ASSEMBLY INSTRUCTIONS

7.1 General instructions for installing the pipe

Transport and storage
The pipes should be transported and stored with care in the original manufacturer's packing. This protects the pipes against contamination and UV light.

Unpacking
The packaging should be carefully removed so that the pipe does not become damaged.
Henco recommends using the SAFECUT for this.

Unrolling
Pipes should be unrolled in the opposite direction to which they were rolled. In other words, start with the pipe end on the outside of the coil.

Damage
Do not use pipes which display any folds, cracks or damage. The pipes must be protected against any distortion, soiling and/or damage.
In order to avoid damage, Henco recommends that you use a protective sleeve or pre-insulated pipe.

Stress
The pipes and fittings must always be laid without stresses and twists.

Tools
We recommend that Henco tools are used when installing pipes and fittings.

Cutting – calibration
Pipes should be CUT SQUARE.
Calibration and bevelling of pipes is only allowed with Henco calibrated tools according to the specified instructions.

Bending
Pipes can be bent manually. To achieve bends with a minimum radius you should use the Henco bending tools.

Sharp objects - sharp edges
The pipe should not come into contact with sharp objects during installation. For example, piping running through ceiling holes may not be bent around sharp edges as there is a danger of cracking.

Bending pipes with mounted fittings
Pipes in which the fittings have already been mounted, should not be bent. If assembly is not possible for technical reasons, the area of the pipe near to the connection should be kept free of stresses.

Expansion in embedded pipes
When embedding pipes, you can use bare pipes if insulated expansion bends are provided at least every 10 m. It is nevertheless advisable to always provide the pipes with a sleeve or insulation from the manufacturer.
Henco recommends using a protective sleeve or pre-insulated pipe to accommodate any expansion.

Expansion when mounting pipes on surfaces
When mounting pipes on surfaces, pipe lengths should be adjusted for the sake of convenience (exposed parts). You should also take expansion into consideration when mounting pipes on surfaces.

Painting pipes
You are allowed to paint the pipe, on the condition that the paint is water-based.

7.2 Making a press connection

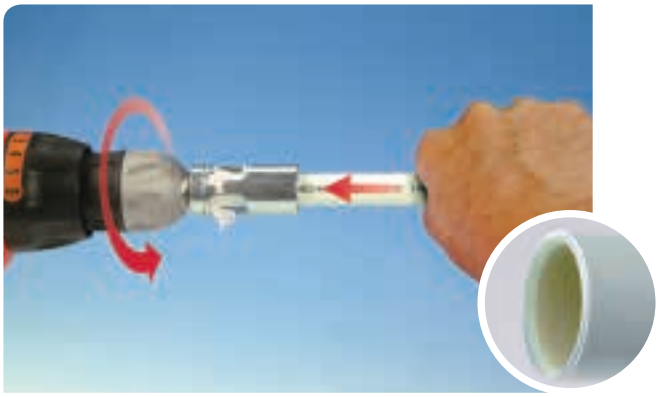
Step by step

Remove the packaging

Use the Henco SAFECUT for this.

Cutting

Always cut the pipe at an angle of 90° (squarely). Use Henco tools, a guillotine cutter or pipe cutter for this.
The guillotine cutter is provided with a shoulder to assist installation of the pipe under 90°.
Do not cut the pipe on a bended section. We recommend that you shorten pipes with larger diameters using a cutter.



Calibration

After the pipe has been cut squarely cut, it needs to be calibrated.
This should be done using the Henco kalispeed.

1. Place the pipe straight in the kalispeed and whilst turning, press until the stop is reached.
2. Turn the kalispeed until you see the bevels on the pipe and have evenly chamfered the inner and outer edges of the pipe.
3. Remove the kalispeed, and dispose of swarth from the pipe and kalispeed.

If the pipe is correctly calibrated (centered, chamfered, levelled off), the chamfering will be clearly visible around the inner and outer edges of the pipe.

7 ASSEMBLY INSTRUCTIONS

Position pipe

Slide the calibrated pipe all the way into the press fitting so the colour of the pipe is visible through the inspection windows.

Pressing

Open the jaws and ensure that the shoulder of the fitting is positioned in the groove of the jaws.
Close the positioned jaws and start pressing. The pressing machine needs to complete a full movement.
The positioned jaws should completely seal up the sleeve after pressing.
You should not press the same sleeve more than once.

Open the jaws after pressing and check whether the pipe is fully inserted so the colour of the pipe is visible through the inspection windows.

Guarantee

When a connection is pressed incorrectly, for example due to a wrong positioning of the fitting in the jaw or the use of a press jaw with a wrong profile, the entire connection has to be removed and replaced. Fittings should not, on any account,
be pressed twice with different press jaws. When removing an entire connection both fitting and pressed part of the pipe should be removed.

This also applies when the pipe detaches from a fitting for whatever reason.

All Henco press fittings have fixed mounted sleeves. The user should never remove the sleeve from the fitting. If this is the case, Henco reserves the right to refuse warranty.

It is not allowed to install a fitting and / or tube with other tools than mentioned in this technical manual.

Pressing without applying stresses

It is very important not to apply stresses to the pipe during pressing. Pipes with fittings should also be kept free of stresses any further assembly.

Once a fitting has been mounted to one end of the pipe using a press connection, no further stresses should be exerted on the fitting through the pipe. If further bending is required, you should fully support the pipe, not the fitting, with your hand.

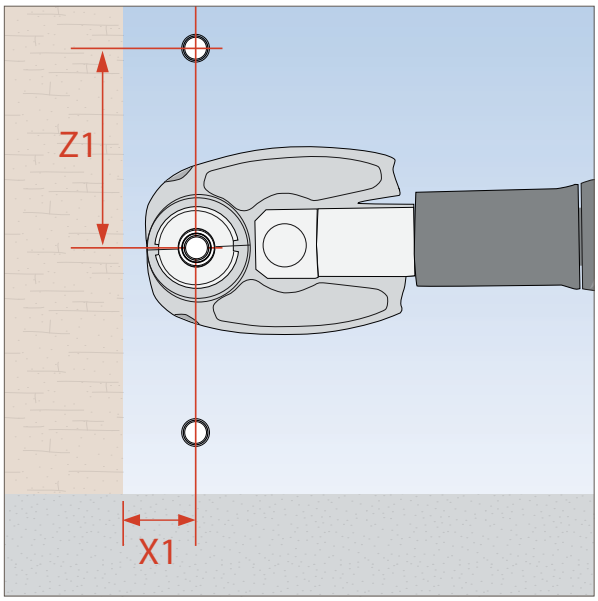
When press and compression connections are used, the compression connection should be made first.

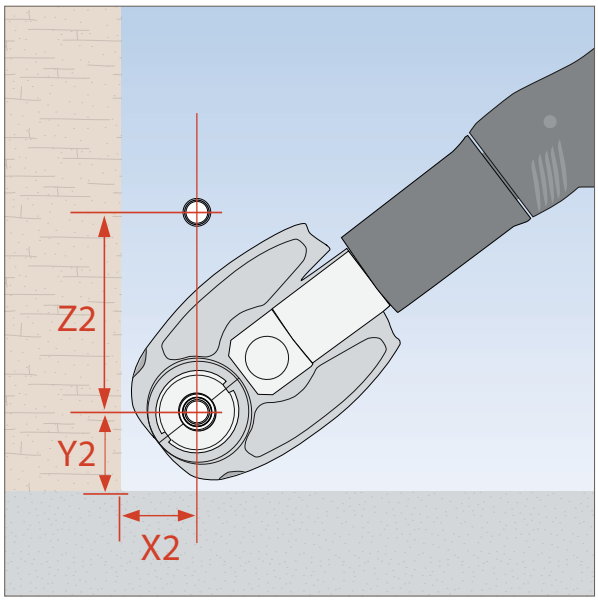
Required assembly space for the pressing jaw

Required assembly space for Henco pressing jaws (Type BE and BE-MINI*)

	14X2	16x2	18X2	20X2	26X3	32X3	40X3.5	50X4.0	63X4.5
X1	30	30	30	30	35	35	50	55	90
Z1	65	65	65	65	70	75	110	115	120
X2	40	40	40	40	50	50	70	75	95
Y2	40	40	40	40	50	50	70	75	95
Z2	90	90	90	90	100	110	135	135	140

* BE-MINI to Ø 32





Henco Press profiles

Henco press fittings should be pressed with profiles as shown below.

Methods of connection		
	BE PROFILE	TH PROFILE
FITTINGS Ø14 - Ø26	**ALLOWED**	**ALLOWED**
FITTINGS Ø32 - Ø40	**ALLOWED**	**NOT ALLOWED**
FITTINGS Ø50 - Ø90	**ALLOWED**	**NOT ALLOWED**

7 ASSEMBLY INSTRUCTIONS

Compatibility of HENCO compression jaws

Henco press fittings should be pressed using Henco BE pressing jaws. In addition to the Henco pressing tools, there are also other pressing tools which are compatible with Henco BE pressing jaws. This compatibility does not apply for the Henco MINI jaws.

