



■ GEBERIT

Geberit Sovent

The innovative soil and waste
drainage system

Contents

Introduction	3
The Sovent history	3
Know-How Installed	3
Who to ask in case of questions?	3
Standards and approvals	4
Years of operation in the correct places	4
Standards and approvals	4
Fields of application	5
Where Sovent is best used	5
For how many storeys is Sovent best used?	5
Feature and benefits	6
Why is Sovent a better solution?	6
Better performance	6
Cheaper than a conventional solution	6
One dimension for all	6
No maintenance required	6
Service life like other fittings	6
Function	7
How does a system with Sovent work?	7
Function of the opening to the stack	8
Maximum velocity of fall	8
Planning	9
Which points have to be observed?	9
Connection load per floor	9
Total connection load	9
Is it necessary to have a Sovent fitting on every floor?	10
Segmentation into zones	10
Determination of the waste water figures	11
Connection of the branch ventilation	11
Insertion of the first floor	12
End of the Sovent stack	12
Joining of stack pipes	12
Vertical to horizontal transition of the stack	13

Contents

Offset line of the stack	14
Mixed installations	14
Drainage line dimension	15
Joining of ventilation pipes	15
Sovent stack with air admittance valve	15
Is a deareator necessary?	15
Acoustic considerations	16
Calculation	17
Hydraulic calculation basis	17
How is a Geberit Sovent system calculated?	17
Simultaneous use of appliances	17
Calculation example 1	18
Calculation example 2	18
Calculation of a collector pipe	19
Installation	20
Installation	20
Material requirement	20
Connection to a Sovent fitting	20
Typical prefabrication	21
Reference buildings	22
Hotel Gran Bali, Benidorm, Spain	22
Casino Towers, Brisbane, Australia	22
Twin Towers, Zurich, Switzerland	23
Bosmal City, Sarajevo, Bosnia	23
Hyatt Regency Hotel, Montréal, Canada	24
Arabella Sheraton Hotel, Cape Town, South Africa	24
Annex	25
Dimension table	25
Drain factor	25
Recommended discharge pipe	26
Collector pipe	27
Practical application design 1 Single stack with Sovent fitting (prewall)	28
Practical application design 2 Single stack with Sovent fitting (under ceiling) ...	29

Introduction

The Sovent history

Sovent, a single stack drainage system, was developed in 1959 by Fritz Sommer, a renowned vocational school director in Bern, Switzerland. The aim of the development was to substantially increase the performance of a soil and waste drainage system, and thus to eliminate a separate vent stack and reduce the diameter of the stacks in high-rise buildings. The specially designed branch inlet fitting, which is covered by worldwide patents, reduces the pneumatic pressure fluctuations in stacks preventing the syphonage of traps.

To prove the virtues of the Sovent system, a 10-storey hydraulic test tower was built in Bern, Switzerland. During the sixties and seventies, the system was furthermore thoroughly tested in multi-storey privately and governmentally owned test installations set up in New York, Tokyo, Paris and Stockholm, and has received wide design code recognition.

This versatile drainage system with the engineered design offers an economical and high-performance alternative to conventional drainage systems.

Know-How Installed

Since Geberit's founding in 1874, the name has been synonymous with quality, ease of installation and technical knowledge.

This is no accident. By applying our knowledge to find ways to make improvements, Geberit creates innovations that optimize synergy and performance throughout the entire system. The result is fast- and easy-to-install, highly reliable, integrated systems that set the standard for the sanitary industry.

Who to ask in case of questions?

Our sales force, technical advisors and service personnel will be pleased to offer support and answer any of your questions.

Please contact your local market organisation for further information or get in touch with Geberit at www.geberit.com.

Standards and approvals

Years of operation in the correct places

Over the last four decades, this innovative system has been installed in thousands of high-rise apartment, office and hotel buildings all over the world.

Standards and approvals

Since Sovent is a special fitting it has not yet found entry in every national standard.

Nevertheless, Sovent is mentioned in several important national standards like DIN EN 12056-2.

All pipes and connections to a Geberit Sovent system are regulated in local standards. This means the system has to be installed in accordance with these regulations.

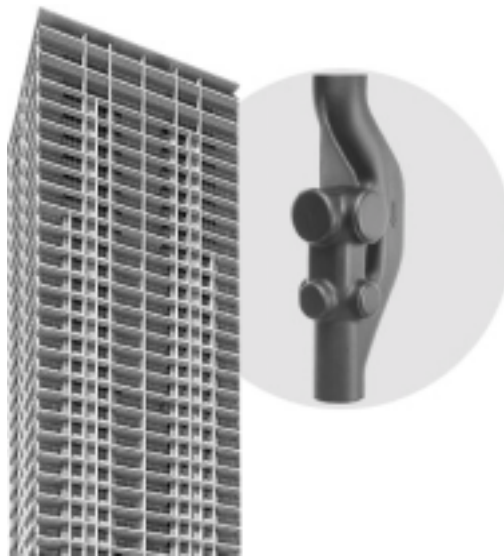
For the stack itself and the base of the stack Geberit gives technical parameters to follow. These are described in detail in this manual.

Fields of application

Where Sovent is best used

Due to its high capacity and excellent performance Geberit Sovent is an ideal drainage system for:

- High-rise buildings
- Hotels
- Laboratories
- Industrial plants



In addition, Sovent is used wherever additional security and up-to-date convenience are required.

For how many storeys is Sovent best used?

The Geberit Sovent system becomes extremely cost-effective in buildings higher than **5 storeys**.

Feature and benefits

Why is Sovent a better solution?

There is a simple answer to that:

- Better performance for less money

Better performance

In comparison with conventional systems, Geberit Sovent:

- Reduces the pneumatic and hydraulic pressure
- Offers versatile branch joining possibilities
- Reduces stack sizes with the same loading capacities as a secondary ventilated system
- Saves space

Cheaper than a conventional solution

With regard to costs, Geberit Sovent has even more advantages:

- It simplifies the design of domestic waste water stacks
- It offers 6 connections on one multiple branch fitting
- Saves material and installation time
- No separate ventilation pipes or back vents are required

One dimension for all

The fitting is characterized by the most common stack size of 110 mm in diameter, and could reach a capacity of up to **over 70 apartments** per stack.

No maintenance required

As with any other system using Geberit high-density polyethylene (HDPE) pipes and fittings, no maintenance is required.

