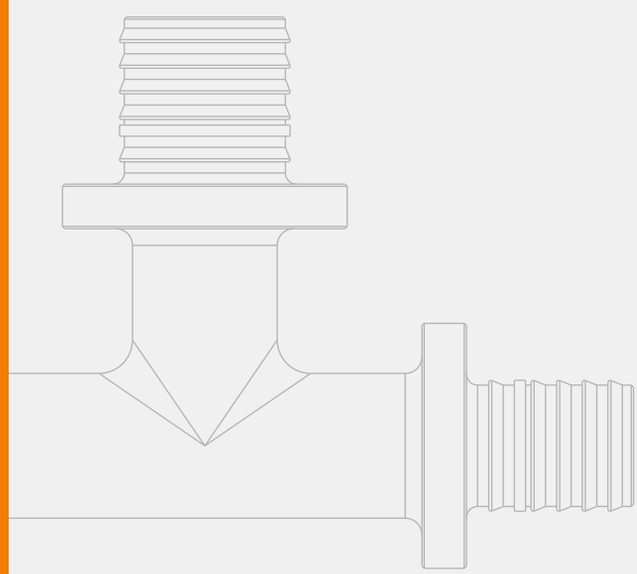
TECE

Pipe systems

TECEflex

TECHNICAL INFORMATION



Contents

Issue: March 2020

System description

TECEflex is the universal installation system for potable water, heating, compressed air and gas installations. All-plastic and composite pipes are available. The pipes are connected using axial pressure sleeve technology - without using O-rings.

TECEflex offers:
- Connection without an O-ring
- Low pressure loss connection due to expansion technology
- High pressure and temperature resistance
- Hygienically flawless
- Error-tolerant and hence totally secure system
- Flush-mounting possible
- Dimensionally stable, bend-resistant composite pipes
- One fitting for three types of pipe - therefore no danger of mixing up the fittings and significantly reduced storage requirement
- Axial press-connector with low cross-section constriction

Pipe types

The TECEflex system offers the right pipe for every installation application:
- Composite pipe for potable water, heating and compressed air applications
- Composite pipe - coloured yellow - for the internal gas installation
- PE-Xc-5S pipe for potable water, heating and compressed air applications (with internal diffusion block)

TECEflex system application limits

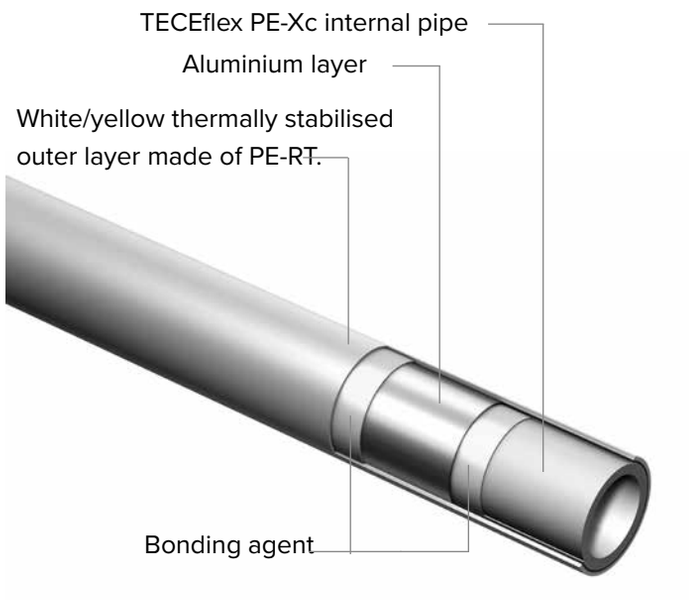
- Suitable for potable water installations according to application class 2 and 10 bar in accordance with ISO 10508 for hot water applications
- Suitable for heating installations according to application class 5 and 6 bar in accordance with ISO 10508 for high temperature applications
- For gas installation up to 100 mbar inside buildings. Local regulations and statutory provisions must be observed.

The system can be operated at 95°C for a short time but the TECEflex components must not be subjected to a temperature greater than 100°C at any time. Open flames are prohibited. With soldered connections on copper pipe, the solder connection must be created first. With the TECEflex system pipe connection, you must wait until the fitting has cooled down.

In rare cases, small bubbles may appear on the pipe surface of the TECElogo composite pipes during operation. These bubbles do not reduce the serviceability and are not critical.

TECEflex PE-Xc/Al/PE-RT composite pipe

Multi-layer composite pipe according to DIN EN ISO 21003 type MP-M with white top layer. Can be used for potable water, heating and compressed air installations.
Only the yellow composite pipes may be used for gas installation. The pipes are marked with W/G 100.
DVGW-certified in Germany for internal gas installation up to 100 mbar.



Composition of the TECEflex composite pipe

The PE-Xc/AL/PE-RT composite pipe is a pipe with a butt-welded aluminium layer. This combination of materials reduces the thermal length change and simultaneously makes the pipe dimensionally stable and bend-resistant.

TECEflex composite pipes can be used as follows:
- In floor and flat distribution,
- In cellars, rising pipes and surface-mounting,
- In insulation in concealed areas,
- In the connection of radiators, also out of the skirting board,
- As underfloor and wall heating, etc.

Delivery forms:
- Dimensions from 14–63 (14/16/20/25/32/40/50/63)
- As rolls or in ready made lengths
- In corrugated sheath pipe or
- As pre-insulated variants
- Coloured yellow for gas installation

Advantages of TECEflex composite pipe:
- Universal pipe for sanitation, heating, compressed air and gas = one pipe for all application areas
- Linear extension comparable to a metal pipe
- Visually appealing white or yellow outer layer
- Easy to lay, as it is resistant to bending and dimensionally stable
- Corrosion resistant
- Resistant to heating inhibitors
- External and internal monitoring
- Outstanding creep strength
- DVGW, TÜV and DIN CERTCO certified
- Suitable for potable water installations according to application class 2 and 10 bar in accordance with ISO 10508 for hot water applications
- Suitable for heating installations according to application class 5 and 10 bar in accordance with ISO 10508

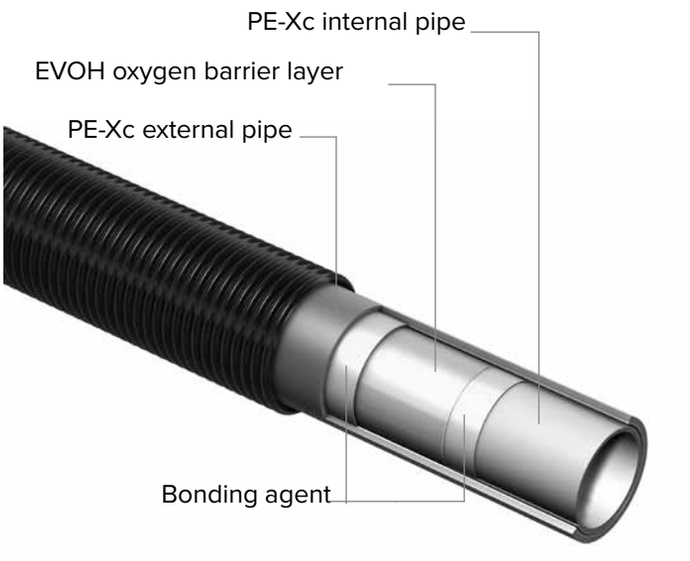
In rare cases, small bubbles may occasionally appear on the pipe surface of the TECEflex PE-Xc/Al/PE-RT composite pipes during operation. These bubbles do not reduce the serviceability and are not critical.

TECEflex PE-Xc 5S pipe

The TECEflex 5S all-plastic pipes are composite pipes in accordance with DIN EN ISO 21003 type MP-P. They are equipped with an internal diffusion block and are therefore optimally protected against adverse construction site conditions. The pipes are insensitive to external moisture, such as condensation water. They are suitable for potable water, heating and compressed air installations:
- Suitable for potable water installations according to application class 2 and 10 bar in accordance with ISO 10508 for hot water applications
- Suitable for heating installations according to application class 5 and 6 bar in accordance with ISO 10508

The TECEflex PE-Xc 5S pipes should not be used in gas installations.

Delivery forms:
- Dimensions 16 and 20
- As a roll
- In black corrugated sheath pipe



Composition of the TECEflex PE-Xc 5S pipe

Fittings

The TECEflex system offers fittings in three material quality grades. All fittings are suitable for TECEflex aluminium composite pipes as well as for all-plastic pipes.

Red brass silicon bronze fittings#

As an internationally operating system provider, TECE is converting products made of gunmetal to silicon bronze, a material that can be used uniformly on an international scale. The processing and material properties are equivalent, silicon bronze is slightly brighter than red brass in direct comparison. Mixed installations of red brass and silicon bronze are possible without restrictions. Both materials are listed in the evaluation principles for metallic materials in contact with potable water (Federal Environment Agency positive list). They therefore meet the requirements of § 17 para. 3 of the Potable Water Ordinance. The item numbers remain unchanged.

Red brass silicon bronze fittings can be used for
- Potable water installations,
- Gas installations,
- Heating installations,
- Compressed air installations.

PPSU plastic fittings

The PPSU fittings can be used for
- Potable water installations,
- Heating installations,
- Compressed air installations.

PPSU fittings should not be used for gas installation.

Cleaners, paints and foams etc. may contain substances that can damage a PPSU fitting. Therefore, PPSU fittings must not be glued or painted. PPSU fittings must not come into contact with PUR foams. PUR foam should not be applied in the immediate vicinity of PPSU - fittings. If necessary, you can check the suitability of PPSU to building or plaster products in the PPSU resistance list - see appendix “PPSU resistance list”.

Brass fittings

The brass fittings can be used for
- Potable water installations,
- Heating installations,
- Gas installations,
- Compressed air installations.

For potable water installations, the application limits of the fitting materials according to ISO 10508 must be strictly observed when selecting the material.

Pressure sleeves

The TECEflex composite pipes and TECEflex PE-Xc 5 S pipes are pressed using various pressure sleeves:
- Brass-coloured pressure sleeves for TECEflex composite pipes
- Silver-coloured pressure sleeves for TECEflex PE-Xc or 5S pipes

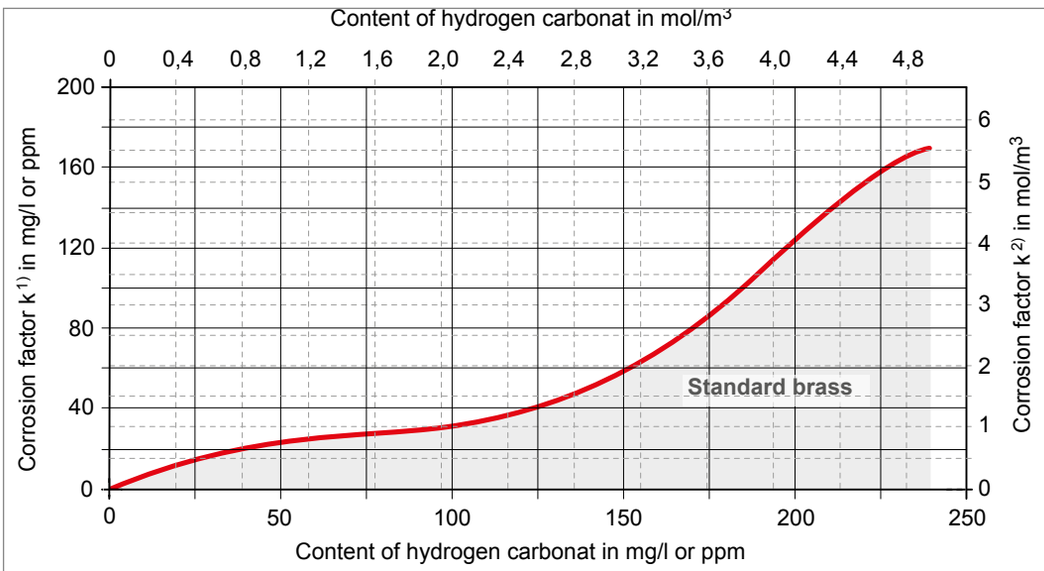
TECEflex system application limits

suitable for potable water **installations** according to application class 2 and 10 bar in accordance with ISO 10508 for hot water applications.
The potable water installation with TECEflex must be planned, constructed and operated in accordance with DIN EN 806, DIN EN 1717 and the recognised rules of technology. Local regulations and statutory provisions must be observed.
The potable water must comply with the currently valid limit values of the following regulations
- European Drinking Water Directive
The materials approved by TECE for potable water installations are particularly corrosion-resistant. Nevertheless, it is possible that, regardless of the material used, corrosion may occur in individual cases even with permissible water qualities due to various influencing factors in a potable water installation. EN 12502-1 describes these factors that can influence corrosion behaviour. During planning, execution and operation, it must be ensured that corrosion is not promoted when used properly.

Suitable for **heating installation** according to application class 5 and 6 bar in accordance with ISO 10508 for high temperature applications.

Suitable for **gas installation** up to 100 mbar inside buildings. Local regulations and statutory provisions must be observed.

At no time may the TECEflex components be exposed to a temperature of more than 100°C. Open flames are prohibited. With soldered connections on copper pipe, the solder connection must be created first. With the TECEflex system pipe connection, you must wait until the fitting has cooled down.
In rare cases, small bubbles may occasionally appear on the pipe surface of the TECEflex multi-layer composite pipes during operation. These bubbles do not reduce the quality or the serviceability and are not critical.



1) k = content of chlorid Cl + 1/3 content of sulphate SO_4 (in mg/l)
2) k = content of chlorid Cl + content of sulphate SO_4 (in mol/m^3)

For water qualities that are above the limit curve, dezincification corrosion for standard brass is to be expected. They must not be used for these water qualities.

Selection of materials for fitting materials according to ISO 10508

TECEflex system pipes	Multi-layer composite pipe in accordance MP M with DIN EN ISO 21003							
Pipe designation	PE-Xc/Al/PE-RT							
Dimension	14	16	20	25	32	40	50	63
Delivery length – roll in m	120	100	100	50	-	-	-	-
Ready made length (m) (5 m/rod)	-	100	70	45	30	15	15	5
Field of application*	HSC, UFH, CAS	PWS, HSC, UFH, CAS, GAS		PWS, HSC, CAS, GAS				
Application class/ operating pressure	2 / 10 bar 5 / 10 bar							
Colour	White	White/yellow						
Outside diameter in mm	15	17	21	26	32	40	50	63
Wall thickness in mm	2.60	2.75	3.45	4.00	4.00	4.00	4.50	6.00
Inside diameter in mm	9.8	11.5	14.1	18	24	32	41	51
Available in corrugated sheath pipe	Yes				-			
Deliverable with insulation λ = 0.040 W/(m · K) - 6 mm - 9 mm - 13 mm	 -- -- --	 Yes Yes Yes			 -- -- --			
Pipe weight empty in kg/m	0.11	0.14	0.21	0.30	0.40	0.53	0.80	1.29
Internal volume in dm^3/m	0.08	0.10	0.16	0.25	0.45	0.80	1.32	2.04
Pipe roughness in mm	0.007							
Thermal conductivity uninsulated in W/(m^2K)	0.35							
Coefficient of thermal expansion in mm/(mK)	0.026							
Minimum bending radius in mm (5 x dimension)	70	80	100 (80)**	125	160	200	250	315

* PWS - potable water systems; HSC - heating system connection; UFH - underfloor heating; CAS - compressed air systems; GAS - gas installations
The classification of the application classes corresponds to the information in ISO 10508[4].

** Pipes of dimension 20 can also be bent with 4 times the dimension.

TECEflex system pipes	5S All-plastic pipes DIN EN ISO 21003 Type MP-P		PE-MDXc 5S heating pipes in accordance with DIN 4724
Pipe designation	PE-Xc /EVOH/PE-Xc		PE-MDXc 5S
Dimension	16	20	16
Delivery length – roll in m	200	120	200/600
Ready made length (m) (5 m/rod)	-	-	-
Field of application*	PWS, UFH, HSC		UFH, HSC
Application class/ operating pressure	2 / 10 bar; 5 / 6 bar		5 / 4 bar
Colour	Silver		Pearl
Outside diameter in mm	16	20	16.2
Wall thickness in mm	2.2	2.8	2.0
Inside diameter in mm	11.6	14.4	12
Available in corrugated sheath pipe	Yes	Yes	-
Deliverable with insulation λ = 0.040 W/(m · K) - 6 mm - 9 mm - 13 mm	 -- -- --		 -- -- --
Pipe weight empty in kg/m	0.09	0.14	0.08
Internal volume in dm^3/m	0.11	0.16	0.11
Pipe roughness in mm	0.007		0.007
Thermal conductivity uninsulated in $W/(m^2K)$	0.35		0.35
Coefficient of thermal expansion in mm/(mK)	0.2		0.2
Minimum bending radius in mm (5 x dimension)	80	100	80

* PWS- potable water systems; HCS- heating system connection; UFH- underfloor heating; CAS- compressed air systems
The classification of the application classes corresponds to the information in ISO 10508[4].

Technical pipe data TECEflex – Part 2

Operating parameters

If the operating parameters are exceeded the pipes and connections will be overstressed. The operating parameters must therefore not be exceeded. This should be ensured using suitable safety/regulation devices (e.g. pressure regulators, safety valves or similar).

