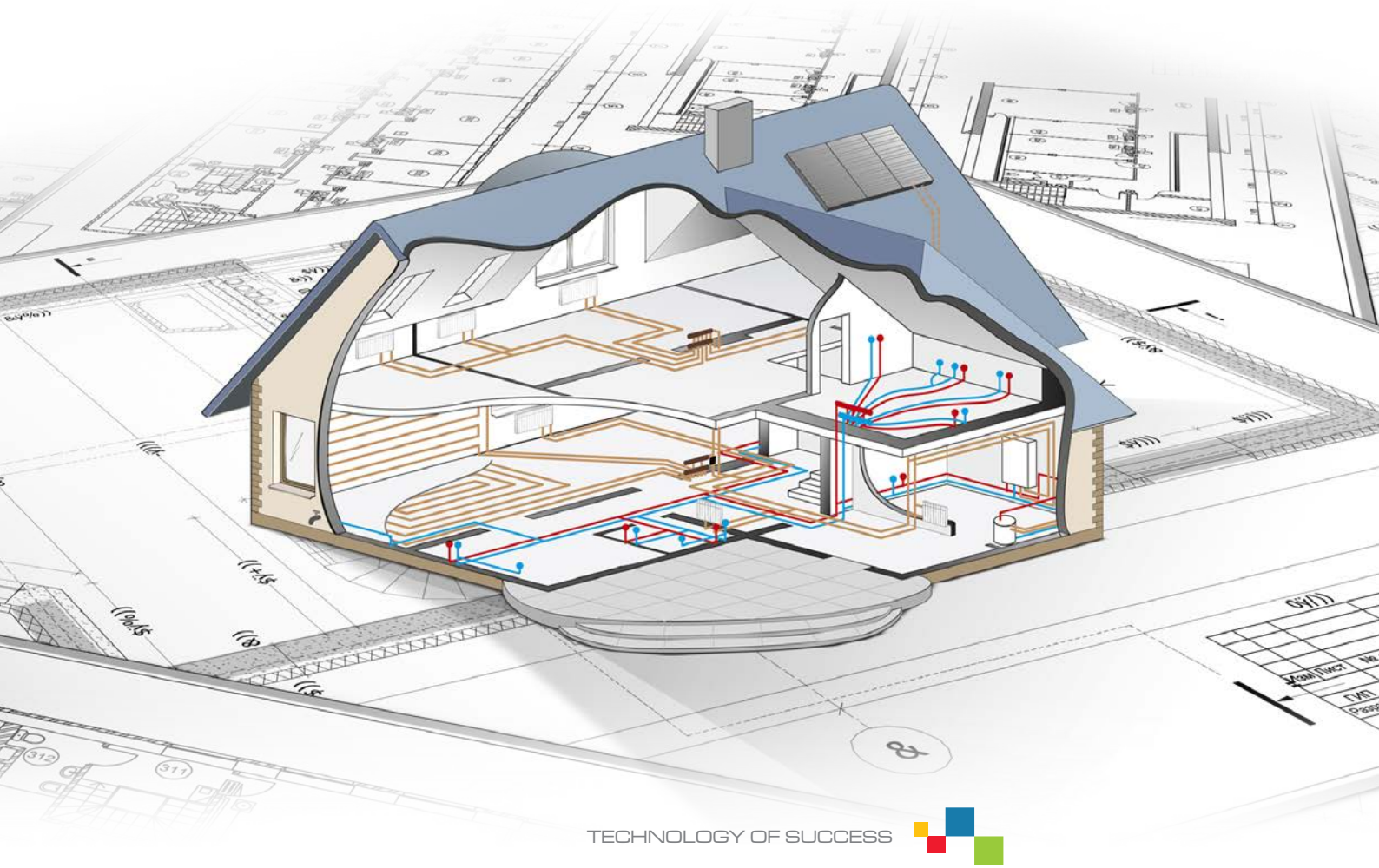
SYSTEM **KAN-therm**

Designer's and contractor's Guidebook

EN 01/2015



TECHNOLOGY OF SUCCESS

ISO **9001**






SYSTEM KAN-therm

About KAN

Modern water and heating solutions

KAN was established in 1990 and has been implementing state of the art technologies in heating and water distribution solutions ever since.