Service life like other fittings

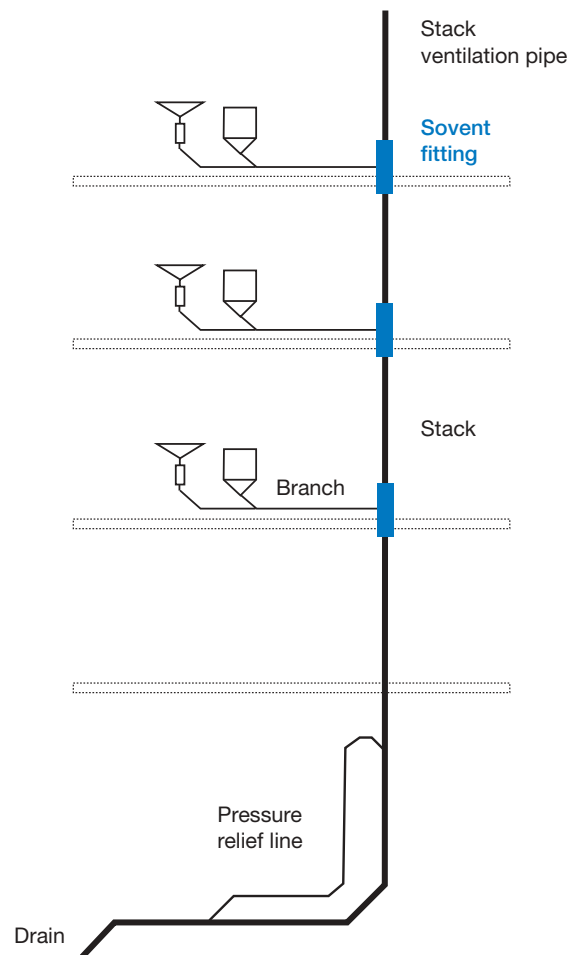
As the Geberit Sovent fitting is also made of high-density polyethylene, it has the same service life as other fittings.

Function

Hydraulic and pneumatic balancing of a stack system is a very complex matter. Each stack design has its own characteristics. The capacity of the stack and vent system is influenced by the flow rate of the appliances, their simultaneous discharge pattern, and the branch inlet configuration and building drain design. To secure the water seal in the traps, the positive and negative pressures in a drainage system have to be limited.

How does a system with Sovent work?

With the Sovent fitting, venting can be managed easily by using one fitting on each floor level. An additional ventilation pipe is not necessary.

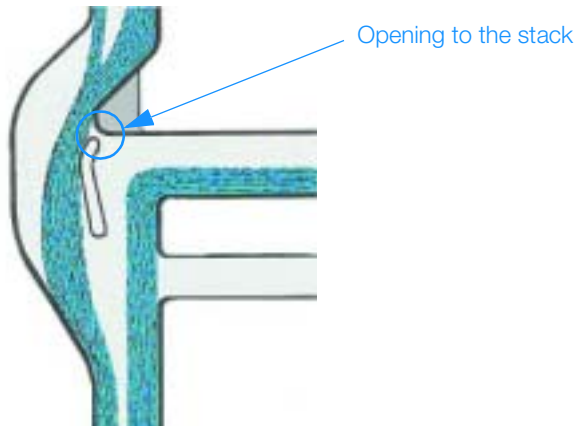


Function

Function of the opening to the stack

The opening to the stack is one of the key characteristics of the fitting. It allows the branches to be ventilated.

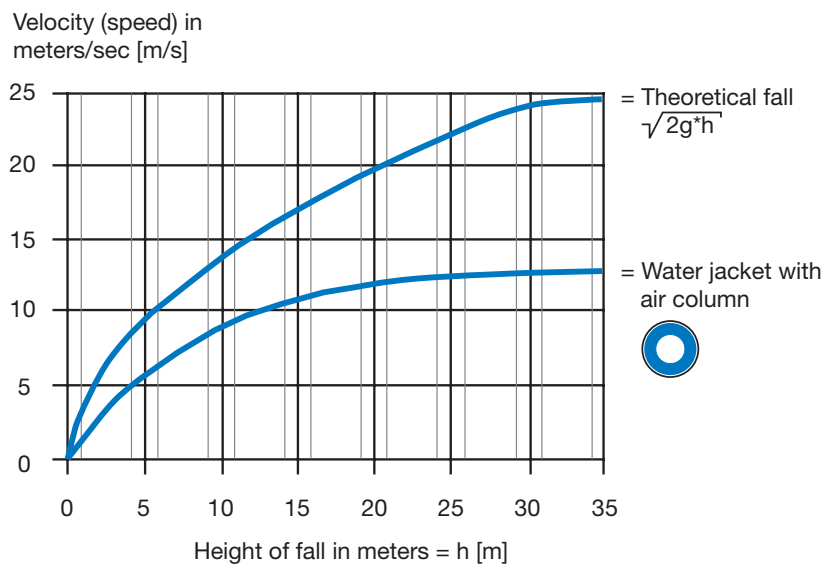
Together with the free air circulation in the stack, the opening smoothes the water flow in the connected branches.



Maximum velocity of fall

Terminal (maximum) velocity is reached after a height of 35 meters (speed) = approx. 13 m/sec and cannot be higher due to friction losses and air resistance in stacks.

The Geberit Sovent fitting itself works as a speed breaker on every floor where it is connected.



Planning

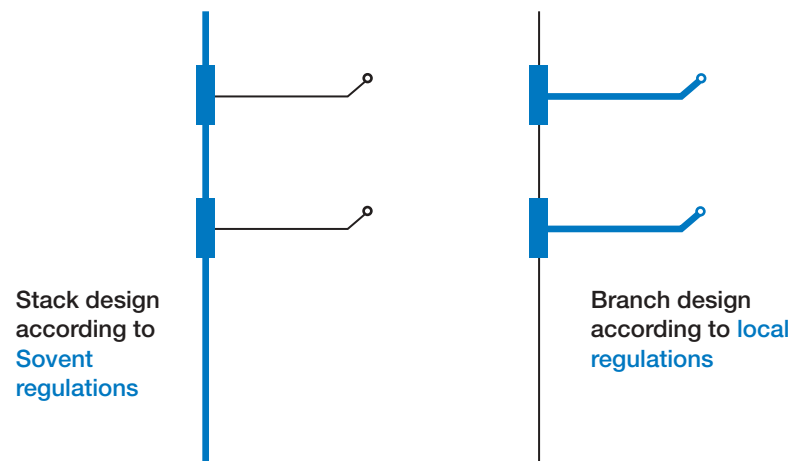
Which points have to be observed?