Compatibility with Henco press jaws

Manufaturer	Type	Battery	Pressure KN	Type BE	Type BE..MINI3	Type BE..Mini2
Klauke	UP 75	18V	32KN	x		no
	UP 110	18V	32KN	x		no
	UAP2	12V	32KN	x		no
	UNP2	230V	32KN	x		no
	UP2EL	230V	32KN	x		no
	UAP3L	18V	32KN	x		no
	UAP4	18V	32KN	x		no
	UAP4L	12V	32KN	x		no
	MAP2L19	18V	19KN		x	no
Novopress	ECO 1 /PRESSBOY	230V	32KN	x		no
	ECO 201	230V	32KN	x		no
	ECO 202/203	18 V	32KN	x		no
	EFP 103	230V	32KN	x		no
	EFP 203	230V	32KN	x		no
	ACO1/ PRESSBOY	12V	32KN	x		no
	ACO102/103	12V	19KN		x	no
	ACO201/202/203	18V	32KN	x		no
	AFP 101	9,6V	19KN		x	no
	AFP201/202	14,4V	32KN	x		no
	ACO 201/202	14,4V	32KN	x		no
REMS	MINI PRESS ACC	14,4V	19KN			no
	MINI PRESS S22V ACC	14,4 V	19KN			no
	POWER-PRESS-SE	230V	32KN	x		no
	POWER-PRESS	230V	32KN	x		no
	POWER-PRESS ACC	230V	32KN	x		no
	AKKU-PERS	14,4V	32KN	x		no
	AKKU-PERS-ACC	14,4V	32KN	x		no
	POWER-PRESS XL ACC	230V	32KN	x		no
VETEC	SPM19	18V	19KN		x	no
	SPM32	14,4V	32KN	x		no
	COMPACT CP700	18V	32KN	x		no
Virax	VIPER P20	14,4V/220V	32KN	x		no
	Viper P21	18V	32KN	x		no
	Viper P21+	18V	32KN	x		no
	VIPER P22	18V	32KN	x		no
	VIPER ML21	18V	32KN	x		no
	VIPER M21	18V	32KN	x		no
	VIPER P25/ P25+	18V	32KN	x		no

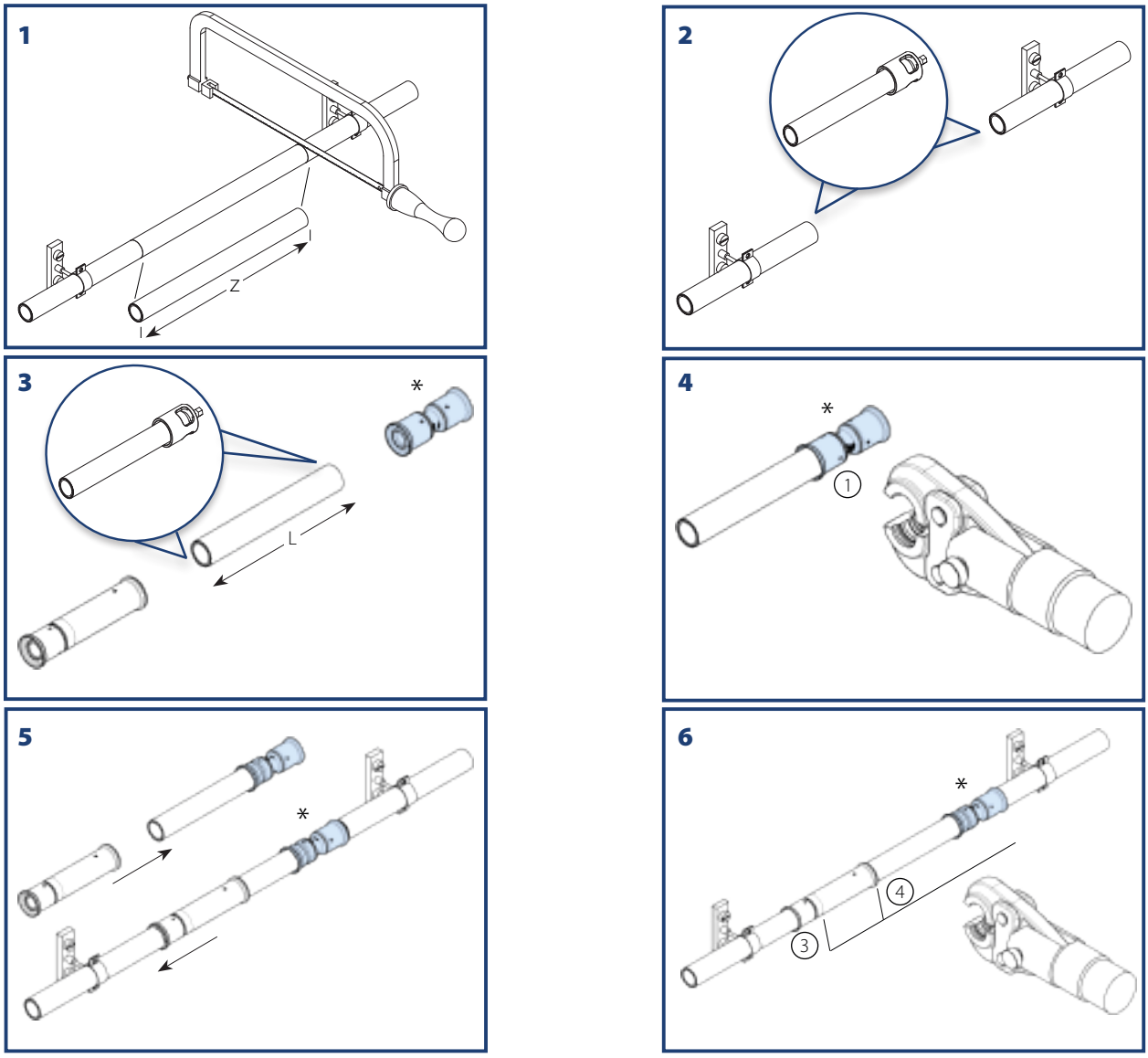
Compatibility with Henco press jaws

Manufaturer	Type	Battery	Pressure KN	Type BE	Type BE..MINI3	Type BE..Mini2
Roller	UNI-PRESS- SE	230V	32KN	x		no
	UNI-PRESS	230V	32KN	x		no
	UNI-PRESS-ACC	230V	32KN	x		no
	UNI-PRESS-XL-ACC	230V	32KN	x		no
	MULTI-PRESS-MINI-ACC	14,4V	19KN		x	no
	MULTI-PRESS-MINI-22V-ACC	21,6V	19KN		x	no
	MULTI-PRESS-MINIS-22V-ACC	21,6V	19KN		x	nn
	MULTI-PRESS	14,4V	32KN	x		no
	MULTI-PRESS-ACC	14,4V	32KN	x		no
Rothenberger	ROMAX PRESSLINER	18V	19KN		x	no
	Romax Pressliner ECO	18V	19KN		x	no
	ROMAX AC ECO	230V	32KN	X		no
	ROMAX 3000 AC	230V	32KN	x		no
	ROMAX 4000	18V	32KN	x		no
	ROMAX COMPACT/TT	18V	19KN		x	no
Viega	PRESS-GUN-PICCO	18V	19KN			no
	PRESS-GUN-5	18V	32KN	x		no
	PRESS-GUN-4E/5E	230V	32KN	x		no
	PRESS-GUN-4B/5B	18V	32KN	x		no
	TYPE-PT3-AH	14,4V	32KN	x		no
	Type 1	230V	32KN	x		no
	TYPE 2	230V	32KN	x		no
Ridgid	RP-210-B	18V	24KN			no
	RP-240	12V	24KN			no
	RP-241	12V	24KN			no
	RP-340-B	18V	32KN	x		no
	RP-340-C	230V	32KN	x		no
Milwaukee	M18-BLHPT 202C	18V	32KN	x		no
	M12-BLHPT 202C	12V	19KN		x	no
CBC	EUROPRESS 2000	220V	32KN	x		no
Hilty	NPR-019-IE-A22	18V	19KN		x	no
	NPR-032-IE-A22	18V	32KN	x		no

In addition, all pressing tools which comply with the following data are allowed:

Compression force	Max. 38 kN - Min. 32 kN
Diameter of locking bolts	15 mm
Lifting fork	40 mm
Electronic monitoring	none
Jaw closure control	none

7.3 Making a repair



Numbers indicate the sequence of the press connection
** Straight coupling or T-piece*

of

REPAIR FITTING	*ARTICLE	Z	L
52P16	15P-1616	200	115
52P20	15P-2020	200	115
52P26	15P-2626	200	115
52P32	15P-3232	270	160
52P16	9P-161616	232	115
52P16	12P-162016	239	115
52P20	10P-201620	243	115
52P20	9P-202020	243	115
52P20	12P-202620	243	115
52P26	10P-261626	249	115
52P26	10P-262026	249	115
52P26	9P-262626	249	115
52P26	12P-263226	260	115
52P32	10P-321632	318	160
52P32	10P-322032	318	160
52P32	10P-322632	318	160
52P32	9P-323232	318	160

7.4 Making a push connection

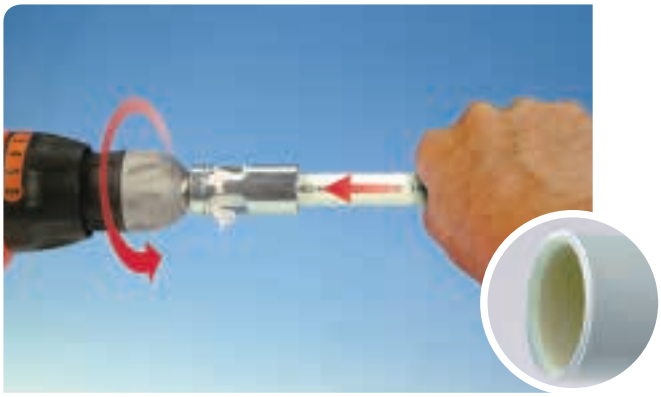
Step by step

Remove the packaging

Use the Henco SAFECUT for this.

