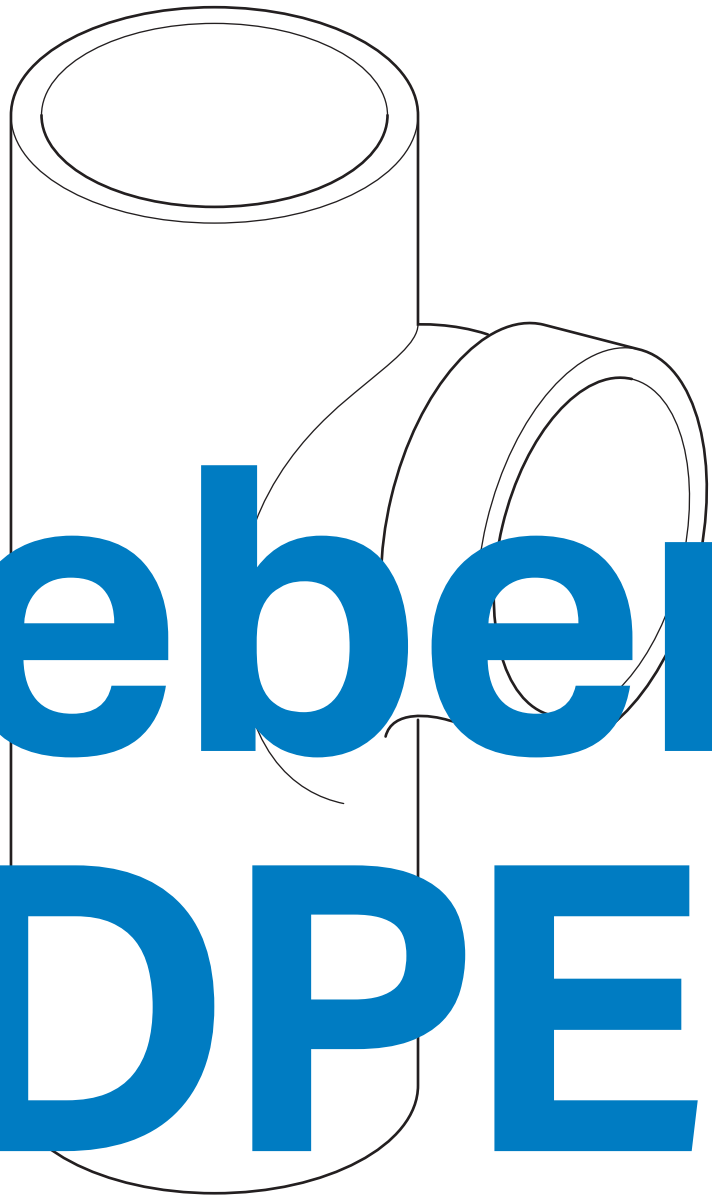
GEBERIT



Geberit HDPE

Trade Waste and Drainage Installation Guide
Valid from 1 August 2014

KNOW HOW INSTALLED

Geberit HDPE

Installation Guide

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1 System

1.1 System description

1.1.1 Geberit HDPE

Geberit HDPE is the complete solution for all types of drainage, both above and below ground. It has high thermal and chemical resistance. The pipes and fittings are manufactured from high density polyethylene and offer numerous advantages compared to conventional piping systems. Geberit HDPE has a high impact and abrasion resistance, is flexible and offers multiple connection options. These combined properties make it ideal for prefabrication, high traffic areas and trade waste applications where quality and reliability are important.

1.1.2 Application range

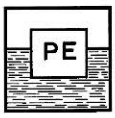
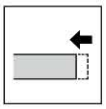
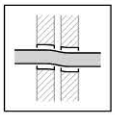
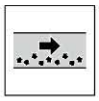
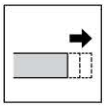
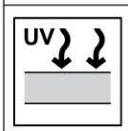
Table 1: Application range

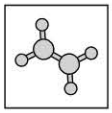
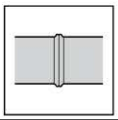
Application	Geberit HDPE
Siphonic and Conventional rainwater pipes	✓
Trade waste	✓
Concrete embedded pipes	✓
Industrial applications	✓
Pump pressure pipes	✓ [1)]

[1)] Without mechanical load max. 1.5 bar internal pressure at max 30 °C, 10 years, ø 40 – 160

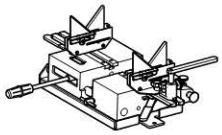
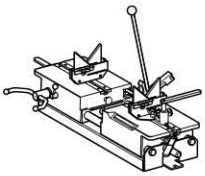
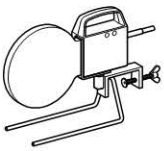
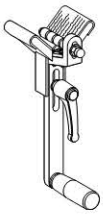
1.1.3 Characteristics

Comments on the individual properties

	Geberit High Density Polyethylene HDPE: Density 951 – 955 kg/m^3	The density of various polyethylene types can be 910 – 960 kg/m^3. Geberit fittings and pipe are up to 955 kg/m^3 making them some of the durable available. HDPE is lighter and more flexible than many alternate materials, which is beneficial particularly with regard to transportation and installation.
	Reduced reversion	Geberit licensed manufacturing process produces HDPE with a reversion less than 15 mm per metre. This leads to less shrinkage and a more robust installation.
	Resistance to cold	Geberit HDPE will not break when the water in the pipes freezes. The pipes will expand as the water freezes and then return to their original shape.
	Elasticity	The flexibility of the piping material can be a key selection criteria with certain applications, especially when pipes are exposed to movement from vibration, earthquake or ground subsidence.
	Resistance to radioactive effluents	There is no risk of damage as a result of medical waste. However, please ask the manufacturer for more information relevant to the particular application.
	Resistance to abrasion	A pipe's resistance to abrasion is a particularly important factor in branch lines, sewer stacks and ground pipes. HDPE is highly resistant to abrasion; its extra thick walls offer additional protection.
	Heat expansion	Heat expansion of HDPE needs to be considered in the design and installation. As a rule of thumb, for every 50 °C increase in temperature, an expansion of 15 mm per metre of pipe can be anticipated.
	Resistance to hot water	Geberit HDPE can be safely used as waste pipe with no mechanical load, up to 80 °C. Temperatures of up to 100 °C for short periods (e.g. surges of steam) are permissible.
	Resistance to impact	Geberit HDPE is unbreakable at room temperature. Its resistance to impact is very high even at extremely low temperatures (down to approx. -40 °C) making ideal for installation in car parks and trafficable areas.
	Non-conductive	Plastics are good insulators of electricity.
	Sealing material	Chemical resistance of the rubber seal is different to HDPE. Refer to the chemical compatibility guide or contact Geberit for assistance on the best joining method.
	Solar radiation	Geberit HDPE pipes are protected against ageing and embrittlement caused by UV rays by the addition of a stabiliser. Consider the heat and expansion in exposed areas.

	Noise	HDPE is a soft material with a low Young's modulus. HDPE limits solid-borne conduction, but airborne noise should be insulated. This can be done by means of a duct or lagging.
	Chemical resistance	Because of its structure, Geberit HDPE is highly resistant to chemicals. Its resistance can be summarized briefly as follows: Geberit HDPE is insoluble in all solutions at 20 °C. Geberit HDPE is only soluble in aliphatic and aromatic carbons and their chlorinating products at over 90 °C. The material will be attacked by heavily oxidized media (conc. HN03, conc. H2 S04) when exposed over long periods at room temperature.
	Tightness	Many years of experience with welding HDPE pipes have shown, the butt and electrofusion welds form a watertight bond that is stronger than the pipe. When installed correctly the joint will remain watertight for the life of the building.
	Protection against blockages	HDPE's low surface tension and hydrophobic properties are highly beneficial in preventing blockages commonly caused by solid deposits and low flow of water.
	Welding temperature	HDPE require a low energy input to produce when compared to many other materials. The welding temperature for HDPE is approximately 230 °C, making welding easier and more reliable than some other joining methods.
	Non-toxic	Plastics are well suited for use in the food industry as packaging material, containers, bottles etc. Geberit HDPE pipes are widely used in the food service and packaging industry.
	Painting	HDPE is not suitable for painting. Its water repellent properties and the flexibility of the material limits the adhesive properties of the paint. If painting is unavoidable, the paint product to be used should be tested for compatibility with the HDPE.

1.2 Overview of tools

 Geberit welding machine Media	Butt welding of ø 40–315 mm can be performed with the Geberit welding machines Media and Universal: • Media: ø 40–160 mm • Universal: ø 40–315 mm
 Geberit welding machine Universal	
 Geberit welding plate	For Geberit welding machines Media and Universal , or separately
 Geberit electrofusion machine ESG 3	The Geberit electrofusion machine ESG 3 is for welding Geberit HDPE pipes and fittings with: • Electrofusion sleeve couplings ø 40–160 mm • Electrofusion couplings with integrated thermal fuses ø 200–315 mm (only 230 V) • Electrofusion tapes ø 50–315 mm Voltage range: 110–230 V
 Geberit pipe scraper	The Geberit handheld pipe scraper is used for removing the oxide coating on Geberit HDPE pipes and fittings as preparation for electrofusion welding
 Geberit lubricant	For lubricating the seals of push-fit connections
 Geberit pipe chamfering tool	For chamfering Geberit HDPE pipes ø 40–160 mm

2 Geberit HDPE

2.1 System components

The complete proven and practical product range consists of:
- Pipes
- Fittings
- Connections
- Fastenings

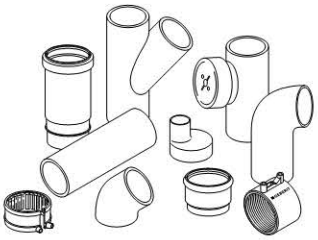


Figure 1: Geberit HDPE product range

2.2 Chemical resistance list

The following information is always required for calculating the chemical resistance:
- Conveyed medium (composition, chemical designation)
- Proportion (concentration in %)
- Temperature in °C
- Information about the duration of exposure, frequency, flow rate
- Other conveyed media

Geberit HDPE can be used between pH 0 and pH 14.

The behaviour of the fitting seal ring (EPDM) relating to the chemical resistance is different to Geberit HDPE.

The way in which the Geberit HDPE pipes and fittings behave when coming into contact with the materials flowing through them is classified as follows:

Resistant (+):	The pipe wall material is generally deemed to be suitable.
Resistant to a certain extent (0):	The suitability of the pipe wall material must be verified for the specific application; further testing may be required.
Not resistant (-):	The pipe wall material is generally deemed to be unsuitable.

The resistance of the seals differs from the resistance of the HDPE pipes and fittings. Geberit HDPE can be used between pH 0 and pH 14.

Table 2: Designations used for the composition of the flow substances

%	Percentage values refer to the percentage by weight
VL	Aqueous solution with percent by weight ≤10 %
L	Aqueous solution with percent by weight > 10 %
GL	At 20 °C, saturated aqueous solution
TR	Chemical is, at a minimum, technically pure
H	Commercially available composition
S	Traces < 0.1 %
G	Typically used percent by weight
All	Saturated solution and every dilution

The information given in the following table is based on immersion tests without mechanical stress and correspond to the current level of knowledge. For example, a mixture of different flow substances may lead to new assessment criteria which are not covered by the table below.
The information given makes no assertions. No warranty claims may be derived from it.
Even if Geberit HDPE has been deemed resistant to a substance, swelling may occur (extension of the pipe); consideration must also be given to the fact that a number of substances could measurably diffuse through Geberit HDPE .

Table 3: Resistance list

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
1.2 dibromethane		0		-	-
2-ethylhexanol		+		0	+
4-methyl-2-pentanol		+		0	+
Acetaldehyde	40	+	+	0	0
Acetaldehyde	TR	+	0	0	0
Acetaldehyde + acetic acid	90:10:00	+			0
Acetamide	TR	+	+	+	+
Acetic acid	70	+	+	+	-
Acetic acid	100	+	0	0	-
Acetic acid butyl ester		+		0	0
Acetic acid ethyl ester (ethyl acetate)	TR	+	0	0	0
Acetic anhydride	TR	+	0	0	0
Acetic anhydride (ethanoic anhydride)	TR	+	0	0	0
Acetoacetic acid ethyl ester		+			0
Acetone	VL	+	+	+	+
Acetone	TR	+	+	0	+
Acetophenone	TR	+			+
Acetylene		+			+
Acid sulphur	10	+	+	+	+
Acid sulphur	70	+	+	+	0
Acid sulphur	90	0	0	-	-
Acronal dispersions	H	+		0	+
Acronal solutions	H	0			-
Acrylic acid emulsions		+	+	+	+
Acrylonitrile	TR	+	+	+	+
Activin (chloramine 1 %)		+	+	+	+
Adipic acid ester		+		0	+
Adipic acids	GL	+	+	+	+
Allyl acetate		+		0	0
Allyl alcohol	96	+	+	+	+
Allyl chloride		0		-	-
Alum (potassium-aluminium sulphate)	All	+	+	+	+
Aluminium chloride	VL	+	+	+	+
Aluminium chloride	GL	+	+	+	+
Aluminium chloride, solid		+	+	+	+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Aluminium fluoride	GL	+	+	+	+
Aluminium hydroxide		+	+	+	+
Aluminium meta phosphate		+	+	+	+
Aluminium sulphate	All	+	+	+	+
Aluminium sulphate, solid		+	+	+	+
Amido sulphate (amido sulphonic acid salts)	All	+	+	+	+
Amido sulphonic acid	All	+	+	+	+
Amino acids		+	+	+	+
Ammonia solution (aqueous ammonia)	All	+	+	+	+
Ammonia, gaseous	100	+	+	+	+
Ammonia, liquid	100	+	+	+	+
Ammonium acetate	All	+	+	+	+
Ammonium carbonate	All	+	+	+	+
Ammonium carbonate and hydrogen carbonate	GL	+	+	+	+
Ammonium chloride	All	+	+	+	+
Ammonium chloride (salmiac)	All	+	+	+	+
Ammonium dihydrogen phosphate	GL	+	+	+	+
Ammonium fluoride	L	+	+	+	+
Ammonium fluoride	L	+	+	+	+
Ammonium hydrogen sulphate	All	+	+	+	+
Ammonium hydrosulphide	All	+	+	+	+
Ammonium hydroxide (aqueous ammonia)	All	+	+	+	+
Ammonium iron (II) sulphate	GL	+	+	+	+
Ammonium meta phosphate		+	+	+	+
Ammonium nitrate	All	+	+	+	+
Ammonium phosphate	All	+	+	+	+
Ammonium sulphate	All	+	+	+	+
Ammonium sulphide	All	+	+	+	+
Ammonium thiocyanate		+	+	+	+
Amyl acetate	TR	+	+	+	+
Amyl alcohol	TR	+	+	+	+
Amyl chloride	100	0		-	-
Amyl phthalate		+		0	0
Aniline (phenylamine)	GL	0	0	0	-
Aniline chlorine hydrate	All	+	0	0	0
Animal glue (bone glue)	H	+	+	+	+
Anise oil	TR	0	0	-	-
Anon (cyclohexanone)	TR	+	0	0	-
Anthraquinone sulphonic acid	1	+	+	+	+
Antiformin (benzaldoxime)	2	+			0
Antifreeze agent (motor vehicles)	H	+	+	+	+
Antimony pentachloride		+	+	+	+
Antimony trichloride	90	+	+	+	+
Antimony trichloride, anhydrous		+	+	+	+
Apple juice	H	+	+	+	+
Aqua regia	TR	-	-	-	-
Aqueous ammonia (ammonia water, ammonium hydroxide)	All	+	+	+	+
Arklone (= Freon, Frigen (fluorochlorinated hydrocarbons CFC)	100	0	-		-

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Arsenic acid	All	+	+	+	+
Arsenic acid anhydride		+	+	+	+
Ascorbic acid (Vitamin C)		+	+	+	+
Asphalt		+		0	-
Barium carbonate chem. 98/99%	All	+	+	+	+
Barium hydroxide	All	+	+	+	+
Barium salt	All	+	+	+	+
Battery acid (sulphuric acid 34 %)	H	+	+	+	+
Beef fat		+	+	0	0
Beer	H	+	+	+	+
Beer caramel	H	+	+	+	+
Beeswax	H	+	+	-	-
Benzaldehyde	All	+	+	0	0
Benzaldehyde in isopropanol	1	+	+	+	-
Benzaldoxime (antiformin)	2	+			+
Benzene	TR	0	0	-	-
Benzene sulphonic acid		+	+	+	+
Benzoic acid	All	+	+	+	+
Benzoic acid sodium (sodium benzoate)	36	+	+	+	+
Benzoyl chloride	TR	0	0	0	-
Benzyl alcohol	TR	+	+	+	0
Benzyl chloride		0		-	-
Bichromate acid sulphur (chromic acid/acid sulphur)	TR	-	-	-	-
Bismuth nitrate, aqueous	All	+	+	+	+
Bismuth salts		+	+	+	+
Bisulphite lye		+	+	+	+
Bitumen		+		0	-
Bone glue (animal glue)	H	+	+	+	+
Bone oil		+	+	+	-
Borax (disodium tetraborate)	All	+	+	+	+
Boric acid	All	+	+	+	+
Boric acid methyl ester		+		-	0
Boron trifluoride		+		0	-
Brake fluid		+	+	+	0
Brandy	H	+	+	+	+
Brandy	H	+	+		+
Bromic acid	40	-	-	-	-
Bromine, liquid and gaseous	All	-	-	-	-
Bromochloromethane		-	-	-	-
Butadiene	50	+			-
Butadiene, gaseous	TR	+			-
Butanediol	All	+	+	+	+
Butanetriol	All	+	+	+	+
Butanol	All	+	+	+	+
Butanone		+		-	+
Butoxyl (methoxybutyl acetate)		+		0	0
Butter		+	+	+	0
Butter milk		+			+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Butyl acetate	TR	+	0	0	0
Butyl acrylate		+		0	0
Butyl alcohol		+	+	+	+
Butyl benzyl phthalate		+	+	+	0
Butylene glycol	TR	+	+	+	+
Butylene, liquid	TR	-	-	-	-
Butylphenol	TR	0			-
Butynediol	100	+	+	+	+
Butyric acid	All	+	+	0	0
Calcium carbide		+	+	+	+
Calcium carbonate	GL	+	+	+	+
Calcium chloride	All	+	+	+	+
Calcium hydroxide	GL	+	+	+	+
Calcium hypochlorite (chlorinated lime)	GL	0	0	-	0
Calcium nitrate	50	+	+	+	+
Calcium oxide (powder)		+	+	+	+
Calcium phosphate		+	+	+	+
Calcium sulphate (gypsum)	GL	+	+	+	+
Calgon (sodium hexametaphosphate)	All	+	+	+	+
Camphor	TR	+		0	-
Camphor		+		0	-
Camphor oil	TR	-	-	-	-
Cane sugar		+	+	+	+
Carbazole		+	+	+	0
Carbolic acid	All	+	+	+	0
Carbolic acid (phenol)	All	+	0	0	-
Carbon disulphide	TR	0	-	-	-
Carbon tetrachloride	TR	-	-	-	-
Carbonic acid (carbon dioxide, soda water)	All	+	+	+	+
Caster oil	TR	+	+	+	0
Caustic potash	50	+	+	+	+
Caustic soda (sodium hydroxide)	All	+	+	+	+
Caustic soda (sodium hydroxide)	All	+	+	+	+
Cetyl alcohol (hexadecanol)		+	+	+	0
Chloracetic acid	All	+	+	+	0
Chloral hydrate	All	+	+	+	0
Chloramine T	TR	+			+
Chloramine T	1	+	+	+	+
Chloric acid	1	+	+	+	0
Chloric acid	10	+	+	+	0
Chloric acid	20	0		-	0
Chlorinated carbonic acid ester		+		0	-
Chlorinated lime (calcium hypochlorite)	GL	0	0	-	0
Chlorinated water	VL	+		0	0
Chlorinated water	GL	0	0	-	0
Chlorine, gaseous, damp	0.5	0		-	0
Chlorine, gaseous, damp	1.0	-	-	-	-
Chlorine, gaseous, damp	97	-	-	-	-

