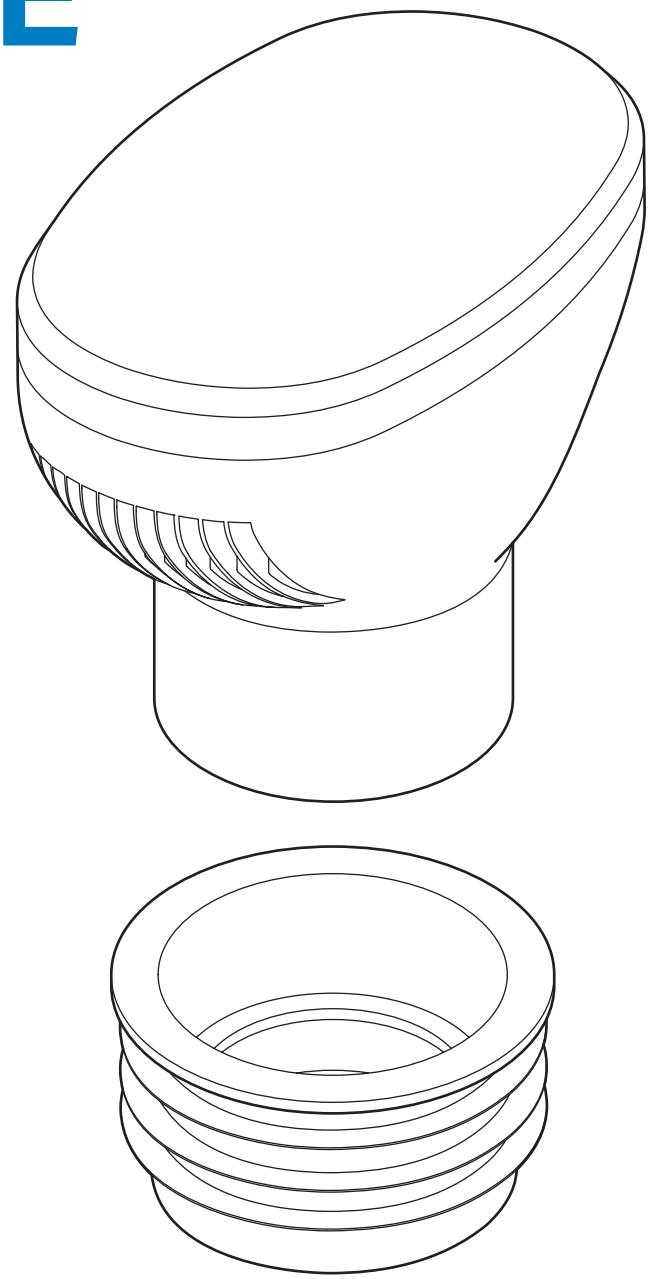
GEBERIT

VALID FROM 1. NOVEMBER 2018

DRAINAGE SYSTEMS INSTALLATION GUIDE



KNOW HOW INSTALLED

Introduction

Geberit HDPE is the total solution for all types of drainage including above ground, below ground and chemical waste. It provides the appropriate solution for every requirement whether it is conventionally installed or prefabricated.

Geberit Silent-db20 gives all the benefits of HDPE with increased levels of sound proofing which is achieved by its patented high density material. The ribbed fittings and acoustic brackets further improve sound dampening near impact zones.

This guide has been designed to assist you and provide technical support for all your Geberit HDPE and Geberit Silent-db20 installation needs. Geberit Silent-db20 has specific requirements that should be considered when planning and installing.

We hoped to have included all your needs but should you need further assistance please contact our Technical Services department on 0800 077 8365.

Standards and Approvals


SQS Certificate

SQS herewith certifies that the company named below has a management system which meets the requirements of the normative bases specified below.

GEBERIT AG
CH-8645 Jona

Certified area

Geberit Group
Details see appendix

Field of activity

Sanitary Technology

Normative bases

ISO 9001:2000 Quality Management System
ISO 14001:2004 Environmental Management System

Swiss Association for Quality and Management Systems SQS
Bernstrasse 103, CH-3052 Zollikofen
Issue date: January 1, 2007

This SQS Certificate is valid up to and including December 31, 2009
Scope numbers 14, 17
Registration number 20644

V. Eidemann, President SQS

T. Zahner, Managing Director SQS

BBA BRITISH BOARD OF AGRÉMENT
CERTIFICATE No. 92/2796

BBA British Board of Agrément

Geberit HDPE pipes and fittings have been certified by many European authorities and in 1976 also received BBA certification.

European Quality Certificate IS0 9001.2000. For its manufacturing plants in Europe Geberit has received the highest quality system available, issued by the Swiss EQ-Net member SQS for compliance with the ISO 9000/ EN 29000 series. EQ-Net members are in all countries throughout Europe, including BSI QA United Kingdom.

DIN

DIN Standards Geberit conforms to:

- EN1519: Plastics piping systems for solid waste and discharge (low and high temperature) within the building structure. Polyethylene (PE)
- DIN 19535-10: High density polyethylene (PE-HD) pipes and fittings for hot-water resistant waste and soil discharge systems (HT) inside buildings-Part 10: Fire behaviour, quality control and installation recommendations.
- DIN EN 12666-1: Plastic piping systems for non-pressure underground drainage and sewerage systems. Polyethylene (PE).

Drainage Systems Installation Guide

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1 Geberit HDPE and Geberit Silent-db20 systems – general information

1.1 Geberit HDPE overview

Geberit HDPE represents state of the art in drainage systems and is a real alternative to more traditional material installations. It combines flexibility, durability and reliability complemented by environmental properties that put other pipe systems to shame. Geberit HDPE is the total solution for all types of drainage including above ground, below ground (within building footprint) and chemical waste. The system is manufactured from High Density Polyethylene, a material with inherent properties that provide many advantages over other traditional piping systems. This has made HDPE the material of choice across Europe.

Geberit HDPE provides specifiers and installers with complete flexibility above and below ground.
The properties of HDPE mean that pipes and fittings are resistant to fracturing, abrasion, impact and extremes of temperature. Combined with the flexibility of several jointing methods and the option of off-site pre-fabrication, Geberit HDPE offers substantial material and labour savings.

1.2 Geberit Silent-db20 overview

Geberit Silent-db20 is a drainage system for buildings with increased levels of sound proofing. Its outstanding acoustic insulation properties are achieved by:

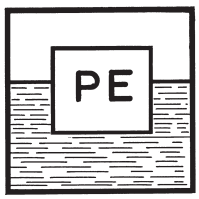
- Patented high density material specifically developed for this purpose (PE-S2).
- Fittings with ribs for further improvement of sound dampening near impact zones.
- Non compressible rubber lined acoustic brackets to reduce the transfer of structure-borne noise by decoupling the stack from the structure.

The complete range consists of pipes and fittings in dimensions from 56mm to 160mm. This guarantees complete acoustic insulation from the appliance connection through to the drainage system.

Advantages of the Geberit Silent-db20 system:

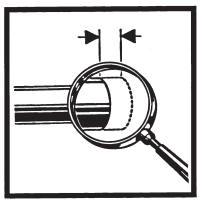
- Improved acoustic properties.
- Geberit Silent-db20 pipes and fittings are compatible with the existing Geberit HDPE Drainage System.
- Time saving installation techniques due to many different connection possibilities.
- Simplified fastening technique for use in commercial drainage systems.
- Bracketing system optimised for the insulation of structure-borne sound.

1.3 Features and benefits of Geberit drainage systems



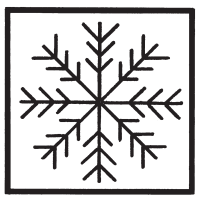
Geberit High Density Polyethylene (HDPE): Density 951 – 955 kg/m³

The density of polyethylene varies between 910 – 960 kg/m³. Geberit HDPE, up to 955 kg/m³, is of the highest quality and has excellent durability. HDPE is light weight, which is beneficial particularly with regards to handling, transportation and installation. Geberit Silent-db20: Density 1700kg/m3 Increased density improves acoustic properties.



Tempered 10mm per metre (licence Geberit International AG)

The safest way of avoiding the inevitable reversion (shortening of the dimensions) after heat load in the plastic pipe, is to take preventative measures during manufacture. Geberit HDPE pipes and Geberit Silent-db20 are therefore stored in hot water baths after manufacture. This process increases the safety of the joints, as there is no chance of joints pulling apart later due to shortening of length.



Resistance to cold

When Geberit HDPE and Geberit Silent-db20 parts are filled with water and then freeze, they stretch elastically as the ice expands. Once the ice melts they resume their original shape, remaining completely intact and undamaged.



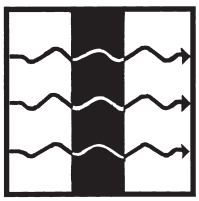
Flexibility

The flexibility of Geberit HDPE makes it ideal for certain buildings or on bridges, especially when pipes have to pass through expansion joints or are in buildings that are subject to traffic vibrations.



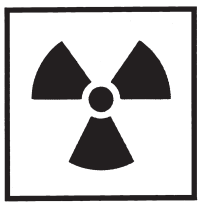
Melt-flow index 0.4 – 0.5g/10min

This describes the working properties of the pipe and at the same time gives information on the molecular weight, which is crucial for a number of raw material properties. The smaller the melt-flow index, the higher the molecular weight and thus the pipe's resistance to stress corrosion.



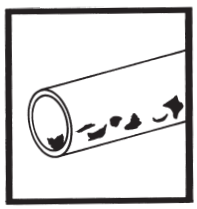
Thermal conductivity 0.43 W/m.K

Geberit HDPE and Geberit Silent-db20 are poor conductors of heat. For this reason the pipe does not become completely warmed through when heat loaded for a short period. Heat loss is about 90% less, for instance, than a similar copper pipe.



Resistance to radioactive effluents

There is no risk of damage as a result of slightly radioactive water. However, please ask our Technical department for more information relevant to the particular application.



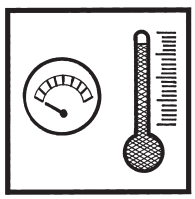
Resistance to abrasion

Drainage systems are increasingly becoming hidden refuse chutes. A pipe's resistance to abrasion is a particularly important factor in branch pipes, soil stacks and ground pipes. Geberit HDPE is highly resistant to abrasion and its extra thick walls offer additional protection.



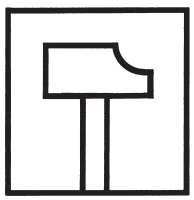
Thermal expansion 0.17mm/m.K

Heat expansion of Geberit HDPE is relatively high. As a rule of thumb, for every 50°C increase in temperature, an expansion of 10mm per linear metre of pipe can be anticipated.



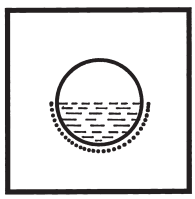
Resistance to hot water

Geberit HDPE can be safely used as a waste pipe with continuous flow temperatures of up to 80°C and for intermittent discharges of up to 100°C for short periods (maximum 1 minute flow for a maximum of 400 times per year).



Resistance to impact

Geberit HDPE and Geberit Silent-db20 are unbreakable at room temperature. Their resistance to impact is very high even at extremely low temperatures (down to approximately -40°C) thus meeting the requirements for externally installed pipes.



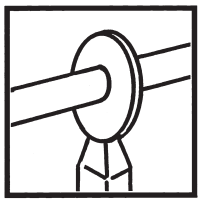
Condensation

Geberit HDPE and Geberit Silent-db20 are poor conductors of heat. No condensation should form during short periods of undercooling. For areas with longer periods of cooling in high humidity conditions, insulation may be required so please seek advice. In particular internal rainwater pipes passing through a warm building would benefit from thermal insulation



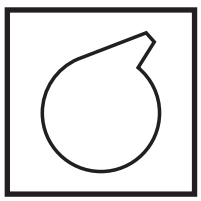
Behaviour in fire

Geberit HDPE and Geberit Silent-db20 are flammable materials in open combustion. They have however been installed throughout Europe for over 40 years and, when installed in accordance with local regulations, present no greater risk of fire propagation than similar plastic based systems. Use with Geberit fire collars is recommended and these should be installed in strict accordance with the instructions provided.



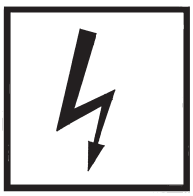
Joint integrity

Many years of experience with welding Geberit HDPE pipes have shown that butt welds do not give any problems as the welding parts are circular on the inside and do not add to the normal risk of blocking.



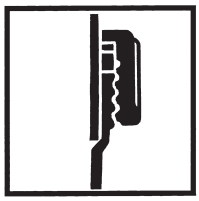
Chemical resistance

Because of its paraffinic structure, Geberit HPDE and Geberit Silent-db20 are highly resistant to chemicals. Their resistance can be summarised briefly as follows: Geberit HDPE and Geberit Silent-db20 are insoluble in all inorganic and organic solutions at 20°C. Geberit HDPE and Geberit Silent-db20 are only soluble in aliphatic and aromatic carbons and their chlorinating products at over 90°C. The material will be attacked by heavily oxidised media (conc. $HN0_3$, conc. $H_2 SO_4$) when exposed over long periods at room temperature. See chemical resistance charts on pages 64–72 for more information.



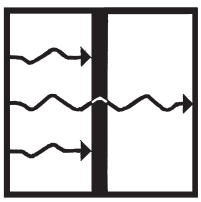
Not electrically conductive

Plastics have an excellent reputation as insulators in the electrical industry, e.g. HDPE cable protection ducts, cast resins, insulating paint etc.



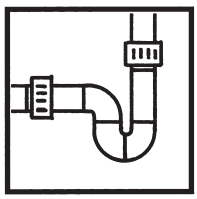
Sealing material

Although the chemical resistance of the seal does not equal that of Geberit HDPE, there is no risk of the seal being destroyed because the rubber ring is installed under compression on all sides and therefore cannot swell. In addition, the wetting factor of the rubber ring in the joint is very low. Many years of experience has shown that the sealing material can endure even the harshest conditions.
NB: Such conditions do not occur in drainage pipes.



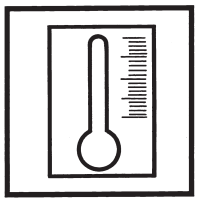
Solar radiation

Geberit HDPE pipes are protected against ageing and embrittlement caused by UV rays by the addition of approximately 2% carbon.



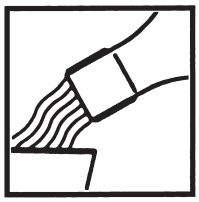
Protection against blockages

Geberit HDPE's water-repelling properties are highly beneficial in this regard.
- Rapid outflow of water
- Prevention of deposits



Welding temperature

Thermoplasts are processed with a high level of energy efficiency. The temperatures required are relatively low in comparison with metals. The welding temperature for Geberit HDPE and Geberit Silent-db20 is approximately 230°C. Simple tools allow for easy processing.



Non-toxic

Plastics are well suited for use in the food industry as packaging materials, containers, bottles etc. Geberit HDPE pipes are used for milk transportation lines in mountain areas and in the food canning and packaging industry.



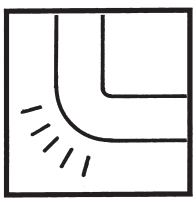
Working pressures

Geberit HDPE and Geberit Silent-db20 pipes are designed for drainage systems. Their use in low pressure areas (swimming pools, transportation lines etc) is subject to a maximum internal pressure load of 15m Water Column (1.5bar) and a temperature of 30°C (10 years).



Painting

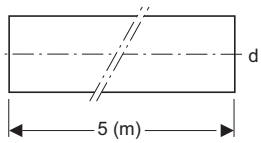
Geberit HDPE is not suitable for painting. Its water repellent properties and the flexibility of the material both have a negative impact on paint. If painting is unavoidable, the paint product to be used should be tested for compatibility with Geberit HDPE.

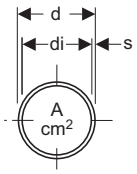


Noise

Improved acoustic properties. Structure-borne sound must be cushioned by taking appropriate measures (acoustically insulated pipe brackets, insulating material).

1.4 Pipe specification Geberit HDPE





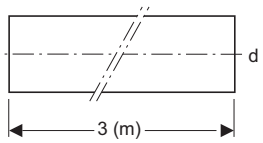
HDPE pipes								
Nominal O/D d (mm)	Wall thickness s (mm)	Inside dia. di (mm)	Area A (cm²)	Weight empty kg/m	Weight full kg/m	Series (ISO) S	PN Number	Article No.
40	3	34	9	0.331	1.239	6.3	8.1	360.000.16.0
50	3	44	15.2	0.420	1.940	8	6.4	361.000.16.0
56	3	50	19.6	0.471	2.434	-	5.7	363.000.16.0
63	3	57	25.4	0.536	3.087	10	5	364.000.16.0
75	3	69	37.3	0.644	4.383	12.5	4.1	365.000.16.0
90	3.5	83	54.1	0.903	6.313	12.5	4	366.000.16.0
110	4.3	101.4	80.7	1.350	9.424	12.5	4	367.000.16.0
125	4.9	115.2	104.5	1.750	12.171	12.5	4	368.000.16.0
160	6.2	147.6	171.1	2.840	19.947	12.5	4	369.000.16.0
200	7.7	184.6	268.4	4.442	31.158	12.5	4	370.050.16.0
250	9.7	230.6	418.2	6.993	48.683	12.5	4	371.050.16.0
315	12.2	290.6	663.8	11.083	77.289	12.5	4	372.050.16.0

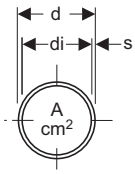
Thinner wall HDPE pipes			Only use for above ground drainage and low (less than 450m bar negative pressure) siphonic rainwater applications					
Nominal O/D d (mm)	Wall thickness s (mm)	Inside dia. di (mm)	Area A (cm²)	Weight empty kg/m	Weight full kg/m	Series (ISO) S	PN Number	Article No.
200	6.2	187.6	276.4	3.580	31.216	16	3.2	370.000.16.0
250	7.8	234.4	431.5	5.630	48.774	16	3.2	371.000.16.0
315	9.8	295.4	685.3	8.920	77.442	16	3.2	372.000.16.0

Standard length of Geberit HDPE pipes is 5 metres (5000mm).

ISO = International Standard Organisation.

1.5 Pipe specification Geberit Silent-db20





O/D d (mm)	Wall Thickness s (mm)	Inside Dia. di (mm)	Area A (cm^2)	Water Volume (l/m)	Weight Full (Kg/m)	Article No.
56	3.2	49.6	19.3	1.93	2.83	305.000.14.1
63	3.2	56.6	25.1	2.51	3.53	306.000.14.1
75	3.6	67.8	36.1	3.60	4.97	307.000.14.1
90	5.5	79	49	4.90	7.38	308.000.14.1
110	6	98	75.4	7.54	10.87	310.000.14.1
135	6	123	118.7	11.87	16.00	312.000.14.1
160	7	146	167.4	16.74	22.50	315.001.14.1

Standard length of Geberit Silent-db20 pipes is 3 metres (3000mm).

2.1 Chemical resistance – The significance of pH values

One of the most crucial factors in selecting a material for a drainage installation is the chemical loading of the effluent being discharged.

Effluent with a low or high pH is harmful because of its corrosive effects, e.g. some drain cleaning fluids have a pH value of up to 12.

Therefore in order to select the most suitable material to handle a specific discharge it is important not only to know the pH value of the effluent but the chemical resistance of the pipe materials.

For full details see chemical resistance tables in the appendix to this guide to assess the performance of Geberit HDPE at various temperatures.

The pH value is therefore important in assessing the chemical level as it will indicate whether the effluent is acid, neutral or alkaline. The pH scale ranges from 0 to 14 (see table below).

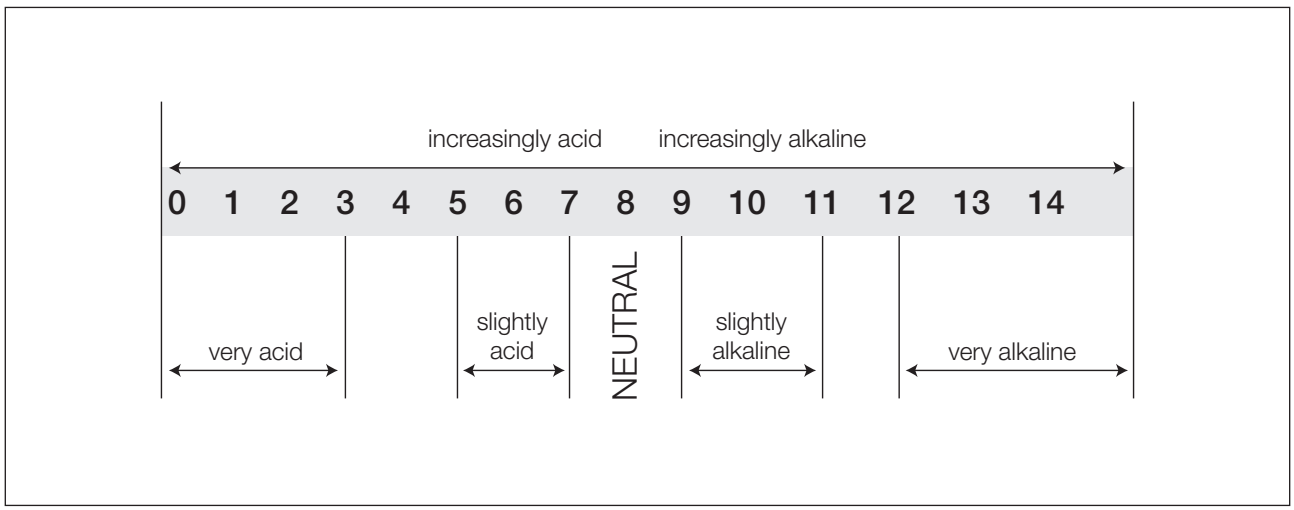
HDPE

… can be used safely with pH values from 0 to 14.

… is suitable, for example, for use with effluents containing over 30% hydrochloric acid.

pH values of some drinks and cleaning agents

	pH-value
Cola drinks	2.8
Apple juice	3.5
Tartaric acid	2.2
Citric acid	2.8
Washing solutions	9 -13
Toilet cleaner	2 - 4



3 Geberit Silent-db20 systems – acoustics

3.1 Best practice for acoustics

Basic principles of minimising sound transmission from noise source.

- Airborne sound rapidly attenuates with distance and transfers through multiple layers (barriers).
- Structure-borne sound travels faster and further (Fig 1).
- The best way to minimise noise is through the construction of the building.
  - Plan bathrooms so they are not next to living rooms.
  - Decouple walls from one another (Fig 2)
  - Use pre-wall installation and wall-hung WC's to decouple the flushing noise from the building structure (Fig 3).

Fig 1

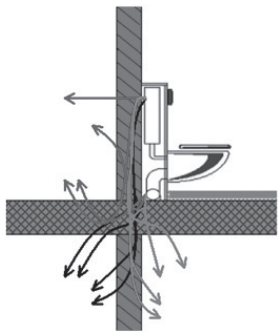


Fig 2

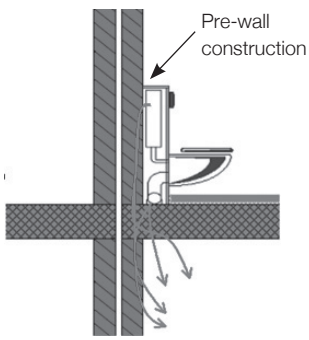
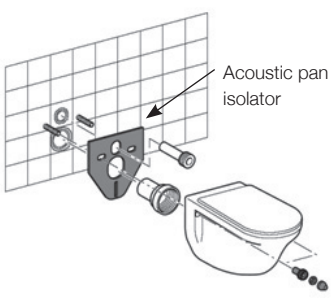


Fig 3



To minimise noise transfer from drainage pipes:

Isolate pipe from structure using acoustic brackets and foam barrier when passing through structure. Contain pipes in duct work preferably with an acoustic material either:

- Wrapped around the pipe (Geberit Isol).
- On two surfaces of the duct inner face.

Additional considerations:

- When pipes pass through concrete floor slabs and walls the pipe must be isolated with Geberit Insulation Hose.
- All vertical offsets must be made using 2 x 45° bends to minimise noise emissions. No offsets are preferred to minimise noise.

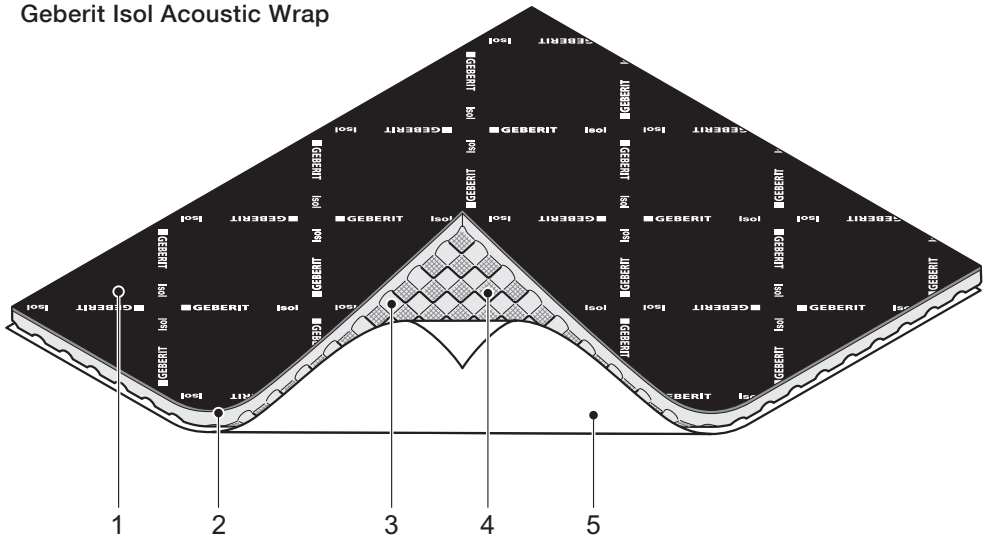
  15° minimum angled bends preferred to minimise noise generation. However, for practical reasons 45° should be the maximum.

  For increased structure-borne noise reduction, install Geberit Duofix installation systems and associated components together with the Geberit Silent-db20 acoustic drainage system.

*standard Geberit HDPE

3.1 Additional acoustic products

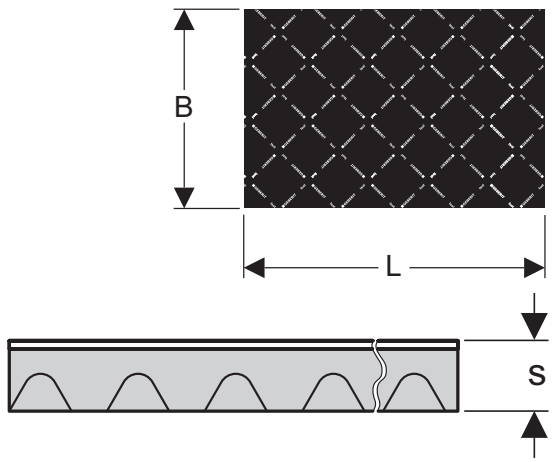
Geberit Isol Acoustic Wrap



Pos.	Description	Material	Thickness (mm)	Details
1	The covering foil prevents moisture penetration at the same time as serving as a vapour barrier	PE	0.07	Black with printed product logo
2	Heavy foil	EVA with mineral filler ($BaSO_4$) and flame retardant	1.4	Anthracite grey basis weight 3kg/m²
3	Semi open-cell acoustic foam	PU foam, open cell	15	Anthracite grey volumetric weight 30kg/m³
4	Self-adhesive layer (only applicable to self-adhesive version)	Polyolefin self-adhesive foil		Colourless used as installation aid
5	Protective paper (only applicable to self-adhesive version)	PE	0.07	Yellow-brown can be pulled off silicon-coated on one side

The covering foil prevents moisture penetration at the same time as serving as a vapour barrier. The heavy foil insulates the airborne sound while the semi open-cell acoustic foam layer prevents the propagation of solid borne noise.

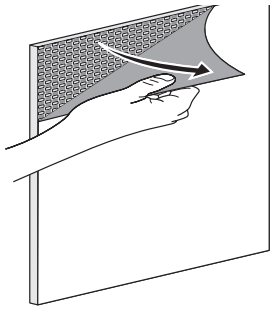
L (cm)	B (cm)	S (mm)
118	78	17



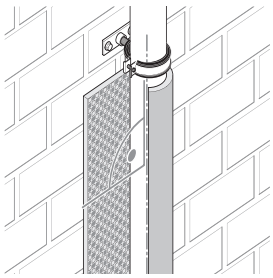
Installation instructions

The pipe must be free from dust and grease before processing.