Cutting

Always cut the pipe at an angle of 90° (squarely). Use Henco tools, a guillotine cutter or pipe cutter for this.
The guillotine cutter is provided with a shoulder to assist installation of the pipe under 90°.
Do not cut the pipe on a bended section. We recommend that you shorten pipes with larger diameters using a cutter.



Calibration

After the pipe has been cut squarely cut, it needs to be calibrated.
This should be done using the Henco kalispeed.

1. Place the pipe straight in the kalispeed and whilst turning, press until the stop is reached.
2. Turn the kalispeed until you see the bevels on the pipe and have evenly chamfered the inner and outer edges of the pipe.
3. Remove the kalispeed, and dispose of swarth from the pipe and kalispeed.

If the pipe is correctly calibrated (centered, chamfered, levelled off), the chamfering will be clearly visible around the inner and outer edges of the pipe.

7 ASSEMBLY INSTRUCTIONS

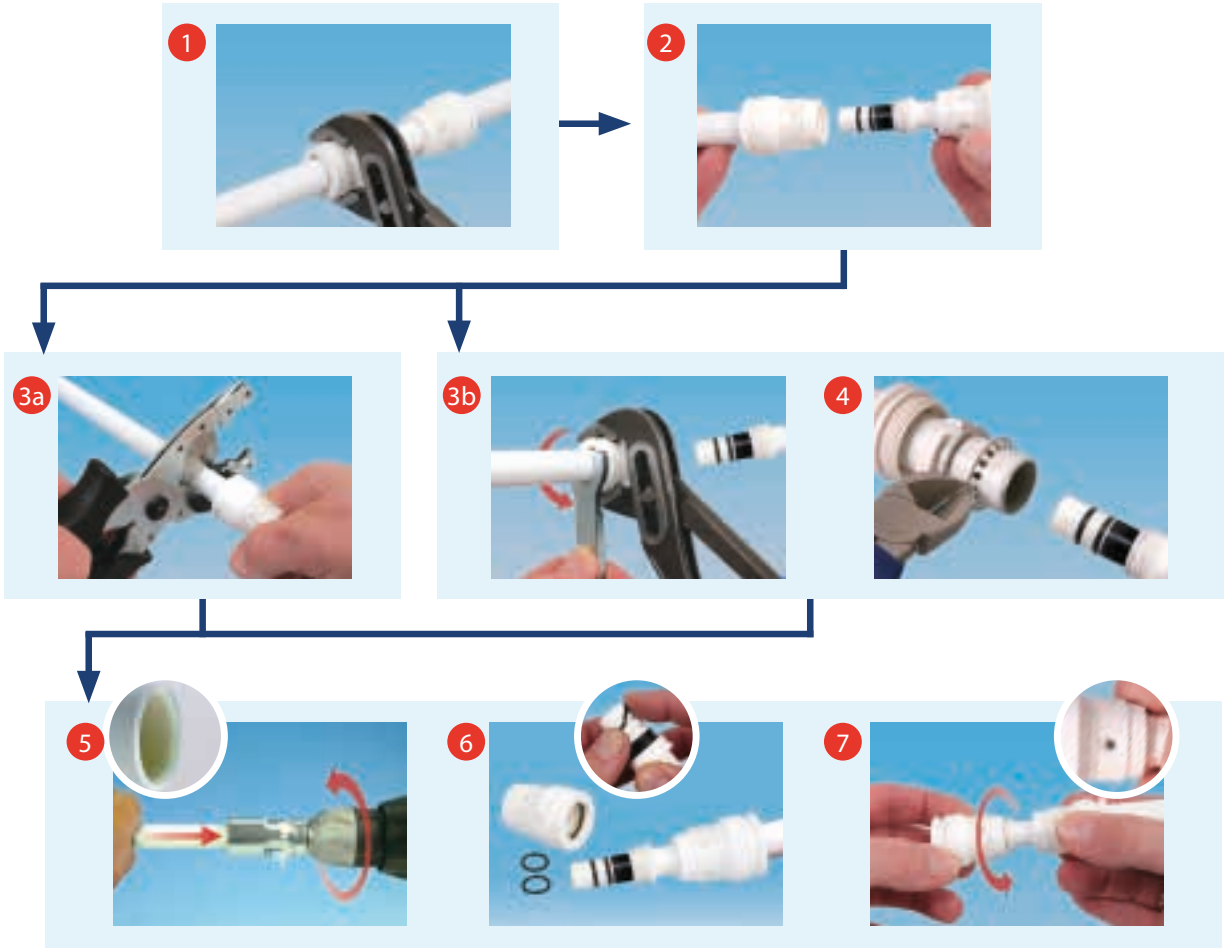
Position pipe

Remove the black protective cap and slide the calibrated pipe into the push fitting as far as it will go, until you can see the colour of the pipe in the inspection windows.

It is not allowed to install a fitting and / or tube with other tools than mentioned in this technical manual.

Disassembling a HENCO Vision push connection

The fitting can be disassembled very quickly if you have chosen an incorrect fitting or need to make changes to the installation.



1 Twist off the sleeve.
2 Pull the pipe, together with the sleeve, from body of the fitting.
3a Method 1: Cut through the pipe behind the sleeve if the pipe is long enough and calibrate this.
3b Method 2: Open the sleeve using the HENCO Vision spanner if the pipe cannot be shortened.
4 Cut through the clamping ring and remove this together with the other parts which are on the pipe.
5 Calibrate.
6 Take a replacement set (sleeve + 2 O-rings) and carefully replace the damaged O-rings without damaging the body of the fitting and the new O-rings.
7 Slide the new sleeve onto the body of the fitting. Insert the calibrated pipe into the fitting. All done!

7.5 Making a screwed/compression connection

Step by step

Remove the packaging

Use the Henco SAFECUT for this.

Cutting

Always cut the pipe at an angle of 90° (squarely). Use Henco tools, a guillotine cutter or pipe cutter for this.
The guillotine cutter is provided with a shoulder to assist installation of the pipe under 90°.
Do not cut the pipe on a bended section. We recommend that you shorten pipes with larger diameters using a cutter.

Calibration

After the pipe has been cut squarely cut, it needs to be calibrated.
This should be done using the Henco kalispeed.

1. Place the pipe straight in the kalispeed and whilst turning, press until the stop is reached.
2. Turn the kalispeed until you see the bevels on the pipe and have evenly chamfered the inner and outer edges of the pipe.
3. Remove the kalispeed, and dispose of swarth from the pipe and kalispeed.

If the pipe is correctly calibrated (centered, chamfered, levelled off), the chamfering will be clearly visible around the inner and outer edges of the pipe.

First slide the union nut and then the clamping ring over the pipe. You can grease the union nut with slide oil make it easier to slide on. Do not use mineral oil!

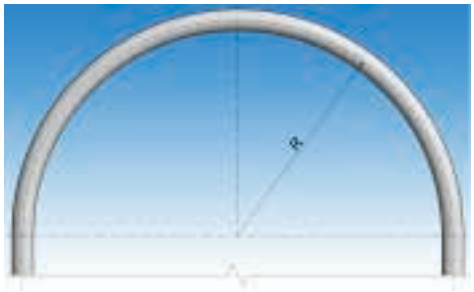
Insert the adapter or socket into the pipe and push to the end. Make sure a synthetic ring is always fitted to prevent electrolysis.

Now turn the union nut or the relevant tap, manifold or nipple. Always do this using two flat open-jawed spanners and respect the forces recommended by the manufacturer or those stated in the following table.

Forces required for creating a compression fitting	
Pipe	Corresponding turning torque in Nm
14 x 2	40
16 x 2	50
18 x 2	55
20 x 2	60
26 x 3	75
32 x 3	100

7.6 Bending HENCO pipes

You should not use heat to bend Henco pipes. For pipes with diameters larger than Ø 26, press fittings should be used. The pipes can be bent manually but it is better to use an internal or external spiral spring for this. To form bends with the shortest possible radius, we recommend the use of Henco bending tools. When bending pipes, the following bending radii should be respected.



Bending with a bending tool

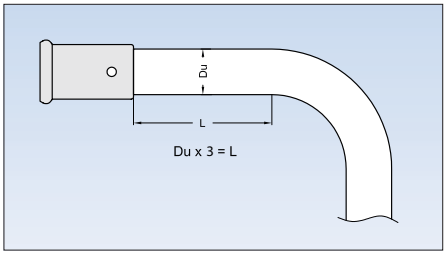
Bending with an external bending spring

Bending with an internal bending spring

Manual bending

You should positioned the start of the bend (L) at a distance of at least 3x the outer diameter of the fitting.