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Chlorine, gaseous, dry	TR	0	0	-	-
Chlorine, liquid	TR	-	-	-	-
Chlorobenzene	TR	0		-	-
Chloroethanol	TR	+	+	+	0
Chloroform	TR	-	-	-	-
Chloromethane	TR	-	-	-	-
Chloromethyl, gaseous	TR	0	-	-	-
Chloroparaffin	100	+	0	-	-
Chloropicrin		0		+	-
Chlorosulphonic acid	TR	-	-	-	-
Chrome alum	All	+	+	+	+
Chrome anode slime		+	+	+	+
Chromic acid	20	+	+	0	0
Chromic acid	50	+	0	-	0
Chromic acid/sulphuric acid	15/35	-	-	-	-
Chromic sulphuric acid	TR	-	-	-	-
Chromic sulphuric acid	All	-	-	-	-
Chromium salt	All	+	+	+	+
Chromium trioxide	50	+	0	-	0
Cider	H	+	+	+	+
Citraconic acid	All	+	+	+	
Citrate (citric acid salts)	All	+	+	+	+
Citric acid	10	+	+	+	+
Citric acid	All	+	+	+	+
Citron aldehyde	TR	+		0	0
Citrus juice		+	+	+	+
Citrus juices		+	+	+	+
Clophene (polychlorinated biphenyl PCB)	100	+	0	-	-
Clove oil			+	0	0
Coal gas, benzene-free	H	+			-
Coca Cola		+			+
Cocoa	G	+	+	+	+
Coconut oil	TR	+	+	0	-
Coconut oil alcohol	TR	+	0	0	0
Cod liver		+		0	0
Coffee	G	+	+	+	+
Cognac		+	+	+	+
Cola concentrates		+	+	+	+
Colouring		+	+	+	0
Compressed air, oleiferous		+	+		-
Cooking oil, vegetable and animal		+	+	+	0
Copper chloride	GL	+	+	+	+
Copper cyanide	All	+	+	+	+
Copper fluoride		+	+	+	+
Copper nitrate	30	+	+	+	+
Copper nitrate	GL	+	+	+	+
Copper sulphate	All	+	+	+	+
Corn oil	TR	+	+	0	-

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Corsolin (disinfectant; chlorophenol soap solution)	VL	+	+	+	
Coumarone resin		+	+	+	+
Creosote		+	+	+	0
Creosote		+		0	0
Cresol	90	+	+	0	-
Cresol	100	+	+	0	-
Crotonic aldehyde	TR	+		0	+
Crude oil		+		0	-
Cuprous salt	GL	+	+	+	+
Cyclanone	H	+	+	+	+
Cyclanone (fatty alcohol sulphate)	L	+	+	+	+
Cyclohexane	TR	+	+	+	-
Cyclohexanone	TR	+	0	0	-
Decahydronaphthalene (decaline)	TR	0	0	-	-
Defoamers		+		0	+
Detergents		+	+	+	+
Developer solutions (photography)		+	+	+	0
Dextrin	18	+	+	+	+
Dextrose (grape sugar, glucose)	All	+	+	+	+
Di-2-ethylhexylphthalate (DOP)		0			0
Dibutyl ether	TR	+	0	-	0
Dibutyl phthalate	TR	+	0	0	0
Dibutyl sebacate	TR	+		0	0
Dichloroacetic acid	50	+	+	+	0
Dichloroacetic acid	TR	+	+	0	0
Dichloroacetic methyl ester	TR	+	+	+	0
Dichlorobenzene	TR	0		-	-
Dichlorodiphenyltrichloroethane (DDT, powder)		+	+	+	+
Dichloroethane (ethylenchloride)		0	-	-	0
Dichloroethylene	TR	-	-	-	-
Dichloropropane		0		-	-
Dielectric (transformer oil)	100	0	0		-
Diesel fuel	H	0	0	0	-
Diethyl ketone		+		0	-
Diethylene glycol		+	+	+	+
Diethylether (ether, ethyl ether)	TR	0	0	0	-
Diglycolic acid 30%	30	+	+	+	+
Diglycolic acid saturated	GL	+			+
Dihexyl phthalate	TR	+		0	-
Diisobutyl ketone	TR	+		-	-
Diisopropyl ether		0	0	-	-
Dimethyl sulfoxide		+	+	+	+
Dimethylamine	TR	+	0	0	+
Dimethylformamide	TR	+	+	0	0
Dinonyl phthalate	TR	0			0
Dioctyl phthalate	TR	0			0
Dioxane	TR	+	+	+	0
Diphenylamine		+		0	

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Diphenyloxide		+		0	-
Disodium phosphate		+	+	+	+
Disodium sulphate		+	+	+	+
Disodium tetraborate (borax)	All	+	+	+	+
Dispersions		+			
Dodecyl benzene sulphonic acid		+		0	+
Dripping		+	+	+	0
Electrolyte baths for electroplating		0		0	-
Emulsifiers		+	+	+	+
Emulsifiers (tensides)	All	+	+	+	+
Emulsions (photographic)	H	+	+	+	+
Engine oil (HD oil)		+		0	-
Epichlorohydrin		+	+	+	0
Essential oils		-	-	-	-
Ester, aliphatic	TR	+		0	0
Ethane		+	+	+	-
Ethanol (rectified spirit, ethyl alcohol, alcohol)	96	+	+	+	+
Ether (ethyl ether, diethyl ether)	TR	0	0	0	-
Ethyl acetate	100	+	0	-	0
Ethyl acetate	TR	+	0	0	0
Ethyl alcohol (ethanol, rectified spirit, alcohol)	96	+	+	+	+
Ethyl alcohol (fermentation slurry)	G	+		0	+
Ethyl alcohol, denatured (2% toluol)	96	0			0
Ethyl alcohol+acetic acid (fermentation mix)		+	+	+	+
Ethyl bromide		0		-	0
Ethyl chloride (dichlorethane)		0	0	0	0
Ethyl chloroacetate	TR	+	+	+	-
Ethylbenzene	TR	0			-
Ethylchloride	TR	0			0
Ethylene		+		0	-
Ethylene glycol	TR	+	+	+	+
Ethylene oxide (oxirane), gaseous	TR	+	+	+	0
Ethylene oxide (oxirane), liquid	TR	-	-	-	0
Ethylenediamine	TR	+	+	+	+
Ethylenediamine-tetra acetic acid		+	+	+	+
Ethylether (ether, diethyl ether)	TR	0	0	0	-
Exhaust gases containing acid sulphur	All	+	+	+	+
Exhaust gases containing acid sulphur, damp	All	+	+	+	0
Exhaust gases containing carbon dioxide	All	+	+	+	+
Exhaust gases containing carbon monoxide	All	+	+	+	+
Exhaust gases containing hydrochloric acid	All	+	+	+	+
Exhaust gases containing hydrogen fluoride	S	+	+	+	+
Exhaust gases containing oleum	S	-	-	-	-
Exhaust gases containing oleum	≤ 5	-	-	-	-
Exhaust gases containing sulphur dioxide	All	+	+	+	+
Exhaust gases containing sulphur trioxide (oleum)	S	-	-	-	0
Exhaust gases, nitrous (nitric oxide)	S	+	+	+	+
Exhaust gases, nitrous (nitric oxide)	≤ 5	+	+	+	+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Exhaust gases, nitrous (nitric oxide)	> 5			-	+
Exsiccator fat		+		0	0
Fatty acid amides		+		0	0
Fatty acids	TR	+	+	0	-
Fatty acids, techn. pure	100	+	0		-
Fatty alcohol sulphate	H	+	+	+	+
Fatty alcohol sulphate (cyclanone)	L	+	+	+	+
Fatty alcohols		+		0	0
Fermentation compound (ethyl alcohol + acetic acid)	G	+	+	+	+
Fermentation slurry (ethyl alcohol)	G	+		0	+
Ferric chloride	All	+	+	+	+
Fixing salt (sodium thiosulphate)	All	+	+	+	+
Floor wax		+		0	-
Fluorine	TR	-	-	-	-
Fluoroboric acid		+		0	0
Fluorosilicic acid	40	+	+	+	+
Fluorosilicic acid	32	+	+	+	0
Formaldehyde (FORMALIN)	40	+	+	+	+
Formalin (aqueous formaldehyde)	40	+	+	+	+
Formamide	TR	+	+	+	+
Formic acid	10	+	+	+	+
Formic acid	50	+	+	+	+
Formic acid	85	+	+	+	0
Formic acid	TR	+	+	+	0
Frigen 12 (Freon 12)	100	0		-	0
Fruit juices	G	+	+	+	+
Fruit juices, fermented		+	+	+	+
Fruit juices, unfermented		+	+	+	+
Fruit pulp	H	+	+	+	+
Fruit wine	H	+	+	+	+
Furfurol		+		0	0
Furfuryl alcohol	TR	+	+	+	0
Furniture polish		+		0	-
Gelatine	All	+	+	+	+
Gin	40	+			+
Glucose (grape sugar, dextrose)	All	+	+	+	+
Glue		+	+	+	+
Glycerine	All	+	+	+	+
Glycerine chlorohydrin		+	+	+	0
Glycine	VL	+	+	+	+
Glycol	H	+	+	+	+
Glycolic acid	37	+	+	+	+
Glycolic acid	70	+	+	+	+
Glycolic acid butyl ester		+	+	+	0
Glysantine		+	+	+	+
Grape sugar (glucose, dextrose)	All	+	+	+	+
Gravy		+	+	+	+
Gypsum (calcium sulphate)	GL	+	+	+	+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Hair shampoo		+	+	+	+
Halothane		0		-	-
Heating oil	H	0	-	-	-
Heptane	TR	+	0	0	-
Hexadecanol (cetyl alcohol)		+	+	+	0
Hexafluorosilic acid	All	+	+	+	0
Hexahydrophenol	TR	+	+	+	-
Hexamethylenetetramine	All	+	+	+	+
Hexane	TR	+	0	0	-
Hexanetriol	TR	+	+	+	+
Honey		+	+	0	+
Hydrazine hydrate	TR	+	+	+	+
Hydrazinium hydroxide	L	+	+	+	+
Hydrochloric acid	≤ 28	+	+	+	+
Hydrochloric acid	> 28	+	+	0	+
Hydrocyanic acid	TR	+	+	+	0
Hydrocyanic acid (hydrogen cyanide)	10	+	+	+	+
Hydrocyanic acid (prussic acid)	10	+	+	+	+
Hydrofluoric acid		+			-
Hydrofluoric acid	70	+		0	-
Hydrofluoric acid (fluorhydric acid)	50	+	+	0	-
Hydrogen	TR	+	+	+	+
Hydrogen bromide acid	50	+	+	+	+
Hydrogen bromide, gaseous	TR	+	+	+	+
Hydrogen chloride gas, damp and dry	TR	+	+	+	+
Hydrogen peroxide	10	+	+	+	0
Hydrogen peroxide	30	+	0	0	0
Hydrogen peroxide	90	+	0	-	0
Hydrogen sulphide		+	+	+	0
Hydrogen sulphide, gaseous	GL	+	+	0	0
Hydroquinone	L	+	+	+	0
Hydrosulfite	VL	+	+	+	+
Hydroxylamine sulphate	12	+	+	+	+
Hypochlorous acid		0	0	0	0
Hypochlorous acid		0	0	0	0
Hypophosphite (salt of hypophosphorous acid)	All	+	+	+	
Ink		+	+	+	+
Iodine tincture DAB6	H	+	+	0	0
Iodine-potassium iodide (3% iodine)		+	+	0	0
i-propanol	TR	+	+	+	+
Iron (II) chloride	GL	+	+	+	+
Iron (II) sulphate	All	+	+	+	+
Iron (III) chloride	All	+	+	+	+
Iron (III) nitrate	L	+	+	+	+
Iron (III) sulphate	GL	+	+	+	+
Iron salt	All	+	+	+	+
Isobutyl alcohol		+	+	+	+
Iso-butyric aldehyde (technically pure)	100	+		-	0

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Iso-octane	TR	+	0	0	-
Isopropanol (isopropyl alcohol)	TR	+	+	+	+
Isopropyl acetate	100	+		0	0
Isopropyl ether	TR	0		-	0
Javelle water (sodium hypochlorite)	5	0	0	0	-
Jelly		+	+	+	+
Kaolin elutriated/ground	All	+	+	+	+
Kerosene (petroleum)	TR	0	0	0	-
Ketone		0	0	0	0
Lactic acid	All	+	+	+	0
Lactose		+	+	+	+
Lanolin (wool fat)	TR	0	0	0	0
Latex (rubber dispersions)		+	+	+	+
Lead (II) acetate	All	+	+	+	+
Lead tetraethyl	TR	+			0
Lemon aroma		+			0
Lemon juice		+	+	+	+
Lemon zest oil		+			-
Lemonades		+			+
Levoxin 15 (hydrazine hydrate)	TR	+	+	+	+
Lime water		+	+	+	+
Limescale (calcium carbonate)	GL	+	+	+	+
Linseed oil	TR	+	+	+	0
Lipoides (lecithins; emulsifiers)	All	+	+	+	
Liquid soap		+	+	+	+
Lithium bromide		+	+	+	+
Lubricating oils	H	0	0	0	-
Lysoform (disinfectant; aqueous solution div. higher aldehydes)	VL	+	+	0	
Lysol (cresol soap solution)		+		0	+
Machine oil (free from aromatic compounds)	TR	0		0	-
Magnesium carbonate	GL	+	+	+	+
Magnesium chloride	All	+	+	+	+
Magnesium fluosilicate		+	+	+	+
Magnesium hydroxide	GL	+	+	+	+
Magnesium iodide		+	+	+	+
Magnesium salts	All	+	+	+	+
Magnesium sulphate	All	+	+	+	+
Magnesium sulphate (Epsom salt)	All	+	+	+	+
Maleic acid	GL	+	+	+	0
Malic acid	1	+	+	+	+
Malic acid	50	+	+	+	+
Malic acid	GL	+	+	+	+
Manganese sulphate		+	+	+	+
Margarine		+	+	+	-
Marmelade	H	+	+	+	+
Mashed potatoes		+	+	+	+
Mayonnaise		+			0
Menthol	TR	+	+	0	-