KAN is European recognized leader and supplier of state of the art KAN-them solutions and installations intended for indoor hot and cold tap water installations, central heating and floor heating installations, as well as fire extinguishing and technological installations. Since the beginning of its activity, KAN has been building its leading position on such values as professionalism, innovativeness, quality and development. Today, the company employs over 600 people, a great part of which are specialist engineers responsible for ensuring continuous development of the KAN-therm system, all technological processes applied and customer service. The qualifications and commitment of our personnel guarantees the highest quality of products manufactured in KAN factories.

Distribution of the KAN-therm system is performed through a network of commercial partners all over Germany, Poland, Russia, Ukraine, Belarus, Ireland, the Czech Republic, Slovakia, Hungary, Romania and in the Baltic States. Our expansion and dynamic development has proven so effective that KAN-therm labeled products are exported to 23 countries, and our distribution network assumes Europe, a great part of Asia, and a part of Africa.

The KAN-therm system is an optimal, complete multipurpose installation system consisting of state of the art, mutually complementary technical solutions for pipe water distribution installations, heating installations, as well as technological and fire extinguishing installations. It is the materialization of a vision of a universal system, the fruit of extensive experience, the passion of KAN's constructors, as well as strict quality control of our materials and final products.

TECHNOLOGY OF SUCCES

INTRODUCTION

KAN-therm is a complete installation system for constructing internal water supply, heating distribution and technological networks. The system comprises state-of-the-art, mutually complementary solutions for installation materials and connection technologies.

The "**KAN-therm** System Guide for Designers and Contractors" is dedicated to all participants of the construction processes involving state-of-the-art installations – designers, installers and construction site inspectors. Our Guide presents a wide range of solutions and installation techniques, as well as a comprehensive presentation of the most modern and popular installation systems collectively forming the **KAN-therm** multisystem.

Such a presentation gives the user an opportunity to learn and compare available systems and, finally, to select the most suitable installation solution, in terms of technology, economics and usability. This guide has been written in compliance with all basic, European standards and guidelines regarding sanitary and heating distribution systems in the construction industry.

The guide has been divided into three basic parts:

- part I, presenting the characteristics of five **KAN-therm** piping installation systems,
- part II, presenting common guidelines for designing and assembling these systems,
- part III, discussing the basic principles of dimensioning **KAN-therm** installations

The "product" part consists of four chapters discussing particular installation systems:

- **KAN-therm Push** (basing on PE-RT and PE-Xc pipes) and **Push Platinum** (basing on multilayer PE-Xc/Al/PE-HD pipes), connected by a sliding ring,
- **KAN-therm Press** with multilayer pipes,
- **KAN-therm PP** consisting of PP-R polypropylene pipes and joints as well as polypropylene compound pipes,
- **KAN-therm Steel** and **KAN-therm Inox**, consisting of carbon steel and stainless steel pipes and fittings joined in press technique.

Apart from a description of pipes and fittings, dimension data and scope of use, each of the above mentioned chapters contains guidelines for executing joints, which are characteristic for each installation system.

Instruction manuals for the remaining **KAN-therm Systems**, such as fire extinguishing sprinkler systems (the **KAN-therm Sprinkler System**) and the **KAN-therm** surface heating system have been included in separate guides due to their different application specifications.

For designers using traditional methods of installation dimensioning, we provide an appendix containing a separate set of tables presenting the hydraulic properties of pipes and fittings described in the System guide, taking into account the typical operating parameters of water supply and heating installations. Apart from the Guide, we offer all designers a free suite containing professional design programs: **KAN ozc**, **KAN c.o.** and **KAN H2O**.

The extensive KAN-therm System presented in the Guide has been created and developed by KAN. KAN is a manufacturer and distributor of installation systems. Its products are exported to over 30 countries. All elements with a **KAN-therm** mark are subject to a very strict quality control system, e.g. in our state-of-the-art research and development laboratory. Research results are honored by the biggest European certification authorities.

Our production process, as well as our entire activity, is supervised by the ISO 9001 quality control system.

