GEBERIT

PLANNING AND INSTALLATION GUIDE

GEBERIT FLOWFIT

VALID FROM JANUARY 2023

KNOW HOW INSTALLED

1 PRINCIPLES

2 PRACTICAL USE

CHAPTER ONE

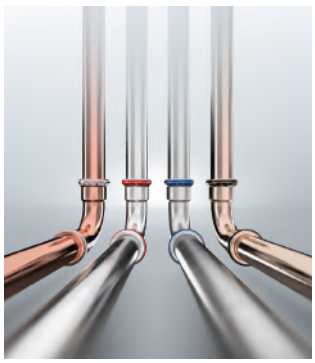
PRINCIPLES

1.1 OVERVIEW OF GEBERIT SUPPLY SYSTEMS

With supply systems made of metal composite, plastic and metal, Geberit offers solutions for a wide variety of applications with liquid and gaseous media.

The pressing systems press the optimally coordinated system components. The pressing of pipes and fittings creates permanent, positive and lengthways non-positive, tight pipe connections.

1.1.1 Geberit pressing systems

Geberit pressing system		System pipe material
Geberit FlowFit		• Multilayer PE-RT II / Al / PE-RT II
Geberit Mepla		• Multilayer PE-RT II / Al / PE-RT II
Geberit Mapress Stainless Steel		• CrNiMo steel 1.4401 • CrNiMo steel 1.4401 with PP jacket • CrMoTi steel 1.4521 • CrNi steel 1.4301
Geberit Mapress Carbon Steel		• Non-alloy steel 1.0034, outside zinc-plated • Non-alloy steel 1.0034, outside zinc-plated, with PP jacket • Non-alloy steel 1.0215, inside and outside zinc-plated
Geberit Mapress Copper		• Copper CW024A according to EN 1057
Geberit Mapress CuNiFe		• Copper-nickel-iron alloy CuNi10Fe1.6Mn, 2.1972.11

1.2 POSITIONING OF THE SUPPLY SYSTEMS

Geberit supply systems can cover almost all areas of application in technical building systems, industry and shipbuilding. The selection of a suitable system is determined, among other things, by the product material characteristics and by application-specific requirements.

The following positioning of the systems depending on their application options in an overall installation serves only as an initial orientation.

	Geberit FlowFit	Geberit Mepla	Geberit Mapress
Storey distribution in prewall installations and solid construction	✓	✓	–
For embedding in concrete	–	–	–
Riser pipes and floor connections	✓	✓	✓
Basement distribution	✓	✓	✓
Industrial installations	✓	✓	✓
Ship installation	✓	✓	✓

✓ Suitable

– Depending on the situation

1.3 TRANSPORT AND STORAGE

1.3.1 Transport and storage rules

The rules for the correct handling of Geberit system pipes during transport and storage are used to protect the pipes from possible damage due to incorrect handling.

These rules do not include any information on health and safety regulations and accident prevention regulations in the handling of long goods. These regulations are country-specific and must be observed by the forwarding agent, stockkeeper and by all other people involved in the transport.

1.3.2 Transport

The following rules must be observed when transporting Geberit system pipes:

- When loading and unloading, make sure that the pipes do not become dirty or damaged. The pipes must not be pulled over the sill or thrown.
- The pipes must be secured against slipping during transport. If the pipes hit the front or rear wall of the loading area during transport, the pipe ends may be damaged or the protection plugs may be pressed into the pipes.
- The pipes may only be transported in closed loading areas.

1.3.3 Storage

When storingGeberit system pipes ML and ML Therm, the following rules must be observed in order to avoid damage due to incorrect storage and mistakes.

- The pipes must only be stored in a dry and well-ventilated storage area.
- The pipes must not be stored directly on the ground, as otherwise the pipe surface may become scratched or damaged.
- In order for air to flow around the pipes and for moisture on the pipe surface to dry more quickly, the pipes must be stored on cantilever-type shelves or dry squared timber. At least three contact points must be provided. The pipes must not sag.
- The pipes must be protected from direct exposure to sunlight.
- If the pipes cannot be stored separately according to pipe dimensions, the smaller pipe dimensions must always be stored on top of the larger pipe dimensions.

1.4 USE AND PROPERTIES OF GEBERIT FLOWFIT

1.4.1 Application range

Geberit FlowFit can be used for basement and riser pipes and for storey distribution under the operating conditions specified in the Geberit FlowFit usage overview.

Main areas of use of Geberit FlowFit:

- potable water installations for hot and cold water
- heating installations
- cooling pipes
- compressed air installations

Most important media:

- drinking water
- heating water
- cooling water with and without frost protection
- service water
- treated water
- rainwater with a pH value > 6.0
- seawater
- extinguishing water
- chemicals and technical liquids
- compressed air (oil purity class 0–3)
- inert gases (e.g. nitrogen)
- negative pressure

The negative pressure is derived from the air pressure at the place of installation minus the pressure of 200 mbar. Example: Air pressure of 980 mbar minus pressure of 200 mbar = 780 mbar of usable negative pressure in the pipe system.

Information regarding media and operating conditions is summarised in the usage overview, which can be viewed in the online catalogues of the responsible sales companies.

1.4.2 Resistance to liquid and gaseous media

In addition to their use for drinking water and heating water, Geberit supply systems can also be used for other liquid and gaseous media. The medium itself may be modified due to the pipes or fittings. The suitability of the Geberit supply systems for different media is therefore not only derived from the resistance of the pipes, but also depends on the medium's intended use.

The current usage overviews can be found in the online catalogue or in the printed catalogue.

If Geberit supply systems are intended for media other than those listed, the resistance of the pipe and sealing materials must be checked and approved by Geberit.

The following are required for the approval:

- product and safety data sheets of the medium
- indication of the concentration
- exposure time, frequency and flow rate
- sample of the medium (only after consultation)
- planned operating temperature
- planned operating pressure
- maximum malfunction temperature
- ambient conditions (e.g. pipe layout through cleanroom, high humidity, permanent moisture, aggressive environment)

Resistance-related enquiries can be made online via the website of the Geberit sales companies.

The Geberit Industrial Application Tool is available at https://industryapplication.geberit.co.uk to assist in selecting a suitable piping system.

1.4.3 System properties

The following table provides an overview of the most important properties of Geberit FlowFit.

Property		Meaning
Diffusion tightness		• The Geberit system pipe ML forms a total barrier against diffusion and is therefore suitable for heating applications.
Hot water resistance		• Permanently 0–70 °C at 10 bar • Short-time exposure up to 95 °C for drinking water (heating water 100 °C) for a maximum of 100 hours in 50 years
Resistance to pressure		• In cold water pipes 16 bar (operating temperature 0–20°C) • In hot water pipes 10 bar (operating temperature 0–70 °C)
UV resistance		• UV-stabilised, but avoid constant sunlight. • Not suitable for continued UV exposure from UV lighting, for example in greenhouses.
Corrosion resistance		• Corrosion-resistant in a normal, dry environment • Corrosion-resistant to a large number of liquid and gaseous media • Corrosion protection required in rooms that are permanently or periodically damp or in aggressive environments
Electrical conductivity		• Dielectric (no uninterrupted metal connection) • Can unrestrictedly be installed upstream of, between and downstream of all pipe materials. • Cannot be used as equipotential bonding. Earthing is therefore not required.

1.5 ADVANTAGES, FEATURES AND FUNCTIONS OF GEBERIT FLOWFIT

The following tables explain the advantages of an installation with Geberit FlowFit.

Table 1: High level of working comfort

Benefits	Features and functions of Geberit FlowFit
Easy handling	• The lateral positioning of the pressing jaw is ideal for narrow areas and for when there is a small distance from the wall or ceiling. • Only 2 pressing jaws for all 8 pipe diameters (lighter cases) • No heavy pressing collars. Lightweight pressing jaws make the installation easier, especially with overhead work. • The pressfitting made of PPSU can be rotated into the optimal pressing position for the plumber. • The pipe diameters D16 to 40 mm can also be pressed with hand-operated pressing pliers.
Faster completion	• No constant change of the pressing tool. Properties with up to 20 apartments can even be realised without changing the pressing jaws. • Intuitively correct assignment of the pressing jaw and fitting through clear colour marking • No deburring and calibration of the pipes (if a pipe end is oval or ragged, a separate Geberit calibration tool is available) • High retaining force of the fittings: The fitted pipe remains in the desired position (e.g. in the riser zone or in the event of a change in direction). • Less effort is required

Table 2: Installation safety

Benefits	Features and functions of Geberit FlowFit
Error-free work	• Inspection window in the fittings for visual control of the pipe insertion depth • Avoidance of failed pressing sequences through the intuitively correct assignment of the pressing jaw and fitting • The pressing indicator is used for pressing and as a tool guide rim. It is practically impossible to press in the wrong direction.
Easy control of the installation	• The detached pressing indicator shows the successful pressing. • Unpressed connections can be easily identified by the attached blue or orange pressing indicator. • The fittings are leaky if unpressed.
Robustness and long service life of the fittings	• Suitability for construction sites due to the compact design of the fitting, stiffening rib on the fitting and the absence of delicate parts • Versatile material that is as robust as metal, but is corrosion-resistant and has a long service life • Stainless steel pressing clamp • High-quality O-ring for safety/tightness with a long service life

Table 3: Cost-effectiveness

Benefits	Features and functions of Geberit FlowFit
Cost savings through optimal workflows and sustainability	• Comfortable work saves energy and time. • Lower material costs (flow-optimised fittings enable smaller pipe diameters) • Durability due to the quality of materials and processing • 25-year spare part guarantee

Table 4: Cleanliness and hygiene

Benefits	Features and functions of Geberit FlowFit
Potable water hygiene made easy from the start	• Pipes and fittings are protected against impurities with protective caps, even in dirty working environments. • The flow-optimised product design enables shorter draw-off times and reduces the risk of stagnation.
Clean installation and sustainability	• The pressing indicators are simply collected and recycled with a collecting device on the pressing jaw. • For installations above existing systems, the collecting device on the pressing jaw prevents pressing indicators from falling down in an uncontrolled manner.

Table 5: Future viability

Benefits	Features and functions of Geberit FlowFit
Compliance with standards	• Materials meet the mandatory normative requirements from 2021 (e.g. metallic fittings are lead-free).
Sustainability	• Environmental product declarations according to EN 15804 (EPDs) are available for Geberit FlowFit system pipes and fittings. • Less material and energy consumption from manufacture to disposal • 25-year spare part guarantee • Innovative recycling system. The Geberit sales company takes back system parts and packaging in order to introduce them back into the manufacturing process or to recycle them.
Latest state-of-the-art technology	• Optimised flow behaviour generates lower pressure losses and allows for smaller pipe diameters. • Simple and fast pressing technology • Smaller distances to the wall and ceiling

Table 6: Intelligent planning

Benefits	Features and functions of Geberit FlowFit
Optimal planning capability	• Support and service through Geberit competence in potable water hygiene • Current BIM content for Geberit FlowFit is provided through the Geberit BIM Catalogue plug-in. • Sanitary engineers can use the range available in their market in the local language.

Table 7: Safeguarding of potable water quality

Benefits	Features and functions of Geberit FlowFit
Potable water hygiene through product design	• Pressure-loss-optimised product design allows for smaller installation designs, thereby reducing the time that the water stays in the pipe. • Smaller pipe diameters shorten the draw-off time. • Flow divider for more water movement in the distribution pipe.

1.6 SYSTEM DESCRIPTION

1.6.1 Overview of Geberit FlowFit

Geberit FlowFit is a corrosion-resistant and universally applicable supply system in which the pipes and fittings are connected by pressing them together laterally to create permanent, leakproof pipes.

Geberit FlowFit is characterised by the following properties:

- The lateral pressing combined with the innovative Geberit FlowFit tool concept enables a smooth, convenient installation with shorter installation times than with conventional pressing systems.
- The flow-optimised system with lower pressure losses enables smaller pipe diameters and therefore a smaller supply system. For potable water installations, this has a positive effect on the draw-off time and potable water hygiene.
- The Geberit system pipe ML combines the stability advantages of metallic material with the corrosion resistance of plastic. The pipes are easy to bend and inherently stable. The stability of the multilayer pipe is ensured by the longitudinally welded aluminium pipe.

The most common uses are listed below. Other applications (media), together with the operating temperatures and operating pressures, are listed in the Geberit FlowFit usage overview.

	System pipe material	Dimensions[1] d [mm]	Most common uses
Geberit FlowFit 	Multi-layer (ML) PE-RT II / Al / PE-RT II 	16–75	• Hot and cold potable water • Heating water • Cooling water with and without antifreeze agent • Treated water • Compressed air (oil class 0–3)

1) Available pipe dimensions for a system pipe/fitting combination

The operating conditions specified in the relevant approvals, standards and technical regulations must be observed for each application. These may differ from the information in the usage overviews.

Geberit provides pressing tools and service-free pressing jaws for pressing the pipes and fittings.

The lateral pressing of Geberit FlowFit enables the number of the required pressing jaws to be significantly reduced. To compress the pipe and fitting, the pressing jaw no longer has to wrap around the fitting, but is placed above the pressing indicator, which is the same size for several fitting dimensions. For lateral pressing, the space requirements for the pressing are lower. Pipes can be laid at a closer distance to the wall and ceiling and pipe systems can be installed in a more space-saving manner.

Only 2 pressing jaws are required for the 8 Geberit FlowFit dimensions:

Figure 1: Blue pressing jaw for the dimensions d16, 20, 25, 32 and 40 mm

Figure 2: Orange pressing jaw for the dimensions d50, 63 and 75 mm

The dimensions d16–40 mm can also be pressed with the Geberit FlowFit hand-operated pressing pliers.

Figure 3: Geberit FlowFit hand-operated pressing pliers

The fitting range includes:

- flow-optimised fittings made of plastic
- fittings made of lead-free gunmetal and lead-free silicon bronze for the transition to other systems and components
- Geberit adapters with MasterFix for connection to Geberit valves
- system transitions to all other Geberit supply systems

1.6.2 System components

The Geberit FlowFit system consists of the following components:

System pipes:

- Geberit system pipe ML
- Geberit system pipe ML Therm

Fittings:

- Geberit FlowFit pressfittings made of PPSU
- Geberit FlowFit pressfittings made of lead-free gunmetal or lead-free silicon bronze

Permanent adapters, including transitions

- to Geberit Mapress
- to Geberit Mepla
- with thread to other systems

Removable adapters and connections, including

- adapters with MasterFix

Connections for heating:

- connector boxes
- connection bends
- connector T-pieces

Manifolds:

- manifold with threaded connection and MasterFix

Tap connectors, including

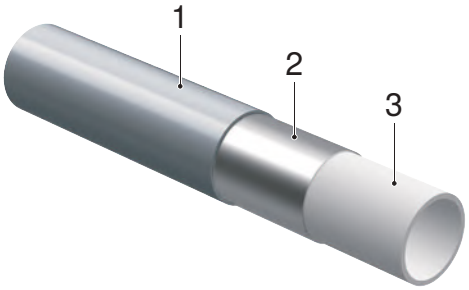
- tap connectors for solid construction with moisture sealing and for direct system connection

Geberit provides the corresponding fastenings and processing tools for the pipe processing and pipe laying.

Geberit system pipe ML

Structure and essential product information

The Geberit system pipe ML is made of 3 layers. It is particularly suitable for drinking water installations.



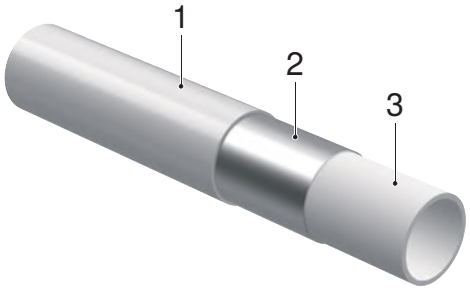
1 Protective jacket
2 Aluminium pipe
3 Media pipe

Outer diameter	16–75 mm
Designs	• Bare • Pre-insulated • In a protective tube
Description	• Media pipe made of polyethylene of raised temperature resistance (PE-RT II), light grey • Longitudinally butt-welded aluminium pipe as a stabilising core • Protective jacket made of polyethylene of raised temperature resistance (PE-RT II), silver grey • Pipe end with transparent protection plug • Insulation made of PE soft foam, closed-cell, red or blue protective foil • Protective tube made of polyethylene, ice blue
Properties	• Inherently stable • Can be bent by hand up to and including a pipe diameter of 32 mm. Larger pipe diameters can be bent with a hydraulic bending tool • Forms a barrier against diffusion • The aluminium core reduces the significant linear expansion that is typical for plastic pipes and allows for larger fastening distances. • The media pipe is food-safe and therefore suitable for all drinking water.

Geberit system pipe ML, Therm

Structure and essential product information

The Geberit system pipe ML, Therm is made of 3 layers. It is particularly suitable for heating and cooling water installations.



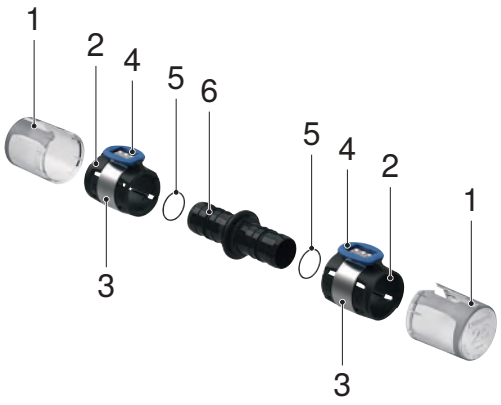
1 Protective jacket
2 Aluminium pipe
3 Media pipe

Outer diameter	16–25 mm
Designs	• Bare • Pre-insulated
Description	• Media pipe made of polyethylene of raised temperature resistance (PE-RT II), light grey • Longitudinally butt-welded aluminium pipe as a stabilising core • Protective jacket made of polyethylene of raised temperature resistance (PE-RT II), white • Pipe end with transparent protection plug • Insulation made of PE soft foam, closed-cell, red protective foil
Properties	• Inherently stable • Can be bent by hand up to and including a pipe diameter of 32 mm. Larger pipe diameters can be bent with a hydraulic bending tool • Forms a barrier against diffusion • The aluminium core reduces the significant linear expansion that is typical for plastic pipes and allows for larger fastening distances. • Not approved for drinking water

Geberit FlowFit pressfittings

Structure and essential product information

The Geberit FlowFit pressfitting made of PPSU with a rotary latching function allows easy and reliable alignment and pressing of the pipe and fitting.



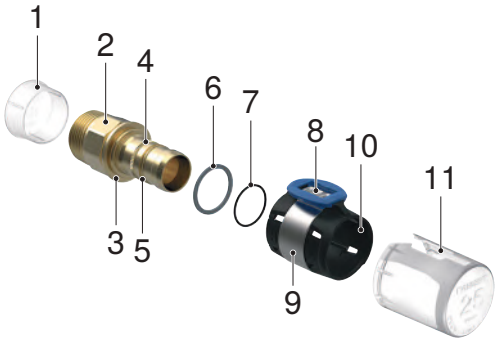
1 Protective cap
2 Collet
3 Pressing clamp
4 Pressing indicator and tool guide rim for pressing jaws
5 O-ring
6 Fitting body

Outer diameter	16–75 mm
Description	• Pressfitting made of polyphenylene sulphone (PPSU), black, with pressing clamp made of stainless steel • Pressing indicator, blue, d16–40 mm • Pressing indicator, orange, d50–75 mm • With transparent protective caps
Properties	• Pressing unit (collet, pressing clamp and pressing indicator) with a rotary latching function for precise alignment and with insertion control. After reaching the correct pipe insertion depth, the unpressed fitting can be turned clockwise and anticlockwise in 45° steps. The fitting engages noticeably and audibly. The fitting can also be pressed in any intermediate position. • The collet holds the pipe in the correct position until it is pressed. • 4 recesses below the press indicator serve as the insertion control. • The pressing indicator detaches after the pressing procedure. • The O-ring is coated with a lubricant containing silicone, which means it is not LABS-free[1)]. • Leaky if unpressed

1) Free of paint-wetting impairment substances, such as silicone

Structure and essential product information

Geberit FlowFit metal pressfittings serve as adapters.



1 Protective cap for male thread
2 Wrench flat
3 Fitting body
4 Antirotation lock
5 Retaining grooves
6 Corrosion barrier washer
7 O-ring
8 Pressing indicator and tool guide rim for pressing jaws
9 Pressing clamp
10 Collet
11 Protective cap for pressing unit

Outer diameter	16–75 mm
Description	• Pressfitting made off lead-free gunmetal or lead-free silicon bronze/ PPSU with stainless steel pressing clamp • Pressing indicator, blue, d16–40 mm • Pressing indicator, orange, d50–75 mm • With transparent protective caps
Properties	• The collet holds the pipe in the correct position until it is pressed. • 4 inspection windows below the pressing indicator serve as an insertion depth control. • The pressing unit can be turned to the position that is optimal for the installer and then pressed. • The pressing indicator detaches after the pressing procedure. • The washer prevents the metal fitting body from coming into contact with the aluminium core of the multilayer pipe and therefore prevents electrochemical corrosion. • The O-ring is coated with a lubricant containing silicone, which means it is not LABS-free[1)]. • Leaky if unpressed

1) Free of paint-wetting impairment substances, such as silicone

Inspection window for insertion depth control

The inspection windows on both sides past the pressing indicator show at a glance whether the pipe and fitting are correctly connected to each other.

Figure 4: If the insertion depth is correct, the pipe can be seen through both inspection windows.

1.6.3 Flow-optimised fittings

Geberit FlowFit fittings have been flow-optimised and generate lower pressure losses than conventional plastic fittings.

The pressure loss is primarily determined by the flow velocity and the flow behaviour of the medium. Geberit FlowFit fittings have been optimised through constructive and fabrication-related measures so as to avoid peak speeds and enable an optimal medium flow behaviour.

The dimensions d16–32 mm in particular have very low Zeta values. Supply systems can be designed with smaller pipe dimensions and therefore more economically with Geberit FlowFit. Smaller pipe dimensions are also advantageous from the point of view of potable water hygiene. A lower water volume means a shorter stay in the pipe and therefore a faster exchange of water.

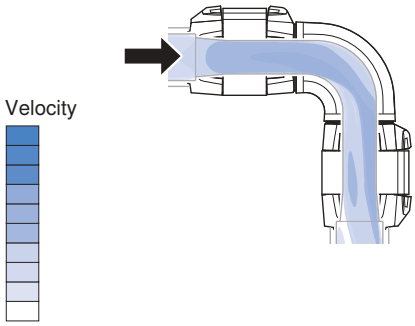


Figure 5: Flow optimisation in a Geberit FlowFit bend 90°

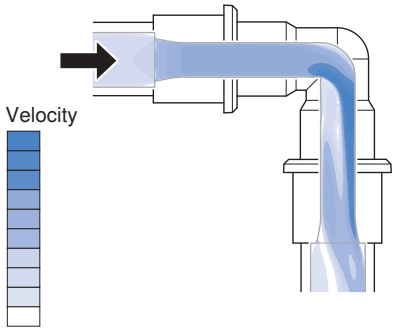


Figure 6: Flow behaviour in a conventional bend 90°

Marking of Geberit system pipe ML

1.6.4 Holding capacity in the fitted, unpressed state

Geberit FlowFit pressfittings are designed to hold the pipe in the correct position until it is pressed. This prevents the pipe from turning and slipping out.

In the event of a change in direction, the fitting holds a fitted pipe up to 0.5 m long in its position in its unpressed state.

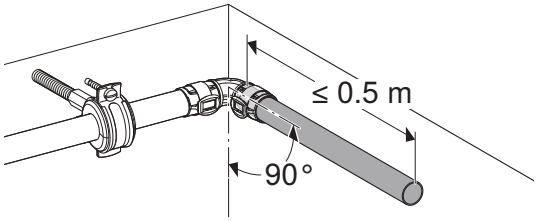


Figure 7: Radial holding capacity of the fitting

In the case of vertically laid pipes, the fitting holds a fitted pipe up to 2.5 m long in its position in an unpressed state.

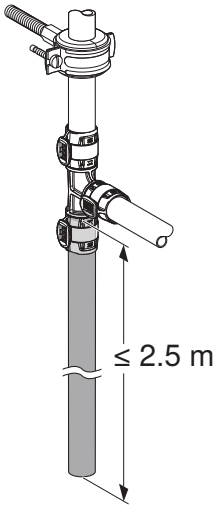


Figure 8: Axial holding capacity of the fitting

1.6.5 Marking of pipes and fittings

Geberit system pipes ML are marked with black lettering on the pipe surface. The following table explains the marking using a d16 mm system pipe as an example.

GEBERIT	Company logo
Geberit system pipe ML	Product name
090101 123735	Manufacturing date and manufacturing time
16 x 2.0	Outer diameter x wall thickness [mm]
PE-RT II / Al / PE-RT II	Material
10 bar	Operating pressure
70 °C	Operating temperature
xxx, DVGW -xxx	Approval marks for Germany
ÖVGW W xxx	Approval marks for Austria
SVGW xxx	Approval marks for Switzerland
KIWA Kxxx	Approval marks for the Netherlands

Marking of Geberit system pipe ML, in a protective tube

Geberit system pipes ML in a protective tube are marked with blue lettering on the pipe surface. The following table explains the marking using a d16 mm system pipe as an example.

GEBERIT	Company logo
Geberit system pipe ML	Product name
090101 123735	Manufacturing date and manufacturing time
16 x 2.0	Outer diameter x wall thickness [mm]
PE-RT II / Al / PE-RT II	Material
10 bar	Operating pressure
70 °C	Operating temperature

Marking of Geberit system pipe ML, pre-insulated

Geberit pre-insulated system pipes ML are marked with blue lettering on the pipe surface. The following table explains the marking using a d16 mm system pipe as an example.

GEBERIT	Company logo
Geberit system pipe ML	Product name
090101 123735	Manufacturing date and manufacturing time
16 x 2.0	Outer diameter x wall thickness [mm]
PE-RT II / Al / PE-RT II	Material
10 bar	Operating pressure
70 °C	Operating temperature

Marking of Geberit system pipe ML, Therm

Geberit system pipes ML, Therm are marked with black lettering on the pipe surface. The following table explains the marking using a d16mm system pipe as an example.

GEBERIT	Company logo
Geberit system pipe ML Therm	Product name
090101 123735	Manufacturing date and manufacturing time
16 x 2.0	Outer diameter x wall thickness [mm]
PE-RT II / Al / PE-RT II	Material

Marking of Geberit FlowFit plastic pressfitting

Geberit FlowFit pressfittings made of PPSU are marked on the collet. The following table explains the marking using a d16mm fitting as an example.

GEBERIT	Company logo
16	Outer diameter [mm]
	Recyclable material
 YYMMDD	Data matrix code with manufacturing date (for internal processes only, for traceability purposes)
	Pipe insertion depth control

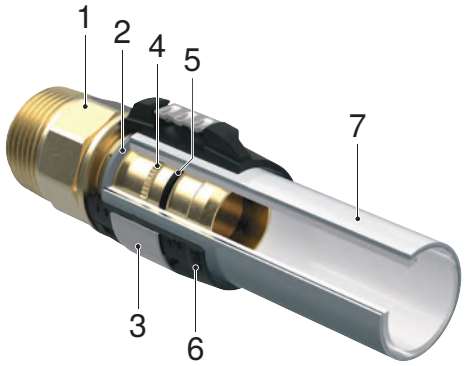
Marking of Geberit FlowFit metal pressfitting

Geberit FlowFit pressfittings made of lead-free gunmetal or lead-free silicon bronze are marked on the collet. The following table explains the marking using a d16mm fitting as an example.

GEBERIT	Company logo
16	Outer diameter [mm]
	Recyclable material
 YYMMDD	Data matrix code with manufacturing date (for internal processes only, for traceability purposes)
	Pipe insertion depth control

1.6.6 Geberit FlowFit pressed joint

The following figure shows a Geberit FlowFit pressed joint after the pressing procedure:



1 Fitting body
2 Corrosion barrier washer
3 Pressing clamp
4 Antirotation lock
5 O-ring in the retaining groove
6 Collet
7 Geberit system pipe

The fitting collet has been designed so as to reliably hold the system pipe in the correct position until it is pressed.