Flow substance	Share	Geberit PE			EPDM seal
		Behaviour at			Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Mercury	TR	+	+	+	+
Mercury chloride	TR	+	+	+	+
Mercury salt	GL	+	+	+	+
Mersol D (compound of higher paraffin sulfonate acid chlorides)	100	-			
Metal soaps		+	+	+	+
Metallic mordants		+			+
Methacrylic acid		+	+	+	0
Methane, gaseous	TR	+			-
Methanol (methyl alcohol)	All	+	+	+	+
Methol (4-methylaminopheno sulphate) (photo developer)	VL	+			0
Methoxybutanol	TR	+	+	0	0
Methoxybutyl acetate (butoxyl)		+		0	0
Methyl acrylate		+	+	+	-
Methyl alcohol (methanol)	All	+	+	+	+
Methyl benzene (toluol)	TR	0	-	-	-
Methyl bromide, gaseous	TR	0	0	-	-
Methyl chloride	TR	0	-	-	-
Methyl chloroacetate	TR	+	+	+	-
Methyl ethyl ketone	TR	+	0	-	0
Methyl glycol		+	+	+	0
Methyl methacrylate		+	+	+	-
Methyl propyl ketone		+		0	0
Methyl salicylate		+		0	-
Methyl sulphuric acid	50	+	+	+	-
Methyl sulphuric acid	100	0			-
Methylacetate	TR	+	+		-
Methylamine	32	+			+
Methylcyclohexane		0		-	-
Methylene chloride	TR	0	0	-	-
Methylisobutylketone		+		-	0
Milk	H	+	+	+	0
Mineral water	H	+	+	+	+
Mixed acid I (sulphuric acid/nitric acid/water):					
• 48/49/3		-	-	-	-
• 50/50/0		-	-		-
• 10/87/3		-			-
• 50/31/19		-			-
• 50/33/17		-			-
• 10/20/70		0			0
Mixed acid II (sulphuric acid/phosphoric acid/water): - 30/60/10		+	0		0
Molasses		+	+	+	+
Mono ethylamine	All	+	+	+	+
Monochlorbenzene		0		-	-
Monochloroacetic ethylester	100	+	+	+	-
Monochloroacetic methylester	100	+	+	+	-
Morpholine	TR	+	+	+	0
Mowilith dispersions		+	+	+	+
Nail polish		+		0	+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Nail polish remover		+		0	0
Naphta	H	0		0	-
Naphthalene	TR	0		0	-
Natural gas	H	+			-
Nekal BX (wetting agent; sodium salts div. isopropyl naphtalene sulphonic acids)	All	+	+	+	
Nickel chloride	GL	+	+	+	+
Nickel nitrate	GL	+	+	+	+
Nickel salts	GL	+	+	+	+
Nickel sulphate	All	+	+	+	+
Nicotine		+	+	+	-
Nicotinic acid	VL	+	+		+
Nitric acid	6.3	+	+	+	+
Nitric acid	25	+	+	+	+
Nitric acid	40	0	0	-	0
Nitric acid	50	0	0	-	0
Nitric acid	65	0	-	-	-
Nitric acid	75	-	-	-	-
Nitrobenzol	TR	+	+	0	-
Nitrocellulose		+			0
Nitrogen (gaseous)	All	+	+	+	+
Nitrotoluenes	TR	+	+	0	-
Nitrous gases	≤ 5	+	+	+	+
N-methylpyrrolidone		+	+	+	0
Nolan diluter		+	+		-
Nolan varnish		+	+		
Nonyl alcohol (Nonanol)		+	+	+	+
Nut oil		+		0	0
Nutrient salt	All	+	+	+	+
Octylcresol	TR	0		-	-
Oils, ethereal		0		-	-
Oils, mineral without additives		0		0	-
Oils, mineral, free from aromatic compounds	H	0	0	0	-
Oils, vegetable and animal	H	+	0	0	-
Oleic acids	TR	+		0	-
Olein (oleic acid)		+	-	0	-
Oleum vapours	TR	-	-	-	0
Oleum vapours (sulphur trioxide)	≤ 5	-			0
Oleum, 10% SO3		-	-	-	-
Optical brighteners		+	+	+	+
Orange juice		+	+	+	+
Orange peel oil		+			-
Oxalic acid	GL	+	+	+	0
Oxygen	TR	+	+	0	+
Ozone	GL	0	-	-	+
Ozone, gaseous 2 %		0	-	-	+
Ozone, gaseous 50 pphm		0		-	+
P 3 7221	VL	+	+		+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
P 3 Galvaclean 20	VL	+	+		+
P 3 Galvaclean 42 = P 3 S	VL	+	+		+
P 3 Galvaclean 44	VL	+	+		+
P 3 Galvaclean 45	VL	+	+		+
P 3 Galvaclean 65	VL	+	+		+
P 3 Manuvo hand cleaner	VL	+	+		+
P 3 Saxim	VL	+	+		+
P 3 Standard	VL	+	+		+
Palm kernel fatty acid	TR	+		-	-
Palm kernel oil		+	+	0	0
Palm oil	H	+	+	0	0
Palmitic acid		+	+	+	-
Palmityl alcohol		+	+	+	0
Paraffin	100	+	+	+	-
Paraffin emulsion	H	+	+	0	0
Paraffin oil	TR	+	+	0	-
Paraformaldehyde		+	+	+	+
p-Butylphenol	TR	0			-
Pectin	GL	+	+	+	+
Pentanol	TR	+	+	+	+
Peppermint oil	TR	+			-
Perchlorethylene	TR	0	0	-	-
Perchloric acid	20	+	+	+	0
Perchloric acid	50	+		0	0
Perchloric acid	70	+	0	-	-
Perfume		+			-
Perhydrol (hydrogen peroxide, aqueous solution)	40	+	0	0	0
Pesticide	G	+	+	+	0
Petrolether	TR	+	0	0	-
Petroleum (kerosene)	TR	0	0	0	-
Petroleum (Normal)	H	+	0	0	-
Petroleum ether (benzine, free from aromatic compounds)	100	+	0	0	-
Petroleum spirit (white spirit)	TR	0	0	0	-
Petroleum without additives		0		0	-
Petroleum, free from aromatic substances	H	0	0	0	-
Petroleum, unleaded and free from aromatic compounds	H	0	0	0	-
Petroleum-benzene compound	80/20	0		0	-
Phenol	All	+	+	+	-
Phenol (carbolic acid)	All	+	0	0	-
Phenolic resin moulding compound		+	+	+	0
Phenylamine (aniline)	GL	0	0	0	-
Phenylethyl alcohol		+	+	+	-
Phenylhydrazine	TR	0		-	-
Phenylhydrazine hydrochloride		+		-	+
Phenylsulphonate (sodium dodecylbenzene sulphonate)		+	+	+	+
Phosgene, gaseous	TR	-	-	-	-
Phosgene, liquid	TR	-			-
Phosphate	All	+	+	+	+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Phosphoric acid	50	+	+	+	+
Phosphoric acid	85	+	+	0	+
Phosphoric pentoxide	100	+	+	+	+
Phosphoric trichloride	TR	+	+	0	+
Phosphorous oxychloride		+	+	0	+
Photo developer	H	+	+	+	0
Photo fixing bath	H	+	+		+
Photographic developer	H	+	+	+	+
Photographic emulsion	H	+	+	+	+
Phthalic acid	50	+	+	+	+
Phthalic acid	GL	+	+	+	+
Phthalic acid ester		+		0	0
Picric acid	10	+	+		0
Picric acid	GL	+	+		0
Pinda oil		+	+	+	-
Pine needle oil	H	+	0	0	-
Pine needle oil		+		0	-
Pineapple juice		+	+	+	+
Polychlorinated diphenyl (PCB)		+		-	-
Polyester resins		0		-	-
Polyester softener		+		0	0
Polyglycol		+	+	+	+
Potash (potassium carbonate)	All	+	+	+	+
Potassium aluminium sulphate (alum)	All	+	+	+	+
Potassium bichromate (potassium dichromate)	All	+	+	+	+
Potassium bisulphate	All	+	+	+	+
Potassium borate	10	+	+	+	+
Potassium borate	GL	+	+	+	+
Potassium bromate	VL	+	+	+	+
Potassium bromate	GL	+	+	0	+
Potassium bromide	All	+	+	+	+
Potassium cadmium cyanide	All	+	+	+	+
Potassium carbonate	All	+	+	+	+
Potassium carbonate (potash)	All	+	+	+	+
Potassium chlorate	All	+	+	+	+
Potassium chloride	All	+	+	+	+
Potassium chromate	40	+	+	+	+
Potassium chromate	GL	+	+	+	+
Potassium cyanide	All	+	+	+	+
Potassium cyanide	All	+	+	+	+
Potassium dichromate (potassium bichromate)	All	+	+	+	+
Potassium ferricyanide	All	+	+	+	+
Potassium ferrocyanide (yellow prussiate of potash)	All	+	+	+	+
Potassium fluoride	All	+	+	+	+
Potassium hydroxide (caustic potash)	50	+	+	+	+
Potassium hydroxide (caustic potash)	50	+	+	+	+
Potassium iodide	All	+	+	+	+
Potassium nitrate	All	+	+	+	+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Potassium perborate		+	+	+	+
Potassium perchlorate	GL	+	+	+	+
Potassium permanganate	20	+	+	+	+
Potassium permanganate	GL	+	+	0	+
Potassium persulphate	All	+	+	+	+
Potassium phosphate	All	+	+	+	+
Potassium sulphate	All	+	+	+	+
Potassium sulphite	L	+	+	+	+
Potassium sulphite		+	+	+	+
Potassium tetracyanocuprate		+	+	+	+
Potassium thiosulphate		+	+	+	+
Propane, gaseous	TR	+	+	+	-
Propane, liquid	TR	+	+		-
Propargyl alcohol	7	+	+	+	+
Propionic acid	50	+	+	+	0
Propionic acid	TR	+	0	0	0
Propylene chloride	100	-			-
Propylene glycol	TR	+	+	+	+
Propylene oxide	TR	+	+	+	-
Prussiate of potash (yellow and red)	All	+	+	+	+
Pseudocumol		0		0	-
Pure acetic acid	TR	+	0	0	-
Pyridin	TR	+	0	0	-
Quinine		+	+	+	+
Rectified spirit (ethanol, ethyl alcohol, alcohol)	96	+	+	+	+
Red prussiate of potash	All	+	+	+	+
Roaster gases, dry	All	+	+	+	+
Rubber dispersions (latex)		+	+	+	+
Rum	40	+	+	+	+
Saccharic acid	GL	+			+
Salicylic acid	GL	+	+	+	+
Salicylic acid methyl ester (methyl salicylate)		+		0	-
Salt (sodium chloride)	All	+	+	+	+
Saturated vapour concentration		+	+	+	+
Scented oils		0		-	-
Sea water	H	+	+	+	+
Sea water	H	+	+	+	+
Sebum	TR	+	+	0	-
Shoe polish		+		0	-
Silicic acid	All	+	+	+	+
Silicone oil	TR	+	+	+	+
Silver nitrate	All	+	+	+	+
Silver salts	GL	+	+	+	+
Slurry		+	+	+	+
Slurry		+	+	+	+
Soap solution	All	+	+	+	+
Soda (sodium carbonate)	All	+	+	+	+
Soda water (carbonic acid)	All	+	+	+	+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Sodium acetate	All	+	+	+	+
Sodium aluminium sulphate		+	+	+	+
Sodium benzoate	36	+	+	+	+
Sodium benzoate (benzoic acid sodium)	GL	+	+	+	+
Sodium bisulphite (sodium hydrogen sulphate)	GL	+	+	+	+
Sodium borate		+	+	+	+
Sodium bromate	L	+	0		+
Sodium bromide	L	+	+	+	+
Sodium carbonate (soda)	All	+	+	+	+
Sodium carbonate (sodium hydrogen carbonate)	GL	+	+	+	+
Sodium chlorate	All	+	+	+	+
Sodium chloride (salt)	All	+	+	+	+
Sodium chlorite	VL	+			0
Sodium chlorite	20	+	0	-	0
Sodium chlorite bleach	H	0		-	-
Sodium chromate	VL	+			+
Sodium copper cyanide	All	+	+		+
Sodium cyanide	GL	+	+	+	+
Sodium dichromate	GL	+	+	+	+
Sodium disulphite (sodium bisulphite)	All	+	+	+	+
Sodium dithionite	VL	+	+	+	+
Sodium dodecyl benzene sulphonate (phenylsulphonate)		+	+	+	+
Sodium ferricyanide	GL	+	+	+	+
Sodium fluoride	GL	+	+	+	+
Sodium hydrogen carbonate (sodium bicarbonate)	GL	+	+	+	+
Sodium hydrogen sulphate (sodium bisulphate)	10	+	+	+	+
Sodium hydrogen sulphate (sodium bisulphate)	All	+	+	+	+
Sodium hydroxide (caustic soda)	All	+	+	+	+
Sodium hypochlorite	12.5	0	-	-	-
Sodium hypochlorite (javel water)	5	+	0	0	0
Sodium hypochlorite solution with 12.5 % active. Chlorine		0	-	-	-
Sodium iodide	L	+			+
Sodium iron cyanide		+	+	+	+
Sodium nitrate	All	+	+	+	+
Sodium nitrite	All	+	+	+	+
Sodium oxalate	GL	+			+
Sodium perborate	All	+		0	+
Sodium perchlorate		+	+	+	+
Sodium peroxide	10	+	+	+	0
Sodium peroxide	GL	0			0
Sodium peroxodisulphate (sodium persulphate)	GL	+	+	+	+
Sodium phosphate	GL	+	+	+	+
Sodium silicate (soluble glass)	All	+	+	+	+
Sodium sulphate	All	+	+	+	+
Sodium sulphate (Glauber salt)	All	+	+	+	+
Sodium sulphide	All	+	+	+	+
Sodium sulphite	GL	+	+	+	+
Sodium thiosulphate (fixing salt)	All	+	+	+	+

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Soft soap		+	+	+	+
Soluble glass (sodium silicate)	All	+	+	+	+
Soya oil		+	+	+	0
Spermaceti		+		0	-
Spindle oil	TR	0	0	0	-
Spirit of wine (ethyl alcohol, ethanol, rectified spirit)	96	+	+	+	+
Spirits	H	+		+	+
Stain removal		0	0	0	-
Starch	All	+	+	+	+
Starch syrup	All	+	+	+	+
Stearic acid	TR	+	+	0	+
Styrol		0		-	-
Sublimed sulphur (elementary sulphur in powder form)	TR	+	+	+	+
Succinic acid	All	+	+	+	+
Suet		+	+	0	0
Sugar solutions	All	+	+	+	+
Sugar syrup	H	+	+	+	+
Sulfuryl chloride	TR	-	-	-	0
Sulphate	All	+	+	+	+
Sulphur	TR	+	+	+	+
Sulphur dioxide, gaseous, dry and damp	TR	+	+	+	+
Sulphur dioxide, liquid	TR	0		0	+
Sulphur trioxide	TR	-	-	-	-
Sulphur trioxide (oleum vapours)	≤ 5	-			0
Sulphurous acid	GL	+	+	+	0
Table salt, saturated (brine)	100	+	+	+	+
Tannic extract from cellulose	H	+	+	+	0
Tannic extract, vegetable	H	+			0
Tannin	10	+	+	+	0
Tannin	10	+	+	+	+
Tar		+		0	-
Tartaric acid	All	+	+	+	0
Tea	GL	+	+	+	+
Tetrabromoethane		-	-	-	-
Tetrachloroethane	TR	-	-	-	-
Tetrachloroethylene	TR	0	0	-	-
Tetrahydrofuran	TR	-	-	-	-
Tetralin	TR	0	0	-	-
Thionyl chloride	TR	-	-	-	+
Thiophene	TR	0	0	-	-
Thiourea	All	+	+		+
Tin (II) chloride	All	+	+	+	0
Tiutol (hypochlorite) (chlorine bleaching, Javelle water)	12.5	0	-	-	-
Toluene		+		0	-
Toluol (methylbenzene)	TR	0	-	-	-
Tomato juice		+	+	+	+
Transformer oil	TR	0		0	-
Treacle	H	+	+	+	0

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Treacle	All	+	+	+	+
Tri-2-chloroethyl phosphate		+	+	+	-
Tributyl phosphate	TR	+	+	+	+
Trichloroacetic acid	50	+	+	+	0
Trichloroacetic acid	TR	+	0	-	0
Trichlorobenzene		-	-	-	-
Trichloroethane	TR	0			-
Trichloroethane, gaseous	100	0	-	-	-
Trichloroethylene	TR	0	-	-	-
Trichlorofluorethane (Frigen 11, Sdp. 24 °C)	100	0	-		-
Tricresylphosphate	TR	+	+	+	0
Triethylene glycol		+	+	+	+
Trilon		+	+	+	+
Trimethylborate		+		-	0
Trimethylolpropane		+	+	+	+
Trioctyl phosphate	TR	+	+	0	0
Trisodium phosphate		+	+	+	+
Turpentine oil	TR	0	0	0	-
Two-stroke oil		0		0	-
Typewriter oil		+	+	0	-
Universal dilution		0	0		-
Urea nitrate	33	+	+	+	+
Uric acid	GL	+	+	+	+
Urine		+	+	+	+
Vaseline oil	TR	0	0	0	-
Vinegar (wine vinegar)	H	+	+	+	0
Vinyl acetate	TR	+	+	0	-
Viscose spinning solutions		+	+	+	-
Vitamin C (ascorbic acid)		+	+	+	+
Walnut oil		+		0	0
Washing detergent	G	+	+	+	+
Washing-up liquid		+	+	+	+
Washing-up liquid	H	+	+	+	+
Water, chlorinated drinking water		+	+	+	+
Water, de-ionised		+	+	+	+
Water, demineralised		+	+	+	+
Water, distilled		+	+	+	+
Water, ozonised drinking water		+			+
Wax		+		0	0
Wax alcohols	TR	0	0	-	0
Wetting agent	5	+			+
Whey		+	+	+	+
Whisky	H	+			+
White spirit	TR	0	0	0	-
Wine	H	+	+	+	+
Wine vinegar (vinegar)	H	+	+	+	0
Wood stain	G	+		0	0
Wool fat (lanolin)	TR	0	0	0	0

Flow substance	Share	Geberit PE Behaviour at			EPDM seal Behaviour at
	%	20 °C	40 °C	60 °C	20 °C
Xylol (mixed isomers)	TR	-	-	-	-
Yeast	All	+	+	+	+
Yeast wort (aqueous solution of maltose and dextrines)	L	+	+	+	+
Zapon dilution		0	0		-
Zinc carbonate	GL	+	+	+	+
Zinc chloride	All	+	+	+	+
Zinc dust	All	+	+	+	+
Zinc oxide	GL	+	+	+	+
Zinc salts	All	+	+	+	+
Zinc sludge		+	+	+	+
Zinc stearate		+	+	+	+
Zinc sulphate	All	+	+	+	+

2.3 Technical data

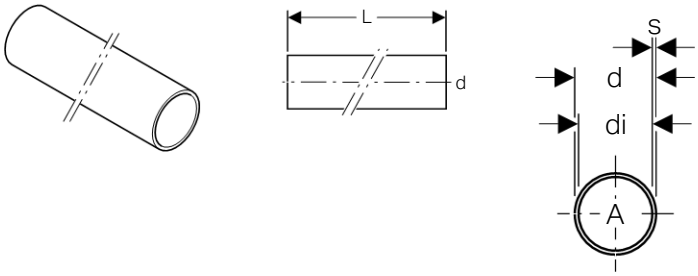
2.3.1 Permitted internal pressure

The Geberit HDPE product range was essentially designed for drainage systems. Geberit has configured the maximum permitted load values for the low pressure range (e.g. pump pressure pipes) to ensure a service life of 10 years.

Pressure	max. 1.5 bar, up to dimension ø 160
Temperature	30 °C

All connections must be made tension resistant.

Geberit HDPE system



dø [mm]	di [mm]	A [cm²]	s [mm]	Permitted internal negative pressure [1] [bar]	Pressure nominal [2] PN [bar]	Series (ISO) S	Weight per m empty [kg]	Weight per m full [kg]	Article no.	Reece code
40	34	9	3	0.96	8.1	6.3	0.33	1.23	360.000.16.0	1430000
50	44	15.2	3	0.47	6.4	8.3	0.46	1.98	361.000.16.0	1430002
56	50	19.6	3	0.33	5.7	-	0.48	2.44	363.000.16.0	1430004
63	57	25.4	3	0.23	5	10	0.61	3.15	364.000.16.0	1430006
75	69	37.3	3	0.13	4.1	12.5	0.73	4.46	365.000.16.0	1430008
90	83	54.1	3.5	0.12	4	12.5	0.96	6.37	366.000.16.0	1430010
110	101.4	80.7	4.3	0.12	4	12.5	1.49	9.56	367.000.16.0	1430012
125	115.2	104.5	4.9	0.13	4	12.5	1.90	12.35	368.000.16.0	1430014
160	147.6	171.1	6.2	0.11	4	12.5	3.00	20.11	369.000.16.0	1430016
200	187.6	276.4	6.2	0.06	3.2	16	3.62	31.26	370.000.16.0	1430018
200	184.6	268.4	7.7	0.11	4	12.5			370.050.16.0	14300027
250	234.4	431.5	7.8	0.06	3.2	16	5.48	48.63	371.000.16.0	1430020
250	230.6	418.2	9.7	0.12	4	12.5			371.050.16.0	14300028
315	295.4	685.3	9.8	0.06	3.2	16	9.66	78.19	372.000.16.0	1430022
315	290.6	663.8	12.2	0.12	4	12.5			372.050.16.0	14300029

[1] Pressure at max. 20 °C and 50 years' service life with a safety factor of 2.0

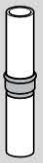
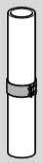
[2] Nominal pressure refers to pipe only, not to fittings

Standards:
- Australia AS/NZS 4401/AS/NZS 5065
- International ISO 8770 / 8772
- European CEN / TC 155 / CEN EN 12056
- Switzerland SN 592 000
- Germany DIN 8075 / 19535 / 19537
- Austria B 5177
- France NF T 54 072
- Italy UNI 8451
- Belgium NBN 42-112
- Netherlands NEN 7008
- Denmark NKB Nr. 8
- Great Britain BS /6367/5572/6437/5114
- Singapore PSB/ENV

2.4 Connection types

The numerous Geberit connection technologies offer solutions for every situation and every connection type.

Table 4: Connection types

Connection type		Tension resistant		Non-tension resistant
		removable	unremovable	removable
	Butt welding		✓	
	Electrofusion sleeve coupling		✓	
	Electrofusion coupling with integrated thermal fuse		✓	
	Expansion socket			✓
	Ring seal socket			✓
	Flange	✓		
	Screw connection without flange bushing			✓
	Screw connection with flange bushing	✓		
	Clamp			✓

2.5 Installation rules

2.5.1 HDPE pipes embedded in concrete

For pipelines which are firmly welded and completely embedded in concrete, the expansion on heating and shrinkage on cooling of HDPE is absorbed by the material itself, due to its high elasticity. The forces which apply when expansion is prevented are considerable for large dimensions.

The fittings must withstand these forces alone as the pipe does not absorb any adhesive force with the concrete. The fittings should therefore be embedded in concrete in a particularly compact matter.

- Reduced branch fittings must be secured by installing electrofusion sleeve couplings
- Connections must be made with butt welding or electrofusion sleeve couplings
- Geberit HDPE pipes and fittings should be inserted in such a way that they are held in position when embedding in concrete, e.g. by fastening on to the formwork
- Pipe must be filled with water during the curing process
- Maximum allowable operating fluid temperature of 40 ° C for pipes encased in concrete must be observed

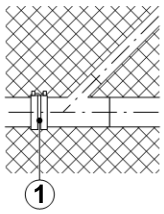


Figure 2: Design with electrofusion sleeve coupling

1 Electrofusion sleeve coupling

Do not install any expansion sockets.

Design for an anchor bracket on a pipe section embedded in concrete in a straight line:

- Electrofusion sleeve coupling
- Flange bushing
- Equal branch fitting embedded in concrete

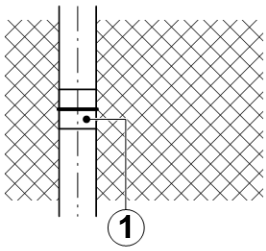


Figure 3: Design with flange bushing

1 Flange bushing

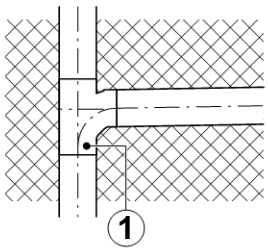


Figure 4: Design with equal branch fitting embedded in concrete

1 Equal branch fitting

AS/NZS 3500.2:2003 specifies:
Clause 9.4.3 High density polyethylene (HDPE) ...
(iii) when fully encased in concrete structures, subject to the approval of a structural engineer, pipes and fittings shall be installed in accordance with the manufacturer's installation instructions.

AS/NZS 2033:2008 specifies:
Clause 5.3.6 Encasement in concrete
Where pipes are to be encased in concrete precautions shall be taken to prevent movement, flotation or deformation of pipes while pouring concrete.
Setting of Geberit HDPE pipes in concrete
All rigidly jointed pipework (e.g. butt and electrofusion welded) may be completely enclosed in concrete within the building structure without a protection layer (e.g. lagging). The installation and the structure have to be designed for such total enclosure. The thrust forces generated from the expansion and contraction of the pipework have to be taken into consideration with this installation method. The manufacturer's and engineer's recommendations shall be strictly followed in such applications.

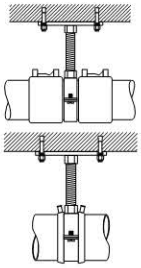
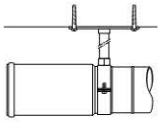
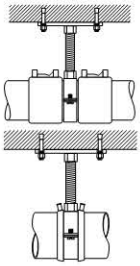
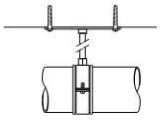
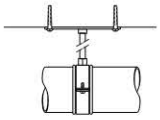
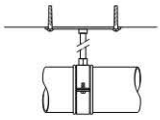
Refer also to AS/NZS3500.2
For additional information contact Geberit Pty Ltd.

2.5.2 Overview of fastening

The thermal expansion or contraction caused through temperature differences is 0.2 mm/m·K for HDPE.