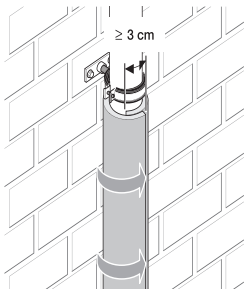
1



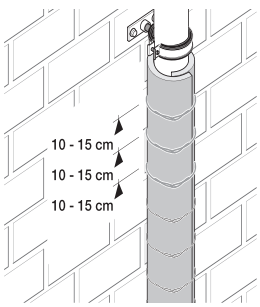
2



3



4



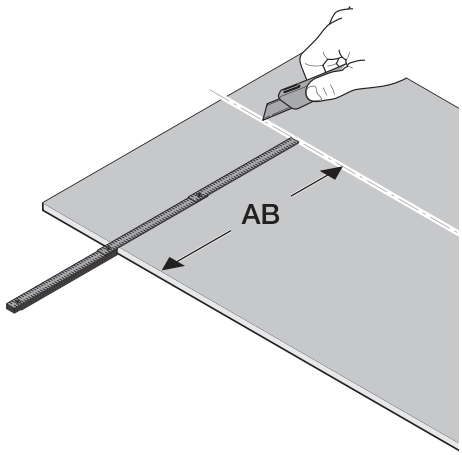
Fastening distance with binding wire is 10-15cm.

5 Use commercial adhesive tape (approximately 7cm wide) to mask off adjacent point against condensation.

For optimum performance the Geberit Isol must cover all the pipework and be overlapped at joins and fixed with tape to prevent the escape of sound.

Installation dimensions

Ø / DN	AB(cm)	m²
40 / 40	26	0.260
50 / 50	29	0.290
56 / 56	31	0.310
63 / 60	33	0.330
75 / 70	37	0.370
90 / 90	43	0.430
110 / 100	49	0.490
125 / 125	54	0.540
135 / 125	57	0.570
160 / 150	65	0.650
200 / 200	78	0.780
250 / 250	91	0.910
315 / 300	111	1.110



4 Jointing methods

Within an ever more competitive culture, installers and specifiers are continually striving to reduce costs, labour and materials used in the construction process. Flexibility of any construction system is paramount in the reduction of many cost factors, allowing a more open view to design and installation.

Geberit HDPE drainage provides installers and specifiers with a wholly more flexible, multi-application drainage solution. The system incorporates several jointing methods that present many advantages over other piping systems. It allows the installer to choose a preferred or appropriate jointing method as well as aiding pre-fabrication of the drainage system off-site. Jointing methods are fast and easy - installers can become proficient in installation after training provided on-site or at Geberit's Training Academy.

The many Geberit jointing methods offer solutions for all situations and each type of connection has different properties that are classified according to the way in which they are assembled:

a To be opened
Jointing methods which can be disconnected after assembly.

b Not to be opened
Jointing methods which can not be disconnected after assembly.

c Tension-resistant
Connections that can withstand tensional forces.

d Non-tension-resistant
Connections that can not withstand tensional forces.

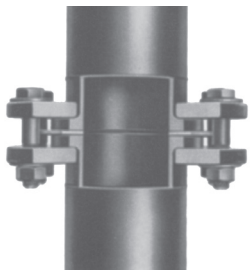

Butt weld


Electrofusion coupling


Ring-seal socket


Screw-threaded joint


Linear expansion socket


Flange joint


Contraction sleeve

Situation \ Jointing methods	Butt weld	Electrofusion coupling	Ring seal socket	Screw threaded joint without flange bushing	Screw threaded joint with flange bushing	Expansion socket	Flange joint	Contraction sleeve	Mechanical Coupling
Tension resistant Not to be opened	✓	✓							
Tension resistant To be opened					✓		✓		
Non-tension resistant Not to be opened						✓		✓	
Non-tension resistant To be opened			✓	✓					✓

4.1 Butt welding



All diameters from Ø 40 to 315mm can be butt welded.

Connection properties

a Permanent leak free jointing.
b Rigid, non-removable.
c Tension-resistant.
d A simple reliable connection.

Application

Butt welding is the easiest jointing method, providing the many advantageous benefits of prefabrication; Geberit HDPE needs no other component in order to be butt welded.

It can be used in all circumstances where prefabrication is used on site or in the workshop.

The essential conditions for a perfect weld are:

- Cleanliness of the welding plate and the parts that are to be welded.
- A correct welding plate temperature with the green light showing.
- The correct pressure for jointing the parts.
- The parts to be welded must be cut square ∢ 90°.
- The pipes are round and ends match. On larger diameter pipes the use of centering rings may be required to reform pipes to true circles.

Butt welding takes up little space. The edge of the weld does not obstruct the pipe, leaving its internal cross-section virtually unchanged. Even quite complicated distribution parts can be assembled in a small space, without wastage of material, because lengths of pipe or elbow sections can be easily reused through butt welding.

Allowance for butt welds

Butt-welding creates a loss in length in the melting and joining of the welded ends. This needs to be accounted for during assembly.

PD (mm)	40-75	90	110	125	160	200	250	315
BW (mm)	3	4	5	5	7	7	8	10

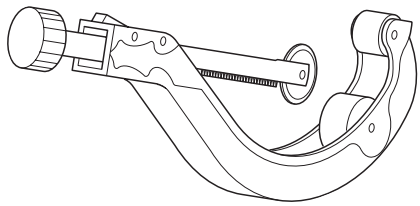
PD = Pipe Diameter BW = Butt Welds

Preparation for butt welding

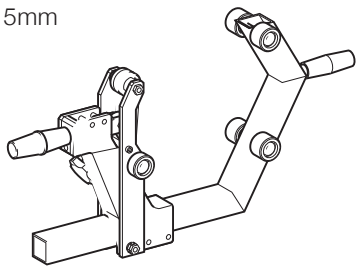
Pipe must be cut square using pipe cutters or a hand mitre saw as shown in the diagrams below.

Pipe Cutter

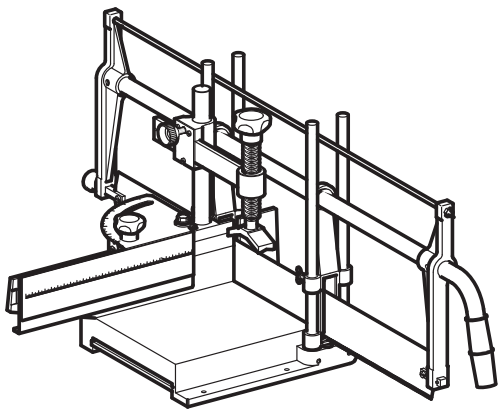
Ø 40 – 160mm



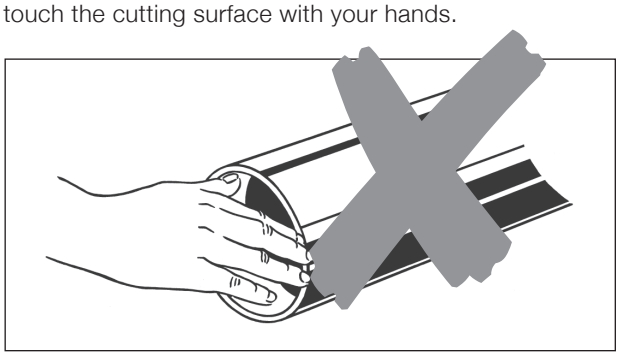
Ø 200 – 315mm



Hand Mitre Saw



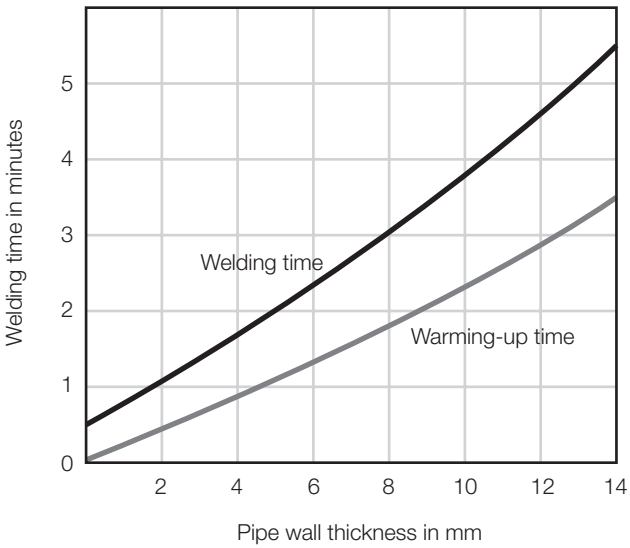
The cutting surface must stay clean, therefore do not touch the cutting surface with your hands.



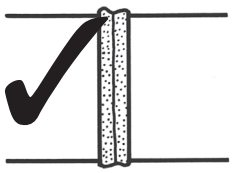
Depending on the diameter of the pipe, Geberit HDPE can be butt welded either by hand or machine.

4.1.1 Butt welding by hand
(for pipes Ø 40 to 75mm)

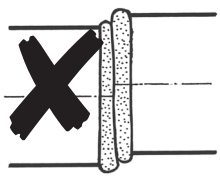
Indicative values for welding and warming up times.



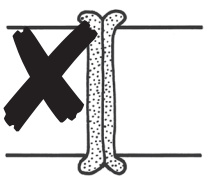
Visually check the welding joint



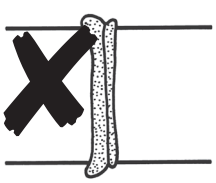
Correct



Incorrect:
Out of axial alignment

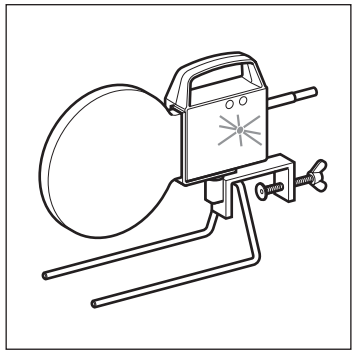


Incorrect:
Too much pressure at the start of the welding procedure

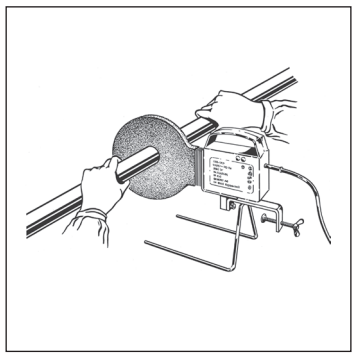


Incorrect:
Uneven welding heat.

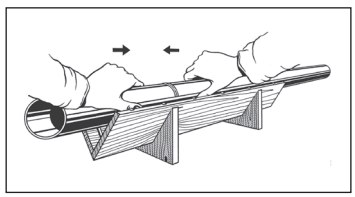
A Geberit welding plate KSS-160 or KSS-200, must be used.



1 Check temperature of the welding plate. Do not start with the welding procedure before the green light is on.



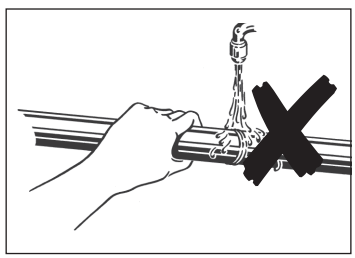
2 Only press the pipe sections at the beginning against the welding plate. Then hold without pressure. Watch melting process carefully.



3 When melted bulge is about as big as half of the wall thickness, take off both pipe sections simultaneously and quickly press them carefully together. Increase welding pressure until you attain necessary pressure (as shown in the table to the left).

Indicative values for welding pressure

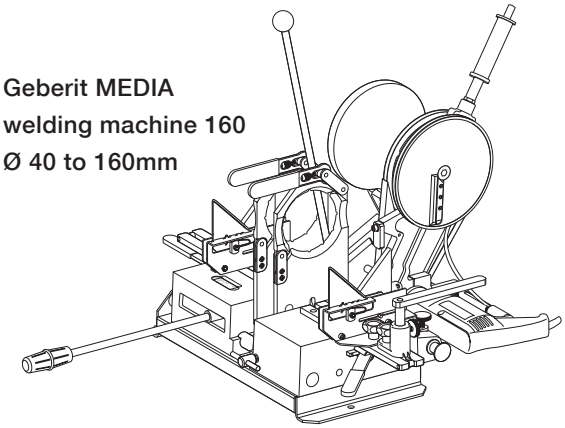
Ø	kg
40	6
50	7
56	8
63	9
75	10



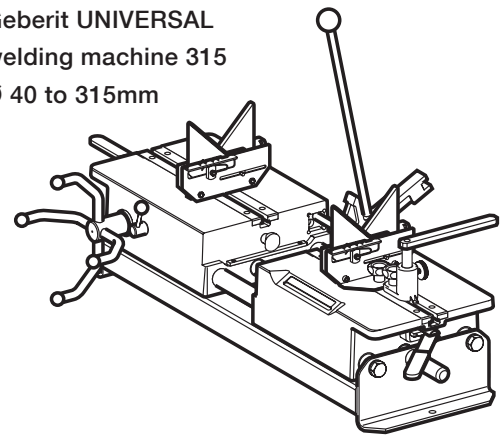
4 Maintain the maximum pressure until the welding seam has cooled (approximately 30 seconds). Do not accelerate the cooling down by contact with cold objects or water.

4.1.2 Butt welding by machine
(for pipes Ø 40 to 315mm)

Geberit MEDIA welding machine 160 Ø 40 to 160mm



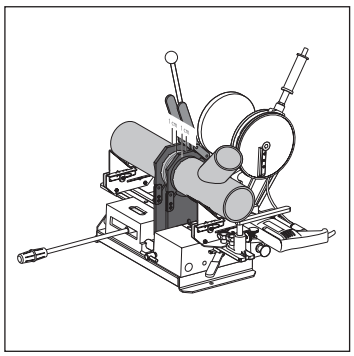
Geberit UNIVERSAL welding machine 315 Ø 40 to 315mm



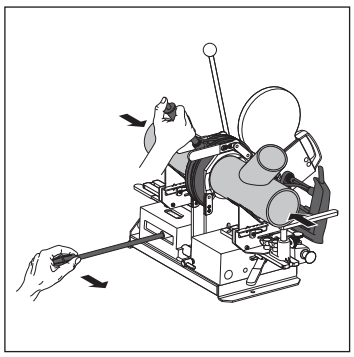
Indicative values for welding pressure

Ø	kg	Ø	kg
40	6	110	22
50	7	125	28
56	8	160	45
63	9	200	57
75	10	250	90
90	15	315	140

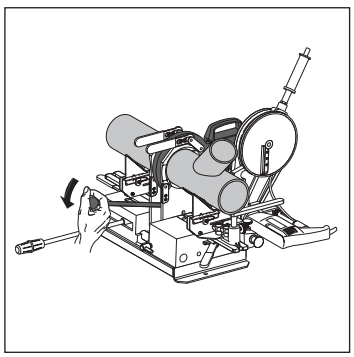
A Geberit MEDIA 160 or UNIVERSAL 315 welding machine must be used.



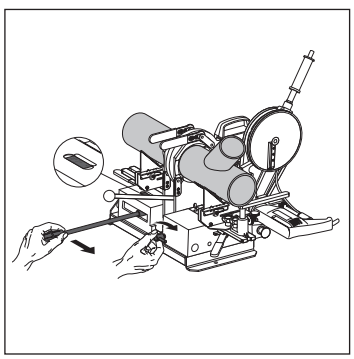
1 Place pipe parts in the tension plates and fix them in a line.



2 Press pipe parts lightly against the planing disc and cut the ends until they are completely clean and plane. Check the cut faces by bringing them together.



3 Melt pipe ends with welding plate (green light on) until the melted bulge is about as big as half of the wall thickness, depending on the size of the pipe.



4 Carefully press together both parts with necessary welding pressure (see table to the left). Do not release the locking handle before the cooling is complete (approximately 40 seconds).

4.2 Electrofusion coupling



Available from Ø 40 to 315mm.

Connection properties

a Simple, reliable joint.
b Rigid, non-removable.
c Tension-resistant.

Application

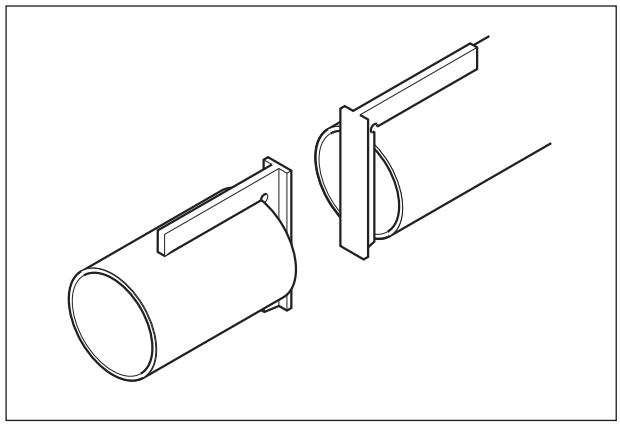
On-site welding, slip coupling for adding fittings or repairing sections.

The heat required to make the joint comes from flowing a constant electrical current through the embedded heater wires within the fitting. The pressure required to make the joint is obtained from the shrinking of the fitting under welding conditions. The shrinking does not alter the internal bore of the joint because the ends and the centre of the fitting are deliberately kept cold during the welding process.

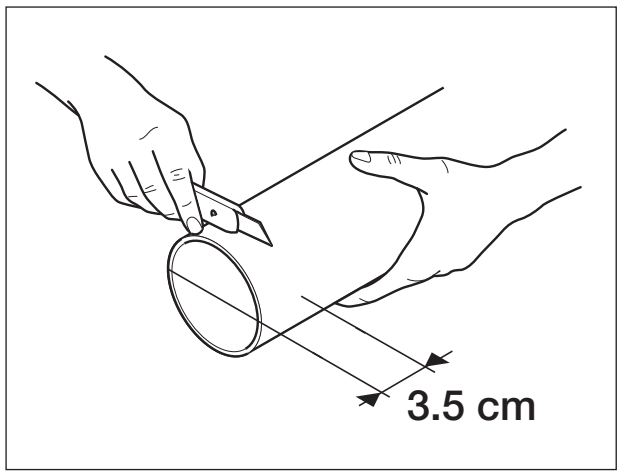
The joint obtained is simple, quick and strong once made. The heater wires remain encased in the HDPE so there is no chance of corrosion. The use of Geberit approved equipment and fittings is essential to ensure a good weld is made.

Preparation for electrofusion

Cut the pipe square.



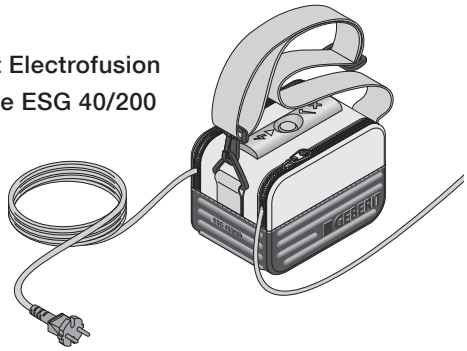
Dry, clean and scrape welding ends. Scraping or abrading of the pipe surface in the area to be fused is necessary to remove oxide layer and ensure an effective weld.



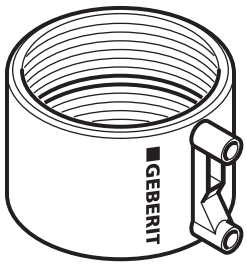
Remove burr. Welding ends must remain dry during the whole welding process. Mark 30mm insertion depth of the electrofusion coupling on the pipe with a grease pencil.

4.2.1 Electrofusion coupling
(for pipes Ø 40 to 160mm)

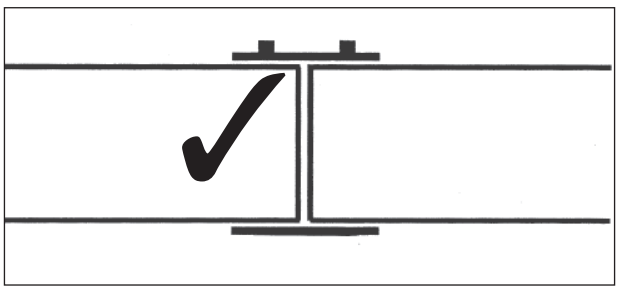
Geberit Electrofusion machine ESG 40/200



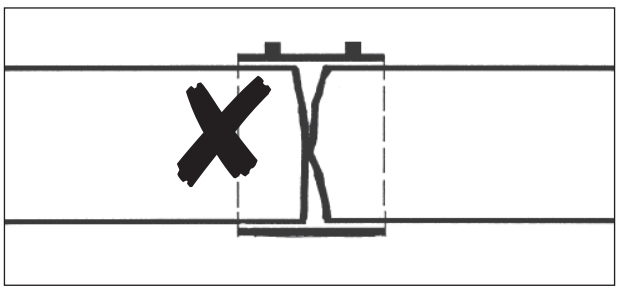
Electrofusion sleeve coupling

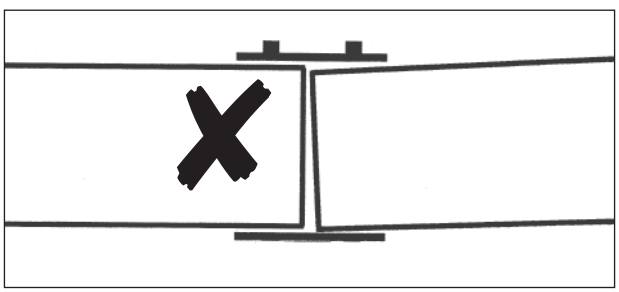


Correct

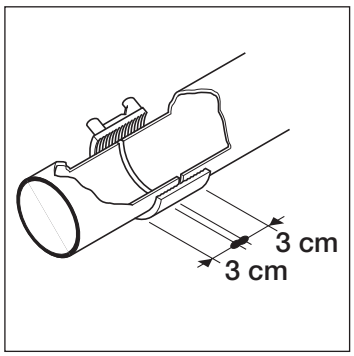


Incorrect





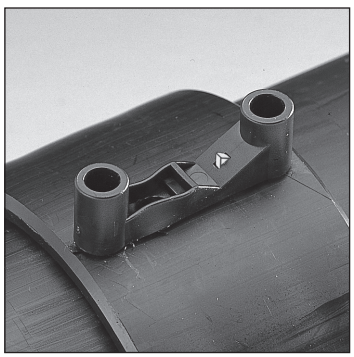
A Geberit Electrofusion machine ESG 40/200 (240V) or Advance Welding AW315G (110V) electrofusion machine must be used.



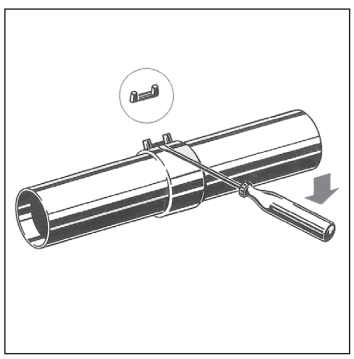
1 Insert pipe or fitting ends into the sleeve coupling up to insertion depth mark.



2 Connect electrofusion machine, start welding procedure. Welding time approximately 70 – 90 seconds.



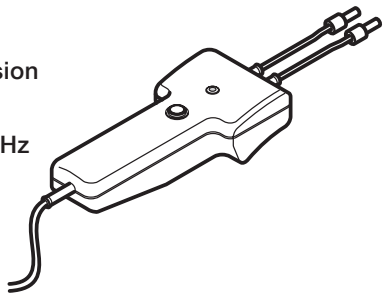
3 After the ‘end’ indicator has turned on, remove the connection cable. The protruding yellow indicator shows whether the welding process was performed correctly.



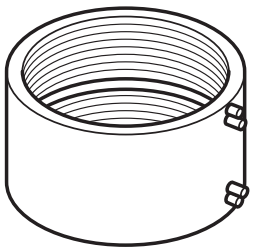
4 If required for sake of appearance, the electrical connector socket on electrofusion couplings (diameters Ø 40 to 160mm) can be removed after the end of installation work.

4.2.2 Electrofusion coupling
(for pipes Ø 200 to 315mm)

Geberit electrofusion welding machine ESG-T2 230 V/50 Hz



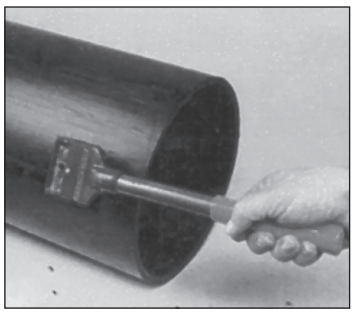
Electrofusion coupling



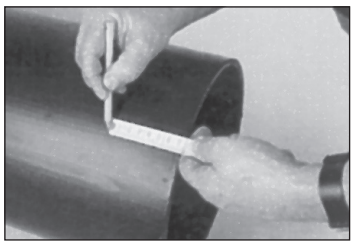
Note:

The same coupling cannot be welded twice since the built-in thermo fuses shut off automatically after the necessary welding temperature has been reached.

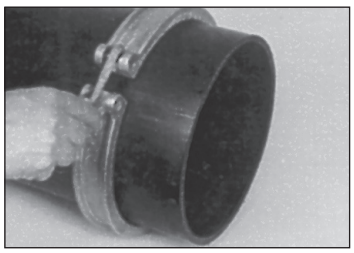
A Geberit starter switch ESG – T2 (230v) or Advance Welding AW315G (110V) electrofusion machine must be used.



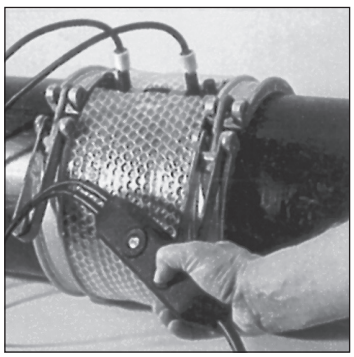
1 Dry, clean, scrape or abrade welding ends to full insertion depth. Remove burr. Welding ends must remain dry during the whole welding process.



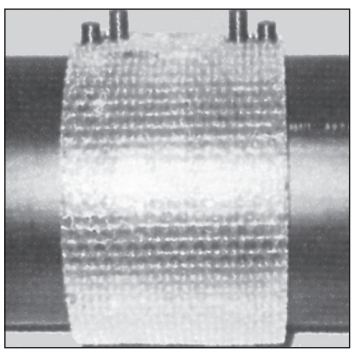
2 Mark insertion length 75mm with a grease pencil.



3 Mount centering rings to ensure proper welding.



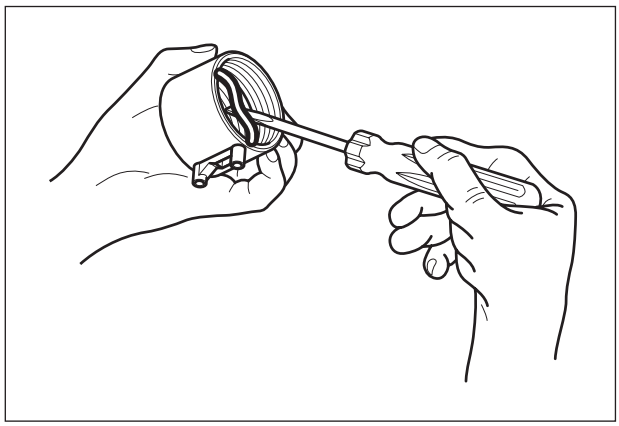
4 Insert pipe or fitting ends into the electrofusion coupling to full insertion depth mark. Connect start switch cable or electrofusion machine. Press start button briefly. Working temperature: -10°C – +40°C. Welding time: approximately 5 to 7 minutes at 20°C. Check indicator window on coupling has changed from white to black.

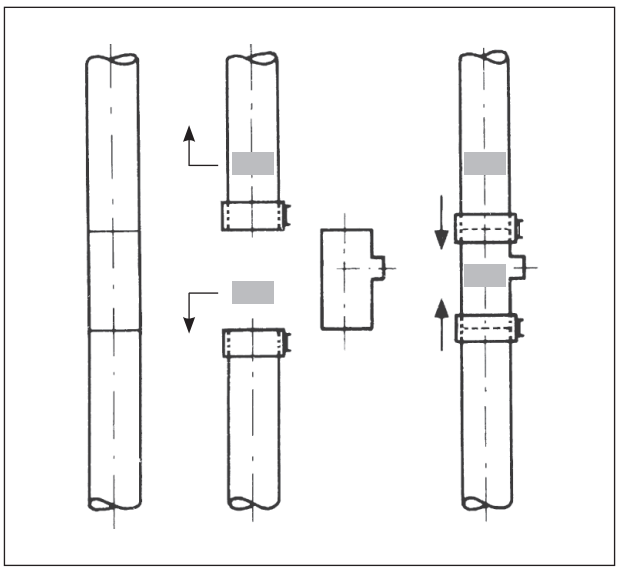


5 Wait for at least 15 minutes after weld has been completed before removing the centering rings. Do not remove the plastic sheet insulation until the coupling has completely cooled down.

4.2.3 Conversion to a slip coupling

To turn the coupling into a slip coupling, the central ring can be removed as shown below.





4.3 Ring-seal sockets



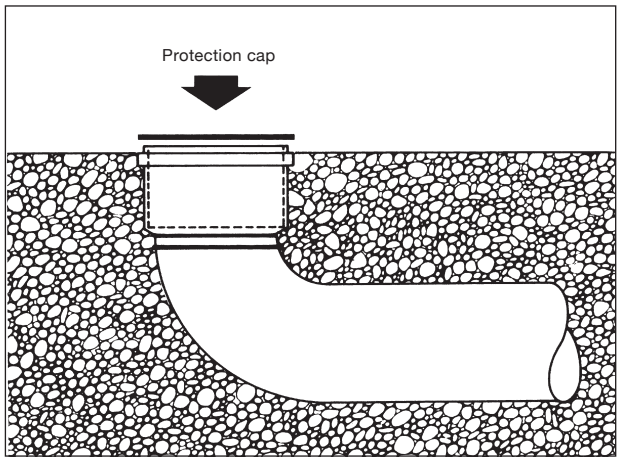
Available from Ø 40 to 160mm.