Application class	Calculation temperature T_D °C	Operating period[b] at T_D Years [a]	T_{max} °C	Operating period at T_{max} Years	T_{mal} °C	Operating period at T_{mal} Hours	Typical application area
1 [a]	60	49	80	1	95	100	Hot water supply (60°C)
2 [a]	70	49	80	1	95	100	Hot water supply (70°C)
3 [c]	20	0.5	50	4.5	65	100	Low-temperature floor heating
	30	20					
	40	25					
4 [b]	20	2.5	70	2.5	100	100	Underfloor heating and low-temperature radiator connection
	40	20					
	60	25					
5 [b]	20	14	90	1	100	100	High-temperature radiator connection
	60	25					
	80	10					

T_D = Temperature for which the pipe system has been designed. T_{max} = Maximum temperature permitted for a short time.
T_{mal} = Highest possible temperature that may occur in the event of an accident (maximum 100 hours in 50 years).

[a] A state can select either class 1 or class 2 according to its national provisions.

[b] If more than one calculation temperature exists for an application class for the operating period and the related temperature, the corresponding times of the operating period must be added. “Plus cumulative” in the table implies a temperature group for the given temperature for an operating period (e.g. the temperature group for a period of 50 years for class 5 is made up as follows: 20°C over 14 years, followed by 60°C over 25 years, followed by 80°C over 10 years, followed by 90°C over 1 year, followed by 100°C over 100 hours).

[c] Only permitted if the temperature during a fault cannot exceed 65°C.

Application classes and classification of operating conditions in accordance with ISO 10508

Areas of application

Potable water installation

Potable water sets special requirements for an installation system. It is a foodstuff and must not be negatively impacted by the installation system materials. The planning and implementation as well as the operation of the potable water installation must be carried out in accordance with the applicable laws, directives and standards. The fitter must ensure that they are installing a piping system that corresponds to the applicable recognised technical regulations. The TECEflex system is DVGW certified and proven suitable for potable water installations.

The following components are available for potable water installations:
- Plastic fittings made of PPSU
- Metal fittings made of red brass/silicon bronze
- White composite pipes
- PE-Xc 5 S all-plastic pipes

All materials are recommended by DVGW and recognised across Europe. All metallic components of the TECEflex system that come into contact with potable water comply with the evaluation principles (as of 21/11/2018) of the German Federal Environment Agency (UBA) as per the 4MS material list (as of 05/01/2017).

Material selection

Fitters have satisfied their duty of care when they
- Have presented the potable water analysis for the supply area of the building project to be constructed and have inspected the suitability of the TECEflex system,
- Have assured themselves of the supplier's experience,
- If necessary, has received approval for TECEflex from TECE.

Water treatment measures

If water treatment measures such as water softening are to be used, it is essential that the potential change in the corrosion-chemical behaviour of the treated water on the potable water installation is assessed. Corrosion damage cannot be ruled out if water treatment systems are operated incorrectly. Therefore, to avoid corrosion damage, the individual situation must first be checked by an expert, for example the system manufacturer.

Measures for Legionella prophylaxis

Potable water installations must be planned, implemented and operated with special care in accordance with the applicable laws, directives and standards.

Disinfection of potable water installations

The suitability of the TECEflex system for potable water is confirmed by the DVGW certification. The components of the TECEflex system are made from materials recognised and valued across Europe. A properly planned, implemented and operated potable water installation is hygienically impeccable and in principle does not require any disinfection measures. Disinfection is only necessary in exceptional instances and only then to be carried out if there is an urgent requirement (contamination).

This is to be viewed as an immediate emergency measure in order to return the potable water installation to a usable state. The cause of the microbial contamination - e.g. construction fault or incorrect operation - must be eliminated. Preventive permanent or regular disinfection of a potable water installation is not permitted. Continuously added disinfection agents can have a significant effect on the lifespan of the potable water installation. Due to potential material impairments, no warranty can be provided for these cases.

Recurring or permanent water contamination is often caused by the installation or operation method. (Dead pipes, stagnation times, heating of the cold water or cooling of the hot water, etc.). In such cases, renovation or ensuring proper operation takes precedence over disinfection.

Connection to water heaters

Water heaters which are not approved for use with TECEflex in this document must be approved for connection with TECEflex by the respective manufacturer. The application limits of the TECEflex system must also be observed in the event of a malfunction.
Unregulated hot water boilers must not be connected directly. A metal pipe of at least just one metre must be installed between the TECEflex and the hot water boiler.

Gas instantaneous water heaters

Some gas instantaneous water heaters can generate impermissibly high pressures or temperatures in the event of a malfunction. They are not suitable for connection with plastic pipes. Connecting gas instantaneous water heaters with TECEflex requires the approval of the appliance manufacturer. You must observe the specifications of the appliance manufacturer.

Electric instantaneous water heaters

The electric instantaneous water heaters listed in the table are approved for connection with TECEflex:

Manufacturer	Description	Output in kW				Control/regulation
AEG	DDLE xx*	18	21	24	27	Electronic
CLAGE	DBX	18	21	24	27	Electronic
	BCX	18	21	24	--	Electronic
	DEX	18	21	24	27	Electronic
	DSX	18	21	24	27	Electronic
Junkers	ED xx*-2 S	18	21	24	--	Hydraulic
Siemens	Type DE xx* 415	18	21	24	27	Electronic
	Type DE xx* 515	18	21	24	27	Electronic
	Type DE xx* 555	18	21	24	27	Electronic
Stiebel Eltron	DEL xx* SL	18	21	24	27	Electronic
	DHE xx* SL	18	21	24	27	Electronic
Vaillant	e VED	18	21	24	27	Electronic
	e VED plus	18	21	24	27	Electronic
	e VED exclusive	18	21	24	27	Electronic

xx* Output (in kW) in the product designation

Solar hot water heating

TECEflex can be used to connect a solar system to a hot water heating system if technical measures ensure that the medium temperature is limited to 70°C. The application limits of the TECEflex system must be strictly observed.

Heating installation

The TECEflex system is suitable for the operating conditions of the high-temperature radiator connection of class 5 according to ISO 10508. Application class 5 reflects the operating conditions of a sliding heating operation over 50 years. See also “Operating parameters”
Constant heating operation.
If a heating installation is operated constantly with a flow temperature independent of the outdoor temperature, the flow temperature must not exceed 70°C. Higher flow temperatures affect the service life of the system.

Skirting systems

Only TECEflex metal fittings and the PE-Xc/Al/PE-RT aluminium composite pipes are approved for the installation of skirting systems. The flow temperature is limited to a maximum of 70°C.

Compressed air installation

TECEflex moulded and connection parts as well as TECEflex aluminium pipes are suitable for use in compressed air systems. The same fittings and pipes are used in compressed air installations as in potable water and heating installations.

TECEflex is certified by TÜV Süd as a compressed air system and has the right to display the TÜV seal. This certification also includes TECEflex PPSU fittings.

System-wide connections with bathroom fittings, valves, fittings, etc. can be established using TECEflex threaded fittings. The TECEflex is suitable for compressed air with these parameters
- Nominal pressure 16 bar,
- Operating pressure 12 bar and
- Maximum peak operating temperature 60° C.

The TÜV Süd certificate is available to download at www.tece.com/en

Gas installation

The TECEflex system is approved for gas installation up to 100 mbar inside buildings. For proper and professional installation, the local regulations, standards and laws must be observed.

The following are available for gas installation:
- Metal fittings made of brass or red brass/silicon bronze
- Composite pipes with PE-Xc inliner in yellow
- Brass-coloured pressure sleeves
- Gas safety fittings (TAE and GSK)

All TECEflex components suitable for gas installation are marked with W/G 100.

Processing information

The TECEflex system must be processed only with the accompanying system tools. TECEflex components must not be connected to third-party pipes or fittings. A warranty claim can only be made for the possible applications outlined in the System Description.
Make sure you read the operating instructions before using the tools. If the operating instructions are no longer available, please contact your TECE contact person or download them from www.tece.com/en.

TECEflex pipes may only be processed using cutting tools in perfect condition. The cutters in particular must be sharp and free of burrs otherwise the installation pipe could be damaged during expansion.
Damaged tools or tools with restricted use must no longer be used. There is a risk of personal injury and damage to property. Get in touch with your TECE contact person

Connection with TECEflex manual tools

TECEflex connections up to dimension 32 can be connected using the TECEflex hand tools.

TECEflex hand tools: Expanding tool with expansion head, pipe cutting pliers, manual crimping pliers with fork heads (from left)

The following work steps must be performed to ensure a correct TECEflex connection:

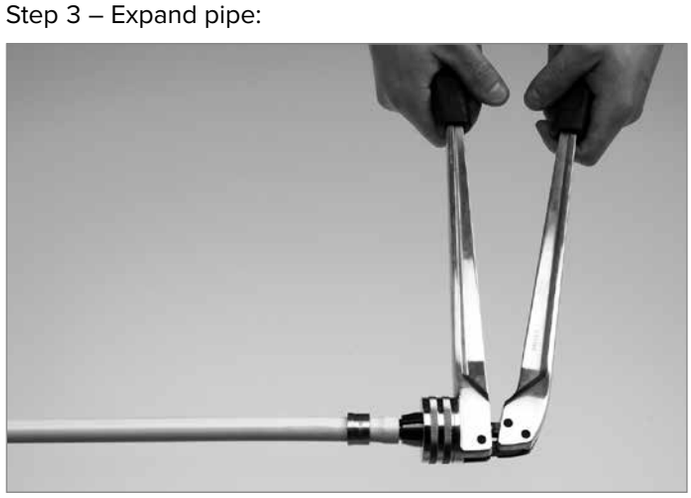
Cut the installation pipe at a right-angle with the TECE pipe cutting pliers (item no.: 8760002 or 720093). From dimension 32, it is recommended to use the plastic pipe cutter (item no.: 80042).

Step 1 – Shorten pipe:

Step 2 - Slide on pressure sleeve:

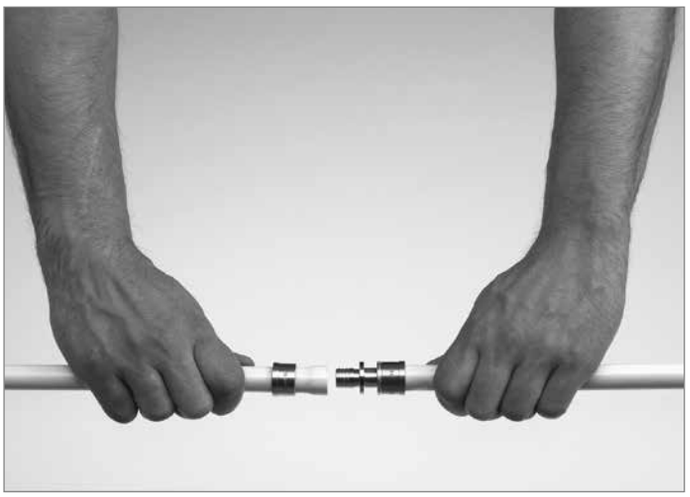
Slide the TECEflex pressure sleeve over the end of the pipe. Here the flat side of the pressure sleeve (without outer ring) must face the fitting.

Step 3 – Expand pipe:



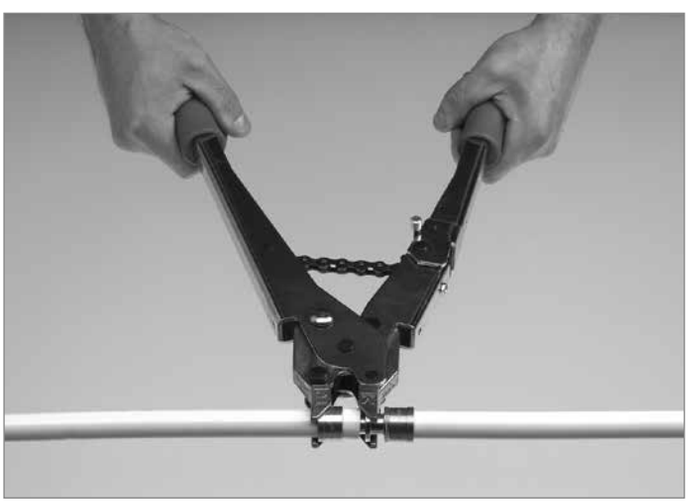
Select the expansion head to match the dimension of the pipe and screw on the expanding tool (item no.: 720056). Slide the end of the pipe onto the expansion head up to the stopper and expand. The TECEflex composite pipes may only be expanded once!

Step 4 – Slide on pipe:



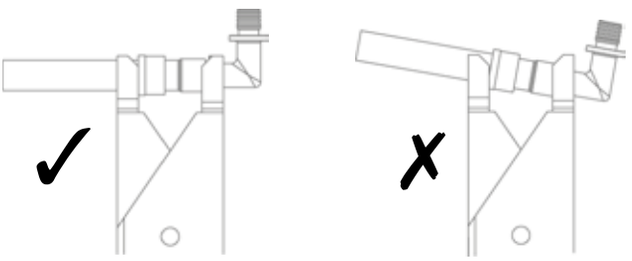
The TECEflex installation pipe must be slid onto the fitting up to the last saw tooth. The pipe does not need to be pushed up to the stopper, the appropriate depth is already set by the expansion. It is not necessary to mark the insertion depth.

Step 5 – Create connection:



Select the fork heads labelled with the pipe dimension and attach them to the handheld crimping pliers using the bolt (item no.: 720050). Push the pressure sleeve towards the end of the pipe by hand as far as it will go, insert the fitting and sleeve into the fork heads. Squeeze the manual crimping pliers repeatedly to press the pressure sleeve up to the fitting. A remaining gap of approx. 0.5 mm between the fitting and the sleeve is specific to the production and insignificant. The connection is even then perfect if the pipe is not slid up to the pressing collar of the fitting.

Note: Pay attention to the correct positioning of the pressing tool when pressing. The fitting must lie completely and at right angles in the pressing tool.



Pressing: Correct position (on left) – Incorrect position (on right)

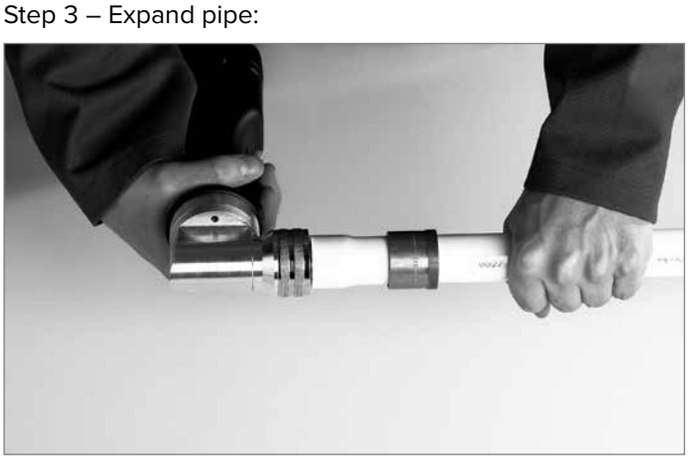
Connection with RazFaz battery-powered tool

Hydraulic battery pressing tools for creating TECEflex connections up to 32 mm.

TECEflex RazFaz battery-operated tools: Expansion tool with expansion heads and pressing tool with pressing forks

The working steps required for a correct connection correspond to the process for “Connection with TECEflex manual tools” (see previous section). Only the expansion (step 3) and pressing (step 5) are carried out with the RazFaz tools.

Step 3 – Expand pipe:



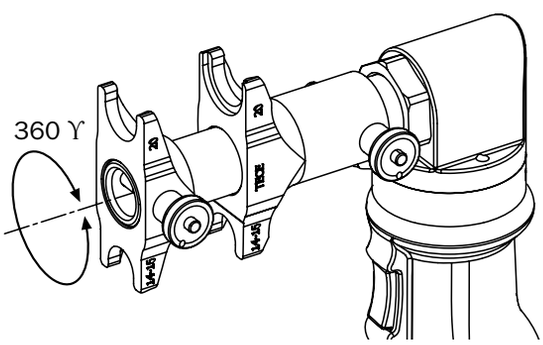
Select the expansion head matching the pipe dimension and screw it onto the RazFaz expansion tool. Now slide the expansion head into the pipe up to the stopper and carry

out the expansion with the pressing tool. The tool must be held right in front of the end of the pipe.

The tool has a final check, which means that the expansion process has to be performed as long as it takes until the expansion head automatically returns to the starting position.

Step 4 – Create connection:

Slide the matching pressing forks onto the pressing tool and lock in with the safety pins. The forks are designed for two dimensions each (14/16–20 and 25–32) and come with seamless 360° rotation.

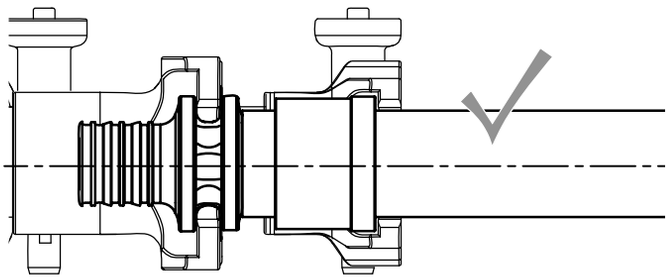


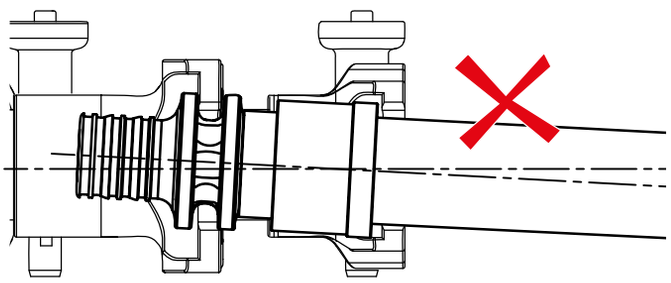
Slide the pressure sleeve up to the end of the pipe as far as possible and place the pressing forks straight on the fitting.