To press the system pipe and fitting, the Geberit FlowFit pressing jaw is placed over the pressing indicator and the pressing procedure is carried out. The pressing procedure permanently deforms the pressing unit (collet and pressing clamp) and pipe and presses them onto the fitting body so that they form a leakproof connection. The pressing indicator detaches during the pressing procedure. This makes it easy to distinguish the pressed connections from the unpressed ones.

The antirotation lock and the retaining grooves on the fitting permanently secure the pipe against being turned and pulled out. The Geberit FlowFit pressed joint is permanent.

Colour concept of Geberit FlowFit pressing jaws

To press the system pipe and fitting, the suitable pressing jaw is inserted into the Geberit pressing tool. The pressing jaw must be the same colour as the pressing indicator of the fitting to be pressed: blue for dimensions d16–40 mm and orange for dimensions d50–75 mm.

Table 8: Geberit FlowFit pressing jaws for Geberit compatibility [1] and [2]

Compatibility	Pressing jaw	d [mm]	Pressfitting
[1]		16–40	
[2]			
[2]		50–75	

Marking of the pressed joint

The Geberit FlowFit hand-operated pressing pliers and the Geberit FlowFit pressing jaws have ridges on the pressing tips.

The impression that the ridges leave during the pressing procedure make it possible to determine

- whether a Geberit pressing tool has been used for the pressing
- and the compatibility (indicated in square brackets) of the pressing jaw used.

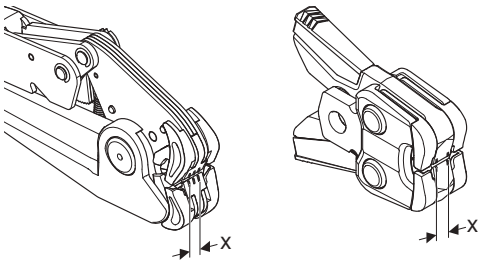


Table 9: Distance between the ridges as an indicator of the pressing tools / pressing jaws used

Distance x [mm]	Number of ridges	Pressing tool / pressing jaw[1)]	Pipe diameter d [mm]
3	3	Hand-operated pressing pliers	16–40
6	2	Pressing jaw [1]	16–40
10	2	Pressing jaw [2]	16–40
14	2	Pressing jaw [2]	50–75

The numbers in square brackets indicate the compatibility.

1.7 TECHNICAL DATA

All technical specifications in the following chapters are subject to work tolerances, any required modifications or other installation options.

1.7.1 Geberit system pipe ML

Material

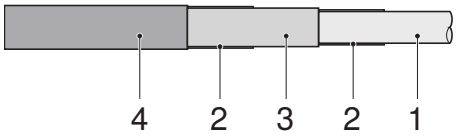


Figure 9: Geberit system pipe ML

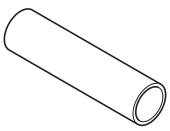
1 Media pipe made of PE-RT II
2 Bonding agent
3 Aluminium pipe
4 Protective jacket made of PE-RT II

Physical properties

Table 10: Geberit system pipe ML

Thermal expansion coefficient α at 20–100 °C	0.026 mm/(m·K)
Thermal conductivity λ at 20 °C	0.41 W/(m·K)
Surface roughness k	7 µm
Fire behaviour	System pipe ML: Class E according to EN 13501-1:2018

Pipe data



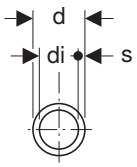


Table 11: Geberit system pipe ML, in bars

DN	d [mm]	s [mm]	di [mm]	E [kN/mm²]	m_R [kg/m]	m_{RW} [kg/m]	V [dm³/m]
12	16	2	12	69.5	0.128	0.241	0.113
15	20	2	16		0.164	0.365	0.201
20	25	2.5	20		0.236	0.550	0.314
25	32	2.8	26.4	70.0	0.328	0.874	0.547
32	40	3	34		0.458	1.365	0.908
40	50	3.8	42.4		0.707	2.117	1.412
50	63	4	55		0.996	3.368	2.376
65	75	4.6	65.8		1.465	4.859	3.400

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume
E Modulus of elasticity

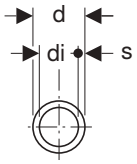
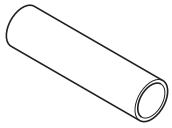


Table 12: Geberit system pipe, ML, in coils

DN	d [mm]	s [mm]	di [mm]	E [kN/mm²]	m_R [kg/m]	m_{RW} [kg/m]	V [dm³/m]
12	16	2	12	69.5	0.105	0.218	0.113
15	20	2	16		0.145	0.345	0.201
20	25	2.5	20		0.217	0.530	0.314
25	32	2.8	26.4	70.0	0.328	0.874	0.547

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume
E Modulus of elasticity

Thermal capacity



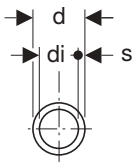


Table 13: Thermal capacity **c** per metre ofGeberit system pipe ML, in bars

DN	d [mm]	s [mm]	c [J/(m•K)]
12	16	2	183
15	20	2	235
20	25	2.5	348
25	32	2.8	493
32	40	3	674
40	50	3.8	1056
50	63	4	1472
65	75	4.6	2000

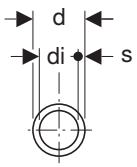
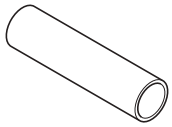


Table 14: Thermal capacity **c** per metre of Geberit system pipe ML, in coils

DN	d [mm]	s [mm]	c [J/(m•K)]
12	16	2	173
15	20	2	226
20	25	2.5	341
25	32	2.8	493

Fire load



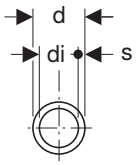


Table 15: Fire load h_u of Geberit system pipe ML, in bars

DN	d [mm]	s [mm]	h_u [kWh/m]
12	16	2	0.84
15	20	2	1.08
20	25	2.5	1.67
25	32	2.8	2.44
32	40	3	3.22
40	50	3.8	5.16
50	63	4	7.08
65	75	4.6	8.43

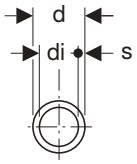


Table 16: Fire load h_u of Geberit system pipe ML, in coils

DN	d [mm]	s [mm]	h_u [kWh/m]
12	16	2	0.97
15	20	2	1.17
20	25	2.5	1.79
25	32	2.8	2.44

1.7.2 Geberit system pipe ML, with circular pre-insulation

Material

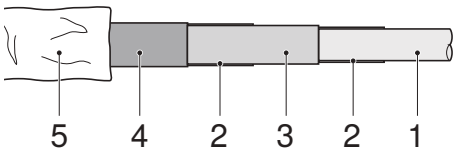


Figure 10: Geberit system pipe ML, with circular pre-insulation

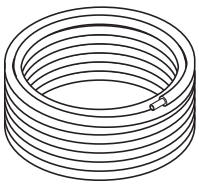
1 Media pipe made of PE-RT II
2 Bonding agent
3 Aluminium pipe
4 Protective jacket made of PE-RT II
5 Insulation, PE soft foam, closed-cell, 100 % free of HCFCs and HFCs. Protective foil (outside) made of PE

Physical properties

Table 17: Geberit system pipe ML, with circular pre-insulation

Designation	Insulation thickness			
	6 mm	10 mm	13 mm	26 mm
Thermal expansion coefficient α at 20–100 °C	0.026 mm/(m·K)			
Thermal conductivity λ, pipe at 20 °C	0.41 W/(m·K)			
Thermal conductivity λ, insulation at 20 °C	0.04 W/(m·K)			
Thermal conductivity λ, pipe and insulation at 20 °C	0.052 W/(m•K)	0.048 W/(m•K)	0.045 W/(m•K)	0.020 W/(m•K)
Surface roughness k	7 µm			
Fire behaviour	System pipe ML: Class E according to EN 13501-1:2018			
	Insulation made of PE: Class C according to EN 13501-1:2018			

Pipe data



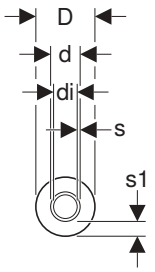


Table 18: Geberit system pipe ML, with circular pre-insulation, in coils, red or blue, insulation thickness 6 mm

DN	d [mm]	s [mm]	di [mm]	D [cm]	m_R [kg/m]	m_{RW} [kg/m]	V [dm^3/m]
12	16	2	12	2.8	0.128	0.241	0.113
15	20	2	16	3.2	0.171	0.372	0.201
20	25	2.5	20	3.7	0.248	0.561	0.314
25	32	2.8	26.4	4.4	0.365	0.912	0,547

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume

Table 19: Geberit system pipe ML, with circular pre-insulation, in coils, blue, insulation thickness 10 mm

DN	d [mm]	s [mm]	di [mm]	D [cm]	m_R [kg/m]	m_{RW} [kg/m]	V [dm^3/m]
12	16	2	12	3.6	0.142	0.255	0.113
15	20	2	16	4	0.188	0.388	0.201
20	25	2.5	20	4.5	0.267	0.580	0.314
25	32	2.8	26.4	5.2	0.387	0.934	0,547

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume

Table 20: Geberit system pipe ML, with circular pre-insulation, in coils, blue, insulation thickness 13 mm

DN	d [mm]	s [mm]	di [mm]	D [cm]	m_R [kg/m]	m_{RW} [kg/m]	V [dm^3/m]
12	16	2	12	4.2	0.156	0.269	0.113
15	20	2	16	4.6	0.203	0.404	0.201
20	25	2.5	20	5.1	0.283	0.596	0.314
25	32	2.8	26.4	5.8	0.405	0.952	0,547

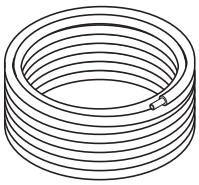
m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume

Table 21: Geberit system pipe ML, with circular pre-insulation, in coils, blue, insulation thickness 26 mm

DN	d [mm]	s [mm]	di [mm]	D [cm]	m_R [kg/m]	m_{RW} [kg/m]	V [dm^3/m]
12	16	2	12	6.8	0.234	0.347	0.113
15	20	2	16	7.2	0.285	0.485	0.201
20	25	2.5	20	7.7	0.372	0.685	0,547

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume

Thermal capacity



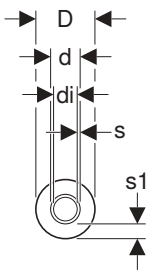
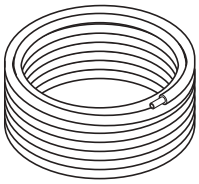


Table 22: Thermal capacity **c** per metre of Geberit system pipe ML, with circular pre-insulation

DN	d [mm]	s [mm]	c [J/(m•K)]			
			Insulation thickness			
			6 mm	10 mm	13 mm	26 mm
12	16	2	216	245	271	418
15	20	2	276	307	336	492
20	25	2.5	400	436	466	636
25	32	2.8	564	606	640	828

Fire load



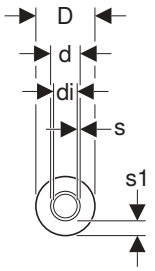


Table 23: Fire load h_u of Geberit system pipe ML, with circular pre-insulation, red or blue, insulation thickness 6 mm

DN	d [mm]	D [cm]	h_u [kWh/m]
12	16	2.8	1.24
15	20	3.2	1.49
20	25	3.7	2.17
25	32	4.4	2.89

Table 24: Fire load h_u of Geberit system pipe ML, with circular pre-insulation, blue, insulation thickness 10 mm

DN	d [mm]	D [cm]	h_u [kWh/m]
12	16	3.6	1.42
15	20	4	1.70
20	25	4.5	2.40
25	32	5.2	3.16

Table 25: Fire load h_u of Geberit system pipe ML, with circular pre-insulation, blue, insulation thickness 13 mm

DN	d [mm]	D [cm]	h_u [kWh/m]
12	16	4.2	1.60
15	20	4.6	1.88
20	25	5.1	2.59
25	32	5.8	3.38

Table 26: Fire load h_u of Geberit system pipe ML, with circular pre-insulation, blue, insulation thickness 26 mm

DN	d [mm]	D [cm]	h_u [kWh/m]
12	16	6.8	2.54
15	20	7.2	2.88
20	25	7.7	3.68

1.7.3 Geberit system pipe ML, in a protective tube

Material

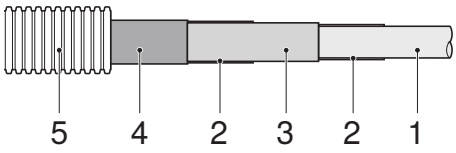


Figure 11: Geberit system pipe ML, in protective tube

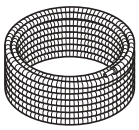
1 Media pipe made of PE-RT II
2 Bonding agent
3 Aluminium pipe
4 Protective jacket made of PE-RT II
5 Protective tube made of PE

Physical properties

Table 27: Physical properties

Thermal expansion coefficient α at 20–100 °C	0.026 mm/(m·K)
Thermal conductivity λ at 20 °C	0.41 W/(m·K)
Surface roughness k	7 μm

Pipe data



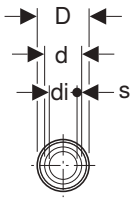
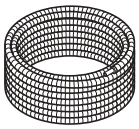


Table 28: Geberit system pipe ML, in a protective tube, in coils

DN	d [mm]	s [mm]	di [mm]	D [cm]	m_R [kg/m]	m_{RW} [kg/m]	V [dm³/m]
12	16	2	12	2.7	0.171	0.284	0.113
15	20	2	16	3.1	0.226	0.427	0.201

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume

Thermal capacity



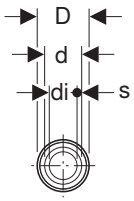
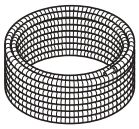


Table 29: Thermal capacity **c** per metre of Geberit system pipe ML, in protective tube

DN	d [mm]	s [mm]	c [J/(m•K)]
12	16	2	299
15	20	2	380

Fire load



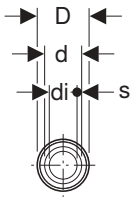


Table 30: Fire load h_u of Geberit system pipe ML, in protective tube

DN	d [mm]	D [cm]	h_u [kWh/m]
12	16	2.7	1.77
15	20	3.1	2.16

1.7.4 Geberit system pipe ML, Therm

Material

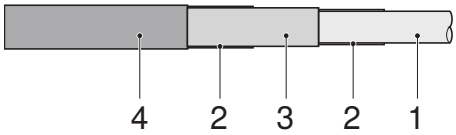


Figure 12: Geberit system pipe ML Therm

1 Media pipe made of PE-RT II
2 Bonding agent
3 Aluminium pipe
4 Protective jacket made of PE-RT II

Physical properties

Table 31: Geberit system pipe ML Therm

Thermal expansion coefficient α at 20–100 °C	0.026 mm/(m·K)
Thermal conductivity λ at 20 °C	0.41 W/(m·K)
Surface roughness k	7 µm
Fire behaviour	System pipe ML: Class E according to EN 13501-1:2018

Pipe data

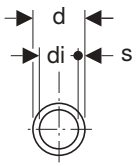


Table 32: Geberit system pipe ML, Therm, in coils

DN	d [mm]	s [mm]	di [mm]	E [kN/mm²]	m_R [kg/m]	m_{RW} [kg/m]	V [dm³/m]
12	16	2	12	69.5	0.105	0.218	0.113
15	20	2	16		0.145	0.345	0.201
20	25	2.5	20		0.217	0.530	0.314

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume
E Modulus of elasticity

Thermal capacity

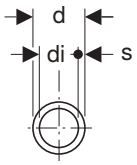


Table 33: Thermal capacity **c** per metre of Geberit system pipe ML Therm

DN	d [mm]	s [mm]	c [J/(m•K)]
12	16	2	173
15	20	2	226
20	25	2.5	341

Fire load

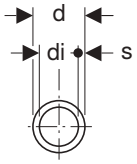


Table 34: Fire load h_u of Geberit system pipe ML, Therm, in coils

DN	d [mm]	s [mm]	h_u [kWh/m]
12	16	2	0.97
15	20	2	1.17
20	25	2.5	1.79

1.7.5 Geberit system pipe ML, Therm, with circular pre-insulation

Material

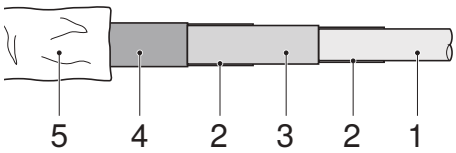


Figure 13: Geberit system pipe ML Therm, with circular pre-insulation

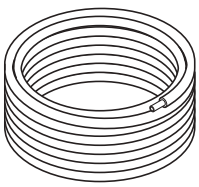
1 Media pipe made of PE-RT II
2 Bonding agent
3 Aluminium pipe
4 Protective jacket made of PE-RT II
5 Insulation, PE soft foam, closed-cell, 100 % free of HCFCs and HFCs. Protective foil (outside) made of PE

Physical properties

Table 35: Geberit system pipe ML Therm, with circular pre-insulation

Designation	Insulation thickness	
	6 mm	10 mm
Thermal expansion coefficient α at 20–100 °C	0.026 mm/(m·K)	
Thermal conductivity λ, pipe at 20 °C	0.41 W/(m·K)	
Thermal conductivity λ, insulation at 20 °C	0.04 W/(m·K)	
Thermal conductivity λ, pipe and insulation at 20 °C	0.052 W/(m•K)	0.048 W/(m•K)
Surface roughness k	7 µm	
Fire behaviour	System pipe ML: Class E according to EN 13501-1:2018	
	Insulation made of PE: Class C according to EN 13501-1:2018	

Pipe data



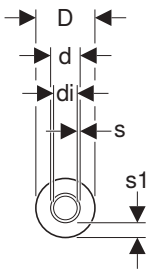


Table 36: Geberit system pipe ML, Therm, with circular pre-insulation, in coils, red, insulation thickness 6 mm

DN	d [mm]	s [mm]	di [mm]	D [cm]	m_R [kg/m]	m_{RW} [kg/m]	V [dm^3/m]
12	16	2	12	2.8	0.128	0.241	0.113
15	20	2	16	3.2	0.171	0.372	0.201
20	25	2.5	20	3.7	0.248	0.561	0.314

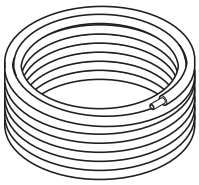
m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume

Table 37: Geberit system pipe ML, Therm, with circular pre-insulation, in coils, red, insulation thickness 10 mm

DN	d [mm]	s [mm]	di [mm]	D [cm]	m_R [kg/m]	m_{RW} [kg/m]	V [dm^3/m]
12	16	2	12	3.6	0.142	0.255	0.113
15	20	2	16	4	0.188	0.388	0.201
20	25	2.5	20	4.5	0.267	0.580	0.314

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume

Thermal capacity



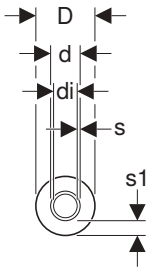
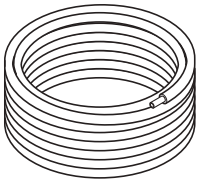


Table 38: Thermal capacity **c** per metre of Geberit system pipe ML Therm, with circular pre-insulation

DN	d [mm]	s [mm]	c [J/(m•K)]	
			Insulation thickness	
			6 mm	10 mm
12	16	2	216	245
15	20	2	276	307
20	25	2.5	400	436

Fire load



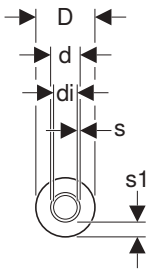


Table 39: Fire load h_u of Geberit system pipe ML, Therm, with circular pre-insulation, red, insulation thickness 6 mm

DN	d [mm]	D [cm]	h_u [kWh/m]
12	16	2.8	1.24
15	20	3.2	1.49
20	25	3.7	2.17

Table 40: Fire load h_u of Geberit system pipe ML, Therm, with circular pre-insulation, red, insulation thickness 10 mm

DN	d [mm]	D [cm]	h_u [kWh/m]
12	16	3.6	1.42
15	20	4	1.70
20	25	4.5	2.40

1.7.6 Geberit system pipe ML, Therm, with eccentric pre-insulation

Material

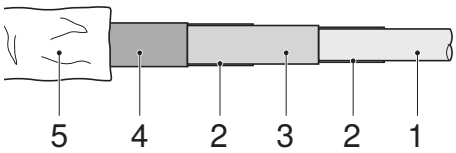


Figure 14: Geberit system pipe ML, Therm, with eccentric pre-insulation

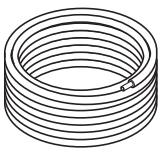
1 Media pipe made of PE-RT II
2 Bonding agent
3 Aluminium pipe
4 Protective jacket made of PE-RT II
5 Insulation, PE soft foam, closed-cell, 100 % free of HCFCs and HFCs. Protective foil (outside) made of PE

Physical properties

Table 41: Geberit system pipe ML, Therm, with eccentric pre-insulation, insulation thickness 13 mm

Thermal expansion coefficient α at 20–100 °C	0.026 mm/(m·K)
Thermal conductivity λ, pipe at 20 °C	0.41 W/(m·K)
Thermal conductivity λ, insulation at 20 °C	0.04 W/(m·K)
Surface roughness k	7 µm
Fire behaviour	System pipe ML: Class E according to EN 13501-1:2018
	Insulation made of PE: Class C according to EN 13501-1:2018

Pipe data



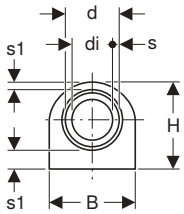
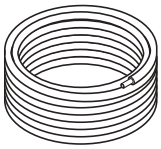


Table 42: Geberit system pipe ML, Therm, with eccentric pre-insulation, in coils

DN	d [mm]	s [mm]	di [mm]	B [cm]	m_R [kg/m]	m_{RW} [kg/m]	V [dm^3/m]
12	16	2	12	3.9	0.155	0.268	0.113
15	20	2	16	4.3	0.201	0.401	0.201
20	25	2.5	20	4.9	0.286	0.600	0.314

m_R Pipe weight
m_{RW} Pipe weight with water at 10 °C
V Pipe volume

Thermal capacity



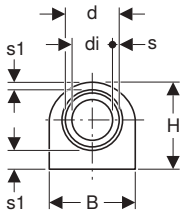
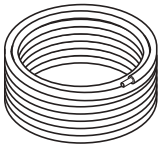


Table 43: Thermal capacity **c** of Geberit system pipe ML, Therm, with eccentric pre-insulation

DN	d [mm]	s [mm]	c [J/(m•K)]
12	16	2	268
15	20	2	332
20	25	2.5	472

Fire load



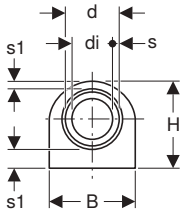
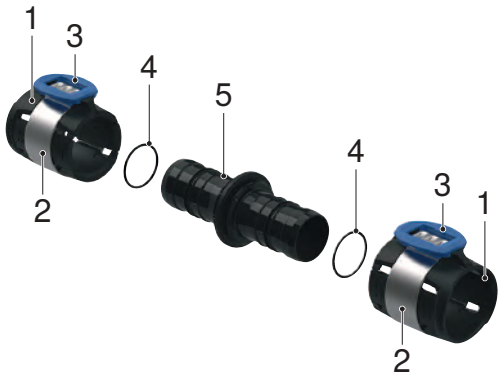


Table 44: Fire load h_u of Geberit system pipe ML, Therm, with eccentric pre-insulation, insulation thickness 13 mm

DN	d [mm]	D [cm]	h_u [kWh/m]
12	16	4.2	1.58
15	20	4.6	1.86
20	25	5.1	2.63

1.7.7 Geberit FlowFit plastic pressfittings

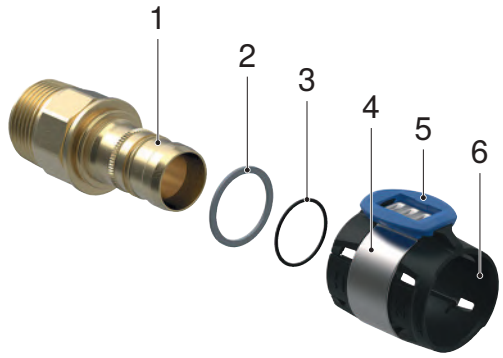
Material



1 Collet (not medium-transporting) made of PA-GF
2 Pressing clamp made of stainless steel 1.4301
3 Pressing indicator and tool guide rim made of POM (Polyoxymethylene)
4 O-ring made of EPDM
5 Fitting body (medium-transporting) made of PPSU

1.7.8 Geberit FlowFit metal pressfittings

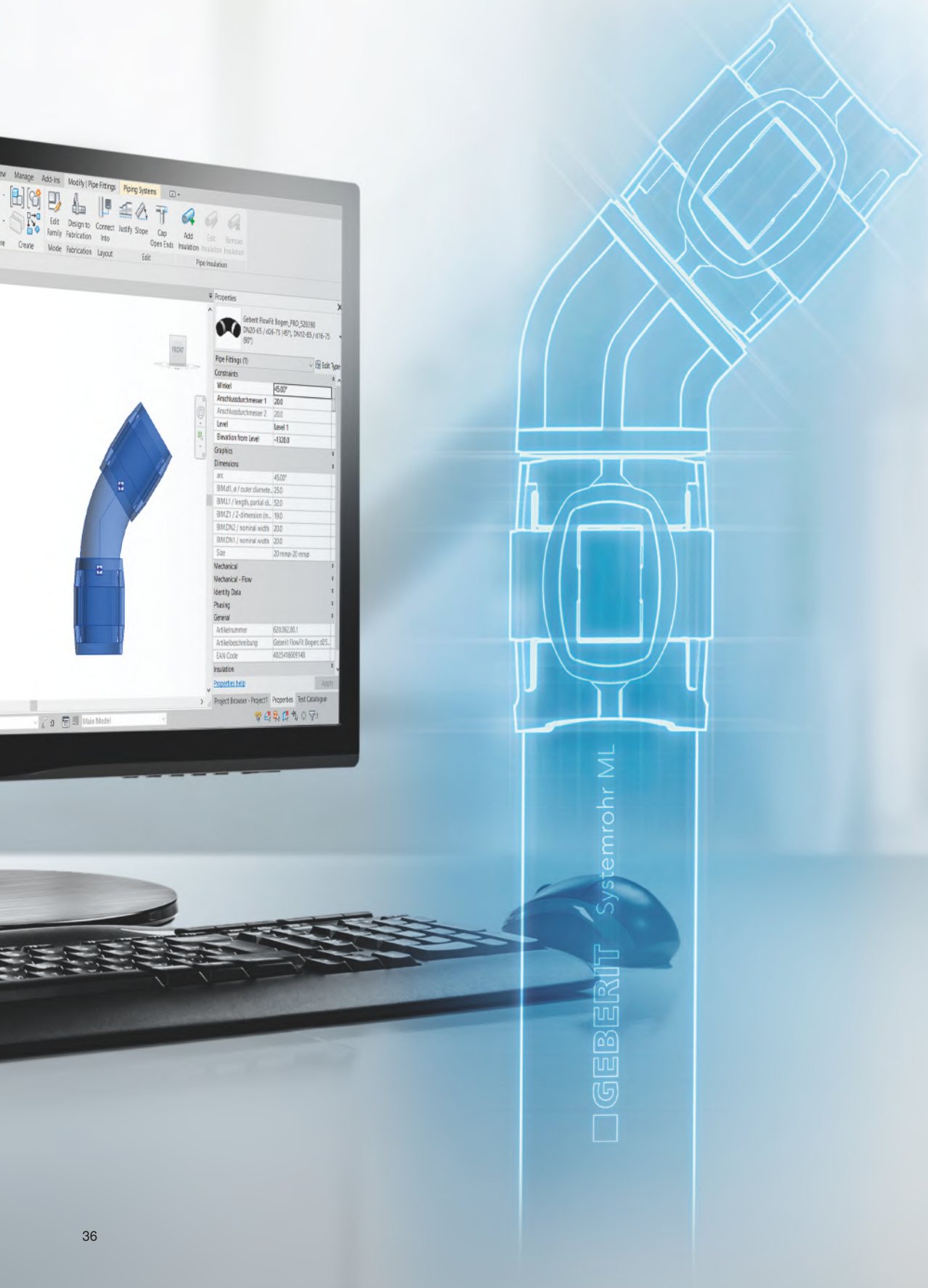
Material



1 Fitting body (medium-transporting) made of lead-free gunmetal or lead-free silicon bronze
2 Corrosion barrier washer made of PE-HD
3 O-ring made of EPDM
4 Pressing clamp made of stainless steel 1.4301
5 Pressing indicator and tool guide rim made of POM (Polyoxymethylene)
6 Collet (not medium-transporting) made of PA-GF

CHAPTER TWO

PRACTICAL USE



2.1 INSULATION OF PIPE SYSTEMS

The insulation of pipe systems must fulfil various functions depending on the constructional situation:

- anticondensation insulation
- thermal insulation
- sound insulation
- absorption of low thermal expansion in pipes

There are a few basic rules to consider when insulating pipe systems:

- It is essential that the choice of insulation is designed to suit the area of use in order to ensure that insulation materials do not damage the pipe material. The restrictions on use provided by the insulation material manufacturers must be observed.
- Insulation materials must be protected against moisture or consist of closed cells in order to avoid a reduction in the insulating effect. Insulation does not replace corrosion protection.
- The installation and routing guidelines provided by the insulation material manufacturers must be observed.
- Insulation shells are not suitable for the absorption of low thermal expansion.
- The absorption of low thermal expansion in pipes is only possible in soft insulation.
- The insulation must be selected according to the respective area of application.