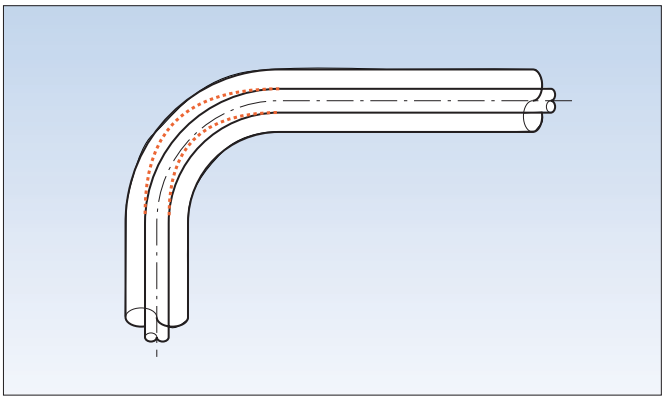
Never use cracked pipes!



7.7 Accommodating length changes (expansion)

During embedding

In order to accommodate the expansion of the pipe, you should introduce at least 1 expansion bend for every 10 meters of pipe where there is no change of direction.
We recommend that you use Henco pipe insulation for this. If you use this insulation, bare Henco pipe can be laid in floors and walls.

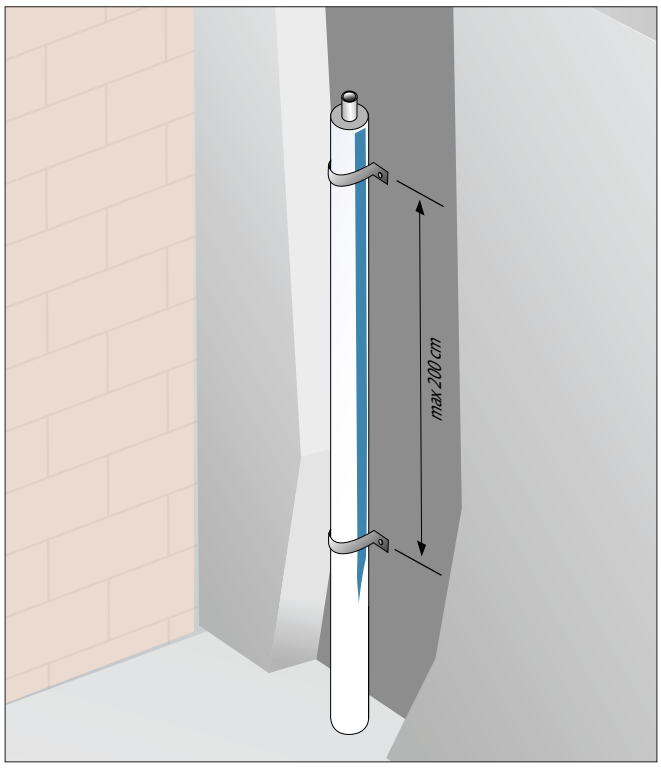


In terms of quality, it is best to always fit a sleeve, or better still insulation.
The sleeve has a protective function and the insulation not only protects and offers thermal insulation but also prevents the formation of condensation.

To determine the thickness of the insulation, you can apply the following rule: 1.5 XΔL (change in length)

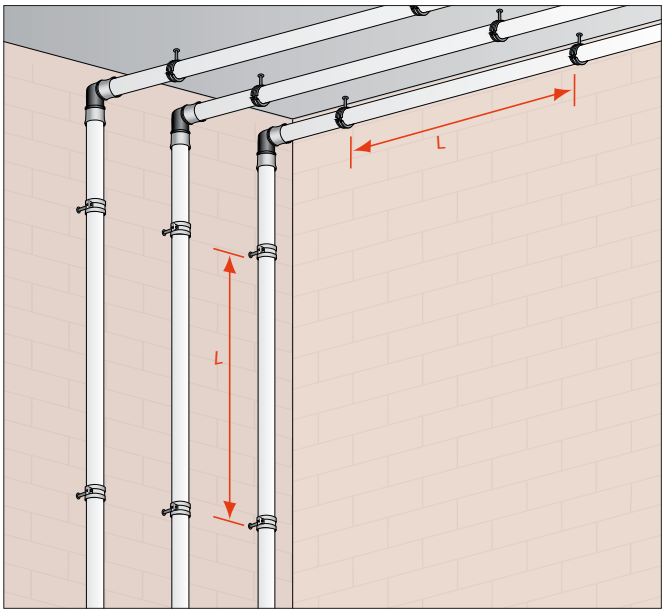
You should ensure that the distance between the two fastening points is no more than 2 metres.

The Henco multilayer pipe is naturally also ideal for underfloor heating where in which case the above guidelines naturally do not apply.



When mounting pipes on surfaces

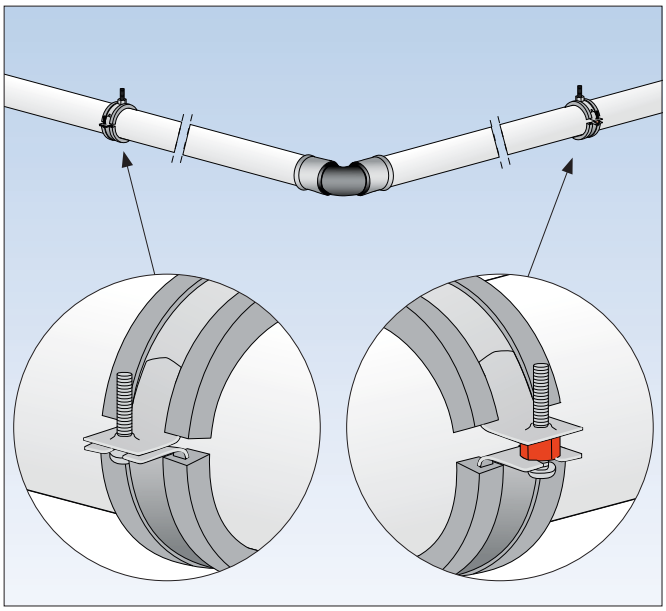
Henco recommends that you use straight lengths of pipes when mounting on surfaces. Pipe brackets must be used when fixing Henco multilayer pipes to the wall or ceiling. The suspension brackets are made from a synthetic material or from metal and have a rubber inlay for protecting the pipe. The specified maximum distance between the brackets must be adhered to.
See table below.
In order to accommodate the expansion of the pipe, you should introduce at least 1 expansion bend for every 10 meters of pipe where there is no change of direction.



Pipe	Max. distance pipe brackets (cm)
14 x 2	80
16 x 2	80
18 x 2	100
20 x 2	120
26 x 3	150
32 x 3	160
40 x 3.5	170
50 x 4	180
63 x 4.5	200
75 x 6	200
90 x 7	200

Pipe brackets

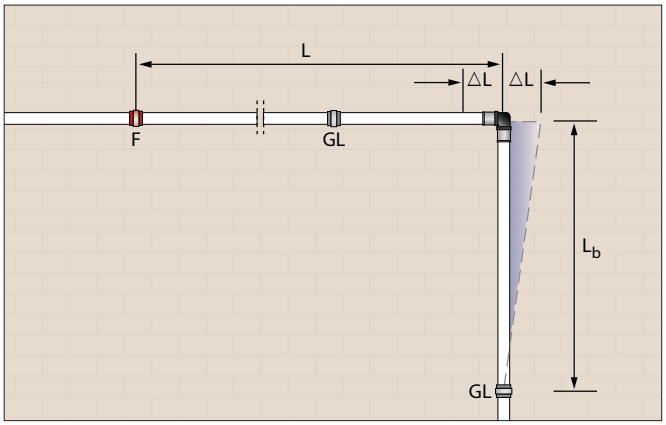
Pipe brackets have two purposes. Firstly they support the pipe network. Secondly they accommodate the length changes to pipes caused by heat by means of sliding and fixed points. The sliding points must be such that the pipe continuously has clearance. The sliding points should be positioned in such a way that the pipe always has clearance. The sliding point cannot become a fixed point when the pipe is mounted to a surface.

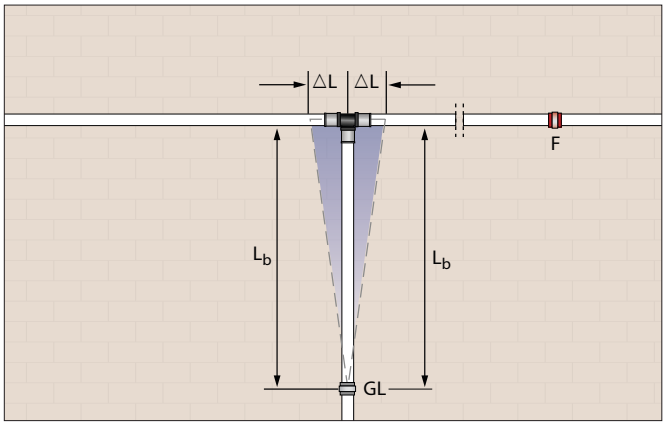


Expansion bends

It is very important that sliding points and fixed points are positioned correctly when you use expansion bends and expansion loops. You should use expansion bends whenever the pipe changes direction.

We recommend that you always use fittings to make the direction change. For pipes with a diameter of 32 mm or greater this is compulsory.