Squeeze the pressing tool to slide the pressure sleeve up to the fitting.

The pressing tool has a final check; the pressing process has to be performed as long as it takes until the pressing forks automatically return to the starting position.

Special care should be taken when pressing PPSU fittings. The pressing forks must always be seated correctly. The tool must not be used diagonally.





The RazFaz tools are high-quality and technically sophisticated hydraulic units. It is advisable to have the equipment serviced regularly to preserve the material. You can find a service address at:

Novopress GmbH & Co. KG
Scharnhorststraße 1
D-41460 Neuss

info@novopress.de

Connection with pressing tool PMA

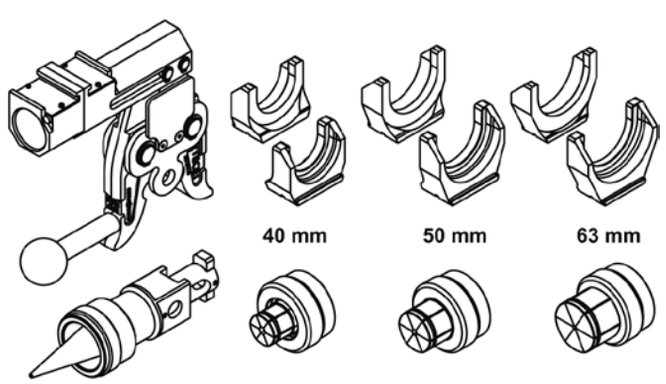
The TECEflex tools for working with dimensions 40–63 require a drive in the form of a commercial pressing machine with a pressing force of at least 32 kN, whereby the pressing force **may not exceed 34 kN**. With higher pressing forces, damage to the tool cannot be ruled out.

TECE recommends the following pressing machines (alphabetical order of manufacturer):

Manufacturer (system operator)	Machine type
Geberit	ACO203plus, ACO203XLplus, ECO203
Klauke	UAP332, UAP432
Novopress	ACO/ECO203, EFP203, ACO203XL
REMS	Akku-Press/Akku-Press ACC, Power-Press/Power-Press ACC
RIDGID	RP 340-B, RP 340-C
Rothenberger	Romax 3000/ 4000/ Ac ECO
Vetec	SPM 32
Viega	Pressgun 5

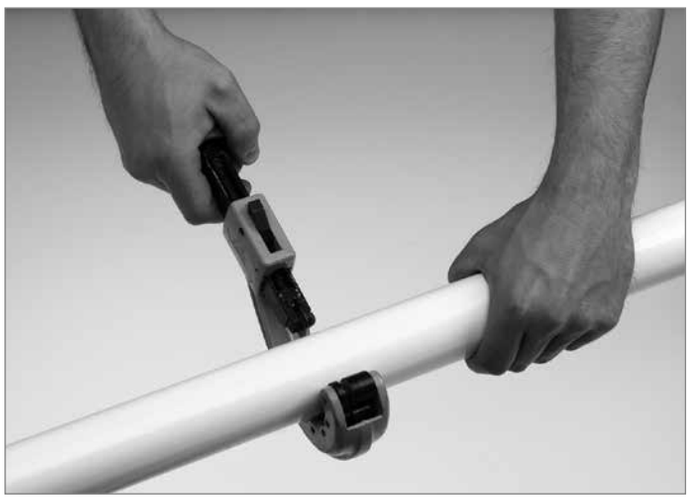
In the event that a pressing machine cannot be found in the list below, approval should be sought from TECE.

Note: A connection is correctly pressed when the pressure sleeve is slid up to the fitting. The guarantee for the press connection therefore does not depend on the status of the pressing tool - the position of the pressure sleeve is the crucial factor.
Please read the manufacturer's safety information for the pressing machine and the TECEflex tools before use and observe these during use.

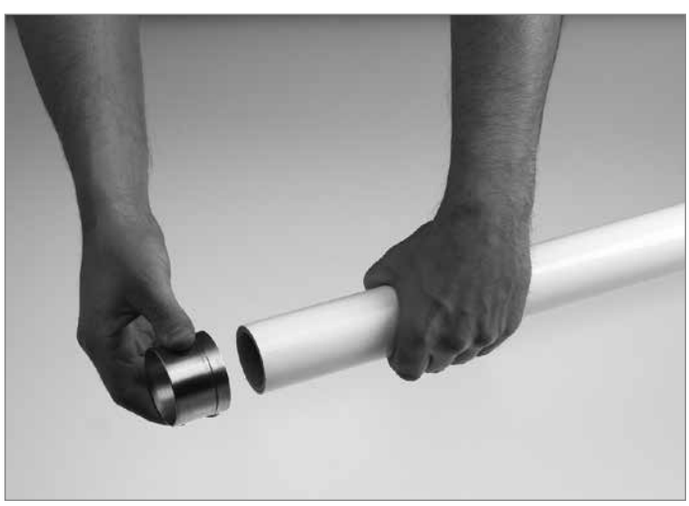


Pressing tool PMA 40 63 TECEflex

The work steps required to form a connection - using the toolset - are the same as those for using the manual pressing tools.



The pipe is disconnected with a pipe cutter (item no. 80042). The pipe cutter is fitted with a special plastic pipe cutting wheel.



In the second step, the TECEflex pressure sleeve is slid over the end of the pipe. Here the flat side of the pressure sleeve (without outer ring) must face the fitting.

Note: Only perform tool changes on an unpowered pressing machine!

Select the expansion tool matching the dimension, insert it into the pressing machine and lock in with the safety bolt. Slide the end of the pipe onto the expansion head up to the stopper and perform the expansion at the pressing machine. The tool must be held straight and right in front of the end of the pipe.

The pipe must be slid onto the fitting up to the last saw tooth. The pipe does not need to be pushed up to the stopper, the appropriate depth is already set by the expansion.

The connection is created in the next step: Insert the pressing machine attachment PMA - with the pressing

forks to match the pipe dimension - into the recess on the pressing machine and lock into the place with the safety bolts.

Push the pressure sleeve towards the end of the pipe by hand as far as it will go, insert the fitting and place the pressure sleeve straight between the fork heads. The base body of the sliding jaw must point parallel to the pipe. Squeeze the pressing machine to press the pressure sleeve up to the fitting. A remaining gap of approx. 0.5 mm between the fitting and the sleeve is specific to the production and insignificant.

Reuse of pressed fittings

TECEflex fittings that are already pressed can be reused. The fittings can simply be removed from the pipe by heating the connection up to approx. 180 °C with a hot air dryer.

Please remember the following:

- Reuse is only possible with metallic moulded and connecting parts (not with PPSU fittings).
- The fitting to be reused must be completely disconnected from the piping system so that the existing installation is not exposed to temperatures above 110 °C.
  If fittings have multiple outlets (e.g. tees or elbows), all connections must be removed.
- The pressure sleeves must not be reused.
- Allow the fitting to cool down sufficiently.
- Never heat with an open flame!
- Never remove the heated pipe end from the connector with bare hands - always use pliers!

Installation Guidelines

General notes

The valid technical rules, standards and regulations must be observed when installing TECEflex installations. Installations must only be carried out by specialist companies. The following information should be considered when using TECEflex pipes.

All components of the TECEflex system must be checked for dirt or damage before installation. All components must be free of tension during installation and operation.
You must ensure adequate freedom of movement of the pipes, caused for example by thermal linear expansion. This can be achieved, for example, by using bending legs. Care must be taken that the fittings are not deformed in the process. This can be caused, among other things, by using pipe wrenches or excessive clamping in a vice. TECE recommends using spanners.

Threaded connections

Only use threads according to ISO 7-1, DIN EN 10226-1 or ISO 228 (Rp = cylindrical internal thread, R = conical outer thread). When combining ISO 7-1 or DIN EN 10226-1 with threads according to ISO 228, the tolerance position must be checked for ease of movement by screwing the threads together first.

Only use approved sealants for potable water installations (e.g. DVGW certified sealants). For threaded connections TECE recommends the use of hemp combined with a sealing paste approved for this purpose. Using too much hemp can cause damage to the internal and outer threaded components. After tightening, the thread tips must remain visible. Care should be taken to ensure no hemp residues remain in the pipe system. If other thread sealants are used, the warranty must be assumed by the sealant manufacturer. Excessive tightening of the threaded connection can cause damage to the components.

Flat-sealing screw connections

For the TECEflex flat-sealing screw connections, only use counterparts with the matching G thread. A seal suitable for the application must be used. If the screw connection is loosened, the sealing surfaces must be checked when reconnecting and the seal should be replaced if necessary.

Processing temperatures

The TECEflex system can be processed within a temperature range from - 10°C to a maximum of + 50°C. With lower temperatures, the ends of the pipe should be warmed up until “lukewarm”. Do not use an open flame for this.

Coating of fittings

Fittings and pressure sleeves must generally be protected from contact with masonry, cement, plaster, screed, aggressive media and other materials and substances that cause corrosion. The components must be completely sealed against vapour and water.

Only use sealants, insulation, protection and adhesive tapes, thread sealing adhesives and fluxes for the installation that have been approved by the respective manufacturer for the PPSU material. Avoid contact between installation foams and components of the TECEflex system. If construction foams are used near to the installation, the PPSU fittings must be wrapped in an air- and vapour-tight protective tape.

The components of the TECEflex system must be protected from dirt, drilling dust, mortar, oils, grease and adhesives. Avoid all contact with water-soluble and non-water-soluble paints and solvents of any kind.

Kinks and deformities

If a kink or deformation occurs in a TECEflex pipe due to improper processing or unfavourable construction site situations, this area must be repaired; if necessary, an angle or bend fitting must be used for tight radii.

Protection against UV radiation

UV radiation damages the TECEflex pipes over time. The pipe packaging offers sufficient protection against UV radiation but is not weather-proof. The pipes should therefore not be stored outdoors. On site, the pipes should not be exposed to sunlight for unnecessary amounts of time. They should be protected against UV light where necessary. TECEflex pipes laid outdoors must be protected against solar radiation in a black corrugated pipe.

Installing TECEflex in soil

TECEflex pipes can be installed in soil under the following conditions:

- Gas pipes may only be laid in the ground within the scope of the DVGW-TRGI.
- The pipelines must be laid in a sand bed.
- The pipelines must be covered in enough fine-grained sand that there is no risk of damage to the pipe from the later application of the filling material.
- Pipelines laid in the ground must not be affected by traffic loads.
- The fittings and the pressure sleeves must be protected from direct contact with soil using suitable anti-corrosion agents.
- Wall bushings in soil must be suitable for plastic pipes and the pipe must be secured against being pulled out.

They must be installed according to the applicable technical rulings and provisions.

Laying pipes on bitumen sheets

Before laying TECEflex pipes on solvent-containing bitumen membranes or coatings, these must be completely dry. The manufacturer's setting times must be observed. The fittings must be wrapped with a protective tape to make them water- and vapour-proof.

Arrangement of pipelines

If cold and hot water pipes are laid on top of one another, the pipes carrying hot water must be laid above the cold water line.

Potential equalisation

The TECEflex composite pipes must not be used as earthing conductors for electrical systems in accordance with VDE 0100.
Therefore, when partially replacing metal pipe installations with a pipe from the TECEflex range (e.g. in case of renovation), the correct earthing must be checked.

Laying in areas at risk of frost

Freezing of the pipes must be avoided at all costs. In frost-prone areas, insulation alone is not sufficient as frost protection. The pipes must be equipped with heat tracing, for example. Pipes that do not contain potable water can be protected with suitable antifreeze.
Inhibitors, antifreeze or other additives can damage the TECEflex pipes. Approval from the respective manufacturer of the additive is required.

In general, the following concentrations apply for antifreeze agents:

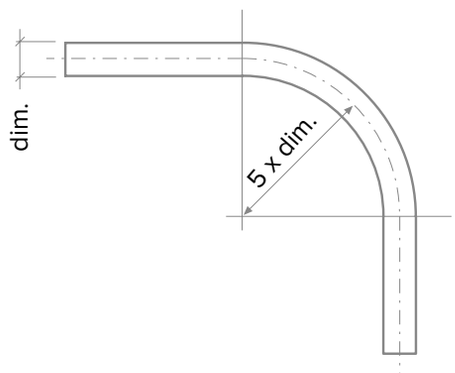
- Ethyl glycol (Antifrogen N): May be used up to a maximum concentration of 50%. TECE recommends restricting the concentration to 35%. A concentration of 50 % Antifrogen N corresponds to frost protection down to a temperature of -38 °C. A concentration of 35 % Antifrogen N corresponds to frost protection down to -22 °C. If Antifrogen N is dosed above 50%, the frost protection effect is reversed. Slurry ice forms at temperatures below -25 °C.
- Propylene glycol: May be used up to a concentration of maximum 25%. Propylene glycol is primarily used in the foodstuffs industry. A concentration of 25% corresponds to frost resistance down to -10°C.

Heat tracings

Heat tracings as well as self-regulating heater bands approved by manufacturers for plastic piping systems can be used for TECEflex. To ensure optimum heat transfer, the heating tapes are fixed to the TECEflex installation pipe over the entire surface with wide aluminium adhesive tape. The manufacturer's instructions should be followed.

Bending radii

The TECEflex composite pipes can be bent with a minimum bending radius - corresponding to five times the pipe dimension.



Minimal bending radius of TECEflex composite pipes

TECEflex pipe dimension	Minimum bending radius in mm
14	70
16	80
20	100 (80)*
25	125
32	160
40	200
50	250
63	315

Bending radii of TECEflex composite pipes

* Pipes of dimension 20 can also be bent with 4 times the dimension.

No pressing may be carried out in the area of the bend. Furthermore, a bend that is to be located directly at the fitting must be carried out before pressing.

TECEflex composite pipes can be bent by hand up to dimension 20. Pipes with dimensions larger than 20 mm must be bent with the TECE bending tools:
- Dim. 16 - 32 mm: Item no. 720222
- Dim. 40 - 63 mm: Item no. 720223

Thermal length changes

Materials expand when heated and contract when cooling down. In hot water and heating installations, due to the large temperature differences caused by the system, the pipes must be fastened in such a way that the linear expansion is absorbed in bends or special compensating bends.

Detecting thermal length changes

Thermal length changes are detected using the following formula:

$\Delta l = \alpha \cdot l \cdot \Delta t$

Δl Thermal length change of the pipe in mm
α Expansion coefficient of TECEflex pipes
l Initial length of the pipe in m; this is the difference between the installation temperature and the maximum possible operating temperature. Among other things, thermal disinfection must be taken into account here.
Δt Temperature difference in K*; this is the difference between the installation temperature and the maximum possible operating temperature. Among other things, thermal disinfection must be taken into account here.

* K = Kelvin is the SI base unit of temperature and relates to absolute zero.
(0 °C = 273.16 K)

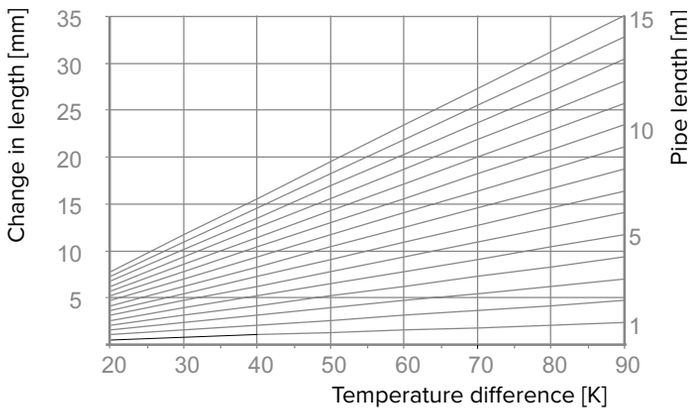
Expansion coefficient of TECEflex pipes:
Composite pipes α = 0.026 mm/(mK)
PE-Xc pipes α = 0.2 mm/(mK)

Example: A 12 metre-long TECEflex gas line made of composite pipe is installed at 5 °C in winter. Operating conditions can lead to a temperature of 35 °C.

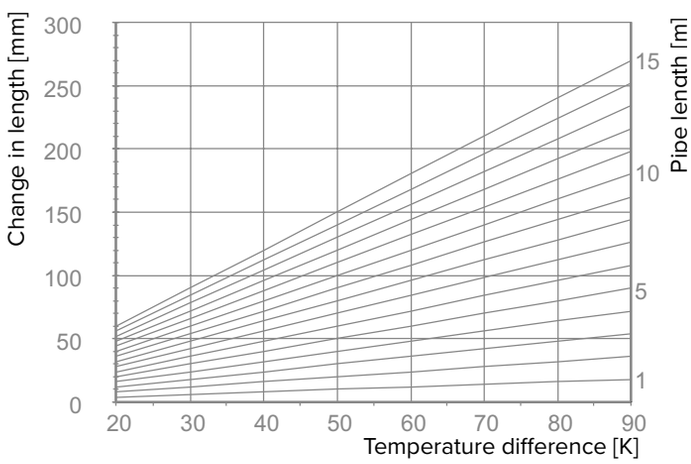
l 12 m
Δt 35 K - 5 K = 30 K
α 0.026 mm/(mK)
Δl = 0.026 mm/(mK) · 12 m · 30 K = 9.36 mm

The result: The pipe will expand by approx. 10 mm. The expansion must be absorbed by structural conditions.

Alternatively, the thermal length extension can be found in the following diagrams.