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Ø 12-32 mm

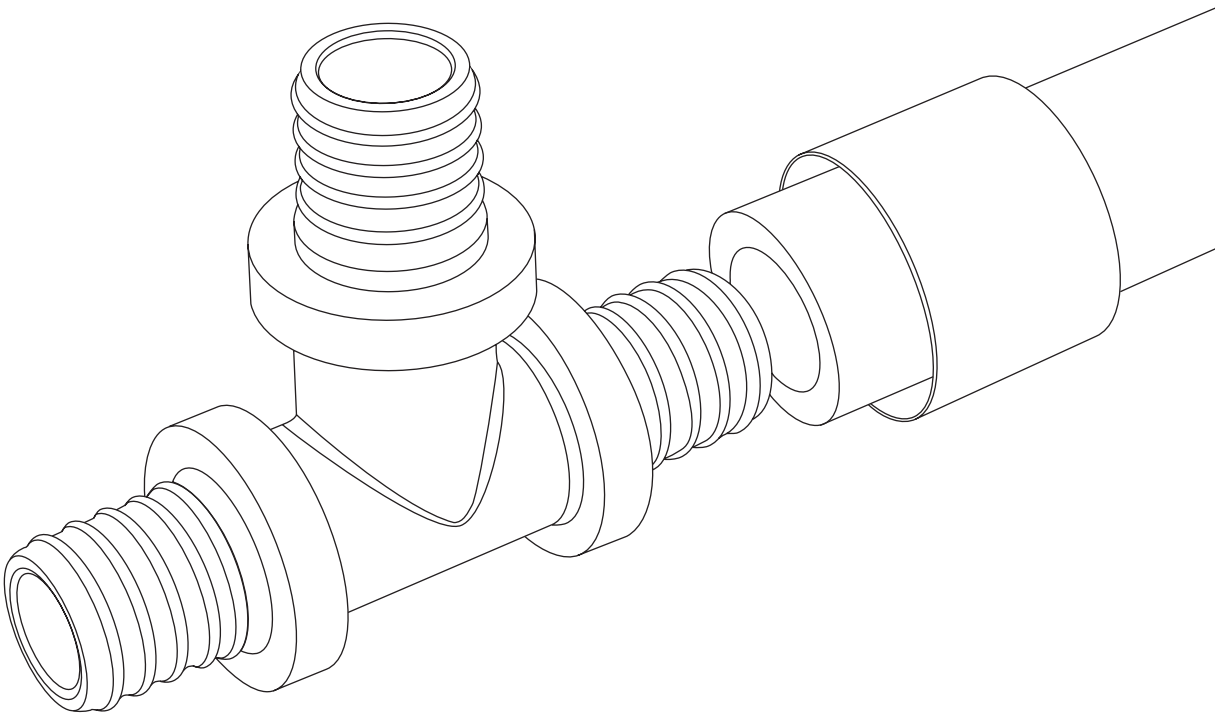
KAN-therm

Push

Reliability and durability

Push Platinum

Reliability and prestige



ISO 9001

1 KAN-therm Push / KAN-therm Push Platinum

1.1 General information

KAN-therm Push is a complete installation system consisting of PE-Xc, PE-RT and PE-Xc/Al/PE-HD Platinum polyethylene pipes and PPSU or brass fittings of diameters Ø12-32 mm.

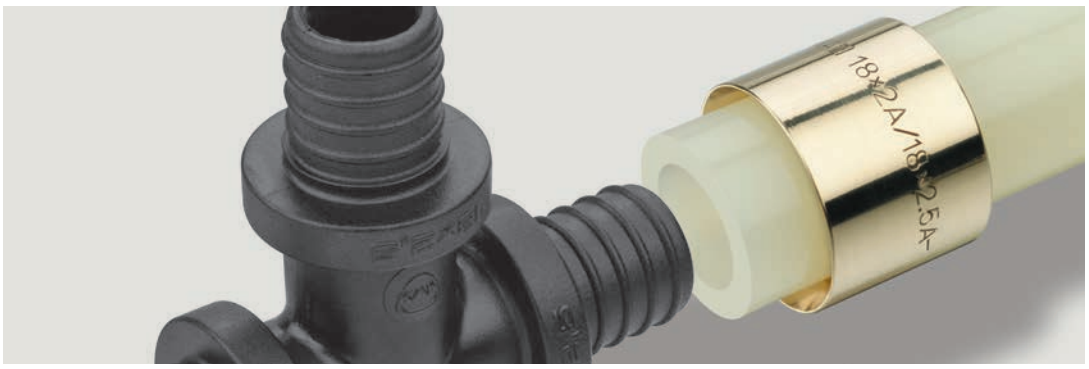
KAN-therm Push joints are executed by pushing expanded pipe ending onto a fitting, and then by sliding a brass ring onto this joint. This technique does not require any additional sealants and guarantees perfect tightness and durability of the installation.