L = length of the pipe
L_b = length of the expansion bend
ΔL = change in length

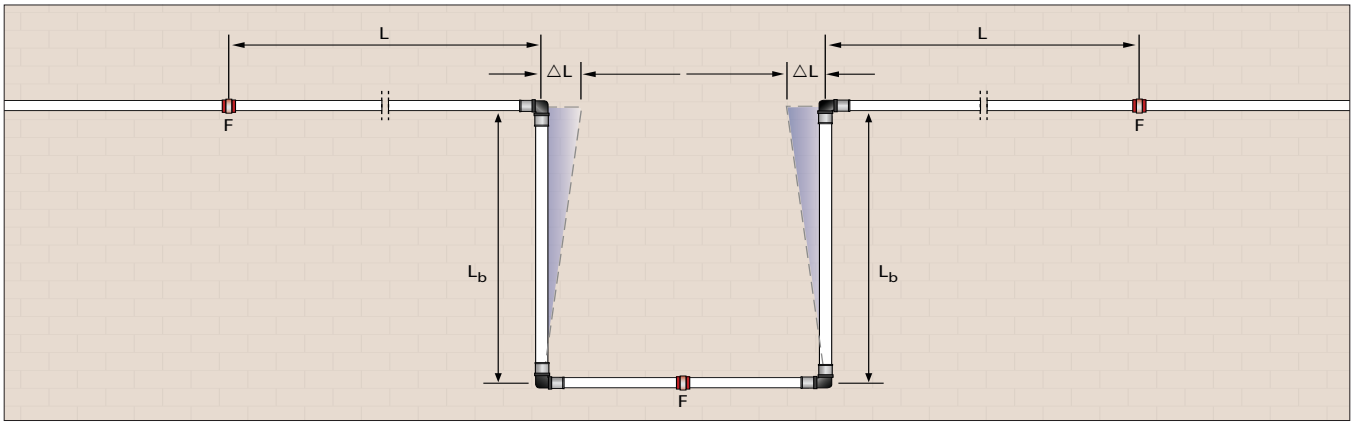
F = fixed point
GL = sliding point

Expansion bend for L (L_b)

Expansion loops

When a long pipe does have any change of direction, you should use expansion loops. An expansion loop is also called a lyra or omega bend. The drawing shows an expansion bend more clearly.

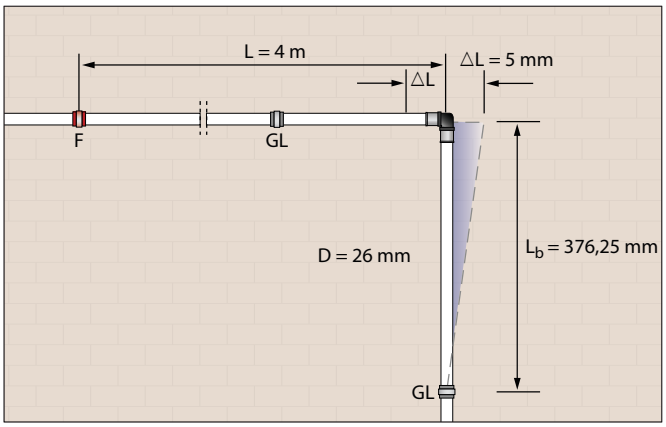
The expansion loop is formed in principle from two expansion bends. A fixed point must therefore be provided at the bottom in the middle of the loop.



The minimum length of the expansion bend can be calculated
using the following formula or you can read it from the diagram below:

$$L_b = C \times \sqrt{(D \times \Delta L)}$$

with: L_b = length of the expansion bend
C = material constant (=33)
D= outer diameter of the pipe
ΔL = change in length



Example:

Given that: $L = 4$ m
$D = 26$ mm
$\Delta T = 50°C$ (Tmin=10°C en Tmax= 60°C)

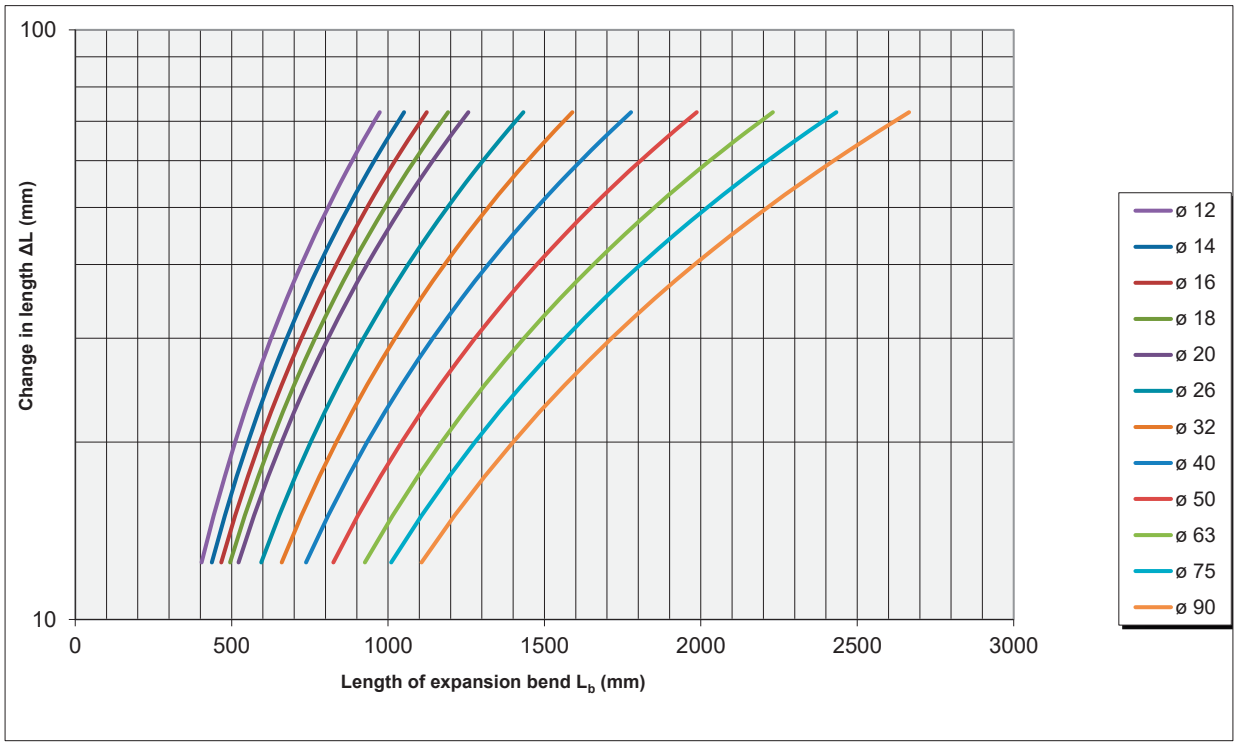
Asked: L_b

Solution: $L_b = C \times \sqrt{(D \times \Delta L)}$

where $\Delta L = L \times \alpha \times \Delta T$
$= 4 \times 0.025 \times 50$
$= 5$ mm

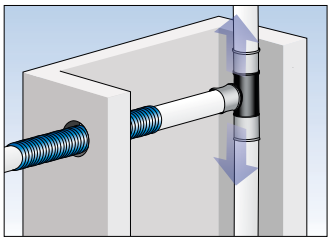
$L_b = C \times \sqrt{(D \times \Delta L)}$
$= 33 \times \sqrt{(26X5)}$
$= 376.25$ mm

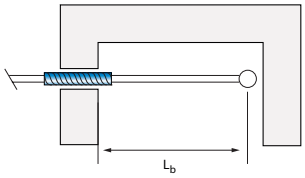
For a pipe with a diameter of 26 mm and a length of 4 m that has a change of direction, when there is a temperature difference of 50°C you will have to provide an expansion bend of 376.25 mm to accommodate the change in length.



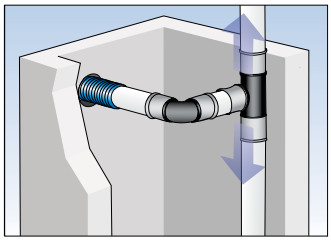
Riser pipes

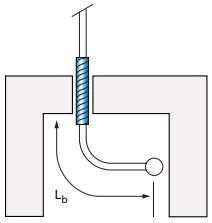
You should also ensure that pipes are able to move freely when they pass between floors to a riser pipe in a shaft. In this case too, the change in length can be accommodated here too by an expansion bend. The expansion bend will then accommodate the upward and downward movements.



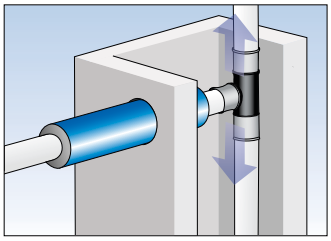


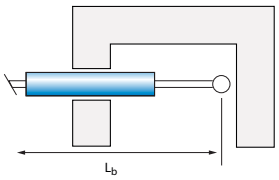
If there is sufficient room in the shaft, in other words, if there is space to accommodate the calculated expansion bend, then it is sufficient to fit a protective sleeve to the pipe where it passes through the wall.