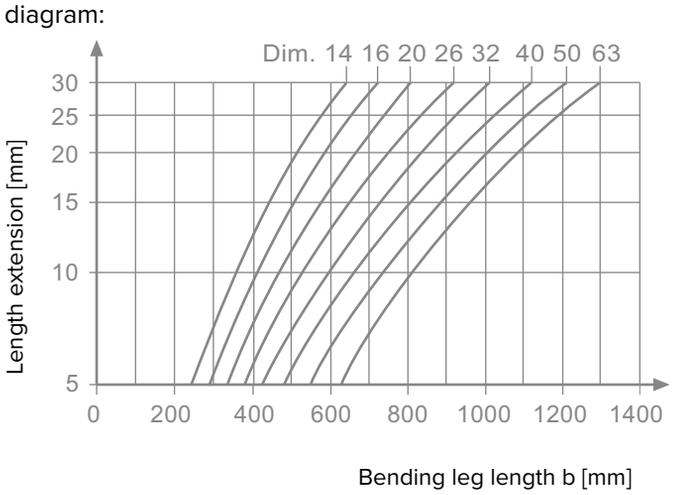
Thermal length extension TECEflex composite pipes



Thermal length extension TECEflex PE-Xc or PE-MD-Xc pipes

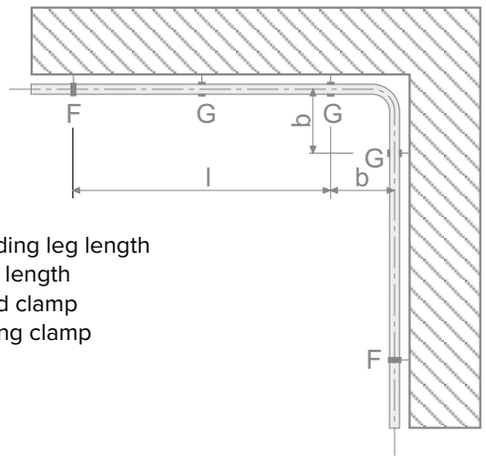
Determining the length of the bending leg

The bending leg length (b) can be found in the following diagram:



Bending leg length for TECEflex pipes

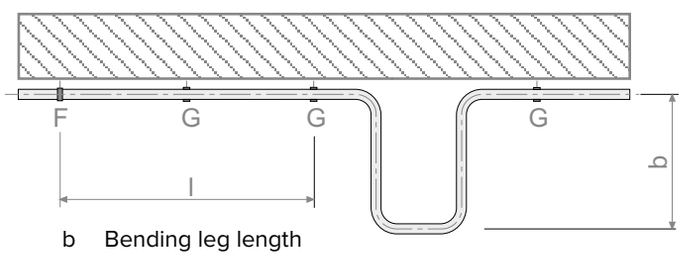
The pipe lengths to be observed can be limited by means of fixed and sliding clamps. Linear expansion in compressed air and gas installations can usually be absorbed by pipe routing with changes in direction.



b Bending leg length
l Pipe length
F Fixed clamp
G Sliding clamp

Compensation of the thermal linear expansion in a change of direction

Sometimes, the planned pipe layout does not offer sufficient room for movement to allow for thermal linear extension. In this case, compensating bends should be included in the plan that take into account the bending leg lengths.



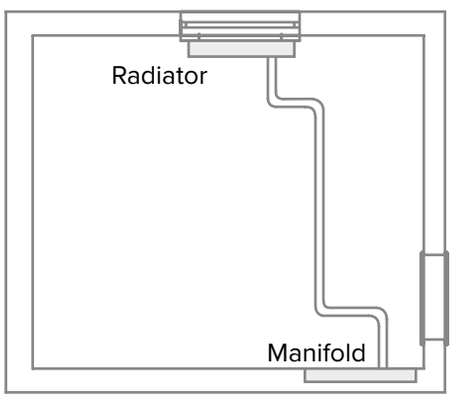
b Bending leg length
l Pipe length
F Fixed clamp
G Sliding clamp

Compensation of thermal linear extension in an extension loop

Example:
The pipe length extension in the aforementioned example is approx. 10 mm. The bending leg length b can be found in the aforementioned diagram. For a TECEflex pipe with a dimension of 20 mm this results in a value of 470 mm. If a sliding clamp is mounted at least 470 mm in front of a bend, no additional compensating bend is required.

Special installation notes for linear extension

- Only TECEflex composite piping is approved for skirting board systems.
- Fixed points can be attached to T-pieces, angles or couplings. For this purpose, a pipe clamp is placed directly in front of each pressure sleeve on the fitting.
- When connecting radiators from the floor or wall, ensure that there is sufficient "clearance" to accommodate the linear expansion.
- The connection should always be guided to the radiators in an elbow design.
- PPSU fittings should be installed tension-free. If necessary, suitable fixings must be arranged to decouple the PPSU fittings from the influence of linear expansion. If PPSU fittings are used with all-plastic pipes, a pipe clamp must be installed directly in front of the sliding sleeve on each outlet.



Example installation taking into account linear extension

Pipe mounting

TECEflex pipes must only be fastened with pipe clamps approved for the application. Commercially available wall plugs can be used to attach clamps as long as they are used on components with sufficient mechanical stability. The TECEflex pipelines may not be attached to other lines.

Pipe clamps

Pipe clamps with the following properties must be used to fasten the TECEflex pipes:

- Suitable for plastic pipes
- Adapted to the size of the TECEflex pipes
- Burr-free, to prevent damage to the pipes

Attaching gas lines

Pipe holders made of combustible materials are approved for use with TECEflex gas lines. Commercially available wall plugs can be used to attach clamps as long as they are used on components with sufficient mechanical stability. The TECEflex gas lines may not be attached to other lines. Equally, other lines must not be attached to gas lines.

Routing of TECEflex pipes

The routing of TECEflex installation lines must comply with the recognised rules of engineering.

Potable water pipes

The quality of the potable water must not be negatively affected by the pipe routing. To prevent microorganisms from multiplying, the pipe routing and insulation must be chosen so that the potable water does not heat up. The cold potable water pipes - in shafts and pre-walls in particular - should be checked to see if they require additional insulation for hygiene reasons. In hollow spaces such as pre-walls, TECE recommends laying cold pipes downwards and hot pipes upwards.

Pipes on plaster

The type and spacing of the fastening depend on the construction conditions on site. The fixation of the pipelines is to be carried out according to static aspects, taking into account the filled and insulated pipes, in accordance with the recognised rules of technology.

Pipe dimension	Installation spacing in m
14	1
16	1
20	1.15
25	1.3
32	1.5
40	1.8
50	2
63	2

Attachment distances for TECEflex lines installed on plaster.

Pipe dimension	Pipe weight filled in kg/m
14	0.19
16	0.24
20	0.37
25	0.55
32	0.85
40	1.33
50	2.12
63	3.33

TECEflex pipe masses

The pipes must be routed in such a way that moisture and dripping or condensation water from other fixtures cannot affect them.

Concealed pipes

Depending on the wall composition or quality of the masonry, the thermal length extension of a concealed TECEflex composite pipe can cause damage to the wall. TECE therefore recommends that all concealed TECEflex composite pipes are fitted with pipe insulation. The pre-insulated TECEflex pipes fulfil this requirement.
Alternatively, if no thermal insulation is required, the composite pipes can be laid in corrugated sheath pipes. These pipes are also part of the TECEflex range.
TECEflex fittings must always be protected from contact with masonry, gypsum, cement, screed, rapid binders or similar by means of suitable coverings. The cover must ensure that no construction moisture can reach the fitting. Direct contact with the building structure must be avoided at all costs, also due to the sound insulation requirements according to DIN 4109 and VDI 4100.

Pipes in concrete or screed

The pipes are tightly enclosed by the concrete or screed so that the linear expansion of the pipe material takes place inwards. Special measures to include thermal linear extension are unnecessary in this instance. However, if the pipes are laid in the insulation layer between the concrete and the screed, they should be arranged in such a way that the expected linear expansion is absorbed by the insulation or by a pipe routing laid in a bend.
Heat insulation and impact sound requirements must be met. The relevant standards and guidelines must be observed. It is therefore advisable to install the TECEflex pipes in a suitable compensating layer. The additional installation height must be considered during planning.
For TECEflex pipes that are laid on the unfinished floor or in the concrete ceiling, a maximum fastening distance of one metre applies. Specifications of DIN 18 560 Screed in Construction must be taken into account. It should be ensured that the TECEflex pipes installed on bare floor surfaces are not damaged by ladders, equipment, wheelbarrows, constant impacts or similar. The pipelines must be inspected immediately before the screed is laid.

Pipes routed through movement joints

If pipelines are routed through building expansion joints, these must be laid in corrugated sheath pipes. The corrugated sheath pipe must sit at least 25 cm above the movement joint on all sides. Thermal insulation with a wall thickness of at least 6 mm may be used as an alternative to corrugated sheath piping.

Routing in floor structures

For the planning and execution of pipelines in floor constructions, the screed laying trade has described in the guideline "Pipes, cables and cable ducts on raw ceilings"

how a routing is to be carried out: “Pipelines in the floor assembly must be installed free of junctions, in straight lines as well as axially parallel and parallel to the wall. Already during the planning stage, heating and potable water pipes should be given priority over electrical lines and empty conduits."

- The pipelines in a pipe route must be grouped together as tightly as possible.
  Caution: The installation should be carried out so that cold water lines are not heated over 25 °C if warm pipes are laid directly beside cold potable water pipes.
- The route width of parallel-routed pipes including pipe insulation must not exceed 30 cm.
- The space between the individual lines should adhere to a minimum distance of 20 cm. The minimum distance of a pipe to a wall is 20 cm.
- In front of distribution cabinets, the above dimensions should be observed as far as possible.
- In the door area, the distance to the door reveal should be at least 10 cm.

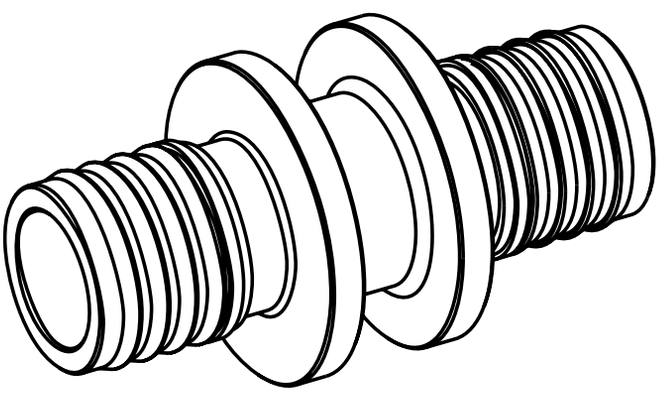
Pipes of different thicknesses or other fittings within the routing must be balanced to create an even surface for the impact sound insulation.

Sound insulation

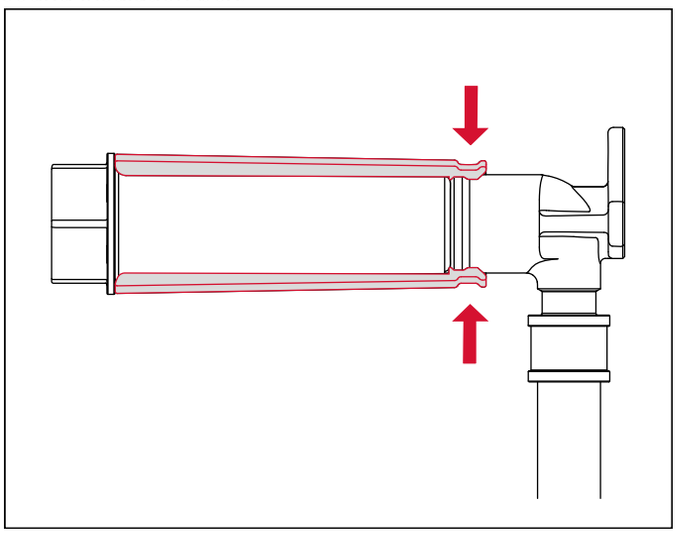
The noise behaviour of a potable water and heating installation in connection with the building structure must be taken into account during planning and execution.
It is essential to observe the relevant local standards and requirements when planning, implementing and operating the systems.

Sealing of bathroom fitting connections with simultaneous sound decoupling of the connections from the structure

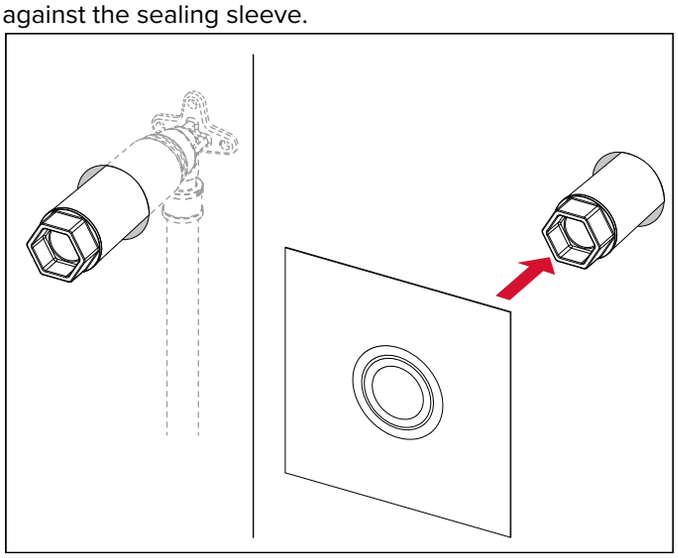
TECE recommends using the Seal System sealing sleeve in conjunction with the TECE sound insulation box for installing bathroom fitting connections. The sound insulation box is equipped with a special mounting for the sealing sleeve and ensures safe decoupling of the building from the wall bushing. The TECElogo range offers pre-assembled units with different wall discs and matching sound insulation boxes. This guarantees a mechanically safe installation.
The installation is carried out in the following steps:
The sealing sleeve slides onto the wall disc when the protective plug is screwed in and forms a seal from the outside.



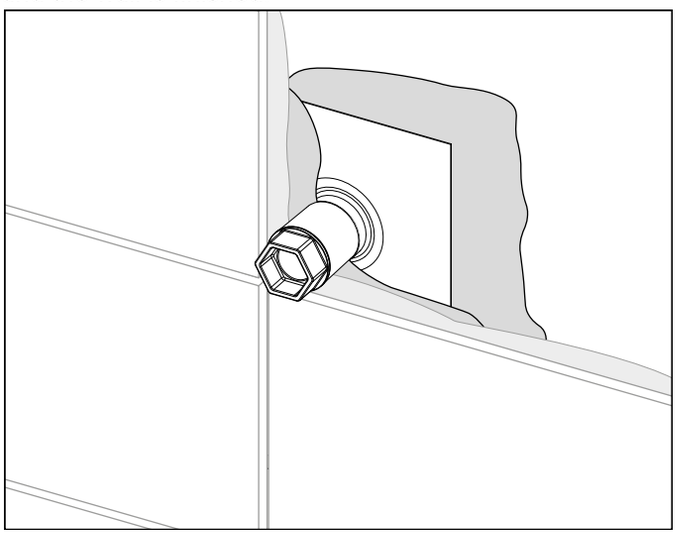
The sealing sleeve fits securely into the mounting of the sound insulation box.



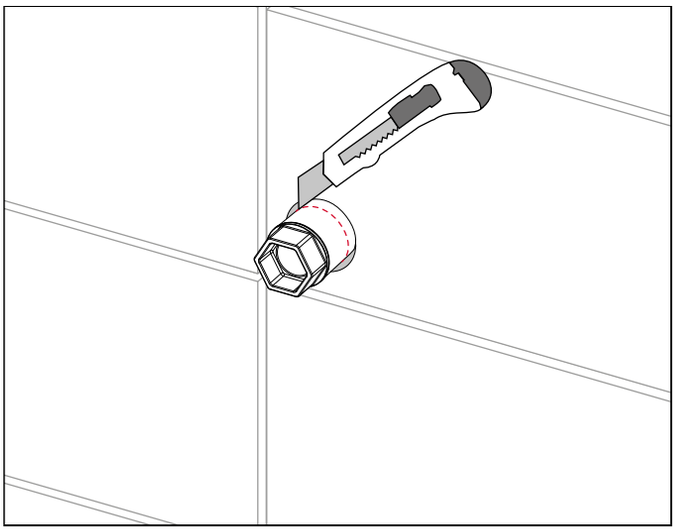
The sealing sleeve is pulled over the plug and lies directly against the sealing sleeve.

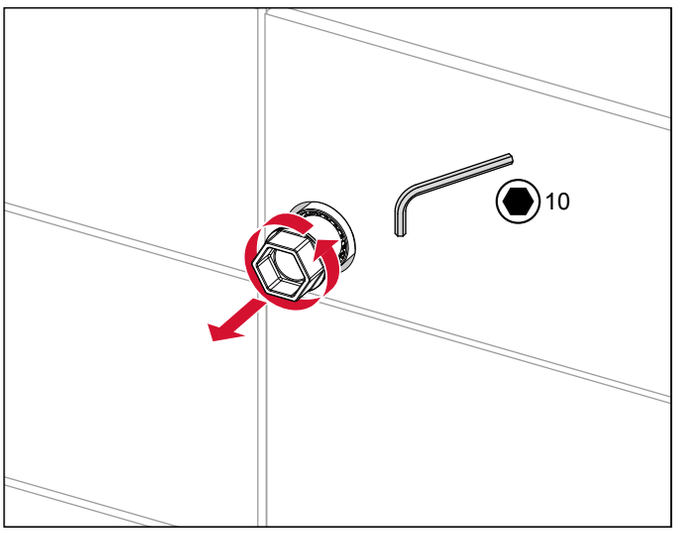


Next, the sealing sleeve is embedded in the sealing level and the wall is finished.

