3: ø 250 mm (DN 250)

5 Installation

5.1 Installation rules

5.1.1 Basic rules

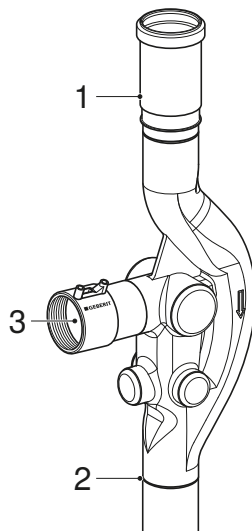
The same rules apply to mounting the Geberit HDPE Sovent fittings as for the mounting of all other Geberit HDPE fittings.

In addition, the following rules must be taken into account for the mounting of the Geberit HDPE Sovent fittings:

- Connection pipes can only be connected using a butt-welding connection.
- Geberit HDPE Sovent fittings may be installed only in the direction of flow. The direction of flow is indicated by an arrow on the fittings.

5.1.2 Prefabrication

For prefabrication, the Geberit HDPE pipes and fittings or Geberit Silent-db20 pipes and fittings can be connected directly to the Geberit HDPE Sovent fitting with electrofusion couplings or butt welding.

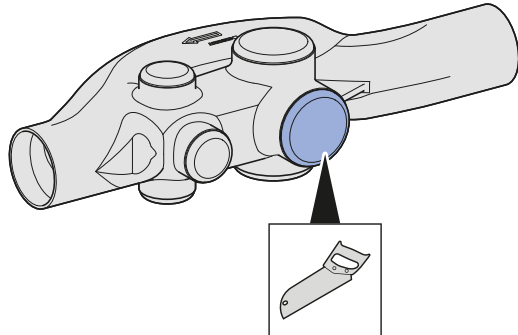


- 1 Expansion socket: connection with butt welding (electrofusion welding also possible)
- 2 Pipe for the stack extension: connection with butt welding (electrofusion welding also possible)
- 3 Branch discharge pipe: connection with electrofusion welding at previously attached connection piece (butt welding also possible)

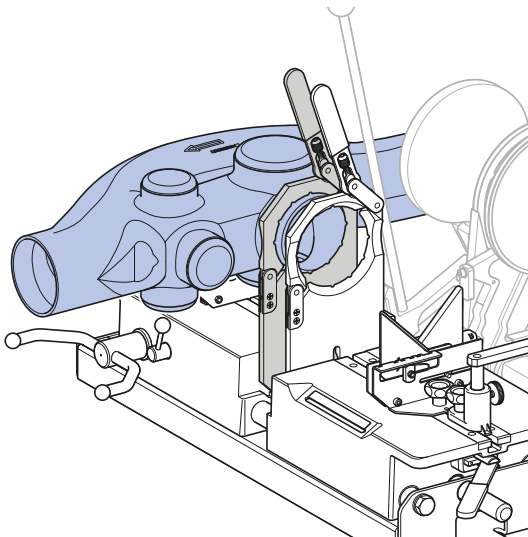
5.2 Installation manual

5.2.1 Connecting Geberit HDPE Sovent fitting with pipe section

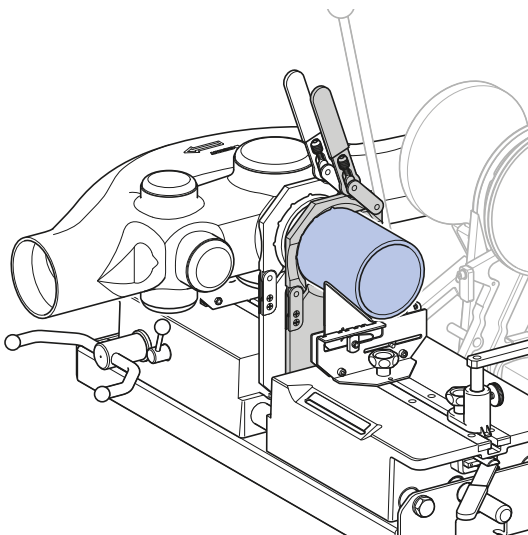
- 1 Saw open the required lateral connection.



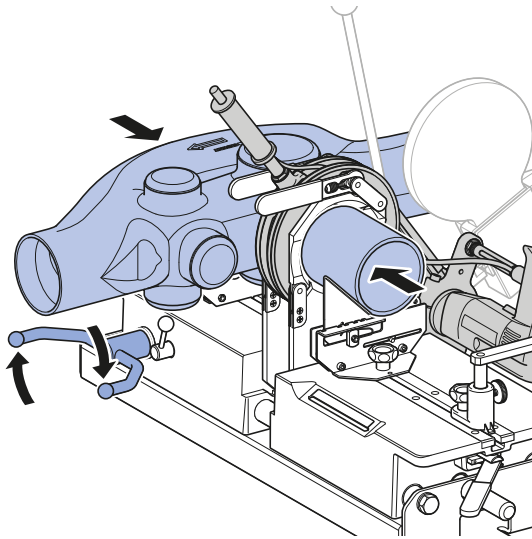
- 2 Clamp the Geberit HDPE Sovent fitting into the welding machine.



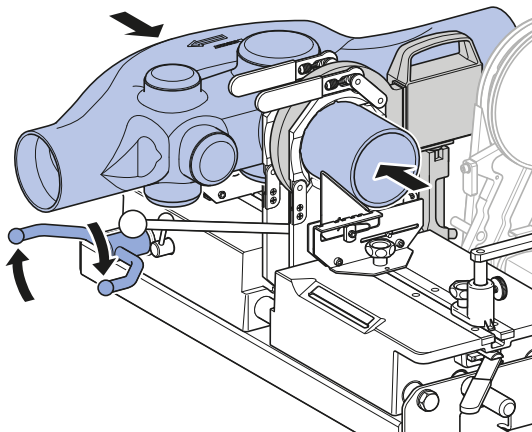
- 3 Clamp the corresponding pipe section of the branch discharge pipe.



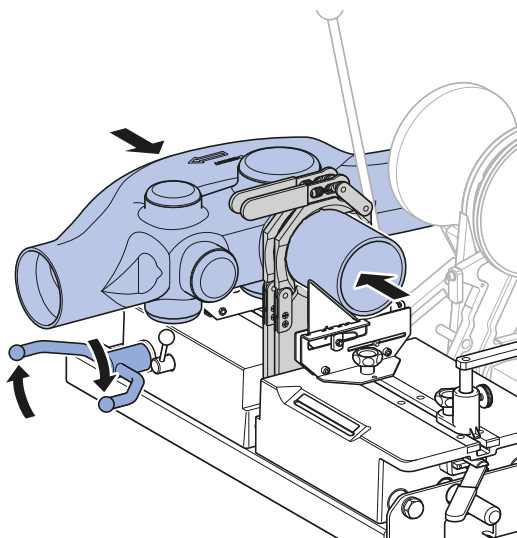
- 4** Surface plane the opened connection and the pipe section.



- 5** Heat both clamped parts.



- 6** Press the parts together and let them cool.



- 7** Remove fitting from welding machine.



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