When a Geberit Sovent system is planned, the following points have to be observed in addition to the general rules for waste and drainage stack design:

- Use of a Sovent fitting instead of a common branch fitting
- Pressure relief ventilation at the base of the stack
- Every stack has to be ventilated through the roof with the same diameter (110 mm)

Connection load per floor

The branches have to be designed in accordance with the local regulations (e.g. EN 12056-2, see 'Annex'), which include the dimensioning diameter and the maximum length of the branch. It is permitted to use all connection possibilities simultaneously. A maximum of **8 WC's** may be connected to a Sovent fitting.



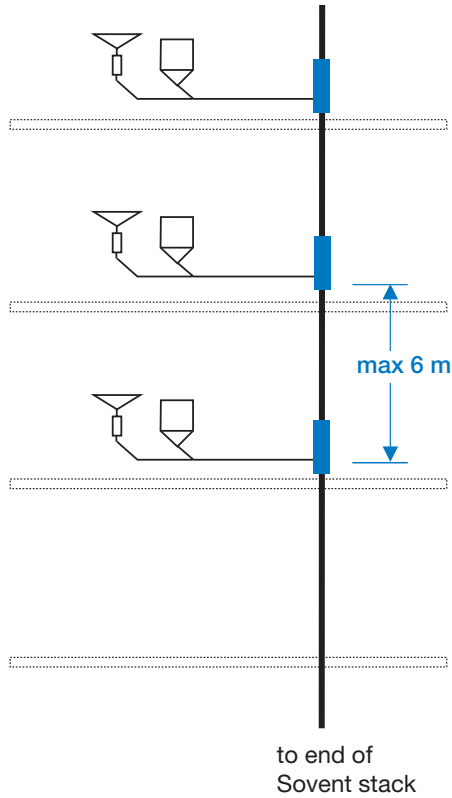
Total connection load

As stated in the calculation chapter, the maximum simultaneous flow per Sovent stack is **8.7 l/s**.

This corresponds to approximately **73 standard type apartments** (with a total number of DU's of 4.1, see calculation example on page 18).

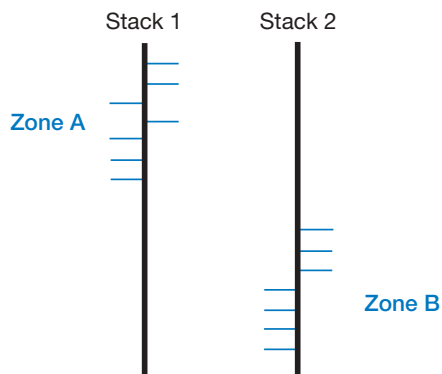
Is it necessary to have a Sovent fitting on every floor?

As a rule, there is a Sovent fitting on every floor. The maximum distance between two fittings shall **not exceed 6 m**.



Segmentation into zones

If the building design requires more than one stack or the maximum load connected to a Sovent stack **exceeds 8.7 l/s (DU > 303)**, segmentation is required. The total load has to be distributed to different Sovent stacks.



Determination of the waste water figures

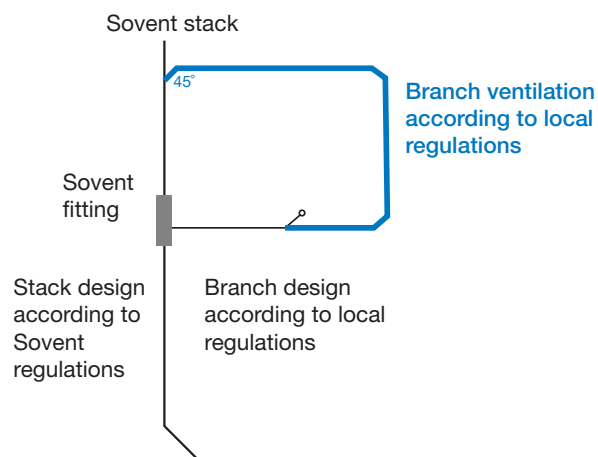
One of the first steps when planning a Geberit Sovent system is to determine the amount of waste water.

For this, all DU's of the appliances have to be taken into account and included in the equation for the Geberit Sovent system (see chapter 'Calculation').

Connection of the branch ventilation

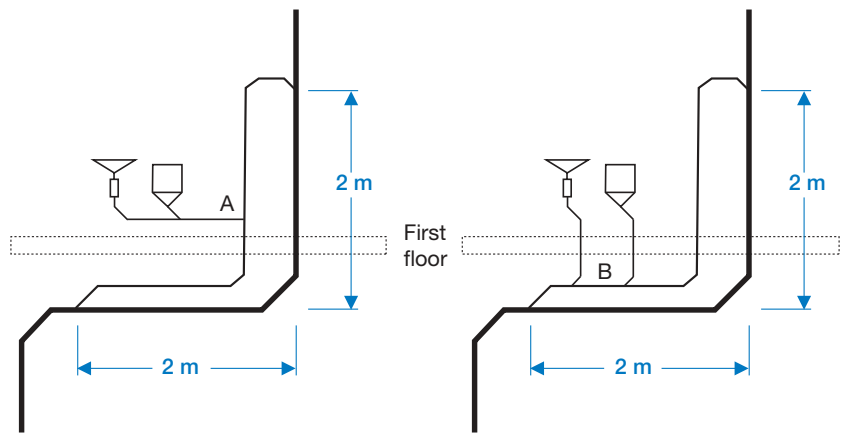
The maximum length of a collector branch pipe without ventilation is determined by local regulations.

If a ventilation pipe is necessary according to these regulations, the pipe is connected to the Sovent stack.



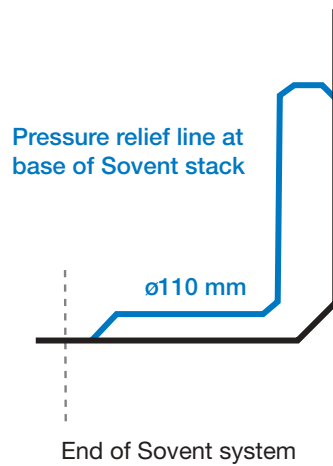
Insertion of the first floor

Sometimes appliances must be connected which are rather close to the base of the stack, for example on the first floor. They are connected to the pressure relief line at the base of the stack (either above A or below B of a floor).