Connection properties

a Non-rigid, removable.
b Non-tension-resistant.
c Simple push-fit connection.

Application

Ring-seal socket joints can be used to provide a connection between various prefabricated parts for ease of assembly.



Assembly

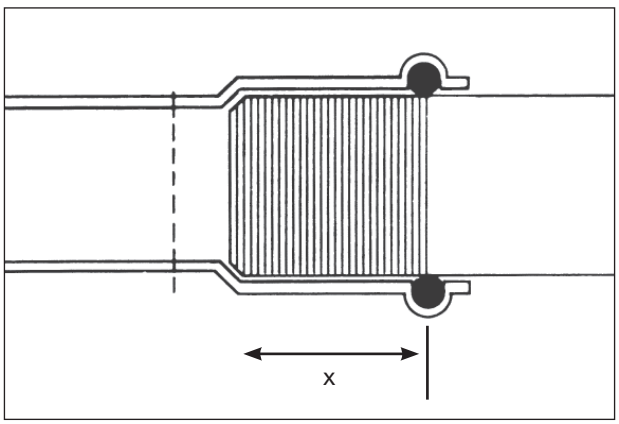
May be used either vertically or horizontally. The small overall dimensions provide an advantage where space is limited. Can easily be assembled or released even where access is difficult.

Ring-seal sockets are provided with a yellow protection cap to prevent the ingress of debris during installation.

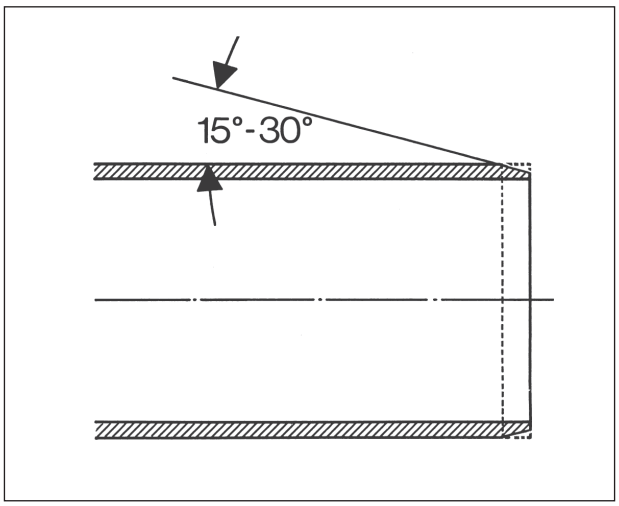
Assembly instructions are the same for both ring-seal sockets and screw-threaded joints – the sleeve lengths are the same for corresponding diameters. The effective sleeve length, i.e. the measurement – X – from the O-ring to the base of the socket, governs the maximum length of the pipe that can be connected by individual joints. Insertion depth should be marked on the pipe with a grease pencil prior to installation.

All pipes must be chamfered prior to insertion and seal(s) lubricated. For HDPE, approximately 15mm of spigot should be allowed for every 1m of pipe.

The pipe must be fully inserted into the socket, because the socket does not act as an expander. Owing to the pipe thickness and the low thermal conductivity of HDPE, the socket seal has a very satisfactory resistance to heat and no shrinkage of the O-ring occurs. The O-ring has a round seat regardless of pipe movement. The O-ring remains fixed in the seat and is always in contact with the pipe.



Length ‘x’ varies with the diameter.



Ideal fitting is obtained by chamfering the pipe end to approximately 15°, lubricating it with soluble lubricant, silicone or Vaseline. **Do not use mineral oil or grease as it can damage the rubber seal.**

4.4 Expansion fittings for Geberit HDPE



Available in Ø 40 to 315mm.

Connection properties

a Non-rigid, demountable joint.
b Non-tension-resistant.
c Simple push-fit connection.

Application

An expansion socket is recommended between anchor brackets, particularly on installations assembled with rigid joints and where excessive thermal movement is anticipated.

At least one expansion joint must be provided on vertical stacks running from floor to floor, long horizontal pipe runs and before connecting to the buried drain pipework, (please see section 7.3).

Different conditions apply for underground installations. Please see section 7 for more information.

4.5 Flanged joint



Available from Ø 50 to 315mm.

Connection properties

a Rigid, mechanical joint.
b Tension-resistant.
c Demountable.

Application

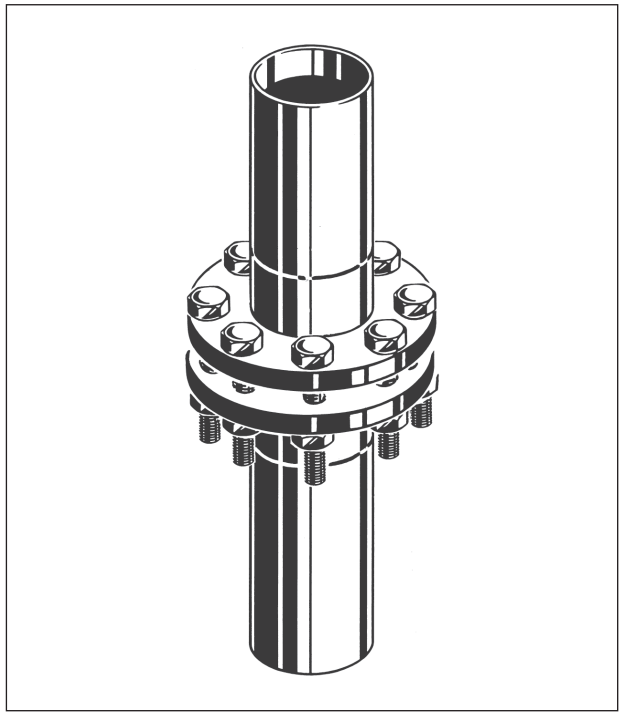
Flanges are normally used as demountable joints for low pressure installations (industrial plant, pump connection, tanks and swimming pools).

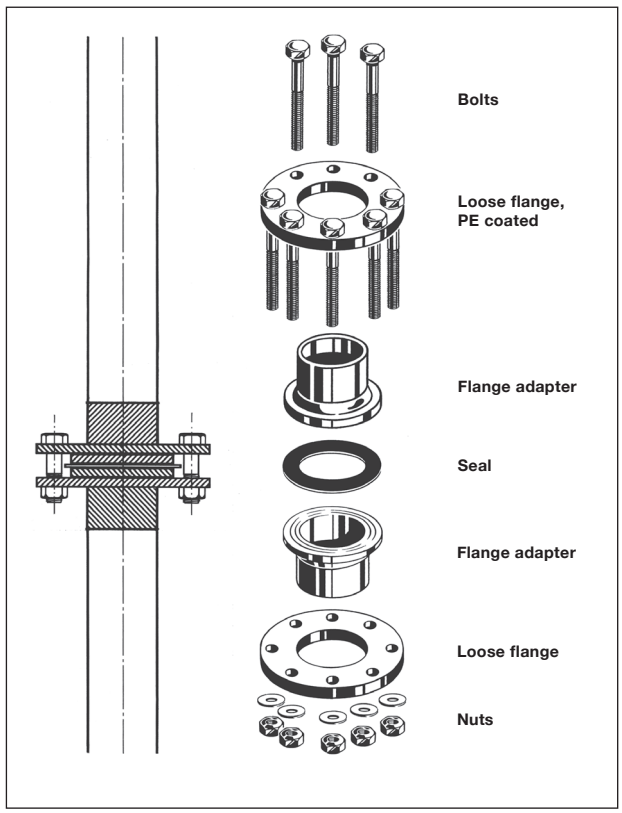
The flange connection system offers easy connection to existing iron and steel installations.

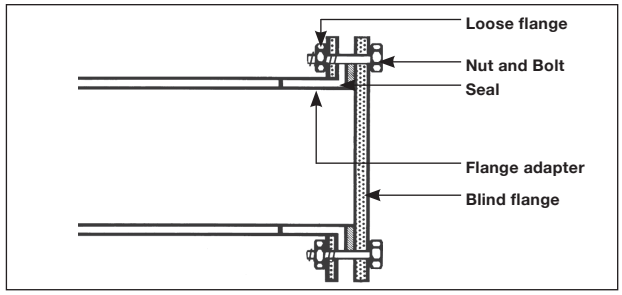
As inspection access opening made by using a blind flange.

Flanges are sintered, i.e. they are coated with polyethylene, and have standard dimensions (PN 10 and 16).

For diameters Ø 50 to 160mm, the flange adaptor can be buttwelded or electrowelded to pipe. For Ø 200-315mm the flange adaptor has to be buttwelded to the pipe.







4.6 Screw-threaded joints



Available from Ø 40 to 110mm.

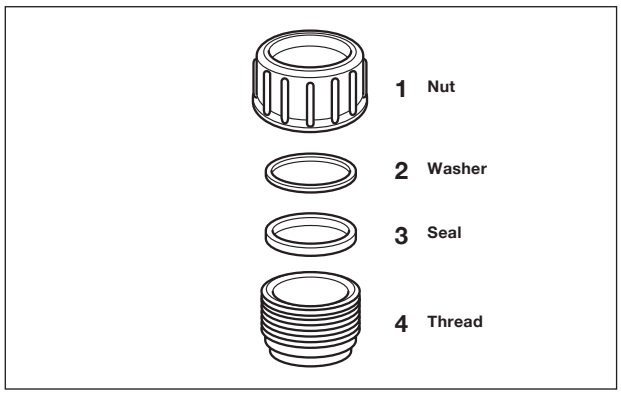
Connection properties

a Non-rigid, mechanical joint.
b Non-tension-resistant.
c Demountable.

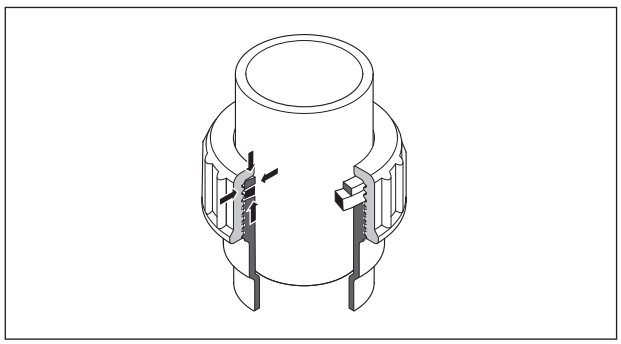
Application

Screw-threaded joints are used for assembly of various prefabricated parts when it is necessary to easily dismantle a system. This type of joint is also used for connection to pipe spigots in other materials.

The standard version is to be buttwelded onto the Geberit HDPE pipe end and the extended version (available in certain diameters) can be electrowelded or buttwelded onto the pipe end.



Complete screw-threaded joint.



The seal is pressed against the thread. A minimum surface area of the seal is in contact with the water.

4.6.1 Screw-threaded joint with flange bushing

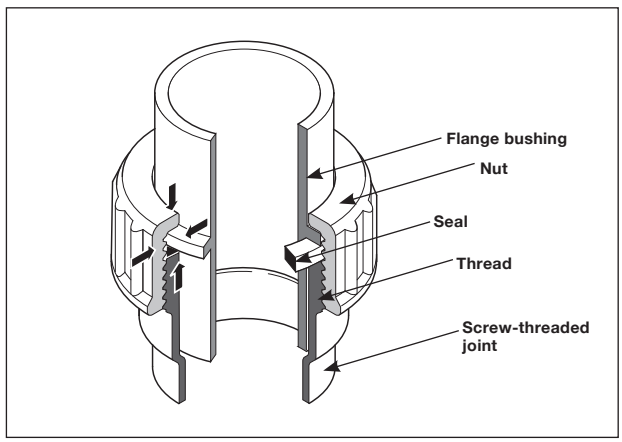
Available from Ø 40 to 110mm.

Connection properties

a Non-rigid, mechanical joint.
b Non-tension-resistant.
c Demountable.

Application

Wherever there is the possibility that a pipe can be pulled out of a screw-threaded joint by axial tensile forces, a flange bushing must be used to ensure that the connection will resist these forces. It is also recommended that a screw-threaded joint with flange bushing should be used when installing in floors or slabs, where the length of pipe between two connections (elbows, branches or sleeves) is longer than 2 metres.



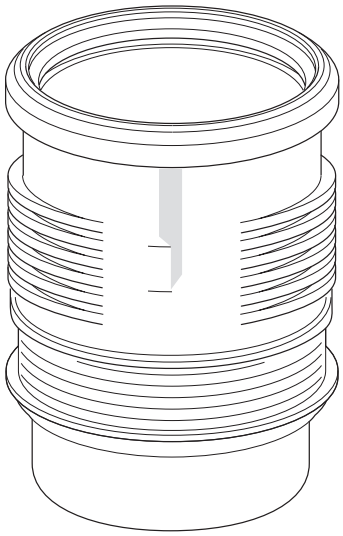
The seal is pressed against the flange bushing and the thread.

4.7 Jointing methods for Geberit Silent-db20

Geberit Silent-db20 uses the normal HDPE jointing methods including butt welding, electrofusion couplings, and mechanical couplings. If using butt welding the plaining blades fitted to the butt welding machine must be changed to carbide steel blades – 240.474.00.1).

Mechanical couplings and electrofusion couplings are the preferred method of joining to minimise noise generation, see section 3 for more information.
In addition the following alternative methods of jointing are available:

4.8 Expansion fittings for Geberit Silent-db20

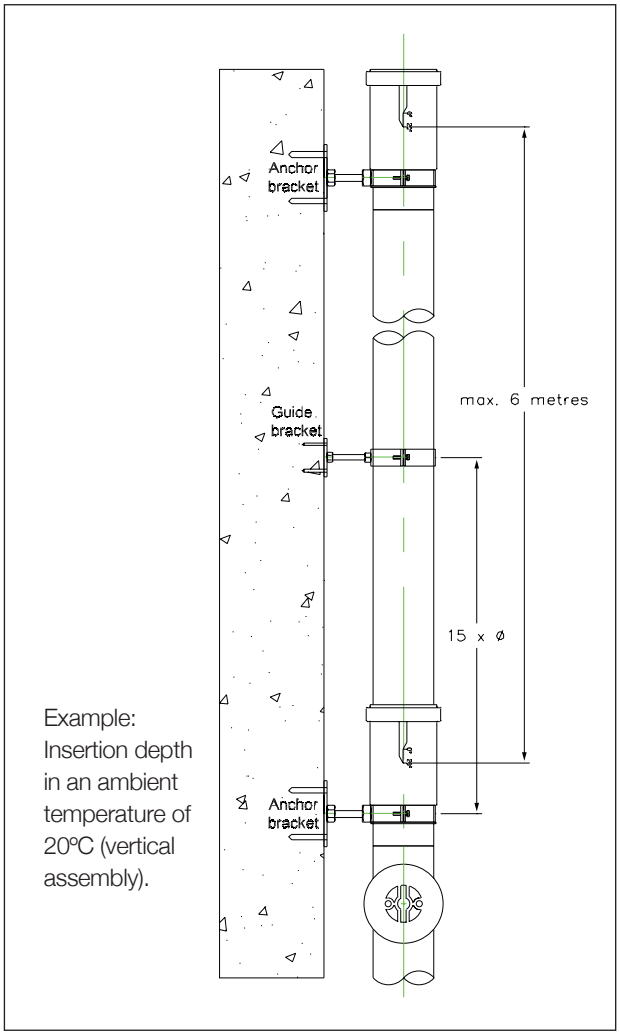


Expansion Socket

Heavily reinforced extended socket with external ribs to reduce noise transfer.

The coupling can be jointed to other fittings or pipe using the standard Geberit HDPE electrofusion coupling. When bracketing the expansion coupling, use one size larger acoustic brackets, i.e. for 110mm expansion coupling, use 125mm bracket). Insert pipe into sealing socket to the insertion markings on the side of the coupling. The expansion socket must be anchored to the structure.

This fitting is only available up to size 110mm.
For 160mm expansion, use double sleeve coupling.
Please see following page for more information.



Example:
Insertion depth in an ambient temperature of 20ºC (vertical assembly).

Vertical installation

To minimise stress on the system it is recommended that an expansion fitting is installed on each floor located above the highest branch connection within 1 metre of the floor level using an anchor bracket positioned around the expansion coupling.

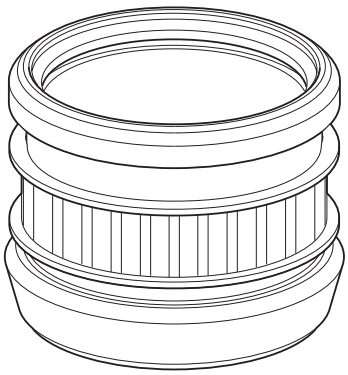
*Maximum 6 metres to next expansion fitting (anchor point)

**Maximum 3 metres when using double sleeve coupling.

Geberit Silent-db20 uses the normal Geberit HDPE jointing methods including butt welding, electrofusion couplings, and mechanical couplings. (If using butt welding the planing blades fitted to the butt welding machine must be changed to carbide steel blades – 240.474.00.1).

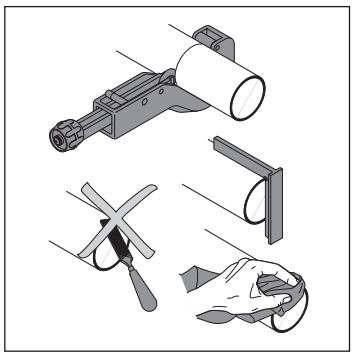
Double Sleeve Coupling

Comprising a double pushfit jointed coupling with one end containing a grab ring to lock the coupling onto the pipe.

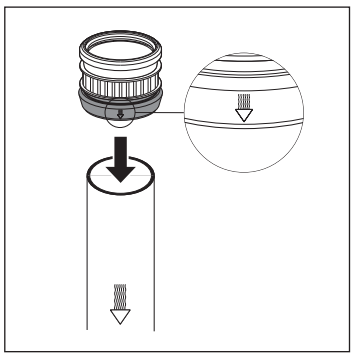


Installation instructions

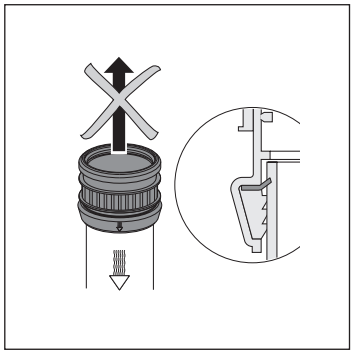
Connect the fixed end of the coupling onto the pipe.



1 The fixed end is only allowed to be used with Geberit Silent-db20 pipes and fittings.

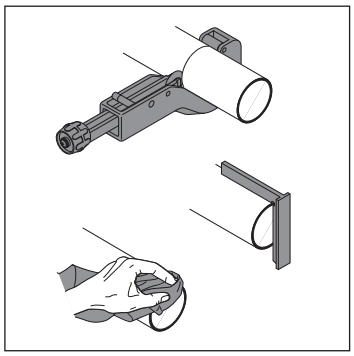


2 Push fully home.

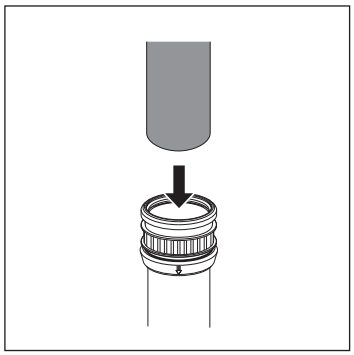


3 Do not attempt to withdraw grab.

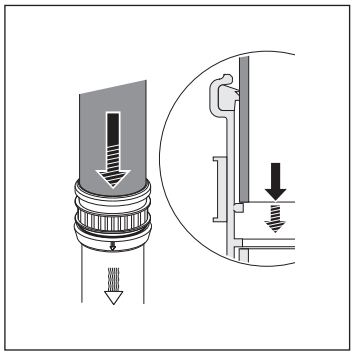
Insert the pipe into expansion side of the coupling.



4 Prepare and chamfer pipe.



5 Lubricate seal.



6 Push pipe fully into socket.

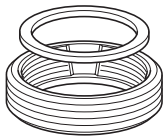
NB For use as a 160mm expansion fitting withdraw the pipe by 15mm, maximum of 3m centres between fixed points.

4.9 Jointing Geberit drainage systems to other materials using adapters

Trap nut adapter

Reduces 1 ½" BSP nut to 1 ¼" BSP size for connecting to 1 1/4" BSP male iron waste outlets etc.

Geberit 1 ¼ " to 1 ½ " BSP adapter

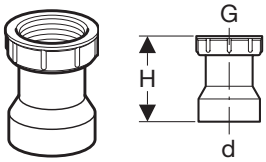


Article no.	G "
242.692.11.1	1 ½ x 1 ¼

Loose nut adapter

Provides female BSP loose nut connection to male iron BSP threaded fittings. Body made from HDPE for butt welding onto standard Geberit pipes and fittings.

Geberit loose nut adapter with plastic screw connection

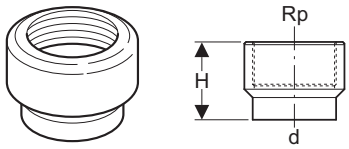


Article no.	dØ mm	G "
152.175.16.1	40	1 ¼
152.176.16.1	40	1 ½
152.179.16.1	50	1 ¼
152.180.16.1	50	1 ½
152.181.16.1	50	2
152.184.16.1	32	1 ¼

Female iron BSP connector

Provides female iron connection to male iron BSP threaded fittings. Body made from HDPE with a metal reinforcing ring for butt welding onto standard Geberit HDPE pipes and fittings.

Geberit HDPE adapter with female thread

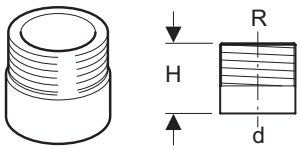


Article no.	dØ mm	Rp "
360.719.16.1	40	½
360.720.16.1	40	¾
360.721.16.1	40	1
361.719.16.1	50	½
361.720.16.1	50	¾
361.721.16.1	50	1
361.722.16.1	50	1 ¼
361.723.16.1	50	1 ½
363.724.16.1	56	2
364.724.16.1	63	2
365.725.16.1	75	2 ½

Male iron BSP connector

Provides male iron connection to female iron threaded BSP fittings. Body made from HDPE with a metal reinforcing ring for butt welding onto standard Geberit HDPE pipes and fittings.

Geberit HDPE adapter with male thread

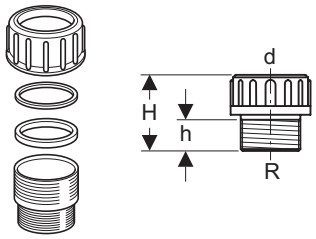


Article no.	dØ mm	R "
361.726.16.1	50	1 ¼
361.727.16.1	50	1 ½
363.728.16.1	56	2
364.728.16.1	63	2
365.729.16.1	75	2 ½

Male iron BSP connector with compression joint to HDPE

Provides male iron connection to female iron threaded BSP fittings. Body made from brass with HDPE loose nut and EPDM seal for mechanical jointing to HDPE and screw thread jointing to other materials.

Geberit HDPE adapter in brass with male thread and HDPE nut

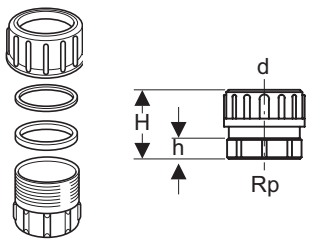


Article no.	dØ mm	R “
359.309.00.1	50	1 ½
359.311.00.1	56	2

Female iron BSP connector with compression joint to HDPE

Provides female iron connection to male iron threaded BSP fittings. Body made from brass with HDPE loose nut and EPDM seal for mechanical jointing to HDPE and screw thread jointing to other materials.

Geberit HDPE adapter in brass with female thread and HDPE nut

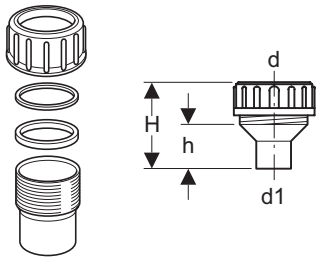


Article no.	dØ mm	Rp “
359.313.00.1	56	2

Male spigot connector with compression joint to HDPE

Provides male spigot connection in brass for soft and hard soldering to lead pipe. Body made from brass with HDPE loose nut and EPDM seal for mechanical jointing to HDPE.

Geberit HDPE adapter in brass for soldering and HDPE nut



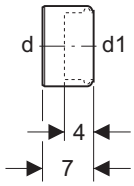
Article no.	dØ mm	d1Ø “
359.330.00.1	56	54

HDPE to PVC-U Adapter 110mm x 90mm

For pushfit into 110mm PVC-U ring seal socket to accept 90mm HDPE into a seal ring socket.

Geberit adapter for PVC coupling 110mm



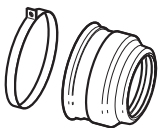


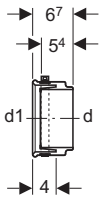
Article no.	dØ mm	d1Ø mm
152.465.00.1	110	90

HDPE to Cast Iron Adapter 110mm x 90mm

EPDM adapter from 90mm HDPE pipe to 110mm cast iron pipe.

Geberit HDPE adapter to cast iron

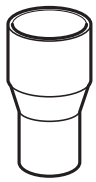


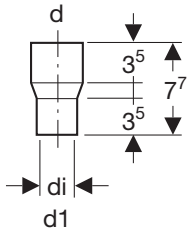


Article no.	dØ mm	d1Ø mm
367.009.16.1	90	110

Adapters from Metric size HDPE pipes to Imperial PVC-U/ABS/PP pipes

Geberit HDPE Metric O/D to imperial uPVC OD size adapter for imperial size traps 32mm to 1 ¼" and 1 ½"

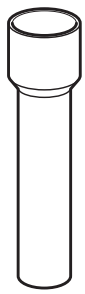




Article no.	dØ mm	d1Ø mm
360.722.16.1	40	36.5
360.723.16.1	40	43
361.728.16.1	50	43
379.701.16.1	32	36

Contraction sleeve (heat shrink)

Available from Ø 50 to 160mm (connects up to 230mm).



Connection properties

a Rigid, non-removable.
a Non-tension-resistant.

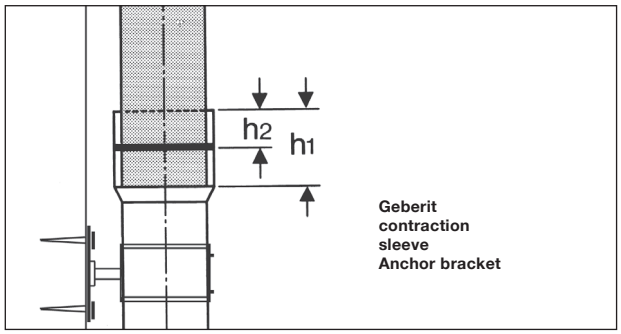
Application

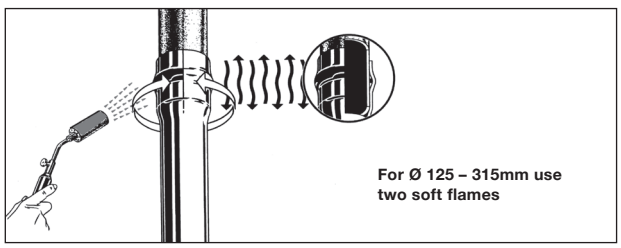
The Geberit HDPE contraction sleeve is a convenient connection possibility for most uneven, irregular, or special materials. A common additional application method is also the connection from HDPE to different clay ware apparatus, e.g. for laboratory sinks.

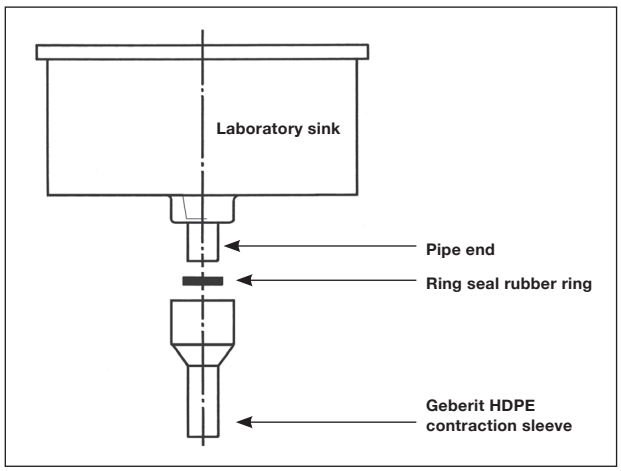
Contraction sleeve to be buttwelded or electrowelded to the HDPE pipe.

Installation

The rubber ring supplied is placed over the pipe end. Make sure that the rubber ring will be placed in the middle of the sleeve length (h2). Then push the contraction sleeve over the pipe end. Apply low heat (approximately 125°C) evenly around the socket, moving the blow lamp constantly. The sleeve will now shrink and give an absolute watertight and strong connection. Afterwards, fix the contraction sleeve pipe with an anchor bracket.



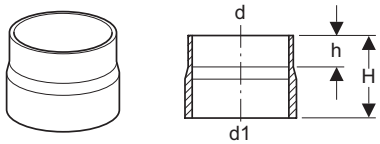




Cast Iron connector

Made from EPDM it provides male spigot for direct connection into Ensign cast iron clamp joint with an internal taper to prevent damming. HDPE end has spigot for either butt-welding or electrofusion coupling. Body made from HDPE with one end enlarged to match Ensign cast iron clamp joint.