2.1.1 Insulation of potable water pipes

In drinking water pipes, the insulation fulfils the function of maintaining the drinking water quality, amongst other things. Cold-water pipes must be insulated against heat and hot water pipes against heat loss.

Missing or unsuitable insulation has the following consequences:

- In cold-water pipes, the water quality can be affected by heat , e.g. through the formation of legionella. The temperature changes also lead to condensation, which encourages corrosion.
- In hot water pipes and circulation lines, the water quality can be affected by heat loss, e.g. through the formation of legionella. Heat loss also leads to increased energy consumption.

The design of the insulation and the insulation thicknesses depend on country-specific specifications and regulations.

Insulation thicknesses for drinking water pipes according to BS 5422:2009

BS 5422:2009 contains reference values for insulation thicknesses for hot and cold water pipes. The calculation is made according to BS EN ISO 12441 (which assumes still air).

Observe the insulation thicknesses specified in the corresponding tables of the standard or the specifications of other markets on the following pages.

Insulation thicknesses for cold-water pipes according to DIN 1988-200

The minimum insulation thicknesses for cold-water pipes can be taken from the following table for an insulation material with the thermal conductivity λ = 0.040 W/(m•K). The values are designed for residential construction and apply for ambient temperatures of 5–25 °C and a maximum of 85% humidity.

Table 45: Minimum insulation thicknesses for cold-water pipes (according to DIN 1988-200:2012-05)

Installation situation	Ambient temperature	Insulation thickness for the thermal conductivity λ = 0.040 W/(m•K)
Surface-mounted pipes in unheated rooms (e.g. basement)	≤ 20 °C (only protection against condensed water)	9 mm
Pipes laid in pipe ducts, floor ducts and suspended ceilings	≤ 25 °C	13 mm
Pipes laid, for example, in plant rooms or media channels and ducts with heat loads	≥ 25 °C	Insulation such as for hot water pipes, installation situation 1–5
Floor pipes and individual supply pipes in prewall installations	–	4 mm
Floor pipes and individual supply pipes in floor constructions (also in addition to non-circulating hot water pipes)[1)]	–	4 mm
Floor pipes and individual supply pipes in a floor construction in addition to heated circulating pipes[1)]	–	13 mm

λ Thermal conductivity of the insulation material at 10 °C

– Does not apply

1) The laying of cold-water pipes in connection with underfloor heating must fulfil the requirements of section 3.6 “Operating temperature” of DIN 1988-200:2012-05. This means that 30 seconds after fully opening a point of use, the temperature of the cold drinking water must not exceed 25 °C during normal operation.

Insulation thicknesses for hot water pipes according to the Building Energy Act

The insulation thicknesses for heat distribution and hot water pipes and valves can be found in the following table. The specified insulation thicknesses refer to the inner diameter of the pipes. In the case of insulation materials with other thermal conductivity values, the insulation thicknesses must be converted.

Table 46: Minimum insulating layer thicknesses for hot water pipes according to the German Building Energy Act (GEG)

Installation situation		Insulation thickness for the thermal conductivity λ = 0.035 W/(m·K)
1	Inner diameter ≤ 22 mm	20 mm
2	Inner diameter > 22 and ≤ 35 mm	30 mm
3	Inner diameter > 35 and ≤ 100 mm	Same as the inner diameter
4	Inner diameter > 100 mm	100 mm
5	Pipes and valves according to installation situations 1–4 in wall and ceiling openings, at pipe junctions, at pipe connection points and in central distribution systems	Half of the respective value for the installation situations 1–4
6	Hot drinking water pipes that are neither included in the circulation circuit nor equipped with pipe heating cable are, for example, floor pipes and individual supply pipes with a water content ≤ 3 l	No insulation requirements against heat emission[1)]

λ Thermal conductivity of the insulation material at 40 °C

1) Insulation is required for a concealed installation (e.g. 4 mm as mechanical protection or – for heating and cooling water installations with pipes made of non-alloy steel – as corrosion protection).

2.1.2 Sound insulation

Geberit supply systems do not produce any inherent noises with the correct system planning and installation. However, they emit noises that come from appliances and valves. Pipes must therefore be equipped with structure-borne sound insulation that consistently decouples the pipe system from the building structure, e.g. for feed-throughs or through the use of insulated pipe brackets. The insulation must be implemented correctly and without any gaps. The thickness of the insulation is not of importance. Country-specific requirements must be observed.

Sound-insulating pipe jacketing

Pipe insulation such as insulation tape, insulation hoses, insulation shells with jacketing or closures serve as sound-insulating measures which decouple the piping system from the building structure.

The thickness of the insulation does not matter when it comes to decoupling from the building structure. Insulation must not be able to absorb cement slurry, as this will re-establish contact between the pipe and the building.

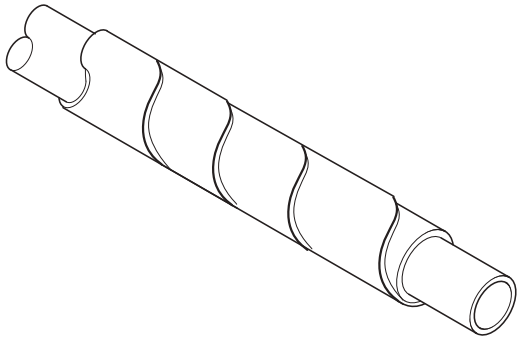


Figure 15: Geberit insulation tape

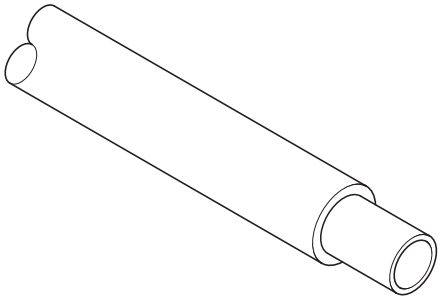


Figure 16: Geberit insulation hose

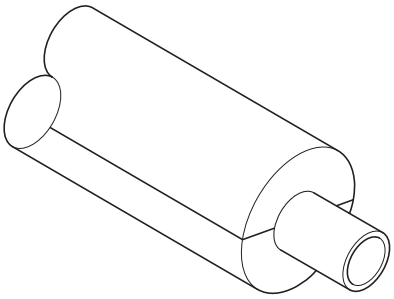


Figure 17: Insulation shell, e.g. made of PIR or PUR

Fastening sound-absorbing pipes

The pipes which have been insulated with insulation tape or insulation hoses can be fastened directly with pipe clips. The insulation therefore ensures structure-borne sound insulation.

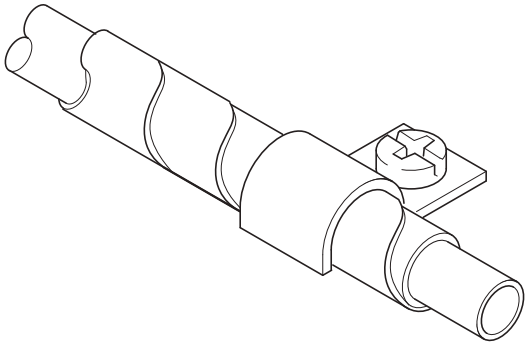


Figure 18: Pipe fastening with pipe clip on Geberit insulation tape

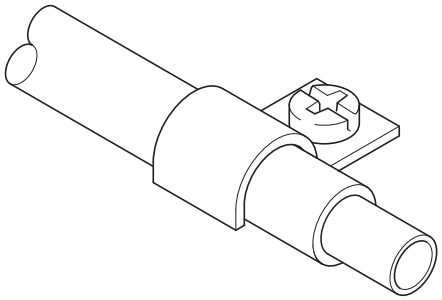


Figure 19: Pipe fastening with pipe clip on Geberit insulation hose

Pipe brackets with solid-borne sound insulation

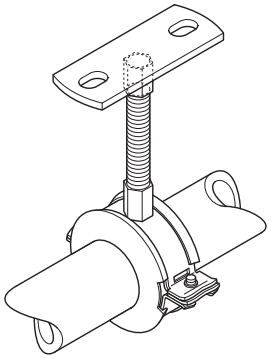


Figure 20: Pipe bracket without lining shell

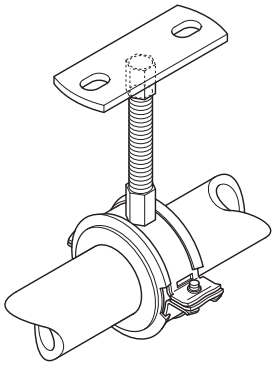


Figure 21: Pipe bracket with lining shell

Sound insulation for Geberit elbow tap connectors

The elbow tap connectors are isolated from both the mounting plate and the building structure with the elements for the structure-borne sound insulation of Geberit elbow tap connectors.

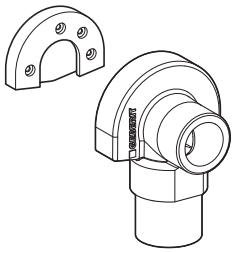


Figure 22: Geberit sound insulation set for elbow tap connector 90°

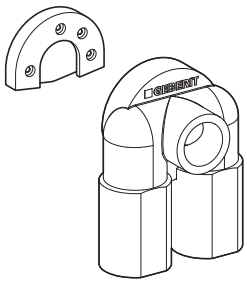


Figure 23: Geberit sound insulation set for a double elbow tap connector 90°

In the case of concealed installation, sound insulation is achieved with the Geberit sound insulation set, comprising the Geberit sound insulation base and a sound insulation cap.

2.1.3 Fire protection

Fire behaviour of Geberit system pipes ML

The Geberit system pipes ML correspond to class E according to EN 13501-1:2018. The fire load of Geberit system pipes ML is 6.5 kWh/kg.

Wall and ceiling feed-throughs, symmetrically installed snap-on pipe section

For Geberit system pipes ML, d16–75 mm, the ceiling and wall feed-throughs for up to fire resistance class R90 are created in accordance with the following specifications:

Wall feed-throughs

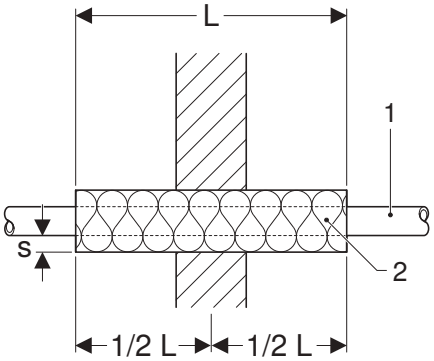


Figure 24: Fire protection for Geberit system pipe ML, d16–75 mm: wall feed-through, solid wall

L Total length ≥ 50 cm
s Insulation thickness
1 Geberit system pipe ML
2 Rockwool RS 800 snap-on pipe section

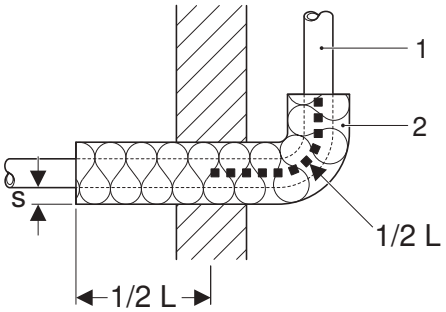


Figure 25: Fire protection for Geberit system pipe ML, d16–75 mm: wall feed-through, solid wall, bend

L Total length ≥ 50 cm
s Insulation thickness
1 Geberit system pipe ML
2 Rockwool RS 800 snap-on pipe section

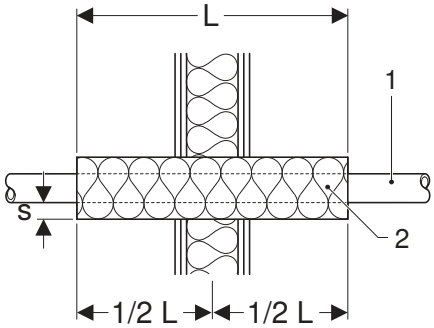


Figure 26: Fire protection for Geberit system pipe ML, d16–75 mm: wall feed-through, drywall

L Total length ≥ 50 cm
s Insulation thickness
1 Geberit system pipe ML
2 Rockwool RS 800 snap-on pipe section

Ceiling feed-throughs

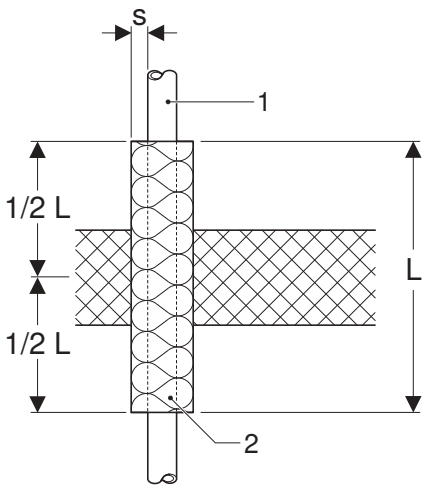


Figure 27: Fire protection for Geberit system pipe ML, d16–75 mm: Ceiling feed-through

L Total length ≥ 50 cm
s Insulation thickness
1 Geberit system pipe ML
2 Rockwool RS 800 snap-on pipe section

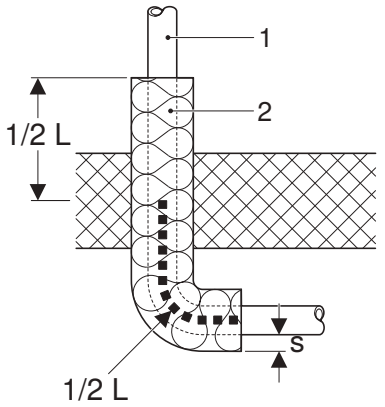


Figure 28: Fire protection for Geberit system pipe ML, d16–75 mm: ceiling feed-through, bend

L Total length ≥ 50 cm
s Insulation thickness
1 Geberit system pipe ML
2 Rockwool RS 800 snap-on pipe section

Wall and ceiling feed-throughs, snap-on pipe section installed flush on one side

For Geberit system pipes ML, d16–75 mm, the ceiling and wall feed-throughs for up to fire resistance class R90 are created in accordance with the following specifications:

Wall feed-throughs

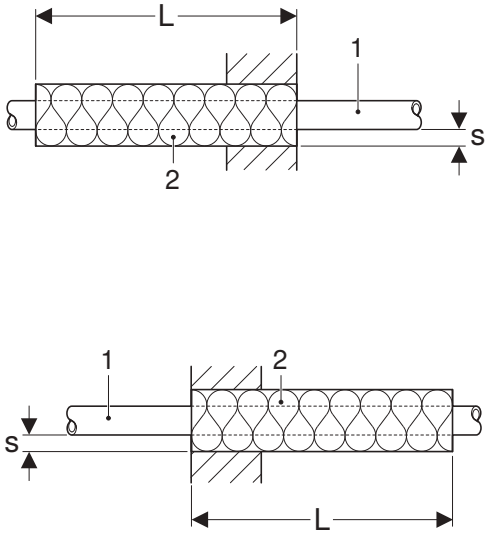


Figure 29: Fire protection for Geberit system pipe ML, d16–75 mm: Wall feed-through for solid wall, flush on one side

L Total length ≥ 50 cm
s Insulation thickness
1 Geberit system pipe ML
2 Rockwool RS 800 snap-on pipe section

Ceiling feed-throughs

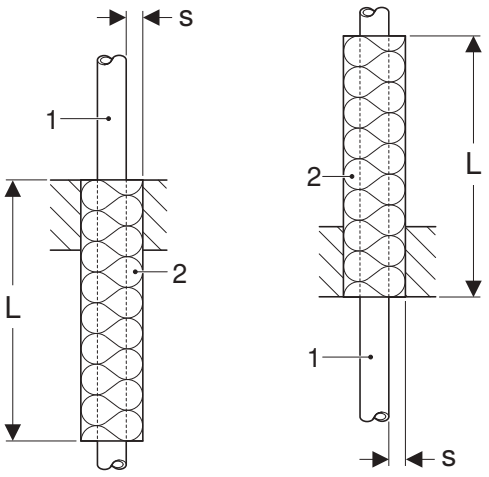


Figure 30: Fire protection for Geberit system pipe ML, d16–75 mm: Ceiling feed-through

L Total length ≥ 50 cm
s Insulation thickness
1 Geberit system pipe ML
2 Rockwool RS 800 snap-on pipe section

Insulation thickness of snap-on pipe sections for wall and ceiling feed-throughs

Table 47: Insulation thickness for Geberit system pipe ML

Application	d [mm]							
	16	20	25	32	40	50	63	75
Insulation thickness [mm] for cold water	20							30
Insulation thickness [mm] for hot water, heating	30				40	50	70	80

Wall and ceiling feed-throughs with snap-on pipe sections

Geberit system pipes ML, together with the Rockwool RS 800 snap-on pipe sections, must be fed through the existing openings of the components.

The following rules apply for the arrangement of the pipes:

- Geberit system pipes ML (d16–75 mm) insulated with snap-on pipe sections may be laid at a distance of 0 cm from each other.
- The pipes may be positioned horizontally next to each other as well as vertically above each other. The pipe axes must be in a line (linear arrangement); an offset arrangement must be avoided.

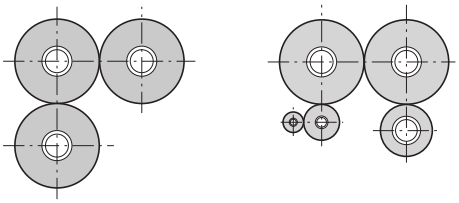


Figure 31: Admissible linear arrangement

Material used for the Rockwool RS 800 snap-on pipe section

The snap-on pipe section consists of concentrically wound rock wool with net-reinforced aluminium foil and a self-adhesive material overlap. This material has the following properties:

- building material class $A2_L$–s1,d0 (RF1) according to EN ISO 1716, EN 13823 (melting point ≥ 1000 °C)
- thermal conductivity: 0.035 W/(m·K)
- minimum length: 0.50 m on ceilings, 0.50 m on walls
- pipe dimension/Pipe section inside diameter: 16–75 mm
- insulation thickness: 20–80 mm

2.2 CORROSION

Corrosion is the reaction of a metallic material to its environment, which causes a measurable change in the material and can lead to an impairment in the function of a component or an entire system. Different types of corrosion can occur depending on the material and application area. A distinction is generally made between external corrosion and internal corrosion. However, certain types of corrosion can occur both internally and externally. Corresponding corrosion protection measures must be taken into account to avoid corrosion occurring.

2.2.1 Resistance to internal corrosion

The inner pipe of the Geberit multilayer pipe made of PE-RT II is corrosion-resistant.

2.2.2 Resistance to external corrosion

The Geberit multilayer pipe is protected from corrosion by the protective jacket made of PE-RT II.

However, corrosion of the inner aluminium pipe may occur at the cut pipe sections if the pipes are laid in the following environments:

- aggressive environment
- permanently damp environment

In these cases, the connection points must be sealed with corrosion protection.

Aggressive environment

An aggressive environment exists in all areas where corrosive gases or vapours can occur, for example in:

- animal facilities
- dairies
- cheese dairies
- storage areas for chemicals
- swimming pools
- areas with acids or alkalis

Permanently damp environment in walls or floors

Typical examples of environments that moisture can regularly enter:

- walls or floors with ground contact
- cellars in the ground water area or in a hillside location

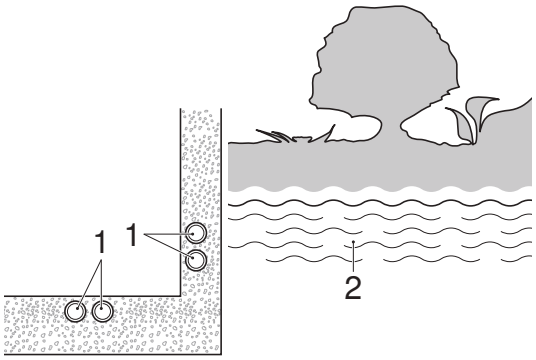


Figure 32: Laying in the cellar with ground water contact

1 Geberit system pipes with insulation
2 Ground water

Permanently damp environment in waterproof concrete troughs

Pipes laid in screed are exposed to permanent moisture if the uncovered concrete floor is designed as a waterproof concrete trough (e.g. involving waterproof concrete or bituminous coats). Regularly accumulating surface water is then stored in the floor construction.

Typical examples:

- washing plants
- large kitchens
- rooms associated with high-pressure cleaning
- swimming pools, spa areas, saunas

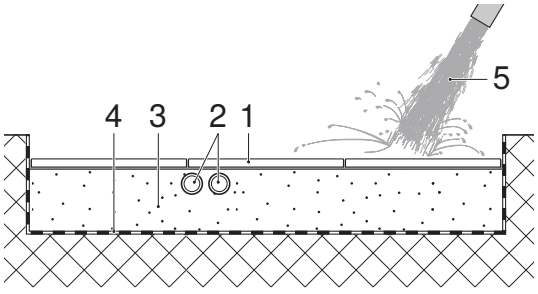


Figure 33: Laying in a waterproof concrete trough

1 Tiles
2 Geberit system pipes with insulation
3 Screed
4 Bituminous coat (forms a barrier against diffusion)
5 Regularly accumulating surface water

Laying without corrosion protection measures

Measures to protect against corrosion are not required if the pipes are equipped with a continuous condensation or thermal insulation and protected from permanent moisture, e.g. in screeds.

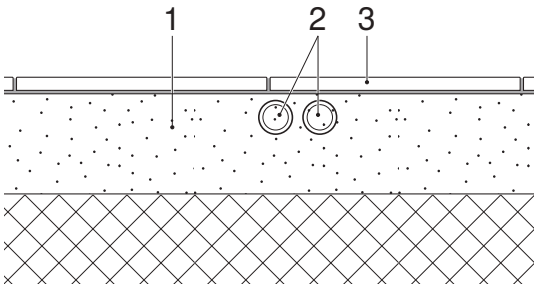


Figure 34: Laying without corrosion protection measures, e.g. tiled floor

1 Screed
2 Geberit system pipes ML with insulation
3 Tiles

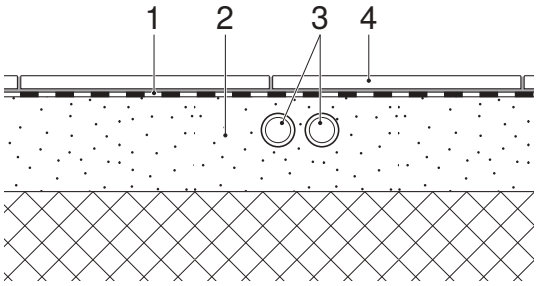


Figure 35: Laying without corrosion protection measures, e.g. in a shower area

1 Seal
2 Screed
3 Geberit system pipes ML with insulation
4 Tiles

Laying with corrosion protection measures

Sealing tapes can be used for corrosion protection when laying in aggressive or permanently damp environments and/or in a concealed location. For plastic fittings made of PPSU, the sealing tapes must meet the following requirements:

- In an aggressive environment, the sealing tape must form a barrier against diffusion, i.e. be made of closed-cell foam.
- In a permanently damp environment, it is important to ensure a complete seal against moisture.
- The adhesive used to fasten the sealing tape must be approved by the manufacturer for use with the material PPSU.

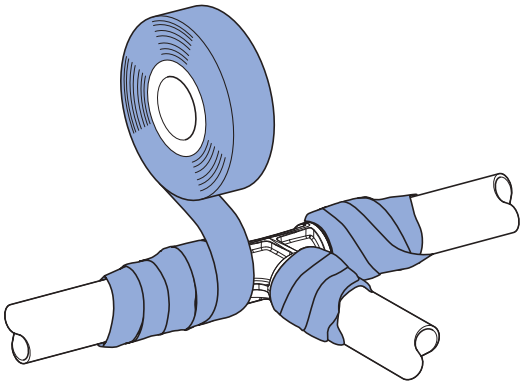


Figure 36: Corrosion protection with Geberit sealing tape

The Geberit sealing tape meets all the corrosion protection requirements in an aggressive or permanently damp environment.

A suitable protective measure (e.g. insulation) must be used to separate concealed pipes from the building structure.

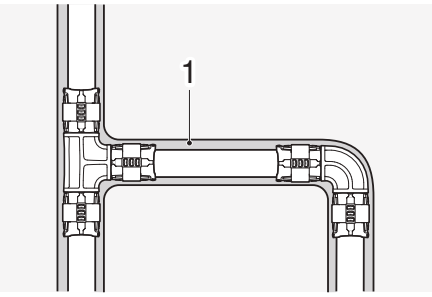


Figure 37: Concealed pipe, with corrosion protection

1 Insulation hose

2.3 MATERIAL DAMAGE CAUSED THROUGH CONTACT WITH PPSU-INCOMPATIBLE SUBSTANCES

If PPSU comes into contact with solvent-based substances, this can lead to material damage and leaks on the plastic parts of the pipe joints. This results in a risk of consequential damage.

To avoid material damage through contact with PPSU-incompatible substances, the following must be observed when processing the system components:

2.3.1 Thread adhesives

Only use standard hemp in conjunction with thread sealing compound or sealing tapes certified for drinking water as sealant for threads.

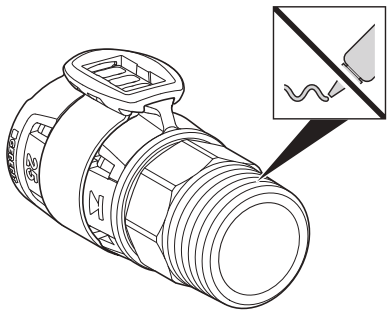


Figure 38: Solvent-based thread adhesives attack the PPSU plastic parts and the O-rings.

2.3.2 Leak detection agents

Only products approved by the manufacturer for use on PPSU may be used as leak detection agents. For example, one suitable product is the Geberit leak detection spray, art. no. 690.942.00.1.

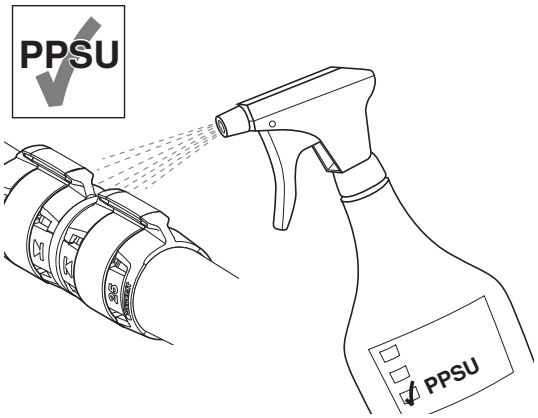


Figure 39: PPSU-compatible leak detection agents do not attack the fittings.