The system is designed for indoor water supply installations (hot and cold tap water) as well as heating installations.

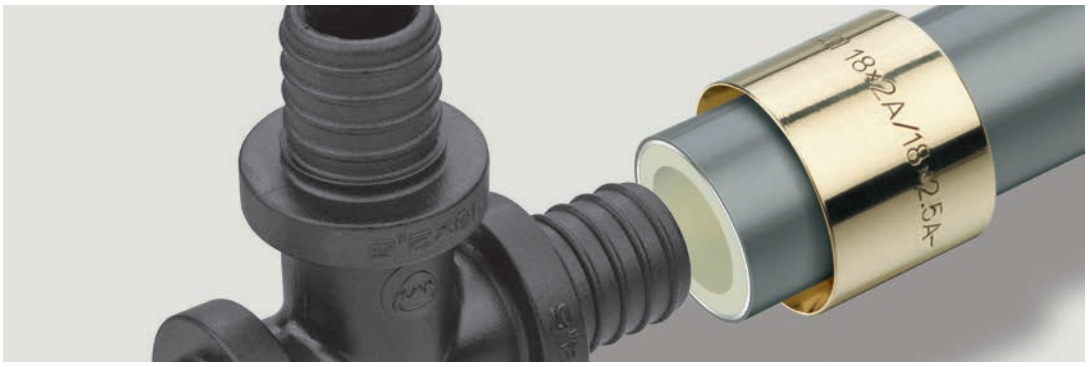
The KAN-therm Push system is characterized by:

- guaranteed durability for over 50 years
- resistance to scaling
- resistance to hydraulic impacts
- high smoothness of internal surfaces
- physiological and microbiological neutrality in potable water installations
- environmentally friendly materials
- easy and quick assembly
- impressive installation lightness
- possibility of executing joints in construction partitions
- effective anti-diffusion barrier
- possibility of applying single-layered and multilayer polyethylene pipes interchangeably.