Geberit HDPE adapter to cast iron

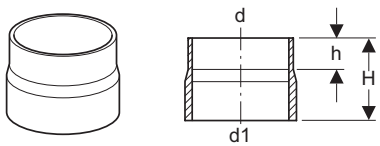


Article no.	dØ mm	d1Ø mm
359.268.16.1	125	135

Cast Iron connector

Provides male spigot for direct connection into Ensign cast iron clamp joint with an internal taper to prevent damming. HDPE end has spigot for either butt-welding or electrofusion coupling. Body made from HDPE with one end enlarged to match Ensign cast iron clamp joint.

Geberit HDPE adapter to cast iron

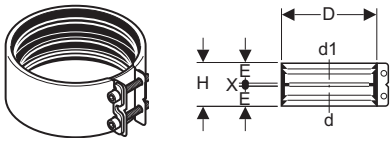


Article no.	dØ mm	d1Ø mm
370.738.16.1	200	212
371.738.16.1	250	274
372.738.16.1	315	326

Clamping coupling

Metal clamp joint for mechanical jointing of HDPE pipes to pipes and fittings of other materials. Suitable for adapting to Ensign cast iron. To be used in conjunction with Reinforcing ring.

Adapter to cast iron

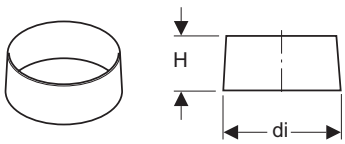


Article no.	dØ mm	d1Ø mm
359.427.00.1	54-56	68
359.429.00.1	63-64	63-64
359.430.00.1	63-64	68
359.432.00.1	75-76	68
359.436.00.1	75-76	89-90
359.438.00.1	89-90	89-90
359.441.00.1	108-110	108-110
359.449.00.1	159-160	159-160

Reinforcing ring

Metal ring for insertion into HDPE pipe to provide support to resist distortion of pipe when clamping coupling is applied.

Reinforcing ring for adapter clamp

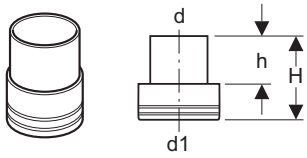


Article no.	dØ mm	d1Ø mm
359.455.00.1	56	50
359.456.00.1	63	57
359.457.00.1	75	69
359.458.00.1	90	83
359.459.00.1	110	101.4
359.464.00.1	160	147.6

Adapter to clay socket

HDPE adapter for connecting into clay sockets by cold caulking.

Adapter to clay/fire element



Article no.	dØ mm	d1Ø mm
367.739.16.1	110	132
368.739.16.1	125	159
369.739.16.1	160	186
370.739.16.1	200	242
371.739.16.1	250	298
372.739.16.1	315	352

5 System installation

Geberit HDPE drainage system pipes and fittings are used for all above ground drainage applications, soil and waste, siphonic rainwater, gravity rainwater and chemical waste systems. They may also be used for underground drainage applications, provided the pipe work is under the footprint of the building (maximum of 1 metre outside the building outer walls).

5.1 Spacing for bracketry

Geberit HDPE pipes are to be fixed with anchor brackets and guide brackets. The distance between anchor brackets is a maximum of 6 metres or whenever stability is required in the system.

Nominal outside diameter Ø	**Spacing of guide brackets**	
	Horizontal	Vertical
(mm)	(m)	(m)
40	0.8	1.0
50	0.8	1.0
56	0.8	1.0
63	0.8	1.0
75	0.8	1.2
90	0.9	1.4
110	1.1	1.7
125	1.3	1.9
160	1.6	2.4
200	2.0	3.0
250	2.0	3.0
315	2.0	3.0

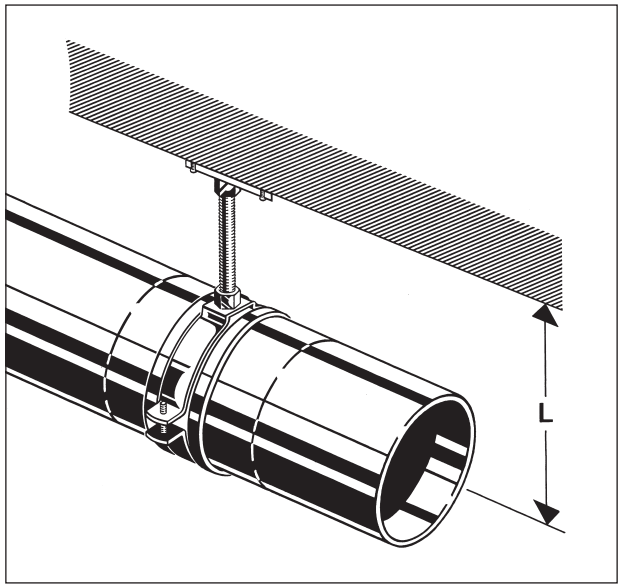
When using the Geberit Pluvia rail system (see section 5.2.4) the fixing to the structure is at 2.5m centres. The fixing between the rail and the pipe is as shown on the above table for horizontal bracketry fixing.

5.1.1 Guide brackets

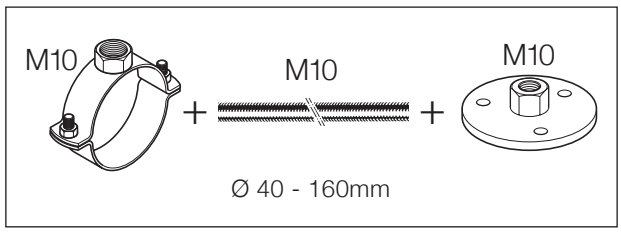
The main purpose of guide brackets is to support the pipe and allow the axial movement caused by the effects of expansion and contraction.

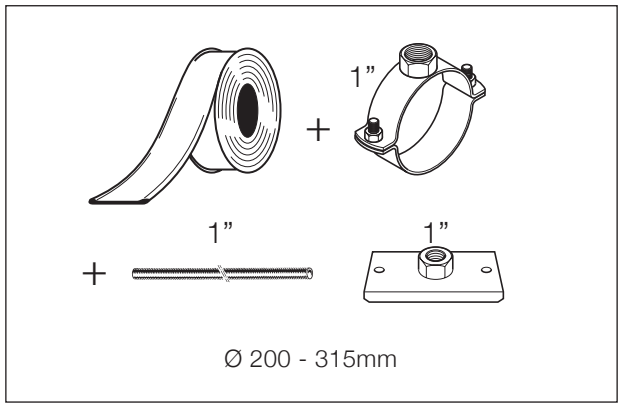
For all fixations of Geberit HDPE pipes Ø 40 - 315mm except for anchor brackets.

Application

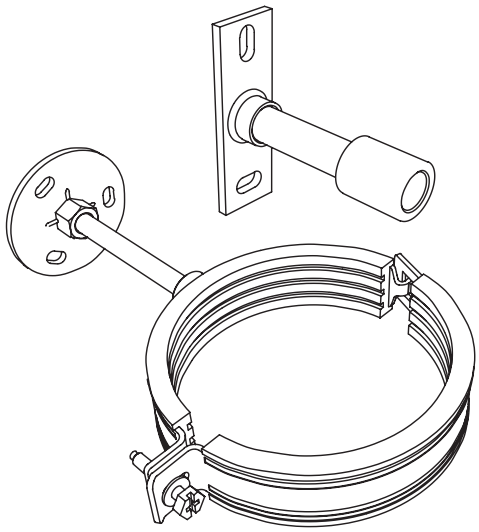


For the distance L, please see table a page 39





5.1.2 Bracketry for Geberit Silent-db20



To maximise the benefit of the acoustic properties of the Silent-db20 system, Geberit Silent-db20 acoustic brackets must be used. These brackets have a rubber insulated lining with controls on restricting the compression of the rubber, removing the risk of over compressing that could result in the transfer of structure borne noise.

Diameter of connecting rod between bracket and wall fixing depends on length. Contact Geberit Technical for advice. please see section 5.2.1 for additional data on fixing using drop rods.

Geberit Silent-db20 pipes are to be fixed with anchor brackets and guide brackets. The distance between the anchor bracket and the guide bracket is maximum of 6 metres or nominal outside diameter spacing of guide brackets whenever stability is required in the system.

Nominal outside diameter Ø (mm)	**Spacing of guide brackets** Horizontal (m)	Vertical (m)
56	0.80	1.50
63	0.80	1.50
75	0.80	1.50
90	0.90	1.50
110	1.10	1.70
160	1.70	2.40

5.2 Managing thermal movement - Above ground systems

The main consideration in any HDPE installation is the management of thermal movement/expansion within the system. There are 3 key methods of planning for thermal movement in Geberit HDPE drainage systems.

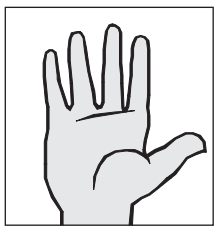
These are:
- Controlled expansion
- Deflection leg
- Rigid fixing

Geberit HDPE Expansion Coefficient

0.17mm/m•K

Physical principal

All materials expand as temperature increases. If the temperature falls, the material contracts.



Rule of thumb:

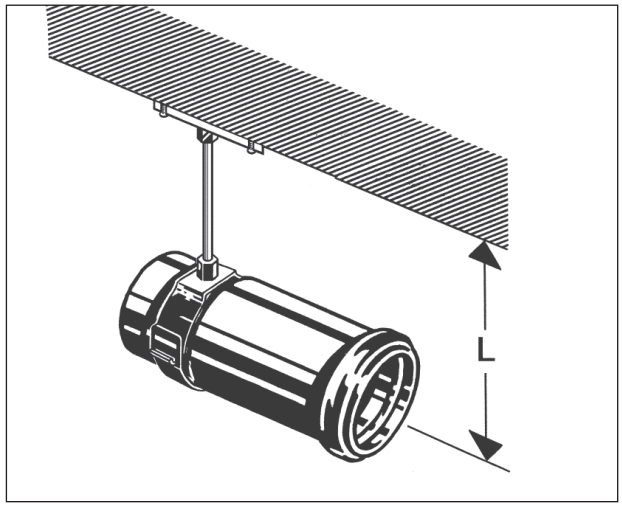
If temperature changes by 50°C, material will expand or contract by 8.5mm/m

5.2.1 Controlled expansion

Expansion socket - use of anchor brackets

Traditionally, plastic drainage systems have required that pipe lengths over 4 metres are fitted with an expansion socket which contains a lubricated seal ring for easy movement of the pipe and an expansion gap within the joint to allow for thermal expansion of the pipe work.

These expansion sockets must be anchored to control the thrust forces that occur as the pipe pushes past the seal ring, as well as to prevent uncontrolled movement of the system that could result in potentially the pipe 'pulling' out of the seal ring joint.



The main purpose of the anchor bracket is to prevent any movement of the expansion socket. It is important to fix each expansion socket with an anchor bracket.

If butt welded to other pipes/fittings, the anchor point must be within 1.5 metres on the downstream side of the expansion fitting allowing the anchor bracket to be located near a strong, secure fixing point, i.e. the floor slab.

If this method is used horizontally on suspended pipework, the drop rod must be of sufficient strength/ rigidity to withstand the side ways thrust forces that occur when the pipe pushes past the seal ring (see table below).

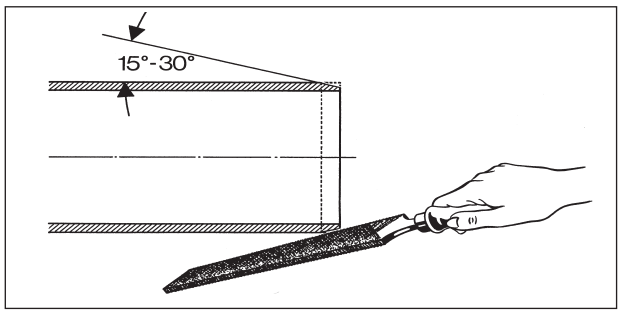
Thrust force <<P>> when in operation	
Ø	**Thrust force P (kg)**
40-63	10
75	12
90	20
110	30
125	40
160	70
200	100
250	150
315	220

The thrust force <<P>> is the slide resistance between the rubber seal and HDPE pipe. This force depends on the pipe diameter.

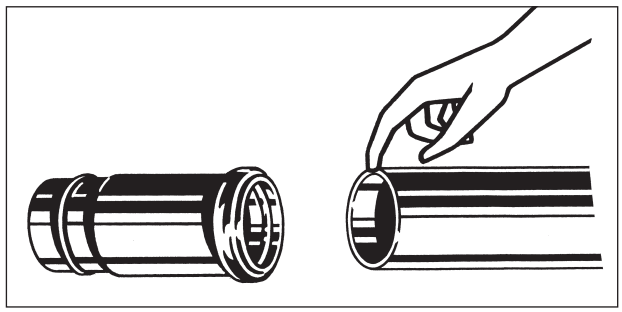
The table below shows the correct drop rod diameter required depending on distance <<L>> to effectively withstand thrust force <<P>>.

Distance from ceiling L (mm)	Drop rod diameter 50/56/63/75/90	Drop rod diameter 110	Drop rod diameter 125	Drop rod diameter 160	Drop rod diameter 200	Drop rod diameter 250	Drop rod diameter 315
100	½"	½"	½"	—	—	—	—
150	½"	½"	½"	½"	—	—	—
200	½"	½"	½"	½"	¾"	1"	
250	½"	½"	½"	¾"	1"	1"	⅝"
300	½"	½"	½"	¾"	1"	⅝"	⅝"
350	½"	½"	½"	1"	1"	⅝"	1½"
400	½"	½"	¾"	1"	1"	⅝"	1½"
450	½"	½"	¾"	1"	⅝"	⅝"	1½"
500	½"	¾"	¾"	1"	⅝"	1½"	2"
550	½"	¾"	¾"	1"	⅝"	1½"	2"
600	½"	¾"	1"	1"	⅝"	1½"	2"

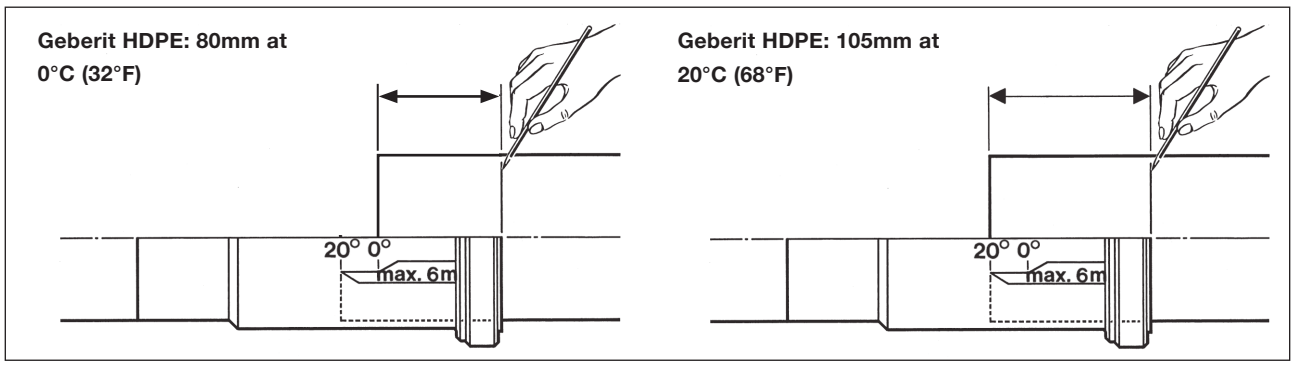
Thermal expansion sockets – Mounting instructions



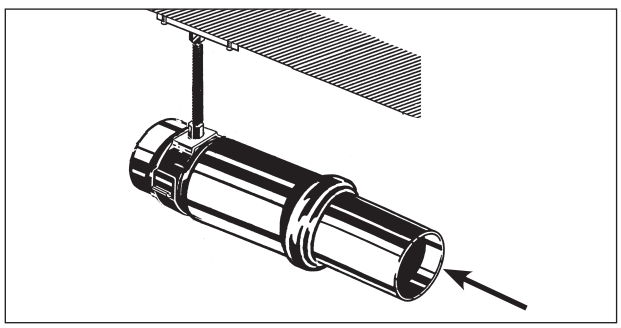
1 Prepare pipe insertion end.



2 Lubricate pipe end and rubber seal with silicone only.



3 Mark insertion depth on the pipe.



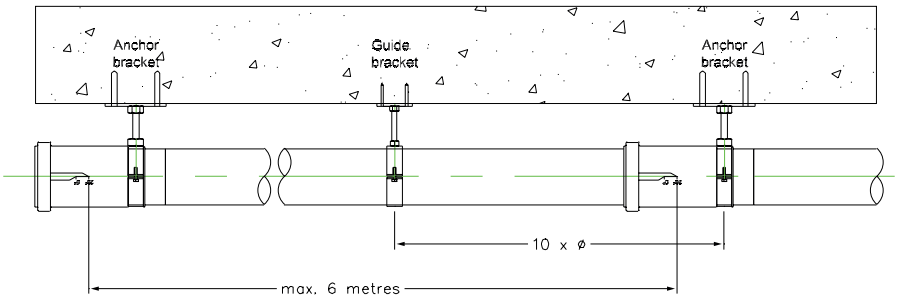
4 Push the pipe into the expansion socket.

Installation

One secure fixed anchor bracket must be installed per floor when branch connections exist and at a maximum of 6 metre centres on plain straight runs of pipe.

The special shape of the seal allows the pipe to slide within the socket during expansion and contraction, ensuring that the connection remains perfectly watertight even under heavy hydraulic load.

The following conditions are important to ensure perfect and easy assembly of the sleeve:



Horizontal assembly (e.g. at 20°C)

1 Chamfering the inserted pipe end to approximately ∢15°.

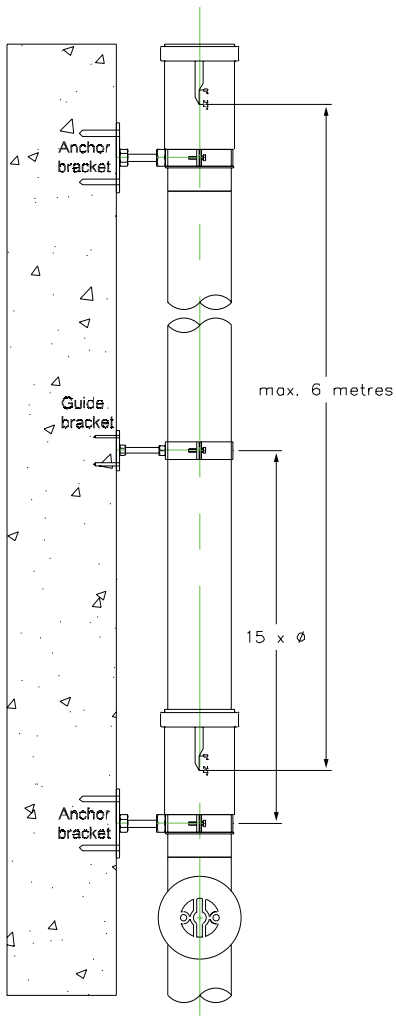
2 Check the scale on the outer surface of the expansion socket for insertion depth.

3 Mark the correct insertion depth on the pipe.

4 Lubricate the pipe end well with soluble lubricant, silicone or Vaseline. Do not use oil or grease which can damage the rubber seal.

When using expansion fittings, all other joints must be tension resistant (see page 18).

Example: insertion depth in an ambient temperature of 20°C (vertical assembly).

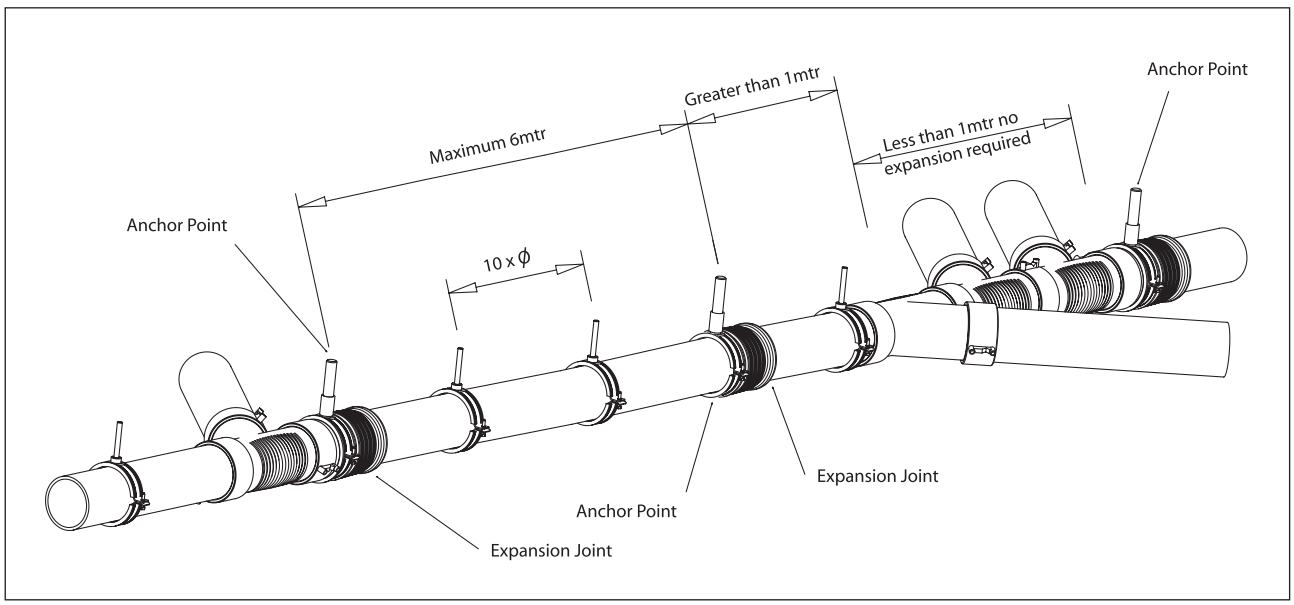


Horizontal installation

For horizontal pipework the position of the expansion joint will vary.

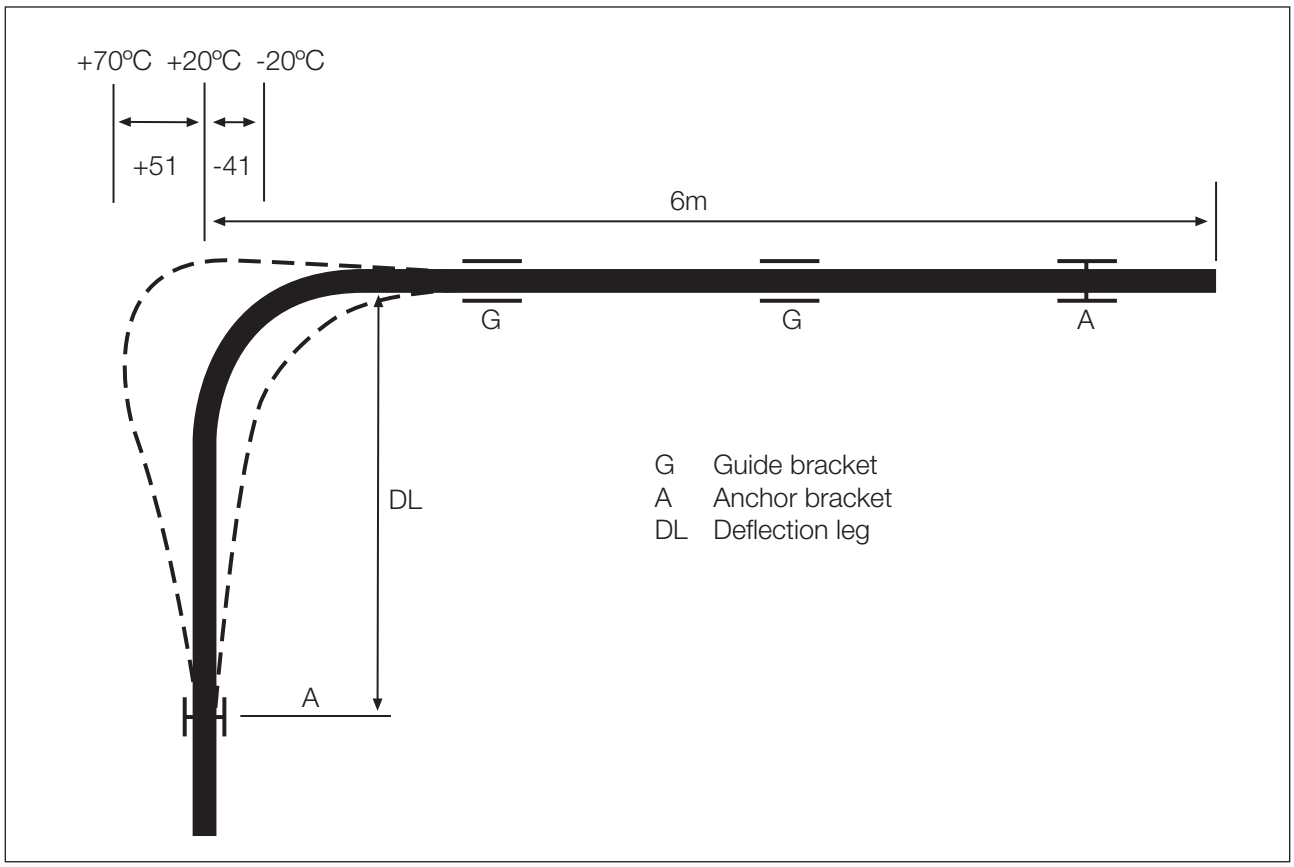
1 On the long runs of pipe with no branch connections, the expansion fitting must be fitted at a maximum of 6 metre centres.

2 With branch connections, the expansion fitting must be installed close to the ‘up stream’ end of any branch. With multiple branches, the expansion fitting must be allowed for all branches over 1 metre of others. The expansion socket must be anchored to the structure with a strong fixing.



5.2.2 Deflection Leg - Guidance on use

A deflection leg is a length/section of pipe specified within the system to accommodate the movement as a result of thermal movement. Deflection legs for pipe lengths of greater than 15m are not recommended as the bending leg will be larger than the maximum bracket spacing.



Compensating thermal expansion by deflection leg.

Determining the change in length

The change in length is determined with the following formula:

$$\Delta L = L \cdot \alpha \cdot \Delta T$$

ΔL: Change in length

L: Pipe length [m]

ΔT: Temperature differential (operating temperature – ambient temperature at ime of installation) [K]

α: Coefficient of thermal expansion 0.17mm/[m·K]

Example:
- α = 0.17 mm/(m·K)
- L = 6m
- ΔT = 50 K

ΔL = 6 x 0.17 x 50 = 51mm

Determining the length of the deflection leg by calculation

Length of the deflection leg (DL) in mm according to the formula:

$$10 \times \sqrt{\Delta L \times \varnothing}$$

Example: DL = $10 \times \sqrt{51 \times 110} = 749$

DL = $10 \times \sqrt{41 \times 110} = 672$

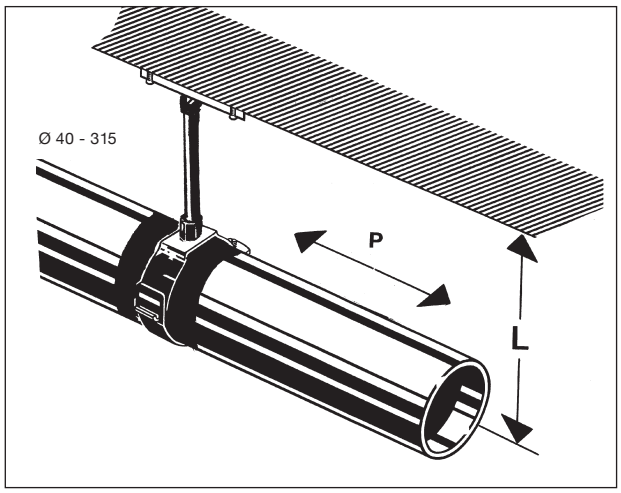
5.2.3 Rigid fixing

Principal:

Any variation in length must be prevented by embedded fixed points (electrofusion couplings, branches, bends or collar bushes) or by the provision of corresponding fixed point structures.

Rigid fixing of the Geberit HDPE system can be achieved by using a proprietary bracketry system (that may in incorporate struts or very strong drop rods) or the Geberit Pluvia rail system, as outlined below.

Rigid installation with anchor brackets



Anchor brackets for rigid fixings must be stronger than possible expansion or contraction forces (P) of the Geberit HDPE pipe (see table opposite).

Geberit HDPE Pipe	Column 1 (Normal installation)	Column 2 (Outside installation)
Ø	+20°C to +90°C force kg	+20°C to -20°C force kg
40	85	221
50	105	277
56	125	315
63	140	365
75	170	428
90	240	598
110	350	882
125	460	1165
160	740	1865
200	940	2375
250	1490	3750
315	2350	5915

This table shows that in the low temperature range (Column 2) the forces are greater than in the high temperature range (Column 1).

Whilst Geberit manufactures Pluvia anchor brackets for its system, it does not manufacture or supply drop rods for connecting the brackets to the ceiling. These must be sourced from a suitable supplier that can verify they can withstand the forces shown in the table above.