End of the Sovent stack

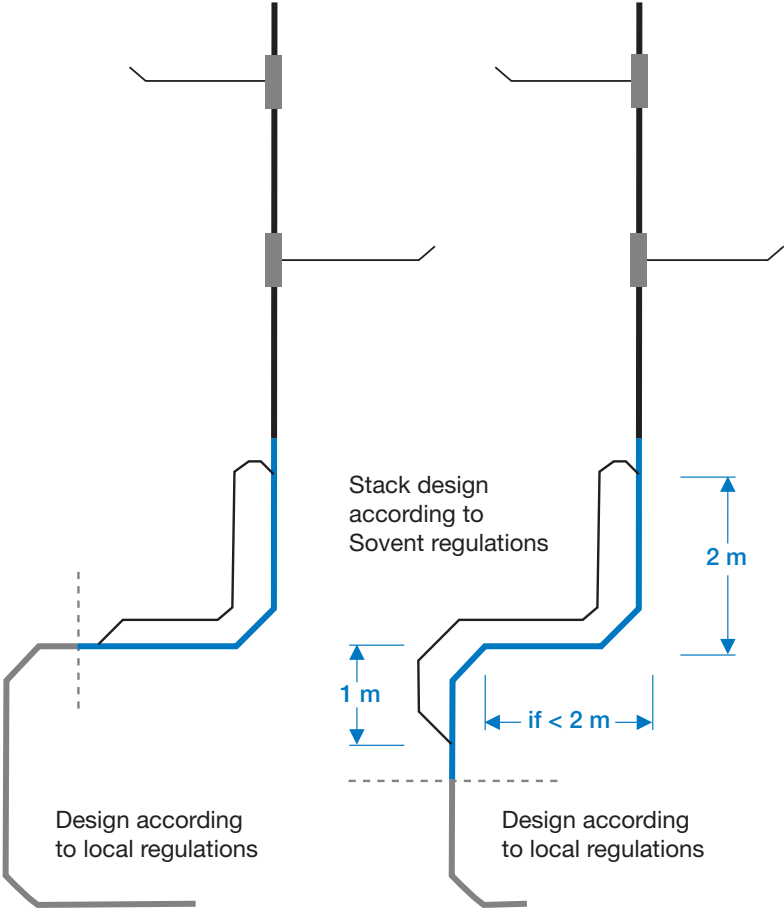
At the base of the stack, the pressure relief line eliminates any pressure build-up, that might occur.



Joining of stack pipes

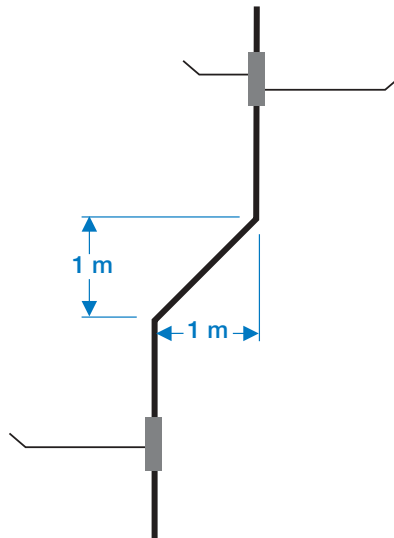
If Sovent stacks are joined together, the resulting drainage pipe is calculated as a collector pipe (see chapter 'Calculation').

Vertical to horizontal transition of the stack



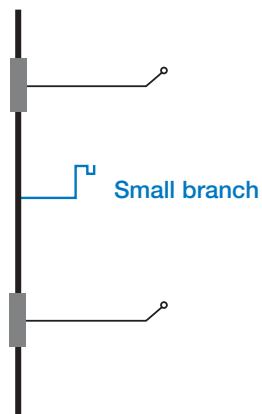
Offset line of the stack

The building design may require a vertical offset of the Sovent stack. Generally this is possible up to an offset of 1 m. If this value is exceeded, a normal vertical to horizontal transition (as described on page 13) has to be established.



Mixed installations

Usually all connections to a stack are made with a Sovent fitting. It is, however, also possible to connect branches with a diameter of **max. \varnothing 63 mm** (e.g. dripping water) to the stack through a normal 91.5°-branch fitting.

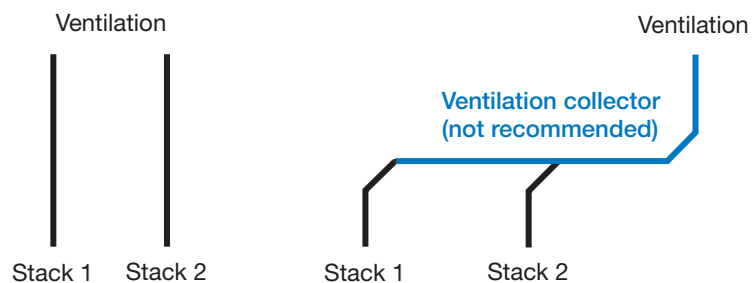


Drainage line dimension

Dimensioning of the drainage line also follows local standards and regulations. See the section 'Calculation of a collector pipe' in the chapter 'Calculation' for information on how to evaluate a total drainage load.

Joining of ventilation pipes

We do not recommend joining the stacks into one ventilation stack. If the building structure permits no other possibility than joining the ventilation, these dimensions are calculated as a collector pipe (see chapter 'Calculation').



Sovent stack with air admittance valve

Generally all Sovent stacks are open and ventilated through the roof. The use of air admittance valves reduces the airflow into the stack, which results in a reduced performance.

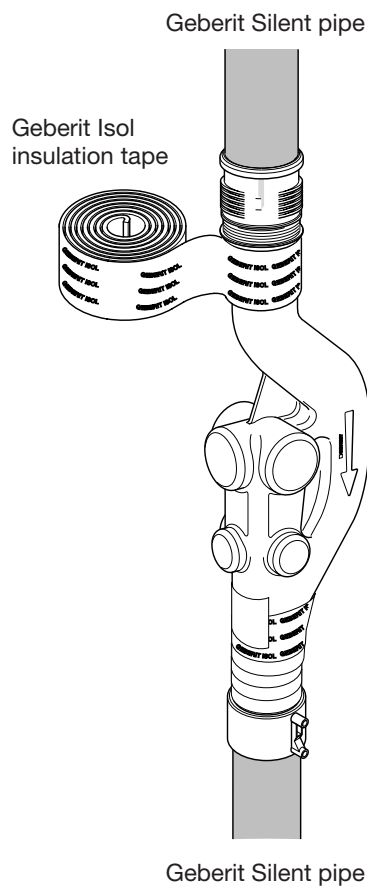
Is a deareator necessary?

No special fitting is necessary. At the end of each Sovent stack, the pressure relief line prevents the build-up of air pressure (see 'End of the Sovent stack').