The fixing method used to manage thermal expansion is controlled in different ways depending on the application.

Table 5: Overview of pipe fixation

Rigid installation (Pluvia, in slab installations, some vertical stack installations)	Sliding installation (trade waste and conventional drainage installations)	
	Fastening with expansion socket	Fastening with deflection leg
The thermal expansion needs to be transfered through the anchor brackets into the building.	The change in length caused by thermal expansion needs to be considered in the pipe routing to prevent deflection.	
 Anchor bracket, constructed with electrofusion sleeve couplings	 Anchor bracket	 Anchor bracket, constructed with electrofusion sleeve couplings
 Guide bracket	 Guide bracket	 Guide bracket

Geberit recommends fastening with expansion socket.

2.5.3 Fastening with expansion socket

Fixing bracket clearances from ceiling and walls with expansion sockets

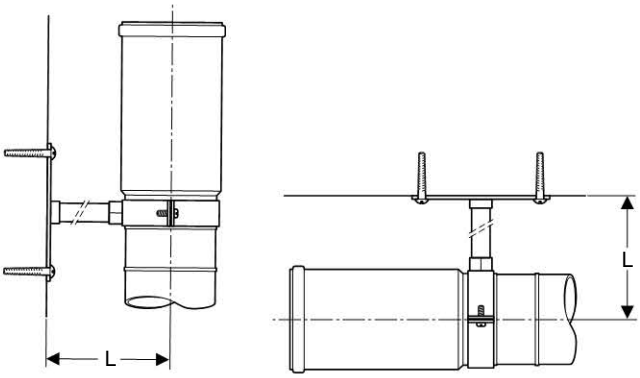


Figure 5: Anchor bracket

Table 6: Pipe nipple diameters and distance from ceiling and walls

Ceiling distance L	Diameters of Geberit HDPE pipe						
	ø 50/56/63/75/90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
[mm]	Pipe nipple used						
100	1/2"	1/2"	1/2"	–	–	–	–
150	1/2"	1/2"	1/2"	1/2"	–	–	–
200	1/2"	1/2"	1/2"	1/2"	3/4"	1"	–
250	1/2"	1/2"	1/2"	3/4"	1"	1"	5/4"
300	1/2"	1/2"	1/2"	3/4"	1"	5/4"	5/4"
350	1/2"	1/2"	1/2"	1"	1"	5/4"	1 1/2"
400	1/2"	1/2"	3/4"	1"	1"	5/4"	1 1/2"
450	1/2"	1/2"	3/4"	1"	5/4"	5/4"	1 1/2"
500	1/2"	3/4"	3/4"	1"	5/4"	1 1/2"	2"
550	1/2"	3/4"	3/4"	1"	5/4"	1 1/2"	2"
600	1/2"	3/4"	1"	1"	5/4"	1 1/2"	2"

Geberit HDPE expansion socket

The change in length of the pipes and fittings must be controlled in the expansion socket. Anchor brackets and sliding brackets must be used for this form of installation type.

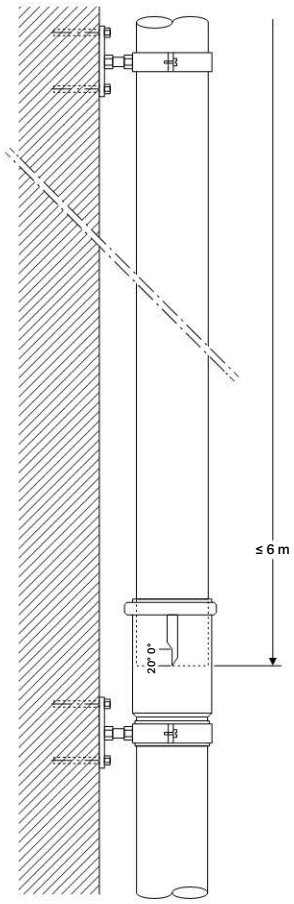


Figure 6: An expansion socket is required every 6 m or pipe length

Geberit HDPE expansion socket insertion depth

The slide-in length depends on the installation temperature. At an installation temperature of 20 °C, the slide-in depth is 105 mm, at 0 °C, it is only 80 mm.

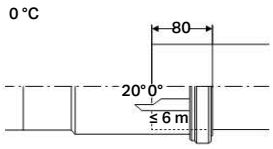


Figure 7: The insertion depth of the expansion socket at 0 °C ambient temperature

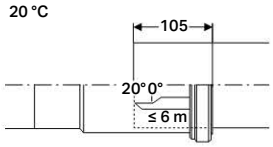
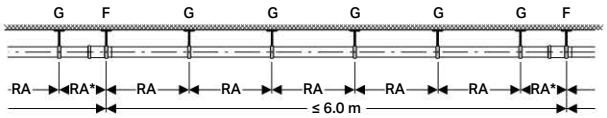


Figure 8: The insertion depth of the expansion socket at 20 °C ambient temperature

Table 7: Insertion depth

dø [mm]	Ambient temperature			
	–10 °C	±0 °C	+10 °C	+20 °C
	Insertion depth [mm]			
50–160	60	80	90	105
200–315	170	180	190	205

Sliding and anchor brackets when fastening on the ceiling

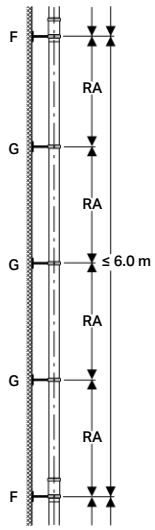


G Sliding bracket
F Anchor bracket
RA Distance between pipe brackets
RA* Distance of anchor bracket to next sliding bracket

Table 8: Fastening distances on ceilings

dø [mm]	RA [m]	RA* [m]
40	0.8	0.4
50	0.8	0.4
56	0.8	0.4
63	0.8	0.4
75	0.8	0.4
90	0.9	0.5
110	1.1	0.6
125	1.3	0.7
160	1.6	0.8
200	2.0	1.0
250	2.0	1.0
315	2.0	1.0

Sliding and anchor brackets when fastening on the wall



G Sliding bracket
F Anchor bracket
RA Distance between pipe brackets

Table 9: Fastening distances on walls

dø [mm]	RA [m]
40	1.0
50	1.0
56	1.0
63	1.0
75	1.2
90	1.4
110	1.7
125	1.9
160	2.4
200	3.0
250	3.0
315	3.0

Anchor bracket when fastening on the ceiling

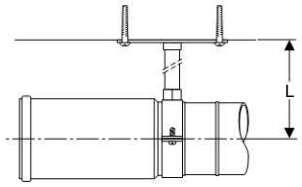


Table 10: Anchor bracket when fastening on the ceiling, fastening with expansion sockets

Ceiling distance L [cm]	Dimension											
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
10	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	–	–	–	–
20	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	1"	1"	1"
30	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	1"	1"	1 1/4"	2"
40	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1 1/4"	1 1/4"	2"
50	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1 1/4"	1 1/2"	2"
60	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1 1/4"	1 1/4"	2"	2"

Anchor bracket when fastening on the wall

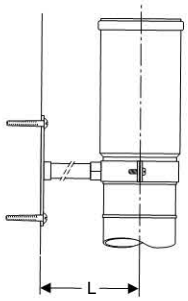


Table 11: Anchor bracket when fastening on the wall, fastening with expansion sockets

Wall distance L [cm]	Dimension											
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
10	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	–	–	–	–
20	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1 1/4"	1 1/4"
30	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1 1/4"	1 1/4"	1 1/2"
40	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1 1/4"	1 1/2"	2"
50	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1 1/4"	1 1/2"	2"	2"
60	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"	1 1/4"	1 1/2"	2"	–

Commercially available products can be used to create the anchor brackets.

Sliding bracket when fastening on the ceiling

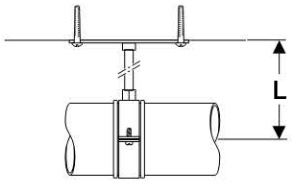


Table 12: Sliding bracket when fastening on the ceiling

Ceiling distance L [cm]	Dimension											
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
10	M10	M10	M10	M10	M10	M10	M10	M10	–	–	–	–
20	M10	M10	M10	M10	M10	M10	M10	M10	M10	1"	1"	1"
30	M10	M10	M10	M10	M10	M10	M10	M10	1/2"	1"	1"	1"
40	M10	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1"	1"	1"
50	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1/2"	1"	1"	1"
60	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"

Sliding bracket when fastening on the wall

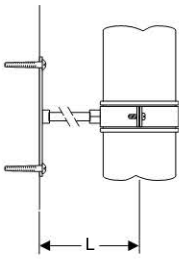


Table 13: Sliding bracket when fastening on the wall

Wall distance L [cm]	Dimension											
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
10	M10	M10	M10	M10	M10	M10	M10	M10	–	–	–	–
20	M10	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1"	1"	1"
30	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1/2"	1"	1"	1"
40	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"
50	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"
60	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"

2.5.4 Fastening with deflection leg

Pipe laying with deflection leg

- The thermal expansion is controlled with the use of anchor brackets and the deflection leg
- The pipe straps must be used in the area of the deflection leg to allow for movement
- The deflection leg must be calculated for each pipe section which branches off or changes direction

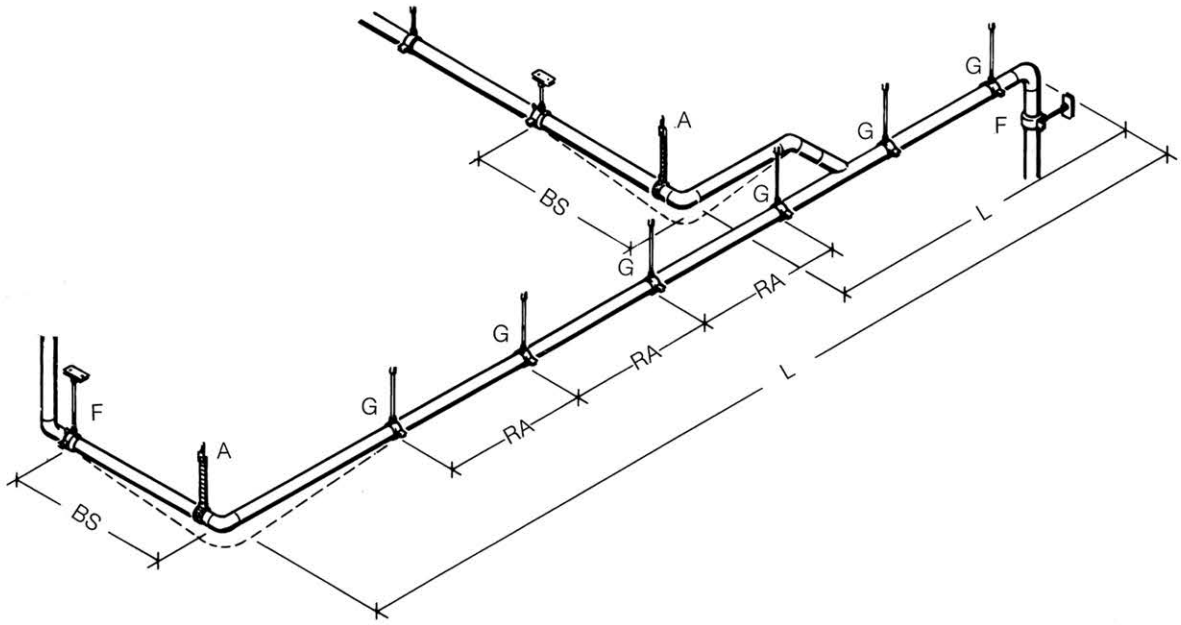


Figure 9: Pipe laying with deflection leg

F Anchor bracket
A Suspension, pipe strap
G Sliding bracket
RA Distance between pipe brackets
BS Deflection leg
L Pipe section in which a change in length can occur

0

Calculating the deflection leg

1. Determining the thermal expansion

The thermal expansion can be determined using figure 10 on page 75:

Given
Maximum temperature = 80 °C
Installation temperature = 20 °C
Temperature differential Δt = 60 °C
Pipe length DS = 4 m

Result
Thermal expansion Δ L = 4.8 cm

2. Calculating the deflection leg

The deflection leg can be determined using figure 11 on page 76 or as follows:

Given
Thermal expansion ΔL = 4.8 cm at ø = 110 mm

Calculation

$$BS = 10 \cdot \sqrt{4{,}8\ \text{cm} \cdot 11\ \text{cm}} = 73\ \text{cm}$$

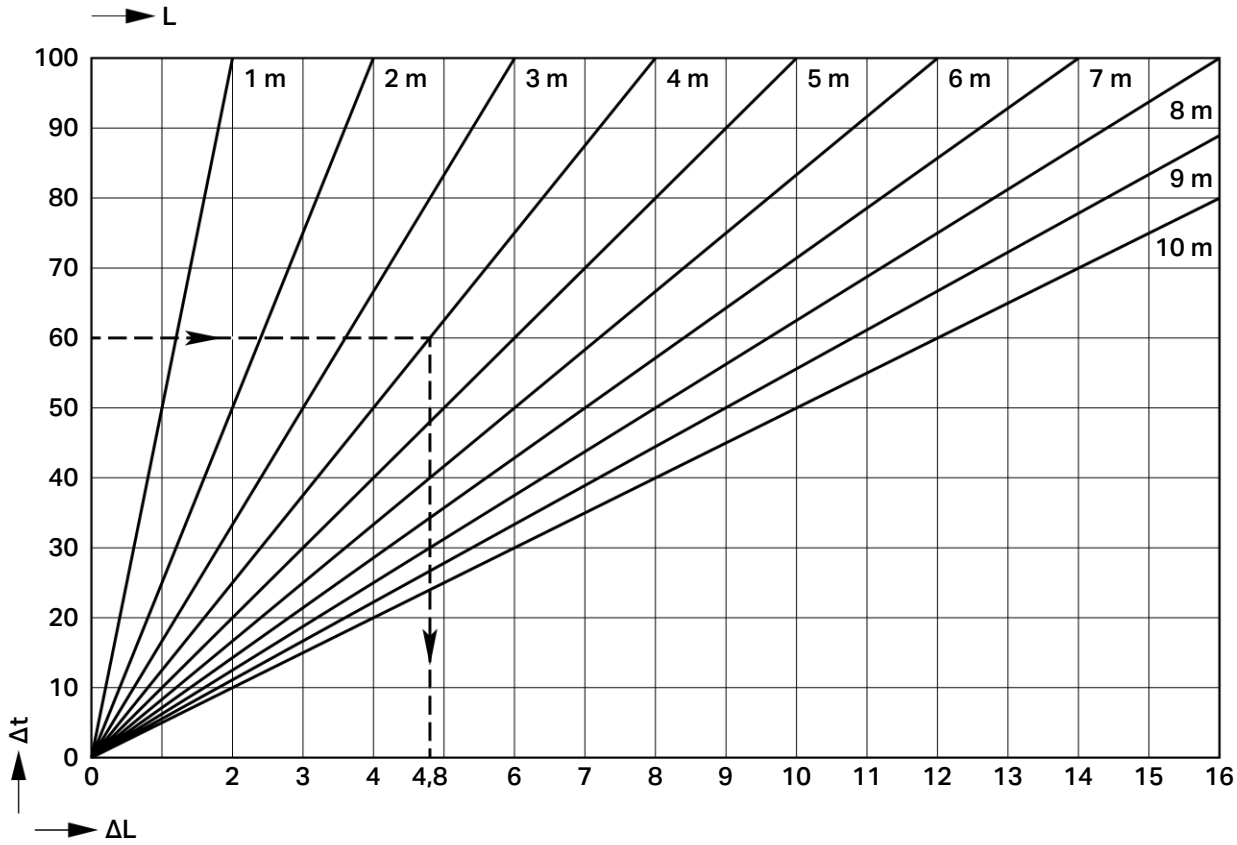


Figure 10: Determining the thermal expansion for HDPE (average linear expansion coefficient: 0.2 mm/m°C)

L Pipe length
Δt Temperature differential [°C]
ΔL Linear expansion or shrinkage [cm]

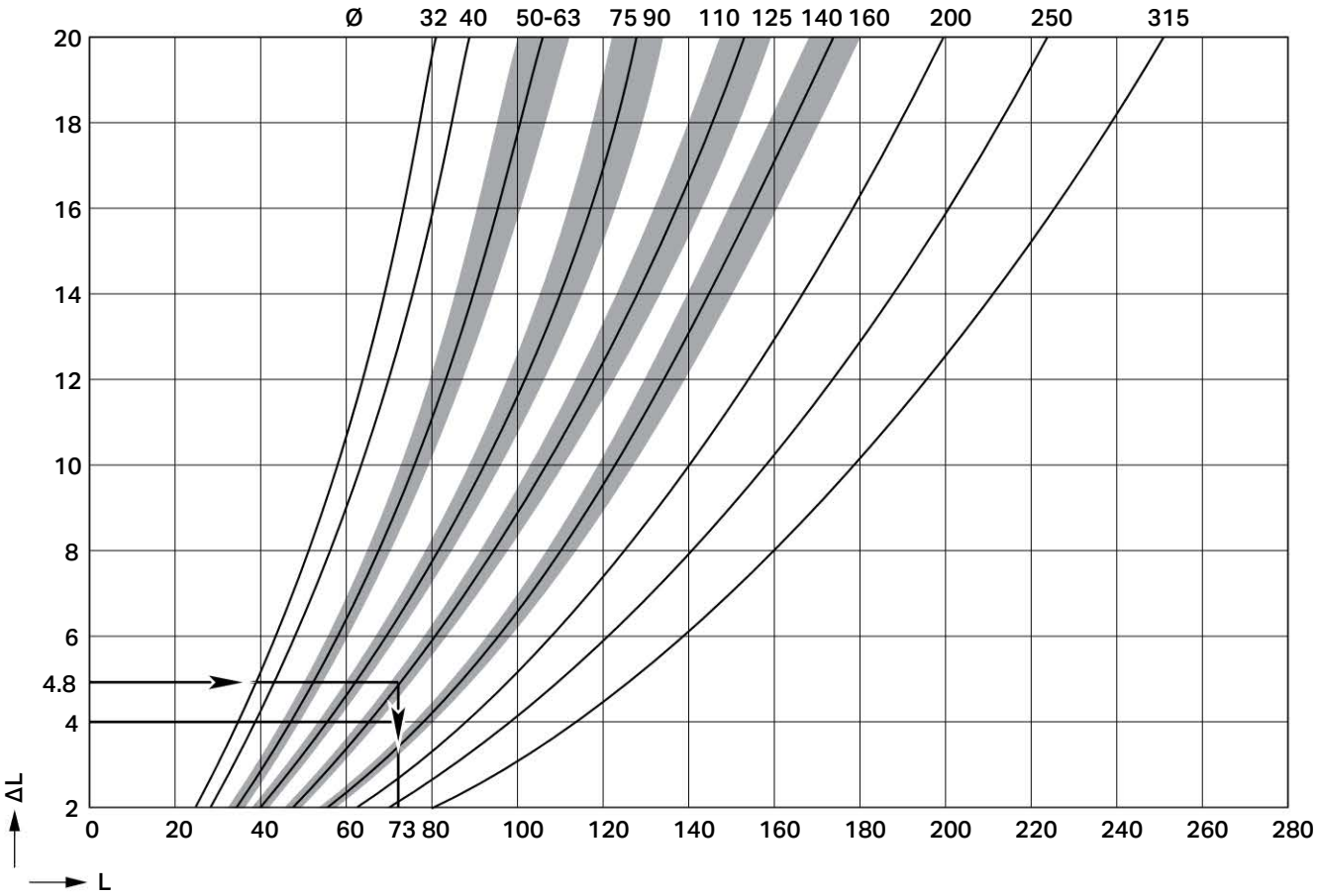


Figure 11: Determining the deflection leg for HDPE

ø Outer diameter
ΔL Change in length of the expansion leg [cm]
L Deflection leg length in [cm]