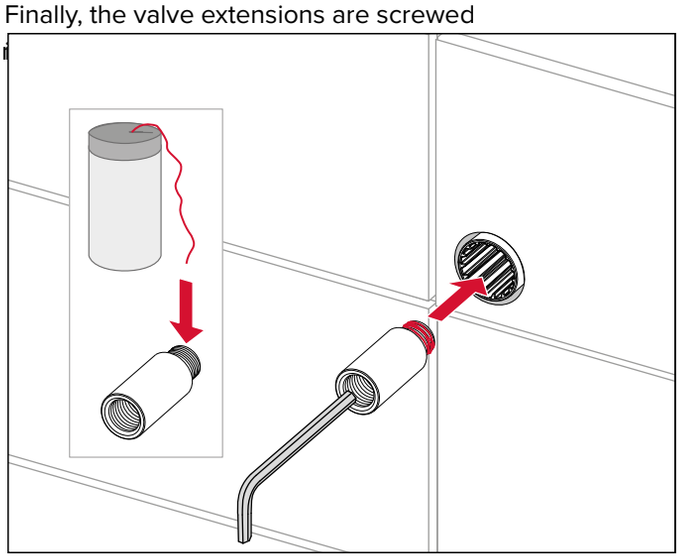


Prior to the assembly of the bathroom fitting, the sealing sleeve is shortened to be flush to the wall and the reusable assembly plug is unscrewed and removed.





Finally, the valve extensions are screwed



Fire protection

When using TECEflex installations, the applicable local laws and standards must be observed and complied with.

Planning and Design

The TECEflex system can be used for potable water and heating installations. Since DVGW-TRGI 2008 came into force, indoor gas installations up to 100 mbar can also be installed with TECEflex. Every application places special requirements on the installation system. This must be given special attention during planning.

Insulation of potable water and heating pipelines

Among other things, insulation of pipelines, bathroom fittings and apparatus must fulfil requirements with regard to heat dissipation, heat absorption, acoustic decoupling, corrosion protection, fire protection and, if necessary, the absorption of thermal linear expansion. The insulation must be chosen according to the respective application.
No insulation materials may be used that could trigger chemical corrosion or contact corrosion on bathroom fittings, valves or pipelines. TECE recommends the use of pre-insulated TECEflex pipes

Insulation against frost

Any water-bearing pipelines routed through areas at risk of frost must be insulated. If there is prolonged stagnation, the pipes can freeze despite the insulation. Heat tracing must be used here if necessary.

Insulation against heating

Potable water systems carrying cold water must be protected against heating. For normal operating conditions and pipe routings in residential construction, the values for the minimum insulation layer thicknesses listed in the following table apply as guide values. For longer stagnation periods, even insulation cannot provide a permanent protection against heating. The structural conditions must be checked and, if necessary, the insulation thicknesses must be increased.

Example: Shafts or pre-walls can heat up significantly due to heating pipes. The potable water must be specially protected here. It may make sense to structurally divide a shaft in order to physically separate the potable water pipes from the hot pipes. Hot pipes should be routed as far up as possible in pre-walls or shafts. The cold water pipe is routed at the bottom of the pre-wall. This arrangement creates a stable temperature stratification within the pre-wall and heat transport via convection is avoided. If there is a risk of moisture penetrating the insulation materials, such as in the case of cold water pipes due to condensation, diffusion-tight insulation must be used. The potable water pipes must be laid at a sufficient distance from pipes that are hot. Installation on warm components, such as a chimney or in a heated wall, must be avoided.
The TECEflex range offers pre-insulated pipes with 9 and 13 mm insulation thickness. Cold water pipes must be protected against condensation. Condensation protection can be dispensed with if no adverse effects on the structural shell or installations are to be expected. Depending on the temperature and the moisture content of the ambient air, pipes must be insulated in such a way that condensation is prevented.

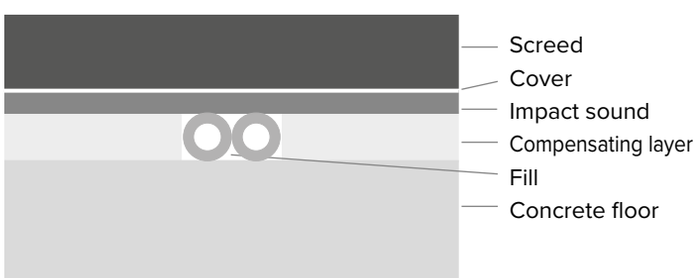
Pipes in contact with the structural shell (e.g. laid under plaster, in screed constructions or within pre-wall technology) must be at least TECEflex pipes laid in corrugated pipe. Additional protection against condensation by insulation is not required here.
The information in the table above can also be used for protection against condensation on the outer insulation surface, assuming a potable water temperature of 10°C.

Insulation of hot water and heat distribution pipes

Pipes carrying hot water must be protected against heat emission.

Insulation of pipes in the floor construction

If installation pipes are laid on the raw concrete ceiling, a suitable levelling layer up to the height of the upper edge of the pipe, including the pipe insulation, must be installed. The impact sound insulation can then be laid on top of this.



Installation example of a TECEflex pipe in the floor

The insulation boards are laid up to the pipes. The spaces in between must be filled with a suitable fill. The impact sound insulation can be laid on this construction. EPS insulation type DR 30-2 is suitable, for example. Make sure that only one impact sound layer is used. In order to minimise thermal bridges, the insulation materials must be applied joint-tight.

Dimensioning of potable water systems

The relevant regulations and laws must be observed for the planning and installation of potable water systems.

Loss coefficient of TECEflex fittings

Fitting	Version	Zeta value	Equivalent pipe length (m)
Transition connector	14 mm x ½“	0.8	0.2
Coupling	14mm	1	0.3
Angle	14mm	4	1.1
Tee TT	14mm	0.8	0.2
Tee Red.	14mm	4	1.1
Transition connector	16 mm x ½“	1	0.3
Coupling	16mm	0.5	0.2
Angle	16mm	3.2	1.3
Elbow	16mm	1.1	1.3
Tee TT	16mm	0.8	0.3
Tee Red.	16mm	3.6	1.5
Transition connector	20 mm x ¾“	1.7	0.6
Coupling	20mm	0.9	0.5
Angle	20mm	4.3	2.4
Elbow	20mm	1.9	2.4
Tee TT	20mm	1.1	0.6
Tee Red.	20mm	4.7	2.6
Transition connector	25 mm x ¾“	0.8	0.4
Coupling	25mm	0.3	0.2
Angle	25mm	2.3	1.7
Elbow	25mm	1.1	1.7
Tee TT	25mm	0.6	0.4
Tee Red.	25mm	2.6	1.9
Transition connector	32 mm x 1"	0.5	0.3
Coupling	32mm	0.2	0.2
Angle	32mm	2.4	2.5
Elbow	32mm	0.6	2.5
Tee TT	32mm	0.3	0.3
Tee Red.	32mm	2.5	2.6
Transition connector	40 mm x 1¼“	0.4	0.4
Coupling	40mm	0.2	0.2
Angle	40mm	2.1	2
Elbow	40mm	0.6	2
Tee TT	40mm	0.3	0.3
Tee Red.	40mm	2.2	2.2
Transition connector	50 mm x 1½“	0.4	0.5
Coupling	50mm	0.1	0.2
Angle	50mm	1.8	2.3
Elbow	50mm	0.5	2.3
Tee TT	50mm	0.2	2.3
Tee Red.	50mm	1.9	2.5
Transition connector	63 mm x 2"	0.3	0.6
Coupling	63mm	0.1	0.2
Angle	63mm	2.2	3.7
Elbow	63mm	0.6	3.7
Tee TT	63mm	0.5	0.8
Tee Red.	63mm	2.2	3.7

Pressure loss tables in the potable water installation – Dimensions 14/16/20/25 mm

TECEflex composite pipes – Pressure losses due to pipe friction for potable water lines												
Water speed	Dim. 14			Dim. 16			Dim. 20			Dim. 25		
	V	m	R	V	m	R	V	m	R	V	m	R
			hPa/m			hPa/m			hPa/m			hPa/m
m/s	l/s	kg/h	mbar/m	l/s	kg/h	mbar/m	l/s	kg/h	mbar/m	l/s	kg/h	mbar/m
0.1	0.008	28.3	0.4	0.011	38.0	0.3	0.016	58.6	0.2	0.025	91.6	0.1
0.2	0.012	42.4	0.6	0.016	57.1	0.5	0.024	87.9	0.3	0.038	137.4	0.2
0.2	0.016	56.5	0.8	0.021	76.1	0.6	0.033	117.3	0.4	0.051	183.2	0.5
0.3	0.020	70.7	1.0	0.026	95.1	0.8	0.041	146.6	1.0	0.064	229.0	0.7
0.3	0.024	84.8	1.3	0.032	114.1	1.8	0.049	175.9	1.3	0.076	274.8	1.0
0.4	0.027	99.0	2.8	0.037	133.2	2.3	0.057	205.2	1.7	0.089	320.6	1.3
0.4	0.031	113.1	3.5	0.042	152.2	2.9	0.065	234.5	2.2	0.102	366.4	1.6
0.5	0.035	127.2	4.3	0.048	171.2	3.5	0.073	263.8	2.7	0.115	412.2	2.0
0.5	0.039	141.4	5.1	0.053	190.2	4.2	0.081	293.1	3.2	0.127	458.0	2.4
0.6	0.043	155.5	6.1	0.058	209.3	5.0	0.090	322.5	3.8	0.140	503.8	2.8
0.6	0.047	169.6	7.0	0.063	228.3	5.8	0.098	351.8	4.4	0.153	549.7	3.3
0.7	0.051	183.8	8.1	0.069	247.3	6.7	0.106	381.1	5.1	0.165	595.5	3.8
0.7	0.055	197.9	9.2	0.074	266.3	7.6	0.114	410.4	5.7	0.178	641.3	4.3
0.8	0.059	212.1	10.3	0.079	285.3	8.5	0.122	439.7	6.5	0.191	687.1	4.9
0.8	0.063	226.2	11.6	0.085	304.4	9.6	0.130	469.0	7.3	0.204	732.9	5.5
0.9	0.067	240.3	12.9	0.090	323.4	10.6	0.138	498.4	8.1	0.216	778.7	6.1
0.9	0.071	254.5	14.2	0.095	342.4	11.7	0.147	527.7	8.9	0.229	824.5	6.7
1.0	0.075	268.6	15.6	0.100	361.4	12.9	0.155	557.0	9.8	0.242	870.3	7.4
1.0	0.079	282.7	17.1	0.106	380.5	14.1	0.163	586.3	10.7	0.254	916.1	8.1
1.1	0.082	296.9	18.6	0.111	399.5	15.4	0.171	615.6	11.7	0.267	961.9	8.8
1.2	0.094	339.3	23.5	0.127	456.6	19.4	0.195	703.6	14.8	0.305	1099.3	11.2
1.3	0.102	367.6	27.0	0.137	494.6	22.4	0.212	762.2	17.0	0.331	1190.9	12.9
1.4	0.113	405.3	32.1	0.151	545.3	26.6	0.233	840.4	20.2	0.365	1313.1	15.3
1.5	0.118	424.1	34.8	0.159	570.7	28.8	0.244	879.4	21.9	0.382	1374.1	16.6
1.6	0.126	452.4	39.0	0.169	608.7	32.3	0.261	938.1	24.6	0.407	1465.7	18.6
1.7	0.134	480.7	43.4	0.180	646.8	36.0	0.277	996.7	27.4	0.433	1557.4	20.7
1.8	0.141	508.9	48.0	0.190	684.8	39.8	0.293	1055.3	30.3	0.458	1649.0	23.0
1.9	0.149	537.2	52.9	0.201	722.9	43.8	0.309	1114.0	33.4	0.483	1740.6	25.3
2.0	0.157	565.5	57.9	0.211	760.9	48.0	0.326	1172.6	36.6	0.509	1832.2	27.7
2.1	0.165	593.8	63.2	0.222	799.0	52.4	0.342	1231.2	40.0	0.534	1923.8	30.3
2.2	0.173	622.0	68.6	0.233	837.0	56.9	0.358	1289.9	43.4	0.560	2015.4	32.9
2.3	0.181	650.3	74.3	0.243	875.1	61.7	0.375	1348.5	47.0	0.585	2107.0	35.6
2.4	0.188	678.6	80.2	0.254	913.1	66.5	0.391	1407.1	50.8	0.611	2198.6	38.5
2.5	0.196	706.9	86.3	0.264	951.1	71.6	0.407	1465.7	54.6	0.636	2290.2	41.4
2.6	0.204	735.1		0.275	989.2		0.423	1524.4		0.662	2381.8	44.4
2.7	0.212	763.4		0.285	1027.2		0.440	1583.0		0.687	2473.4	47.5
2.8	0.220	791.7		0.296	1065.3		0.456	1641.6		0.713	2565.0	50.8
2.9	0.228	820.0		0.306	1103.3		0.472	1700.3		0.738	2656.7	54.1
3.0	0.236	848.2		0.317	1141.4		0.489	1758.9		0.763	2748.3	57.5
3.6	0.283	1017.9		0.380	1369.7		0.586	2110.7		0.916	3297.9	80.1
4.0	0.314	1131.0		0.423	1521.8		0.651	2345.2		1.018	3664.4	97.1
4.6	0.361	1300.6		0.486	1750.1		0.749	2697.0		1.171	4214.0	125.3
5.0	0.393	1413.7		0.528	1902.3		0.814	2931.5		1.272	4580.4	146.0

Pressure loss tables in the potable water installation – Dimensions 32/40/50/63 mm

TECEflex composite pipes – Pressure losses due to pipe friction for potable water lines												
Water speed	Dim. 32			Dim. 40			Dim. 50			Dim. 63		
	V	m	R	V	m	R	V	m	R	V	m	R
			hPa/m			hPa/m			hPa/m			hPa/m
m/s	l/s	kg/h	mbar/m	l/s	kg/h	mbar/m	l/s	kg/h	mbar/m	l/s	kg/h	mbar/m
0.1	0.045	162.9	0.1	0.080	289.5	0.1	0.132	475.3	0.1	0.204	735.4	0.0
0.2	0.068	244.3	0.2	0.121	434.3	0.1	0.198	712.9	0.1	0.306	1103.1	0.1
0.2	0.090	325.7	0.3	0.161	579.1	0.2	0.264	950.6	0.2	0.409	1470.8	0.1
0.3	0.113	407.2	0.5	0.201	723.8	0.3	0.330	1188.2	0.3	0.511	1838.5	0.2
0.3	0.136	488.6	0.7	0.241	868.6	0.5	0.396	1425.9	0.3	0.613	2206.2	0.3
0.4	0.158	570.0	0.9	0.281	1013.4	0.6	0.462	1663.5	0.5	0.715	2574.0	0.3
0.4	0.181	651.4	1.1	0.322	1158.1	0.8	0.528	1901.2	0.6	0.817	2941.7	0.4
0.5	0.204	732.9	1.4	0.362	1302.9	1.0	0.594	2138.8	0.7	0.919	3309.4	0.5
0.5	0.226	814.3	1.7	0.402	1447.6	1.2	0.660	2376.5	0.8	1.021	3677.1	0.6
0.6	0.249	895.7	2.0	0.442	1592.4	1.4	0.726	2614.1	1.0	1.124	4044.8	0.8
0.6	0.271	977.2	2.3	0.483	1737.2	1.6	0.792	2851.7	1.2	1.226	4412.5	0.9
0.7	0.294	1058.6	2.6	0.523	1881.9	1.8	0.858	3089.4	1.3	1.328	4780.2	1.0
0.7	0.317	1140.0	3.0	0.563	2026.7	2.1	0.924	3327.0	1.5	1.430	5147.9	1.2
0.8	0.339	1221.5	3.4	0.603	2171.5	2.4	0.990	3564.7	1.7	1.532	5515.6	1.3
0.8	0.362	1302.9	3.8	0.643	2316.2	2.6	1.056	3802.3	1.9	1.634	5883.3	1.5
0.9	0.385	1384.3	4.2	0.684	2461.0	2.9	1.122	4040.0	2.2	1.736	6251.0	1.7
0.9	0.407	1465.7	4.7	0.724	2605.8	3.3	1.188	4277.6	2.4	1.839	6618.7	1.8
1.0	0.430	1547.2	5.1	0.764	2750.5	3.6	1.254	4515.3	2.6	1.941	6986.4	2.0
1.0	0.452	1628.6	5.6	0.804	2895.3	3.9	1.320	4752.9	2.9	2.043	7354.2	2.2
1.1	0.475	1710.0	6.1	0.844	3040.1	4.3	1.386	4990.6	3.2	2.145	7721.9	2.4
1.2	0.543	1954.3	7.8	0.965	3474.4	5.4	1.584	5703.5	4.0	2.451	8825.0	3.1
1.3	0.588	2117.2	9.0	1.046	3763.9	6.3	1.716	6178.8	4.6	2.656	9560.4	3.5
1.4	0.648	2334.3	10.7	1.153	4149.9	7.5	1.892	6812.5	5.5	2.928	10541.0	4.2
1.5	0.679	2442.9	11.6	1.206	4342.9	8.1	1.980	7129.4	6.0	3.064	11031.2	4.6
1.6	0.724	2605.8	13.0	1.287	4632.5	9.1	2.112	7604.7	6.7	3.269	11766.6	5.1
1.7	0.769	2768.6	14.5	1.367	4922.0	10.1	2.244	8080.0	7.5	3.473	12502.1	5.7
1.8	0.814	2931.5	16.0	1.448	5211.5	11.2	2.376	8555.2	8.3	3.677	13237.5	6.3
1.9	0.860	3094.3	17.7	1.528	5501.1	12.4	2.508	9030.5	9.1	3.881	13972.9	7.0
2.0	0.905	3257.2	19.4	1.608	5790.6	13.6	2.641	9505.8	10.0	4.086	14708.3	7.7
2.1	0.950	3420.1	21.2	1.689	6080.1	14.8	2.773	9981.1	11.0	4.290	15443.7	8.4
2.2	0.995	3582.9	23.0	1.769	6369.6	16.1	2.905	10456.4	11.9	4.494	16179.1	9.1
2.3	1.040	3745.8	24.9	1.850	6659.2	17.5	3.037	10931.7	12.9	4.698	16914.6	9.9
2.4	1.086	3908.6	26.9	1.930	6948.7	18.9	3.169	11407.0	13.9	4.903	17650.0	10.7
2.5	1.131	4071.5	29.0	2.011	7238.2	20.3	3.301	11882.3	15.0	5.107	18385.4	11.5
2.6	1.176	4234.4	31.1	2.091	7527.8	21.8	3.433	12357.6	16.1	5.311	19120.8	12.4
2.7	1.221	4397.2	33.3	2.171	7817.3	23.4	3.565	12832.9	17.3	5.516	19856.2	13.2
2.8	1.267	4560.1	35.6	2.252	8106.8	25.0	3.697	13308.2	18.5	5.720	20591.6	14.2
2.9	1.312	4722.9	37.9	2.332	8396.3	26.6	3.829	13783.5	19.7	5.924	21327.0	15.1
3.0	1.357	4885.8	40.3	2.413	8685.9	28.3	3.961	14258.7	20.9	6.128	22062.5	16.0
3.6	1.629	5863.0	56.2	2.895	10423.1	39.5	4.753	17110.5	29.2	7.354	26475.0	22.4
4.0	1.810	6514.4	68.1	3.217	11581.2	47.9	5.281	19011.7	35.4	8.171	29416.6	27.2
4.6	2.081	7491.6	88.0	3.700	13318.3	61.9	6.073	21863.4	45.8	9.397	33829.1	35.2
5.0	2.262	8143.0	102.6	4.021	14476.5	72.2	6.601	23764.6	53.4	10.214	36770.8	41.0