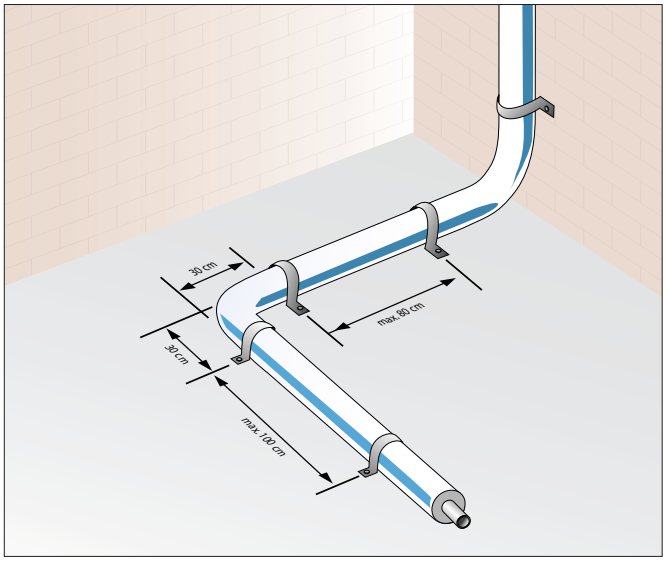
If the shaft is too small to fit the calculated expansion bend, the hole in the wall will have to be made larger to give the pipe sufficient room for movement. The pipe must be provided with insulation where it passes through the wall.





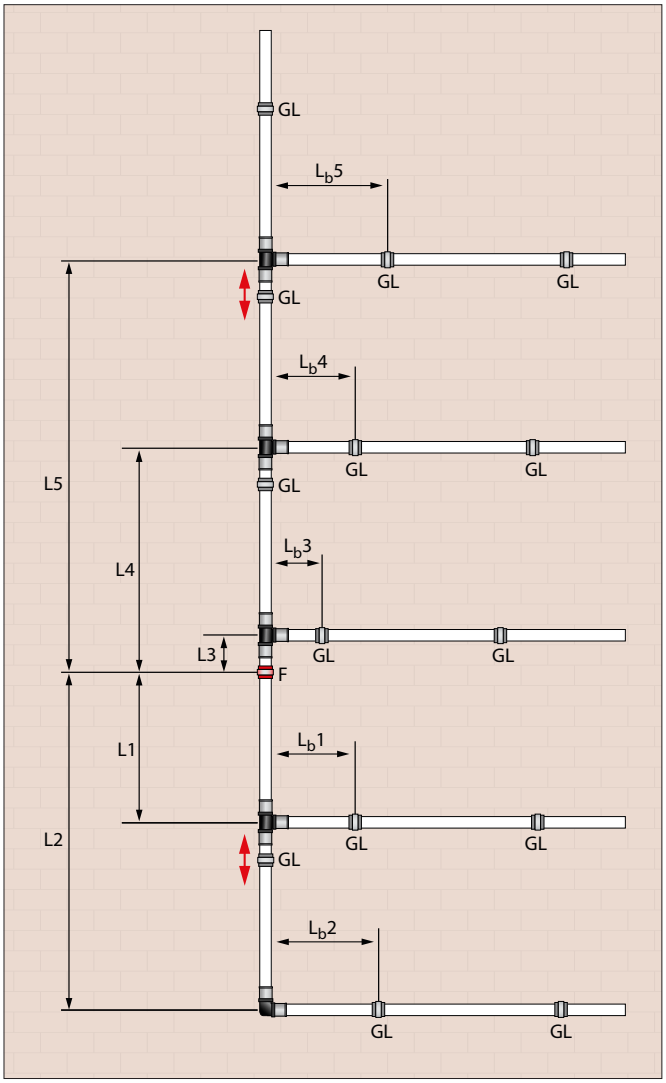
Laying pipes straight on a floor

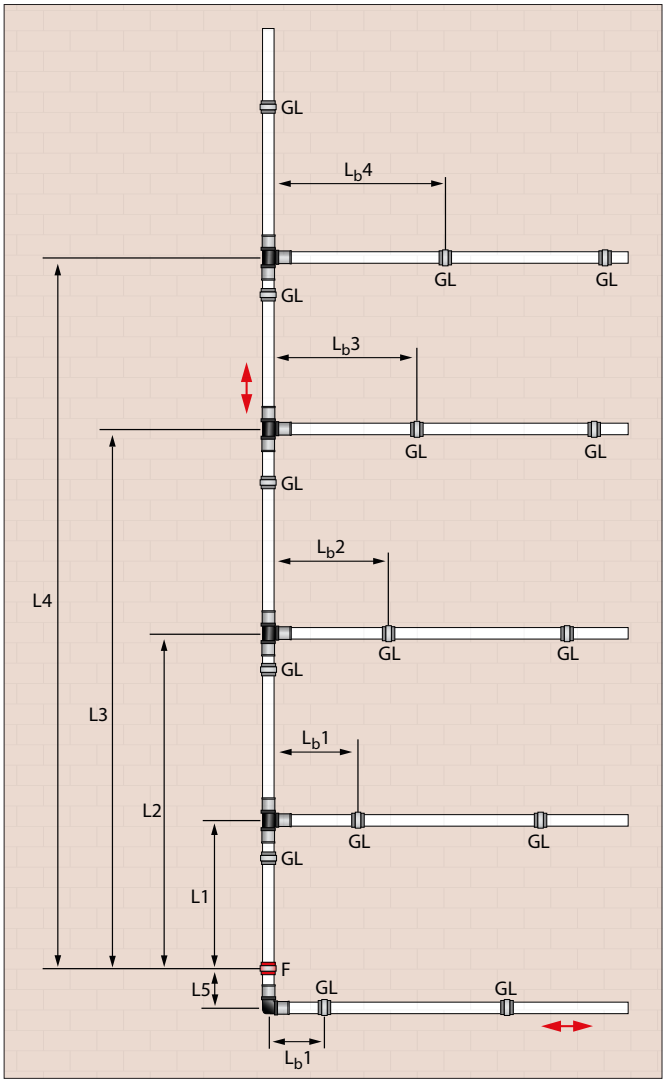
For installations where HENCO multilayer pipes are laid straight on a floor, the maximum distance between fixtures is 80 cm. Fixtures should be positioned at 30 cm before and after a 90° bend and you should use pipe brackets.



You should always provide a fixed point if the riser pipe is longer than 10 m. It is recommended that this point is located in the middle of the pipe as then lower expansion forces will be generated.

The drawings show that the total length of the expansion bends which need to be provided if the fixed point is situated in the middle of the riser pipe is much less than when the fixed point is at the start of the riser pipe.





$L_b1 + L_b2 + L_b3 + L_b4 + L_b5$ < $L_b1 + L_b2 + L_b3 + L_b4 + L_b5$

7.8 Embedding fittings

Synthetic press fittings (PVDF)

Synthetic (PVDF) press fittings can be embedded without the use of protective measures in:

- Pure sand-cement screed floors
- Anhydrite screed floors
- Construction concrete
- Polyurethane

Synthetic push fittings Henco Vision

Henco Vision Synthetic (PVDF) push fittings can be embedded without the use of protective measures in:

- Pure sand-cement screed floors
- Anhydrite screed floors
- Construction concrete
- Polyurethane

Blank brass press fittings

Blank brass fittings should be protected against corrosion. You can do this by using protective silicone tape (Siligum Tape) where each coil should overlap by at least 50%. You should start by wrapping the pipe side with one full 1 turn of tape.

Tin-plated brass press fittings

Tin-plated brass press fittings can be embedded without the use of protective measures in:

- Pure sand-cement screed floors
- Anhydrite screed floors

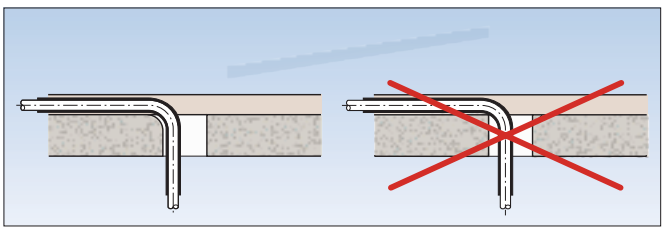
However, you should ensure that the tin-plated surface of the fitting is fully intact and does not exhibit any signs of damage.

Compression fittings

Henco recommends that brass compression fittings are not embedded but are rather are used solely for surface mounting.

7.9 Pipes passing through openings

During installation you should ensure that bare pipes do not enter into contact with any sharp objects. For example, piping running through openings in ceilings may not be bent around sharp edges as there is a danger of cracking.
You should replace any cracked pipes.



7.10 Pipes in hazardous areas

When laying Henco multilayer pipes in areas which are subject to aggressive gases (stables, etc.) or constantly exposed to humidity permanently penetrating humidity (industrial kitchens, swimming baths,etc), the metal connectors must be protected. You can do this by using appropriate anti-rust strips or heat reflecting materials in accordance with DIN 1988/7.

7.11 Pipe insulation

When using pipe insulation other than that provided by the manufacturer you should check if any adhesives to be used contain products which are harmful to the pipe and fittings, even these adhesives are not applied directly to the insulation to the plastic pipe.

7.12 Frost protection and trace heating

The system is suitable for the deployment of trace heating. The aluminium pipe guarantees even heat transfer over the entire area of the pipe.
You should attach any additional heating to the pipe at normal indoor temperature using cables or self-adhesive tape. You should consult Henco when using self-adhesive tape for the fastening of the trace heating to the pipe, or for to improve heat distribution. Trace heating must be technically approved. When using additional heating, the drinking water temperature should not exceed 60°C.
You should also ensure that the additional heating is switched off in systems where the water does not circulate.