Sliding bracket when fastening on the ceiling

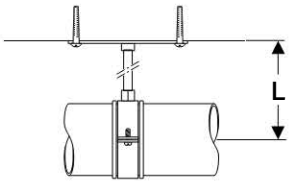


Table 14: Sliding bracket when fastening on the ceiling

Ceiling distance L [cm]	Dimension											
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
10	M10	M10	M10	M10	M10	M10	M10	M10	–	–	–	–
20	M10	M10	M10	M10	M10	M10	M10	M10	M10	1"	1"	1"
30	M10	M10	M10	M10	M10	M10	M10	M10	1/2"	1"	1"	1"
40	M10	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1"	1"	1"
50	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1/2"	1"	1"	1"
60	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"

Sliding bracket when fastening on the wall

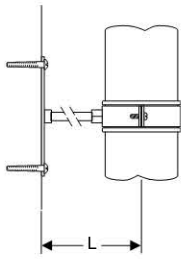


Table 15: Sliding bracket when fastening on the wall

Wall distance L [cm]	Dimension											
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
10	M10	M10	M10	M10	M10	M10	M10	M10	–	–	–	–
20	M10	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1"	1"	1"
30	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1/2"	1"	1"	1"
40	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"
50	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"
60	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"

Anchor bracket with Geberit electrofusion sleeve coupling or electrofusion tape

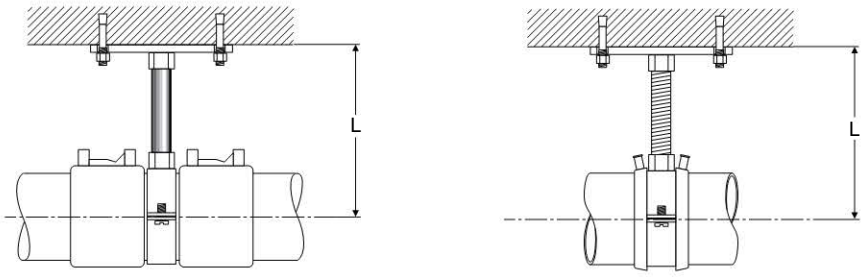


Table 16: Anchor bracket on ceilings, fastening with deflection leg

Ceiling distance L [cm]	Dimension								
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160
10	3/4"	1"	1"	1"	1"	1 1/4"	1 1/2"	2"	–
20	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	2"	–	–	–
30	1 1/4"	1 1/2"	1 1/2"	2"	2"	–	–	–	–
40	1 1/2"	2"	2"	2"	2"	–	–	–	–
50	2"	2"	2"	–	–	–	–	–	–
60	2"	2"	–	–	–	–	–	–	–

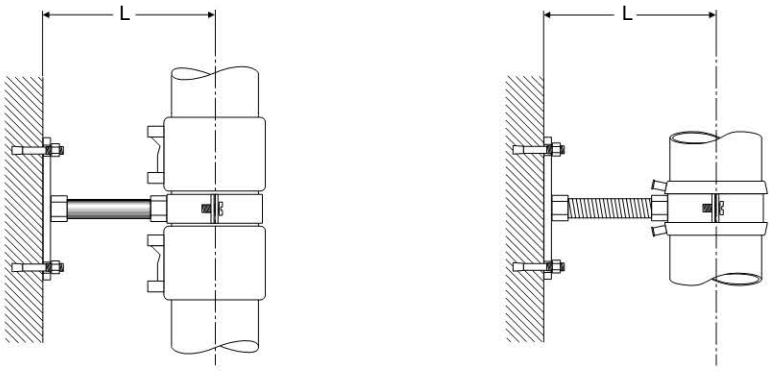


Table 17: Anchor bracket on walls, fastening with deflection leg

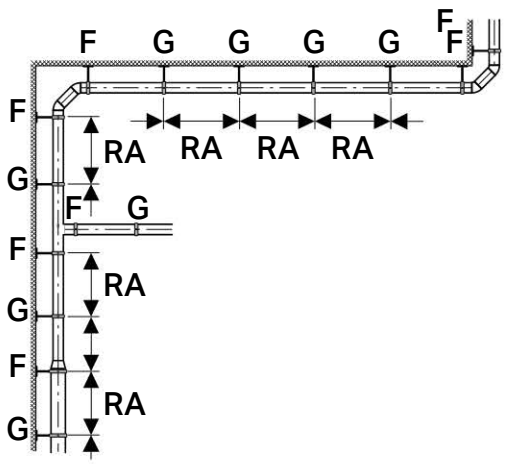
Wall distance L [cm]	Dimension								
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160
10	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1 1/4"	–
20	3/4"	3/4"	1"	1"	1"	1 1/4"	1 1/4"	1 1/2"	–
30	1"	1"	1"	1"	1 1/4"	1 1/4"	2"	2"	–
40	1"	1"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	2"	–	–
50	1"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	2"	2"	–	–
60	1 1/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"	2"	–	–	–

Commercially available products can be used to create the anchor brackets.

2.5.5 Conventional rigid installation

For rigid installation, pipe brackets with appropriate struts must be used on the building structure after the forces have been calculated. It is important to ensure that the fastening screws withstand the forces imposed.

- Rigid installation is used for horizontal and vertical pipelines
- Rigid installation is recommended up to DN 125 (ø 125)
- The expansion forces which are produced from thermal changes in length are transferred to the building
- The specific transfer of force takes place at the anchor brackets



G Sliding bracket
F Anchor bracket
RA Distance between pipe bracket

dø [mm]	RA [m]
40	0.8
50	0.8
56	0.8
63	0.8
75	0.8
90	0.9
110	1.1
125	1.3
160	1.6
200	2.0
250	2.0
315	2.0

Routing guidelines

- An anchor bracket must be attached immediately before and after each branch fitting and at each outlet from a branch fitting
- An anchor bracket must be attached immediately before and after each reducer

Sliding bracket when fastening to the ceiling

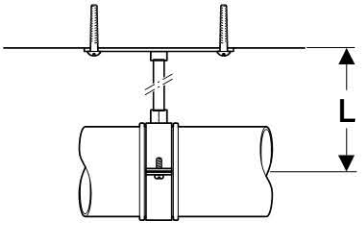


Table 18: Sliding bracket when fastening to the ceiling

Ceiling distance L [cm]	Dimension											
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
10	M10	M10	M10	M10	M10	M10	M10	M10	–	–	–	–
20	M10	M10	M10	M10	M10	M10	M10	M10	M10	1"	1"	1"
30	M10	M10	M10	M10	M10	M10	M10	M10	1/2"	1"	1"	1"
40	M10	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1"	1"	1"
50	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1/2"	1"	1"	1"
60	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"

Sliding bracket when fastening on the wall

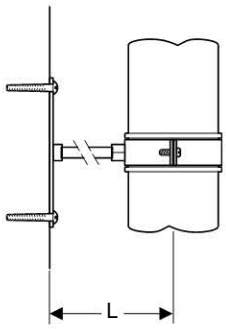


Table 19: Sliding bracket when fastening on the wall

Wall distance L [cm]	Dimension											
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160	ø 200	ø 250	ø 315
10	M10	M10	M10	M10	M10	M10	M10	M10	–	–	–	–
20	M10	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1"	1"	1"
30	M10	M10	M10	M10	M10	M10	1/2"	1/2"	1/2"	1"	1"	1"
40	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"
50	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"
60	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"

Anchor bracket with Geberit electrofusion sleeve coupling

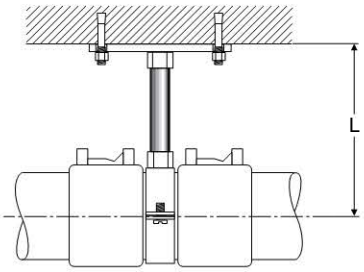


Table 20: Anchor brackets on ceilings, rigid installation

Ceiling distance L [cm]	Dimension								
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160
10	3/4"	1"	1"	1"	1"	1 1/4"	1 1/2"	2"	–
20	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	2"	–	–	–
30	1 1/4"	1 1/2"	1 1/2"	2"	2"	–	–	–	–
40	1 1/2"	2"	2"	2"	2"	–	–	–	–
50	2"	2"	2"	–	–	–	–	–	–
60	2"	2"	–	–	–	–	–	–	–

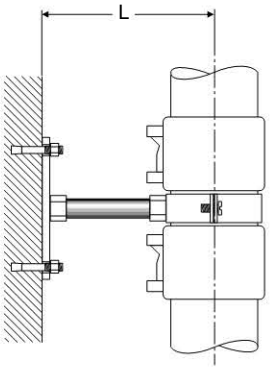


Table 21: Anchor brackets on walls, rigid installation

Wall distance L [cm]	Dimension								
	ø 40	ø 50	ø 56	ø 63	ø 75	ø 90	ø 110	ø 125	ø 160
10	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1 1/4"	–
20	3/4"	3/4"	1"	1"	1"	1 1/4"	1 1/4"	1 1/2"	–
30	1"	1"	1"	1"	1 1/4"	1 1/4"	2"	2"	–
40	1"	1"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	2"	–	–
50	1"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	2"	2"	–	–
60	1 1/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"	2"	–	–	–

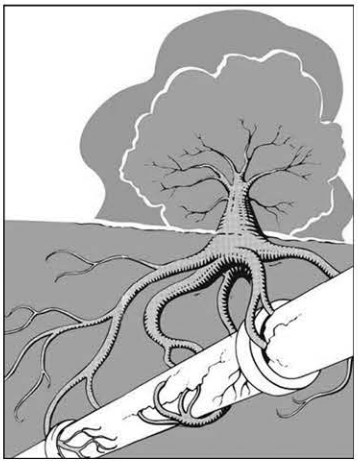
Commercially available products can be used to create the anchor brackets.

3 Special applications

3.1 Pipe laying outside of buildings

3.1.1 Pipe laying in the ground

1. **Tightness**
   Geberit HDPE is a reliable water drainage system where the welded joints are 100% water tight. Peace of mind for all.
2. **Resistance to chemicals**
   Geberit HDPE provides the assurance of universal resistance to the greatly diversified types of chemical attack by the disposal water, as well as by external factors (acidic soils).
3. **Elasticity**
   Geberit HDPE is a flexible, operationally reliable drainage system, even in soils in which a certain degree of settling of ground must be anticipated.
4. **Material**
   Drainage material selected for in ground applications needs to consider the soil, environmental factors and attack from inside and out.



5. **Friendly to the environment**
   The Geberit HDPE drainage systems comply with environmental regulations.

When laying HDPE pipes and fittings in the ground, the local regulations and standards must be observed and applied. We refer to the standards listed below for reference:

- AS 3500
- DIN EN 1610
- DIN EN 12056
- DIN 1986-3-4-30-100
- DIN EN 752

It is important that the pipeline zone is correctly designed so that is can withstand the load capacity of the Geberit HDPE pipes and fittings in the ground.

The pipeline zone is the filling in the area of the Geberit HDPE pipe and consists of bedding, side filling and the covering zone.

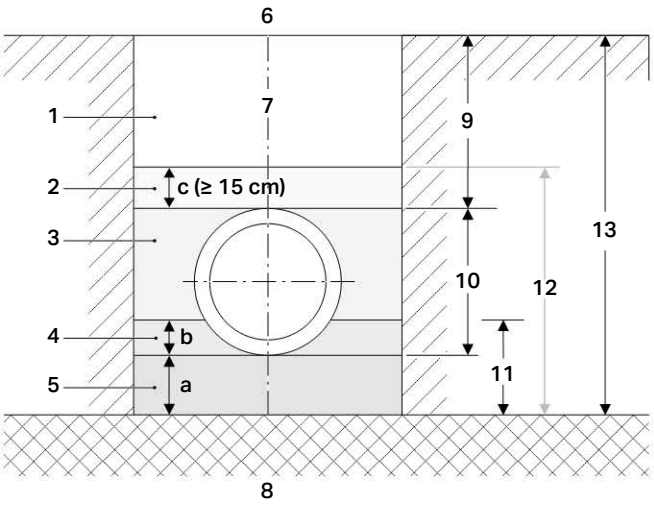


Figure 12: Pipeline zone

1 Main filling
2 Covering zone
3 Side filling
4 Upper bedding layer
5 Lower bedding layer
6 Surface
7 Trench walls
8 Trench floor
9 Depth of cover
10 Pipe outside diameter
11 Bedding
12 Pipeline zone
13 Trench depth

3.1.2 Pipe feed-through for building connection

According to DIN EN 12056, load on a discharge pipe due to different levels of subsidence of the building must be avoided using suitable measures. Geberit HDPE absorbs different levels of subsidence due to the flexibility of the material. In addition, insulation must be applied which is thicker than the expected subsidence.

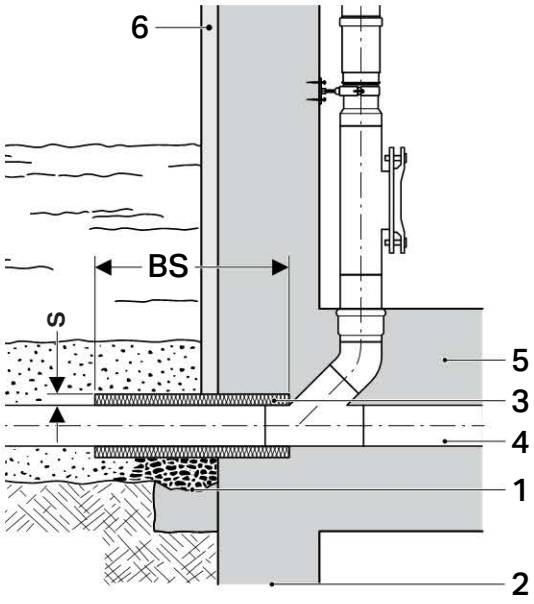


Figure 13: Pipe feed-through for building connection

1 Seepage water drain pipe
2 Subsidence
3 Insulation against subsidence
4 Geberit HDPE pipe
5 Foundation slab
6 Filter plate
BS Deflection leg
s Insulation thickness
ΔS Subsidence expected

The deflection leg length (BS) depends on the expected shifting of the terrain (ΔS) and on the diameter of the pipe (DN):

$$BS = 10 \cdot \sqrt{\Delta S \cdot DN}$$

Trench profiles

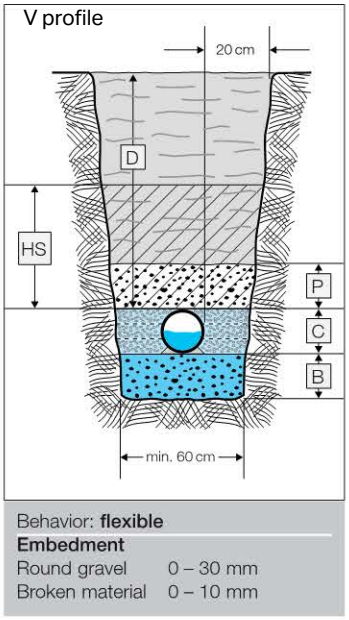


Figure 14: V profile

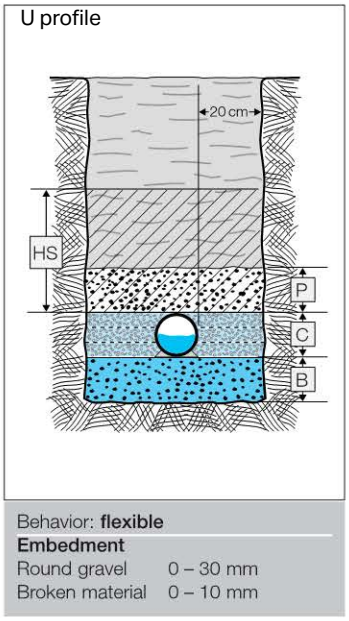
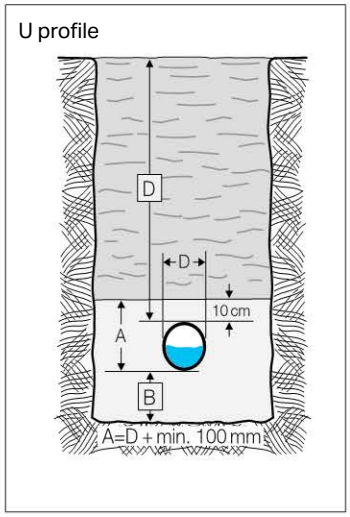
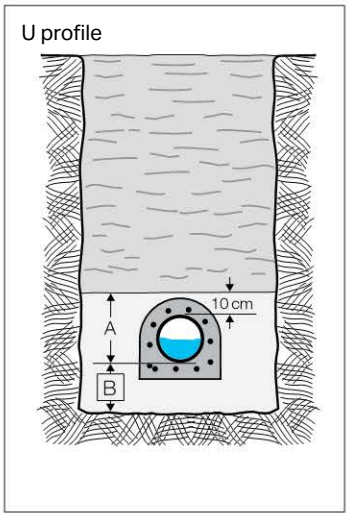


Figure 15: U profile



Behavior: **rigid**
Embedment
in concrete
PC 200 kg/m3

Figure 16: U profile



Behavior: **rigid**
Embedment
in reinforced concrete
PC 250 kg/cm3

Figure 17: U profile

B Bedding, 100 mm
C Consolidation
P Protective layer, 300 mm
HS Safety height
D Consolidation stratum depth

Bedding:
- Pipe must have a bedding of at least

Consolidation
- Side fill to upper edge of pipe

Protective layer
- With trench profile 1A cover to above top edge of pipe over entire width of trench

Safety height (when using mechanical compactors)
- Vibration compactor (1,000 N)
  - HS = 0.4 m
- Vibration roller (3,000 N)
  - HS = 0.3 m
- Vibration roller (15,000 N)
  - HS = 0.5 m

Consolidation stratum depth (min. covering)
- In area of road
  - D = 0.8 m
- Outside road area
  - D = 0.5 m

Max. covering:
- Up to 6 m without problem
- In cases of minimum coverings or heavy loading, measures such as load distribution plates or appropriate trench profiles are to be used.

Traffic loads (Protective layer P):
- Heavy traffic
  - Load = 9 tons
- Normal traffic
  - Load = 6 tons

Away from roads (Protective layer P):
- Always
  - Load = 3 tons

Filling material (Grain size)
- Round gravel
  - O = 30 mm
- Broken material
  - O = 30 mm

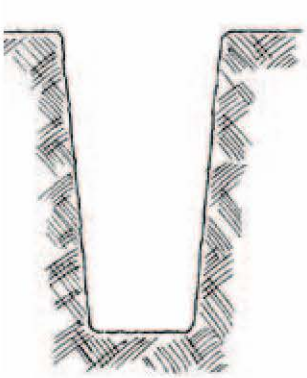
For all trenching work, local guidelines, standards and regulations must be observed.

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

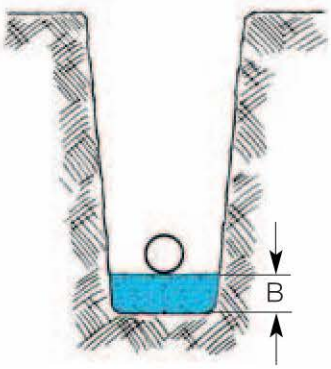
3.1.3 Guidelines for laying drainage pipes

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

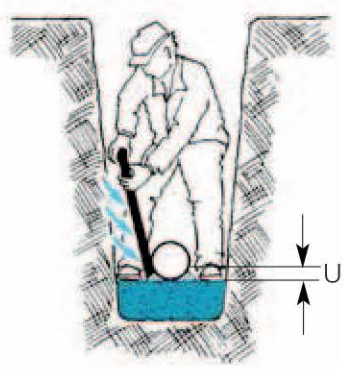
The trench is to be dug as narrow as possible – but not narrower than the pipe diameter + 40 cm. The floor of the trench must be level and free from rocks and loose clumps. Correct elevation and slope are also important.



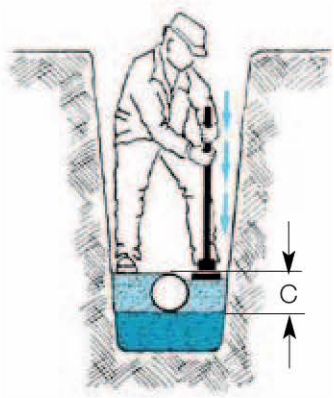
B = Bedding
Under normal soil conditions the trench is provided with a bedding layer of round gravel (grading up to 30 mm) or of broken material (grading up to 10 mm) of a thickness of approx. 100 mm. The bedding layer must be compacted and tamped. In certain cases it will be neccessary to reinforce the ground.