Pressure loss tables for the heating installation – Dimensions 14/16/20/25 mm

Pressure loss due to pipe friction in the heating installation												
Connection capacity (W)				Mass flux	Dim. 14		Dim. 16		Dim. 20		Dim. 25	
					v	R	v	R	v	R	v	R
Spread (K)						hPa/m		hPa/m		hPa/m		hPa/m
20 K	15 K	10 K	5 K	kg/h	m/s	mbar/m	m/s	mbar/m	m/s	mbar/m	m/s	mbar/m
200	150	100	50	8.60	0.03	0.13	0.02	0.07				
300	225	150	75	12.90	0.05	0.19	0.03	0.11				
400	300	200	100	17.20	0.06	0.25	0.05	0.14				
600	450	300	150	25.80	0.09	0.38	0.07	0.21				
800	600	400	200	34.39	0.12	0.51	0.09	0.28				
1000	750	500	250	42.99	0.15	0.64	0.11	0.35				
1200	900	600	300	51.59	0.18	0.76	0.14	0.42				
1400	1050	700	350	60.19	0.21	0.89	0.16	0.49				
1600	1200	800	400	68.79	0.24	1.02	0.18	0.56				
1800	1350	900	450	77.39	0.27	1.15	0.20	0.63				
2000	1500	1000	500	85.98	0.30	2.21	0.23	0.70	0.15	0.30		
2300	1725	1150	575	98.88	0.35	2.80	0.26	0.81	0.17	0.34		
2800	2100	1400	700	120.38	0.43	3.91	0.32	1.94	0.21	0.42		
3000	2250	1500	750	128.98	0.46	4.40	0.34	2.18	0.22	0.79		
3500	2625	1750	875	150.47	0.53	5.73	0.40	2.84	0.26	1.02		
4000	3000	2000	1000	171.97	0.61	7.21	0.45	3.57	0.29	1.29	0.19	0.45
4500	3375	2250	1125	193.47	0.68	8.83	0.51	4.37	0.33	1.57	0.21	0.55
5000	3750	2500	1250	214.96	0.76	10.60	0.57	5.24	0.37	1.88	0.23	0.66
5500	4125	2750	1375	236.46	0.84	12.50	0.62	6.17	0.40	2.22	0.26	0.77
6000	4500	3000	1500	257.95	0.91	14.55	0.68	7.18	0.44	2.57	0.28	0.90
6500	4875	3250	1625	279.45	0.99	16.73	0.73	8.25	0.48	2.95	0.31	1.03
7000	5250	3500	1750	300.95	1.06	19.04	0.79	9.38	0.51	3.36	0.33	1.17
7500	5625	3750	1875	322.44			0.85	10.58	0.55	3.78	0.35	1.31
8000	6000	4000	2000	343.94			0.90	11.84	0.59	4.23	0.38	1.47
8500	6375	4250	2125	365.43			0.96	13.16	0.62	4.70	0.40	1.63
9000	6750	4500	2250	386.93			1.02	14.55	0.66	5.19	0.42	1.80
9500	7125	4750	2375	408.43			1.07	16.00	0.70	5.70	0.45	1.98
10000	7500	5000	2500	429.92					0.73	6.23	0.47	2.16
10500	7875	5250	2625	451.42					0.77	6.79	0.49	2.35
11000	8250	5500	2750	472.91					0.81	7.36	0.52	2.55
11500	8625	5750	2875	494.41					0.84	7.96	0.54	2.75
12500	9375	6250	3125	537.40					0.92	9.21	0.59	3.18
13000	9750	6500	3250	558.90					0.95	9.86	0.61	3.40
14000	10500	7000	3500	601.89					1.03	11.23	0.66	3.87
15000	11250	7500	3750	644.88							0.70	4.37
16000	12000	8000	4000	687.88							0.75	4.89
17000	12750	8500	4250	730.87							0.80	5.44
18000	13500	9000	4500	773.86							0.85	6.01
19000	14250	9500	4750	816.85							0.89	6.61
20000	15000	10000	5000	859.85							0.94	7.24
22000	16500	11000	5500	945.83							1.03	8.56

Pressure loss tables for the heating installation – Dimensions 32/40/50/63 mm (part 1)

Pressure loss due to pipe friction in the heating installation												
Connection capacity (W)				Mass flux	Dim. 32		Dim. 40		Dim. 50		Dim. 63	
					v	R	v	R	v	R	v	R
Spread (K)						hPa/m		hPa/m		hPa/m		hPa/m
20 K	15 K	10 K	5 K	kg/h	m/s	mbar/m	m/s	mbar/m	m/s	mbar/m	m/s	mbar/m
7000	5250	3500	1750	300.95	0.18	0.30						
7500	5625	3750	1875	322.44	0.20	0.34						
8000	6000	4000	2000	343.94	0.21	0.38						
8500	6375	4250	2125	365.43	0.22	0.42						
9000	6750	4500	2250	386.93	0.24	0.46						
9500	7125	4750	2375	408.43	0.25	0.51						
10000	7500	5000	2500	429.92	0.26	0.55						
10500	7875	5250	2625	451.42	0.28	0.60						
11000	8250	5500	2750	472.91	0.29	0.65	0.16	0.17				
11500	8625	5750	2875	494.41	0.30	0.70	0.17	0.18				
12500	9375	6250	3125	537.40	0.33	0.81	0.19	0.21				
13000	9750	6500	3250	558.90	0.34	0.87	0.19	0.22				
14000	10500	7000	3500	601.89	0.37	0.99	0.21	0.25				
15000	11250	7500	3750	644.88	0.40	1.11	0.22	0.28				
16000	12000	8000	4000	687.88	0.42	1.24	0.24	0.32				
17000	12750	8500	4250	730.87	0.45	1.38	0.25	0.35				
18000	13500	9000	4500	773.86	0.48	1.53	0.27	0.39				
19000	14250	9500	4750	816.85	0.50	1.68	0.28	0.43				
20000	15000	10000	5000	859.85	0.53	1.84	0.30	0.47				
22000	16500	11000	5500	945.83	0.58	2.17	0.33	0.55				
24000	18000	12000	6000	1031.81	0.63	2.52	0.36	0.64				
26000	19500	13000	6500	1117.80	0.69	2.90	0.39	0.74				
28000	21000	14000	7000	1203.78	0.74	3.31	0.42	0.84				
30000	22500	15000	7500	1289.77	0.79	3.73	0.45	0.95	0.27	0.29		
32000	24000	16000	8000	1375.75	0.85	4.19	0.48	1.06	0.29	0.33		
34000	25500	17000	8500	1461.74	0.90	4.66	0.51	1.18	0.31	0.36		
36000	27000	18000	9000	1547.72	0.95	5.15	0.53	1.30	0.33	0.40		
38000	28500	19000	9500	1633.71	1.00	5.67	0.56	1.43	0.34	0.44		
40000	30000	20000	10000	1719.69			0.59	1.57	0.36	0.48		
42000	31500	21000	10500	1805.67			0.62	1.71	0.38	0.52		
44000	33000	22000	11000	1891.66			0.65	1.85	0.40	0.57		
46000	34500	23000	11500	1977.64			0.68	2.01	0.42	0.62		
48000	36000	24000	12000	2063.63			0.71	2.16	0.43	0.66	0.28	0.23
50000	37500	25000	12500	2149.61			0.74	2.32	0.45	0.71	0.29	0.25
52000	39000	26000	13000	2235.60			0.77	2.49	0.47	0.76	0.30	0.27
54000	40500	27000	13500	2321.58			0.80	2.66	0.49	0.81	0.32	0.29
56000	42000	28000	14000	2407.57			0.83	2.84	0.51	0.87	0.33	0.31
58000	43500	29000	14500	2493.55			0.86	3.02	0.52	0.92	0.34	0.33
60000	45000	30000	15000	2579.54			0.89	3.21	0.54	0.98	0.35	0.35
62000	46500	31000	15500	2665.52			0.92	3.40	0.56	1.04	0.36	0.37
64000	48000	32000	16000	2751.50			0.95	3.60	0.58	1.10	0.37	0.39
66000	49500	33000	16500	2837.49			0.98	3.80	0.60	1.16	0.39	0.41
68000	51000	34000	17000	2923.47			1.01	4.00	0.62	1.22	0.40	0.43
70000	52500	35000	17500	3009.46			1.04	4.22	0.63	1.29	0.41	0.45
72000	54000	36000	18000	3095.44			1.07	4.43	0.65	1.35	0.42	0.48

Pressure loss tables for the heating installation – Dimensions 32/40/50/63 mm (part 2)

Pressure loss due to pipe friction in the heating installation												
Connection capacity (W)				Mass flux	Dim. 32		Dim. 40		Dim. 50		Dim. 63	
					v	R	v	R	v	R	v	R
Spread (K)						hPa/m		hPa/m		hPa/m		hPa/m
20 K	15 K	10 K	5 K	kg/h	m/s	mbar/m	m/s	mbar/m	m/s	mbar/m	m/s	mbar/m
76000	57000	38000	19000	3267.41					0.69	1.49	0.44	0.52
80000	60000	40000	20000	3439.38					0.72	1.63	0.47	0.57
84000	63000	42000	21000	3611.35					0.76	1.78	0.49	0.63
88000	66000	44000	22000	3783.32					0.80	1.93	0.51	0.68
92000	69000	46000	23000	3955.29					0.83	2.09	0.54	0.73
96000	72000	48000	24000	4127.26					0.87	2.25	0.56	0.79
100000	75000	50000	25000	4299.23					0.90	2.42	0.58	0.85
104000	78000	52000	26000	4471.20					0.94	2.59	0.61	0.91
108000	81000	54000	27000	4643.16					0.98	2.77	0.63	0.98
112000	84000	56000	28000	4815.13					1.01	2.96	0.65	1.04
116000	87000	58000	29000	4987.10					1.05	3.15	0.68	1.11
120000	90000	60000	30000	5159.07					1.09	3.35	0.70	1.18
124000	93000	62000	31000	5331.04							0.73	1.25
128000	96000	64000	32000	5503.01							0.75	1.32
132000	99000	66000	33000	5674.98							0.77	1.39
136000	102000	68000	34000	5846.95							0.80	1.47
140000	105000	70000	35000	6018.92							0.82	1.55
144000	108000	72000	36000	6190.89							0.84	1.63
148000	111000	74000	37000	6362.85							0.87	1.71
152000	114000	76000	38000	6534.82							0.89	1.79
156000	117000	78000	39000	6706.79							0.91	1.87
160000	120000	80000	40000	6878.76							0.94	1.96
164000	123000	82000	41000	7050.73							0.96	2.05
168000	126000	84000	42000	7222.70							0.98	2.14
172000	129000	86000	43000	7394.67							1.01	2.23
176000	132000	88000	44000	7566.64							1.03	2.33
180000	135000	90000	45000	7738.61							1.05	2.42
184000	138000	92000	46000	7910.58							1.08	2.52
188000	141000	94000	47000	8082.55							1.10	2.62
192000	144000	96000	48000	8254.51							1.12	2.72
196000	147000	98000	49000	8426.48							1.15	2.82
200000	150000	100000	50000	8598.45							1.17	2.92

Guide values and installation times

The following table contains the guide values for the assembly of pipes and pressure sleeve connectors in running metres, ready laid, including attachment for chase and pre-wall installation in single and multiple-family homes, shown in group minutes.

TECEflex Ø in mm	Installation time for run. m. ready laid, incl. attachment in group minutes
14	5–9
16	5–9
20	6–10
25	7–11
32	8–12
40	14–16
50	16–18
63	18–20

Note: Additional services according to the Standard Building Contract Terms (VOB) or additional time required - e.g. for slitting, setting up the construction site, 100 % insulation and pressure test - are not included. The group minutes indicated are for fitters with system experience.

Rinsing potable water systems

Provided that it is ensured during assembly that no impurities are introduced into the pipe installation, thorough flushing of the pipes is sufficient.

Pressure test of potable water systems

The successful performance and documentation of a pressure test is a requirement for any claims under the TECE warranty. For potable water installations, a pressure test must be carried out in accordance with DIN EN 806-4. Before the pressure test is performed it should be ensured that all components in the installation are freely accessible and visible in order to be able to localise incorrectly installed fittings. If the piping system is to remain in an unfilled state after a pressure test (e.g. because a regular exchange of water cannot be guaranteed after 72 hours at the latest), it is advisable to carry out a pressure test with compressed air or inert gases
Regardless of the test medium, statements about the tightness of the system cannot be made solely on the basis of the test pressure curve. In addition, the tightness of the system must be checked by a visual inspection of uncovered pipes. For this purpose, a visual inspection, supported by leak detection agents if necessary, should be carried out to locate fine leaks.

Use of leak detectors

Only use leak detectors (e.g. foam building agents) with a current DVGW certification that are also approved by their respective manufacturers for use with the PPSU material.

Please note:

For hygienic reasons, TECE recommends that a leak test with oil-free compressed air or inert gas is preferable to a leak test with potable water.

Heating systems

A heating installation must be rinsed thoroughly prior to commissioning to remove metallic residues or liquids. The leak test is carried out the same way as the leak test for potable water installations.

Documentation

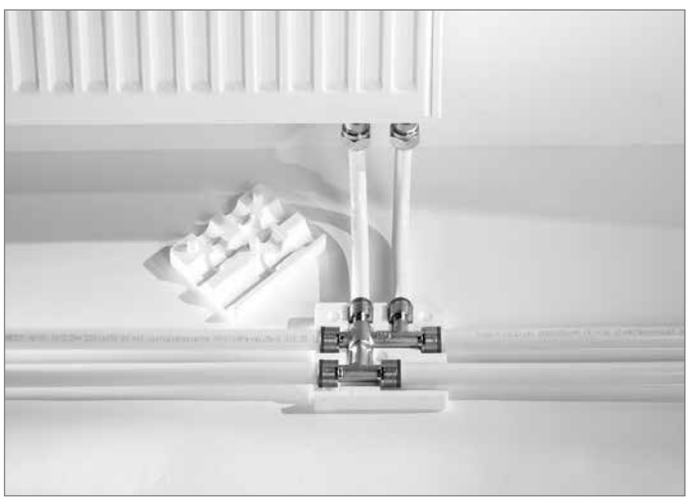
The inspections must be documented in a suitable manner and, if necessary, in accordance with local guidelines and laws.

Radiator connection

The TECEflex system offers a comprehensive range of fittings for rational connection of radiators for most construction situations.

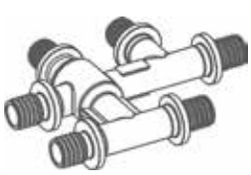
Cross-fitting

The cross fitting allows the supply and return pipes of two parallel main pipes to be diverted. The installation height of the fittings with insulation box is just 35 mm.

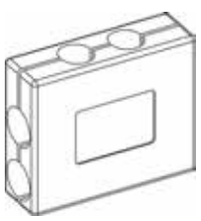


Radiator connection with cross-fitting

The use of cross-fittings not only saves assembly time but also negates the risk of damage to crossed pipes from wheelbarrows, crushing or similar.



Cross-fitting
(item no. 718501/ ...02/...03)



Protection box
(item no. 718020)

Connection from the floor

Radiators can be connected directly from the screed with the TECEflex composite pipe. The length extension of the pipe must be compensated to avoid “popping sounds”. The pipes should therefore be equipped with an insulating tubing of at least 6 mm thick.