2.3.3 Adhesives, coatings, adhesive and protective primers

The fittings must be protected from contact with solvent-based adhesives, coatings and adhesive and protective primers. Adhesives for insulation are a particular source of danger, such as PVC solvent welding agents that attack the fitting material.

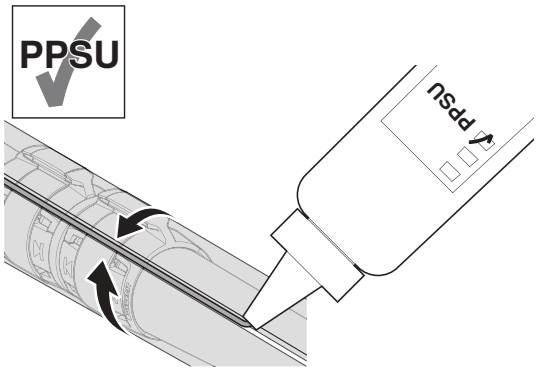


Figure 40: Insulation may only be bonded with PPSU-compatible adhesives.

2.4 TRACE HEATER

A trace heater can be used as a temperature maintenance or frost protection system. Installation with a thermostat is recommended since a low power output occurs at the limit temperatures even with a self-regulating heating strip.

It must be selected and fastened in accordance with the manufacturer's specifications.

Basic requirements for the trace heater:

- trace heater self-regulating at 65 °C, up to a maximum of 70 °C only in combination with a thermostat
- thermostat in accordance with manufacturer specifications
- installation directly on the Geberit system pipe ML

The aluminium core of the Geberit system pipe ML ensures even heat transfer around the pipe. The entire piping system must be heat-insulated.

Additional heat conduction measures are not required.

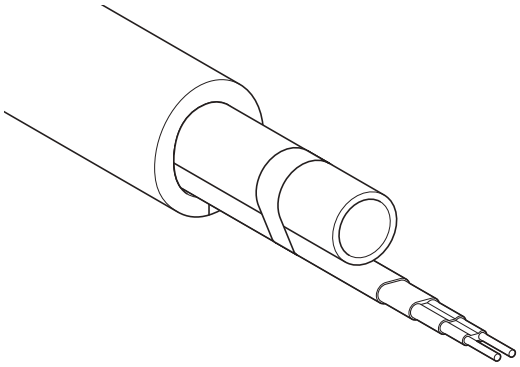


Figure 41: Principle of a hot water pipe with heating cable

Only self-regulating heating cables may be used at 65 °C.

2.5 TRANSFER OF HEAT

Transfer of heat refers to the transportation of energy in the form of heat across at least one thermodynamic boundary. The heat is transferred in the direction of the environment with the lower temperatures.

Heat emission is when the thermal energy is transferred from inside to outside, and thermal absorption is when the thermal energy is transferred in the opposite direction.

Pipes can be used for heat emission (underfloor heating, heating ceilings, heating walls, etc.) and also for thermal absorption (cooling water systems, geothermal heat storage, etc.).

2.5.1 Calculation of the heat emission

The heat emission $\dot{Q}_R$ is calculated using the following formula:

$$\dot{Q}_R = (T_i - T_a) \cdot k_r$$

$\dot{Q}_R$	Heat flow for 1 m pipe [W/m]
k_r	Heat transfer coefficient [W/(m·K)]
T_i	Water temperature in the pipe
T_a	Room temperature

In the first step, the heat transfer coefficient k_r is calculated. The heat transfer coefficient k_r can be calculated using a general or simplified formula.

2.5.2 General calculation of the heat transfer coefficient

Table 48: Diameter of Geberit system pipe ML

Nominal width	Outer pipe diameter	Aluminium layer outer diameter	PE-RT II layer outer diameter	Pipe inside diameter
DN	da [mm]	d2 [mm]	d1 [mm]	di [mm]
12	16	15.2	14.4	12.0
15	20	19.2	18.2	16.0
20	25	23.7	22.6	20.0
25	32	30.4	28.8	26.4
32	40	38.4	36.6	34.0
40	50	48.1	45.8	42.4
50	63	61.4	59.3	55.0
65	75	72.9	70.4	65.8

Assumptions for the general calculation:

- surface-mounted
- stationary air

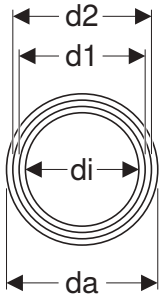


Figure 42: Cross-section of Geberit system pipe ML

The heat transfer coefficient is determined in the general calculation using the following formula:

$$k_r = \frac{\pi}{\frac{1}{\alpha_i \cdot d_i} + \frac{1}{2 \cdot \lambda_{PE\text{-}RT\ II}} \cdot \ln\left(\frac{d_1}{d_i}\right) + \frac{1}{2 \cdot \lambda_{Al}} \cdot \ln\left(\frac{d_2}{d_1}\right) + \frac{1}{2 \cdot \lambda_{PE\text{-}RT\ II}} \cdot \ln\left(\frac{d_a}{d_2}\right) + \frac{1}{\alpha_a \cdot d_a}}$$

k_r Heat transfer coefficient
α_i Heat transfer coefficient, inside [W/m²·K][1)]
α_a Heat transfer coefficient, outside [W/m²·K]
d_a Outer diameter [mm]
$d_{1,2}$ Diameter of intermediate layers [mm]
d_i Inner diameter [mm]
$\lambda_{PE\text{-}RT\ II}$ Thermal conductivity, inner pipe/protective jacket [W/m·K]
λ_{Al} Thermal conductivity, aluminium pipe [W/m·K]

1) The following applies here: 6000 W/m² · K (water at 60 °C and v = 1 m/s)

α_a is calculated as follows:

$$\alpha_a = 1.23 \frac{\Delta t^{0.25 + 0.1 d_a}}{d_a^{0.25}} \text{ [W/(m}^2\text{·K)]}$$

Δt Temperature differential [K]

(Approximation equation according to Glück [Recknagel, Sprenger, Hönmann: Handbook for Heating and Air-conditioning Technology, Oldenbourg Wissenschaftsverlag Munich, Vienna, p. 167, Figure 1.3.5–22])

Values for Geberit system pipes ML:

- α_i = 6000 W/(m²·K)
- α_a = 8.1 W/(m²·K)
- $\lambda_{PE\text{-}RT\ II}$ = 0.38 W/(m·K)
- λ_{Al} = 204 W/(m·K)
- $\lambda_{PE\text{-}RT\ II}$ = 0.38 W/(m·K)

2.5.3 Simplified calculation of the heat transfer coefficient

The simplified calculation of the heat transfer coefficient is used when the pipe only transfers the heat to another component or a liquid.

With this method, the heat transfer coefficient is calculated using the following formula without taking into account the radiant proportion:

$$k_r = \frac{\pi}{\frac{1}{\alpha_a \cdot d_a}}$$

k_r Heat transfer coefficient
α_a Heat transfer coefficient, outside [W/(m²•K)]
d_a Outer diameter [mm]

The following applies for Geberit system pipes:

- α_a = 8.1 W/(m²•K)

2.5.4 Tabulated determination of the heat emission

The heat emission can also be calculated in a simplified manner from the following table. The values of the heat flow rate $\dot{Q}_R$ are based on the general calculation of the heat transfer coefficients k_r.

Table 49: Heat flow rate $\dot{Q}_R$ in W/m for Geberit system pipe ML, bare

d x s [mm]	Temperature differential ΔT [K]									
	10	20	30	40	50	60	70	80	90	100
16 x 2.0	3.0	7.1	11.8	16.9	22.3	27.9	33.8	39.9	46.1	52.6
20 x 2.0	3.6	8.5	14.0	20.0	26.5	33.2	40.2	47.4	54.9	62.5
25 x 2.5	4.2	10.0	16.5	23.5	31.0	38.9	47.1	55.6	64.3	73.3
32 x 2.8	5.1	12.0	19.8	28.3	37.4	46.9	56.7	67.0	77.5	88.3
40 x 3.0	6.0	14.2	23.5	33.6	44.4	55.7	67.4	79.5	92.0	104.9
50 x 3.8	7.1	16.7	27.7	39.5	52.2	65.4	79.2	93.4	108.1	123.1
63 x 4.0	8.4	19.9	33.0	47.2	62.3	78.1	94.6	111.6	129.1	147.1
75 x 4.6	9.6	22.8	37.8	54.1	71.4	89.6	108.5	128.0	148.1	168.8

Table 50: Heat flow rate $\dot{Q}_R$ in W/m for Geberit system pipe ML, with circular pre-insulation, in coils, insulation thickness 6 mm

d x s [mm]	Temperature differential ΔT [K]									
	10	20	30	40	50	60	70	80	90	100
16 x 2.0	2.6	5.7	9.1	12.7	16.4	20.2	24.0	27.9	31.9	35.9
20 x 2.0	3.0	6.7	10.7	14.9	19.2	23.6	28.2	32.8	37.5	42.2
25 x 2.5	3.5	7.8	12.4	17.3	22.4	27.6	32.9	38.3	43.8	49.4
32 x 2.8	4.1	9.3	14.9	20.7	26.8	33.1	39.5	46.0	52.6	59.3

Table 51: Heat flow rate $\dot{Q}_R$ in W/m for Geberit system pipe ML, with circular pre-insulation, in coils, insulation thickness 10 mm

d x s [mm]	Temperature differential ΔT [K]									
	10	20	30	40	50	60	70	80	90	100
16 x 2.0	2.3	5.1	8.1	11.1	14.2	17.4	20.6	23.9	27.2	30.5
20 x 2.0	2.7	5.9	9.4	12.9	16.5	20.3	24.0	27.9	31.7	35.6
25 x 2.5	3.1	6.9	10.8	15.0	19.2	23.5	27.9	32.4	36.9	41.5
32 x 2.8	3.7	8.2	12.9	17.8	22.9	28.1	33.4	38.7	44.2	49.6

Table 52: Heat flow rate $\dot{Q}_R$ in W/m for Geberit system pipe ML, with circular pre-insulation, in coils, insulation thickness 13 mm

d x s [mm]	Temperature differential ΔT [K]									
	10	20	30	40	50	60	70	80	90	100
16 x 2.0	2.2	4.8	7.5	10.2	13.0	15.9	18.8	21.7	24.7	27.7
20 x 2.0	2.5	5.5	8.6	11.8	15.1	18.5	21.8	25.2	28.7	32.2
25 x 2.5	2.9	6.3	10.0	13.7	17.5	21.4	25.3	29.3	33.3	37.3
32 x 2.8	3.5	7.5	11.8	16.3	20.8	25.4	30.1	34.9	39.7	44.6

Table 53: Heat flow rate $\dot{Q}_R$ in W/m for Geberit system pipe ML, with circular pre-insulation, in coils, insulation thickness 26 mm

d x s [mm]	Temperature differential ΔT [K]									
	10	20	30	40	50	60	70	80	90	100
16 x 2.0	1.8	3.8	5.9	8.0	10.1	12.2	14.3	16.5	18.7	20.8
20 x 2.0	2.1	4.3	6.7	9.1	11.5	13.9	16.4	18.9	21.3	23.8
25 x 2.5	2.4	5.0	7.6	10.4	13.1	15.9	18.8	21.6	24.5	27.3

2.5.5 Graphical determination of the heat emission

The heat emission can also be calculated in a simplified manner from the following graphics. The values of the heat flow rate $\dot{Q}_R$ are based on the general calculation of the heat transfer coefficients k_r.

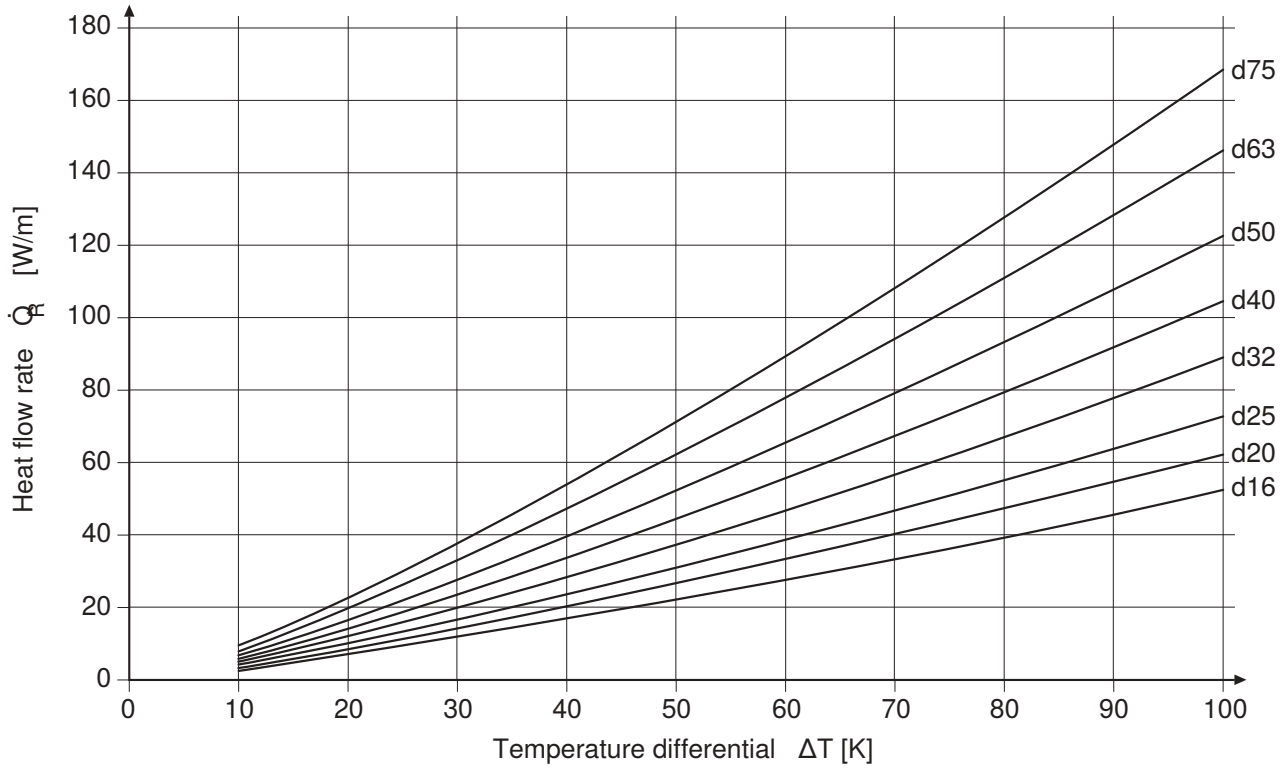


Figure 43: Heat emission for Geberit system pipe ML, bare

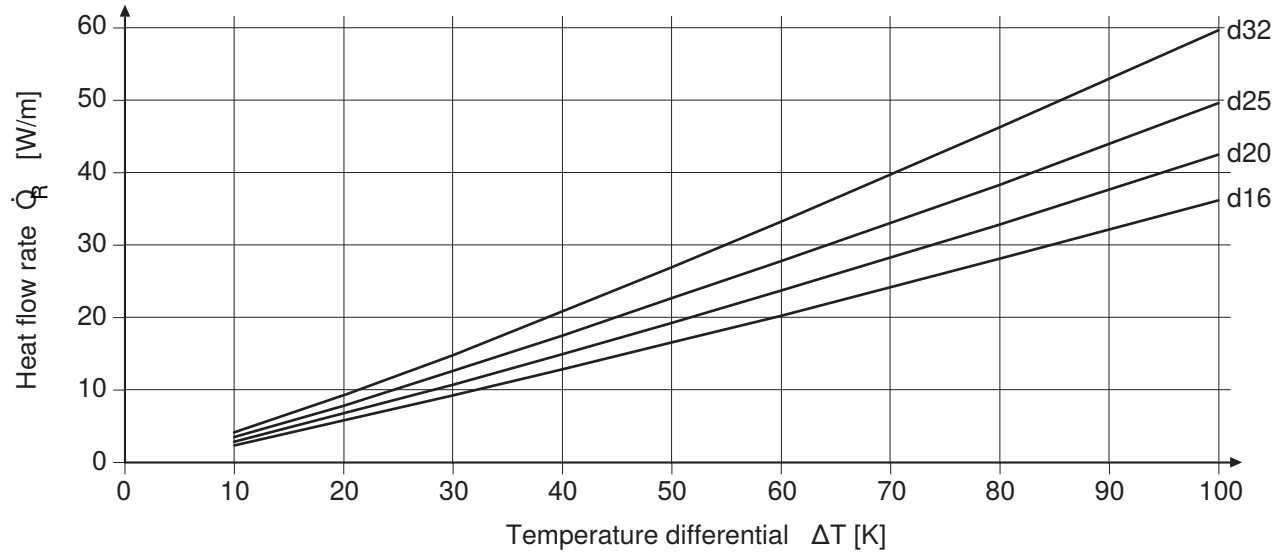


Figure 44: Heat emission for Geberit system pipe ML, 6 mm, pre-insulated

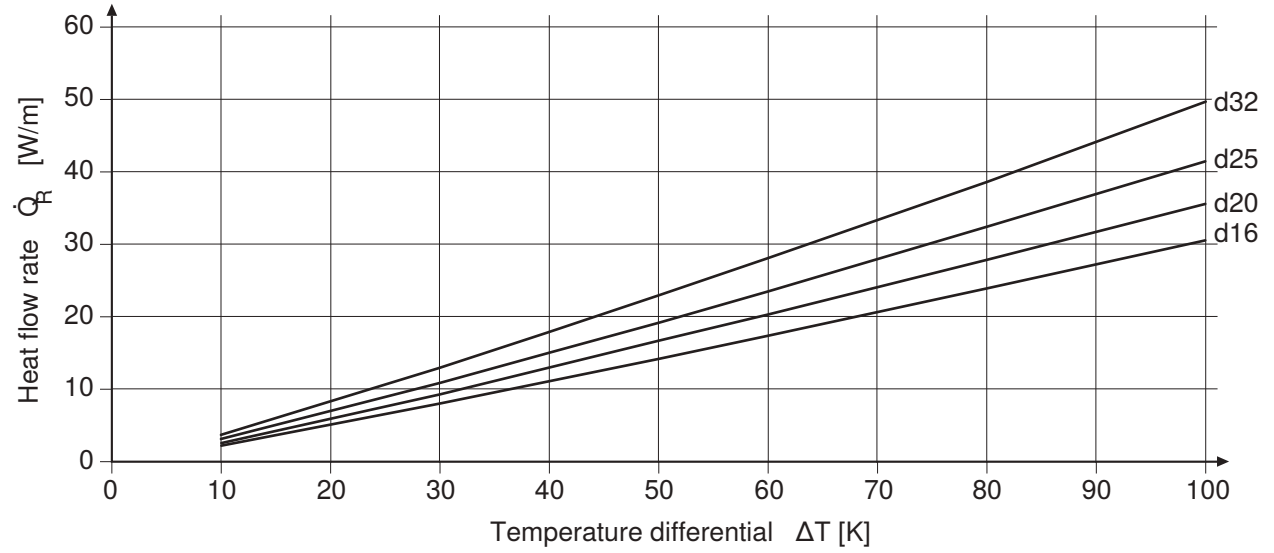


Figure 45: Heat emission for Geberit system pipe ML, 10 mm, pre-insulated

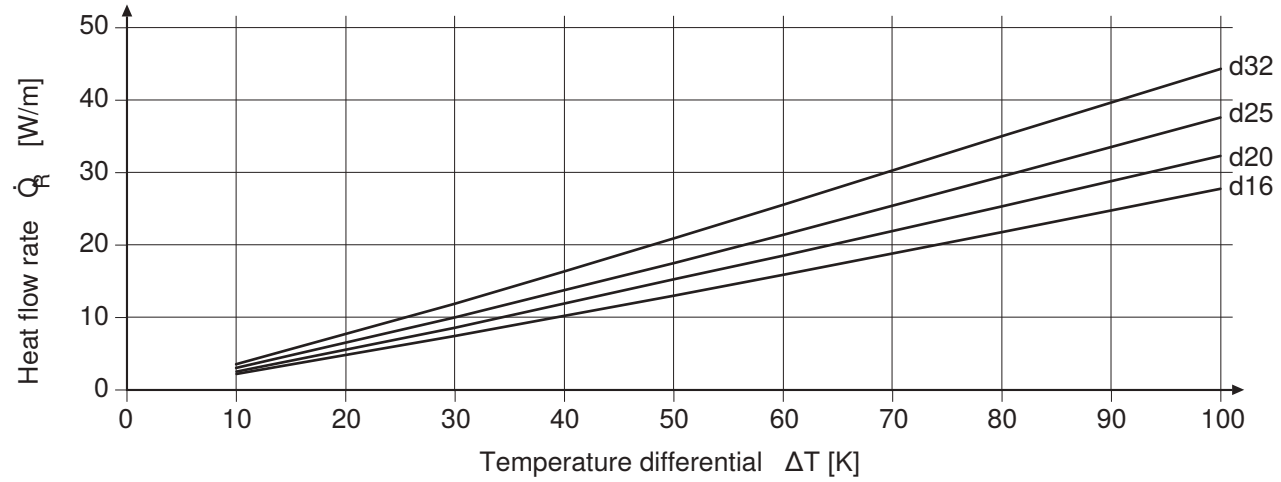


Figure 46: Heat emission for Geberit system pipe ML, 13 mm, pre-insulated

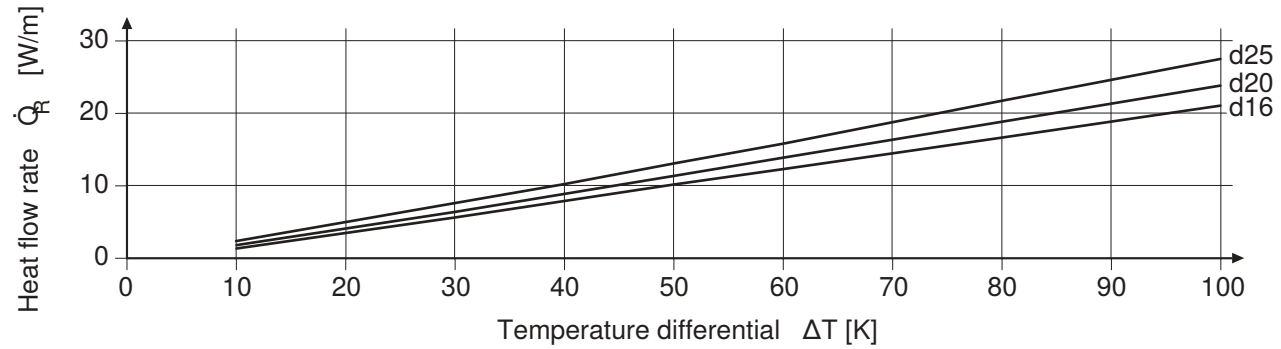


Figure 47: Heat emission for Geberit system pipe ML, 26 mm, pre-insulated

2.6 MINIMUM DIMENSIONS FOR FITTING COMBINATIONS

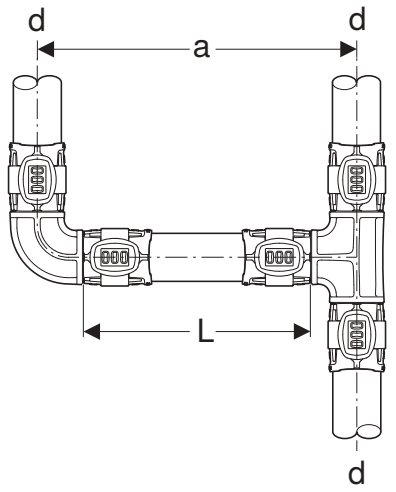


Table 54: Minimum pipe length between 2 fittings with a pressed joint

	d [mm]							
	16	**20**	**25**	**32**	**40**	**50**	**63**	**75**
L [cm]	7.3	7.3	7.3	8.6	8.6	14.0	15.0	15.0
a [cm]	11.9	12.3	12.7	14.8	15.8	24.3	26.3	27.5

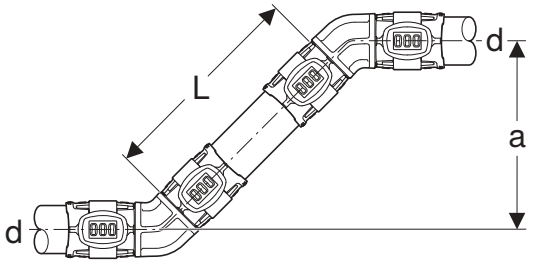


Table 55: Minimum pipe length and minimum distance between 2x bends 45°

	d [mm]					
	25	**32**	**40**	**50**	**63**	**75**
L [cm]	7.3	8.6	8.6	14.0	15.0	15.0
a [cm]	11.6	13.7	14.1	21.5	24.0	24.8

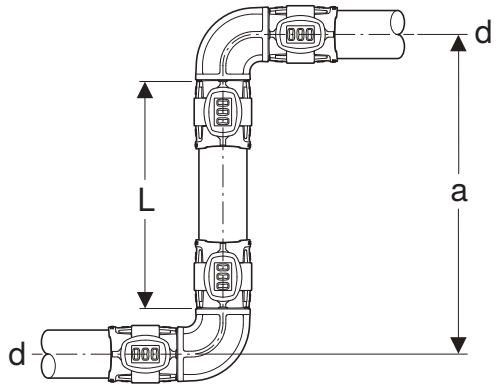
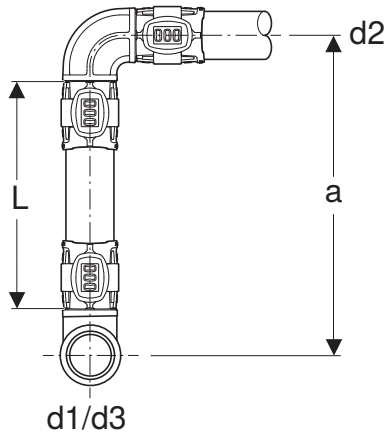


Table 56: Minimum pipe length and minimum distance between 2x bends 90°

	d [mm]							
	16	**20**	**25**	**32**	**40**	**50**	**63**	**75**
L [cm]	7.3	7.3	7.3	8.6	8.6	14.0	15.0	15.0
a [cm]	12.3	12.7	13.1	15.4	16.4	25.2	27.2	28.4



d1/d3 Through-flow
d2 Outlet

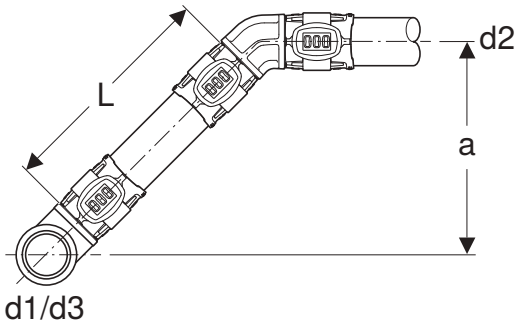
Table 57: Minimum pipe length and minimum distance between a T-piece and bend 90°

d2 [mm]		d1/d3 [mm]							
		16	**20**	**25**	**32**	**40**	**50**	**63**	**75**
16	L [cm]	7.3	7.3	7.3	8.1	–	–	–	–
	a [cm]	11.4	11.6	11.6	12.7	–	–	–	–
20	L [cm]	7.3	7.3	7.3	8.1	8.1	–	–	–
	a [cm]	11.4	11.8	12.1	12.9	13.3	–	–	–
25	L [cm]	–	7.3	7.3	8.1	8.1	10.9	11.4	11.4
	a [cm]	–	12.1	12.3	13.1	13.5	14.9	15.6	16.2
32	L [cm]	–	–	–	8.6	8.6	11.4	11.9	11.9
	a [cm]	–	–	–	14.2	14.6	16.0	16.7	17.3

d2 [mm]		d1/d3 [mm]							
		16	20	25	32	40	50	63	75
40	L [cm]	–	–	–	–	8.6	11.4	11.9	11.9
	a [cm]	–	–	–	–	15.2	16.6	17.3	17.9
50	L [cm]	–	–	–	–	–	14.0	14.5	14.5
	a [cm]	–	–	–	–	–	23.4	24.1	24.7
63	L [cm]	–	–	–	–	–	–	15.0	15.0
	a [cm]	–	–	–	–	–	–	25.3	25.9
75	L [cm]	–	–	–	–	–	–	–	15.0
	a [cm]	–	–	–	–	–	–	–	26.5

2 / 2

– Not available



d1/d3 Through-flow
d2 Outlet

Table 58: Minimum pipe length and minimum distance between a T-piece and bend 45°

d2 [mm]		d1/d3 [mm]						
		20	25	32	40	50	63	75
25	L [cm]	7.3	7.3	7.3	7.3	7.3	7.3	7.3
	a [cm]	10.4	10.6	10.9	11.2	12.0	12.5	13.0
32	L [cm]	–	–	8.6	8.6	8.6	8.6	8.6
	a [cm]	–	–	12.3	12.6	13.4	13.9	14.3
40	L [cm]	–	–	–	8.6	8.6	8.6	8.6
	a [cm]	–	–	–	12.7	13.5	14.0	14.4
50	L [cm]	–	–	–	–	14.0	14.0	14.0
	a [cm]	–	–	–	–	19.3	19.8	20.2
63	L [cm]	–	–	–	–	–	15.0	15.0
	a [cm]	–	–	–	–	–	21.5	22.0
75	L [cm]	–	–	–	–	–	–	15.0
	a [cm]	–	–	–	–	–	–	21.9

– Not available

2.7 PIPE LAYING

2.7.1 Basic laying process

Geberit FlowFit pressfittings are designed to hold the pipe in the correct position until it is pressed and to prevent the pipe from twisting and slipping out. The pressing units with a pressing indicator can be turned into a suitable position in an unpressed state.