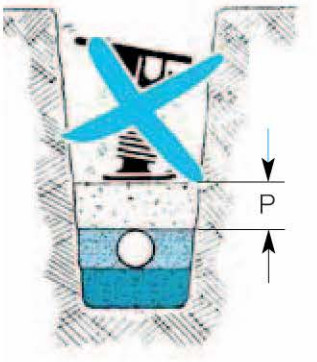
U = Underpinning
After the pipe has been laid, recesses are to be provided for sockets and flanges so that the pipe is supported along its entire length. The underpinning is to be done with a tamping post or the like. It must be done very carefully. If several pipes are laid, make sure that the lowest one is fully covered before the one above is placed. The pipe must lay flat, and it must be installed with the correct slope.



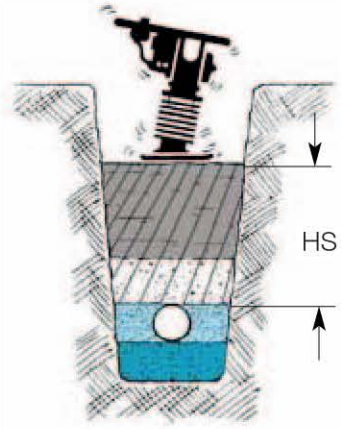
C = Consolidation layer
The material is to be filled in layers of approx. 100 mm thickness. Tamping can be done by stamping with the feet, or with a special tool. The purpose of this material is to help prevent the pipe from deforming, so that it must be compacted well on both sides at the same time.



P = Protective layer
Now fill in a layer of the same material (must not contain rocks which could cause point loading of the pipe) of at least 300 cm.
Attention: To prevent the pipe from rising the trench is to be finish-filled on the same day up to and including the protection layer.



HS = Safety margin height
For the further filling the available material is to be used. The trench must not contain rocks which cannot be lifted by hand. As soon as permitted by the safety margin height, this compacting can be done by machine. The regulations and byelaws on the refilling of trenches are to be observed.



Distribution of ground pressure

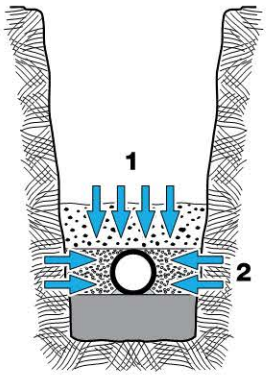
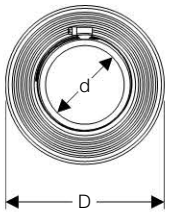


Figure 18: Distribution of ground pressure

1 Ground load and possible traffic load
2 Shoring pressure

The ground pressure and ground load distribution are governed essentially by the compaction. For calculation the appropriate standards and the local building and safety regulations are to be observed.

3.1.4 Penetration through walls

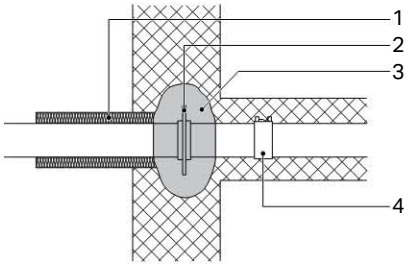


Dimensions

Pipe size [mm]	D [mm]	Article No.	Reece code
110	210	348.227.00.1	1433725
160	260	348.229.00.1	1433726

Application range

- For sealing pipes in the walls, ceilings and ground
- Compression proof up to 8 bar
- For protection against moisture
- For Geberit HDPE



1 Insulation against subsidence
2 Geberit puddle flange
3 All-round concrete covering min. 8 cm
4 Electrofusion sleeve coupling as an anchor bracket

3.1.5 Moisture protection

Moisture sealing is used everywhere where pipelines are routed through masonry, floors or ceilings, and the penetration of moisture must be prevented.

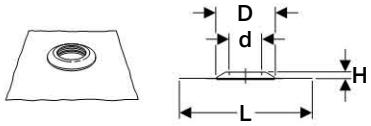


Figure 19: Moisture sealing

Table 22: Dimensions

dø [mm]	D [mm]	H [mm]	L [mm]
50	13.5	2.5	50
56	13.5	2.5	50
75	19.5	2.5	50
90	19.5	2.5	50
110	19.5	2.5	50
125	21	2.5	50

Application range	• Moisture pressure up to 0.1 bar • For applications where water does not reach a depth greater than 100 mm
Design	• Geberit moisture sealing with Resistit foil • Geberit moisture sealing with Sarnafil foil PVC
Pipe dimensions	ø 50, 56, 75, 90, 110, 125

Ceiling feed-through with moisture sealing

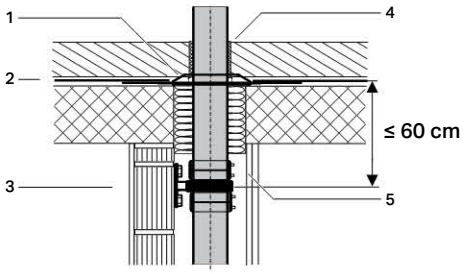


Figure 20: Ceiling feed-through with moisture sealing

1 Moisture protection
2 Sealing collar
3 Anchor bracket with 2 Geberit electrofusion sleeve couplings
4 Insulation hose
5 Insulation hose

Wall feed-through with moisture sealing

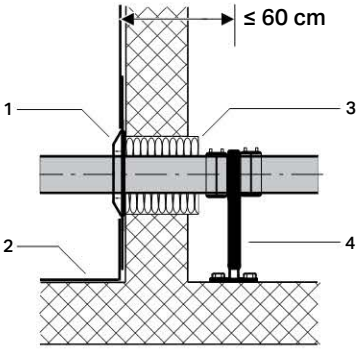


Figure 21: Wall feed-through with moisture sealing

1 Moisture protection
2 Sealing collar
3 Insulation hose
4 Anchor bracket with 2 Geberit electrofusion sleeve couplings

Floor feed-through with moisture sealing

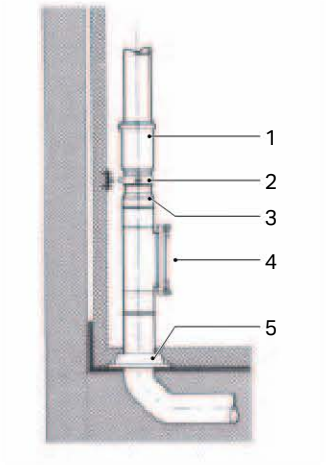


Figure 22: Floor feed-through with moisture sealing

1 Expansion socket
2 Anchor Bracket
3 Reducer
4 Access pipe
5 Sealing collar

3.1.6 Connections to ducts

Connection to ducts should only be made using a duct lining or specially prefabricated duct connector. Because subsidence always has to be taken into consideration, the connection must be designed to be flexible.

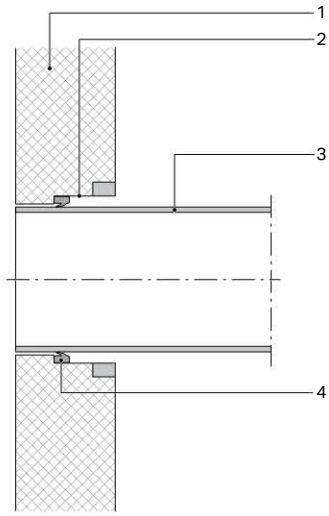


Figure 23: Connection with prefabricated duct connector

1 Concrete duct prefabricated
2 Recess for seal (using the steel ring fitted in the formwork with the defined outer diameter)
3 Geberit HDPE pipe
4 EPDM seal

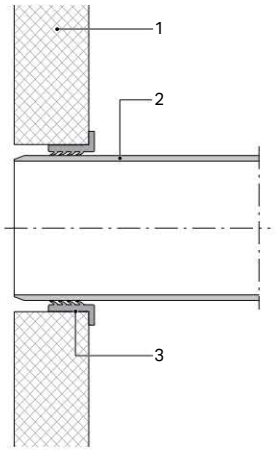


Figure 24: Connection with sealing of connection

1 Concrete duct with appropriate core hole
2 Geberit HDPE pipe, bevelled, treated with lubricant
3 Multi-lip sleeve with stopper inserted into the core hole from outside

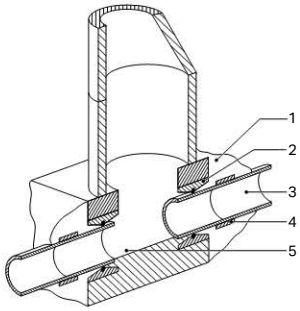


Figure 25: Open guidance bar

1 Concrete
2 Duct lining
3 Geberit HDPE pipe
4 Anchor bracket required if necessary
5 Bench

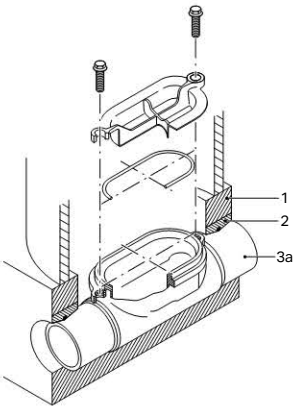


Figure 26: Geberit HDPE access pipe 90° with oval access cover

1 Concrete
2 Duct lining
3 Access pipe

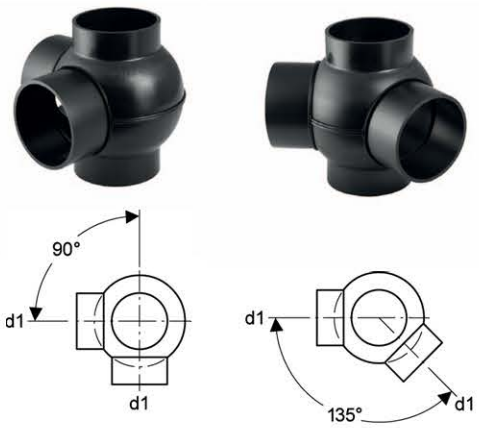
3.1.7 Ball Junctions

The Geberit ball junctions allow designers and plumbers the opportunity to create compact installations. The increased diameter of the intersection area provides for a smoother and less critical side entry of the waste water into the stack. In particular, installations where the branch lines have the same diameter as the stack.

Refer to AS3500 for correct applications.

Offset Ball Junctions

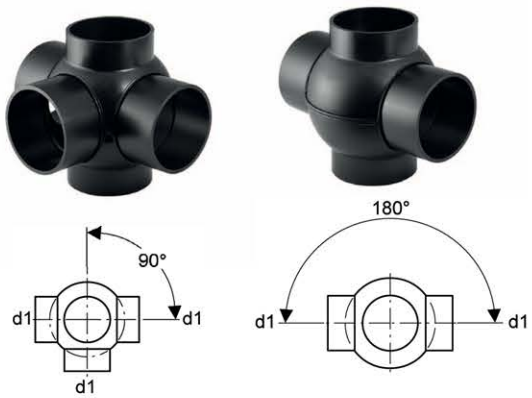
The offset ball junction is generally the best way of connecting different types of fixtures to the stack. Fixtures of different types, unequal fixture unit rating and different diameters may be connected using a ball junction.



Opposite Connections

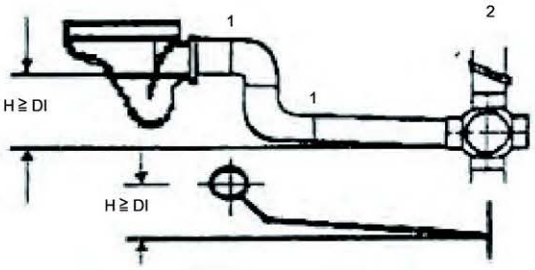
Connections directly opposite (180°) on a ball junction should only be used in accordance to AS3500.

It is essential to consider the impact of the hydraulic action of directly opposed connections.



Height difference

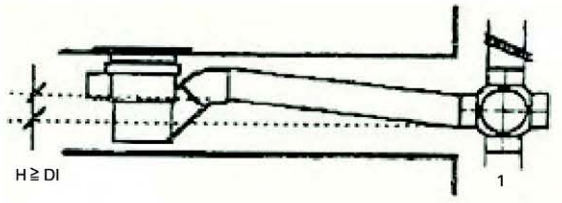
Any fixture trap connected to a ball junction should have a minimum height difference of the inside diameter (DI) of the connecting pipe. This is measured from the lowest point where the pipe is joined onto the stack to the water seal of the fixture trap. This can be achieved via a step up in the pipe work with appropriate fittings before the fixture trap.



1 Fittings
2 Stack

If the total gradient (height difference) of the pipe work from stack to the water seal of the fixture trap meets the required height difference.

The maximum allowable gradient or distance to the stack should not be exceeded.



1 Stack

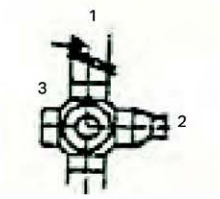
If there is more than one fixture connected to the same line, the outlined requirements must be met for each fixture trap.

1 Stack

Branch line connections

All branch line connections to a ball junction should be made with concentric reducers at the same centre line.

No stacks should be connected to the side entry of a ball junction.



1 Stack
2 Concentric reducer
3 Centre line

Installation recommendation

AS/NZS3500.2 amendment 3 2010 clause 6.6.1, 6.6.2 and 6.6.5.1. In Australia currently some local authorities ask for additional restrictions or do not allow the use of ball junctions at all. Enquire directly with the appropriate authority prior to starting any planning or installation.

Clause 6.6.1 Types

Any of the following types of junctions may be used to connect fixture, branch or common discharge pipes to a stack, the following apply:

1. 45° junctions
2. Sweep junctions
3. Aerator junctions
4. Ball junctions
5. Square junctions

No fixture shall be connected to the branch or common discharge pipe within 500 mm in length from the stack if the entry is at grade.

Clause 6.6.2 Restrictions

Where any fixture trap is connected to a ball junction, the weir of the fixture trap shall be at the same height or above the top of the branch junction fitting. Where a square or ball junction is used and any discharge pipe is less than 500 mm in length from the stack, one of the following shall apply:

1. A self-sealing device shall be fitted to the fixture
2. An S-trap shall be fitted to the fixture and a vertical dropper provided in the discharge pipe between the fixture and the stack junction
3. A P-trap shall be fitted to the fixture, and the discharge pipe graded at not less than 6.65 % (1 in 15)

Clause 6.6.5.1 Opposed connections at the same level

Opposed connections at ball junctions or aerator junction fittings may be used only where the opposing pipes are connected to equal numbers of the same type of fixtures.

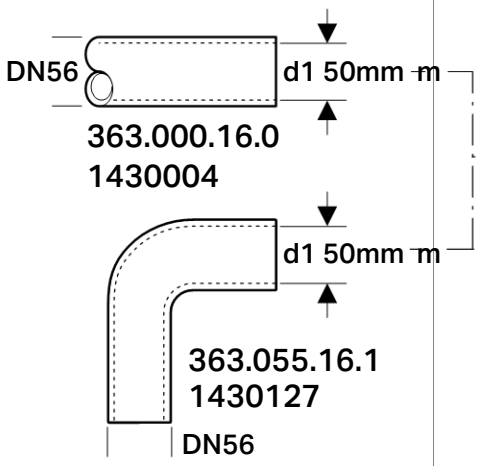
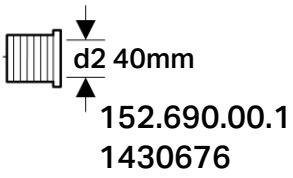
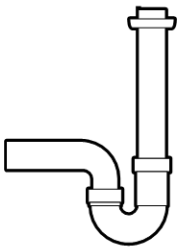
Opposed connections, other than at ball type junctions or aerator junction fittings, shall only be made using double 45° junctions or double sweep junctions.

Clause 6.6.5.2 Opposed connections at different levels

Grade fixture or common discharge pipes that are located at lower level than any other opposed similar pipes shall not be connected to a stack within a restricted entry zone unless the lower pipe enters the stack at an angle of 45°.

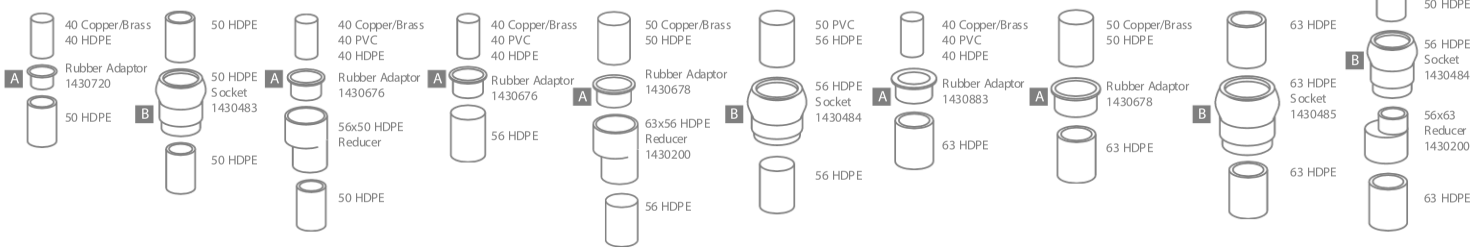
3.2 Trap connection with Geberit rubber collar

3.2.1 Geberit HDPE

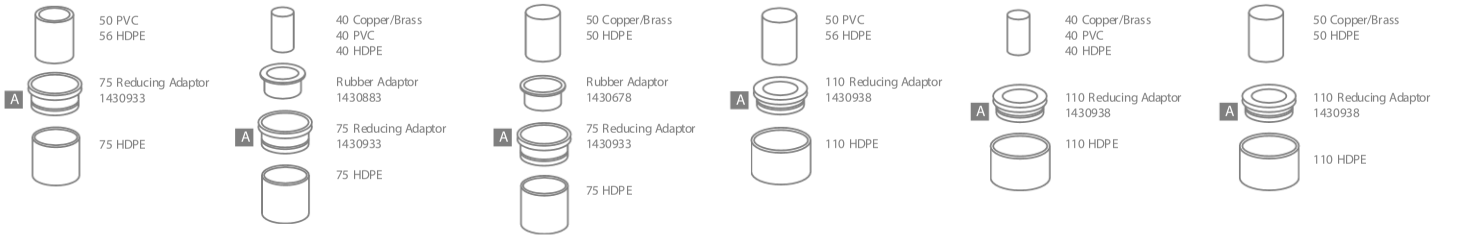
Geberit HDPE pipe section / connection bend	Geberit rubber collar	Trap
		

Adaptors

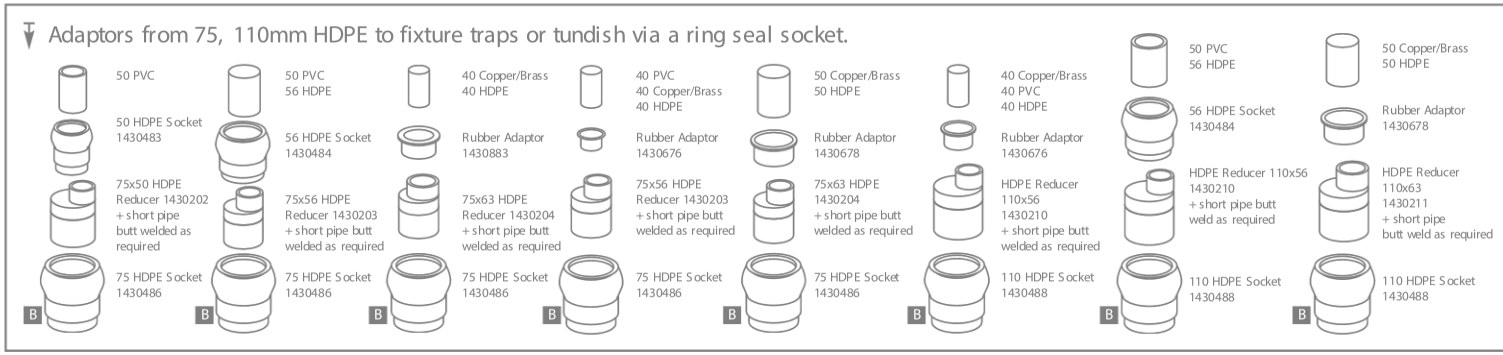
Adaptors from 50, 56, 63mm HDPE to the fixture trap or tundish.



Adaptors from 75, 110mm HDPE to fixture traps or tundish.