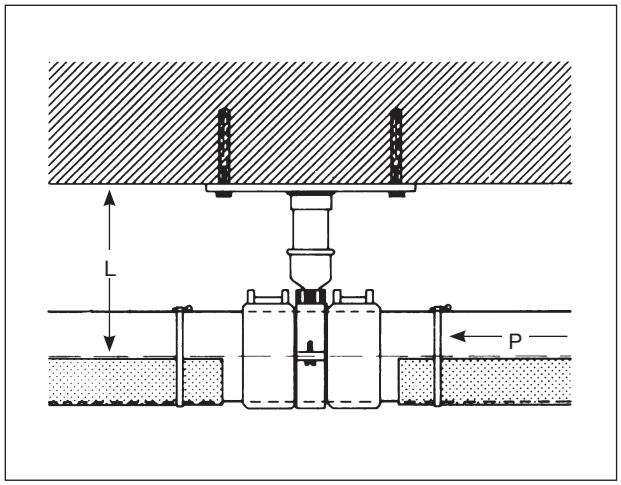
Rigid fixing - Anchor brackets

Rules:

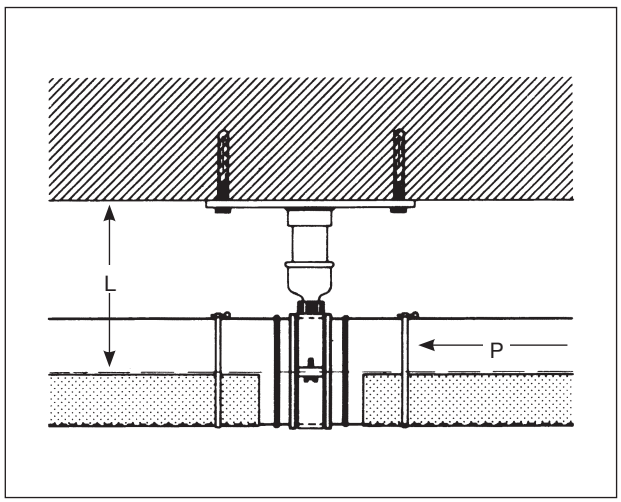
Anchor brackets must be stronger than the possible forces generated during thermal expansion or contraction of Geberit HDPE pipes.

Examples of anchor brackets:

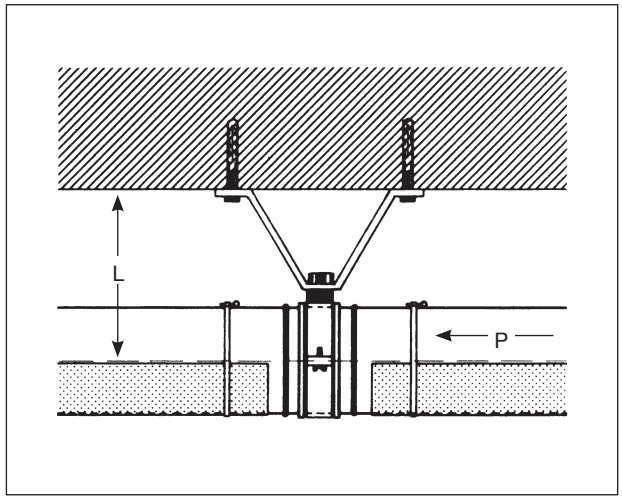
The examples of anchor brackets below show typical rigid installations.



Anchor bracket with double electrofusion sleeve coupling.



Anchor bracket with electrowelding tape.



Anchor bracket with flat iron and electrowelding tape.

Dimension of drop rod or flat iron profile:

The distance <<L>> and the thrust force <<P>> have to be taken into account when selecting the diameter of the drop rod between mounting plate and bracket. For the required drop rod dimension, see the table below.

If they can not meet these dimensional requirements, additional struts will be required to provide sufficient rigidity to resist the forces generated by the system due to thermal expansion. The third party supplier must provide the necessary calculations to prove their product is fit for purpose.

Ceiling or wall distance L · (mm)	**Geberit Dimensions** 50-56 pipe Ø	63-75 pipe Ø	90 pipe Ø	110 pipe Ø	W cm^3	125 pipe Ø	W cm^3	160 pipe Ø	W cm^3
100	½”	¾”	1”	1”		5/4”			
150	¾”	1”	1”	5/4”		5/4”		2”	
200	¾”	1”	5/4”	1½”		1½”		2”	
250	1”	1”	5/4”	1½”		2”			9.3
300	1”	5/4”	5/4”	2”		2”			11.2
350	5/4”	5/4”	1½”	2”		2”			13.0
400	5/4”	5/4”	1½”	2”			9.0		15.0
450	5/4”	1½”	2”	2”			10.1		16.8
500	5/4”	1½”	2”		9.5		11.3		17.7
550	5/4”	1½”	2”		10.5		12.4		20.5
600	1½”	1½”	2”		11.4		13.6		22.4

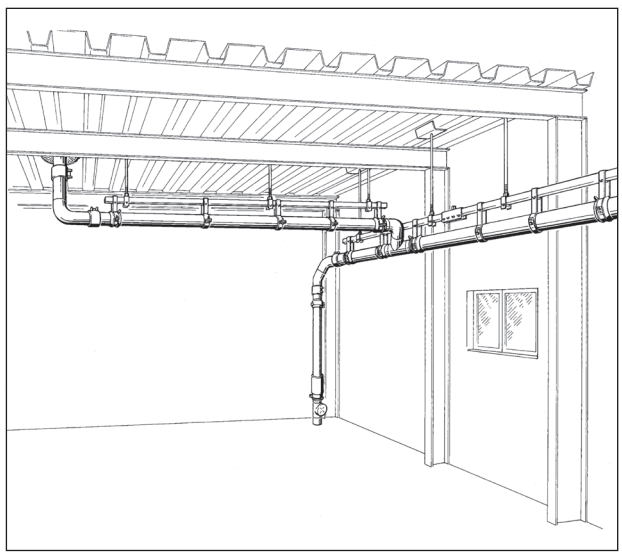
W = indication coefficient for steel profile.

5.2.4 Suspended rail system

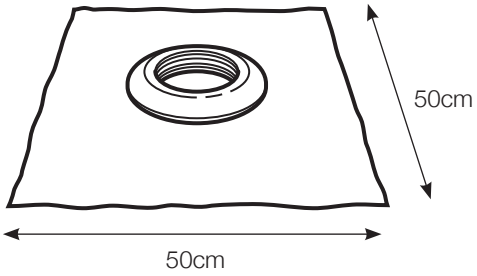
The Geberit Pluvia rail system was developed for the suspended installation of horizontal pipework.
The system includes a metal rail that absorbs all the forces generated when the pipe tries to expand.
Geberit guarantees this system to control all forces and only dead weight fixings are required to the ceiling.

Advantages of the rail system:

- Quick installation.
- Fewer ceiling fastening points.
- Controls thermal movement.
- No expansion because of rigid installation.
- No expansion sockets in the horizontal pipes.
- Simple prefabrication is possible.
- One fastening for anchor and support brackets.



5.3 Waterproofing



Wherever a waterproof layer is required, the Geberit sealing for passages through walls or ceilings provides a perfect watertight seal between the Geberit HDPE pipe and the waterproof membrane.

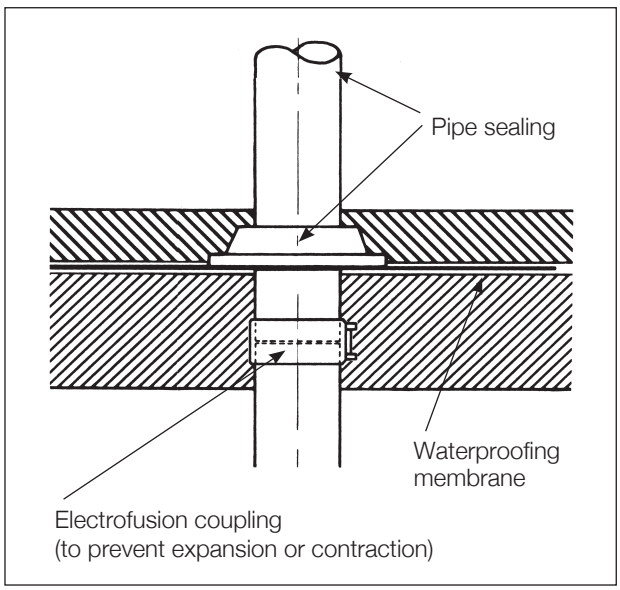
Type 1: PVC to be welded with PVC sheet
Type 2: PE to be welded with Samafil FPO-A-foil.

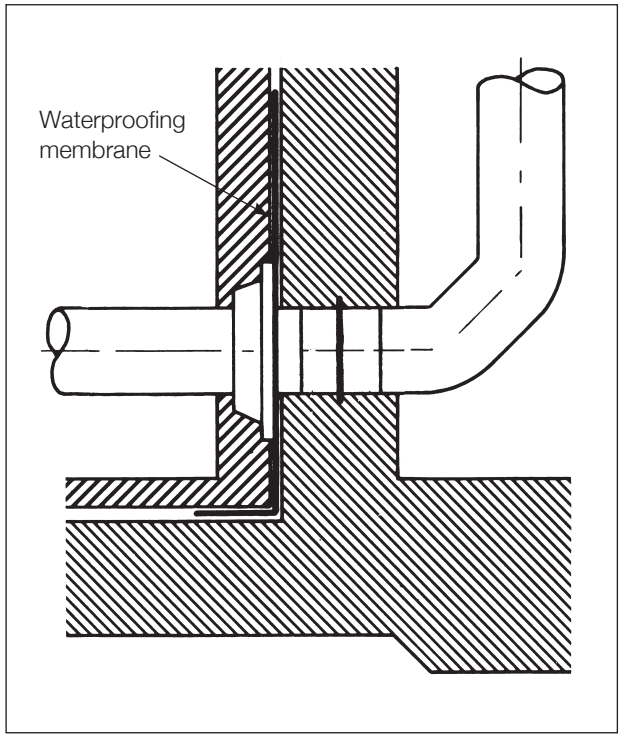
For Geberit HDPE pipes Ø 50,56,75,90, 110 and 125mm.

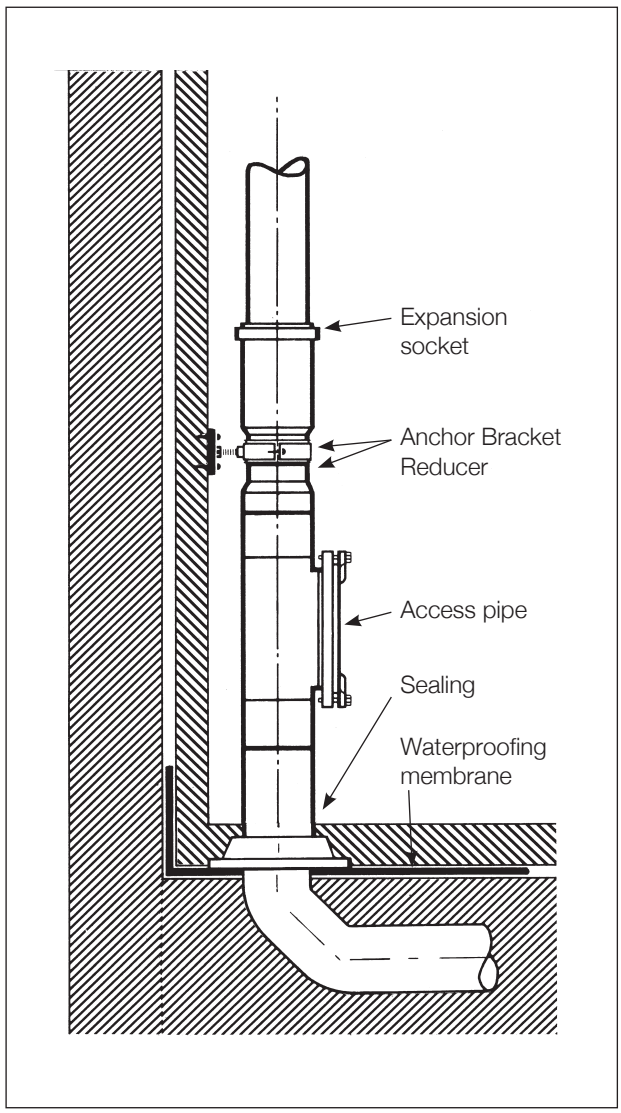
Attention:

Thermal expansion or contraction of the pipe is to be prevented. Maximum water pressure 0.1 bar.

Installation examples





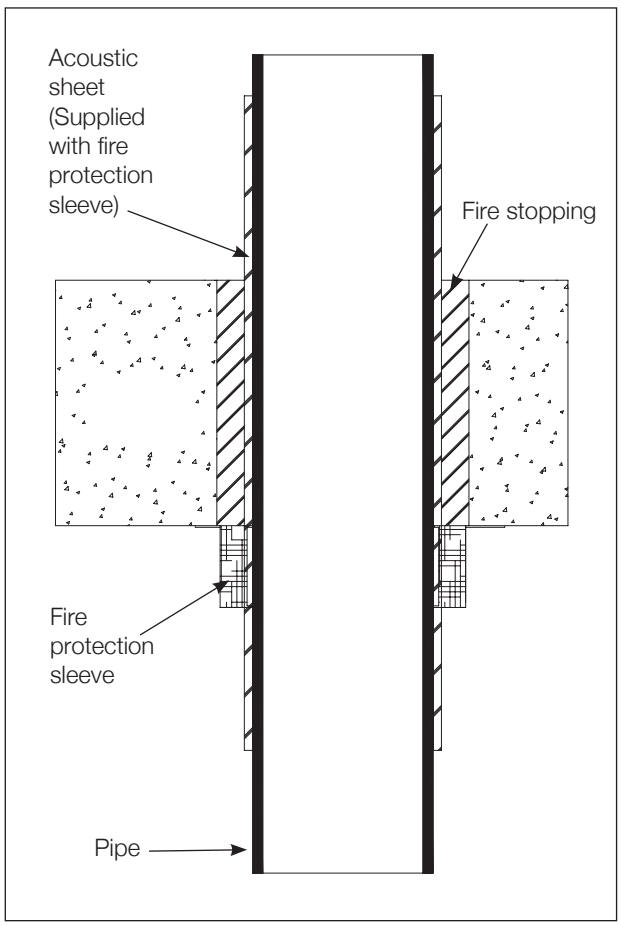


5.4 Fire protection

To comply with building regulations B3 where pipes pass through fire rated barriers, Geberit provides intumescent fire sleeves that also incorporate a separate acoustic sleeving. Geberit Fire Protection Sleeve RS90 Plus EN is tested to BS EN 1366-3:2009 – Fire resistance tests for service installations. Penetration seals.

Intumescent collars can be fitted using any means of installation shown in Fig A or Fig B. Any gaps between construction and pipe penetration are to be filled with a fire rated intumescent mastic.

- Fire protection walls/ceilings require pipe penetrations to be fire sleeved.



NOTE:
Wrap acoustic sheet around pipe and tape in position prior to assembly of fire protection sleeve.

Installation options

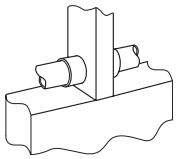


Fig. A
Surface fixed-wall mounted

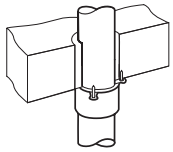


Fig. B
Surface fixed-floor mounted

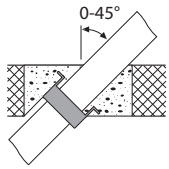
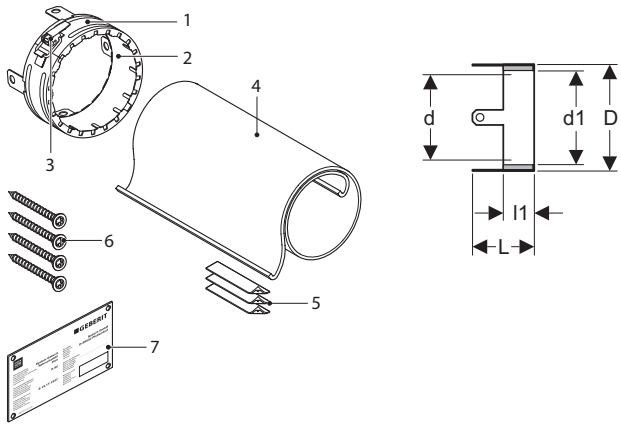


Fig. C
Partially/completely embedded in concrete

NB Firebreak may be partially or completely embedded into the floor slab or wall. See installation instructions for details. All fixings must be made of metal.



1 Housing with fastening brackets that can be bent
2 Foaming insulation
3 Draw latch
4 Solid-borne sound insulation
5 3 adhesive strips
6 Fastening screws for later installation
7 Identification plate

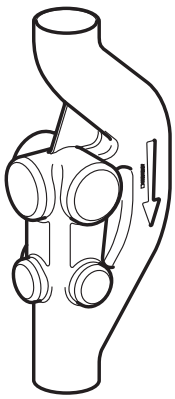
Article No.	dø (mm)	d1ø (mm)	DN	D (cm)	L (cm)	l1 (cm)	
348.300.00.1	32–56	66	30–56	7,8	8,5	5	3
348.301.00.1	63/75	83	60–70	10,2	8,5	5	3
348.302.00.1	90	96	90	11,9	8,5	5	4
348.303.00.1	110	117	100	14,5	8,5	5	4
348.304.00.1	125/135	142	125	17	10,5	7	5
348.305.00.1	160	170	150	20,6	11,5	8	6
348.306.00.1	200	213	200	27,2	12,5	9	7

Once the temperature in the room which is ablaze reaches a certain level, the intumescent material expands as a foam crushing the pipe and closing off the cross section, therefore preventing (for a specified length of time) the fire and smoke from spreading through the opening.

Geberit HDPE and Geberit Silent-db20 fire protection sleeves are Class 90, giving 90 minutes of fire protection.

6 Alternate stack ventilation system

6.1 Geberit Sovent overview



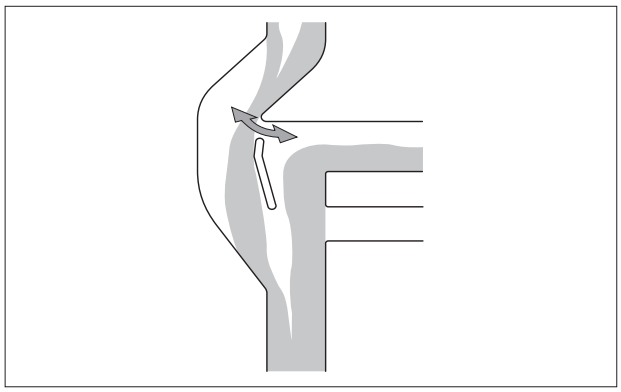
System description

Sovent, a fitting for single stack drainage systems, substantially increases the performance of a soil and waste drainage system, and thus eliminates the need for a separate vent stack and reduces the diameter of stacks in high rise buildings.

Due to its high capacity and excellent performance, the Geberit Sovent fitting is an ideal drainage solution for:

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

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



Function

The specially designed branch inlet fitting reduces the pneumatic pressure fluctuations in stacks, preventing the siphonage of traps. The opening to the stack is one of the key characteristics of the fitting as 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.

6.1.1 Geberit Sovent – Planning

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.

Connection load per floor

The branches have been designed in accordance with the local regulations (e.g. EN 12056-2), 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 WCs may be connected to a Sovent fitting.

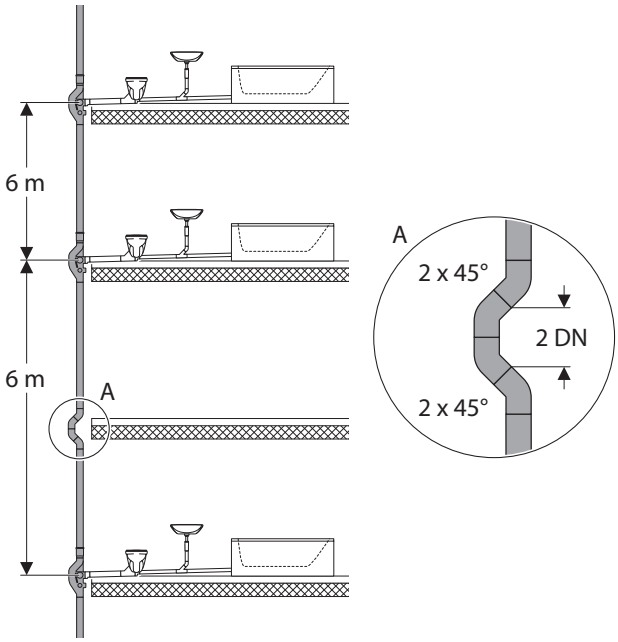
Total connection load

The maximum permissible load with waste water of a Geberit Sovent stack d110 is 12 l/s, for d160 it is 17.0 l/s. The pipe dimension of the stack, with main ventilation through the roof, must be configured in the dimension ø110mm / DN 100 or ø 160mm / DN 150 throughout.

Fitting	Maximum load with waste water	Dimension of stack with main ventillation through roof
Sovent d110	12 l/s	ø 110mm / DN 100
Sovent d160	17.0 l/s	ø 160mm / DN 150

Installation per floor

A Geberit Sovent fitting must be planned in every floor where there are connections to the stack. The maximum distance between two Sovent fittings must not exceed 6m.

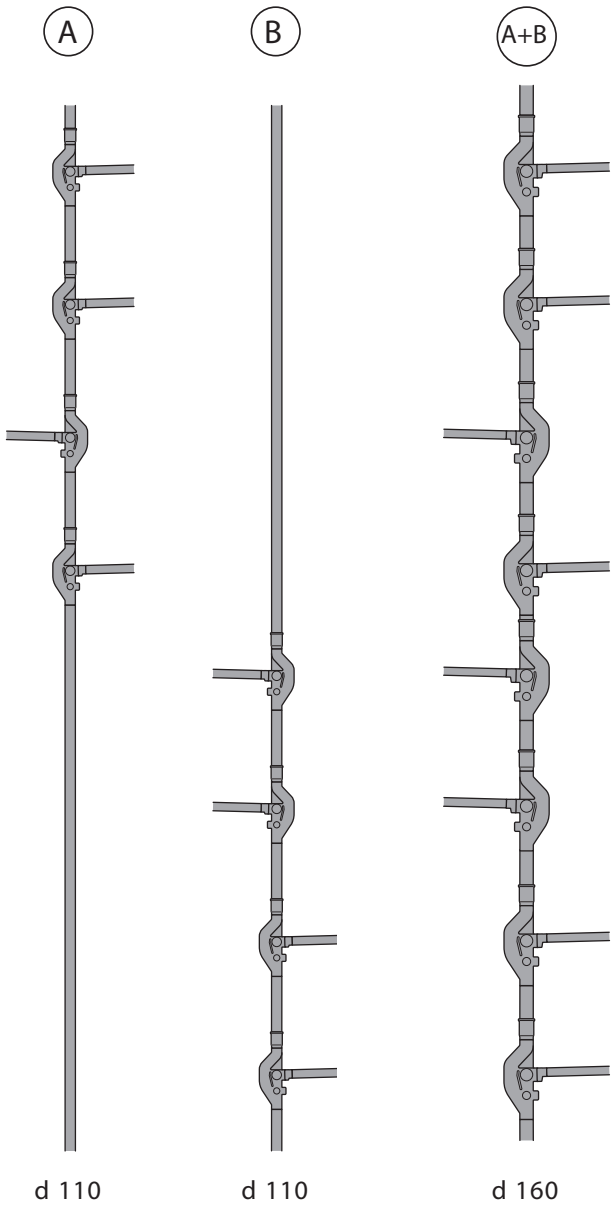


This combination of two offsets with two 45° bends is only allowed when no appliances are connected on the corresponding floor

Planning of further stacks

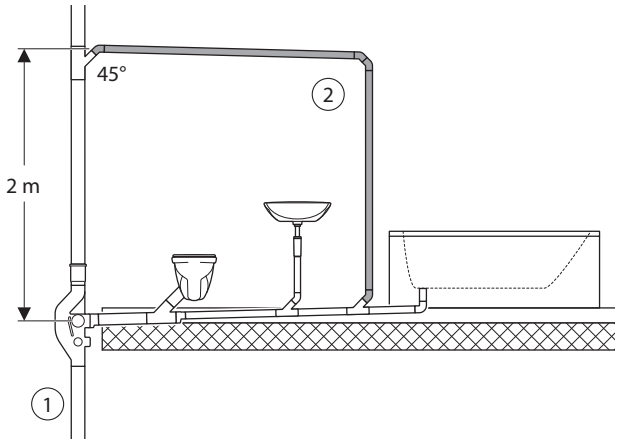
If the waste water load of the stack d110 is greater than 12 l/s, the following measures must be planned:

- Use further stacks and distribute the connections accordingly
- Or use a stack d160 (maximum 17.0 l/s)



Planning of branch ventilation

The maximum length of branch discharge pipes and the branch ventilation pipes are laid out in the applicable country-specific standards and regulations and must be followed. Branch ventillation pipes can be connected directly to the discharge stack according to the following diagram.

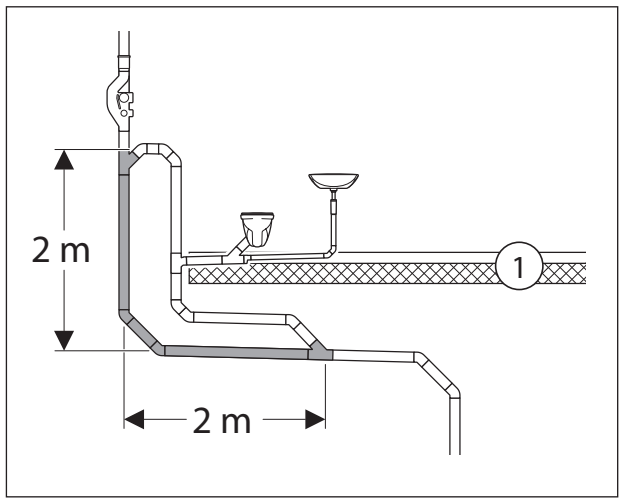


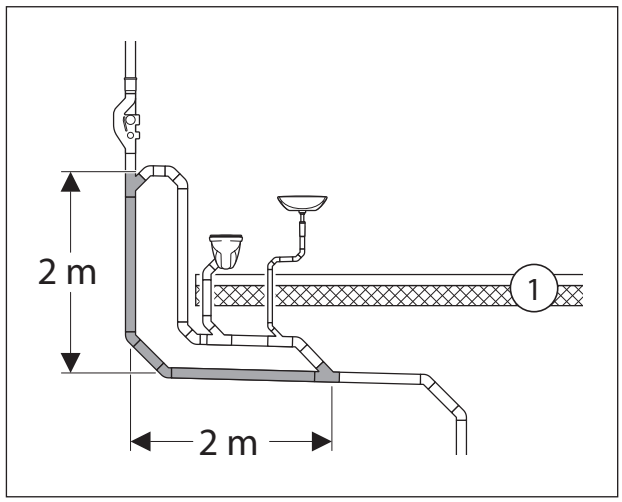
1 Planning of a discharge stack according to Geberit Sovent rules

2 Planning of branch discharge and branch ventilation pipes acording to country-specific standards

Zones without connections

Zones without connections must be planned before the direction charge into the underground pipe or the collector pipe if domestic sanitary appliances are connected to the discharge stack in order to prevent backing up. The sanitary appliances must be connected to a branch ventilation pipe of the dimension ø 110 mm / DN 100.

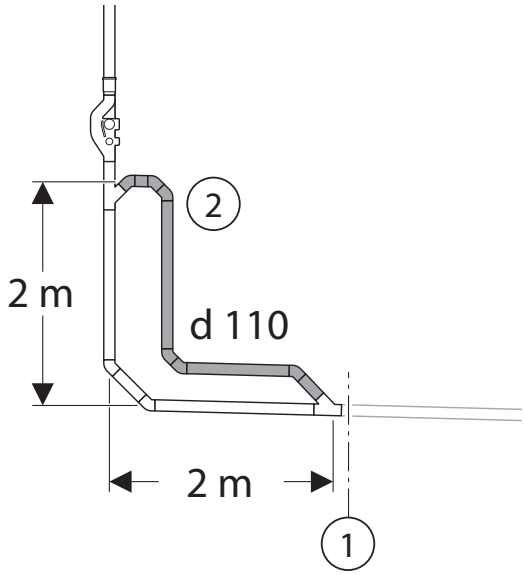




1 First floor

Transition to the underground or collector pipe

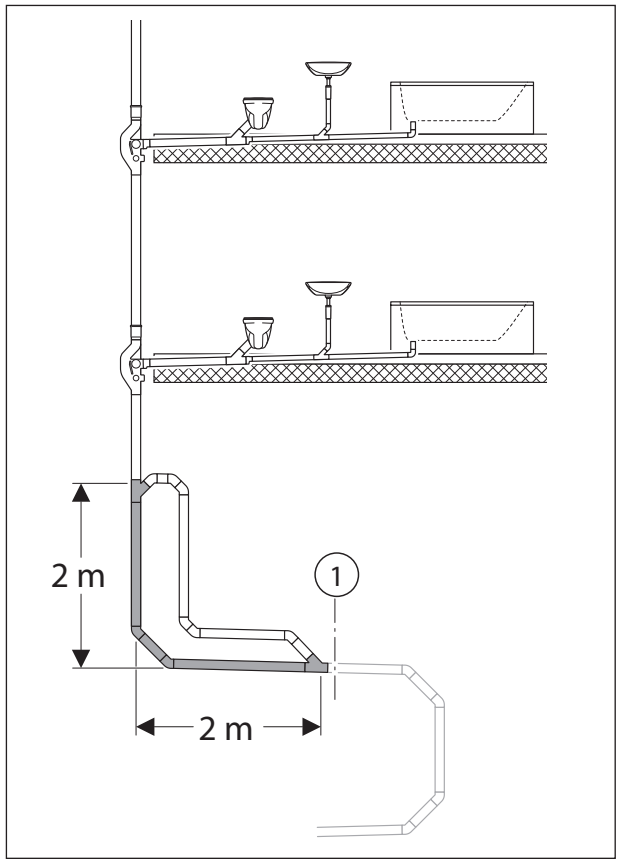
A branch ventilation pipe must be fitted at the end of each Sovent discharge stack for reducing the pressure.