During installation, the pipes must be kept tension-free (e.g. with pipe brackets).

The following sequence applies when laying Geberit FlowFit pressing systems:

1. Fasten the pipes in guide brackets.
2. Connect the pipes and pressfittings.
3. Turn the pressing unit with the pressing indicator to the desired position before the pressing procedure.
4. Press the pipes and pressfittings.

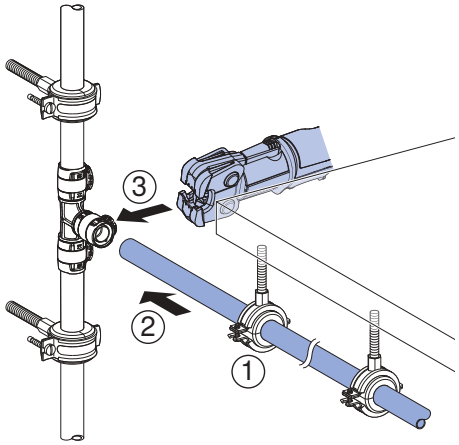


Figure 48: Pipes must be kept tension-free during the pressing procedure, e.g. with pipe brackets.

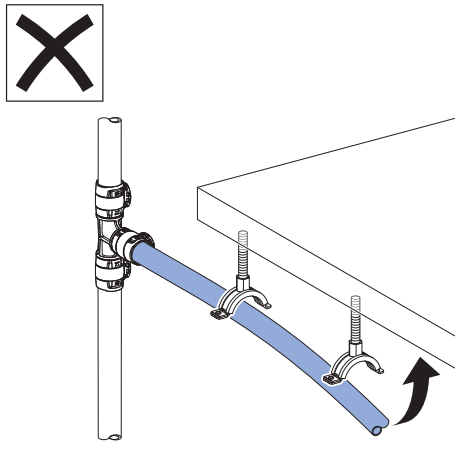


Figure 49: Inadmissible tension on the pipe

Before the pressing procedure, it is important to check that the fitting and in particular the pressing unit are clean and free of impurities from other trades, e.g. free of concrete slurry.

2.7.2 Concealed laying

Make sure that all concealed pipes are systematically insulated from the building. The following system pipes can be used for this purpose:

- Geberit system pipes with insulation
- Geberit system pipes with protective tube

Fastenings which are not sound-insulating must be fixed in place above the insulation or protective tube. The system pipes must be fixed in place, as otherwise pressure surges may generate noise in the area of pipe crossovers.

All local installation provisions and provisions specific to your country of installation must be adhered to.

2.7.3 Laying through ceiling feed-throughs

Do not bend pipes which are routed through ceiling feed-throughs over edges as otherwise the pipe could kink.

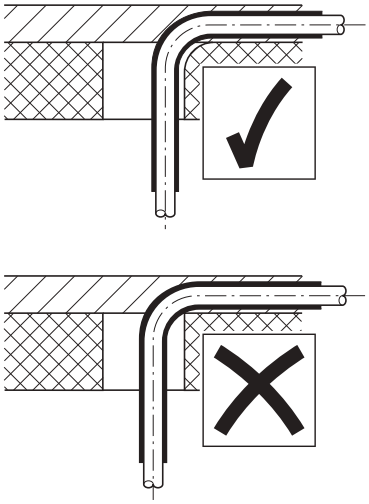


Figure 50: Laying pipes through a ceiling feed-through

2.7.4 Connection to pipes laid in parallel

Geberit provides a T-piece crossing for connecting to two parallel pipes without intersections. This is only suitable for heating and cooling for hygienic reasons.

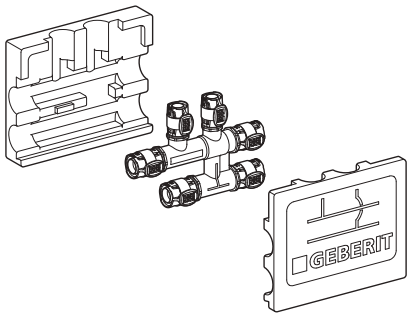


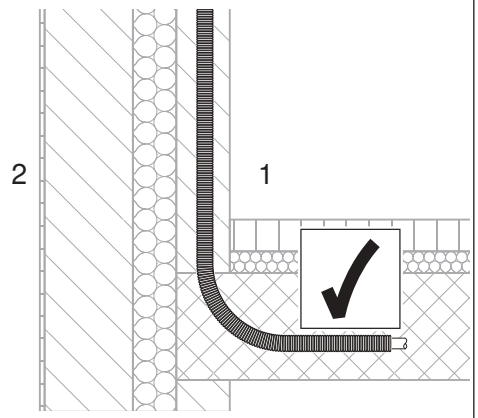
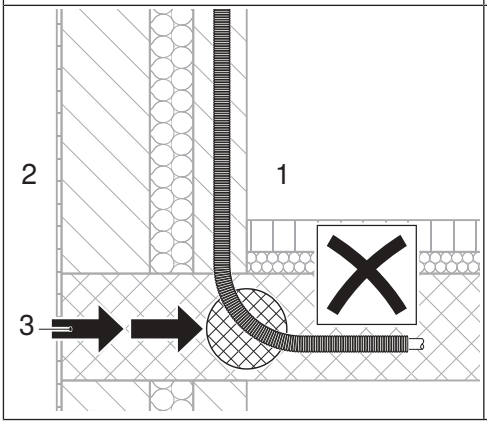
Figure 51: Geberit FlowFit T-piece crossing with insulation box

2.7.5 Protection against impact

Geberit system pipes and fittings must be protected appropriately against mechanical loads and impact (e.g. when laying on unfinished floors).

2.7.6 Frost protection

In order to prevent pipes freezing, the following information on frost protection must be taken into account when laying pipes:

Example: Pipe laying	Note concerning pipe laying
	When laying pipes in heated buildings, route pipes in areas of the building structure where the temperature is above 0 °C.
	If some pipes are located in frost-prone areas (e.g. cold bridges), there is an increased risk of pipes freezing.

1 Inside (warm area)

2 Outside (cold area)

3 Cold bridge

Suitable measures to prevent the danger of frost:

- Only lay pipes in the warm areas of buildings
- Lay pipes with frost protection tape
- Provide an option for shutting off and draining the relevant section of pipe

2.7.7 Connection to a water heater

When connecting to devices, e.g. a continuous flow heater, electric solar accumulator or a solid fuel, it is important to ensure that the maximum water temperature arising there does not exceed the maximum admissible temperature of the pipe system.

Through protective measures on these devices, e.g. a thermostat, thermal cut-out, thermal overload device, it is important to ensure that short-term malfunction temperatures of a maximum of 100 °C (for heating systems) and 95 °C for potable water systems for the pipe system are not exceeded.

2.8 THERMAL EXPANSION OF PIPES

Pipes expand differently due to thermal effects depending on the material. This thermal expansion is designated as change in length Δl. The higher the temperature differences, the greater also the change in length.

The following affect the change in length:

- material
- ambient conditions
- operating conditions (e.g. media with different temperatures)

The change in length must be taken into account in the planning of the pipe installation.

In the case of pipes that are embedded in concrete in the protective tube or with the corresponding insulation, the thermal expansion is absorbed within the protective tube or insulation. No further measures are therefore required.

The following designs must be taken into account for exposed or concealed installation and when laying pipes in ducts.

The pipes are kept flexible with guide brackets.

Anchor points direct the change in length in the desired direction. Suitable measures must be taken to absorb the change in length, depending on the specification of the change in length.

2.8.1 Control of the change in length with guide brackets and anchor points

The pipe length and application purpose have an influence on which measures must be taken to absorb the temperature-related changes in length.

Table 59: Control of the change in length depending on the pipe length and application purpose

Pipe length L in the case of straight pipes	Application purpose		
	Cold water	Hot water/circulation	
	d16–75	d16–25	d32–75
< 12 m	No control of the change in length is required through guide brackets and anchor points if the pipe is insulated[1)]		
> 12 m	No control of the change in length is required through guide brackets and anchor points if the pipe is insulated[1)]		Control of the change in length through guide brackets and anchor points

1) Rule of thumb: Insulation thickness = 1.5 x change in length Δl

2.8.2 Longitudinal forces

The longitudinal forces that occur during thermal expansion can be calculated using the following formula:

$$F = A \cdot E \cdot \alpha \cdot \Delta T$$

F	Force due to thermal expansion of the pipe [N]
A	Annulus of aluminium pipe [mm^2]
E	Modulus of elasticity of aluminium = 70 kN/mm^2
α	Thermal expansion coefficient of aluminium = 0.026 mm/(m•K)
ΔT	Temperature differential (operating temperature – ambient temperature at the time of installation) [K]

Example:

A temperature differential of 30 K results in the following maximum forces for Geberit system pipe ML:

Pipe dimension [mm]	Annulus of aluminium pipe [mm^2]
16	21.7
20	27.7
25	36.4
32	47.0
40	71.3
50	104.2
63	152.3
75	283.6

Table 60: Longitudinal forces due to thermal expansion [N]

Pipe dimension [mm]	Temperature differential ΔT [K]							
	10	20	30	40	50	60	70	80
16	396	792	1188	1583	1979	2375	2771	3167
20	503	1007	1510	2013	2517	3020	3523	4027
25	663	1327	1990	2653	3316	3980	4643	5306
32	855	1710	2564	3419	4274	5129	5984	6838
40	1297	2594	3890	5187	6484	7781	9077	10,374
50	1897	3794	5691	7589	9486	11,383	13,280	15,177
63	2772	5544	8316	11,088	13,860	16,632	19,404	22,176
75	5161	10,322	15,483	20,645	25,806	30,967	36,128	41,289

2.8.3 Configuration of anchor points

The anchor point must be able to absorb the reaction forces that occur during the temperature-related changes in length in the pipe. The reaction forces result from the resistance of the deflection leg on the anchor point.

Calculation software available on the market can be used to calculate the reaction forces.

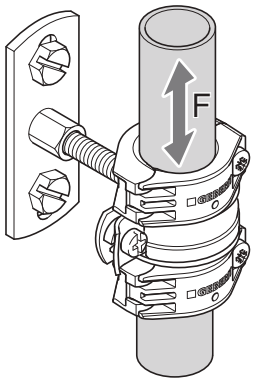


Figure 52: Simple anchor-point fastening

Table 61: Maximum force absorption of an anchor point with a simple anchor-point fastening with Geberit system pipes ML

Pipe dimension [mm]	Maximum force absorption [N]
16	400
20	500
25	550
32	1000
40	1400
50	2100
63	2500
75	3000

In the case of increased reaction forces due to temperature-related changes in length in the pipe, additional anchor-point fastenings can be installed in a row.

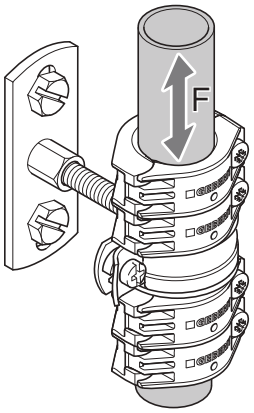


Figure 53: Double anchor-point fastening

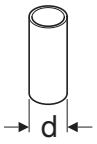
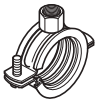
This measure increases the maximum force absorption of an anchor point to the following values:

Table 62: Maximum force absorption of an anchor point with a double anchor-point fastening with Geberit system pipes ML

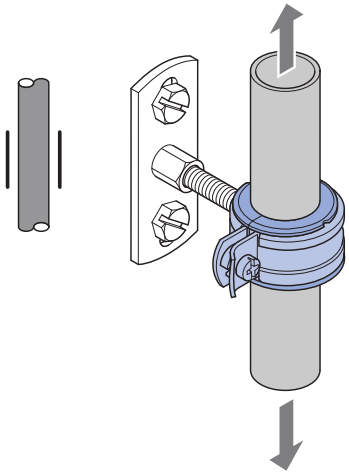
Pipe dimension [mm]	Maximum force absorption [N]
16	800
20	1000
25	1100
32	2000
40	2800
50	4200
63	5000
75	6000

2.8.4 Installing an anchor point

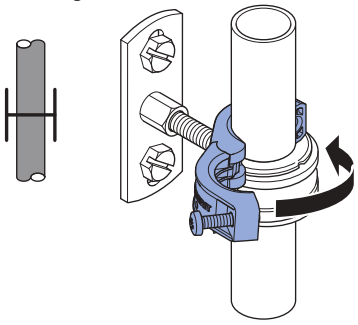
✓ Suitable pipe bracket is available.

		
d 25	603.702.00.1	601.854.26.1
d 32	604.702.00.1	601.855.26.1
d 40	605.702.00.1	601.856.26.1
d 50	606.702.00.1	601.858.26.1
d 63	607.702.00.1	601.859.26.1
d 75	608.702.00.1	601.860.26.1

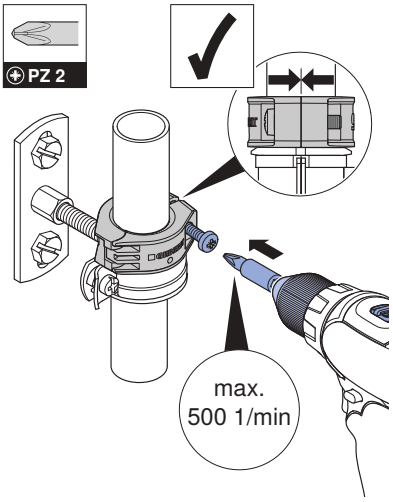
✓ Geberit pipe bracket is installed.



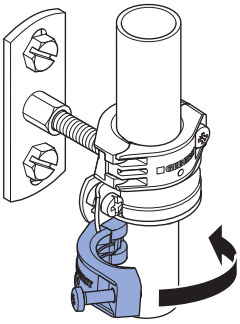
1 Attach an anchor-point fastening above the pipe bracket lining shell.



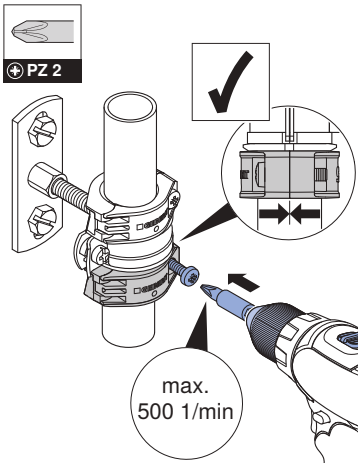
2 Tighten the screw on the anchor-point fastening.



3 Attach a further anchor-point fastening below the pipe bracket lining shell.



4 Tighten the screw on the anchor-point fastening.



2.9 ABSORPTION OF CHANGE IN LENGTH

2.9.1 Expansion space or insulation

Slight changes in the length of pipes can be absorbed by the elasticity of the piping system or by means of compressible insulation.

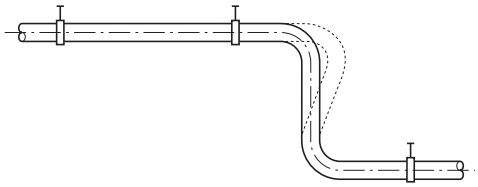


Figure 54: Absorption of a change in length Δl by the elasticity of the piping system

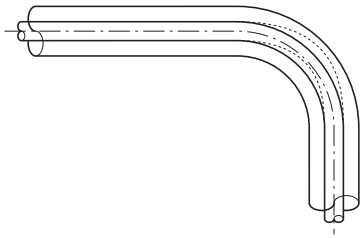


Figure 55: Absorption of a change in length Δl by means of compressible insulation

Calculation of the insulation thickness

The following rule of thumb applies for the calculation of the insulation thickness:

insulation thickness = 1.5 · change in length Δl

Regulations (country-specific standards, provisions or directives) define a minimum insulating layer thickness for the insulation. If the calculated insulation thickness is less than the minimum insulating layer thickness defined in the regulations, the insulation thickness defined in the regulation must be used.

Maximum absorption of changes in length for pre-insulated pipes

Table 63: Geberit system pipe ML, pre-insulated

s1 [mm]	l_{comp}max. [mm]
6	4.0
10	6.7
13	8.7
26	13.3

s1 Insulation thickness

l_{comp}max. Maximum absorption of change in length

2.9.2 Deflection legs as an expansion compensator

If the changes in length cannot be balanced out by means of the insulation, then the change in length must be absorbed by an expansion compensator. Deflection legs are a type of expansion compensator.

Deflection legs can be used if there is a change in direction, for long straight pipes or as a U-bend.

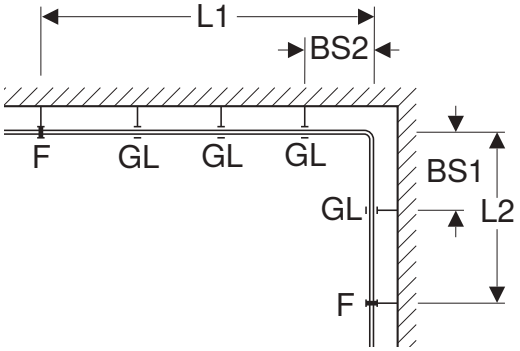


Figure 56: Expansion compensation through change in direction

BS Deflection leg
F Anchor point
GL Guide bracket
L pipe length

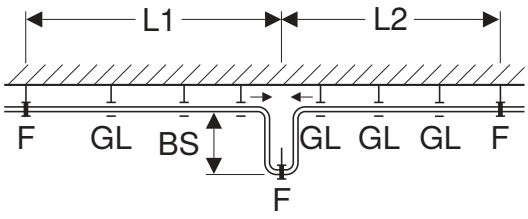


Figure 57: Expansion compensation by a U-bend

BS Deflection leg
F Anchor point
GL Guide bracket
L pipe length

The longer pipe section (L1 or L2) is used as pipe length L to calculate the deflection leg length in the case of a U-bend.

Deflection legs in riser pipes

In riser pipes over several floors, the thermal expansion is controlled with anchor points. The thermal expansion in several floor connections is absorbed by means of deflection legs. The sliding brackets on horizontal pipes act like anchor points for the thermal expansion of the pipe vertically.

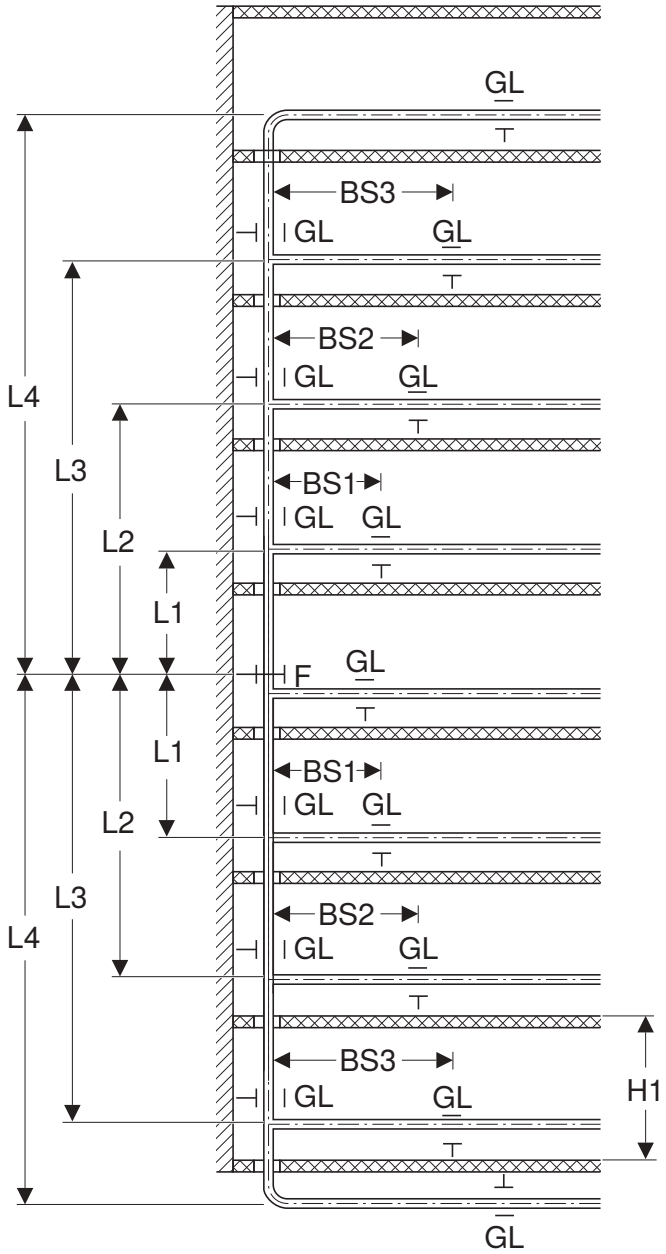


Figure 58: Riser pipe with an anchor point in the middle: control of the thermal expansion upwards and downwards halves the deflection leg length

F Anchor point
BS Deflection leg
GL Guide bracket
L Pipe length
H1 Floor height

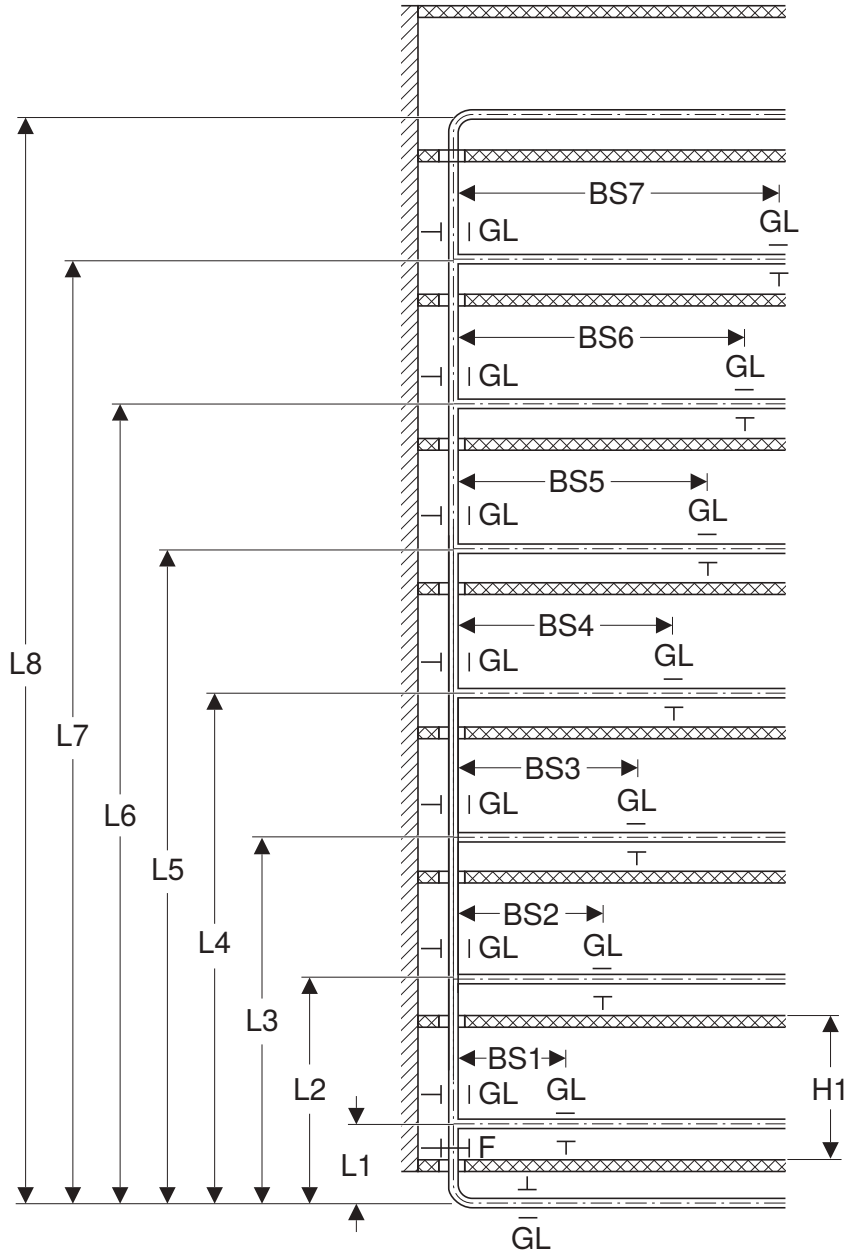


Figure 59: Riser pipe with an anchor point at the bottom: control of the thermal expansion upwards

F Anchor point
BS Deflection leg
GL Guide bracket
L Pipe length
H1 Floor height

Deflection legs for pipe laying in a duct

If the pipe is laid in a duct, the change in length can be absorbed by deflection legs as follows:

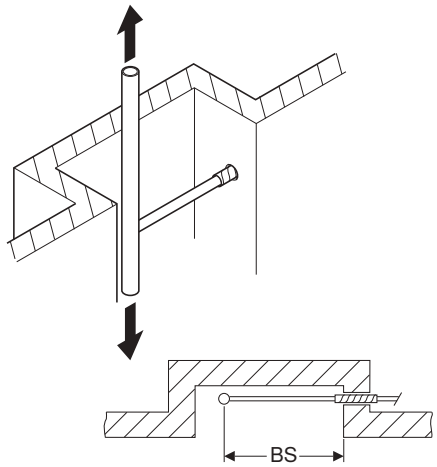


Figure 60: Straight deflection leg, without insulation

BS Deflection leg

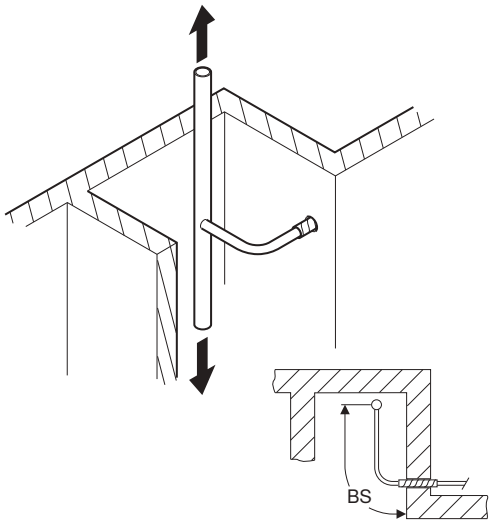


Figure 61: Bent deflection leg, without insulation

BS Deflection leg

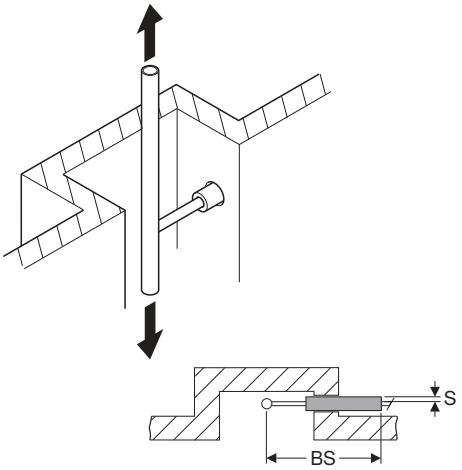


Figure 62: Straight deflection leg, with insulation

BS Deflection leg
S Insulation thickness

Calculation of the deflection leg length

The thermal expansion of pipes depends on the material, among other things. Material-dependent parameters must be considered when calculating the deflection leg length. The following table lists the parameters for Geberit system pipes ML.