It is also recommended that a protective cuff be placed around the visible parts of the pipe. This avoids damage to the pipes e.g. by vacuuming.

Radiator connection with mounting tees/elbows

The TECEflex range offers assembly tees made of nickel-plated copper for more demanding requirements. Due to their cranked shape, the connection of a radiator can be created from parallel flow and return pipes.

Radiator connection with radiator mounting tee

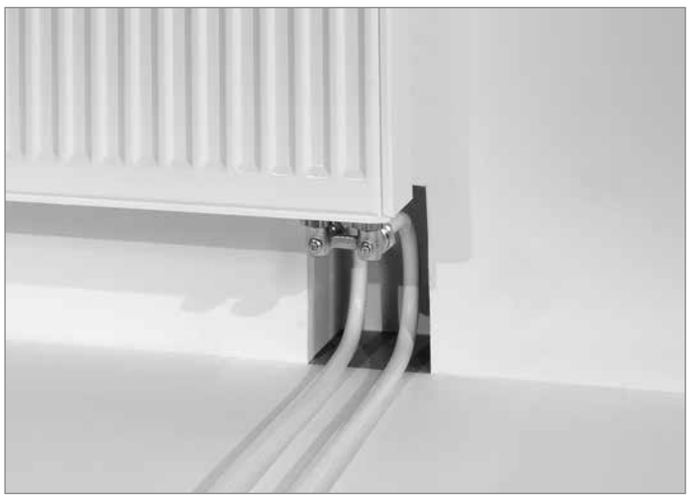
The nickel-plated copper pipes are connected to the radiator valve block via a pinch screw connection.

Alternatively, if the flow and return pipes do not run along the bottom of the radiator, the radiator mounting elbows made of nickel-plated copper can be used.

Radiator connection with radiator mounting elbow

Connection from the wall

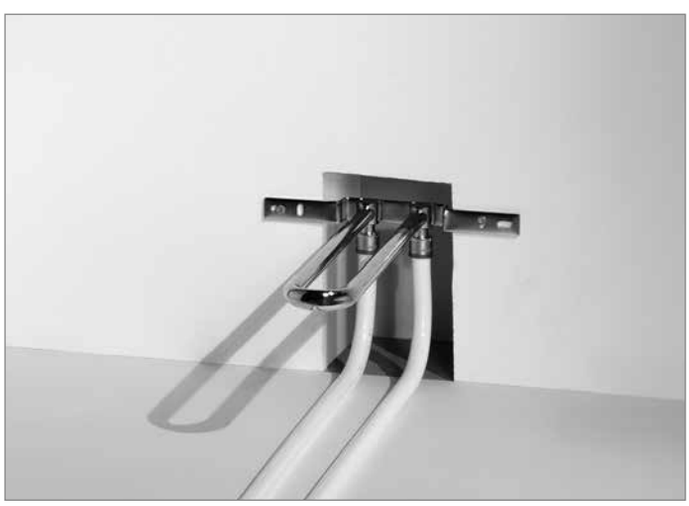
The special bending properties of the TECEflex composite pipe make it possible to connect the radiator directly from the wall. The chase in the wall must be able to accommodate the minimum bending radii of TECEflex pipes.



Radiator connection from the wall

Radiator connection using the radiator mounting fitting for compact radiators from the wall

The radiator mounting fitting is equipped with sturdy fastening clips for secure fixing in the wall chase. TECEflex connection technology lets you connect pipes directly in the wall chase.



Radiator connection with radiator mounting unit - ready for pressure test

Radiator connection with radiator mounting unit, connected to the valve block

The connection between flow and return allows the heating system to be pressure tested without a construction plug. To assemble the radiator, the U-pipe is suitably shortened and connected to the valve block via a pinch screw connection.
Alternatively, a radiator mounting fitting is available on the floor. It is also equipped with a U-pipe and allows you to perform a pressure test without assembly plugs.
TECEflex radiator mounting set dim. 16 x 15 mm Cu

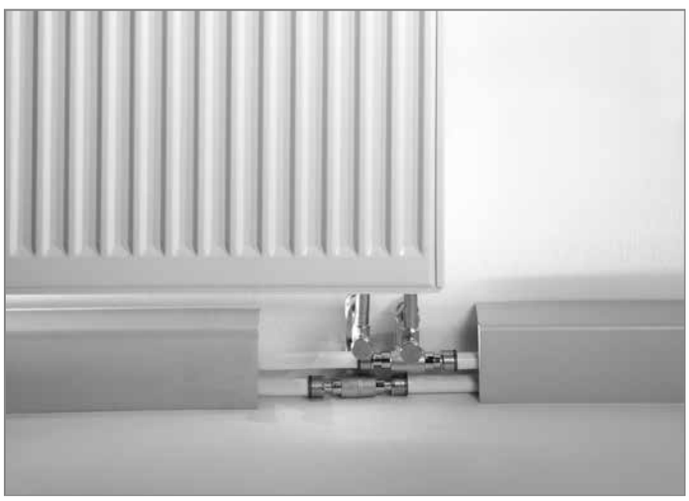
Connection from the wall with mounting module

For optimal connection from the wall, the radiator mounting module with pre-insulated pipes can be used. Another feature is the especially tight radii of the TECEflex pipes.

Radiator connection with mounting module - connected to the valve block

Radiator connection from a skirting board

The TECEflex range offers a skirting board connection fitting with connection elbows or elbow shut-offs for connection from a skirting board. For renovations, this allows radiators to be connected without any pressing work. TECEflex composite pipes in skirting board systems may only be used together with brass fittings. TECE recommends the use of skirtings from HZ.



Radiator connection from the skirting board

Compressed air installation

Design sizes for the pressure loss Δp

Compressed air installations with a maximum pressure p_{max} of 8 bar or more should not exceed a total pressure loss through the pipe network to the consumer of ΔP = 0.1 bar. TECE recommends the following values for individual pipeline types:

- Main line Δp ≤ 0.04 bar
- Distribution line Δp ≤ 0.04 bar
- Connection lead Δp ≤ 0.03 bar

The following applies for pipeline networks with maximum pressures ≤ 8:
Pipeline network pressure loss Δp ≤ 1.5 bar of p_{max}.

Oils

Oil may be present in the compressed air depending on the type of compressor. The compressed air is classified according to the maximum permitted oil content. Depending on the class, the oil content can vary from 0.01 to 25 mg/m^3 compressed air. The TECEflex system is suitable for all qualities of compressor oil.

Pressure test

TECE recommends carrying out a pressure test before commissioning a compressed air system.

Planning a compressed air installation

Compressed air lines should always be laid as straight as possible. The fewer fittings are used, the lower the pressure losses. Long, hand-bent deflectors are therefore preferable to angled couplings when laying pipes.

Larger compressed air networks should be split into as many multiple sections as possible. The individual sections should each be fitted with a shut-off valve. This ensures there is always the option to take individual sections of the piping network out of operation in order to undertake repairs or expansion work.

Larger compressed air networks can make it thoroughly reasonable to integrate a second compressor station. This allows the pipe network to be supplied from a second point. This results in compressed air having shorter distances to travel and the pressure loss is reduced.

Pipeline network without compressed air drying

If drying is not used in compressed air systems, condensate in the form of water droplets emerges. In these instances, the following points should be considered to avoid damage to the compressed air consumers:

- Avoidance of cooldowns.
  The pipes should be arranged so that the compressed air does not cool down on the way to the consumer. Ideally, the compressed air in the network should gradually warm up. This reduces the relative humidity of the air and avoids condensation forming.
- The compressed air lines must be laid with a gradient of approx. 1.5 % to 2 % in the direction of flow so that the condensate can collect at the lowest points of the pipe network.
- Main lines that run directly from the pressure tank should rise vertically. The resulting condensation then runs back into the pressure tank.
- Condensate drains must be installed at the deepest points in the pipe network.
- Connection lines must branch off upwards in the direction of flow.
- A maintenance unit with filter, water separator and pressure regulator should always be installed. Depending on the application, a second compressed air oiler may be necessary.

Pipeline network with dry compressed air

If a compressed air dryer is installed in a compressed air network, a large part of the measures dealing with condensate treatment can be omitted. Pipelines may also be laid without a gradient.

Condensate drains are only required at the filter in the compressed air tank and the compressed air dryer. Connection leads can be connected vertically downwards. Installation of a pipe network for dry compressed air is significantly cheaper. The purchase of a compressed air generally pays for itself even with smaller systems.

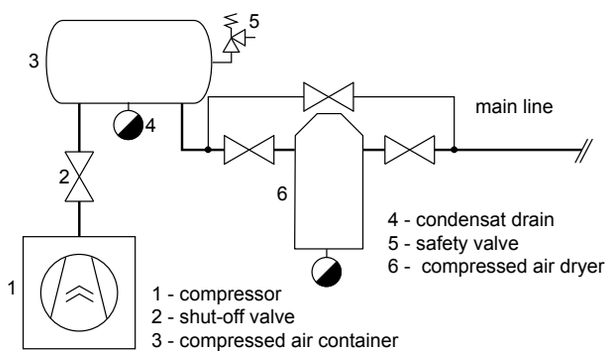
Compressed air pipes

A compressed air pipe is normally split into three pipe types:

- Main pipe
- Distribution pipe
- Connection pipe

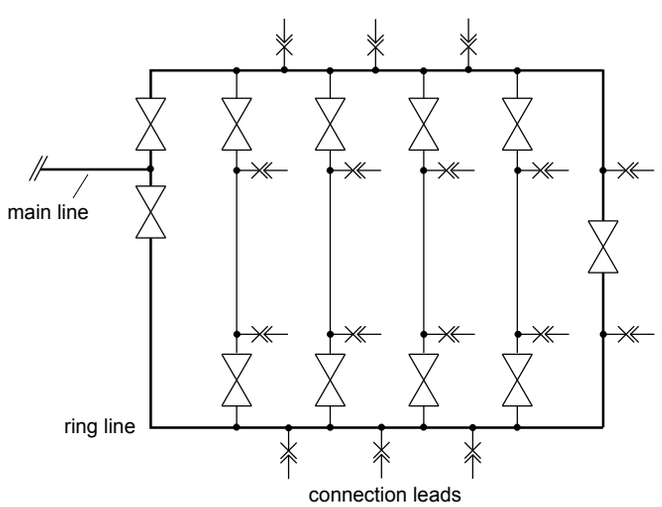
The main pipe

The main pipe connects the compressor with the distribution pipes. Normally, the compressed air treatment and the compressed air tank are connected to the main pipe. These transport the total delivery volume of the compressor. The pressure loss in the main pipe should not exceed 0.04 mbar.



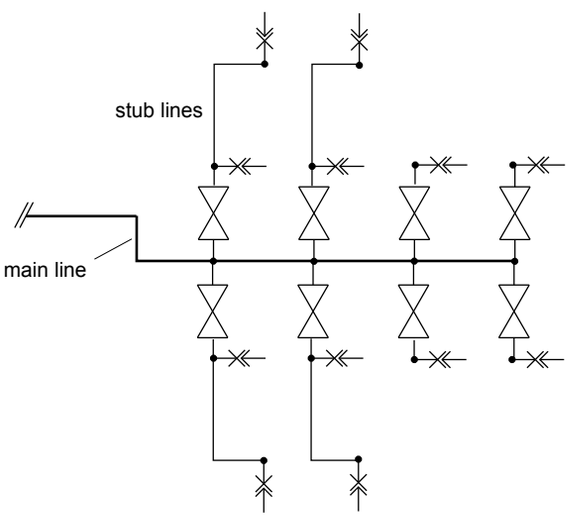
Distribution pipe as a ring line

If possible, distribution pipes should always be fitted as ring pipes. This significantly increases the economic efficiency of the system. A ring pipe forms a closed distribution ring. This makes it possible to block off individual sections from the network without interrupting the supply of compressed air to the other sections. Compared to branch distribution pipes, the compressed air has to cover a shorter distance. This means you can calculate half the fluidic pipe length and half the volume flow when dimensioning the ring pipe.



The distribution pipe as a ring pipe

The stub pipes connect the main pipe to the connection leads. Stub pipes are often used to supply consumers located a little further away. Stub pipes are often utilised in order to use fewer raw materials. This advantage is usually balanced out again, however, since they have to have larger dimensions than a ring pipe. The pressure loss in stub pipes must not exceed 0.3 mbar.



Connection pipes

Connection pipes connect the consumers with the supply pipe. As a rule, the compressed air consumers are operated using different pressures. This is why a pressure regulator is usually installed on the end of a connection pipe. Connection pipes are always connected to the distribution pipe from above and then guided downwards as otherwise a large amount of condensation or compressor oil collects in the connection pipe. TECE recommends always installing connection pipes in dimension 32 for the industrial sector. This dimension only entails low additional costs when compared to smaller measurements and generally always guarantees a secure supply of compressed air. With a connection length up to 10 metres, consumers with a compressed air requirement of up to 1800 litres per minute can be securely connected. The pressure loss in a connection pipe should not exceed 0.3 mbar.

Collection pipe

If several compressors are connected to one pipeline, it is called a collection pipeline. The following points should be observed for these pipes:

- Collection pipe with gradient:
  The collection pipe must be laid with a gradient in the direction of flow of approx. 1.5% to 2%. The connection pipe must be connected to the collection pipe from above.
- With longer rising pipes, a water separator with automatic compressor drainage should be installed in order to compensate for the returning condensation.

Calculation basis for compressed air installations

The correct dimensioning and design of a compressed air installation is in the economic interest of every operator. Pipelines with dimensions that are too small cause high pressure losses in the pipe network. These must be balanced out again by higher air compression in order to be able to guarantee the necessary performance of the consumers. This would lead to excessively high costs for the system operator, however.

The following parameters affect the internal pipe diameter d_i:

Nominal length (in m)

The pipe length must always be measured precisely. The equivalent pipe length should be used for bathroom fittings and moulded parts - the same equivalent pipe length can be used as in gas installation - and added to the pipe length measured.
As an estimate, the measured pipe length can also be multiplied by 1.6 (+60%). The result is the total pipe length needed to calculate the internal pipe diameter:

$L_{total} = L_{straight} \cdot 1.6$

This multiplier is the estimated share of individual resistances from pipe elbows, fittings and bathroom fittings.

Volume flow ($\dot{V}$ in l/s)

When determining the internal pipe diameter d_i,the largest possible air flow rate should be assumed, as an increased pressure drop has a particularly strong effect at maximum compressed air demand.

Operating pressure and overpressure (in bar)

The internal pipe diameter d_i is determined on the basis of the compressor shut-off pressure p_{max} since the pressure drop Δp is also highest at the highest pressure.

Dimensioning

There are various approaches for calculating the required internal pipe diameter. A relatively simple option is to calculate using the approximate formula.

$$d_i = \sqrt[5]{\frac{1{,}6 \cdot 10^3 \cdot \dot{V}^{1{,}85} \cdot L}{10^{10} \cdot \Delta p \cdot p_{max}}}$$

d_i = internal diameter of pipeline [m]
$\dot{V}$ = total volume flow [m^3/s]
L = fluidic pipe length [m]
Δp = intended pressure drop [bar]
p_{max} = compressor shut-off pressure [bar_{abs}]

Example 1

The internal pipe diameter d_i of a compressed air installation in a workshop should be calculated using the above approximate formula. The distribution pipe is built as a stub pipe. The intended total pressure loss is a Δp of 0.08 bar. The maximum operating pressure (compressor shut-off pressure) is 8 bar abs. The total pipe length is 75 metres, the number of fittings and moulded parts is unknown. A volume flow of 90 m^3/h flows through this pipeline.

First, the fluidic total pipe length is now calculated as follows:

L_{total} = 75 m · 1.6
= 120 m

given: L =120 metres
$\dot{V}$ = 90 m^3/h => 0.025 m^3/s
Δp = 0.08 bar
p_{max} = 8 bar

$$d_i = \sqrt[5]{\frac{1{,}6 \cdot 10^3 \cdot 0{,}025^{1{,}85} \cdot 120}{10^{10} \cdot 0{,}08 \cdot 8}}$$

=> d_i = 0.032 m ≥ 32 mm

Selected pipe dimension: TECEflex composite pipe dim. 40 (40 x 4 mm)

Example 2

For this example calculation we are using the same workshop as in the first example. The difference, however, is in the fact that the distribution pipe is installed as a ring pipe. Smaller pipe diameters are possible with a ring pipe, so the calculation can be made in this instance using the following adjusted approximate formula:

$$d_i = \sqrt[5]{\frac{1{,}6 \cdot 10^3 \cdot \dot{V}^{1{,}85} \cdot L}{10^{10} \cdot \Delta p \cdot p_{max} \cdot 7{,}21}}$$

The constant 7.21 includes half the fluidic pipe length and half the volume flow.

This then leads to:

$$d_i = \sqrt[5]{\frac{1{,}6 \cdot 10^3 \cdot 0{,}025^{1{,}85} \cdot 120}{10^{10} \cdot 0{,}08 \cdot 8 \cdot 7{,}21}}$$

=> d_i = 0.021 m ≥ 21 mm

Selected pipe dimension: TECEflex composite pipe dim. 32 (32 x 4 mm)

The calculation shows that by using a ring pipe as a distribution pipe, the pipe dimension can be reduced by at least one dimension in most cases.