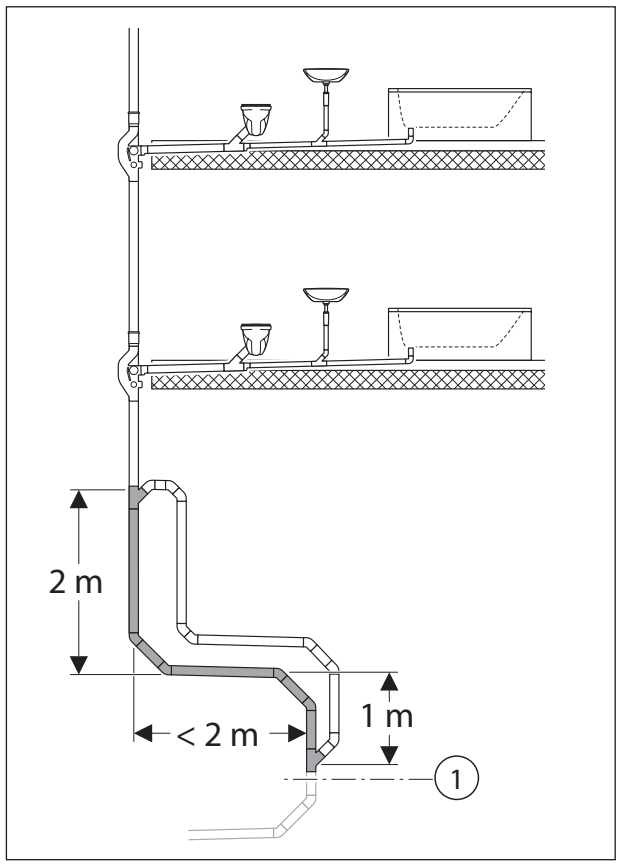


1 End of the Sovent system
2 Branch ventilation pipe for pressure relief

Note:
When several Sovent stacks are connected to an underground pipe or a collector pipe, they must be dimensioned in accordance with the specifications in Section 7.3

Zones without connections in the stack offset

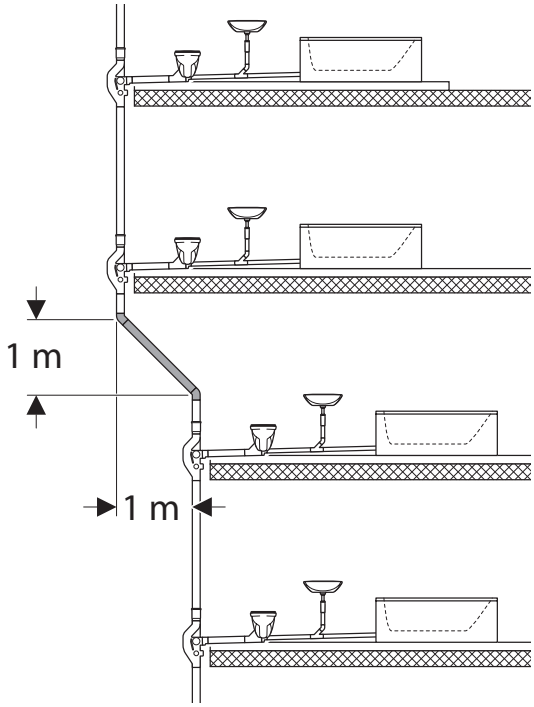




1 End of the Sovent systems; planning of the subsequent pipe layout in accordance with country-specific standards

Discharge stack with offset

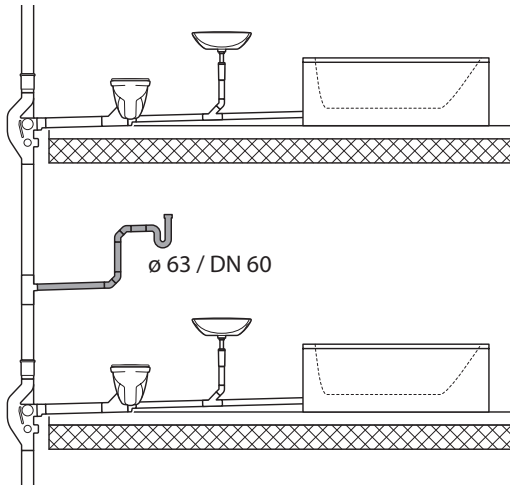
If an offset is necessary in the the discharge stack, this can be configured without further measures at max. 45° deflection up to an offset of 1m. If the offset is larger, a pressure relief pipe must be planned in the same way as for the stack offset.



Additional connections to the Sovent discharge stack

Normally, all pipes can be connected to the Sovent fitting. As an exception, however, condensation pipes can be connected to the stack between two Sovent fitiings when the following conditions are met:

- The maximum dimension of the branch discharge pipe is ø 63mm
- The connection is made exclusively using an 88.5° branch fitting



Mixed installations of the Sovent d110 and Sovent d160

Mixed installations of Sovent fittings ø 110 / DN 100 und ø 160 / DN 150 in the same discharge stack are not allowed.

Admitting and venting air in Sovent stacks

Each Sovent discharge stack must be individually continued through the roof. If combined ventilation is planned for several discharge stacks, this ventilation collector pipe must be configured in accordance with the applicable country-specific standards and regulations.

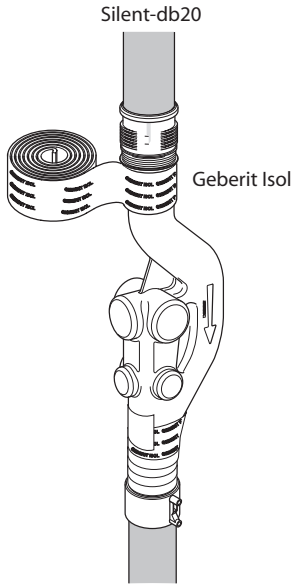
If the corresponding information is missing, a ventilation collector pipe can be set up in accordance with the following rules:

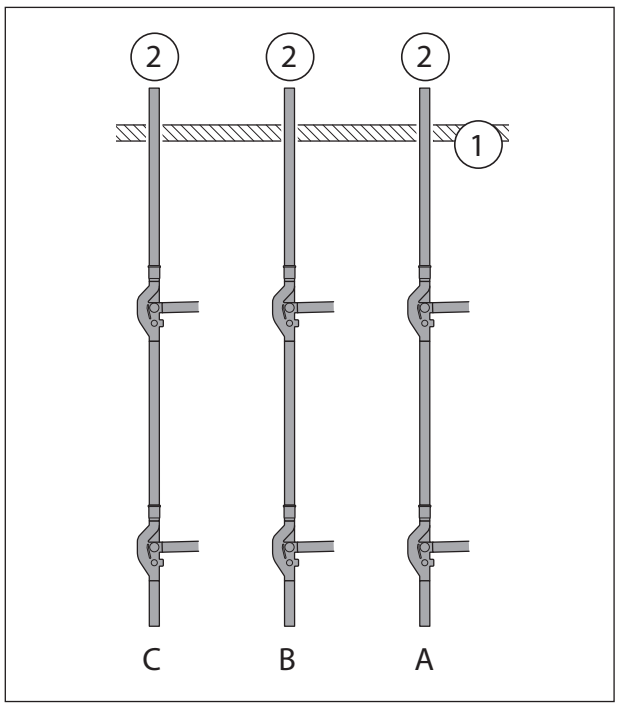
- Combine a maximum of 3 Sovent stacks
- The size of the ventilation collector pipe must be increased in accordance with the following scheme for each additional stack connected.

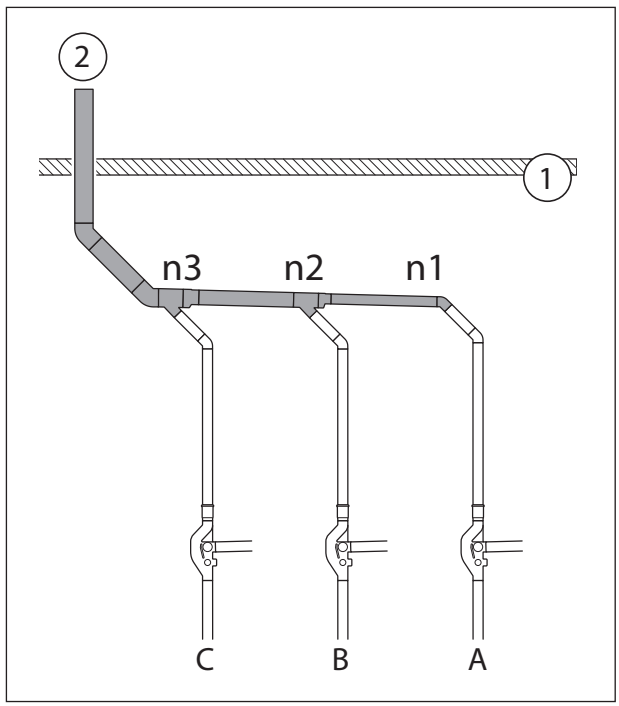
The use of air admittance valves in Sovent stacks is not permitted. Air admittance valves can have a negative effect on the discharge capacity of the Sovent discharge stack.

Airbourne sound insulation of Sovent fittings

When Geberit Sovent fittings are used, it is possible to assume the same airbourne sound propagation as in Geberit HDPE stack branch fittimgs. We recommend using Geberit Silent-db20 pipelines for Sovent discharge stacks with increased acoustic insulation requirements. The individual Sovent fittings must be insulated against airbourne sound propagation using Geberit Isol.







1 Building roof
2 Ventilation pipe or ventilation collector pipe

Fitting	Dimension n1	Dimension n2	Dimension n3
Sovent d110	ø 110 mm / DN 100	ø 160 mm / DN 150	ø 200 mm / DN 200
Sovent d160	ø 160 mm / DN 150	ø 200 mm / DN 200	ø 250 mm / DN 250

6.1.2 Geberit Sovent - Stack sizing

Basic requirements for selecting Sovent dimensions

The dimensions of the individual connection pipes, the combined waste stacks and the underground/ collector pipes must be selected as for conventional drainage, in accordance with applicable national standards and regulations.

The dimensions of the Sovent stack must be selected according to the following formula:

$$Q_{max} = k \times \sqrt{\sum DU}$$

Q_{max} = Maximum dirty water load (For Sovent stack 12 l/s)

k = Drainage coefficient for specific country (Standard residential and office building = 0.5)

$\sum DU$ = Total of all connection values

6.1.3 Geberit Sovent - installation

In general, the installation of a Geberit Sovent system follows the same rules as the installation of a conventional drainage system. 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.

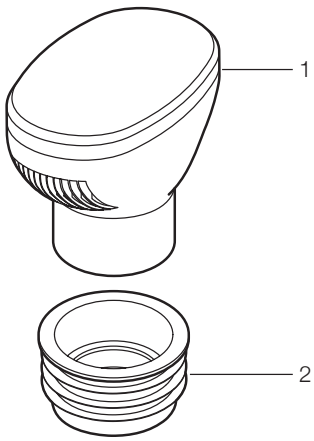
The Sovent fitting has six connection possibilities. The connections are capped off and can be used to suit the optimum installation configuration. It is necessary to have a Geberit welding machine (Universal or Media).

Installation Instructions

Prerequisites:

- Temperature of the welding plate 230°C.
- Ambient temperature -10°C to +40°C.
- The reference values for the time needed for the butt welding process are known.
- Fix the Sovent fitting into the welding machine.
- Saw open the required connections.
- Use a machine to plane the opened connection off smoothly.
- Clamp the corresponding pipe section of the connection pipe.
- Heat both clamped parts.
- Press the parts together and let them cool.
- Remove the finished Sovent fitting from the welding machine.

6.2 Geberit air admittance valve



The Geberit air admittance valve GRB90 consists of:

1 Housing
2 Sleeve

In conjunction with main ventilation, the valve can be used:

- As a replacement for the second main ventilation system or recirculating air ventilation.
- As a replacement for indirect secondary ventilation systems.
- For individual ventilation systems used in existing drainage objects with drainage malfunctions.

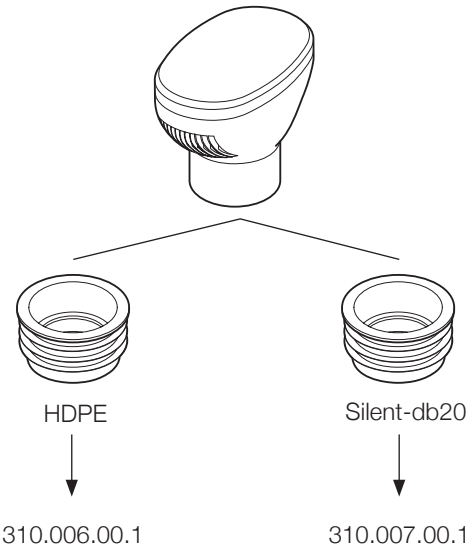
Function

The air admittance valve is closed in normal conditions. The flow of waste water generates a negative pressure in the pipe system which causes the valve to open, allowing atmospheric air to flow in. The valve is closed immediately and forms a seal after the pressure has equalised.

Product standards

BS EN 12380	2003-03	Ventilation valves for drainage systems - requirements, test methods and evaluation of conformity.
DIN 1986-100	2002-03	Drainage systems on private ground - Part 100: additional specifications to BS EN 752 and BS EN 12056.
BS EN 12056-1		Gravity drainage system inside buildings - Part 1: general and performance requirements.
BS EN 12056-2		Gravity drainage system inside buildings - Part 2: sanitary pipework, layout and calculation.

6.2.1 Geberit air admittance valve - GRB90



The housing colour and the colour of the sleeve are black (white print).

The air admittance valves GRB90 can be connected to the pipes, Geberit HDPE and Geberit Silent-db20 of the dimensions ø 75 – ø 110mm.

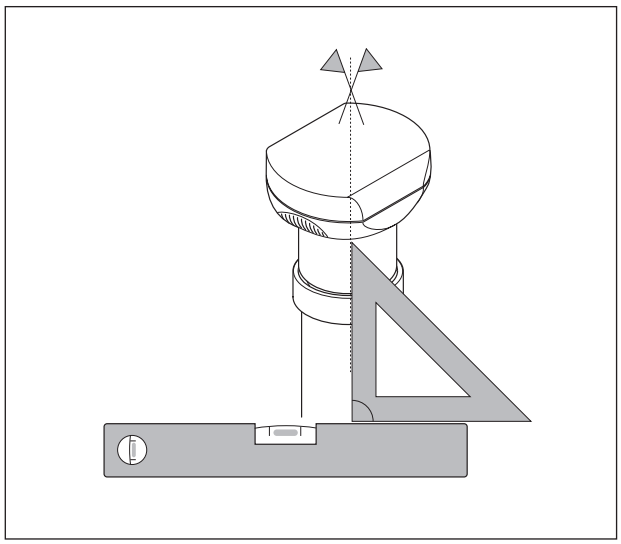
The air admittance valves have different sleeves for the different types of pipe (Geberit HDPE or Geberit Silent-db20). The housing is the same for all air admittance valves.

90mm air admittance valves can be connected to all pipe types and dimensions Ø 75 to Ø 110mm from Geberit.

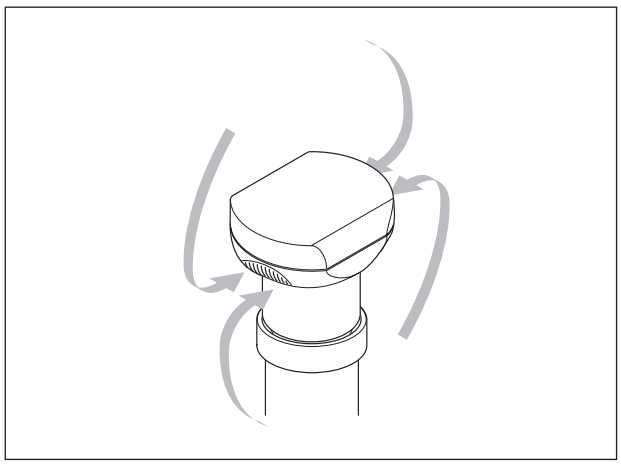
Maximum air capacity 35 l/s at –250 Pa.
Permitted temperature range -20°C to +60°C.
BS EN 12380 Designation A1

Please note the following points in order for the air admittance valve to function correctly:

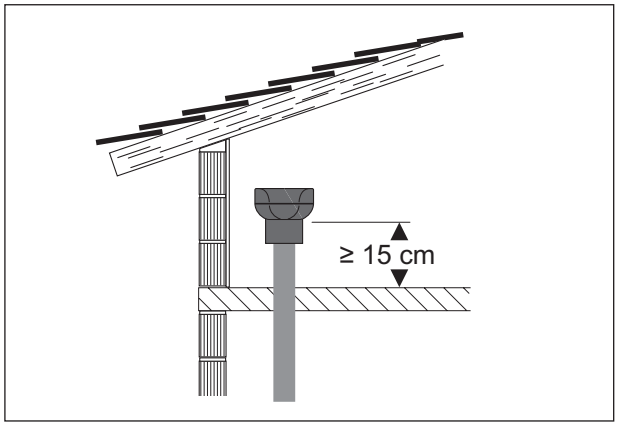
- The air admittance valve is allowed to be installed under the overflow edge.
- The air admittance valve must be installed vertically.



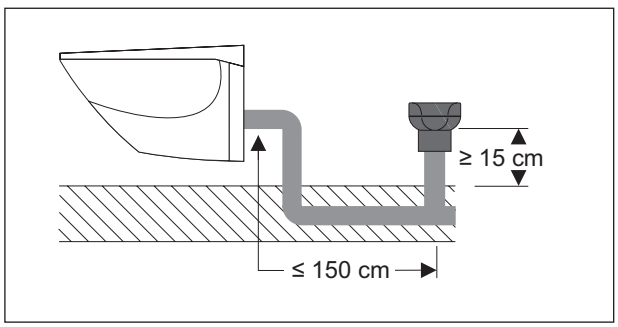
- The openings must be clean and are not allowed to be covered.
- Intake air must be able to flow to the valve without restrictions.
- For installation in a pre-wall, it is necessary to use a fan housing in order to ensure adequate intake air.



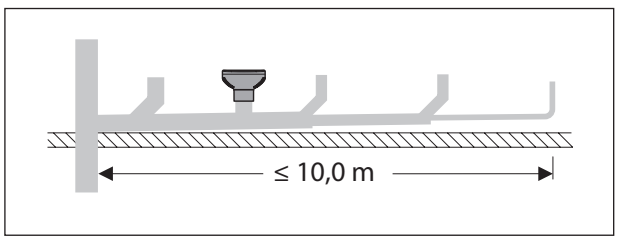
- Ensure the valve is installed where it can be accessed for maintenance and servicing.



Minimum distance above the floor, when using air admittance valves in the attic.



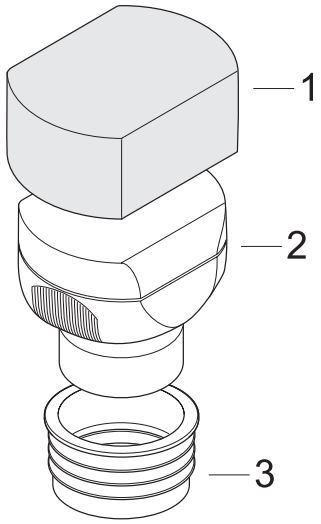
Connection dimensions for toilet pipe ventilation on horizontal connection pipe.



Installation instructions

1. Install a connection piece on the air admittance valve according to the type and dimension of the pipe.
2. Push the air admittance valve onto or into the vertical pipe end, cut off at right angles. Use lubricant if necessary.
3. Put on a thermal insulation cap if there is danger of frost.

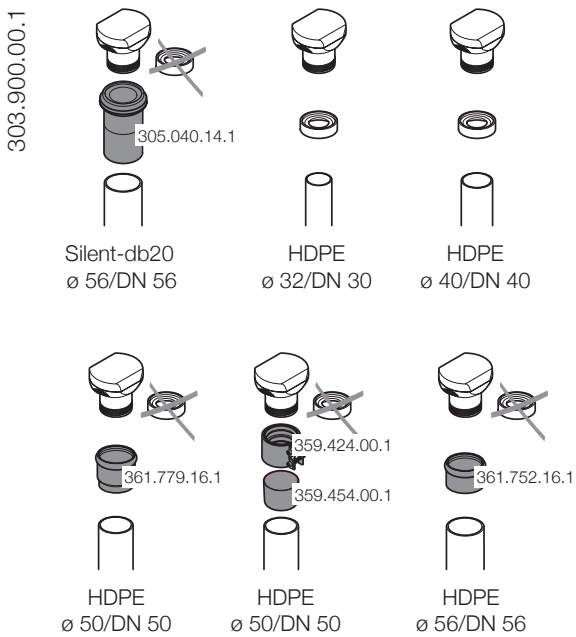
6.2.2 Geberit air admittance valve - GBR50



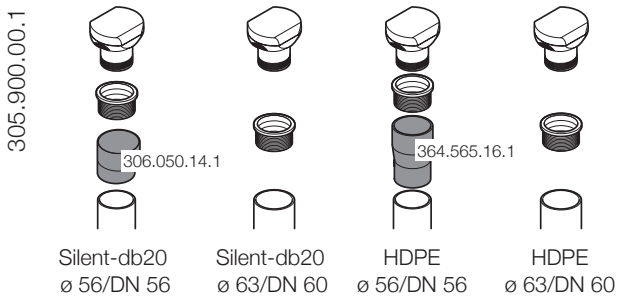
Pipe ventilation valve comprising of:

1 Heat insulation cap.
2 Housing.
3 Connection sleeve.

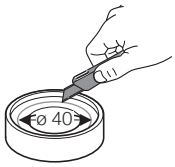
Connection possibilities



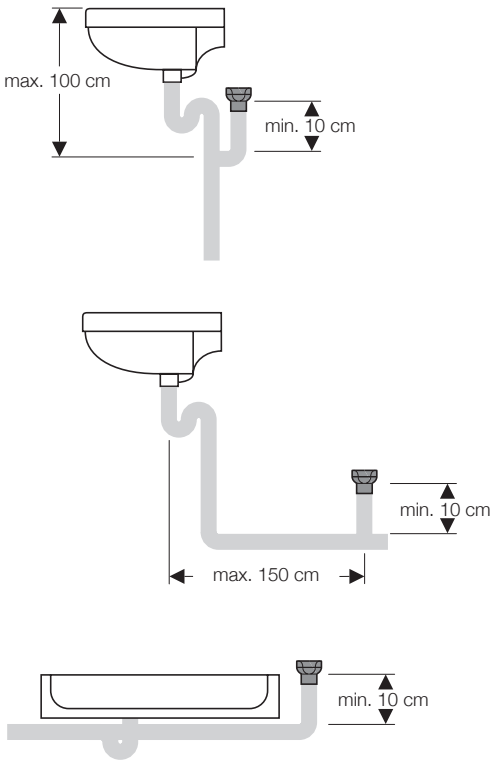
The indicated articles are not included in the scope of delivery; they have to be ordered separately.



The connector has to be adjusted when using pipes of ø/DN 40.

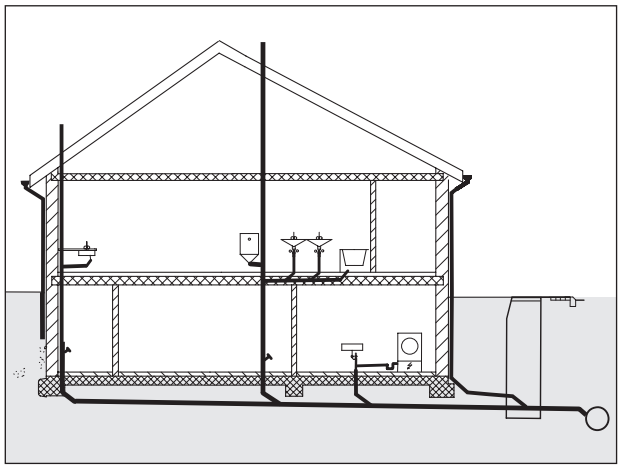


Dimensions of installation



7 Buried drain systems

7.1 Buried drain systems overview



Underground drainage

The Geberit HDPE drainage system has a proven track record for soil and waste installations. It can also be used for under the building and up to 1 metre outside the building envelope.

It is suitable for underground applications such as ground pipes and domestic drainage pipes.

For underground systems, use pipe to a minimum of PN4 rating. Do not use Geberit Silent-db20 as a buried drain system.

Criteria for underground drainage pipes

1 Joint integrity

Environmental protection regulations do not permit leaking drainage pipes. Geberit HDPE is a reliable water drainage system which assures maximum dependability with regard to joint integrity.

2 Material

As in soil and waste drainage systems, the quality of the material is the main criterion for underground applications. In addition to the attack from the inside, the pipes are also subjected to attacks from the outside. Geberit HDPE provides resistance to the greatly diversified types of chemical attack by the disposal water, as well as by external factors (e.g. acidic soils). Geberit HDPE can be successfully used to prevent penetration underground and provide drainage in brown field or contaminated sites. See the chemical resistance list in section 8.3 for more information or contact Geberit Technical.

3 Flexibility

Geberit HDPE is a flexible, operationally reliable drainage system, even in soils in which a certain degree of settling of ground is anticipated.

Special consideration for buried drain application

Geberit HDPE system is suitable for buried drain application under the envelope of the building at reasonable shallow depths and normal conditions. When any of the following conditions exist please contact Geberit for confirmation on its suitability.

- Pipes at depths greater than 4 metres below ground level
- Pipes subjected to external water pressures exceeding 2 metres head (high water table)
- Contaminated ground conditions
- Pipes subjected to internal negative pressures
- If during the construction stage high point will be experienced due to heavy plant etc.
- If other manufacturers components are to be incorporated into the system (puddle flanges and other sleeving gaskets etc are used)
- Non domestic type discharges are expected, for example:
  - High volume discharges that could subject the pipe to more than 1.5 bar pressure
  - Combined high temperature and high volume discharges
  - Chemical waste
  - Radioactive waste

7.2 Trench details

Loadings on buried pipes need to be carefully calculated. Please contact Geberit on 0800 077 8365 for assistance calculating loadings on Geberit drainage pipes.

For all trenching work the local guidelines, standards and regulations must be observed.

Important for underground installation is correct laying of the pipe in the trench, as well as careful consideration of the following.

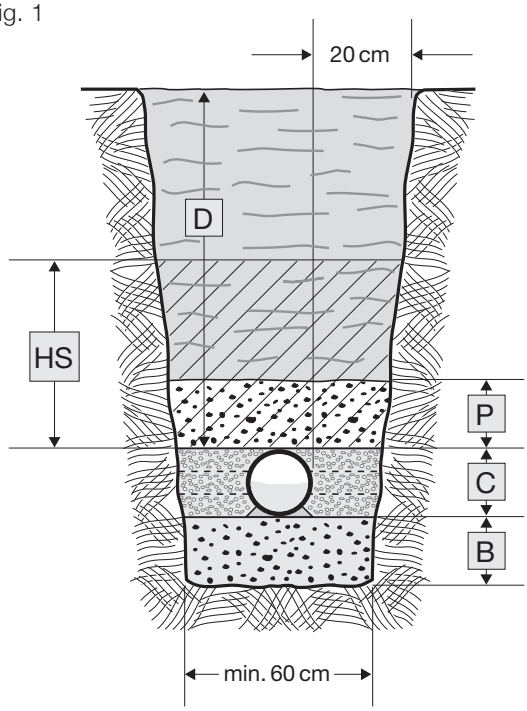
B = Bedding
The pipe must have a bedding of at least 100mm.

C = Consolidation
Side fill to upper edge of pipe.

P = Protective layer
With trench profile 1A cover to above top edge of pipe over entire width of trench - minimum 300mm. Maximum 40mm stone sile, no heavy compaction equipment.

Filling material
Granular material to BS 882 or similiar to be used. Example: 10mm nominal single size shingle is suitable for pipes up to 300mm. 14mm nominal single size shingle is suitable for pipes 125mm to 300mm. 20mm nominal single size shingle is suitable for pipe 200mm to 300mm.