KAN-therm Push



KAN-therm Push Platinum



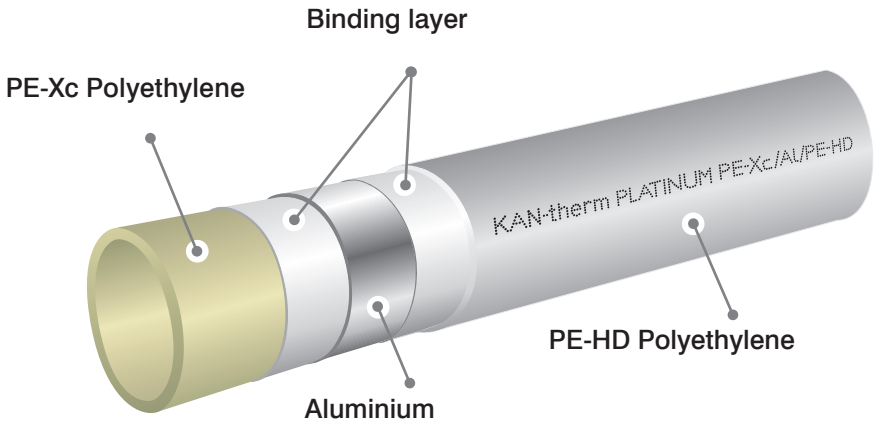
1.2 Pipes in the KAN-therm Push System

Pipe structure and material – physical properties

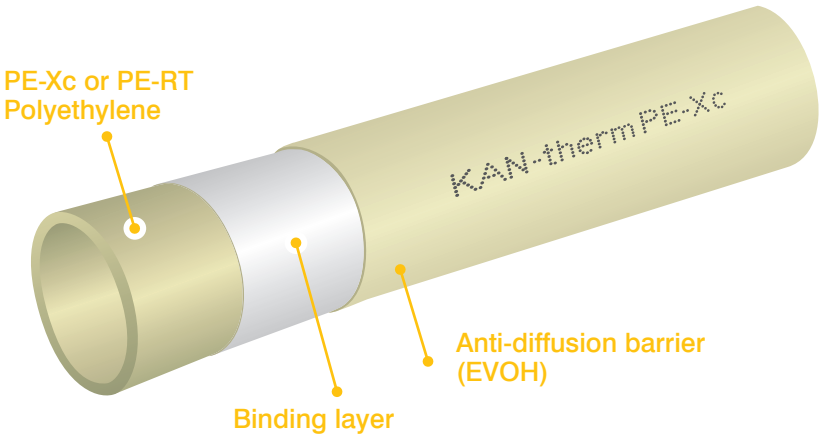
Due to economic and technical aspects, and the possibility of optimizing the scope of use, the KAN-therm Push System offers two types of polyethylene pipes with similar working parameters – PE-RT and PE-Xc pipes and PE-Xc/Al/PE-HD multilayer pipes.

- KAN-therm PE-Xc pipes are manufactured of high density polyethylene cross-linked with a stream of electrons on a molecular level (the "c" physical method, without the use of chemicals). Polyethylene structure cross-linking results in achieving the most optimal and very high resistance to thermal, and mechanic loads. Degree of cross-linking > 60%.
- Both pipe types have a barrier preventing the penetration (diffusion) of oxygen from the environment of heating water through pipe walls. The barrier consisting of EVOH coating (Ethylene vinyl alcohol) meets the requirements of DIN 4726 (penetrability < 0.10 g O_2/m^3 x d). EVOH-coated pipes may also be used in tap water installations.
- PE-Xc/Al/PE-HD KAN-therm Push Platinum pipes are multilayer pipes, in which the base pipe is made of polyethylene, cross-linked with a stream of electrons PE-Xc. A laser-welded layer of aluminum provides complete diffusion tightness and significantly reduces the thermal elongation of the pipe. The external layer is made of high density polyethylene PE-HD and shields the aluminum layer against damage. Thanks to such structure, pipes do not have a shape memory, allowing them to be formed in any way.

PE-Xc/Al/PE-HD Platinum pipe cross-section



Cross-section of PE-RT (PE-Xc) pipe with anti-diffusion coating



Physical properties of PE-RT, PE-Xc and PE-Xc/Al/PE-HD pipes

Property	Symbol	Unit	PE-Xc	PE-RT	PE-Xc/Al/PE-HD
Linear elongation coefficient	α	mm/m × K	0,14 (20 °C) 0,20 (100 °C)	0,18	0,025
Thermal conductivity	λ	W/m × K	0,35	0,41	0,4
Density	ρ	g/cm^3	0,94	0,933	0,95
Module E	E	N/mm^2	600	580	2950
Extension when stretching		%	400	1000	-
Minimal bending radius	R_{min}		5 × D	5 × D	5 × D 3 × D (with spring)
Internal wall roughness	k	mm	0,007	0,007	0,007

Marking of e.g. PE-RT pipes

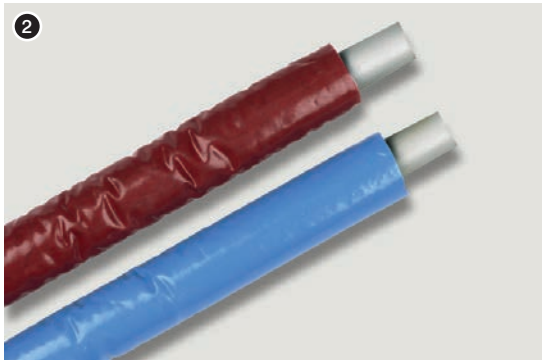
All pipes are marked with permanent descriptions with a 1-m span, containing i. a. the following indications:

Marking description	Example of marking
Name of manufacturer and/or trademark:	KAN, KAN-therm
Nominal external diameter x wall thickness	25 x 3.5
Pipe structure (material)	PE-RT
Pipe code	0.9226
Number of standard or Technical Certificate	DIN 16833
Application class/es with design pressure	Class 2/10 bar, Class 5/8 bar
Diffusion marking	Sauerstoffdicht nach DIN 4726
Date of production	18.08.09
Other manufacturer markings, e.g. running meter, batch number	045 m

Notice – other, additional markings, e.g. numbers of certificates (e.g. DVGW) may also be inscribed on the pipe.