Acoustic considerations

Acoustic insulation has to be designed in accordance with relevant standards, local government requirements and the situation on site.

Geberit Silent or HDPE wrapped with Geberit Isol is the ideal pipe material to be used in conjunction with Geberit Sovent installations if maximum airborne and solid-borne sound insulation is provided.









See also Geberit's special brochure for general guidelines on acoustic insulation.

Calculation

Hydraulic calculation basis

Each appliance has a specified design unit, whereas one **DU** is equal to **1 l/s**. Local standards have to be taken into consideration when calculating the design units.

Find an example of the DU's as stated in the EN regulation:

Symbol	Appliance	DU
	Washbasin, Bidet, Urinal	0.5
	Shower without plug Shower with plug	0.5 0.8
	Bathtub	0.8
	Kitchen sink	0.8
	WC (6 or 7 l) WC (9 l)	2.0 2.5
	Oriental WC	2.5

How is a Geberit Sovent system calculated?

The key figure in a Geberit Sovent system is the maximum **simultaneous flow rate (Qs)** in the stack which is **8.7 l/s**.

Maximum Sovent stack loadings in **design unit rating (DU)** and simultaneous flow rate are established using the equation:

$$Q_s = 0.5 \times \sqrt{\sum DU}$$

This makes a total of about **300 DU's per stack**.

Simultaneous use of appliances

The **drain factor 0.5** in the equation formula of $Q_s = 0.5 \times \sqrt{\sum DU}$ represents the simultaneous use of appliances connected to one stack. This means that not all branches (apartments) are discharging water to the stack at the same time. For other drain factors see 'Annex'.

Calculation

Calculation example 1

20 storey apartment building with 2 apartments per floor.

Apartments consisting of:

kitchen, bathtub, 2 washbasins and WC (6l).

Appliance	DU
Kitchen	0.8
Bathtub	0.8
Washbasin (2x)	1.0
WC (6 l)	2.0
Total per apartment	4.6
Total per floor	9.2

Therefore, the total number DU's is: 20 floors x 9.2 = 184 DU

$$\text{Simultaneous flow: } Q_s = 0.5 \times \sqrt{\sum DU} = Q_s = 0.5 \times \sqrt{184} = 6.78 \text{ l/s}$$

Maximum load per Sovent stack is: 8.7 l/s

This means, for this example one Sovent stack of ø 110 mm is suitable.

Calculation example 2

Building with 120 standard apartments consisting of:

kitchen, bathtub, washbasin and WC (6 l).

Appliance	DU
Kitchen	0.8
Bathtub	0.8
Washbasin	0.5
WC (6 l)	2.0
Total per apartment	4.1

Therefore, the total number DU's is: 120 apartments x 4.1 = 492 DU

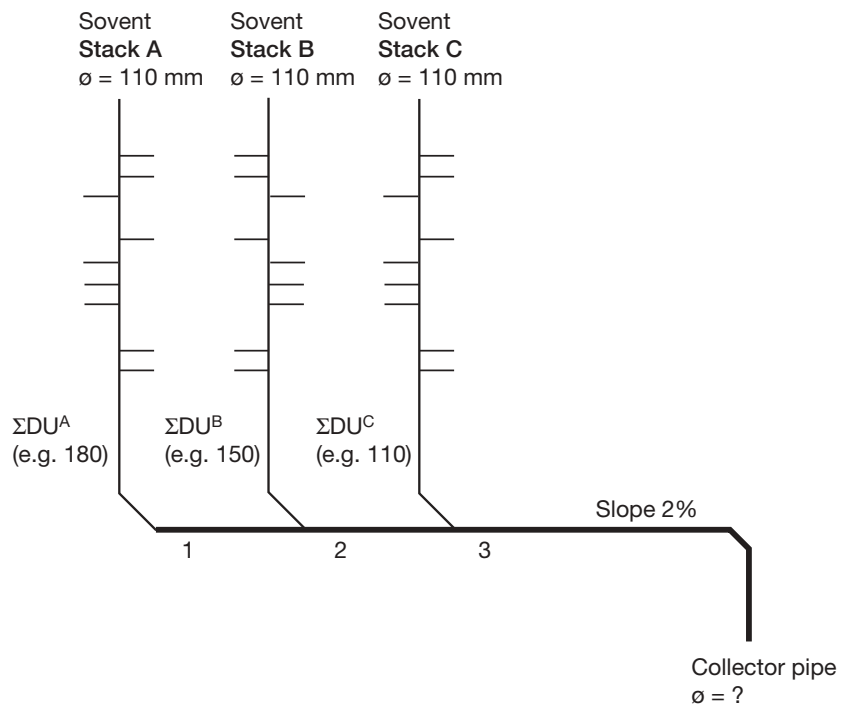
$$\text{Simultaneous flow: } Q_s = 0.5 \times \sqrt{\sum DU} = Q_s = 0.5 \times \sqrt{492} = 11.1 \text{ l/s}$$

Maximum load per Sovent stack is: 8.7 l/s

This means, for this example a minimum of two Sovent stacks of ø 110 mm are needed.

Calculation of a collector pipe

A high-rise building is usually equipped with several stacks, which are then combined into a collector pipe. The dimension of this pipe is calculated in the following way:



$$\text{Point 1: } 0.5 \times \sqrt{\Sigma DU^A} = 0.5 \times \sqrt{180} = 6.7 \text{ l/s}$$

$$\text{Point 2: } 0.5 \times \sqrt{\Sigma DU^A + \Sigma DU^B} = 0.5 \times \sqrt{330} = 9.1 \text{ l/s}$$

$$\text{Point 3: } 0.5 \times \sqrt{\Sigma DU^A + \Sigma DU^B + \Sigma DU^C} = 0.5 \times \sqrt{440} = 10.5 \text{ l/s}$$

According to the dimension table of the EN regulation (see 'Annex'), the resulting collector pipe has a dimension of **DN ø = 150 mm** (Geberit OD = 160 mm).

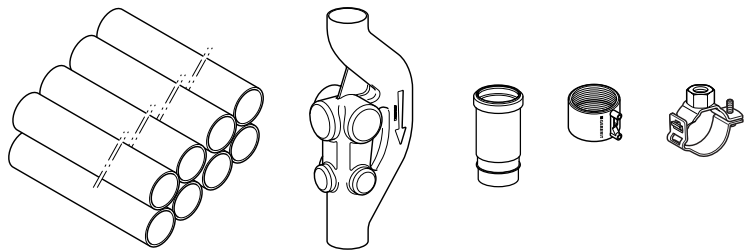
Installation

Installation

In general, the installation of a Geberit Sovent system follows the same rules as the installation of conventional drainage systems. It does, however, require much less work since secondary ventilation is not necessary. The installation of a Sovent fitting is similar to the installation of an ordinary branch fitting.