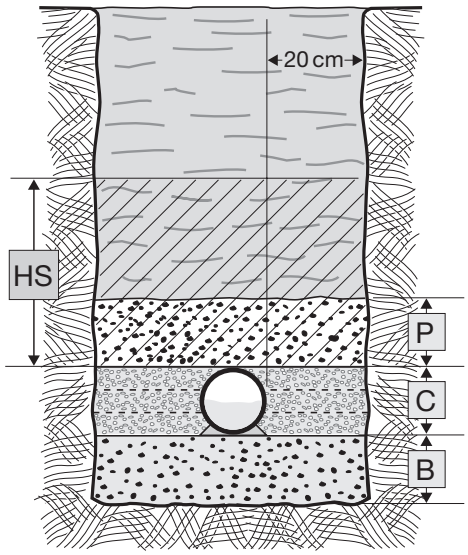
Fig. 1



Behaviour: **Flexible.**

Fill material
Granular material.

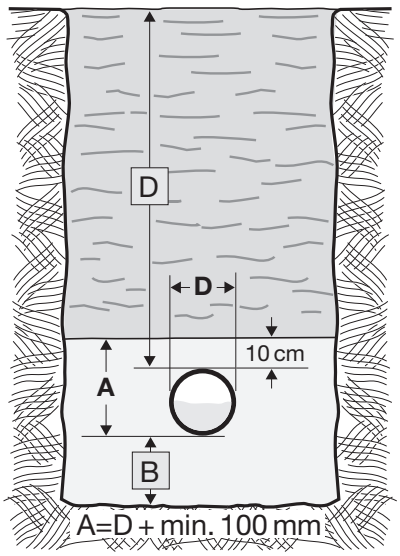
Fig. 2



Behaviour: **Flexible.**

Fill material
Granular material.

Fig. 3



Behaviour: **Rigid.**

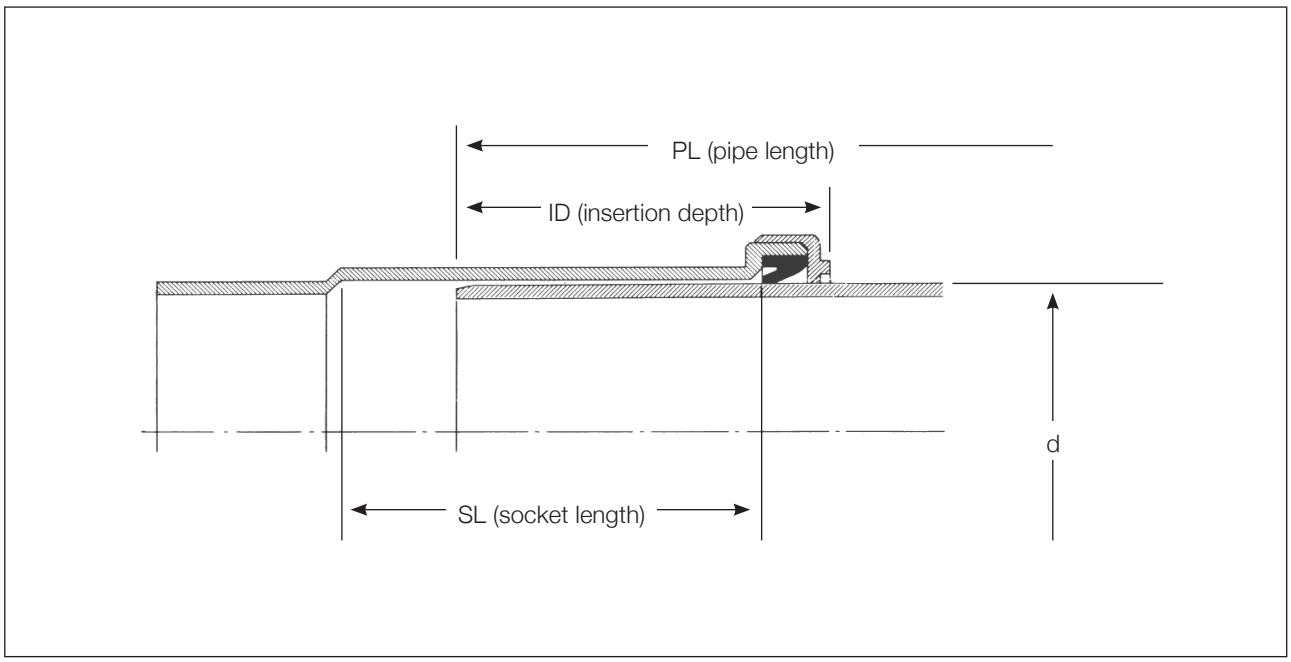
Fill material
Concrete.

Refer to BS EN 1295-1 for more details

7.3 Managing thermal movement - Buried drain application

Like above ground systems, the key aspect of underground installation is the management of expansion/thermal movement.

Use of expansion sockets



In addition to the butt welded and electrofusion welded connection, the expansion socket is an ideal connection in underground drainage systems. Since in such systems lower temperature differences are usually encountered than in stacks and connector pipes, smaller length variations can be accounted for.

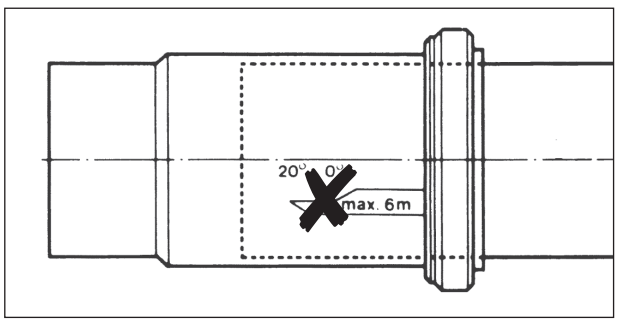
For this reason in underground installations the distance between expansion sockets can be longer.

The values calculated according to the formula

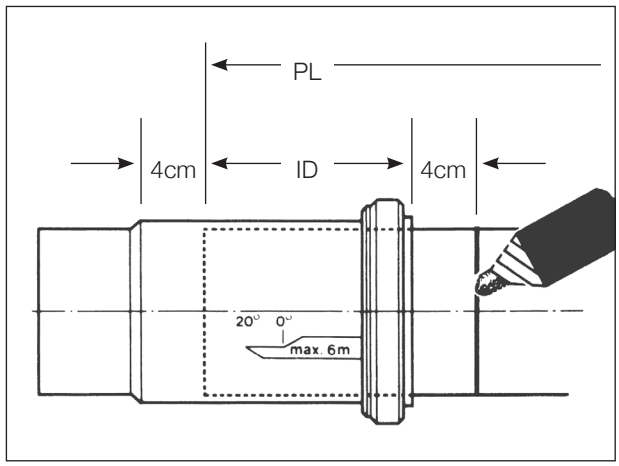
$$PL \leq \frac{SL - 0.3\ d}{0.006}$$

and rounded off.

Please note: The scale found on the outer surface of the socket does not apply in the case of underground installations.



Insert bevelled pipe to maximum socket depth, mark and pull back 40mm.



Nominal outside diameter Ø (mm)	Socket length SL (mm)	**Pipe length PL (for Δt ≤ 30°C) PL (m)**	Insertion depth ID (mm)
110	140	**15**	130
125	140	**15**	130
160	140	**15**	130
200	220	**20**	230
250	220	**20**	230
315	220	**20**	230

7.4 Rigid installation - Embedded in concrete

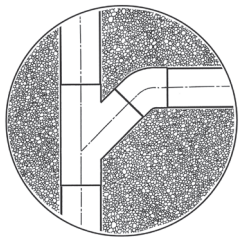
Principal:

Any variation in length must be prevented by embedded fixed points in concrete (e.g. electrofusion couplings, branches, bends or collar bushes) or by the provision of corresponding fixed point structures.

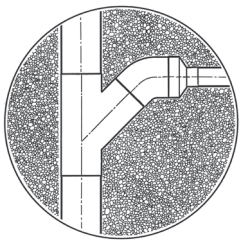
Embedding in concrete

Basically, Geberit HDPE material absorbs within itself thermal movement due to its high elasticity. In the case of large diameters however (e.g. 315mm) the forces <<P>> (resulting from expansion and contraction) are considerable. They must be absorbed by the embedded fixpoints alone, since cement/concrete will not adhere to Geberit HDPE pipework.

Branch equal

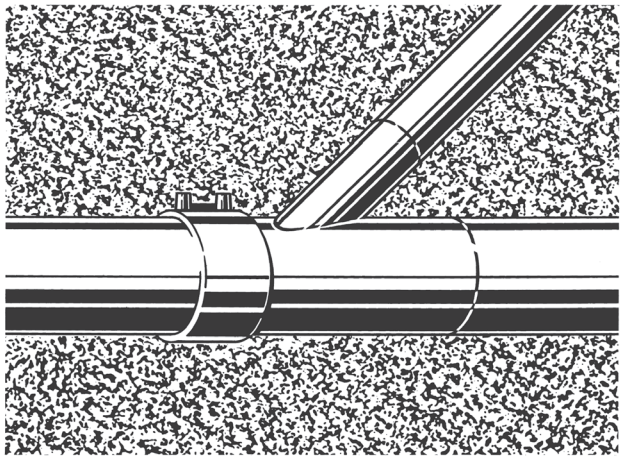


Branch equal with reducer

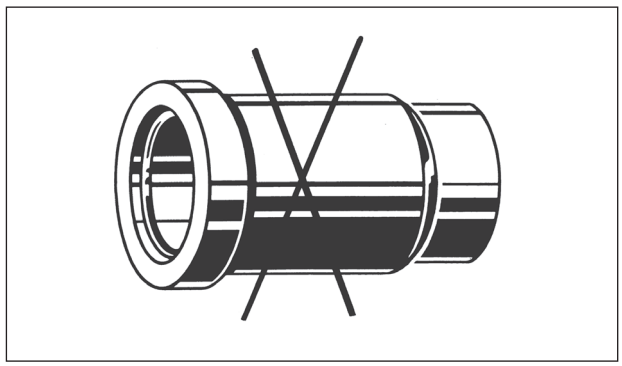


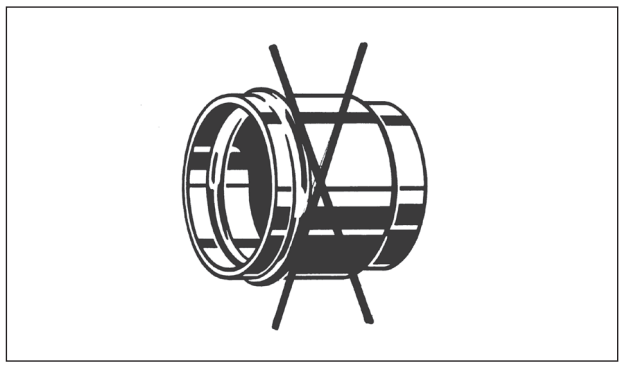
Since the fitting has to act as a fixed point, do not insulate it.

Pipes should be embedded such that there is a minimum of 40mm between the top of the pipe and the finish of the filling material.



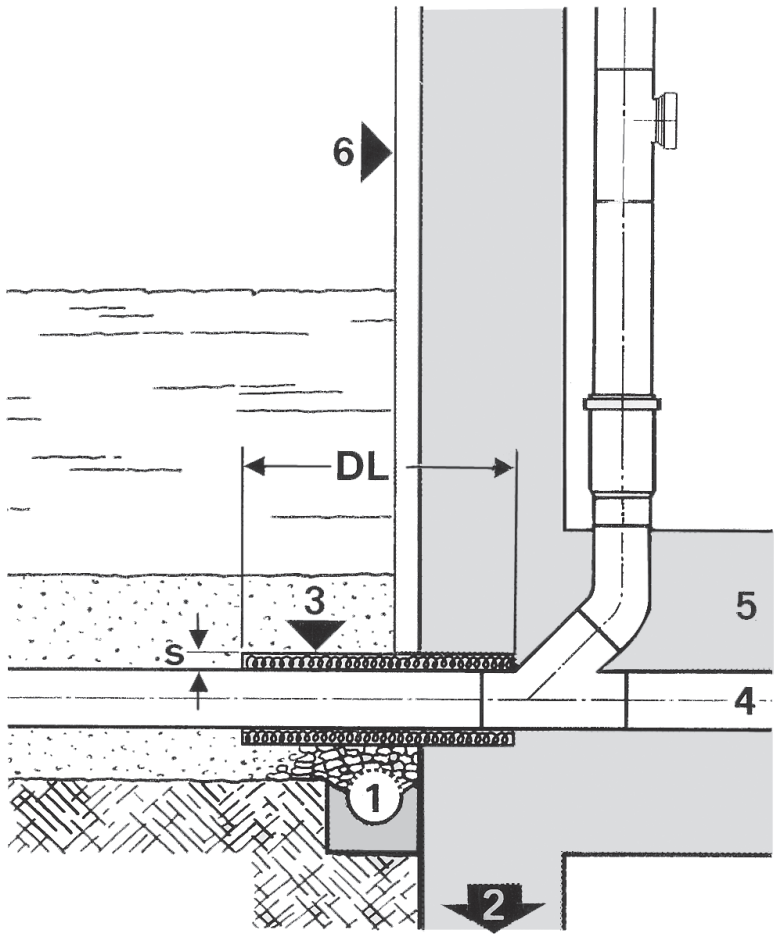
Reduced small branches of large pipe diameters must be secured by an additional anchor point (electrofusion couplings or collar bushes) in order to prevent shearing off the branch.





Important: Under no circumstances should a ring seal or expansion socket be embedded in concrete.

7.5 Pipes penetrating through building walls



1 Seepage pipe
2 Settling
3 Insulation mat
4 HDPE pipe Ø
5 Foundation slab
6 Seepage tank lining
DL = Deflection leg
S = Insulation thickness
ΔS = Expected settling

With regard to the ground line between the building wall and the street sewer, where extreme settling can occur, an installation mat must be wrapped around the ground line to act as a deflection leg.

In such cases, Geberit HDPE is an ideal material, since it assures tightness and at the same time provides maximum flexibility.

Deflection leg

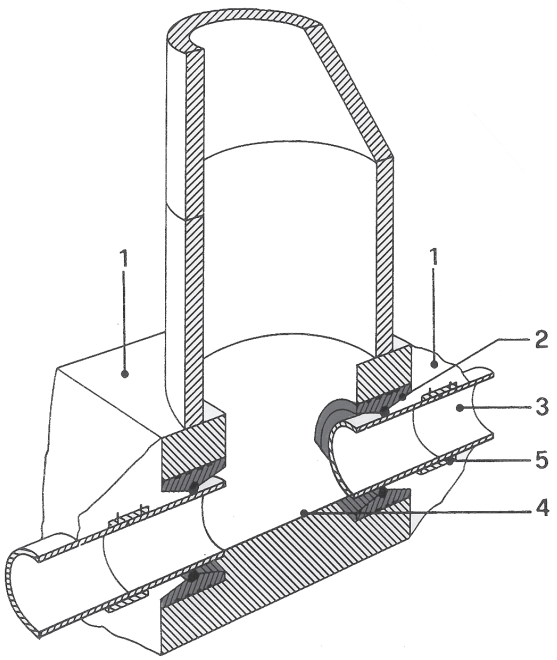
The length of the deflection leg is dependant upon the expected settling and on the pipe diameter.

$$\text{Length DL} = 10 \cdot \sqrt{\Delta S \cdot Ø}$$

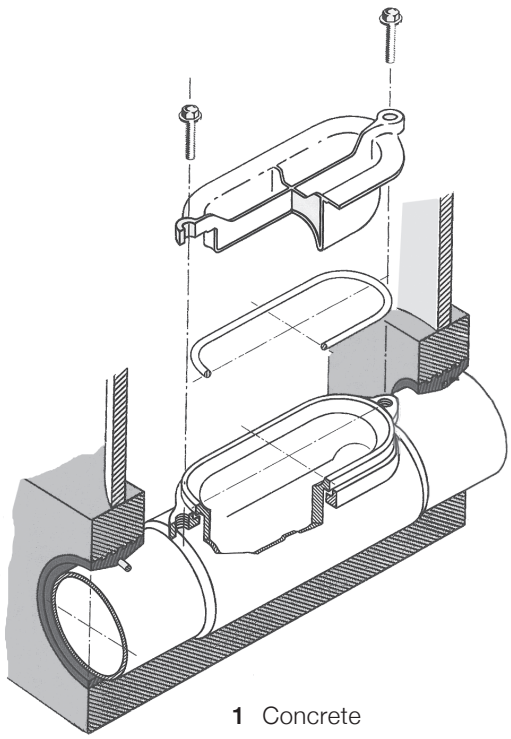
Note: The insulation must be thicker than the expected settling.

Expected settling Δ S	Geberit HDPE pipe Ø	Deflection leg DL
20 - 40mm	125 - 160/200 - 315	1.0m/1.0m
40 - 60mm	125 - 160/200 - 315	1.0m/1.5m
60 - 80mm	125 - 160/200 - 315	1.5m/1.7m

7.6 Connection to manhole



1 Concrete
2 Manhole sleeve
3 Geberit HDPE pipe
4 Bench
5 Anchor point if required



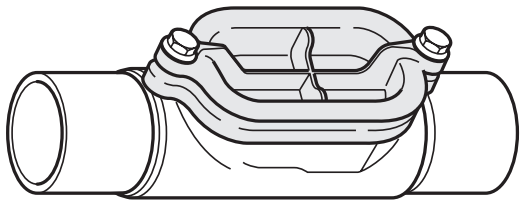
1 Concrete
2 Manhole sleeve
3 Access pipe
(Art nr. 3xx.454.16.1)

Open manhole

Plastic pipes should only be connected with manholes by means of a special manhole sleeve. Since settling of ground has to be expected such a sleeve must have the same ideal characteristics as Geberit HDPE: it must assure tightness and at the same time flexibility.

A rubber ring provides the flexible seal between sleeve and plastic pipe.

Geberit access pipe with oval access cover



Appendix: Chemical Resistance

The following symbols and abbreviations are used to indicate the composition of the flow substances:

% Percentages refer to mass proportions in %.
VL Aqueous solution, mass proportion <= 10%.
L Aqueous solution, mass proportion > 10%.
GL Aqueous solution saturated at 20°C.
TR Chemical is at least technically pure.
H Normal commercial composition.
S Traces < 0.1%.
G Usual mass proportion of any saturated solution or dilution.

Data is based on immersion tests without mechanical load and reflects current levels of knowledge. No claims under guarantee may be made on the basis of this information.

The following data is required for a declaration of chemical resistance:

- Corrosion medium, composition (chemical description), DIN safety data sheet.
- Temperature.
- Proportion (concentration).
- Information on reaction time, frequency, flow quantity.
- Other flow media.

Explanation

When the pipe wall material comes into contact with substances flowing through the pipe, different processes can take place, such as the absorption of liquid (swelling), the extraction of soluble elements in the material (shrinkage) or chemical reactions (hydrolysis, oxidation etc), that can sometimes cause the properties of the pipe or pipeline parts to change.

The performance of pipes and pipeline parts when in contact with effluent substances can be classed as follows:

NB: Does not cover systems incorporating EPDM seal rings.

● **Resistant**
The pipe wall material is generally regarded as being suitable.

◑ **Limited resistance**
The suitability of the pipe wall material must be checked in each individual case and, if necessary, further tests should be carried out.

❍ **Not resistant**
The pipe wall material is generally regarded as being unsuitable.

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
A				
Acetic aldehyde	40	●	●	◑
Acetic aldehyde	TR	●	◑	◑
Acetic aldehyde+acetic acid	90:10	●		
Acetanhydride (acetic anhydride)	TR	●	◑	◑
Acetamide	TR	●	●	●
Acetanhydride	TR	●	◑	◑
Acetic acid	70	●	●	●
Acetic acid	100	●	●	◑
Acetic acid butyl ester		●		◑
Acetic ether (ethylacetate)	100	●	●	
Aceto-acetic acid		●		
Acetone	VL	●	●	●
Acetone	TR	●	●	●
Acetophenone	TR	●		
Acetylene			●	
Acronal dispersions	H	●		◑
Acronal solutions	H	◑		
Acrylonitrile	TR	●	●	●
Acrylic acid-emulsions		●	●	●
Acrylic acid ethylester	100			
Activine (chloramine 1%)		●	●	●
Adipinic acid	GL	●	●	●
Adipinis acid ester		●		◑
Allyl acetate		●		◑
Allyl alcohol	96	●	●	●
Allyl chloride		◑		
Alum (potassium aluminium sulphate)	any	●	●	●
Aluminium chloride	VL	●	●	●
Aluminium chloride	GL	●	●	●
Aluminium chloride, solid		●	●	●
Aluminium fluoride	GL	●	●	●
Aluminium hydroxide		●	●	●
Aluminium metaphosphate		●	●	●
Aluminium sulphate	any	●	●	●
Aluminium sulphate, solid		●	●	●
Amidosulphates (amido-sulphonic acid salts)	any	●	●	●
Amido-sulphonicacid	any	●	●	●
Amino acids		●	●	●
Ammonia, gaseous	100	●	●	●
Ammonia, liquid	100	●	●	●
Ammonia solution (ammonium hydroxide)	any	●	●	●
Ammonium acetate	any	●	●	●
Ammonium carbonate and bicarbonate of ammonium	GL	●	●	●
Ammonium carbonate	any	●	●	●
Ammonium chloride (sal-ammoniac)	any	●	●	●
Ammonium dihydrogen phosphate	GL	●	●	●
Ammonium fluoride	L	●	●	●
Ammonium hydrosulphide	any	●	●	●
Ammonium metaphosphate		●	●	●
Ammonium nitrate	any	●	●	◑
Ammonium phosphate	any	●	●	●
Ammonium sulphate	any	●	●	●
Amonium sulphide	any	●	●	●
Ammonium thiocyanate		●	●	●
Amyl acetate	TR	●	●	●
Amyl alcohol	TR	●	●	●
Amyl chloride	100	◑		❍
Amyl phthalate		●		◑
Anilin (phenylamine)	GL	◑	◑	◑

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Anilin chlorhydrate	any	●	●	●
Anise oil	TR	◑	◑	●
Anone (cyclohexanone)	TR	●	◑	◑
Anthraquinone sulphonic acid	1	●	●	●
Antifomine (benzaldoxime)	2	●		
Anti-freeze	H	●	●	●
Antimonious trichloride, anhydrous		●	●	●
Antimonious trichloride	90	●	●	●
Antimonious pentachloride		●	●	●
Apple juice	H	●	●	●
Apple wine	H	●	●	●
Aqua regia	TR	○	○	○
Arklone (= reon, frigen) (Chloro fluorcarbon CFC)	100	◑	○	
Aromativ oils		◑		○
Arsenic	any	●	●	●
Arsenic acid anhydride		●	●	●
Ascorbic acid (vitamin C)		●	●	●
Asphalt		●		◑
B				
Barium carbonate chem. precipitated 98/99%	any	●	●	●
Barium hydroxide	any	●	●	●
Barium salts	any	●	●	●
Battery acid (sulphuric acid,~34%)	H	●	●	●
Baysilon separating agent	100	●	●	
Beef fat		●		◑
Beef suet		●	●	●
Beeswax	H	●	●	○
Beer	H	●	●	●
Beer colouring	H	●	●	●
Benzaldehyde	any	●	●	◑
Benzaldehyde in isopropyl alcohol	1	●	●	●
Benzene	TR	◑	◑	○
Benzaldoxime (antiformine)	2	●		
Benzene/benzol mixture 80/20		●		◑
Benzene sulfonic acid		●	●	●
Benzoic acid	any	●	●	●
Benzoyl chloride	TR	◑	◑	◑
Benzyl alcohol	TR	●	●	●
Benzyl chloride		◑		○
Bichromate sulphuric acid (chromic acid/sulphuric acid)	TR	○	○	○
Bismuth nitrate, acqueous	any	●	●	●
Bismuth salts		●	●	●
Bisulfite solution		●	●	●
Bitumen		●		◑
Bleach solution with 12,5% active chlorine		◑	○	○
Bone oil		●	●	●
Borax (sisodic tetraborate)	any	●	●	●
Boric acid	any	●	●	●
Boric acid methyl ester		●		○
Boric trifluoride		●		◑
Brake fluid		●	●	●
Brandy	H	●	●	●
Bromic acid	40	○		
Bromin, liquid and gaseous	any	○	○	○
Bromochloromethane		○		
Butadiene	50	●	●	●
Butadiene	TR	●	○	○
Butandial	any	●	●	●
Butane, gaseous	TR	●	●	●
Butanol	any	●	●	●

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Butanon		●		○
Butantriol	any	●	●	●
Butindial	100	●	●	●
Butoxyl (methosybutylacetate)		●		◑
Butter		●	●	●
Buttermilk		●		
Butyl acetate	TR	●	◑	◑
Butyl acrylate		●		◑
Butyl alcohol		●	●	●
Butyl benzylphthalate		●	●	●
Butylene, liquid	TR	○	○	○
Butylene glycol	TR	●	●	●
Butylene phenol	TR	●	●	●
Butylene phenol, p-tertiary	TR	◑		
Butyric acid	any	●	●	◑
C				
Calcium carbide		●	●	●
Calcim carbonate	GL	●	●	●
Calcium chloride	any	●	●	●
Calcium hydroxide (lime)	GL	●	●	●
Calcium hypochlorite (chlorinated lime)	GL	●	●	●
Calcium nitrate	50	●	●	●
Calcium oxide (powder)		●	●	●
Calcium phosphate		●	●	●
Calcium sulphate (gypsum)	GL	●	●	●
Calgon (sodium hexametaphosphate)	any	●	●	●
Campher	TR	●		◑
Campher oil	TR	○	○	○
Cane sugar		●	●	●
Caoutchouc dispersions (Latex)		●	●	●
Carbazol		●	●	●
Carbol (phenol)	any	●	●	◑
Carbolic acid (phenol)	any	●	●	◑
Carbon bisulphide	TR	◑	○	○
Carbon dioxide (soda water)	any	●	●	●
Carbon tetrachloride	TR	○	○	○
Castor oil	TR	●	●	●
Caustic ammonia (ammonium hydroxide)	any	●	●	●
Caustic potash solution	50	●	●	●
Caustic soda (sodium hydroxide)	any	●	●	●
CD 2 up to 5%		●		
CD 3 up to 5%		●		
Cetyl alcohol		●	●	●
Chloracetic acid	any	●	●	●
Chloral hydrate	any	●	●	●
Chloramine T	TR	●		
Chloramine T	VL			
Chloric acid	1	●	●	●
Chloric acid	10	●	●	●
Chloric acid		◑		○
Chlorinated carbon dioxide ester		●		◑
Chlorinated lime (calcium hypochlorite)	GL	●	●	●
Chlorinated paraffin	100	●	◑	○
Chlorine	VL	●		◑
Chlorine	GL	◑	◑	○
Chlorine, gaseous, damp	0,5	◑		○
Chlorine, gaseous, damp	1,0	○	○	○
Chlorine, gaseous, damp	97	○	○	○
Chlorine, gaseous, dry	TR	◑	◑	○
Chlorine, liquid	TR	○	○	○
Chloroacetic acid ethyl ester	TR	●	●	●
Chloroacetic acid methyl ester	TR	●	●	●