7.13 Cleaning the pipe

Powerclean (Innotec) can be used.

7.14 Anti-freeze

A maximum of 45% ethylene glycol combined with 55% water is allowed in the Henco multilayer pipe system.
It can withstand a minimum temperature of -10°C.

7.15 Installation temperatures

The minimum temperatures at which multilayer pipes can be installed are as follows:

- - 20°C for PE-Xc/AL/PE-Xc multilayer pipes
- + 7° for synthetic pipes

7.16 Disinfection and cleaning

The manufacturer should be consulted before using disinfectant products or applying a thermal cycle where temperatures exceed the specified usage temperature.
The following products can be used:

- **Hadex**
  Diluted with water at a concentration of 1:13000 (± 4 ppm Bleach) in accordance with the instructions.
  Treat for a maximum of 5 minutes at 90°C and only perform one treatment per year.
- **Herlisil**
  Diluted with water at a concentration of 1:1000 (± 500 ppm hydrogen peroxide) in accordance with the instructions.
  Treat for a maximum of 5 minutes at 90°C and only perform one treatment per year.
- Citric acid
  Maximum 10% diluted with water.
  Treat for a maximum of 5 minutes at 90°C and only perform one treatment per year.

It should be noted here that these treatments will only have a long-term effect if the source of the contamination is dealt with professionally.

7.17 Osmosis water

The Henco multilayer pipe PE-Xc/AL/PE-Xc is suitable for osmosis water (purified water). However, you should only use synthetic fittings (PVDF) which do not contain brass components.

7.18 Earthing (conduction)

The Henco system is not electrically conductive and as a result is not suitable for any kind of electrical earthing.

7.19 Water quality

The water quality must meet the standards of 99/83/EC.

7.20 Hydrogen peroxide

This is allowed on the condition that it is diluted to a maximum of 6%.

7.21 Pressure and density tests

Density test for sanitary and radiator installations with water

- Density test intended to detect unpressed fittings. Test pressure 50 kPA (0.5 bar) - test time 60 minutes. Accuracy of the pressure gauge 5 kPa (50 mbar), in addition, all connections in the system must be checked for leaks with suitable bubble-forming test equipment.

Pressure test (DIN 1988) for sanitary installations with water

- Pressure gauges should be used which can measure a pressure difference of 0.1 bar.
- The pressure gauge must be fitted on the lowest point of the installation.
- The installation should not be embedded when you perform the pressure test.

Two tests are carried out - an introductory test and a main test.

The introductory test

- The pressure test is performed at a pressure word of 15 bar; this is the maximum permitted constant working pressure is 10 bar increased by 5 bar.
- The piping system should be tested at a pressure of 15 bar for 30 minutes. After 30 minutes you should ause for 10 minutes and then test the piping system again for 30 minutes at a pressure of 15 bar.
- You should next perform a test lasting 30 minutes. In this test, the pressure should not drop by more than 0.6 bar (0.1 bar every 5 minutes) and the installation must remain watertight.

The main test

- The main test should take place immediately after the introductory test.
- The test should last 2 hours.
- The pressure measured during the introductory test, should not have dropped by more than 0.2 bar at the end of the 2 hours.
- The installation must remain fully watertight.

Pressure test (DIN 18380) for radiator installations with water

- The fitter must check the sealing of the water pipes before these are embedded or concealed with cement, plaster or other materials.
- Pressure gauges should be used which can measure a pressure difference of 0.1 bar.
- The pressure gauge must be fitted on the lowest point of the installation.
- The heating installation must be put under water pressure and be de-aerated. In case of frost, the installer can take protection measurements or execute the pressure test with air.
- The heating pipe must undergo a pressure test at a pressure 1.3 times greater than the total pressure of the installation (static pressure), with at least 1 bar overpressure at each point of the installation.
- The pressure test should be carried out over 24 hours.
- The pressure should not drop by more than 0.2 bar.
- The installation should remain watertight.

Pressure test (DIN 18380) and density test for radiator installations with compressed air or inert gas

- Pressure tests with air are allowed in the following situations:
  - High hygienic demands (e.g. hospitals)
  - Long period of stagnation of water between the pressure test and the start-up
  - Pipelines that cannot be completely filled with water between the pressure test and the start-up (e.g. frost)
- In case of frost, the installer can take protection measurements or execute the pressure test with air.
- A test pressure above 2.5 bar may not be used.
- Density test intended to detect unpressed fittings.
  Test pressure 50 kPA (0.5 bar) - test time 60 minutes.
  Accuracy of the pressure gauge 5 kPa (50 mbar), in addition, all connections in the system must be checked for leaks with suitable bubble-forming test equipment.
- Pressure test
  Test pressure 250 kPa (2.5 bar) - test time 10 minutes.

Pressure test protocols

For sanitary installations with water

Henco PRESSURE TEST PROTOCOL FOR SANITARY APPLICATIONS
(according to DIN 1988)

Project .....

Installation site .....

Client ..... Installer .....

Name of person carrying out the test .....

Start test Date ..... Time .....

Area of piping tested .....

Was the piping filled with filtered water and fully de-aerated? ☐ Yes ☐ No

Ambient temperature ..... °C Water temperature ..... °C

Type of Henco pipe ☐ Ø12 ☐ Ø14 ☐ Ø16 ☐ Ø18 ☐ Ø20 ☐ Ø26
☐ Ø32 ☐ Ø40 ☐ Ø50 ☐ Ø63 ☐ Ø75 ☐ Ø90

Total pipe length ..... m

Were the fittings inspected visually? ☐ Yes ☐ No

INTRODUCTORY TEST

Maximum allowed test pressure is 1,5 times the maximum working pressure.

Pressure at start of test ..... bar time .....

Stop the test for 10 minutes, after 30 minutes and then test again for 30 minutes.

Test pressure (30 minutes after start of the test) ..... bar time .....

Test pressure (60 minutes after start of the test) ..... bar time .....

Pressure loss per 5 minutes ..... bar

(max. 0.1 bar per 5 minutes and max. 0.6 bar in total)

Did you detect a leak during the pressure test? ☐ Yes ☐ No

Was the max. pressure loss exceeded during the pressure test? ☐ Yes ☐ No

MAIN TEST (immediately after the preparatory test and lasting 2 hours)

Test pressure (at start of main test) ..... bar time .....

Test pressure (after 2 hours) ..... bar time .....

(pressure loss may be max. 0.2 bar)

Did you detect a leak during the pressure test? ☐ Yes ☐ No

Place ..... Date .....

Signature of client Signature of installer

For installations with radiators with water

HENCO PRESSURE TEST FOR RADIATORS
(according to DIN 18380)

1. INSTALLATION INFORMATION

Project: .....

Client: .....

Street/house number: .....

Postcode/city: .....

Maximum working pressure: .....

Maximum working temperature: .....

2. CARRY OUT PRESSURE TEST

For testing seals in a heating installation that uses the Henco piping system,
the following items apply to the pressure test:

1. If a safety group or measurement facilities have to be provided in the future then replace these now with pipes or pipe connections
2. Fill the heating installation to filtered water and de-aerate.
3. Connect the pressure test device and put the installation under test pressure:
   The test pressure should correspond with the pressure of the safety clip. Minimum test pressure: 1 bar.
4. Increase the test pressure again after 2 hours since there can be a drop in pressure due to expansion of the pipes.
5. Maintain the test pressure for at least 3 hours in the heating installation and observe that the pressure drop is < 0.2 bar.
6. Furthermore you should perform a full visual inspection on the heating system for leaks:
   There should be no water leaking from the heating installation.
7. If there is a risk of frost, the necessary measures must be taken (use anti-freeze products or heat the building). Once the heating is no longer exposed to frost, the anti-freeze products must be fully removed from the piping. The installation must be rinsed at least 3 times with fresh water to achieve this.

Note!
When pouring the screed, the heating installation should be set to its maximum working pressure so that any leaks can be seen immediately.

3. CONFIRMATION

The pressure test was performed in accordance with the instructions. No leaks were detected during the test.

Test pressure: ..... Test duration: .....

Pressure drop after 5 hours: .....

Client: ..... Signature: .....

Contractor: ..... Signature: .....

Place: ..... Date: .....

7.22 Legionella

General

Legionella bacteria can be found in all fresh water, so also in mains drinking water. However, the bacteria can only grow and become a risk under a number of specific conditions which concern the design and maintenance of the installation in particular.
Legionella bacteria undergo explosive growth in the temperature range 25°C - 45°C and are dangerous to health when in vapour form.

Nature of the piping

The materials used to make water pipes do influence on the growth of Legionella, provided that correct thermal management is observed:

- Cold water temperatures below 25°C
- Hot water temperatures above 60°C
- No stagnation or dead sections in the piping system

If the above are observed, you do not need to use separate materials for water supply pipes.

So you can also use Henco multilayer pipe PE-Xc/AL/PE-Xc

Biofilm

The composition of the water and the type of the piping materials used do have an effect on the formation of biofilm in drinking water pipes. At temperatures between 25°C and 60°C Biofilm is more prevalent in water at temperatures between (X C and Y C), and this increases the chances that legionella bacterial will be present.