The process can therefore be called simple, easy and quick.

Material requirement



Connection to a Sovent fitting

The Sovent fitting has 6 connection possibilities. These connections are capped off and can be used to suit the optimum installation configuration.

Branches can be connected to the fitting individually or simultaneously.



1. Fix fitting in welding machine



2. Cut off required ends



3. Plane the ends



4. Welding



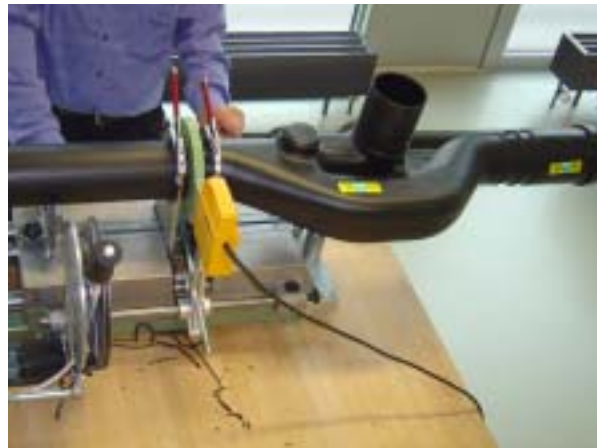
5. Press together while cooling



6. The fitting is ready for any type of connection

Typical prefabrication

Using electroweld sleeve couplings or butt welding, HDPE pipes or Geberit Silent can be connected directly to the Sovent fitting.



Add one expansion socket on top of the Sovent fitting and the Geberit HDPE pipe at the bottom.



Reference buildings

Many buildings all over the world are equipped with Sovent fittings. They are fully operational and fulfill their task to satisfy the building owners.

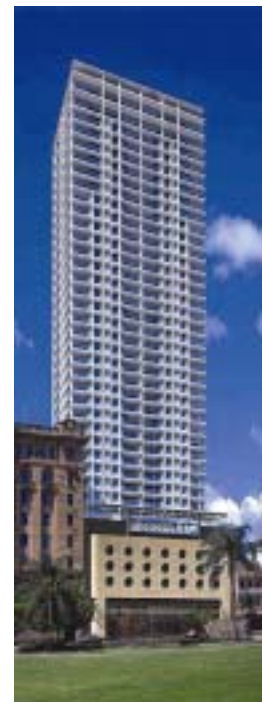
Hotel Gran Bali,
Benidorm, Spain

Tallest hotel in Europe (210 m). 432 Sovent fittings and 1400 m of HDPE pipes installed.



Casino Towers,
Brisbane, Australia

Under construction. The building will consist of 43 storeys and include 12 stacks with approximately 560 Sovent fittings.



Twin Towers,
Zurich, Switzerland

Business building.



Bosmal City,
Sarajevo, Bosnia

Under construction. Apartment buildings with over 20 storeys. 520 Sovent fittings installed.



Reference buildings

Hyatt Regency Hotel,
Montréal, Canada

605 guest rooms, including 22 junior suites, 9 executive suites and 3 presidential suites.



Arabella Sheraton Hotel,
Cape Town, South Africa

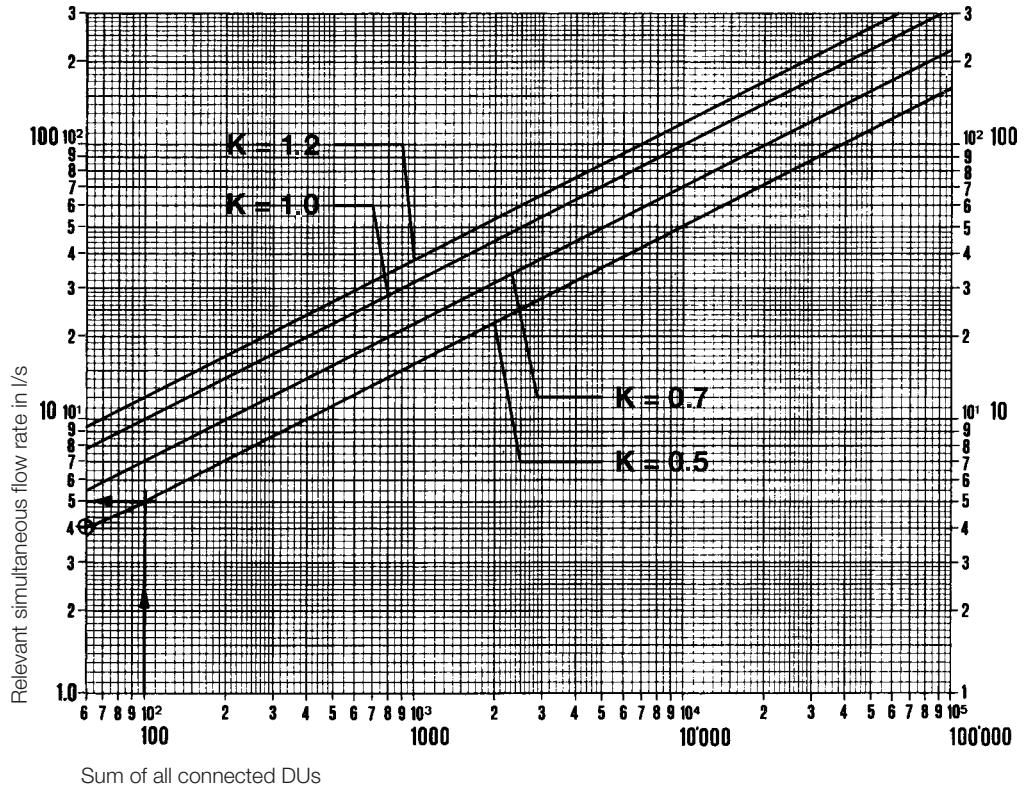
19 storey hotel building with 497 rooms. Distributed on 24 stacks there are 400 Sovent fittings installed.



Annex

Dimension table

EN 12056-2 / SN 592 000 Maximum expected discharge for Sovent stack.