Adaptors from 75, 110mm HDPE to fixture traps or tundish via a ring seal socket.



A Can generally be fitted after the main pipe work has been installed, but before the floor coverings.

B Have to be installed at the same time as the main pipe work

3.3 Low pressure application

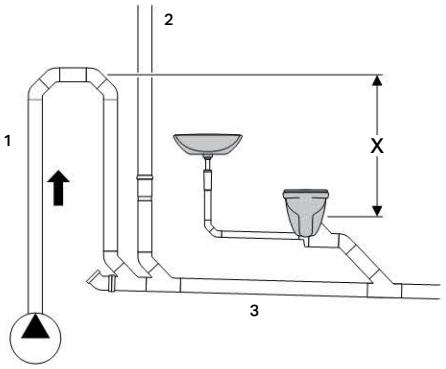
The Geberit HDPE product range can also be used for the discharge pipe of a pump assembly. The prerequisite for this is that the mechanical load is low and has only a short duration, and that no thermal medium (such as hot water) is pumped.

Pressure	≤1.5 bar
Temperature	≤ 30 °C

All connections must be created using butt welding, electrofusion sleeve coupling or flange connection.

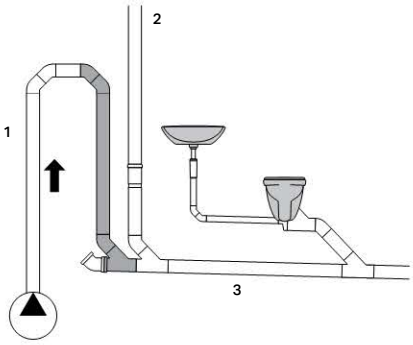
Bear the following important points in mind when planning discharge pipes for drainage systems:

- The discharge pipe must be installed higher than the lowest device (height X) using a pipe loop.



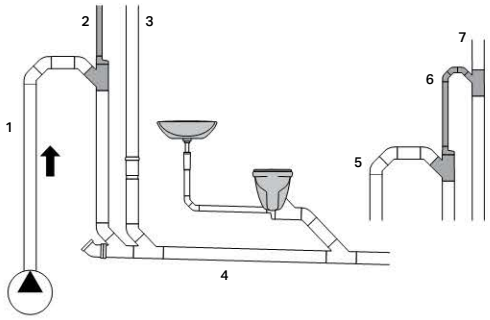
1 Pressurized pump pipe
2 Vertical duct
3 Collector pipe

- If the flow rate is less than 5 l/s the vertical section of the pipe loop must be extended.



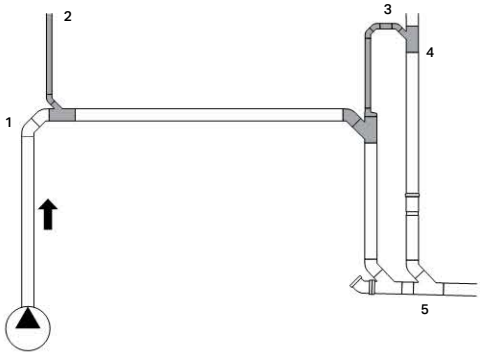
1 Pressurized pump pipe
2 Vertical duct
3 Collector pipe

- If the flow rate is more than 5 l/s the vertical duct must be ventilated with a ventilation pipe with an inside diameter of at least 50 mm.



1 Pressurized pump pipe V > 5 l/s
2 Ventilation
3 Vertical duct
4 Collector pipe
5 Pressurized pump pipe
6 Lateral ventilation
7 Vertical duct

- Long horizontal collector pipes must be ventilated. The ventilation pipe must have a minimum inside diameter of 57 mm or be two sizes smaller than the discharge pipe. The ventilation pipe must be higher than then delivery height of the pump and must go over the roof.



1 Pressurized pump pipe
2 Ventilation
3 Lateral ventilation
4 Vertical outlet duct
5 Collector pipe

4 Installation instructions

4.1 Manufacturing pipe joints by welding

4.1.1 Types of welding

Welding joints can be created by various processes:
- Electrofusion sleeve coupling
- Butt welding

General information about welding

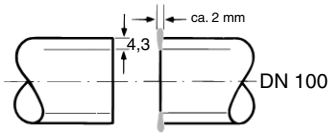
Up to ø 75, welding can be done by hand; from ø 90, we recommend welding using the Geberit welding machines Universal or Media.

When welding Geberit HDPE pipes and fittings, the quality of the connection is primarily dependent on:
- The material characteristics
- The manufacturing specifications
- The tolerances

This applies particularly to electrofusion welding. The electrofusion sleeve couplings and the pipes and fittings must be matched to the automatic welding control by the electrofusion machine.

The Geberit electrofusion machine, electrofusion sleeve couplings and fittings are a self-contained manufacturer-specific system, which cannot be replaced with external products. Geberit can therefore only guarantee the suitability of pipes, fittings and electrofusion sleeve couplings for welding if Geberit products are exclusively connected to other Geberit products.

The welding bead should be about half as thick as the pipe wall thickness.



4.1.2 Creating a butt welding joint

A welding plate is required as a processing tool:

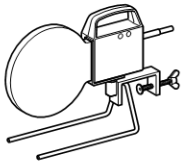


Table 23: Reference values for welding Geberit HDPE

dø	Welding allowance per weld seam	Heating up time	Time until full pressure buildup	Welding and cooling time	Welding pressure
[mm]	[cm]	[min]	[s]	[min]	[N]
40	0.3	0,40	4	3	60
50	0.3	0,40	4	3	70
56	0.3	0,40	4	3	80
63	0.3	0,40	4	3	90
75	0.3	0,40	4	4	100
90	0.4	0,50	5	5	150
110	0.5	1,00	5	5	220
125	0.5	71	5	5	280
160	0.7	1,30	5	5	450
200	0.7	1,50	5	5	570
250	0.8	2,00	5	5	900
315	1.0	2,30	6	6	1400

Prerequisite

- Ambient temperature: -10 °C to +40 °C
- Clean welding plate surface
- Welding plate temperature: 220 °C signal lamp green
- Up to ø 75 mm the welding can be done by hand. From ø 90 mm the Geberit welding machines Universal or Media must be used.

Creating butt welding manually

1 Cut the pipes to size at right angles to the pipe axis and if necessary clean them.

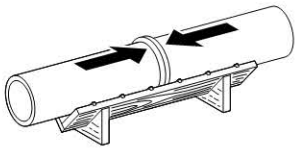
2 Heat the pipe ends.

3 Press the pipe ends lightly on the plate.

4 Only hold the pipe ends so that heat can flow evenly.

5 Immediately push the pipe ends together after welding beads form.

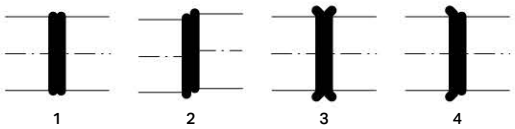
6 Increase the welding pressure slowly to the reference value. See Table 23: (page 96) for reference.



Do not accelerate the cooling process by applying cold items or water.

7 Examine the butt welding.

Result

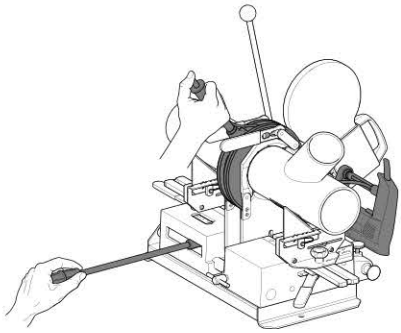


1 Correct
2 Incorrect, off the axis
3 Incorrect, welding pressure too high at the beginning of welding
4 Incorrect, uneven welding temperature

Creating butt welding by machine

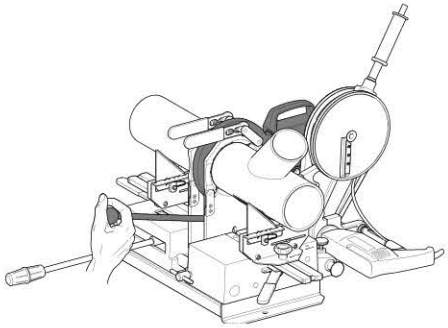
1 Align and clamp the fittings or pipe ends which have been cut at right angles and deburred in the welding machine.

2 Plane the ends to the required dimensions.



3 Press the pipe ends lightly on the plate.

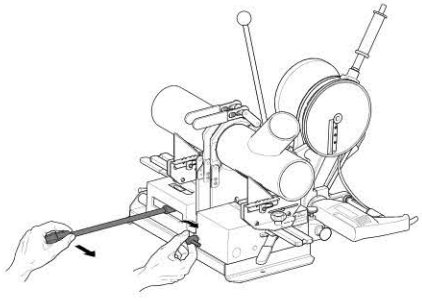
4 Only hold the pipe ends so that heat can flow evenly.



5 Remove the welding plate after the welding bead has formed.

6 Immediately push the pipe ends together.

7 Increase the welding pressure slowly to the reference value.



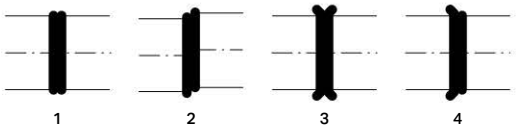
Do not accelerate the cooling process by applying cold items or water.

8 Allow the pipe ends to cool.

9 Unclamp the pipe assembly after the welding and cooling time.

10 Examine the butt welding.

Result



1 Correct
2 Incorrect, off the axis
3 Incorrect, welding pressure too high at the beginning of welding
4 Incorrect, uneven welding temperature

4.1.3 Creating an electrofusion sleeve coupling welding joint

- Geberit electrofusion sleeve couplings with integrated thermal fuses are required.

Figure 27: Geberit electrofusion sleeve coupling (height 60 mm)

- The Geberit electrofusion welding machine ESG 3 is required as a processing tool.

Figure 28: Geberit electrofusion welding machine ESG 3

The Geberit electrofusion welding machine is only designated for welding Geberit HDPE pipes and fittings with electrofusion sleeve couplings ø 40–160 mm. Can do up to 3 connections at the same time ø 40–110 mm and one ø 125–315 mm.

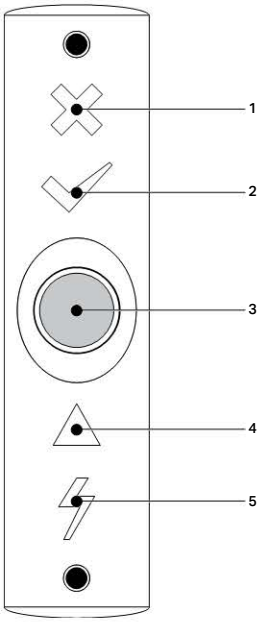


Figure 29: Operating interfaces of the electrofusion machine

1 General malfunction display
2 Welding complete display
3 Start display and actuation
4 Ready for welding display
5 Mains connection display

Prerequisite

- Permissible ambient temperature: -10 °C to +40 °C
- Mains voltage: 185–265 V / 50–60 Hz, power consumption max. 1100 W
- Fuse: Electronic overflow protection. The machine is equipped with a mechanism which prevents a double weld when a sleeve connection cable is connected
- Operation with emergency generator unit: Minimum power 1500 W

DANGER
Danger of fatal electric shock

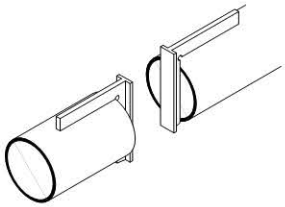
- Welding must not be carried out.
- Stop the water flow.
- Dry pipelines and electrofusion sleeve couplings.

Creating electrofusion sleeve coupling welding joints 40–160 mm

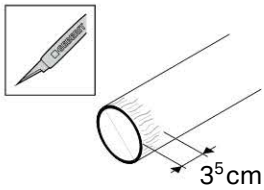
Correctly performed electrofusion weldings must only be carried out once.

All pipes and fittings must be clean and dry during the welding process

1 Cut the pipes to size at right angles to the pipe axis and roughly clean dirty surfaces.

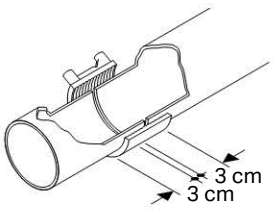


2 Scrape the pipe section/fitting surface in the insertion area of the electrofusion sleeve coupling, Emery cloth must be used to remove the oxidised layer from the pipe. An approved pipe scraper is also acceptable and is recommended for larger pipe sizes, 160–315 mm.



The small amounts of HDPE residue left over from this process will not affect the quality of the connection. No further cleaning procedures are required.

3 Mark clean pipe sections/fittings in the insertion area of the electrofusion sleeve coupling with an insertion depth of 3 cm.



4 Insert the pipe sections/fittings into the electrofusion sleeve coupling and examine the insertion depth: The axes of the welding ends must match.

Only connect the sleeve connection cable with the electrofusion sleeve coupling/electrofusion tape after clean, dry Geberit HDPE pipes or fittings have been inserted.

5 Connect the device to the mains voltage. Display ϟ lights up.

6 Connect the sleeve connection cable with electrofusion sleeve coupling/electrofusion tape. Display ▲ lights up.

DANGER
Risk of burns
- Do not touch the pipeline, electrofusion sleeve coupling or electrofusion tape during the welding process or during the cooling-down phase.

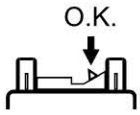
7 Press the start button ●. Display ● lights up and display ▲ goes out. Welding is completed after approximately 80 seconds. The start button display ● goes out and the display ✔ lights up.

Keep the pipeline in an unstressed position during the entire welding procedure.

Result

Welding has been performed correctly and is finished.

Completed welding is indicated by the protruding yellow indicator.



4.1.4 Creating an electrofusion coupling 200–315 mm

- Geberit electrofusion couplings with integrated thermal fuses and indicators are required

Figure 30: Geberit electrofusion sleeve coupling (height 150 mm) with integrated thermalfuse

- The Geberit electrofusion welding machine ESG T2 or ESG 3 is required as a processing tool

Figure 31: Geberit electrofusion welding machine ESG T2 or ESG 3

The Geberit electrofusion welding machine ESG T2 is solely intended to be used for welding Geberit HDPE pipes and fittings with 200–315 mm electrofusion couplings with integrated thermal fuses.

Prerequisite

- Permissible ambient temperature: -10 °C to +40 °C
- Mains voltage: 220–240 V / 50 Hz
- Power consumption: 2500 W
- Fuse: The electrofusion couplings with integrated thermal fuses have two fuses that switch off the welding current once the corresponding temperature is reached. The same electrofusion coupling with integrated thermal fuse cannot be welded a second time
- Operation with emergency generator unit: Minimum power 2.5 kW. No other devices can be connected during the welding process. The starter switch voltage under load is at least 200 V
- Recommendation: Always mount Geberit pressure ring

DANGER
Moisture or water-filled pipelines
Fatal danger!

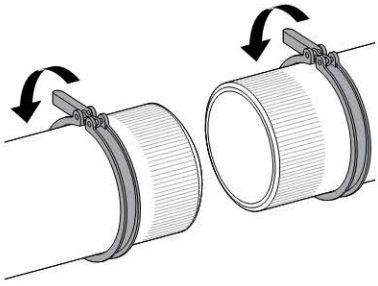
- ▸ Welding must not be carried out.
- ▸ Stop the water flow.
- ▸ Dry pipelines and electrofusion couplings with integrated thermal fuses.

An isolation transformer (230 V / 2.5 kW) must be included in the circuit when carrying out welding work in damp areas.

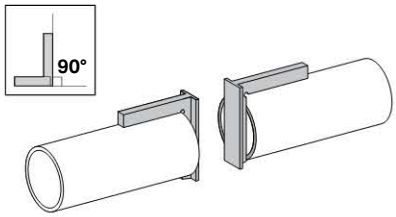
Creating electrofusion coupling with integrated thermal fuse welding joint

Correctly performed electrofusions with integrated thermal fuses must only be carried out once.

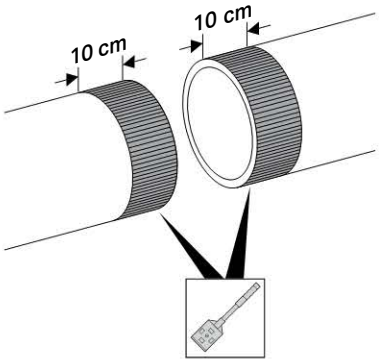
1 Attach pressure rings to the pipes. Once the welding time has elapsed, the pressure rings must remain mounted for 15 minutes.



2 Cut the pipes to size at right angles to the pipe axis and roughly clean dirty surfaces.

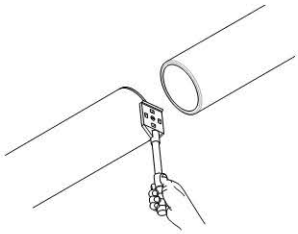


3 Scrape the pipe section/fitting surface in the insertion area of the electrofusion coupling with integrated thermal fuse with the Geberit pipe scraper.

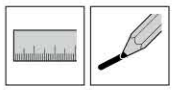


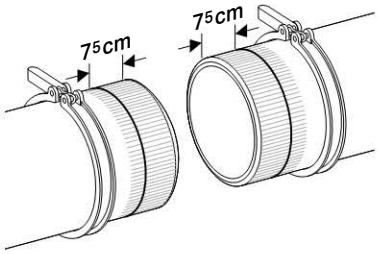
Remove only the uppermost oxide layer evenly and thinly. No recesses must arise.

4 Remove any burrs and slightly chamfer the pipe ends.

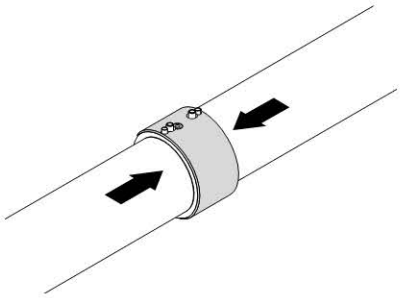


5 Mark clean pipe sections/fittings in the insertion area of the electrofusion coupling with integrated thermal fuse with an insertion depth of 7.5 cm.





6 Insert the pipe sections/fittings into the electrofusion coupling with integrated thermal fuse and check the insertion depth. The axes of the welding ends must match.



Do not remove the thermofilm. Only connect the connection cable with the jointing nut after clean, dry Geberit HDPE pipes or fittings have been inserted.

7 Connect device to mains voltage and sleeve connection cable to the electrofusion coupling with integrated thermal fuse.

CAUTION
Risk of burns

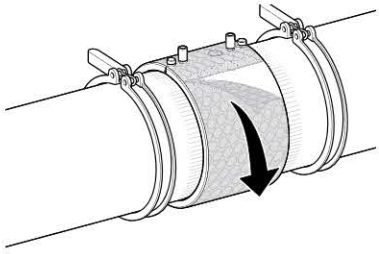
- Do not touch the pipeline and the electrofusion coupling with integrated thermal fuse during the welding process and the cooling down phase.

8 Press the start button briefly. The "weld" signal lamp lights up. Welding current flows through the connected electrofusion coupling with integrated thermal fuse for the next few minutes. The "weld" signal lamp goes out. The welding process is ended.

Keep the pipeline in an unstressed position during the entire welding process.

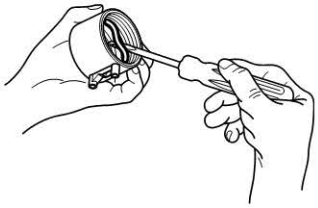
9 Examine the welding: Press the start button briefly. If the lamp goes out when you let go, the welding process has been carried out correctly. If the lamp remains lit up when you let go, the welding time was interrupted and must be repeated once the jointing nut has cooled down.

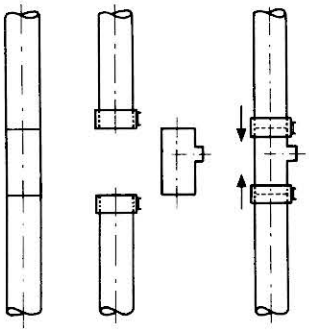
10 Remove the thermofilm approx. 15 minutes after welding end.



Creating a slide-over electrofusion sleeve coupling

To change the electrofusion sleeve coupling into a slide-over sleeve, remove the central ring. This process can also be used for repairs.