Annex

Resistance list PPSU

Brand name	Date	Concentration	Manufacturer	Use
Cooling lubricants				
Castrol nonol cooling lubricant		100%	Castrol	Not permitted
Rocol RTD		100%		Not permitted
Cooling lubricant M200 No. 1	June 2009	100%		Not permitted
Disinfection agents				
FINKTEC FT-99 CIP		6%	Finktec GmbH	Not permitted
Mikro Quat		100%	Ecolab	Not permitted
Mikrobac forte		1%, 23°C	Bode Chemie	Permitted
Hydrogen peroxide		35%, 23°C		Permitted
Potassium permanganate KMnO4		15 mg/l, 23°C		Permitted
Sodium hypochlorite NaOCl		> 6%, 23°C		Permitted
Calcium hypochlorite Ca(ClO)2		50 mg/l, 23°C		Permitted
Chlorine dioxide ClO2		6 mg/l, 23°C		Permitted
Aniosteril D2M	June 2009	5%	Laboratoires Anios	Permitted
Aniosteril Contact	June 2009	1%	Laboratoires Anios	Permitted
Witty W4		2%, 23°C, 4 h		Permitted
Descaler				
DS-40		4%		Not permitted
Boiler noise protection		0.20%		Permitted
Calcolith DP		10%, 40°C, 24 h		Permitted
Calcolith TIN-BE		5%, 80°C, 24 h		Permitted
Household descalers (quick descalers)		20%		Permitted
LS1		0.60%		Permitted
MB1		4%		Permitted
Super Concentrate		0.20%		Permitted
Superfloc		2%		Permitted
Cleaning agents				
Arkopal 110		5%	Hoescht	Not permitted
ANTIKAL		100%	P & G	Not permitted
BREF - For The Bathroom		100%	Henkel	Permitted
BREF - Fresh Shower		100%	Henkel	Permitted
CAROLIN - gloss cleaner		1.80%	Boltom Belgium	Permitted
CAROLIN - active fresh		1.90%	Boltom Belgium	Permitted
CAROLIN - with linseed oil		1.90%	Boltom Belgium	Permitted
CAROLIN - Marseille soap		1.80%	Boltom Belgium	Permitted
Meister Proper - lemon		3.40%	P & G	Not permitted
Meister Proper - Extra Hygiene		3.50%	P & G	Permitted
Meister Proper - sensitive surfaces		2.40%	P & G	Not permitted
Meister Proper - orange peel		3.40%	P & G	Not permitted
Meister Proper - winter fresh		3.40%	P & G	Not permitted
TERRA - stone floors		12%	Henkel	Permitted
TERRA - parquet		3.20%	Henkel	Permitted
TERRA - high gloss floors	June 2009	100%	Henkel	Permitted

Brand name	Date	Concentration	Manufacturer	Use
Seals				
Cimberio Loxeal 58 11 PTFE thread sealant		100%		Not permitted
Dreibond 5331		100%, 23°C	Dreibond	Not permitted
EPDM rubber O-ring		100%	Join de France	Permitted
Easyfit (Griffon)	June 2009	100%	Bison International	Not permitted
Everseal pipe thread sealant		100%, 82°C	Federal Process Corp.	Not permitted
FACOT PTFE SEAL (PTFE sealant)		100%		Not permitted
Filjoint	June 2009	100%	GEB	Not permitted
FILETPLAST EAU POTABLE	June 2009	100%	GEB	Permitted
GEBATOUT 2	June 2009	100%	GEB	Permitted
GEBETANCHE 82 (EX-GEB)	June 2009	100%	GEB	Not permitted
Griffon assembly kit		100%	Verhagen-Herlitzius BV.	Permitted
Kolmat jointpaste (- 30 up to + 135°C)		100%	Denso	Permitted
Locher Paste Spezial		100%	Locher & Co AG	Permitted
Loctite 5061		100%	Loctite	Permitted
Loctite 518 seal eliminator		100%, 82°C	Loctite	Not permitted
Loctite 5331	June 2009	100%	Loctite	Permitted
Loctite 5366 silicomet AS-310		100%	Loctite	Permitted
Loctite 542		100%, 23°C	Loctite	Not permitted
Loctite 55	June 2009	100%	Loctite	Not permitted
Loctite 572 thread sealant	June 2009	100%, 60°C	Loctite	Not permitted
Loctite 577		100%, 23°C	Loctite	Not permitted
Loctite Dryseal	Sep. 2008	100%	Loctite	Permitted
Manta Tape		100%		Permitted
Multipak		100%		Permitted
Neo-Fermit		100%	Nissen & Volk	Permitted
Neo-Fermit Universal 2000		100%	Nissen & Volk	Permitted
Plastic Fermit - sealant		100%	Nissen & Volk	Permitted
Precote 4		100%	Omnifit	Not permitted
Precote 80		100%	Omnifit	Not permitted
RectorSeal # 5		100%, 82°C	RectorSeal Corp.	Not permitted
Red Silicone Sealant (- 65 up to + 315°C) Silicone sealant		100%	Loctite	Permitted
Rite-Lok		100%	Chemence	Not permitted
Scotch-Grip Rubber & Seal Adhesive # 1300		100%, 82°C	3M	Not permitted
Scotch-Grip Rubber & Seal Adhesive # 2141		100%, 82°C	3M	Not permitted
Scotch-Grip Rubber & Seal Adhesive # 847		100%, 82°C	3M	Not permitted
Selet Unyte		100%, 82°C	Whitman	Not permitted
Tangit metalock	Apr. 2007	100%	Henkel	Not permitted
Tangit Racoretanche	June 2009	100%	Loctite	Permitted
Tangit Unilock	June 2009	100%	Henkel	Not permitted
TWINEFLO (PTFE band) + processing medium		100%	Resitape / Ulith	Permitted
Twineflon	March 2009	100%	Unith	Permitted
Unipack	May 2006	100%		Not permitted
Unipack Packsalve		100%		Permitted
Viscotex Locher Paste 2000		100%		Permitted

Brand name	Date	Concentration	Manufacturer	Use
Adhesive				
Atmosfix	July 2009	100%	Atmos	Not permitted
ARMAFLEX 520 ADHESIVE	Dec. 2008	100%, 50°C		Not permitted
ARMAFLEX HT 625	Dec. 2009	100%, 50°C		Not permitted
BISON SILIKONENKIT SANITAIR		100%		Permitted
Bison-Tix contact adhesive		100%, 23°C	Perfecta International	Not permitted
CFS SILICONE SEALANT S-200 silicone sealant)		100%		Permitted
Colle Mastic hautes Performances	June 2009	100%	Orapi	Permitted
Epoxy ST100	July 2007	100%		Not permitted
GENKEM CONTACT ADHESIVE		100%		Not permitted
GOLD CIRCLE SILICONEKIT BOUW TRANSPARENT		100%		Permitted
Knauf Sanitär Silicone Kit		100%		Permitted
Knauf Silicone Kit for Acrylic	July 2009	100%	Henkel	Permitted
Pattex colle rigide PVC		100%		Not permitted
PEKAY GB480 (Vidoglue) adhesive		100%		Not permitted
PEKAY GB685 (Insulglue) adhesive		100%		Permitted
Repa R 200		100%		Permitted
RUBSON SILIKON SANITÄR TRANSPARENT SET		100%	Rubson	Permitted
RUBSON SILIKON SANITÄR TRANSPARENT SET		100%	Rubson	Permitted
Hydrophobic wood glue		100%		Permitted
Foams				
BISON PUR FOAM	March 2009	100%		Not permitted
Boxer Mounting Foam	Feb 2007	100%		Not permitted
Gunfoam - Winter - Den Braven East sp. z o.o.	Feb 2007	100%		Not permitted
Gunfoam Proby	Feb 2007	100%		Not permitted
Hercusal	Feb 2007	100%		Not permitted
MODIPUR HS 539	July 2009	100%	Wickes	Not permitted
MODIPUR US 24 TEIL 2	July 2009	100%		Not permitted
MODIPUR HS 539 / US 24 TEIL 2 (1/1)	July 2009	100%		Not permitted
PUR Foam (contains diphenylmethane-4,4-diisocyanate)		100%		Not permitted
O.K. - 1 K PUR		100%		Not permitted
Omega Faum - foam	Feb 2007	100%		Not permitted
Proby Mounting Foam	Feb 2007	100%		Not permitted
PURATEC - 1 K PUR		100%		Not permitted
PURATEC - 2 K PUR		100%		Not permitted
Ramsauer PU foam	July 2009	100%		Not permitted
Shaft and Well Foam Klima plus		100%		Not permitted
Soudal Mounting Foam for low temperatures	Feb 2007	100%		Not permitted
SOUDAL Gun Foam Soudalfoam -10	Feb 2007	100%		Not permitted
SOUDAL PU foam	July 2009	100%		Not permitted
Door mounting foam 2-K Klima plus		100%		Permitted
TYTAN Professional Gun Foam Winter	Feb 2007	100%		Not permitted
TYTAN Professional for PCV gun foam	Feb 2007	100%		Not permitted
TYTAN Professional Lexy 60 low-pressure	Feb 2007	100%		Not permitted
TYTAN Euro-Line Mounting Foam	Feb 2007	100%		Not permitted
TYTAN Professional for PCV mounting foam	Feb 2007	100%		Not permitted

Brand name	Date	Concentration	Manufacturer	Use
ZIMOWA SUPER PLUS - (mounting foam)	Feb 2007	100%		Not permitted
Greases				
BAYSILONE OIL M 1000		100%		Permitted
BECHEM BERUSOFT 30		100%	bechem	Permitted
Bechem Berulube Sihaf 2	May 2008	100%	bechem	Permitted
Dansoll Silec Blue Silicone Spray		100%	dansoll	Permitted
Dansoll Super Silec Sanitär mounting paste		100%	dansoll	Permitted
Huile de chenevis		100%		Permitted
Kluber Proba 270		100%	Kluber	Permitted
Kluber Paralig GTE 703		100%, 80°C, 96 h	Kluber	Permitted
Kluber Syntheso glep1		100%, 135°C, 120 h	Kluber	Not permitted
KLÜBERSYNTH VR 69-252		100%	Kluber	Permitted
Kluber Unislikikone L641		100%	Kluber	Permitted
Kluber Unislikikone TKM 1012		100%, 80°C, 96 h	Kluber	Permitted
OKS 462 / 0956409		100%	Kluber	Permitted
OKS 477 VALVE GREASE		100%	Kluber	Permitted
Laureat Zloty Installator		100%		Permitted
Luga Spray (Leif Koch)		100%	Leif Koch	Permitted
Rhodorsil 47 V 1000		100%, 80°C, 96 h		Permitted
SiliKon Spray (Motip)		100%	Motip	Permitted
silicona lubricante SDP ref S-255		100%		Permitted
Silicone oil M 10 - M 100000		100%		Permitted
Silicone oil M 5		100%		Permitted
Turmisilon GL 320 1-2		100%		Permitted
UNISILIKON L250L	June 2008	100%		Permitted
Wacker silicone		50%, 95°C, 96 h	Wacker	Not permitted
Metals				
Copper ions (Cu 2+)		50 ppm		Permitted
Solder flux S 39	June 2009	100%		Permitted
Solder flux S 65	July 2009	100%		Not permitted
YORKSHIRE FLUX		100%		Not permitted
Degussa Degufit 3000		100%	Degussa	Permitted
Aluminium ions (Al 3+)		50 ppm		Permitted
Atmosflux	July 2008	100%		Permitted
Paint				
Sigma Superprimer TI		100%	Sigma Coatings	Permitted
Sigma Amarol		100%	Sigma Coatings	Permitted
Decalux		100%	De Keyn Paint	Permitted
Permaline		100%	ITI-Trimetal	Permitted
Silvatane		100%	ITI-Trimetal	Permitted
DULUX water-based high-gloss paint		100%	ICI	Not permitted
DULUX water-based silky gloss paint, satin		100%	ICI	Not permitted
DULUX for microporous wood, silky gloss		100%	ICI	Permitted
DULUX floor paint, very tough, silky gloss		100%	ICI	Permitted
DULUX metal paint, anti-corrosive, high gloss		100%	ICI	Permitted
Hammerite white, silky gloss		100%	ICI	Permitted

Brand name	Date	Concentration	Manufacturer	Use
Hammerite white, high gloss, based on Xyleen		100%	ICI	Not permitted
Hammerite silver-grey high gloss, based on Xyleen		100%	ICI	Permitted
Boss Satin		100%	BOSSPAINTS	Permitted
Hydrosatin Interior		100%	BOSSPAINTS	Permitted
Carat		100%	BOSSPAINTS	Permitted
Bolatex		100%	BOSSPAINTS	Permitted
Optiprim		100%	BOSSPAINTS	Permitted
Elastoprim		100%	BOSSPAINTS	Permitted
Plastiprop		100%	BOSSPAINTS	Not permitted
Formule MC		100%	BOSSPAINTS	Not permitted
MAPEGRUNT		100%	Mapei	Permitted
DULUX PRIMER		100%	ICI	Permitted
UNI-GRUNT		100%	Atlas	Permitted
Wall filler and construction products				
Bituperl (insulating filler with bitumen)		100%		Permitted
Insulating coat with bitumen		100%		Permitted
Cold adhesive for bitumen paper		100%		Permitted
Climacoll adhesive for pipe insulation foam		100%		Not permitted
Compactuna		6%		Permitted
FERROCLEAN 9390	Feb 2008	100%		Permitted
FT-extra		100%		Permitted
Giso base primer		100%		Not permitted
KNAUF STUC PRIMER	July 2009	100%		Permitted
Mellerud mould killer		100%		Permitted
Mineral wool insulation with blocking layer against metal vapour	July 2007	100%		Not permitted
Nivoperl (insulating filler)		100%		Permitted
PCI LASTOGUM	Feb 2008	100%		Permitted
PCI Seccoral 1K	Feb 2008	100%		Permitted
Perfax Rebouche tout	July 2009	100%		Permitted
PE pipe insulation foam		100%		Permitted
Polyfilla inner wall filler		100%	Polyfilla	Permitted
Porion immediate trowel		100%	Henkel	Permitted
Porion mortar for repairs		100%	Henkel	Not permitted
Portland Cement - cement		100%	CBR	Permitted
RIKOMBI KONTAKT (RIGIPS)		100%		Permitted
Self-adhesive insulation PE foam (wrapping tape)		100%		Not permitted
SOPRO FDH 525 (liquid foil)	Sep. 2008	100%		Permitted
Stucal Putz		100%	Gyproc	Permitted
TANGIT REINIGER	July 2007	100%		Not permitted
TANGIT special cleaner	July 2007	100%		Permitted
Tile adhesive		100%		Permitted
Universal primer		100%		Permitted
Wood-concrete Multiplex Bruynzeel (moisture from...)		100%		Not permitted
Wood pint (moisture from...)		100%		Not permitted

Brand name	Date	Concentration	Manufacturer	Use
Wood MDF medium density fibreboard (moisture from...)		100%		Not permitted
Wood Multiplex sealed watertight (moisture from...)		100%		Not permitted
Anti-Termite				
Aripyreth Oil Solution		100%, 23°C		Permitted
Baktop MC		100%, 23°C		Permitted
Ecolofen CW		100%, 23°C		Permitted
Ecolofen Emulsificable Concentrate - emulsifiable concentrate		100%, 23°C		Permitted
Ecolofen Oil Solution - oil solution		100%, 23°C		Permitted
Grenade MC		100%, 23°C		Permitted
Hachikusan 20WE/AC		100%, 23°C		Permitted
Hachikusan FL		100%, 23°C		Permitted
Kareit Oil Solution - oil solution		100%		Permitted
Rarap MC		100%, 23°C		Permitted
Corrosion inhibitors				
BAYROFILM T 185		0.30%		Permitted
Copal corrosion inhibitor	April 2007	100%		Permitted
KAN-THERM	Sep. 2008	100%		Permitted
INIBAL PLUS	Sep. 2008	100%		Permitted
NALCO VARIDOS 1PLUS1	Jan 2009	2%, 23 & 95°C		Permitted
Gas leak sprays				
LIQUI MOLY leak seeker spray		100%, 23°C		Permitted
Multitek gas leak spray		100%		Not permitted
Sherlock gas leak detector		100%		Permitted
Ulith leak detector spray	Sep. 2008	100%		Permitted
LEAK TRACE SPRAY 400ML (PART 3350)	Jan 2009	100%, 23°C & 95°C		Permitted
LEAK TRACE SPRAY 400ML (PART 1809)	Jan 2009	100%, 23°C & 95°C		Permitted
LEAK TRACE PLUS (PART 890-27)	Jan 2009	100%, 23°C & 95°C		Permitted
LEAK TRACE 400 ML (PART 890-20)	Jan 2009	100%, 23°C & 95°C		Permitted
LEAK TRACE SPRAY ROTEST	Jan 2009	100%, 23°C & 95°C		Permitted
GUPOFLEX LEAK-SEEKER (ART 301) leak seeker	Jan 2009	100%, 23°C & 95°C		Permitted
LEAK TRACE 5 L (PART 4120)	Jan 2009	100%, 23°C & 95°C		Permitted
GUEPO LEAK-SEEKER ETL (ART 121) leak seeker	Jan 2009	100%, 23°C & 95°C		Permitted
GUEPO LEAK-SEEKER SOAPLESS (ART 131) soapless leak seeker	Jan 2009	100%, 23°C & 95°C		Permitted
GASLEAK DETECTOR (GRIFFON)	June 2009	100%, 60°C		Permitted
GASLEAK DETECTOR KZ gas leak detector	June 2009	100%, 60°C		Permitted

The information in this table has been compiled to the best of our knowledge and is intended as general information. The results in the table show typical average values from a representative number of individual measurement results. These values should in no way be seen as specifications. Furthermore, TECE assumes no responsibility for the use of products not contained in this list.