Reading example:
20 apartments with a DU of 5
= 100 DU's

See dimension table = 5 l/s

The maximum expected discharge for the above stack is 5 l/s.

or
Calculation using the formula:
20 apartments with a DU of 5
= 100 DU's

Formula: $Q_s = 0.5 \times \sqrt{100} = \underline{\underline{5 \text{ l/s}}}$

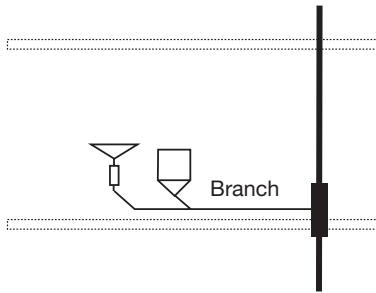
Drain factor

EN 12056-2 / SN 592 000 recommends the following drain factors (K).

Typical drain factor of a building type	K
Irregular use: e.g. residential buildings, guest houses, offices	0.5
Regular use: e.g. hospital, schools, restaurants, hotels	0.7
Frequent use: e.g. public toilets, shower rooms	1.0
Special use: e.g. laboratories	1.2

Recommended discharge pipe

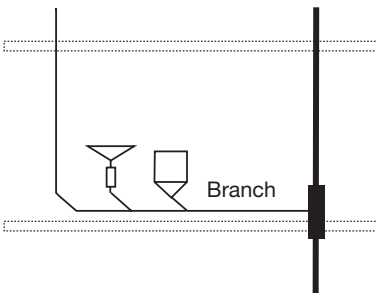
According to EN 12056-2 / SN 592 000 the following branch discharge pipe **without secondary vent system** is recommended.



max. permitted numbers DU	largest single DU	DN	Geberit OD 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 1 fixtures a 1.5 DU
- 2) Maximum 2 WC a 2.0 DU (6 liter flush)

According to EN 12056-2 / SN 592 000 the following branch discharge pipe **with secondary vent system** is recommended.



max. permitted numbers DU	largest single DU	Branch vent pipe	DN	Geberit OD 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	2.5	56 ³⁾	100	110

- 1) Maximum 2 fixtures a 0.8 DU
- 2) Maximum 2 WC a 2.0 DU (6 liter flush)
- 3) Up to 25 DU the diameter of the branch vent pipe is 56
(if DU > 25 the branch vent pipe diameter is 63)

Collector pipe

EN 12056-2 Maximum permitted simultaneous flow rate l/s

Table A) filling degree 50%

Slope								DN	Geberit
1:100	1:66	1:50	1:40	1:33	1:28	1:25	1:20	inside	OD
1%	1.5%	2%	2.5%	3%	3.5%	4%	5%	ø i.d.	[mm]
2.5	3.1	3.5	4.0	4.4	4.7	5.0	5.6	100	110
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	150	160
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	300	315

Reading example:

Maximum expected discharge: 10.5 l/s

Slope for collector pipe: 2%

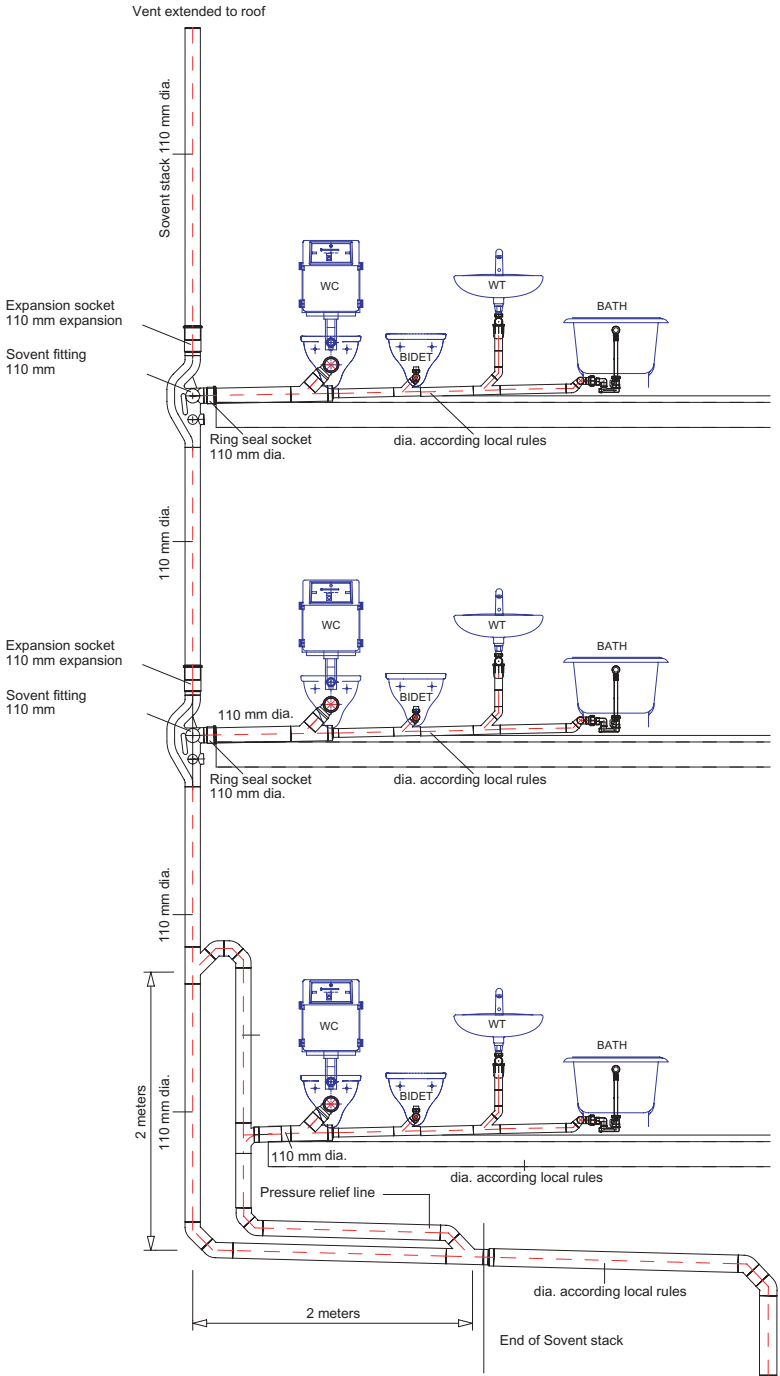
Enter the table at the column 2%: 10.5 is between **5.7 and 10.9 l/s**