PE-RT pipes

1. PE-RT pipes
2. PE-RT pipes with thermal insulation



Pipe color, packaging

The color of the pipe is milk-white, the surface – glossy (with anti-diffusion coating). Depending on pipe diameter, pipes are supplied in 200, 120, 50, 25-meter rolls in cardboard boxes and on 500, 1000, 3000 and 4000 m pallets. Pipes are also offered in a version with thermal insulation, 6 mm thick.

PE-RT pipe dimension parameters

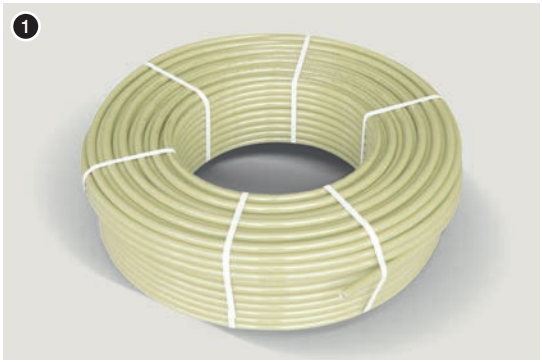
PE-RT pipes are offered in types of series: S (pipe series) corresponding to the pressure series PN 20 and PN 12.5.

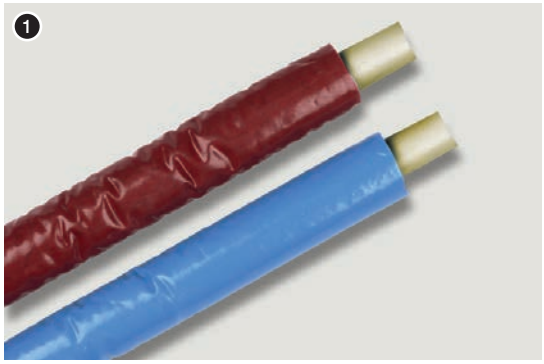
Dimensions, weight by unit, water capacity of PE-RT pipes

DN	External diameter x wall thickness mm × mm	Wall thickness mm	Internal diameter mm	S dimension series	Weight by unit kg/m	Number in roll m	Water capacity l/m
12	12 × 2,0	2,0	8,0	2,50	0,071	200	0,050
14	14 × 2,0	2,0	10,0	3,00	0,085	200	0,079
16	16 × 2,0	2,0	12,0	3,50	0,094	200	0,113
18	18 × 2,0	2,0	14,0	4,00	0,119	200	0,154
18	18 × 2,5	2,5	13,0	3,10	0,125	200	0,133
25	25 × 3,5	3,5	18,0	3,07	0,247	50	0,254
32	32 × 4,4	4,4	23,2	3,14	0,390	25	0,423

PE-Xc pipes

1. PE-Xc pipe
2. PE-Xc pipe with thermal insulation





Pipe color, packaging

The color of the pipe is creamy, the surface – glossy (with anti-diffusion coating). Depending on pipe diameter, pipes are supplied in 200, 120, 50, 25-meter rolls in cardboard boxes and on 500, 1000, 3000 and 4000 m pallets. Pipes of 12, 14 and 18 mm in diameter are also offered in a version with thermal insulation, 6 mm thick.

PE-Xc pipe dimension parameters

PE-Xc pipes are offered in types of series: S (pipe series) corresponding to the pressure series PN 20 and PN 12.5.

Dimensions, weight by unit, water capacity of PE-Xc pipes

DN	External diameter × wall thickness mm × mm	Wall thickness mm	Internal diameter mm	S dimension series	Weight by unit kg/m	Number in roll m	Water capacity l/m
12	12 × 2,0	2,0	8,0	2,50	0,071	200	0,050
14	14 × 2,0	2,0	10,0	3,00	0,085	200	0,079
16	16 × 2,0	2,0	12,0	3,50	0,094	200	0,113
18	18 × 2,0	2,0	14,0	4,00	0,119	200	0,154
18	18 × 2,5	2,5	13,0	3,10	0,125	200	0,133
25	25 × 3,5	3,5	18,0	3,07	0,247	50	0,254
32	32 × 4,4	4,4	23,2	3,14	0,390	25	0,423

PE-Xc/Al/PE-HD Platinum Pipes

Colour, packaging

The color of the pipe is silvery. Depending on pipe diameter, pipes are supplied in 200, 50, 25-meter rolls in cardboard boxes and on 3000, 750, 375 m pallets.