Table 64: Material-dependent parameters for calculating the deflection leg length

Pipe material	$\alpha^{1)}$	m_c	
		C	U
PE-RT II / Al / PE-RT II	0.026 mm/(m·K)	33	19

α Thermal expansion coefficient

1) The thermal expansion coefficient α = 0.026 mm/(m·K) applies to temperatures between 20–100 °C. It applies to all pipe dimensions, per length and per Kelvin temperature increase.

m_c Material constant

C Material constant for calculating the deflection leg length L_B (change in direction, branch pipe)

U Material constant for calculating the deflection leg length L_U (U-bend)

The calculation of the deflection leg length comprises the following steps:

- Calculation of the change in length Δl
- calculation of the deflection leg length L_B with a change in direction and branch pipe or calculation of the deflection leg length L_U with U-bends.

calculation of the change in length ΔI

The change in length ΔI is calculated with the following formula:

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

ΔI	Change in length [mm]
L	Pipe length [m]
ΔT	Temperature differential (operating temperature - ambient temperature at time of installation) [K]
α	Thermal expansion coefficient α [mm/(m • K)]

Sample calculation for system pipe ML

Given:

- Material: PE-RT II / Al / PE-RT II
- L=30 m
- α = 0.026 mm/(m·K)
- ΔT = 50 K

Required:

- Change in length ΔI [mm]

Solution:

$$\Delta I = L \cdot \alpha \cdot \Delta T \left[\frac{m \cdot mm \cdot K}{m \cdot K} = mm\right]$$

ΔI = 30 • 0.026 • 50

ΔI = 39.00 mm

The change in length ΔI can also be calculated in a simplified manner from the following table.

Table 65: Change in length ΔI in mm for Geberit system pipe ML

L [m]	Temperature differential ΔT [K]						
	10	20	30	40	50	60	70
1	0.3	0.5	0.8	1.0	1.3	1.6	1.8
2	0.5	1.0	1.6	2.1	2.6	3.1	3.6
3	0.8	1.6	2.3	3.1	3.9	4.7	5.5
4	1.0	2.0	3.1	4.2	5.2	6.2	7.3
5	1.3	2.6	3.9	5.2	6.5	7.8	9.1
6	1.6	3.1	4.7	6.2	7.8	9.4	10.9
7	1.8	3.6	5.5	7.3	9.1	10.9	12.7
8	2.0	4.2	6.2	8.8	10.4	12.5	14.6
9	2.3	4.7	7.0	9.4	11.7	14.0	16.4
10	2.6	5.2	7.8	10.4	13.0	15.6	18.2
20	5.2	10.4	15.6	20.8	26.0	31.2	36.4
30	7.8	15.6	23.4	31.2	39.0	46.8	54.6
40	10.4	20.8	31.2	41.6	52.0	62.4	72.8
50	13.0	26.0	39.0	52.0	65.0	78.0	91.0

L Pipe length

Calculation of the deflection leg length with a change in direction and branch pipe

The deflection leg length L_B to be calculated is defined as follows with changes in direction and branch pipes:

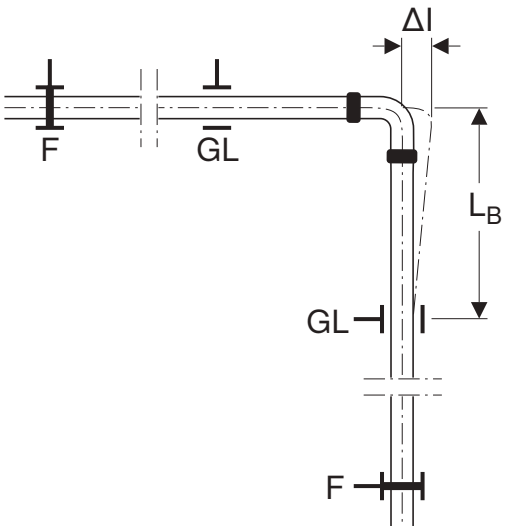


Figure 63: Expansion compensation with a change in direction

F	Anchor point
GL	Guide bracket
L_B	Deflection leg length
ΔI	Change in length

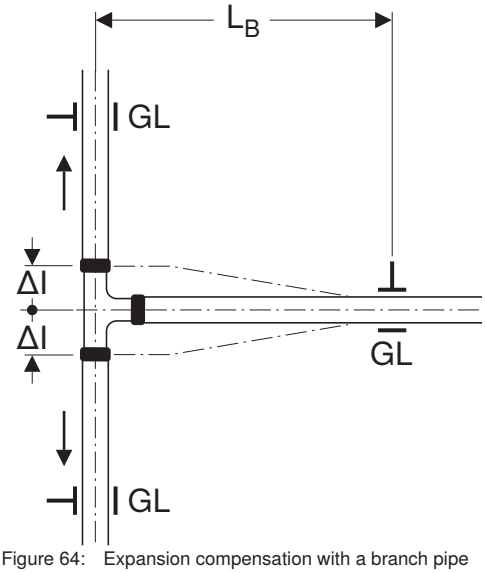


Figure 64: Expansion compensation with a branch pipe

GL	Guide bracket
L_B	Deflection leg length
ΔI	Change in length

The deflection leg length L_B is calculated using the following formula:

$$L_B = \frac{C \cdot \sqrt{d \cdot \Delta l}}{1000}$$

L_B	Deflection leg length [m]
d	Outer pipe diameter [mm]
ΔI	Change in length [mm]
C	Material constant

Given:

- Material: PE-RT II / Al / PE-RT II
- C = 33
- d = 32 mm
- ΔI = 39 mm

Required:

- L_B [m]

Solution:

$$L_B = \frac{C \cdot \sqrt{d \cdot \Delta l}}{1000} \left[\frac{\sqrt{mm \cdot mm}}{\frac{mm}{m}} = m \right]$$

$$L_B = \frac{C \cdot \sqrt{d \cdot \Delta l}}{1000} \left[\frac{\sqrt{mm \cdot mm}}{\frac{mm}{m}} = m \right]$$

$$L_B = \frac{33 \cdot \sqrt{32 \cdot 39}}{1000}$$

$$L_B = 1.17 \text{ m}$$

The deflection leg length L_B can also be calculated in a simplified manner from the following graphics:

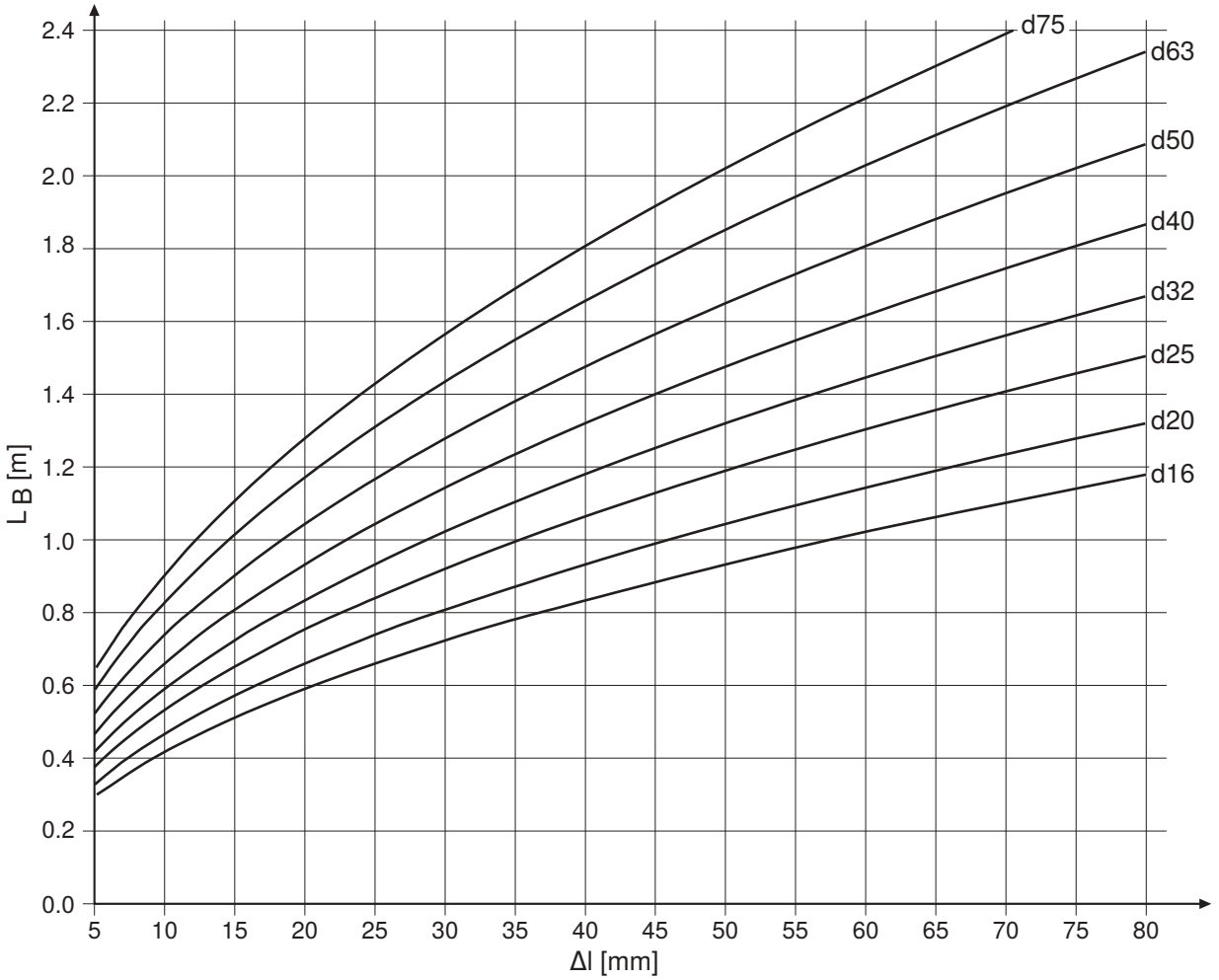


Figure 65: Deflection leg length L_B depending on the change in length ΔI for Geberit system pipe ML

Calculation of the deflection leg length for U-bends

The deflection leg length L_U to be calculated is defined as follows:

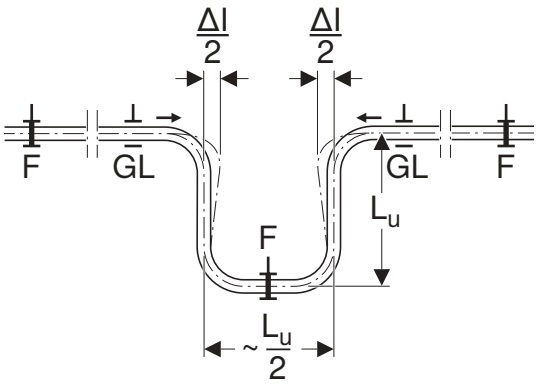


Figure 66: U-bend, made of bent pipe

F Anchor point
GL Guide bracket
L_U Deflection leg length
ΔI Change in length

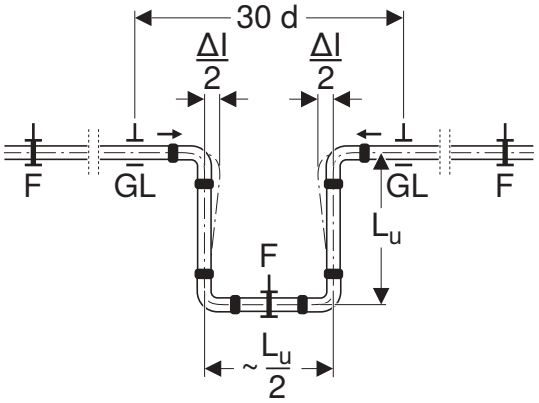


Figure 67: U-bend, made with pressfittings

F Anchor point
GL Guide bracket
L_U Deflection leg length
ΔI Change in length

The deflection leg length L_U is calculated using the following formula:

$$L_U = \frac{U \cdot \sqrt{d \cdot \Delta l}}{1000}$$

L_U Deflection leg length [m]
d Outer pipe diameter [mm]
ΔI Change in length [mm]
U Material constant

Given:

- Material: PE-RT II / Al / PE-RT II
- U = 19
- d = 32 mm
- ΔI = 39 mm

Required:

- L_U [m]

Solution:

$$L_U = \frac{U \cdot \sqrt{d \cdot \Delta l}}{1000} \left[\frac{\sqrt{mm \cdot mm}}{\frac{mm}{m}} = m \right]$$

$$L_U = \frac{19 \cdot \sqrt{32 \cdot 39}}{1000}$$

$$L_U = 0.67 \text{ m}$$

The deflection leg length L_U can also be calculated in a simplified manner from the following graphics:

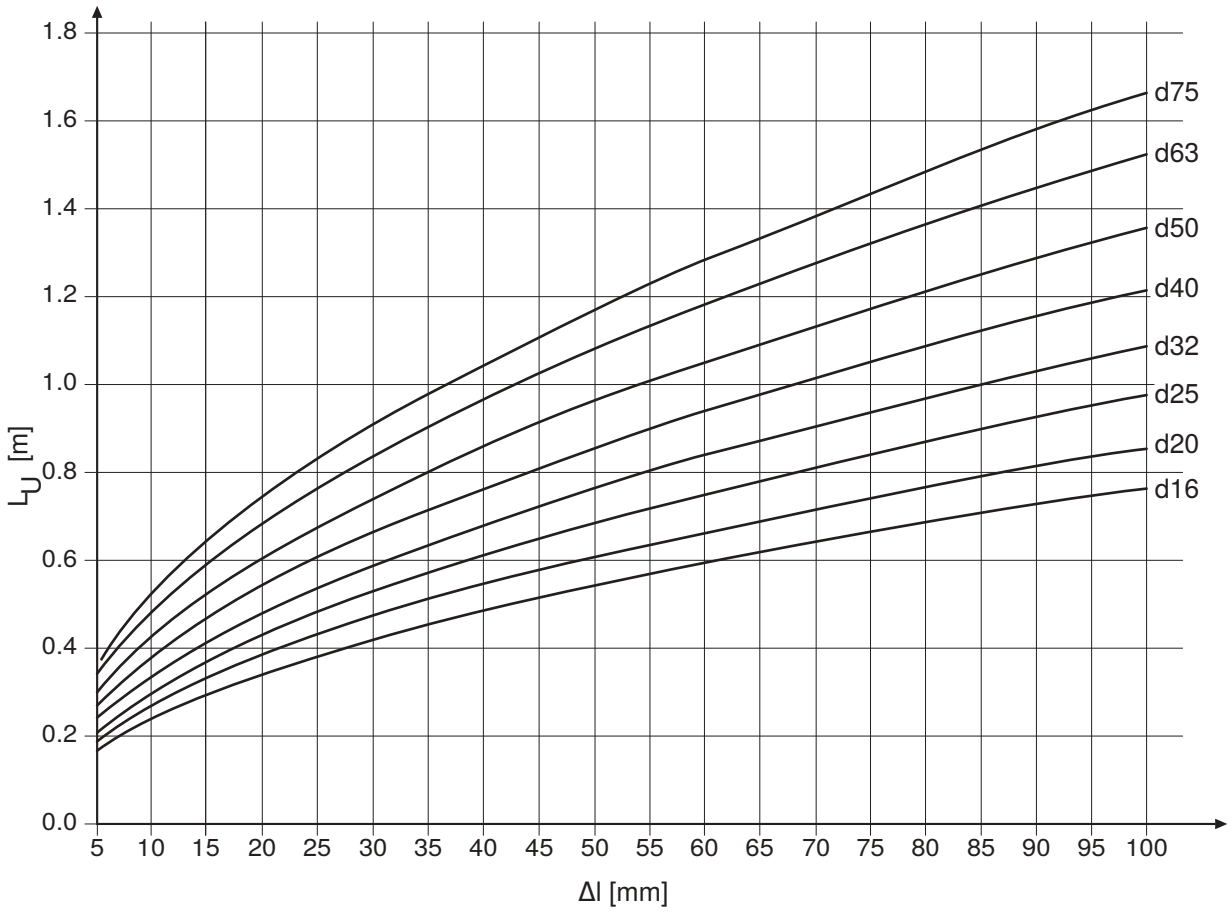


Figure 68: Deflection leg length L_U depending on the change in length Δl for Geberit system pipe ML

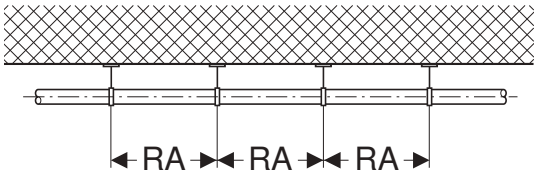
2.10 PIPE FIXATION

2.10.1 Pipe bracket spacing

Exposed Geberit system pipes are fixed with pipe brackets. Geberit pipe brackets, insulated, can be used to prevent the transmission of structure-borne sound.

The fastening distance between the individual pipe brackets is 1.5–2.5 m for horizontally laid Geberit system pipes, depending on the diameter.

No further measures, such as support shells, are required if the specified pipe bracket spacing is adhered to.



RA Pipe bracket spacing

Table 66: Pipe bracket spacings and load per pipe bracket

Pipe bracket Art. no.	d [mm]	Horizontal pipe spacing[1)] [m]	Vertical pipe spacing [m]	F [N]	F_{max} [N]
601.851.26.1	16	1.5	2.0	3.1	800
601.852.26.1	20	1.5	2.0	5.0	800
601.853.26.1	25	1.5	2.0	7.7	800
601.854.26.1	32	2.0	2.6	18.6	800
601.855.26.1	40	2.0	2.6	28.4	800
601.856.26.1	50	2.5	3.3	54.6	1000
601.858.26.1	63	2.5	3.3	83.4	1000
601.859.26.1	75	2.5	3.3	118.5	1000

1) Recommendation by Geberit

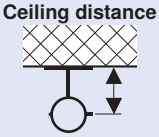
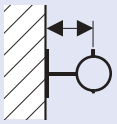
F Load per pipe bracket, pipe filled with water. The information applies to horizontally fastened pipes.

F_{max} Maximum admissible load per pipe bracket, pipe filled with water The information applies to horizontally fastened pipes.

2.10.2 Thickness of the threaded rods

Pipe brackets are fastened to the wall or ceiling with threaded rods. The required thickness of the threaded rods for the fastening of guide brackets must be chosen depending on the distance from the ceiling or wall.

Table 67: Required thickness of the threaded rods for fastening guide brackets to ceiling and walls

	Distance between pipe brackets [cm]								
	Ceiling distance 					Wall distance 			
d [mm]	≤ 10	11–20	21–30	31–40	41–60	≤ 10	11–20	21–30	31–60
16	M8	M8	M8	M10	M10	M8	M10	M10	1/2"
20	M8	M8	M8	M10	M10	M8	M10	M10	1/2"
25	M8	M8	M10	M10	M10	M8	M10	1/2"	1/2"
32	M8	M10	M10	M10	1/2"	M8	M10	1/2"	1/2"
40	M8	M10	1/2"	1/2"	1/2"	M10	M10	1/2"	1/2"
50	M10	M10	1/2"	1/2"	1/2"	M10	M10	1/2"	1/2"
63	M10	M10	1/2"	1/2"	1/2"	M10	M10	1/2"	1/2"
75	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"

2.10.3 Fastening distances for concealed stop valves

Maximum distances between the pipe bracket and concealed stop valve

The following maximum distances apply when mounting a concealed stop valve:

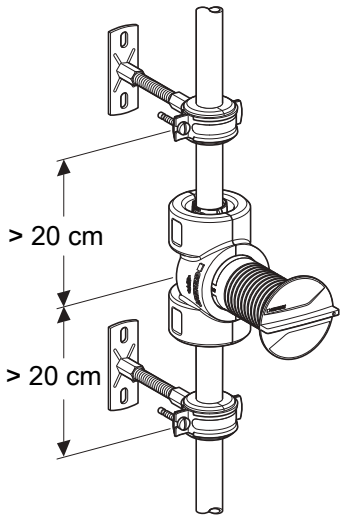


Figure 69: Maximum distance between the pipe bracket and concealed stop valve with Geberit FlowFit

Shortening dimension when mounting the turn handle

The maximum shortening dimension must be observed when mounting the turn handle of a concealed stop valve.

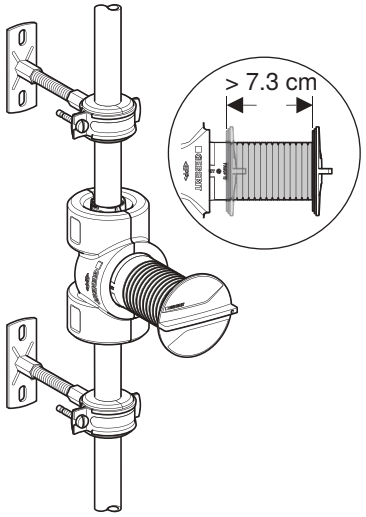


Figure 70: Maximum shortening dimension for a turn handle with Geberit FlowFit

2.10.4 Ball valve fastening distances

Maximum distances between the pipe bracket and ball valve

The following maximum distances apply when mounting a ball valve:

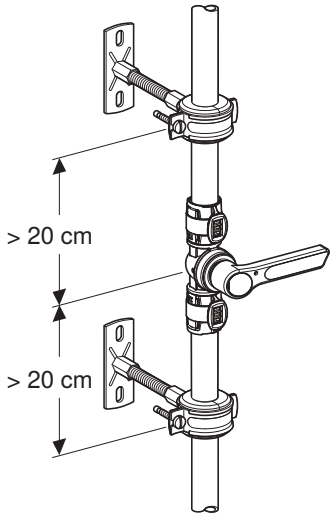
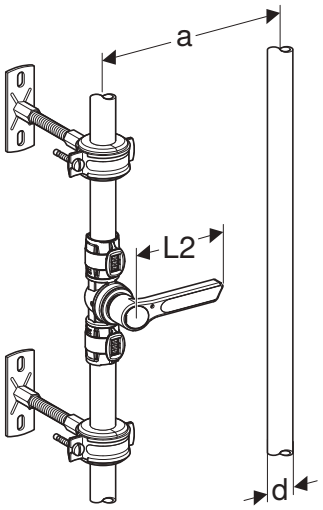


Figure 71: Maximum distance between the pipe bracket and ball valve with Geberit FlowFit

Minimum distances with parallel pipes

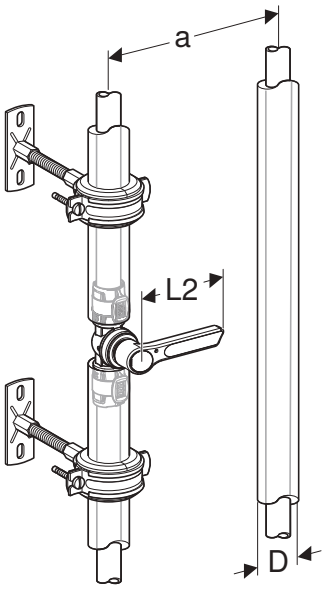
For uninsulated pipes, the following minimum distance applies when mounting a ball valve with lever:



a Minimum distance between 2 uninsulated pipes
L2 Actuator lever length
d Outer pipe diameter

$$a = L2 + \frac{d}{2} + 1\ cm$$

For insulated pipes, the following minimum distance applies when mounting a ball valve with lever:



a Minimum distance between 2 insulated pipes
L2 Actuator lever length
D Outer diameter of insulated pipe

$$a = L2 + \frac{D}{2} + 1\ cm$$

2.11 PIPEWORK

2.11.1 Processing temperature

Geberit FlowFit system components can be processed at an ambient temperature of -10 °C to +60 °C.

Battery-operated pressing tools can be used in temperatures ranging from -10 °C to +50 °C.

2.11.2 Bending Geberit system pipes ML

The following must be taken into account when bending Geberit system pipes ML:

- It is generally recommended to bend the pipes before they are connected or pressed into a fitting.
- If bending is necessary after the pressing procedure, the pressed joint must be kept tension-free during the bending process.
- Pipes with outer diameters of 63 and 75 mm can be bent to a limited extent.
- The inside of the bend should not be dented or compressed.
- The protective jacket must not be damaged.

The following table shows the smallest possible bending radius and the minimum oval diameter for pipes.

r_m Smallest possible bending radius
X Minimum oval pipe diameter

d [mm]	r_m [cm]	x [mm]
16	5.8	15
20	7.0	19
25	9.0	24
32	11.6	30
40	16.0	37
50	20.0	47
63	22.0[1)]	59[1)]
75	26.0[1)]	71[1)]

1) Geberit system pipes d63 and d75 mm may be bent by a maximum of 30 degrees using suitable bending dies. The specified bending radius refers to the inside of the bend according to EN 10255. Geberit recommends executing changes in direction for d63 and d75 not with bends, but with Geberit fittings.

If a previously pressed system pipe is to be bent, the connection points must be secured.

With the Geberit bending tool

Geberit system pipes ML d16–32 mm can be bent with the Geberit handheld bending tool, hydraulic. The Geberit bending die and the Geberit bending cheek must correspond to the outer pipe diameter d.

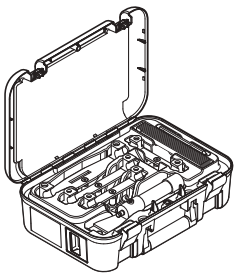
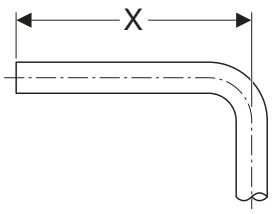


Figure 72: Geberit handheld bending tool, hydraulic, in case

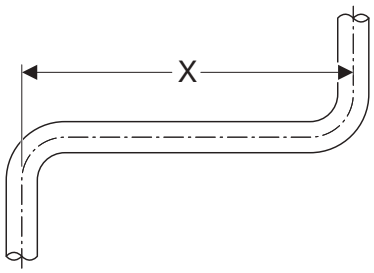
The bending radii of the bending dies correspond to the smallest possible bending radii r_m.

Producing a bended pipe section using the Geberit bending tool

Take into account the minimum deflection leg.