Select the higher value: 10.9 and find the inside diameter 150 mm

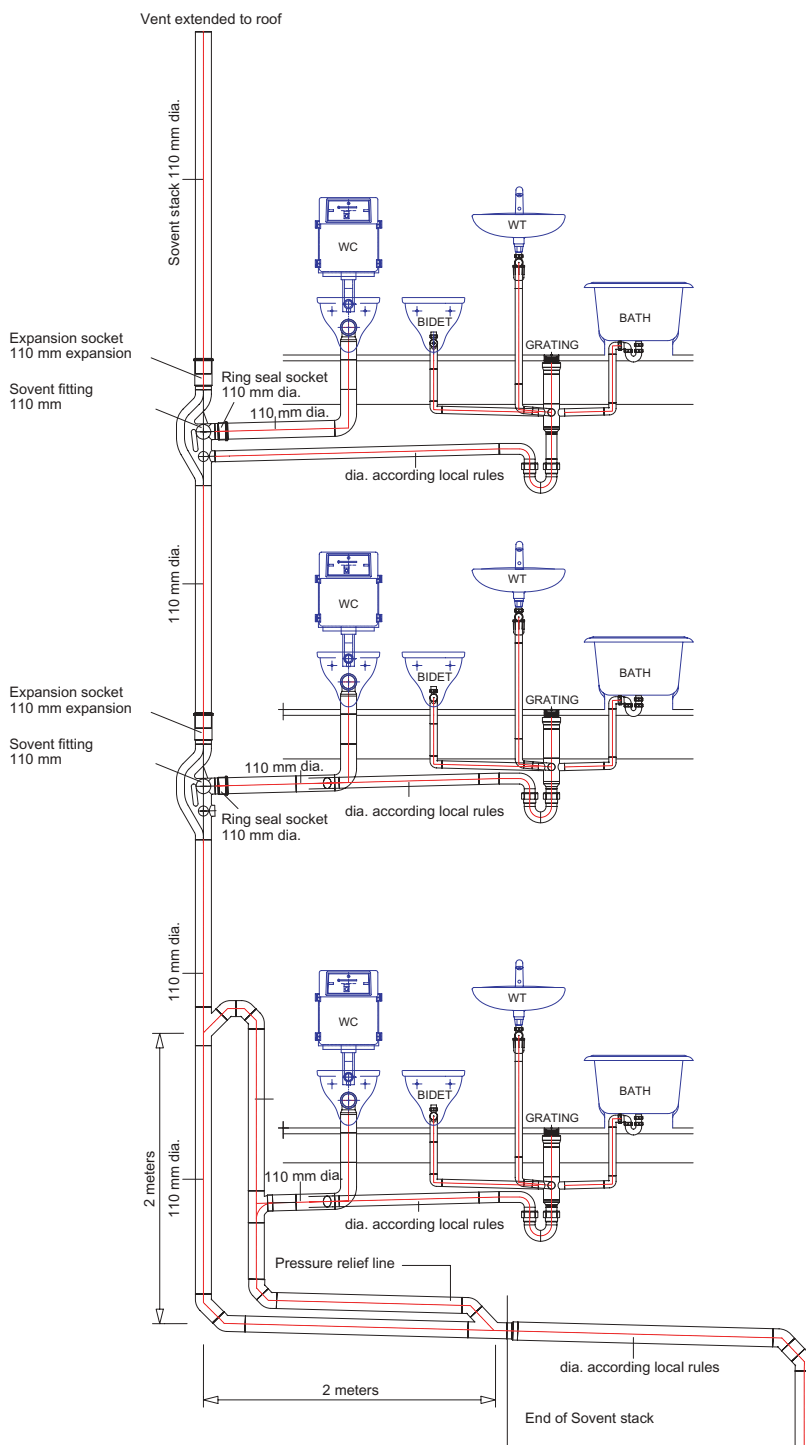
Table B) filling degree 70%

Slope								DN	Geberit
1:100	1:66	1:50	1:40	1:33	1:28	1:25	1:20	inside	OD
1%	1.5%	2%	2.5%	3%	3.5%	4%	5%	ø i.d.	[mm]
2.2	2.7	3.1	3.4	3.8	4.1	4.4	4.9	80	-
2.5	3.1	3.6	4.0	4.3	4.7	5.0	5.6	90	90
4.2	5.1	5.9	6.7	7.3	7.9	8.4	9.4	100	110
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	150	160
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	300	315

Practical application design 1
Single stack with Sovent fitting
(prewall)



Practical application design 2
 Single stack with Sovent fitting
 (under ceiling)



Annex

Index

A

Acoustic insulation	16
Additional ventilation pipe	7
Advantages	6
Air admittance valves	15
Air resistance	8
Apartments	
standard type.....	9
Appliance	17
connection	12

B

Base of the stack	12
Better performance	6
Branch joining	6
Butt welding	21

C

Collector pipe	15, 19
dimension	19
Common stack size	6
Connection possibilities	20
Connections	6
Contact	3
Cost-effective	5

D

Design unit rating	17
Dimension	
table	19
Discharge pattern	7
Drainage	
load	15
pipe	12
Dripping water	14

E

Ease of installation	3
Electroweld sleeve couplings	21

F

First floor	12
Free air circulation	8
Friction losses	8

G

Geberit	
Isol	16
Silent	16, 21
General rules	9

H

HDPE pipes	21
High-rise apartment	4
High-rise buildings	5
Hotel building	4
Hotels	5
Hydraulic balancing	7
Hydraulic test tower	3

I

Industrial plants	5
Innovative system	4
Isol	16

K

Key characteristics	8
Key figure	17
Know-How Installed	3

L

Laboratories	5
Local standards	4

M

Market organisation	3
Maximum	
distance	10
simultaneous flow	9
Multiple branch fitting	6

N	
National standards	4
O	
Office building	4
Opening to the stack	8
P	
Patents	3
Pneumatic balancing	7
Polyethylene	6
prefabrication	21
Pressure	
build-up	12
hydraulic	6
pneumatic	6
Pressure relief ventilation	9
S	
Sales force	3
Segmentation	10
Separate vent stack	3
Service	
life	6
personnel	3
Silent	16
Simultaneous flow	
maximum	9
rate	17
Simultaneous use of appliances	17
Single stack drainage system	3
Sound insulation	16
Sovent history	3
Special fitting	4, 15
Speed breaker	8
Stack	
loadings	17
vertical offset	14
Standard type apartments	9
Standards	
local	4
national	4
Syphonage	3

T	
Technical	
advisors	3
knowledge	3
V	
Velocity	8
Ventilation	
pipe	11
stack	15
Versatile drainage system	3
Vertical offset	14
W	
Waste	
drainage	3
water	11
water stacks	6
Water flow	8
Worldwide patents	3
Z	
Zones	10



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Subject to change without notice. The information in this document contains general description of the technical options available, which do not always have to be present in the individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.