Legionella pneumophila

Legionella pneumophila is one of the dozens of varieties of Legionella. This bacteria can cause Legionellosis or Legionnaire's disease if inhaled. However, there are many other types of Legionella which are on the whole are harmless. In 80% of installations where Legionella is found, only the harmless forms are present.

Study by KIWA Water Research, Nieuwegein (the Netherlands)

KIWA set up a test system using pipes made from 4 different materials (copper, RVS, PE-Xc, PVC-C) to study the effects of temperature (25 - 45 - 55 - 60°C) on the concentration of Legionella pneumophila.
The test was carried out with drinking water that had Legionella pneumophila added. The test used a domestic tap arrangement.

Results of the study

- Choice of piping

The primary result of the study was that the choice of piping has no effect on the growth of Legionella when correct thermal management is observed.

- NEN 1006

For domestic systems, NEN 1006 stipulates a hot water temperature of 55°C or higher. In the piping studied there was sufficient thermal disinfection at a temperature of 60°C. The studied recommended increasing the standard in NEN 1006 to 60°C

- Temporary effect of copper

New copper piping only temporarily inhibits the growth of Legionella. This effect is reduced in copper piping that is older than 2 years. KIWA does not consider justifiable claims that copper piping might be "healthier" than piping made from other materials to be justifiable..

The entire study by KIWA is described in H2O23 of 2007.
For more information, contact the KIWA PR department on 030-6069623

7.23 UV resistance

Henco multilayer pipes should be protected against direct sunlight or UV-irradiation. You should cover the pipes during storage or transport once they have been removed from their packaging. If the pipes are fitted with a protective sleeve or insulation when mounted to a surface, then they will be perfectly protected against UV radiation.

7.24 Fire classification

The Henco multilayer pipe, consisting of two cross-linked polyethylene layers and a butt-welded aluminium layer, is classified as E under EN 13501-1:2007+A1: 2009 and EN/TS 15117:2005.

7.25 HENCO TS: the guaranteed "TOTAL SAFE" piping system

Heating installations in newly built homes usually have a piping network embedded in the screed floor. The Henco TS system is the perfect solution for this use. Whereas radiators are individually connected in systems using manifolds, the Henco TS system uses one main pipe for each floor, where the radiators are connected by means of crossover T-pieces in a two-pipe arrangement.

Advantages:

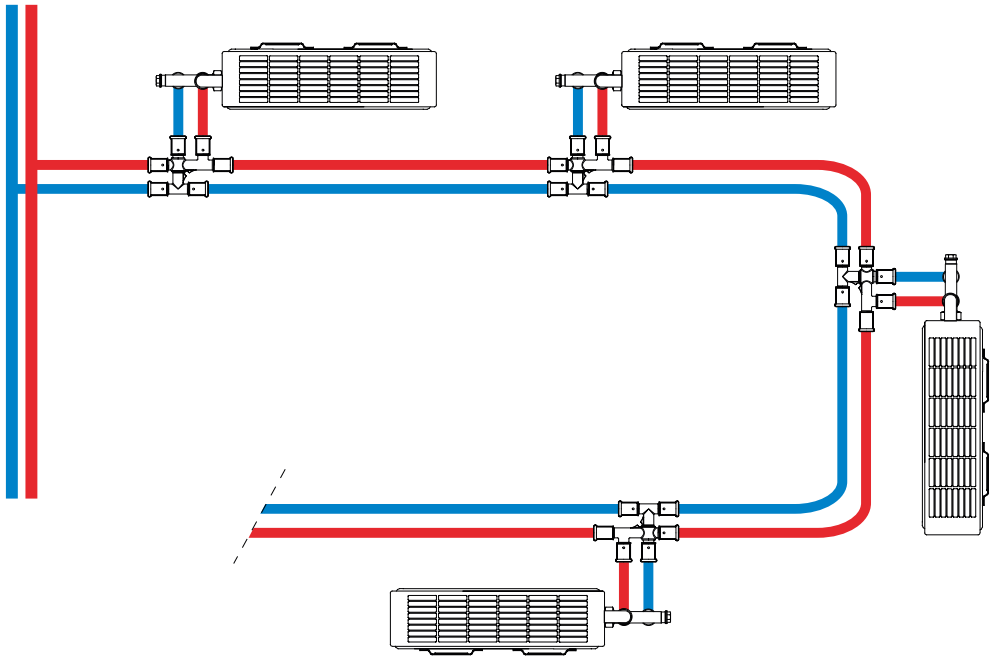
- No manifold required.
- Less piping is needed.
- Greatly reduces the thermal load on the floor.

A double crossover tee ensures that pipes do not have to be laid on top of each other.

Because heating installations are usually calculated with operating temperatures higher than 40°C, the piping to be laid must have a protective sleeve or insulation (NEN 2741 Ned.). We also recommend that the crossing-free T-pieces are provided with insulation boxes.

The Henco TS system is made up of the following components:

- Henco PE-Xc/AL/PE-Xc pipes with protective sleeve or insulation
- Double crossover tees with insulation boxes
- Press fittings and screw/compression fittings
- Connection sets for radiators
- Radiator valves for manual and thermostatic operation
- Fastening materials



ISO-BOX

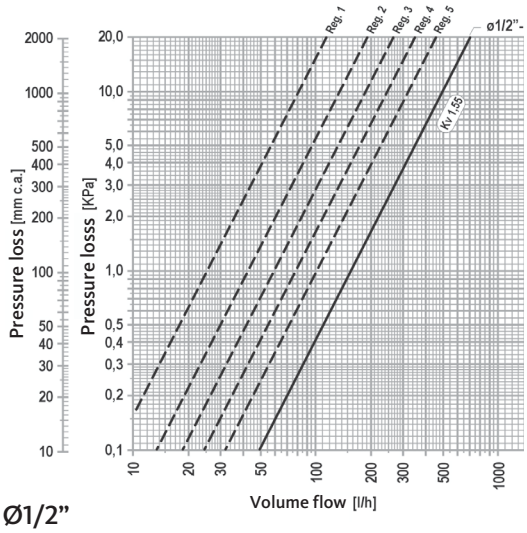
Double crossover tee

Henco PE-Xc/AL/PE-Xc pipes with protective sleeve

It goes without saying that for best performance from the installation using the Henco TS system, the radiators should be regulated individually.

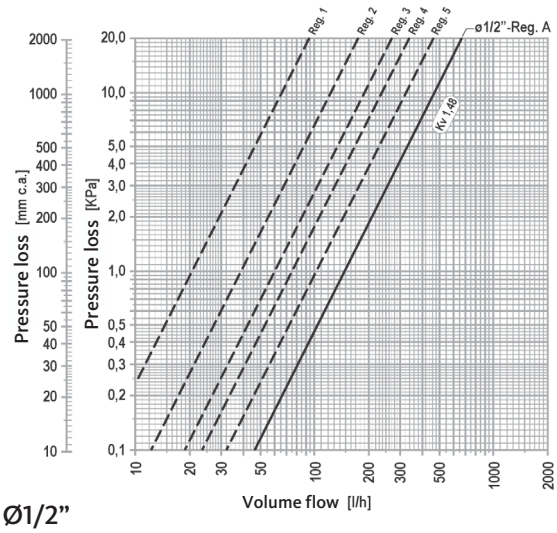
Regulation diagrams

Regulation diagram for manual radiator valves



Ø1/2"

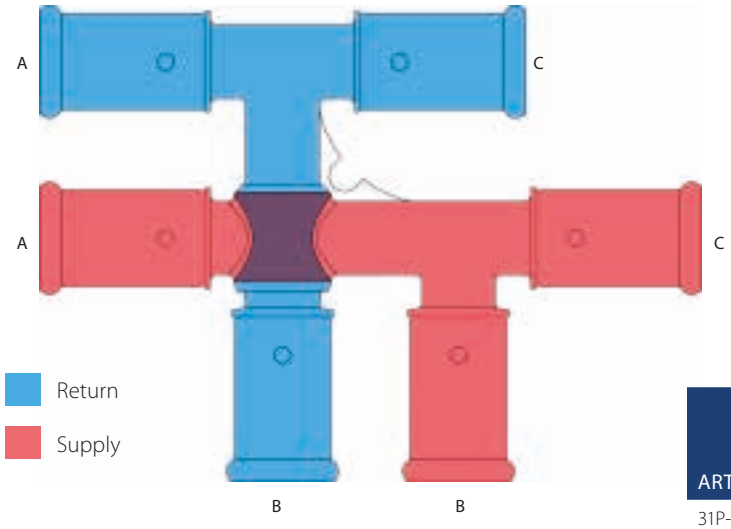
Regulation diagram for thermostatic radiator valves



Ø1/2"

For pipe calculation purposes, the KV values of the crossing-free T-pieces are as follows

Circulation	31P-161616	kv value 1.2
	31P-201616	kv value 1.6
	31P-201620	kv value 3.3
	31P-202020	kv value 3.3



ART. NO.	DIAMETER mm A	B	C	ZETAVALUES in equivalent m A-B	A-B	A-C	A-C
31P-161616	16	16	16	2,26	3,7	0,83	1,35
31P-201616	20	16	16	1,51	1,41	1,34	1,54
31P-201620	20	16	20	1,57	1,82	0,64	0,74
31P-202020	20	20	20	5,08	3,54	1,94	2,23