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Chlorobenzol	TR	❍	◑	
Chloroform	TR	❍	❍	❍
Chloromethyl, gaseous	TR	◑		❍
Chlorosulphiric acid	TR	❍	❍	❍
Chromanode mud		●	●	●
Chromic acid	20	●	●	◑
Chromic acid	50	●	◑	❍
Chromic acid/sulphuric acid/water, 50/15/35		❍	❍	❍
Chromic alum	any	●	●	●
Chromous salt	any	●	●	●
Chromium sulphuric acid	TR	❍	❍	❍
Chromium sulphuric acid	any	●	❍	
Chromium trioxide	50	●		❍
Citraconic acid	any	●	●	●
Citrate	any	●	●	●
Citric acid	any	●	●	●
Citronaldehyde	TR	●		◑
Citrus juices		●	●	●
Clophene (polychlorinated biphenyls PCB)	100	●	◑	❍
Coal tar oil		●		◑
Coca Cola		●		
Cocoa	G	●	●	●
Coconut oil alcohol	TR	●	◑	◑
Coconut oil	TR	●	●	◑
Cod liver oil		●		◑
Coffee	G	●	●	●
Cognac		●		
Cola conzentrate		●	●	●
Compressed air containing oil		●	●	
Cooling oil, vegetable and animal		●	●	●
Copper chloride	GL	●	●	●
Copper cyanide	any	●	●	●
Copper fluoride		●	●	●
Copper nitrate	30	●	●	●
Copper nitrate	GL	●	●	●
Copper salts	GL	●	●	●
Copper sulphate	any	●	●	●
Corn oil	TR	●	●	◑
Corsolin (disinfectant; chlorophenol soap solution)	VL	●	●	●
Cover paint		●	●	
Creosote		●	●	●
Cresol	90	●	●	●
Cresol	100	●	●	◑
Crotonaldehydo	TR	●		◑
Crude oil		●		◑
Crystalline acid	TR	●		◑
Crystal oil (solvent naphtha)	TR	◑	◑	◑
Cumarone resin		●	●	●
Cyclanone	L	●	●	●
Cyclanone	H	●	●	●
Cyclohexane	TR	●	●	●
Cyclohexanol	TR	●	●	●
Cyclohexanone (Anone)	TR	●	◑	◑
D				
Decahydronaphtalene (Decalin)	TR	●	◑	◑
Dessicator oil		●		◑
Detergents		●	●	●
Developing solutions (photographic)		●	●	●
Dextrine	18	●	●	●
Dextrose (glucose, grape sugar)	any	●	●	●
Diamin hydrate	TR	●	●	●
Diethyl ether (ether, ethyl ether)	TR	◑	◑	◑
Diethylene glycol		●	●	●
Di-2-ethylhexylphthalate (DOP)		●		◑
Diethyl ketone		●		◑
1,2-Dibromoethane		◑		❍
Dibuthyl ether	TR	◑		❍
Dibutylphthalate	TR	●	◑	◑
Dibutylsebacate	TR	●		◑
Dichlorethylene	TR	❍	❍	❍
Dichlorbenzene	TR	◑	❍	❍
Dichloracetic acid	50	●	●	●
Dichloracetic acid	TR	●	●	◑
Dichloracetic acid methyl ester	TR	●	●	●
Dichlorodiphenyltrichloromethane (DDT, powder)		●	●	●
Dichlorpropane		◑		❍
Dichlorpropene		◑		❍
Dielectric (transformer oil)	100	●	◑	
Diesel fuel	H	●	◑	◑
Diglycolic acid	30	●	●	●
Diglycolic acid	GL	●		
Dihexylphthalate	TR			◑
Di-isobutylketone	TR	●		❍
Di-isopropylether		◑	◑	❍
Dimethylamine	TR	●		◑
Dimethylformamide	TR	●	●	◑
Dimethylsulfoxide		●	●	●
Disodic phosphate		●	●	●
Disodic sulphate		●	●	●
Disodic tetraborate (Borax)	any	●	●	●
Dinonylphtalate	TR	◑		
Dioctylphtalate	TR	●	●	◑
Dioxan	TR	●	●	●
Diphenylamine		●		◑
Diphenyloxide		●		◑
Dispersions		●		
Distilled oils		❍	❍	❍
Dodecyl benzene sulphonic acid		●		◑
Dry potash (potassium hydroxide)	50	●	●	●
Dyes		●	●	●
E				
Electrolytecbaths for electroplating		◑		◑
Emulsifying agents		●	●	●
Emulsifying agents (Tenside)	any	●	●	●
Emulsionen (photographic)	H	●	●	●
Epichlorohydrin		●		◑
Epichlorohydrin		●	●	●
Epsom salts (magnesium sulphate)	any	●	●	●
Ethane		●	●	●
Ethanol (rectified spirit, ethyl alcohol, wine spirit)	96	●	●	●
Ether (sulphuric ether, diethyl ether)	TR	◑	◑	◑
Ethyl acetate	TR	●	◑	◑
Ethyl alcohol (rectified spirit, ethyl alcohol, wine spirit)	96	●	●	●
Ethyl alcohol, denatured (2% Toluol)	96	◑		
Ethyl alcohol (fermation mash)	G	●		◑
Ethyl alcohol + acetic acid (fermentation mix)	G	●	●	●
Ethyl benzene	TR	◑		

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Ethyl chloride	TR	◑		
Ethylene			●	◑
Ethylene chloride	TR	◑		
Ethylene chlorohydrin	TR	●	●	●
Ethylene dichloride (Ethylene chloride)		◑	◑	◑
Ethylene diamine	TR	●	●	●
Ethylene diamintetra-acetic acid		●	●	●
Ethylene bromide		◑		
Ethylene chloride (dichlorethylene)		◑	◑	◑
Ethylene glycol	TR	●	●	●
Ethylene oxide, gaseous	TR	●	●	●
Ethylene oxide, liquid	TR	❍	❍	❍
Ethyl ether (Ether, Diethyler)	TR	◑	◑	◑
2-ethylhexanol		●		◑
Ester, alphatic	TR	●		◑
Exhaust gases, containing hydrogen fluoride	S	●	●	●
containing hydrogen fluoride	≤S	●	●	●
containing carbon dioxide	any	●	●	●
containing carbon monoxide	any	●	●	●
containing nitric oxide	S	●	●	●
containing nitric oxide	≤5	●	●	●
containing nitric oxide	>5			❍
containing oleum	S			
containing oleum	≤5	❍		
containing hydrochloric acid	any	●	●	●
containing sulphur dioxide	any	●	●	●
containing sulphuric acid	any	●	●	●
containing sulphuric acid (damp)	any	●	●	●
containing sulphur trioxide (oleum)	S	❍	❍	❍
containing sulphur trioxide (oleum)	≤S	●	●	●
Fatty alcohol		●		◑
Fatty alcohol sulphonate (cyclanone)	L	●	●	●
Fatty alcohol sulphonate	H	●	●	●
Fatty acids (technically pure)	100	●	◑	
Fatty acids	TR	●	●	◑
Fatty acid amides		●		◑
Fermentation mash (ethyl alcohol)	G	●		◑
Fermentation mix (ethyl alcohol + acetic acid)	G	●	●	●
Ferrous chloride	GL	●	●	●
Ferric chloride	any	●	●	●
Ferric nitrate	L	●	●	●
Ferric sulphate	GL	●	●	●
Ferrous sulphate	any	●	●	●
Fertilizer salts	any	●	●	●
Fir needle oil	H	●	◑	◑
Fixative salt (sodium thiosulphate)	any	●	●	●
Floor polish		●		◑
Flowers of sulphur (elementary sulphur in powder form)	TR	●	●	
Fluoride	TR	❍	❍	❍
Fluobolic acid		●		◑
Formaldehyde (formalin)	40	●	●	●
Formalin (acqueous formaldehyde)	40	●	●	●
Formamide	TR	●	●	●
Formic acid	10	●	●	●
Formic acid	50	●	●	●
Formic acid	85	●	●	●
Formic acid	TR	●	●	●
Freon 12	100	◑		❍
Fruit juices	G	●	●	●

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Fruit juices, unfermented		●	●	●
Fruit juices, fermented		●	●	●
Fruit wine	H	●	●	●
Fruit pulp	H	●	●	●
Fruit tree carbolineum		●		◑
Fuel oil	H	●	◑	◑
Furfur alcohol	TR	●	●	●
Furfurol		●		◑
Furniture polish		●		◑
G				
Gas liquor		●	●	●
Gelatine	any	●	●	●
Gin	40	●		
Gypsum (calcium sulphate)	GL	●	●	●
Glauber's salt (sodium sulphate)	any	●	●	●
Glucose (grape sugar, dextrose)	any	●	●	●
Glue		●	●	●
Glutine glue	H	●	●	●
Glycerin	any	●	●	●
Glycerin chlorohydrine		●	●	●
Glycocoll	VL	●	●	●
Glycol	H	●	●	●
Glycolic acid	37	●	●	●
Glycolic acid	70	●	●	●
Glycolic acid butyl ester		●	●	●
Glysantine		●	●	●
Grape sugar (glucose, dextrose)	any	●	●	●
Gravy		●	●	●
H				
Halothane		◑		❍
Heptane	TR	●		◑
n-Heptane	TR	●	◑	◑
Hexadecanol (cetyl alcohol)		●	●	●
Hexafluorosilicic acid	32	●	●	●
Hexamine	any	●	●	●
Hexane	TR	●	◑	◑
n-Hexane	TR	●		◑
Hexantriol	TR	●	●	●
Höchst drilling agent		◑	◑	◑
Honey		●	●	◑
Hydraulic fluid		●		◑
Hydrazine hydroxide	L	●	●	●
Hydroammonium sulphate (ammonium hydrosulphate)	any	●	●	●
Hydrobromic acid	50	●	●	●
Hydrochloric acid	any	●	●	●
Hydrochloric gas, dry+damp	TR	●	●	●
Hydrocyanic acid (prussic acid)	10	●	●	●
Hydrocyanic acid	TR	●	●	●
Hydrofluoric acid	50	●	●	◑
Hydrofluoric acid	70	●		◑
Hydrogen	TR	●	●	●
Hydrogen bromine, gaseous	TR	●	●	●
Hydrogen peroxide	10	●	●	●
Hydrogen peroxide	30	●	●	●
Hydrogen peroxide	90	●	◑	❍
Hydrogen sulphide	GL	●	●	●
Hydrogen sulphide, gaseous	TR	●	●	◑
Hydrogen superoxyde	30	●	●	●
Hydrogen superoxyde	90	●	◑	❍
Hydroquinone	L	●	●	●

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Hydrosilicofluoric acid	32			
Hydrosilicofluoric acid	any	●	●	●
Hydrosulphite	VL	●	●	●
Hydroxylamine sulphate	12	●	●	●
Hypochlorous acid		◑	◑	◑
Hypophosphite	any	●	●	●
I				
Ink		●	●	●
Interlacing agent	5	●		
Insecticides	G	●	●	●
Iodine-potassium iodide (3% iodine)		●	●	●
Isobutyl alcohol		●	●	●
Iso-octane	TR	●	◑	◑
Isopropanol (isopropyl alcohol)	TR	●	●	●
Isopropyl acetate	100	●		◑
Isopropyl ether	TR	◑		❍
Isobutylaldehyde (technically pure)	100	●		❍
Iron (III) ammonium sulphate	GL	●	●	●
Iron salts	any	●	●	●
J				
Jam	H	●	●	●
Javel water (sodium hypochlorite)	5	●	●	●
Jelly		●	●	●
K				
Kaolin, washed/ground	any	●	●	●
Kerosine (petroleum)	TR	●	●	◑
Ketone		◑	◑	◑
Kitchen salt, saturated (sole)	100	●	●	●
L				
Lactose		●	●	●
Lanolin	TR	●	●	●
Lactic acid	any	●	●	●
Latex (caotchouc dispersions)		●	●	●
Lead (II) acetate	any	●	●	●
Lemon aroma		●		
Lemon juice		●	●	●
Lemon zest		●		
Lime (calcium hydroxide)	GL	●	●	●
Lime water		●	●	●
Linseed oil	TR	●	●	●
Lighting gas, benzole free	H	●		
Levoxin 15 (diamin hydrate)	TR	●	●	●
Liquid soap		●	●	●
Liquor	H	◑		❍
Lemonade		●		
Lipoids (lecithin, emulsifiers)	any	●	●	●
Lithium bromide		●	●	●
Lixtone - SO			●	
Lixtone TS 803/M			●	
Lubricant oils	H	●	●	◑
Lubricant soap		●	●	●
Lysoform (disinfectant; acqueous solution var. higher aldehydes)	VL	●	●	◑
Lysol		●		◑

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Magnesium carbonate	GL	●	●	●
Magnesium chloride	any	●	●	●
Magnesium fluorsilicate		●	●	●
Magnesium hydroxide	GL	●	●	●
Magnesium iodide		●	●	●
Magnesium salts	any	●	●	●
Magnesium sulphate	any	●	●	●
Maleic acid	GL	●	●	●
Malic acid	1	●	●	●
Malic acid	50	●	●	●
Malic acid	GL			
Manganese sulphate		●	●	●
Margarine		●	●	●
Maschine oil	TR	●		◑
Mashed potato		●	●	●
Mashes		●	●	●
Mayonnaise		●		
Molasses	H	●	●	●
Molasses aroma		●	●	●
Menthol	TR	●	●	◑
Mercuric chloride	TR	●	●	●
Mercuric salts	GL	●	●	●
Mercury	TR	●	●	●
Mersol D (mixture of higher paraffin sulfonic acid chlorides)	100	❍		
Metallic mordant		●		
Metallic soap		●	●	●
Methacrylic acid		●	●	●
Methane, gaseous	TR	●		
Methanol (methyl alcohol)	any	●	●	●
Methoxybutanol	TR	●	●	◑
Methoxybutyl acetate (butoxyl)		●		◑
Methyl alcohol (methanol)	any	●	●	●
Methyl acetate	TR	●	●	
Methyl acrylate		●	●	●
Methylamine	32	●		
Methylbenzene (toluol)	TR	◑	❍	❍
Methyl bromide, gaseous	TR	◑		❍
Methyl chloride	TR	◑	❍	❍
Methylcyclohexane		◑		❍
Methylene chloride	TR	◑	◑	❍
Methyl ethyl ketone	TR	●	◑	❍
Methyl glycol		●	●	●
Methyl isobutylketone		●		❍
Methyl metacrylate		●	●	●
n-Methyl-2-pentanol		●		◑
Methyl propylketon		●		◑
n-Methyl pyrrolidone		●	●	●
Methylsalicylate (Salicylic acid methyl ester)		●		◑
Methyl sulphuric acid	50	●	●	●
Methyl sulphuric acid	100			
Metol (4-methyl-amino-phenosulphate) (photographic-developer)	VL	●		
Milk	H	●	●	●
Mineral oil, without additives		●		◑
Mineral oil, free of aromatic compounds	H	●	●	◑
Mineral water	H	●	●	●
Mixed acid I (sulphuric acid/nitric acid/water)				
48/49/ 3		❍	❍	
50/50/ 0		❍	❍	
10/87/ 3		❍		

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
50/31/19		❍		
50/33/17		❍		
10/20/70		◑		
Mixed acid II (sulphuric acid/phosphoric acid/water) 30/60/10		●	◑	
Monochlorbenzene		◑		❍
Monochloracetic acid ethyl ester	100	●	●	
Monochloracetic acid methyl ester	100	●	●	
Monoethylamine	any	●	●	●
Morpholine	TR	●	●	●
Motor oil		●		◑
Mowilith-dispersions		●	●	●
N				
Nail varnish		●		◑
Nail varnish remover		●		◑
Naphtha	H	●		◑
Naphthalin	TR	●		◑
Natural gas	H	●		
Nekal BX (interlacing agent; sodium salts var. isopropyl naphthaline sulphonic acids)	any	●	●	●
Nickel chloride	GL	●	●	●
Nickel nitrate	GL	●	●	●
Nickel salts	GL	●	●	●
Nickel sulphate	any	●	●	●
Nicotine		●	●	●
Nicotinic acid	VL	●	●	
Nitric acid	6,3	●	●	●
Nitric acid	25	●	●	●
Nitric acid	40	◑		❍
Nitric acid	50	◑	◑	❍
Nitric acid	65	◑	❍	❍
Nitric acid	75	❍	❍	❍
Nitrochloroform		◑		●
Nitrobenzene	TR	●	●	◑
Nitrocellulose		●		
Nitrogen (gaseous)	any	●	●	●
Nitrous gases	≤5	●	●	●
Nitrotoluols	TR	●	●	◑
Nolan stop-off lacquer (dangerous substance)			●	●
Nolan thinner (dangerous substance)		●	●	
Nonyl alcohol (nonanol)		●	●	●
Nut oil		●		◑
O				
Octyl cresol	TR	◑		❍
Oleic acid		●		◑
Oil of cloves		●		◑
Oils, distilled		◑		❍
Oils, mineral, without additives		●		◑
Oils, mineral, free of aromatic compounds	H	●	●	◑
Oils, vegetable and mineral	H	●	◑	◑
Oleum, 10% SO_3		❍	❍	❍
Oleum vapours (sulphur trioxid)	≤5	◑		
Oleum vapours	TR	❍	❍	❍
Oleic acid	TR	●	●	◑
O-nitrotuluol	TR	●	●	◑
Optical whiteners		●	●	●
Orange juice		●	●	●
Orange zest		●		
Orotol		●	●	●
Oxalic acid	GL	●	●	●

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Oxygen	TR	●	●	◑
Ozone, gaseous 50 pphm		◑		❍
Ozone, gaseous 2%		◑	❍	❍
Ozone	GL	◑	❍	
P				
P3 Galvaclean 20 (dangerous substance)		●	●	
P3 Galvaclean 42 = P 3 S (dangerous substance)		●	●	
P3 Galvaclean 44 (dangerous substance)		●	●	
P3 Galvaclean 45 (dangerous substance)		●	●	
P3 Galvaclean 65 (dangerous substance)		●	●	
P3 Manuvo hand cleaner (dangerous substance)		●	●	
P3 Saxim (dangerous substance)		●	●	
P3 Standard (dangerous substance)		●	●	
P3 7221 (dangerous substance)		●	●	
Palmityl acid		●	●	●
Palmityl alcohol		●	●	●
Palm kernel oil		●	●	●
Palm oil	H	●	●	◑
Palm kernel oil acid	TR			❍
Paraffin 100		●	●	●
Paraffin emulsion	H	●	●	◑
Paraffin oil	TR	●	●	◑
Paraformaldehyde		●	●	●
Parfume		●		
Paris inert oxyd (dangerous substance)		●	●	
Peanut oil		●	●	●
Pectin GL		●	●	●
Pentanol	TR	●	●	◑
Peppermint oil	TR	●		
Perchlorethylene	TR	◑	◑	❍
Perchloric acid	20	●	●	●
Perchloric acid	50	●		◑
Perchloric acid	70	●	◑	❍
Perhydrol (hydrogen peroxide, acqueous solution)	40	●	●	●
Petroleum ether	TR	●	◑	◑
Petroleum (kerosene)	TR	●	●	◑
Petroleum spirit (light petrol, free from aromatic compounds)	100	●	●	◑
Petrol, regular grade	H	●	●	◑
Photographic emulsion	H	●	●	●
Photographic developer	H	●	●	●
Photographic fixer bath	H	●	●	
Pineapple juice		●	●	●
Pine needle oil		●		◑
Phenol (carbolic acid)	any	●	●	◑
Phenol resin mould substances		●	●	●
Phenylamine (aniline)	GL	◑	◑	◑
Phenylethyl alcohol		●	●	●
Phenylhydrazine	TR	◑		❍
Phenylhydrazine hydrochloride		●		❍
Phenyl sulphonat (Sodium dodecylbenzene sulphonate)		●	●	●
Phosgene, gaseous	TR	❍	❍	❍
Phosgene, liquid	TR	❍		
Phosphates	any	●	●	●
Phosphoroxichloride		●		◑
Phosphorpentoxide	100	●	●	●
Phosphoric acid	50	●	●	●
Phosphoric acid	95	●	●	◑
Phosphortrichloride	TR	●	●	◑
Phosphoryl chloride	TR	◑		

Chemical resistance

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Phtalic acid	50	●	●	●
Phtalic acid	GL	●	●	●
Phtalic acid ester		●		◑
Picric acid	1	●		
Picric acid	GL	●	●	
Polychlorinated biphenyl (PCB)		●		❍
Polyester resins		◑		❍
Polyester softeners		●		◑
Polyglycols		●	●	●
Pork dripping		●	●	●
Potash (potassium carbonate)	any	●	●	●
Potassium ferrocyanide, pot. ferricyanide	any	●	●	●
Potassium ferricyanide and potassium ferrocyanide	any	●	●	●
Potassium cyanide	any	●	●	●
Potassium ammonium sulphate (alum)	any	●	●	●
Potassium carbonate	any	●	●	●
Potassium bichromate (potassium dichromate)	any	●	●	●
Potassium bisulphate	any	●	●	●
Potassium borate	10	●	●	●
Potassium borate	GL			
Potassium bromate	VL	●	●	●
Potassium bromate	GL	●	●	◑
Potassium bromide	any	●	●	●
Potassium cadmium cyanide	any	●	●	●
Potassium carbonate (potash)	any	●	●	●
Potassium chlorate	any	●	●	●
Potassium chloride	any	●	●	●
Potassium chromate	40	●	●	●
Potassium chromate	GL	●	●	●
Potassium cyanide	any	●	●	●
Potassium dichromate (potassium bichromate)	any	●	●	●
Potassium ferricyanide	any	●	●	●
Potassium fluoride	any	●	●	●
Potassium hexacyano ferrate	any	●	●	●
Potassium hydroxide (caustic potash)	50	●	●	●
Potassium iodide	any	●	●	●
Potassium nitrate	any	●	●	●
Potassium perborate		●	●	●
Potassium perchlorate	GL	●	●	◑
Potassium permanganate	20	●	●	●
Potassium permanganate	GL	●	●	◑
Potassium persulphate	any	●	●	●
Potassium phosphate	any	●	●	●
Potassium sulphate	any	●	●	●
Potassium sulphite	L	●	●	●
Potassium sulphite		●	●	●
Potassium tetracyanocuprate		●	●	●
Potassium thiosulphate		●	●	●
Propane, liquid	TR	●		
Propane, gaseous	TR	●	●	●
i-Propanol	TR	●	●	●
n-Propanol (n-propyl alcohol)	TR	●	●	●
Propargyl alcohol	7	●	●	●
Propionic acid	50	●	●	●
Propionic acid	TR	●	◑	◑
Propylene chloride	100	❍		
Propylene glycol	TR	●	●	●
Propylene oxide	TR	●	●	●
Prussic acid	TR	●	●	●
Prussic acid (hydrocyanic acid)	10	●	●	●
Pseudocumol		◑		◑
Pyridine	TR	●	◑	◑
Q				
Quinine		●	●	●
R				
Ratak Resit 65 (Fuchs)		●		
Rectified spirit (ethanol, ethyl alcohol, spirit of wine)	96	●	●	●
Rinsing agents	H	●	●	●
Roaster gases, dry	any	●	●	●
Rum	40	●	●	●
S				
Saccharic acid	GL			
Sagrotan (disinfection, chlorophenol soap solution)	VL	●	●	●
Sagrotan		●		◑
Salicylic acid	GL	●	●	●
Salicylic acid methyl ester (methylsalicylate)		●		◑
Sal-ammoniac (ammonium chloride)	any	●	●	●
Salt (sodium chloride)	any	●	●	●
Saturated steam concentrate		●	●	●
Seawater	H	●	●	●
Separating agent		●	●	●
Sewage		●	●	●
Shampoo		●	●	●
Shoe cream		●		◑
Silicic acid	any	●	●	●
Silicofluoric acid	40	●	●	●
Silver nitrate	any	●	●	●
Silver salts	GL	●	●	●
Silicon oil	TR	●	●	●
Soda (sodium carbonate)	any	●	●	●
Soap solution	any	●	●	●
Soda lye (sodium hydroxide, caustic soda)	any	●	●	●
Soda water (carbon dioxide)	any	●	●	●
Sodium acetate	any	●	●	●
Sodium aluminium sulphate		●	●	●
Sodium benzoate	GL	●	●	●
Sodium benzoate	36	●	●	●
Sodium bicarbonate (sodium hydrogen carbonate)	GL	●	●	●
Sodium bisulphate (sodium hydrogen sulphate)	GL	●	●	●
Sodium bisulphitt (sodium hydrogen sulphite, sodium disulphite)	any	●	●	●
Sodium borate		●	●	●
Sodium bromate	L	●	◑	
Sodium bromide	L	●	●	●
Sodium carbonate (soda)	any	●	●	●
Sodium chlorate	any	●	●	●
Sodium chloride (salt)	any	●	●	●
Sodium chlorite	VL	●		
Sodium chlorite	20	●	◑	❍
Sodium chlorite bleaches	H	◑		❍
Sodium chromate	VL	●		
Sodium cyanide	GL	●	●	●
Sodium dichromate	GL	●	●	●
Sodium disulphite (sodium bisulphite)	any	●	●	●
Sodium dithionite	VL	●	●	●
Sodium dodecyl benzene sulphonate (phenyl sulphonate)		●	●	●
Sodium ferricyanide		●	●	●

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
Sodium fluoride	GL	●	●	●
Sodium hexacyanoferrate	GL	●	●	●
Sodium hydrogen carbonate (sodium bicarbonate)	GL	●	●	●
Sodium hydrogen sulphate (sodium bisulphate)	10	●	●	●
Sodium hydrogen sulphite (sodium bisulphite)	any	●	●	●
Sodium hydroxide (caustic soda)	any	●	●	●
Sodium hypochlorite (Javel water)	5	●	●	●
Sodium hypochlorite	12,5	●	◑	❍
Sodium iodide	L	●		
Sodium copper cyanide	any	●	●	
Sodium nitrate	any	●	●	●
Sodium nitrite	any	●	●	●
Sodium oxalate	GL	●		
Sodium perborate	any	●		◑
Sodium perchlorate		●	●	●
Sodium peroxide	10	●	●	●
Sodium peroxide	GL	◑		
Sodium peroxodisulphate (sodium persulphate)	GL	●	●	●
Sodium phosphate	GL	●	●	●
Sodium silicate (water glass)	any	●	●	●
Sodium sulphate (Glauber's salt)	any	●	●	●
Sodium sulphide	any	●	●	●
Sodium sulphite	GL	●	●	●
Sodium thiosulphate (fixative salt)	any	●	●	●
Softeners		●		◑
Soya oil		●	●	●
Spermaceti		●		◑
Sperm oil alcohol (mixture of higher oil alcohols)	100	●	●	
Spindle oil	TR	◑	◑	◑
Spin bath acid, containing CS2	0,01			❍
Spirits	H	●		●
Stain remover		◑	◑	◑
Stannous (II) chloride	any	●	●	●
Starch	any	●	●	●
Starch syrup	any	●	●	●
Stearic acid	TR	●	●	◑
Stellhefen flavouring (aqueous solution of maltose and dextrines)	L	●	●	●
Styrol		◑		❍
Succinic acid	any	●	●	●
Suet	TR	●	●	●
Sugar beet juice	any	●	●	●
Sugar solutions	any	●	●	●
Sugar syrup	H	●	●	●
Sulphate	any	●	●	●
Sulphur	TR	●	●	●
Sulphur dichloride	TR	❍	❍	❍
Sulphur dioxide	any	●	●	●
Sulphur dioxide, gaseous, dry and damp	any	●	●	●
Sulphur dioxide, liquid	TR	◑		◑
Sulphurated potash (potassium polysulphide)	any	●	●	
Sulphuric acid	10	●	●	●
Sulphuric acid	70	●	●	●
Sulphuric acid	90	◑	◑	❍
Sulphur sodium (sodium sulphide)	any	●	●	●
Sulphur trioxide (oleum vapours)	≤5	◑		
Sulphur trioxide	TR	❍	❍	❍
Sulphurous acid	GL	●	●	●

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
T				
Taningan extra (synthetic tanning substances)	GL	●	●	❍
Tannic acid (tannine)	10	●	●	●
Tannin (tannic acid)	10	●	●	●
Tea	G	●	●	●
Tar		●		◑
Tartaric acid	any	●	●	●
Turpentine	TR	◑	◑	◑
Tetrabromethane		❍	❍	❍
Tetrachloroethane	TR	❍	❍	❍
Tetrachloroethylene	TR	◑	◑	
Tetraethyl lead	TR	●		
Tetrahydrofurane	TR	❍	❍	❍
Tetrahydronaphthalin (Tetralin)	TR	●	◑	❍
Thioglycol (thiodiethylene glycol)	100	●	●	●
Thioglycolic acid		●	●	●
Thiocarmabide	any	●	●	
Thionyl chloride	TR	❍	❍	❍
Thiophene	TR	◑	◑	❍
Tincture of iodine DAB6	H	●	●	◑
Tiutol (hypochlorite Javel water)	12/13	◑	❍	❍
Toluol (methyl benzene)	TR	◑	❍	❍
Tomato juice		●	●	●
Transformer oil	TR	●		◑
Triethanolamine	TR	●	●	●
Triethylene glycol		●	●	●
Tributyl phosphate	TR	●	●	●
Trichloroethane, gaseous	100	◑	❍	❍
Trichloroethane	TR	◑		
Trichloroethylene	TR	◑	❍	❍
Trichlorobenzene		❍	❍	❍
Trichlorethylphosphate		●	●	●
Trichloroacetic acid	50	●	●	●
Trichloroacetic acid	TR	●	◑	❍
Trichlorofluorethane (freon 11, Sdp. 24°C)	100	◑	❍	
Triethanolamine	TR	●	●	●
Tricresylphosphate	TR	●	●	●
Trilon		●	●	●
Trimethylborate		●		❍
Trimethylolpropane		●	●	●
Trisodium phosphate		●	●	●
Trioctylphospate	TR	●	●	◑
T-SS up to 5%		●		
Two-stroke oil		●		◑
Typewriter oil		●	●	●
U				
Universal thinners		◑	◑	
Uric acid	GL	●	●	●
Urine	33	●	●	●
V				
Vaseline oil	TR	◑	◑	◑
Vinegar (wine vinegar)	H	●	●	●
Vinyl acetate	TR	●	●	●
Viscose spinning solutions		●	●	●
Vitamin C (ascorbic acid)		●	●	●

Chemical resistance

Flow through substance	Geberit HDPE Proport. %	Performance at 20°C	40°C	60°C
W				
Wax alcohols	TR	◑	◑	◑
Waxes		●		◑
Walnut oil		●		◑
Washing agents	G	●	●	●
Washing up liquid		●	●	●
Water, distillied		●	●	●
Water, fully desalinized		●	●	●
Water de-ionized		●	●	●
Water chlorinated driking water		●	●	●
Water, ozonized drinking water		●		
Water glass (sodium silicate)	any	●	●	●
Wattle, vegetable	H	●		
Wattle, from cellulose	H	●	●	●
Wine	H	●	●	●
Wine vinegar (vinegar)	H	●	●	●
Wine spirit (ethyl alcohol, ethanol, rectified spirit)	96	●	●	●
White spirit	TR	●	◑	❍
White spirit (cristal oil)	TR	◑	◑	◑
Whisky	H	●		
Whwy		●	●	●
Wood stain	G	●		◑
X				
Xylene (isomer mixture)	TR	❍	❍	❍
Y				
Yeast	any	●	●	●
Z				
Zampon thinners		◑	◑	
Zinc carbonate	GL	●	●	●
Zinc chloride	any	●	●	●
Zinc oxide	GL	●	●	●
Zinc salts	any	●	●	●
Zinc sludge		●	●	●
Zinc dust	any	●	●	●
Zinc stearate		●	●	●
Zinc sulphat	any	●	●	●

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