Dimensions, weight by unit, water capacity of PE-Xc/Al/PE-HD Platinum pipes

DN	External diameter x wall thickness mm × mm	Wall thickness mm	Internal diameter mm	Weight by unit kg/m	Number in roll m	Water capacity l/m
14	14 × 2,25	2,25	9,5	0,085	200	0,071
18	17 × 2,8	2,8	11,4	0,094	200	0,102
25	25 × 3,7	3,7	17,6	0,247	50	0,243
32	32 × 4,7	4,7	22,6	0,390	25	0,401

1.3 Scope of use

Pipes and joints in the **KAN-therm Push** are in full compliance with standards, which guarantees their long-term and reliable operation as well as full security of assembly and use of the installation.

- PPSU Push joints: compliance with PN-EN ISO 15875-3:2005: approved for use by the National Institute of Hygiene,
- brass joints and connectors: compliance with PN-EN 1254-3; approved for use by the National Institute of Hygiene,
- PE-RT pipes: compliance with PN-EN ISO 22391-2:2010; approved for use by the National Institute of Hygiene,
- PE-Xc pipes: compliance with PN-EN ISO 15875-2:2004; approved for use by the National Institute of Hygiene,
- PE-Xc/Al/PE-HD Platinum pipes: compliance with PN-EN ISO 21003-2, approved for use by the National Institute of Hygiene.

Working parameters and scope of use of PE-Xc and Platinum piping installations

Installation type and application class (acc. to ISO 10508)	T_{rob}/T_{max} [°C]	Av. nom. DN	Working pressure P_{rob} [bar]			Types of connections			
			PE-Xc	PE-RT	Platinum	Push (sliding ring)		Screwed	
						PE-RT PE-Xc	Platinum	PE-RT PE-Xc	Platinum (union adapter)
Cold tap water	20	12	10	10	-	+	-	+	-
		14	10	10	10	+	+	+	+
		16	10	10	-	-	-	+	-
		18	10	10	10	+	+	+	+
		25	10	10	10	+	+	+	-
		32	10	10	10	+	+	+	-
Hot tap water (class 1)	60/80	12	10	10	-	+	-	+	-
		14	10	10	10	+	+	+	+
		16	10	10	-	-	-	+	-
		18	10	10	10	+	+	+	+
		25	10	10	10	+	+	+	-
		32	10	10	10	+	+	+	-
Hot tap water (class 2)	70/80	12	10	10	-	+	-	+	-
		14	10	10	10	+	+	+	+
		16	8	8	-	-	-	+	-
		18	10	10	10	+	+	+	+
		25	10	10	10	+	+	+	-
		32	10	10	10	+	+	+	-
Floor heating, low-temperature heater system (class 4)	60/70	12	10	10	-	+	-	+	-
		14	10	10	10	+	+	+	+
		16	8	8	-	-	-	+	-
		18	10	10	10	+	+	+	+
		25	10	10	10	+	+	+	-
		32	10	10	10	+	+	+	-
Heater system (class 5)	80/90	12	10	10	-	+	-	+	-
		14	10	10	10	+	+	+	+
		16	10	8	-	-	-	+	-
		18	10	10	10	+	+	+	+
		25	10	10	10	+	+	+	-
		32	10	10	10	+	+	+	-

Notice

According to ISO 10508, the following application classes are distinguished, in which working temperature parameters are defined for installations (working temperature T_{rob}/ maximum temperature T_{max}/ failure temperature T_a):

1 – Hot tap water 60°C ($T_{rob}/T_{max}/T_a$ – 60/80/95)
2 – Hot tap water 70°C ($T_{rob}/T_{max}/T_a$ – 70/80/95)
4 – Floor heating, low-temperature heater system 60°C ($T_{rob}/T_{max}/T_a$ – 60/70/100)
5 – Heater system 80°C ($T_{rob}/T_{max}/T_a$ – 80/90/100)

Working temperature for particular application classes depends on the series of pipes S (types of series by dimensions)

$$S = (d_n - e_n) / 2e_n$$

where d_n – internal diameter of the pipe; e_n – pipe wall thickness

1.4 Transport and storage

PE-RT, PE-Xc and Platinum multilayer pipes may be stored in temperatures up to 30°C. They may also be stored in temperatures below 0°C, however, they must be protected against dynamic shocks in such conditions. During transport, pipes must be protected against mechanic damage. Due to sensitivity to ultraviolet rays, pipes must not be exposed to direct, long-term sun rays.