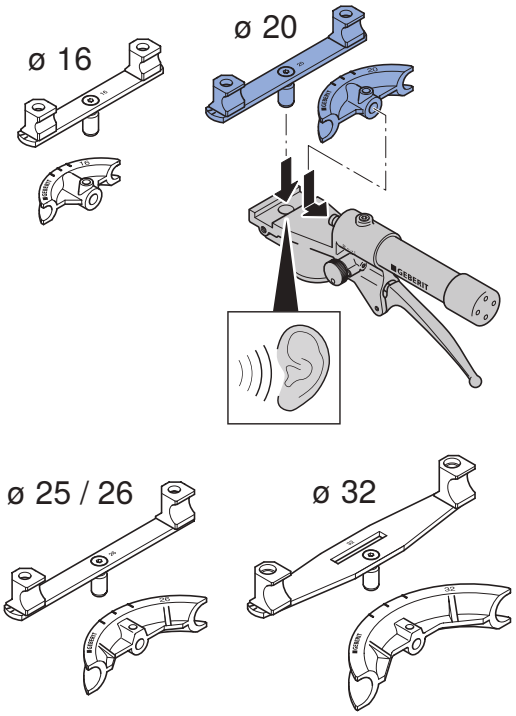


d [mm]	DN	x_{min} [cm]
16	12	12
20	15	13
25 / 26	20	18
32	25	24

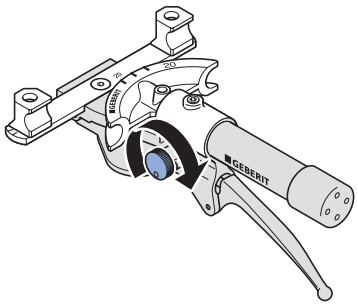


d [mm]	DN	x_{min} [cm]
16	12	15
20	15	17
25 / 26	20	23
32	25	31

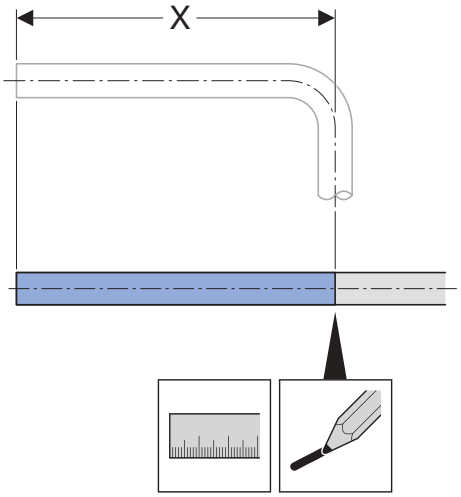
1 Select and fit the bending die and bending cheek according to the pipe diameter.



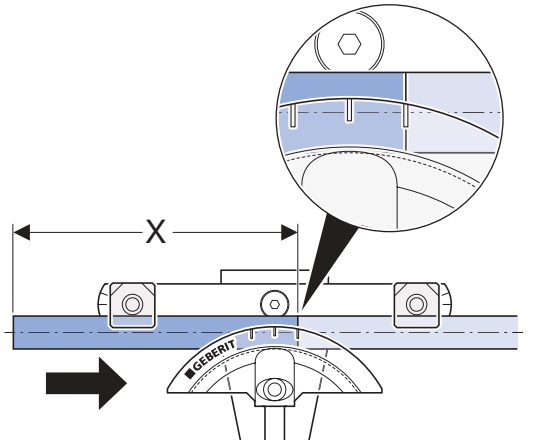
2 Close the hydraulic chamber.

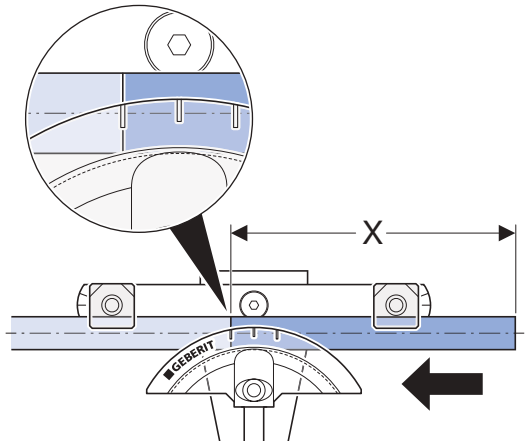


3 Measure and mark the deflection leg length.

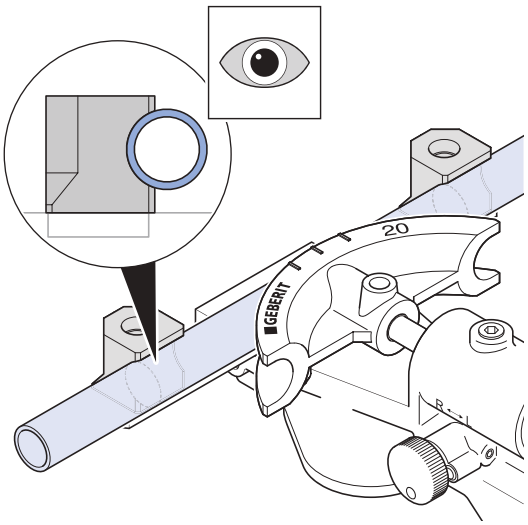


4 Insert the pipe and level it.

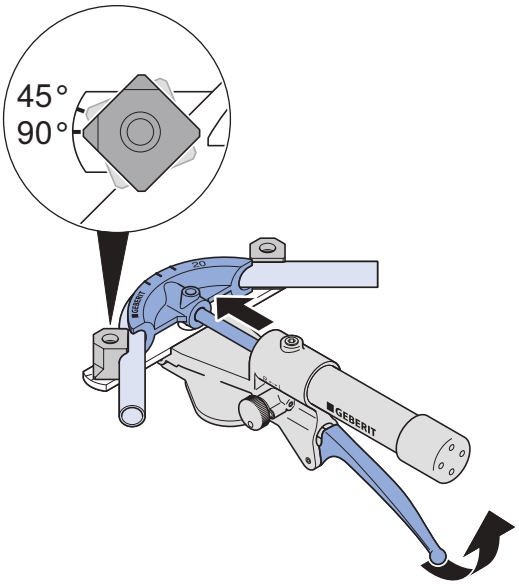




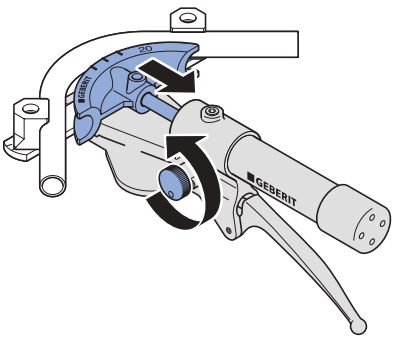
5 Check the correct seat of the pipe in the mounts.



6 Set the bending angle and bend the pipe.



7 Open the hydraulic chamber.



By hand

Geberit system pipes ML d16–25 can be bent by hand.

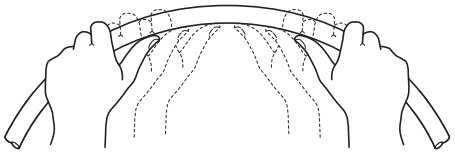


Table 68: Bending radius r_m

d [mm]	r_m [cm]
16	≥ 4 x d
20	≥ 5 x d
25	≥ 6 x d

Pipes which are bent by hand should not have any indentations on the surface or be compressed on the inside.

With the Geberit external bending spring ML

Geberit system pipes ML in the dimensions d16 and d20 can be bent with the Geberit external bending spring ML in order to avoid dents or compressions.

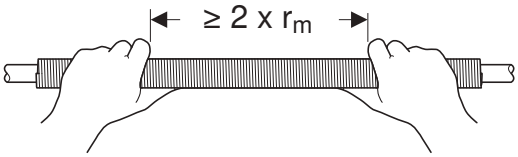


Figure 73: Bending by hand with the Geberit external bending spring ML

Geberit system pipes ML must not be bent using an internal bending spring because this can lead to damage on the inner pipe.

Bending of pre-insulated system pipes

Bending of pre-insulated system pipes with the Geberit handheld bending tool can cause unseen damage to the inner pipe. In addition, the protective jacket or the insulation can be damaged. For this reason, pre-insulated pipes should preferably be bent manually. Bending with the handheld bending tool is only permitted after the insulation has been removed beforehand.

2.11.3 Space requirements for pressing

The Geberit FlowFit pressfitting made of PPSU can be turned to the most favourable position for pressing. This means that the space required for pressing is less than for other pressing systems. In the case of pipes routed side by side, a minimum distance must be taken into account for pressing. This minimum distance can be reduced by the height of the offset fittings.

Table 69: Pressing with Geberit FlowFit hand-operated pressing pliers

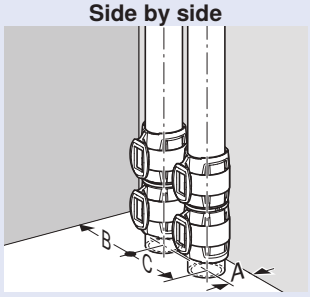
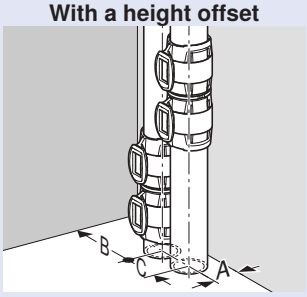
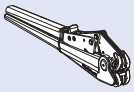
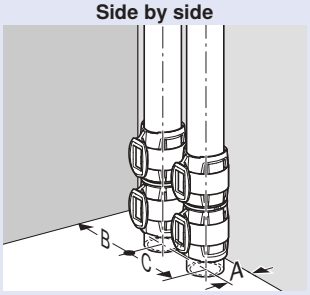
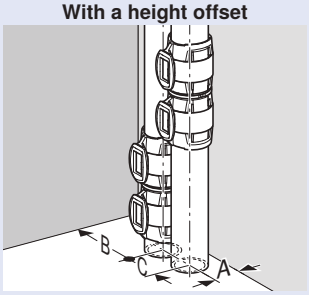
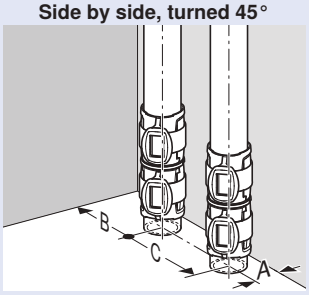
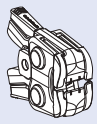
		Side by side 			With a height offset 		
	d [mm]	**A [cm]**	**B [cm]**	**C [cm]**	**A [cm]**	**B [cm]**	**C [cm]**
	16	1.2	4.4	5.1	1.2	4.4	2.3
	20	1.5	4.4	5.2	1.5	4.4	2.7
	25	1.7	4.4	5.1	1.7	4.4	3.2
	32	2.0	4.4	5.2	2.0	4.4	4.0
	40	2.4	4.4	5.2	2.4	4.4	4.8

Table 70: Pressing with Geberit FlowFit pressing jaws

		Side by side 			With a height offset 			Side by side, turned 45° 		
	d [mm]	**A [cm]**	**B [cm]**	**C [cm]**	**A [cm]**	**B [cm]**	**C [cm]**	**A [cm]**	**B [cm]**	**C [cm]**
	16	2.0	4.3	5.0	2.0	4.3	2.3	2.0	2.0	7.3
	20	1.8	4.3	5.2	1.8	4.3	2.7	1.8	1.8	7.5
	25	1.8	4.3	5.2	1.8	4.3	3.2	1.8	1.8	8.0
	32	2.2	4.3	5.2	2.2	4.3	4.0	2.2	2.2	8.5
	40	2.8	4.3	5.2	2.8	4.3	4.8	2.8	2.8	9.2
	50	3.0	6.0	7.8	3.0	6.0	6.0	3.0	3.0	12.0
	63	4.0	6.0	7.6	4.0	6.0	–	4.0	4.0	13.0
	75	4.5	6.0	9.0	4.5	6.0	–	4.5	4.5	14.0

All information concerning space requirements refer to the centre of the pipe.

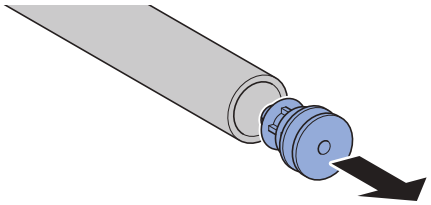
– Does not apply

A side-by-side arrangement with a rotation of 45 degrees is not possible when installing with the Geberit FlowFit hand-operated pressing pliers.

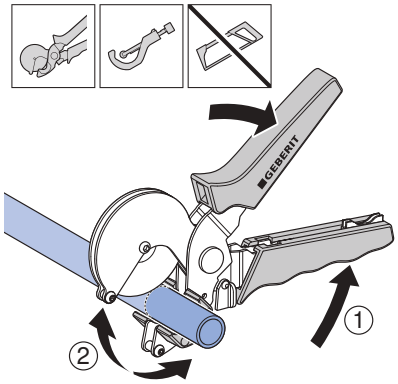
2.12 PRESSING PREPARATIONS

2.12.1 Preparing a Geberit system pipe ML

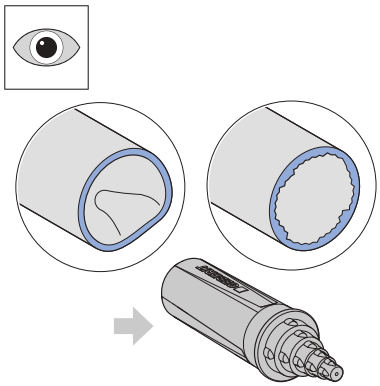
1 Remove the protection plug from the pipe.



2 Cut the pipe to length at a right angle with Geberit pliers or the Geberit pipe cutter ML.

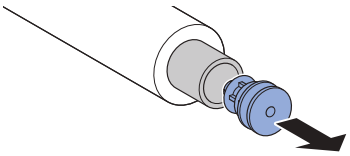


Calibrate the pipe if necessary.

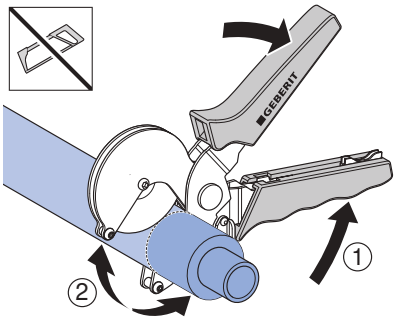


2.12.2 Preparing a Geberit system pipe ML, with circular pre-insulation

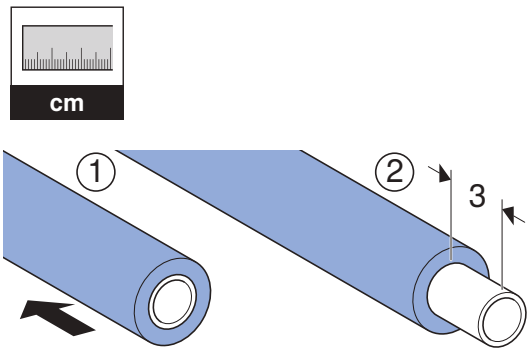
1 Remove the protection plug from the pipe.



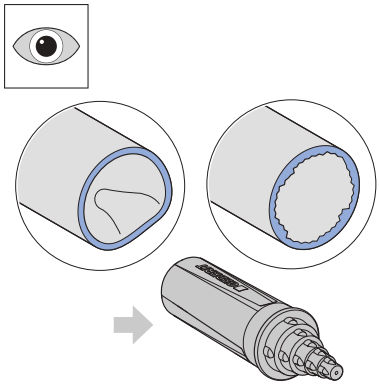
2 Cut the pipe and insulation to length at a right angle with Geberit pliers.



3 Push the insulation back at the pipe end.

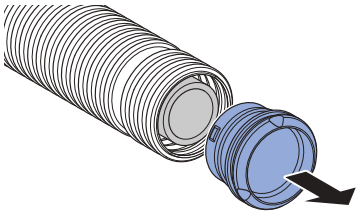


Calibrate the pipe if necessary.

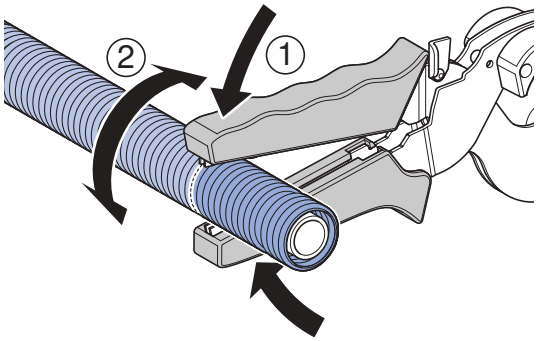


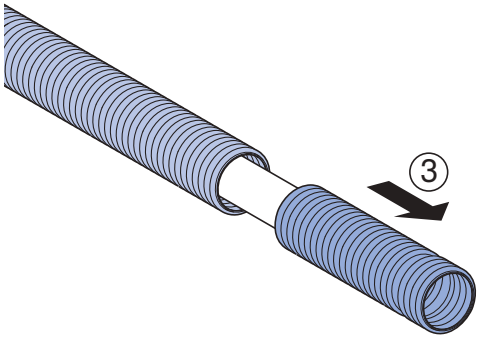
2.12.3 Preparing a Geberit system pipe, in a protective tube

1 Remove the protection plug from the pipe.

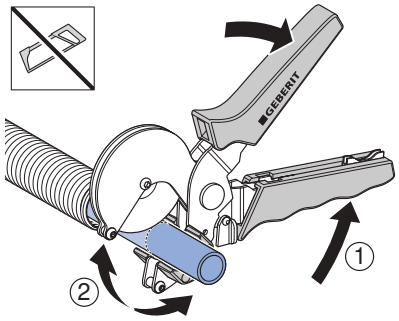


2 Cut the protective tube to length.

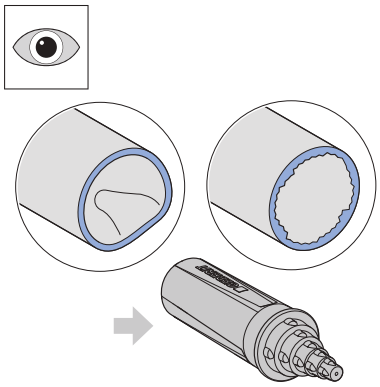




3 Cut the pipe to length at a right angle with Geberit pliers.



Calibrate the pipe if necessary.



2.13 CREATING A PRESSED JOINT

2.13.1 Rules for creating a pressed joint

- Make sure that the pipe or prefabricated elements are aligned and the screwing joints sealed.
- The fitting and in particular the pressing unit must be clean and free of impurities from other trades, e.g. free of concrete slurry.
- Make sure that the inserted system pipes and fittings are tension-free and remain tension-free during the pressing procedure.
- Geberit system pipes and Geberit FlowFit fittings may only be pressed at ambient temperatures ranging from -10 °C to +60 °C.
- If necessary, turn the pressing unit with the pressing indicator to the correct position prior to starting the pressing procedure.
- For the pressing procedure, the Geberit FlowFit pressing jaw or the Geberit FlowFit hand-operated pressing pliers must be positioned straight so that they grip the pressing indicator evenly at the top and bottom.

2.13.2 Calibration of Geberit system pipes ML

Calibration of the pipes is not necessary with Geberit FlowFit.

However, calibration may be useful in the following cases for ease of further handling:

- pipe ends are heavily deformed
- cut surfaces display significant burrs

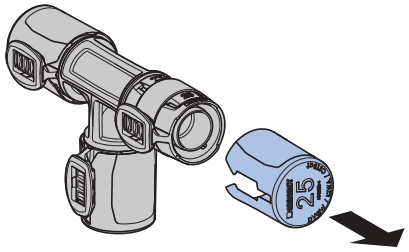
Geberit provides 2 sizes of Geberit FlowFit calibration tool for these cases:

- for d16–40 mm
- for d50–70 mm

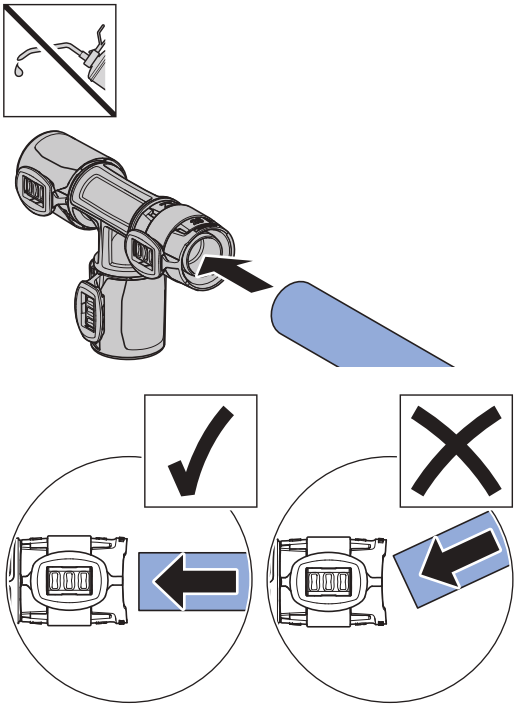
The Geberit FlowFit calibration tool is used to push the burrs into the pipe interior and round the pipe. The pipe and fitting can then be connected more easily.

2.13.3 Pressing a fitting and pipe

1 Remove the protective cap from the fitting.

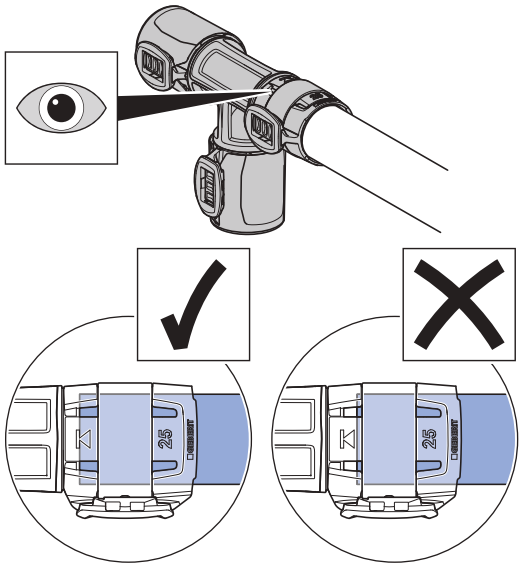


2 Slide the pipe straight into the fitting.



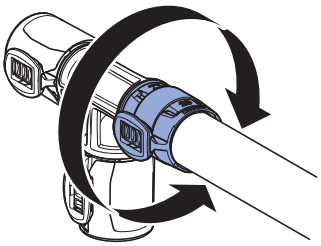
3

Make sure that the pipe is fully inserted.



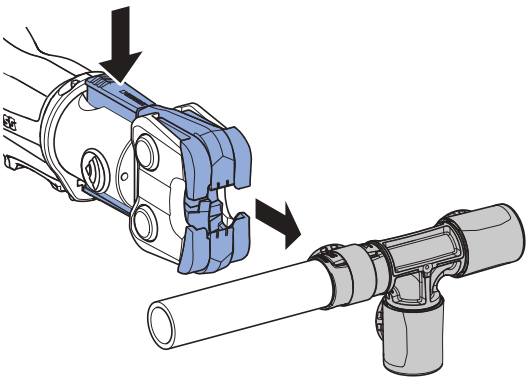
4

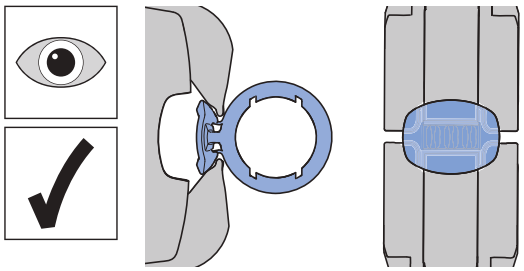
Turn the pressing unit to an easily accessible position, in which the pressing jaw can be positioned tension-free.

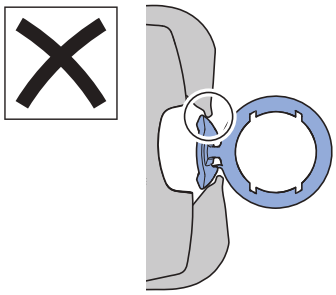


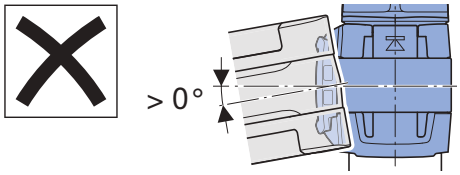
5

Position the pressing jaw straight and press the fitting and pipe.



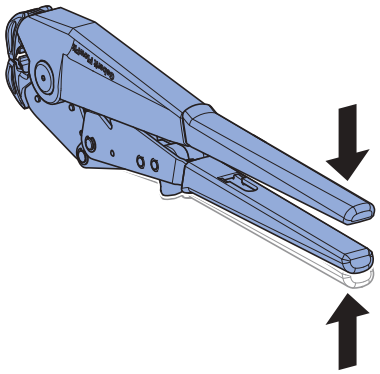




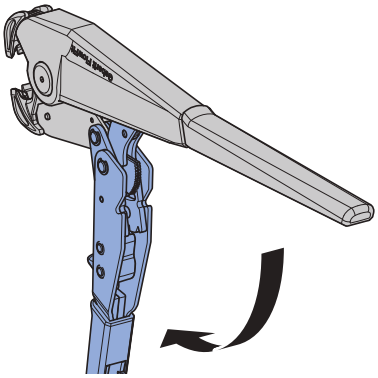


2.13.4 Producing a pressed joint with hand-operated pressing pliers

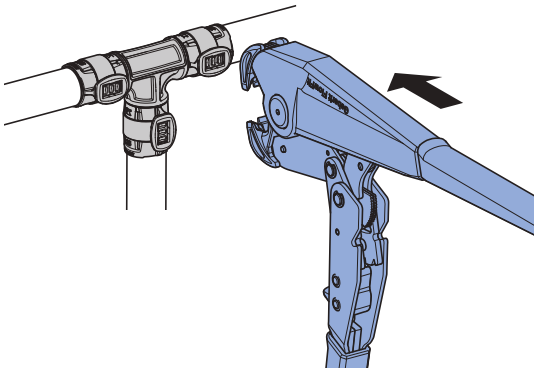
1 Press the levers together.



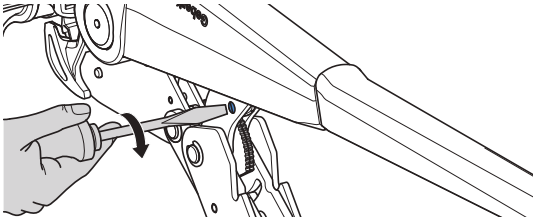
2 Open the lower arm of the lever.



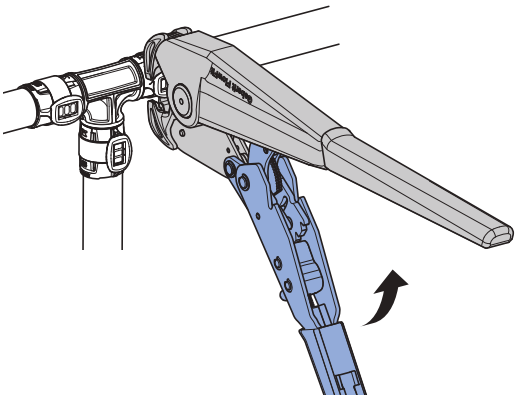
3 Position the pressing tips on the pressing clamp.