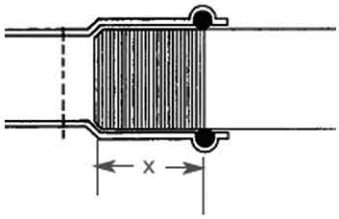




4.2 Other Geberit HDPE jointing methods

4.2.1 Ring-seal socket joint

Figure 32: Ring seal socket joint (available ø 40 - 160 mm)



X Length varies with the diameter

Connection properties
- Removable
- Non-tension-resistant

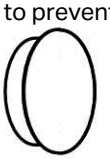
Use

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

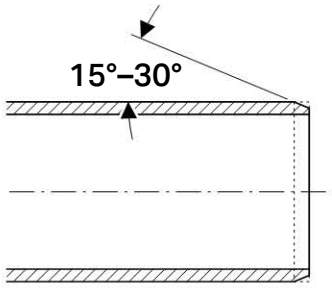
Ring-seal sockets are provided with a yellow protection cap to prevent the ingress of debris during installation.



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 pipe which can be connected by individual joints.

For HDPE approximately 15 mm of spigot should be allowed for every 1 m 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 very satisfactory resistance to heat and no shrinkage of the O-ring occurs.
The O-ring has a round seat regardless of pipe movements. The O-ring remains fixed in the seat and is always in contact with the pipe.



Ideal fitting is obtained by chamfering the pipe end to approximately 15°, lubricating it with soft soap, Silicone or Vaseline. Do not use mineral oil or grease which can damage the rubber seal

4.2.2 Screw-threaded joint

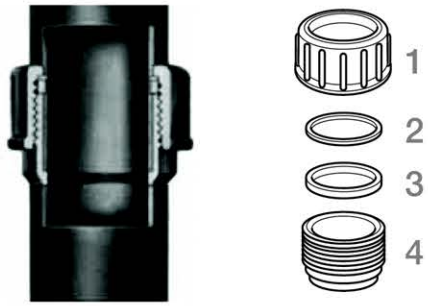


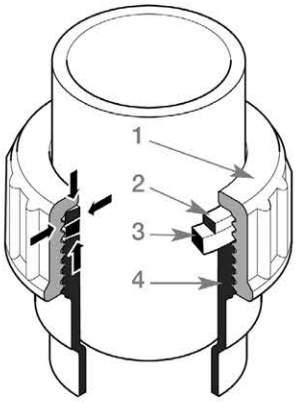
Figure 33: Screw-threaded joint without flange bushing (available ø 40–110 mm)

1 Nut
2 Washer
3 Seal
4 Thread

Connection properties
- Removable
- Non-tension-resistant

Use

Screw-threaded joints are used for assembly of various prefabricated parts when it is necessary to easily dismantle and also as the connection to sink traps and shower trays.



1 Nut
2 Washer
3 Seal
4 Thread

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

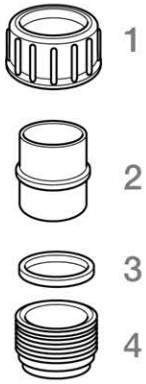
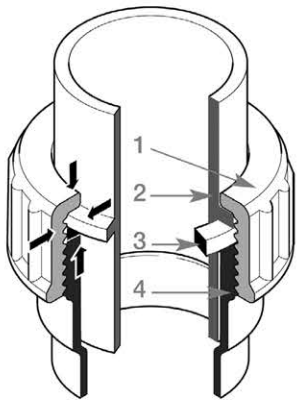


Figure 34: Screw-threaded joint with flange bushing (available ø 40–110 mm)

1 Nut
2 Flange bushing
3 Seal
4 Thread

Use

Wherever there is to allow for service or removal of a component within the system. Flange connections are also used when changing materials such as copper or cast iron.



1 Nut
2 Flange bushing
3 Seal
4 Thread

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

4.2.3 Flanged joint

Figure 35: Flanged joint (available ø 50–315 mm)

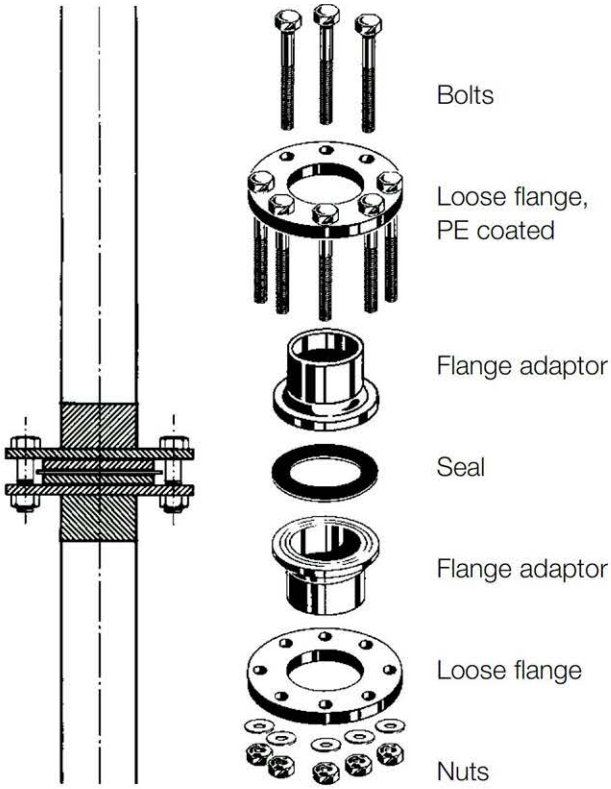
Connection properties
- Removable
- Tension-resistant

Use

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

The flange connection system offers easy connection to existing copper and stainless 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 3.2–PN 10).



4.2.4 Geberit HDPE contraction sleeve

This product is special order and may require longer lead time.

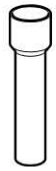


Figure 36: Geberit HDPE contraction sleeve (available ø 50–160 mm)

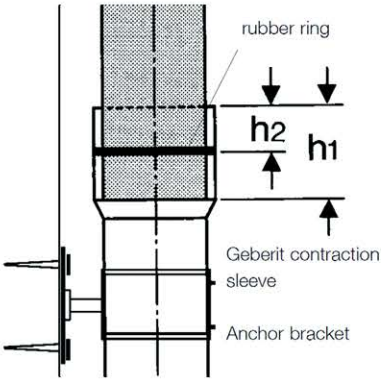
Connection properties
- Rigid, non-removable
- Non-tension-resistant

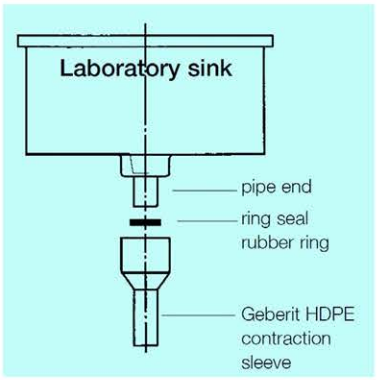
Use

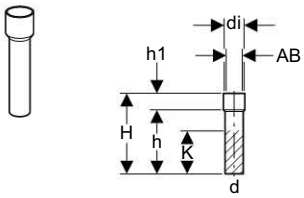
The Geberit HDPE contraction sleeve is a convenient connection possibility for most uneven, irregular or special materials.
A common additional application method is also the connection from HDPE to different clay ware apparatus, e. g. for Laboratory sinks.

Installation

The enclosed rubber ring will be 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 (approx. 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.







d [mm]	di [mm]	AB1 [mm]	H [cm]	h [cm]	h1 [cm]	K [cm]	Art. No.
50	60	53–54	30	24	6	17	152.651.16.1
50	70	60–67	27,5	22	5,5	17	152.197.16.1
50	80	67–74	28,5	23	5,5	17	152.198.16.1
50	90	80–84	30,5	23,5	7	17	152.652.16.1
50	100	90–94	31	24	7	17	152.653.16.1
56	70	60–67	24,5	19	5,5	14	152.149.16.1
56	80	67–74	24,5	19	5,5	14	152.150.16.1
56	60	53–54	26,5	20,5	6	14	152.654.16.1
63	73	60–67	26,5	20,5	6	14	152.657.16.1
63	80	67–74	26,5	19	7,5	14	152.658.16.1
75	90	80–84	24,5	17,5	7	12	152.151.16.1
75	80	67–74	25	19	6	12	152.152.16.1
75	100	90–94	28	19	9	12	152.661.16.1
90	110	84–98	17	7	10	0	366.550.16.1
110	125	102–111	16	6	10	0	367.551.16.1
110	140	102–126	18	8	10	0	367.550.16.1
125	150	116–136	18	8	10	1	368.550.16.1
160	195	148–180	20	8	12	1	369.550.16.1
160	230	189–212	30	12	18	5	369.551.16.1

4.2.5 Geberit HDPE adapter clamp

This product is special order and may require longer lead time.

Figure 37: Geberit HDPE Adapter Clamp

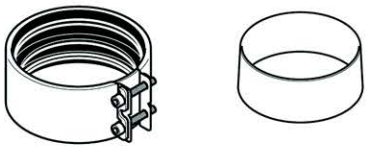
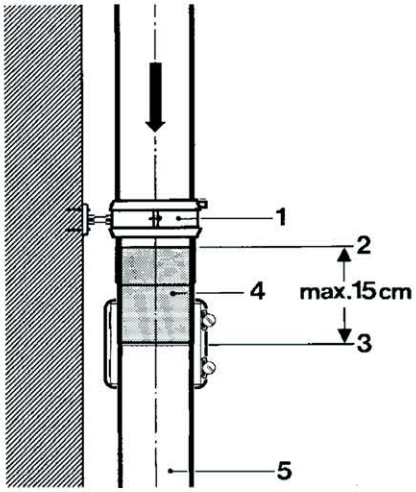


Figure 38: Geberit HDPE Adapter Clamp



1 Anchor bracket
2 Butt weld seam
3 Coupling
4 HDPE adaptor with reinforcement ring
5 Steel, cast iron, clay, fibre cement pipes

Connection properties
- Removable
- Non-tension-resistant

Use

The adapter clamps have multiple functions and can consequently be used as adapters to other materials as well as any other types of connection.

Installation

It is necessary to insert an appropriate reinforcement ring into the ends of the HDPE pipe first when these clamps are used as adapters to HDPE pipes or for HDPE pipe connections.

Important:
If the joint from HDPE to steel – cast iron or earthenware – is made with a coupling, it has to be secured by an anchor bracket. Install the anchor bracket as close as possible to the coupling (maximum 15 cm).

4.2.6 Geberit HDPE adaptors

Table 24: Pipe threads (for detail information see HDPE catalogue)

Pipe threads	Connection to	Thread diameter	Geberit diameter	Material
	Male pipe thread	1/2"–2 1/2"	40–75 mm	HDPE with steel ring reinforcement
	Female pipe thread		1 1/4"–2 1/2"	50–75 mm HDPE with steel ring reinforcement
	Female pipe thread		1 1/4"–2 1/2"	50/56 mm adaptor in brass + HDPE nut
	Male pipe thread	2"–3"	56/75 mm	Adaptor in brass + HDPE nut

Table 25: Threaded pipe ends (for detail information see HDPE catalogue)

Pipe threads	Connection to	Thread diameter	Geberit diameter	Material
	Male-thread	1 1/4"–2"	40/50 mm	HDPE, upon request also available with nut in brass
	Male-thread	60 x 1/8"	40/50 mm	HDPE
	Female-thread	1/2"–1"	40/50 mm	HDPE, with brass nipple

Table 26: Soldering / Welding (for detail information see HDPE catalogue)

Pipe threads	Connection to	Pipe diameter	Geberit diameter	Material
	Lead	50/60	56 mm	Brass with HDPE nut for soldering
	Lead	50/60	56 mm	Lead with HDPE nut for welding or soldering
	PVC	50/63	56 mm	PVC for solvent cement joint + HDPE nut

4.3 Additional information

4.3.1 Physical characteristics for Geberit HDPE

Table 27: Physical characteristics of Geberit HDPE

Characteristics	Unit	Test method	Test specimen	Value
Density	g/cm^3	DIN 53479	Plate	0.953...0.955
Reduced specific viscosity (viscosity coefficient)	dl/g	ISO/R 1191	0.1% solution	3.0
Melt-flow index MFI 190/5	g/10 mins.	DIN 53735	in decalin granulate	0.4...0.7
Mechanical characteristics, measured under standard climatic conditions 23 °C, 50% relative air humidity				
Tensile strength	N/mm^2	DIN 53455. ISO/R 527; test velocity 125mm/min	Test specimen 3 with measurements in the ratio 1:4	22
Elongation at yield stress	%			15
Ultimate tensile strength	N/mm^2			32
Elongation at break	%			>800
Limit bending strengt	N/mm^2	DIN 53452	Standard small bar injection moulded	28
Torsional rigidity	N/mm^2	DIN 53447	60 mm x 6.35 mm x 2 mm	240
Bending creep modulus 1 minute value	N/mm^2	Bending creep test ob 3 N/mm^2	120 mm x 20 mm x 6 mm	800
Indentation hardness 30 second value	N/mm^2	DIN 53546, Test strengt 132, 4 N	Sheet, 4 mm	40
Shore hardness D	-	DIN 53505	Sheet, 4 mm	60
Impact strengt	mJ/mm^2	DIN 53453	Standard small bar, moulded	15
Impact strengt at +23 °C and -40 °C	mJ/mm^2	DIN 53453	Standard small bar, injection moulded	
Thermal characteristics				
Crystallite melting range	°C	Polarisation microscope	Microtone section	127...131
Mean linear expansion coefficient between 20 °C and 90 °C	K-1	DIN 52328; ASTM D 696	50 mm x 4 mm x 4 mm	$1.7 \cdot 10^{-4}$
Heat conductivity at 20 °C	Wm ·k	DIN 52612 sheet method	Plate, 8 mm Injection, moulded	0.43
Electrical properties, measured under standard climatic conditions of 23 °C, 50% relative air humidity				
Specific transmission resistance	Ω · cm	DIN 53482, VDE 0303 Part3	Foil, 0.2 mm	>1016
Surface resistance	Ω	DIN 53482, VDE 0303 Part 3	Sheet, 1 mm	>1013
Electric strength	kV/cm	DIN 53481, VDE 0303 Part 2	Foil, 0.2 mm	700
Dielectric index εr, (relative dielectric constant) at 2,106 Hz	-	DIN 53483, VDE 0303 Part 4 (immersion method)	Foil, 0.2 mm	2.50

Characteristics	Unit	Test method	Test specimen	Value
Dielectric loss factor tan δ at 50 Hz	- 103 Hz 104 Hz 105 Hz	DIN 53483, VDE 0303 Part 4 - - -	Foil, 0.2 mm	$6 \cdot 10^{-4}$ $5 \cdot 10^{-4}$ $5 \cdot 10^{-4}$ $6 \cdot 10^{-4}$
Track resistance		DIN 53480, VDE 0303 Part 1	Sheet ≥ 3 mm	KA 3c KC > 600
Arc resistance		DIN 53484, VDE 0303 Part 5	120 mm x 120 mm x 10 mm	L4

In a number of countries, a tensile test is carried out on a test specimen taken in longitudinal (or transversed) direction of the pipe, e.g. in Great Britain according to BS 3284. The values thereby obtained do not necessarily need to agree with those given table, which applies especially for the in the elongation at break.

The values given above relate exclusively to the corresponding test methods or test specimens. Results which are obtained with specimens taken from pipes may not agree.In contrast with injection, moulded specimens are free from flow orientations. This strongly influences the test result. Measurement with moulded bars is therefore preferred.

4.3.2 Ecological properties of Geberit HDPE

Polyethylene (HDPE) is a simple compound of carbon and hydrogen atoms, harmless to humans, animals and plants.

HDPE environmental loads relate to the fields of manufacture and disposal. In addition to the raw material crude oil, energy is used for the preparation of the plastic granulate and in the manufacture of the products.

HDPE is the perfect material for drainage systems from an ecological point of view. It has a long life span, no toxic gases rises from incineration (e. g. hydrochloric acid HCL from PVC) during disposal. It consumes much smaller quantities of energy during fabrication process and transport than steel, cast iron or copper pipes.

For more information about environment and sustainability, please order our report :

Life Cycle Assessment Drainage pipes for buildings

4.3.3 Certification for Geberit HDPE

Certificate

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

GEBERIT Geberit International AG
8645 Jona
Switzerland

Certified area
Geberit Group
Details see appendix

Field of activity
Sanitary and Piping Technology

Standards
ISO 9001:2008 Quality Management System
ISO 14001:2004 Environmental Management System

Swiss Association for Quality and Management Systems SQS
Bernstrasse 103, CH-8052 Zollikofen
Issue date: January 1, 2013

This SQS Certificate is valid up to and including December 31, 2015
Scope numbers 14, 17
Registration number 20644

K. Edelmann, President SQS
K. Chabert, Managing Director SQS

SQS Certificate ISO 9001:2008, ISO 14001:2004

global-mark

Certificate of Conformity

This certificate confirms that the company below complies with the following standard:

Company Name	Geberit Pty Ltd
Company Other Name	
Client ID	100150
Certification Standard	AS/NZS 4401-2006 : Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings - Polyethylene (PE)
Scope of Certification	Refer to Certification Schedule for details - WaterMark Level 1-CofC 40004
Type of Certification	Product Conformance

Certificate Dates:

Certification Review Date	2/10/2007
Certification Expiry Date	2/10/2017
Certificate Issue Date	3/02/2008
Certificate Last Update Date	4/09/2012

Please refer to Page 2 for Approved Sites

JAS-ANZ

Certification Manager

Watermark Certificate AS/NZS 4001:2006

global-mark

Certificate of Conformity

This certificate confirms that the company below complies with the following standard:

Company Name	Geberit Pty Ltd
Company Other Name	
Client ID	100150
Certification Standard	AS/NZS 5065-2005 : Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
Scope of Certification	Refer to Certification Schedule for details - WaterMark Level 1- CofC 40011
Type of Certification	Product Conformance

Certificate Dates:

Certification Review Date	2/10/2007
Certification Expiry Date	2/10/2017
Certificate Issue Date	3/02/2008
Certificate Last Update Date	4/09/2012

Please refer to Page 2 for Approved Sites

JAS-ANZ

Certification Manager

Watermark Certificate AS/NZS 5065:2005

Standards:
Geberit HDPE conforms to:

- AS/NZS 4401 Plastic piping systems for soil and waste discharge (low and high temperature) inside buildings - Polyethylene (PE).
- AS/NZS 5065 Polyethylene and Polypropylene pipes and fittings for drainage and sewerage applications.

Geberit named in top 10 most sustainable companies globally

Geberit is a proven international leader in the area of sustainability. Having recently been named among the top 10 most sustainable companies in the world from a study conducted by media company, Corporate Knights, further “supports and validates Geberit’s continuing commitment to be environmentally responsible in everything we do,” said Managing Director of Geberit Australia. Saving water, resource efficiency and sustainable construction are core areas of concern for the Geberit organisation both globally and locally. A key focus for Geberit Australia is to continually update, integrate and effectively implement a sustainable strategy that will make a positive impact today and tomorrow.

Geberit believes that sustainability must be lived in all company sectors. Geberit aims to be a role model to and set standards for partners, customers and suppliers. This includes safe, environmentally friendly and resource efficient production with an increasing proportion of renewable energies, procurement and logistics with high environmental and ethical standards ensuring that the entire manufacturing process of all products comply with the highest standards in environmental protection, social responsibility and ethical action.

Sustainability means satisfying the needs of today’s generation in a manner that will ensure a solid basis for the livelihoods of future generations. To assist in achieving this, Geberit provides 100% recyclable HDPE Polyethylene (PE), which is a simple compound of carbon and hydrogen atoms, harmless to humans, animals and plants. HDPE is the perfect ecological solution as it has a long life span and does not excrete toxic gases during incineration during disposal and consumes much smaller quantities of energy. All Geberit manufacturing sites are compliant to the latest ISO standard (ISO 9001 & 14001).

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Geberit Pty Ltd
Unit 8a
6-8 Byfield Street
Macquarie Park
NSW 2113

Phone: 1800 GEBERIT
+61 2 9889 7866
Fax: +61 2 9889 7855
support.au@geberit.com

→ www.geberit.com.au

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