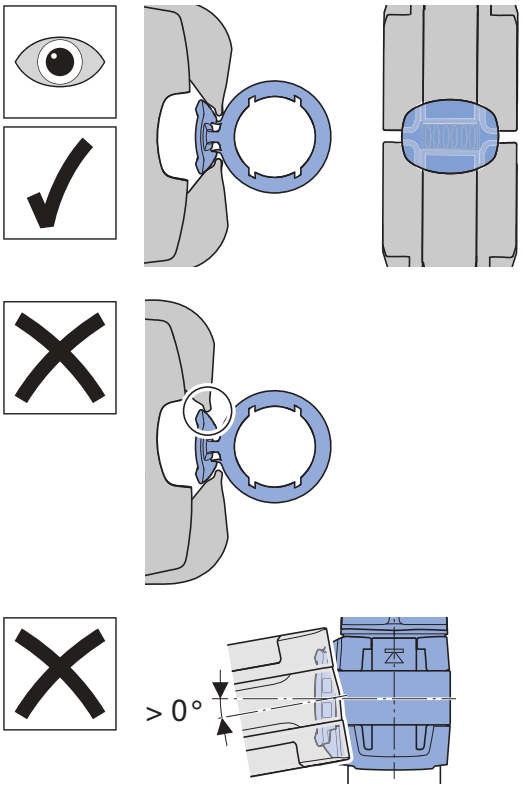


Release any pressing operation initiated by mistake

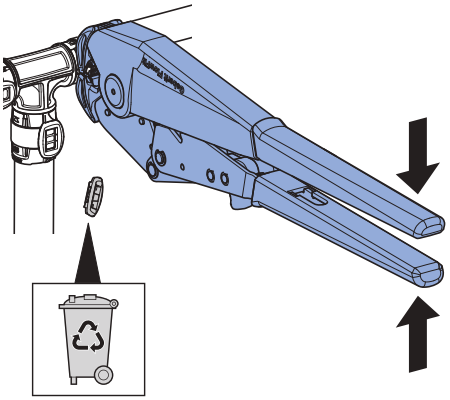


4 Make sure that the pressing tips are sitting correctly and press the levers together.



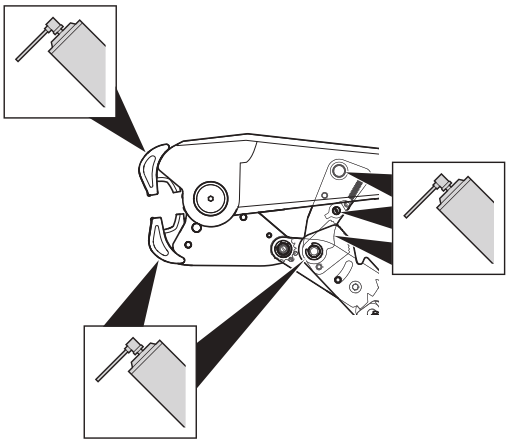


5 Complete the pressing operation.

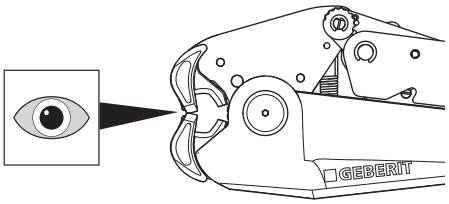


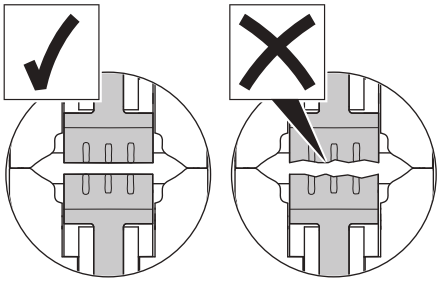
Maintenance of Geberit FlowFit hand-operated pressing pliers

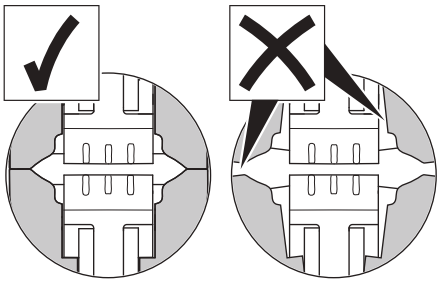
1 Lubricate the joints and untreated surfaces.

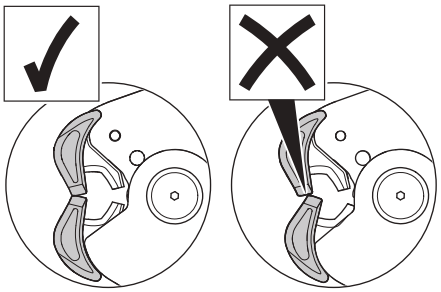


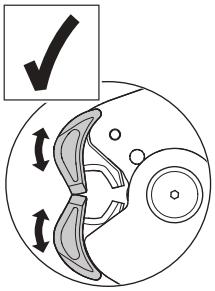
2 Check the pressing jaw for external defects, such as damage, incipient cracks, patches of rust and other signs of wear.

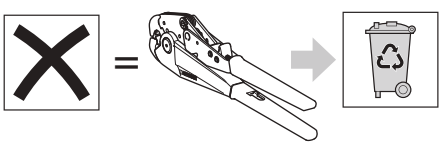












3 Use the Geberit PowerTest to make sure that it is working properly.

d16–40

2.13.5 Corrective pressing of a pressfitting

If a fitting with a blue pressing indicator has been accidentally pressed with an orange pressing jaw, the connection requires corrective pressing. To do this, the blue pressing indicator is put back on the fitting and pressed with the blue pressing jaw.

2.14 PRESSING TOOL

2.14.1 Information on the compatibility of pressing attachments and pressing tools

In order to be able to assign the pressing attachments to the pressing tools, Geberit has introduced compatibilities. Compatibility is indicated in the documents by a number in square brackets, e.g. [2], and on the products in a frame, e.g. 2. The Technical Information on compatible pressing tools provides an overview of the compatible pressing tools for Geberit pressing systems, which is updated annually.

2.14.2 Maintenance

Geberit FlowFit press capacity test

The patented Geberit FlowFit pressed joint requires the appropriate processing tools. The use of Geberit processing tools is a prerequisite for the additional Geberit warranty.

In order to make optimal pressed joints, the Geberit FlowFit pressing jaws must be in perfect condition. Even small amounts of wear that are not immediately visible to the naked eye can impair the pressing result. The Geberit PowerTest can be used to determine any damage and wear to the pressing jaws in good time.

Geberit FlowFit pressing jaws are service-free and do not have any service stickers. The Geberit PowerTest enables time-saving self-monitoring to reliably detect any wear in good time and serves as testing documentation.

The Geberit PowerTest must be performed every 6 months to achieve optimal pressing results.

Information on the tools is contained in the Technical Information on Geberit processing tools for supply systems. For the structure and function of Geberit FlowFit pressing jaws, please refer to the user manual for Geberit FlowFit pressing jaws [1] + [2].

Maintenance and service plans for pressing tools

Maintenance and service plans for pressing tools with a mains connection

Pressing tools and pressing attachments that are not maintained, or are not professionally maintained, can cause serious accidents. The maintenance and service intervals as well as maintenance and service work described below must be followed.

Table 71: Maintenance and service plan for pressing tools with a mains connection and compatibility [2], [3]

	Pressing tool	In the range [MM/YY]	Interval	Work
User maintenance	All	–	Regularly (before use, at the start of the working day)	► Check the pressing tool and mains cable or rechargeable battery for defects and damage that could affect safety. ► Clean and lubricate the pressing tool (see the operation manual).
	All	–	Every six months	► Have a qualified electrician or an authorised repair shop carry out an inspection and take measurements to establish any defects or damage that could affect safety. ► Country-specific regulations can necessitate specific tests and maintenance work.
	EFP 2 [2]	01/05–06/16	Every six months or after 2,500 pressing operations	► Top up with gearbox grease (art. no. 90010).
Service by a repair shop	EFP 2 [2] ECO 201 [2]	01/05–06/16 02/01–03/11	Annually	► Have an authorised repair shop check the pressing force and the state of wear.
	EFP 202 [2]	04/11–04/16	After 40,000 pressing operations or **after 2 years** at the latest in accordance with the information on the service sticker	
	ECO 202 [2]	04/11–04/16	After 40,000 pressing operations (interval is indicated by the red and green LEDs flashing alternately) or **after 2 years** at the latest in accordance with the information on the service sticker	
	ECO 203 [2] ECO 301 [3]	04/16–until now 01/05–03/19	If the red and green LEDs flash alternately or **after 2 years** at the latest in accordance with the information on the service sticker	
	EFP 203 [2]	04/16–until now	**After 2 years** in accordance with the information on the service sticker	

– Does not apply

A service sticker on the pressing tool, pressing jaw, adapter jaw and pressing collar indicates the date when the next service is due.

Arrange for the pressing tool (type ACO pressing tools with a battery charger) to be sent for a service together with the pressing jaws, adapter jaws and pressing collars in the transport case.

The addresses of authorised repair shops can be requested from the Geberit sales companies.

Maintenance and service plan for pressing tools with a rechargeable battery

Pressing tools and pressing attachments that are not maintained, or are not professionally maintained, can cause serious accidents. The maintenance and service intervals as well as maintenance and service work described below must be followed.

Table 72: Maintenance plan for pressing tools with a rechargeable battery and compatibility [1], [2], [2XL]

	Pressing tool	In the range [MM/YY]	Interval	Work
User maintenance	All	–	Regularly (before use, at the start of the working day)	► Check the pressing tool and mains cable or rechargeable battery for defects and damage that could affect safety. ► Clean and lubricate the pressing tool (see the operation manual).
	All	–	Every six months	► Have a qualified electrician or an authorised repair shop carry out an inspection and take measurements to establish any defects or damage that could affect safety. ► Country-specific regulations can necessitate specific tests and maintenance work.
Service by a repair shop	AFP 101 [1] ACO 201 [2]	07/06–04/12 04/11–04/16	Annually	► Have an authorised repair shop check the pressing force and the state of wear.
	ACO 102 [1] ACO 202 [2]	04/12–04/18 04/11–04/16	After 40,000 pressing operations (interval is indicated by the red and green LEDs flashing alternately) or **after 2 years** at the latest in accordance with the information on the service sticker	
	ACO 103plus [1] ACO 203 [2] ACO 203plus [2] ACO 203XL [2]/[2XL] ACO 203XLplus [2]/[2XL]	04/18–until now 04/16–04/18 04/18–until now 01/05–03/19 04/18–until now	If the red and green LEDs flash alternately or **after 2 years** at the latest in accordance with the information on the service sticker	

– Does not apply

A service sticker on the pressing tool, pressing jaw, adapter jaw and pressing collar indicates the date when the next service is due.

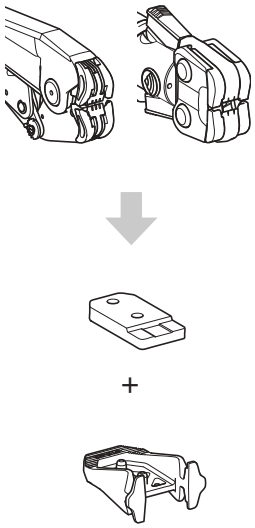
Arrange for the pressing tool (type ACO pressing tools with a battery charger) to be sent for a service together with the pressing jaws, adapter jaws and pressing collars in the transport case.

The addresses of authorised repair shops can be requested from the Geberit sales companies.

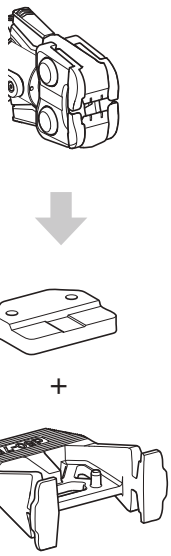
Using the Geberit PowerTest

Type assignment of the test unit to ensure compatibility.

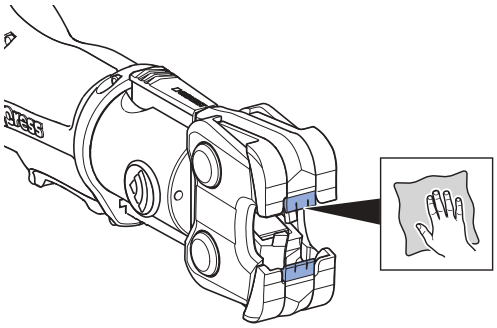
d16–40



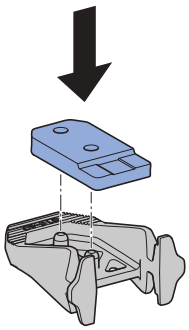
d50–75



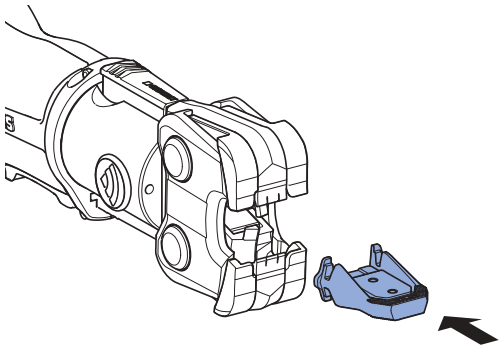
1 Clean the pressing tips.



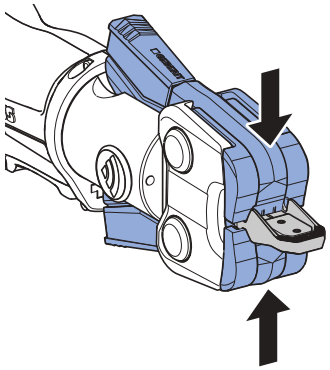
2 Place the test unit on the Geberit FlowFit support.



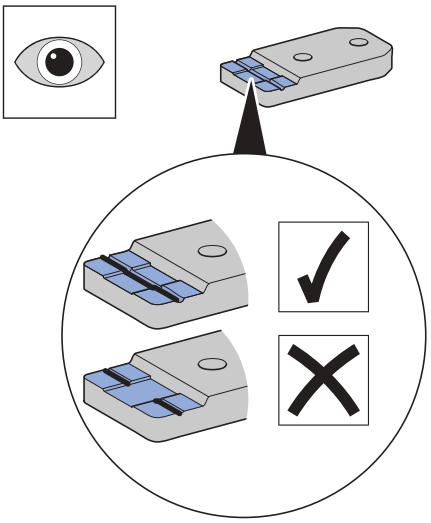
3 Insert the Geberit FlowFit support into the pressing tool.



4 Perform a test pressing.

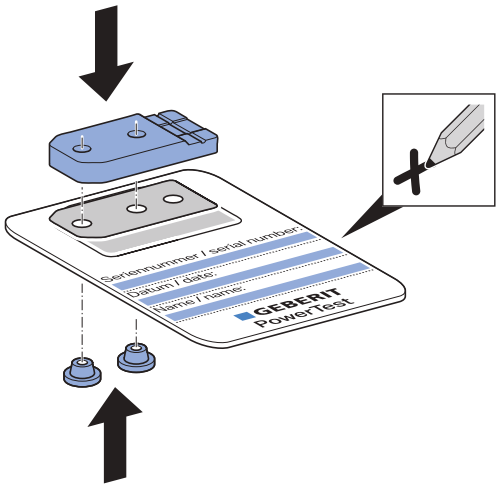


5 Evaluate the test result.



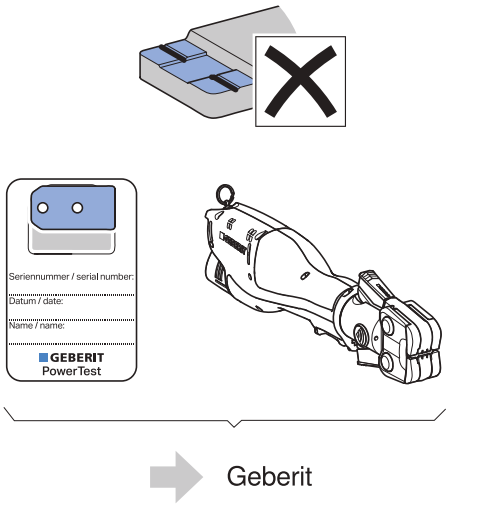
6

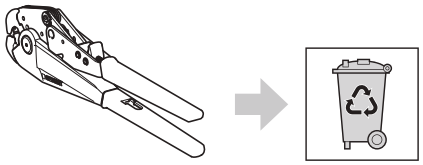
Attach the test unit to the PowerTest label.



7

If the test result is negative, send the pressing tool to Geberit for testing. Dispose of the Geberit FlowFit hand-operated pressing pliers appropriately.





2.15 COMMISSIONING

In addition to a professional installation, careful commissioning is required to ensure a hygienically perfect drinking water installation. The commissioning is regulated in the respective country-specific edition ofEN 806-4:2010 as well as in other country-specific regulations.

The commissioning includes the following subtasks:

- pressure test
- initial filling
- flushing

After the commissioning, the operator assumes responsibility for the proper operation of the installation.

2.15.1 Pressure test

The pressure test consists of two steps:

1. Leak test
2. Load test

The installation is tested for tightness with the leak test and for strength with the load test.

If only one section of the system is to undergo a pressure test, care must be taken to ensure that any open pipe ends associated with the section concerned have been sealed by means of caps, plugs or blind flanges. It is also important to ensure that the section has been isolated from the rest of the system using suitable shut-off devices.

If the system or section contains valves and appliances that have not been designed to withstand the test pressures associated with the leak/load test, these components will need to be disassembled and fitting pieces used in their place. The components should not be reinstalled in the system until the pressure test is complete.

If the test medium is supplied via a connection with a higher pressure level than the test pressure, then a water pressure reducing valve (plus a relief valve, if necessary) must be used to prevent the test pressure being exceeded.

Wherever possible, a drinking water installation should be filled directly from the drinking water network. If this is not possible, we recommend that suitable measures be implemented.

When performing the pressure test with potable water, air bleed devices must be provided at the highest points of the system and the piping system must be fully bled before the test commences.

As a basic principle, Geberit recommends carrying out the pressure test in sections and performing separate tests for different types of piping system. If this is not possible in cases where the pressure test involves different piping systems (particularly when Geberit system pipes PB have been used in a system), the "leaky if unpressed" leak test (Geberit FlowFit/ Mepla/Mapress) should be performed first. Once this has been done, there is a second step to be performed: Follow the relevant testing instructions for the piping system based on Geberit system pipes PB.

Once the pressure test is complete, the test pressure should be released in a safe manner.

Pressure test of drinking water installations according to EN 806-4

A pressure test on drinking water installations is recommended by Geberit.

A pressure test on drinking water installations can be conducted using the following test media in accordance with EN 806-4:2010:

- oil-free compressed air
- inert gas (e.g. nitrogen)
- drinking water

The choice of the test medium for the pressure test depends on the piping system, the application and the time when the system is due to be commissioned. Take into consideration hygiene and corrosion aspects.

Pressure test using oil-free compressed air or inert gas

Pay attention to the following basic rules for the pressure test:

- Make sure that the system is vented.
- Increase the test pressure slowly.
- Make sure that there is no drop in pressure during the test time.

Table 73: Pressure test using oil-free compressed air or inert gas

	DN	p [kPa]	t [min]
Leak test	–	15 (0.15 bar)	120[1)]
Load test	≤ 50	max. 300 (3 bar)	10
	> 50	max. 100 (1 bar)	

p Test pressure

t Test time

– not specified

1) Applies to a pipe volume of ≤ 100 l. For every 100 l of additional pipe volume: + 20 min.

Leak test with filtered water

Pay attention to the following basic rules for the pressure test:

- Make sure that the system is vented.
- Increase the test pressure slowly.
- Make sure that there is no drop in pressure during the test time.
- Inspect for possible leaks during the leak test (leaky if unpressed) of the pressure test with drinking water.

The water may remain in the piping system for up to 7 days under optimal conditions. Regular flushing is recommended.

Table 74: Geberit system pipe ML

	p_{max} [kPa]	t [min]
Leak test (leaky if unpressed)	600 (6 bar)	15
Leak test (main test)	1100 (11 bar)	30

p_{max} Maximum test pressure
t Test time

Pressure test of heating installations

The pressure test of heating installations is conducted in accordance with EN 14336:2004. The pressure test is generally performed with water.

Pay attention to the following basic rules for the pressure test:

- Make sure that the system is vented.
- Increase the test pressure slowly.
- Make sure that there is no drop in pressure during the test time.
- After the pressure test with cold water, heat the system up to the calculated maximum temperature.
- Document the pressure test.

Table 75: Test procedures for heating systems

	p[1)]	t [min]
Pressure test	Min. 100 kPa (1 bar) Max. 1.3 times the operating pressure	120

p Test pressure
1) At each point of the system
t Test time

2.15.2 Initial filling and flushing

The filling of a drinking water installation must only be carried out through a sufficiently flushed service connection pipe. The flushing of the service connection pipe must be carried out in accordance with the water supply specifications before the installation of the domestic water meter. It is important to ensure that there are sufficient drainage options.

Ideally, the flushing of drinking water pipes should take place at least 72 hours before the intended operation of the installation. The flushing process must be carried out separately for the cold and hot water installation. The initial filling and flushing must be documented.

2.16 MAINTENANCE AND REPAIR OF GEBERIT FLOWFIT

2.16.1 General maintenance notes

The operator of buildings must ensure that the potable water meets the prescribed quality at the various outlet taps.

Regular consumption of potable water prevents stagnation in the system. The entire system should be flushed at all points of use after lengthy stagnation times, e.g. after holiday absence of more than 3 days. This rinsing should be performed before the water is used for human consumption. To do this, all outlet taps must be opened until complete water replacement and temperature stability is achieved or an automatic flushing device must be installed. In general, garden pipes and frost-proof or rarely used points of use must be routed by means of loop throughs to a frequently used sanitary appliance to ensure the renewal of potable water. Regardless of this, pipes must be shut off and emptied if there is a risk of frost. A maintenance/ servicing schedule should be prepared for large buildings (hotels, hospitals, etc.) and a general hygiene schedule for all buildings.

2.16.2 Descaling of pipes

Geberit supply systems for drinking water are designed for maintenance-free operation. Malfunctions can occur due to limescale deposits in the pipe if the operating conditions are not matched to the existing water quality.

Limescale deposits that cause malfunctions (e.g. reduced water flow) in Geberit supply systems can be removed with suitable descaling agents and in accordance with the following rules:

- Only sulfamic acid or citric acid-based descaling agents are allowed to be used.
- The descaling agent must contain a corrosion-protection agent and be approved by the manufacturer for use with non-ferrous heavy metals.
- Approved descaling agents must be used for the descaling of drinking water pipes.
- Under no circumstances should the descaling agent come into contact with the aluminium on the front-end connection points of the multilayer pipes.
- The concentration for use and application time (max. 8 hours) of the descaling agent specified by the manufacturer must be observed.
- The descaling agent must be used at room temperature (max. 25 °C).
- After descaling, the pipes must be flushed thoroughly. The pH value must then be checked at the points of use. Acid must no longer be detectable.
- Before descaling, hot water pipes must be flushed with cold water until the temperature at all points of use is below the application temperature.
- The piping system must be open so that the pressure generated by the descaling process can escape if need be.
- Mechanical removal of the limescale deposits is not admissible as the surface of the system pipe may be damaged.

2.16.3 Freezing of Geberit system pipes ML

For the repair of pipe sections, individual pipe sections may be frozen before and after the affected pipe section.

When freezing pipe sections, the following rules must be observed:

- The specifications of the appliance manufacturer must be observed.
- The freezing sleeves must be matched to the outer diameter of the pipe.
- Only straight pipe sections must be frozen.
- Spacing of at least 30 cm must be maintained between the fittings and connection points.
- No changes must be made to the pipe; in particular, damage to the protective jacket must be avoided.
- Any damaged pipe sections must be replaced.

It takes multilayer pipes longer to freeze than pipes made of metallic materials.

2.16.4 Pipe lining

Geberit system pipes ML are not suitable for pipe lining by means of sandblasting and a subsequent coating of epoxy resin. The system pipes do not withstand the pressure that is generated by sandblasting. Furthermore, the surface of the system pipes is not designed for an epoxy resin coating.

2.17 DISINFECTION OF DRINKING WATER INSTALLATIONS

2.17.1 Principles

Drinking water installations must only be disinfected in proven cases of contamination and only for a limited time. Prophylactic disinfection contradicts the principle of minimisation of the Drinking Water Inspectorate. Disinfection of drinking water installations is only successful when all sources of contamination have been removed. The limit values for disinfectant concentrations specified in the Drinking Water Inspectorate are maximum values, which were set with due consideration of hygienic and toxicological viewpoints. They do not allow any automatic conclusions to be drawn about the resistance of the materials used to disinfectants. Drinking water installations may only be disinfected by skilled persons. The disinfection measures must be recorded in writing.

The disinfection measures place a strain on the materials and components of the potable water installation and may adversely affect its service life. Disinfection measures carried out incorrectly can damage the potable water installation.

BS 8558 and BS EN 806 provide guidance on materials, water quality and cleaning and disinfection, which should be read in conjunction with the information contained here.

2.17.2 Methods of disinfection

Drinking water installations and washbasin taps can be disinfected using thermal or chemical methods. Drinking water can also be disinfected by means of UV radiation.

A combined thermal-chemical disinfection is not admissible.

2.17.3 Thermal disinfection

In the case of thermal disinfection, microorganisms that are found in water are killed off by the effects of temperature.

The following rules must be observed during thermal disinfection:

- The piping system must be thoroughly rinsed before the disinfection process is performed.
- The water heater and the entire circulation must be heated up to at least 70 °C.
- All points of use must be opened step by step or line by line respectively.
- Hot water must be allowed to run at all points of use for at least 3 minutes at 70 °C.
- The temperatures must not decrease during the disinfection process.
- Risk of scalding must be eliminated by taking suitable measures.
- Performance of the disinfection process must be documented in a report.

2.17.4 Chemical disinfection

Effective killing or inactivation of microorganisms is only possible if the disinfectant used can act on the microorganisms directly. In the case of chemical disinfection, a disinfectant is therefore used in a sufficient concentration in all areas of the drinking water installation.

A distinction is made between the following chemical disinfection techniques:

- system disinfection
- drinking water disinfection

Chemical disinfectants corrode the drinking water installation and must only be used in the event of contamination.

Using a combination of several chemical disinfectants is not admissible.

Chemical disinfection can be performed several times throughout the service life of the drinking water installation. The disinfection measures, however, place a strain on the materials and components of the drinking water installation and may adversely affect its service life. It is not possible to provide a specification on the reduction in service life depending on the number of chemical disinfections performed.

System disinfection

For system disinfection, a disinfectant in a high concentration is added to a cold-water pipe over a short period of time.

Geberit piping systems and Geberit washbasin taps are suitable for system disinfection.

The following rules apply when carrying out system disinfection:

- Concentrations, temperatures and application times of the permitted disinfectants must be adhered to in strict compliance with country-specific regulations.
- Skilled persons must take specific measuring and control technology precautions.
- To prevent increases in concentration, the specific characteristics of the affected drinking water installation must be taken into account.
- Concentrations, temperatures and application times must be documented.
- Cleaning and disinfection measures must be recorded.
- To remove disinfectant and dead germs after disinfection is complete, the drinking water installation must be flushed thoroughly with hygienically perfect drinking water.
- All points of use must be flushed until the limit value of the Drinking Water Inspectorate is reached.
- No drinking water may be consumed during disinfection and the subsequent flushing phase.

Drinking water disinfection

For drinking water disinfection, a disinfectant in a low concentration is added to the drinking water pipe (cold or hot) for a limited time.

Geberit piping systems and Geberit washbasin taps are suitable for time-limited drinking water disinfection.

The following rules apply when carrying out drinking water disinfection:

- Concentrations, temperatures and the duration of application of the permitted disinfectants must be adhered to in strict compliance with the country-specific regulations.
- Skilled persons must take specific measuring and control technology precautions.
- To prevent increases in concentration, the specific characteristics of the affected drinking water installation must be taken into account.
- Concentrations, temperatures and by-products must be monitored and documented directly after the dosing point using measurement technology.
- The concentration of the agent in the treated water must be measured daily.
- The drinking water disinfection must be kept as short as possible and it should last no longer than it takes for the technical rehabilitation to be realised.

Exceeding the concentration for use and duration can adversely affect the service life of the piping system.

2.17.5 UV disinfection

Geberit Mapress piping systems

Geberit Mapress piping systems are suitable for UV disinfection without restriction.

2.18 DISPOSAL

2.18.1 Recycling

At the end of its service life, the Geberit system can be broken down into its individual parts and recycled according to the materials used.

Table 76: Recycling of Geberit FlowFit

Component	Material	Recycling	Remarks
System pipes ML	PE-RT II / Al / PE-RT II	Separation of Al and PE	Performed by specialist company, Material collection by recycling companies
System pipes ML, with circular pre-insulation	PE-RT II / Al / PE-RT II PE soft foam	Separation of Al, PE and PE soft foam	
Protective tubes	PE-HD	Plastic recycling	Material collection by recycling companies
Fittings made of metal	Rg+ SiBr	Scrap metal	
Fittings made of plastic	PPSU	Plastic recycling	
Pressing indicators	POM	Plastic recycling	Return of the material through a Geberit sales company
Protective caps and plugs	PE-LD/PE-HD	Plastic recycling	
Outer packaging	HDPE Cardboard	Plastic recycling Paper recycling	Material collection by recycling companies

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