1.5 PE-Xc, PE-RT and PE-Xc/Al/PE-HD Platinum installation joints

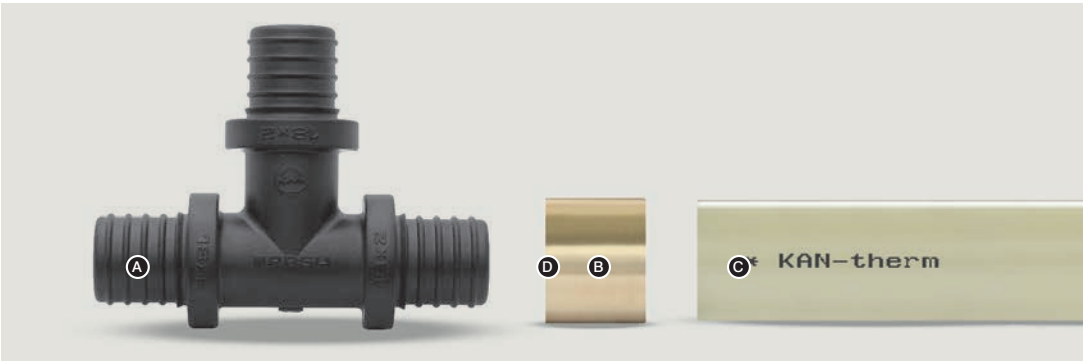
The basic technique of connecting pipes in the KAN-therm system is the Push clamping technique using a sliding brass ring. Screwed clamp joints may also be used to connect pipes to devices and fixtures.

Push joints with slide rings

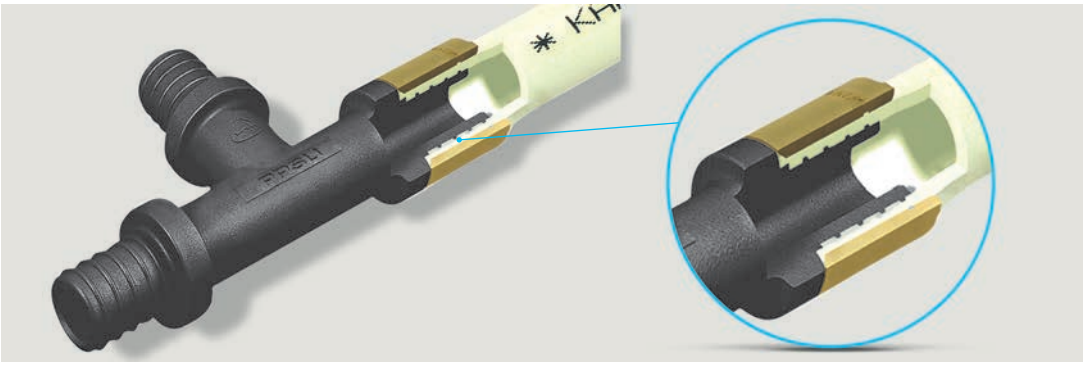
Fittings in the Push System are equipped with special profiled stubs (without additional sealants) inserted into the expanded ending of the pipe, and after that a brass ring is slid onto the joint. The pipe is then tightened radially on the stub. Such connection allows for conducting installations in construction partitions (in flooring finishing coats and under layers of plaster), without any limitations. In the KAN-therm system, fittings are universal for all types of pipes.

Components of Push joints

a. Push fitting
b. Brass ring for Push joints
c. PE-RT, PE-Xc or PE-Xc/Al/PE-HD Platinum pipe
d. Chamfered internal edge of the ring



Cross-section of a Push joint



Push fittings

Fittings in the KAN-therm system are universal. They may be used to connect PE-RT and PE-Xc polyethylene pipes as well as PE-Xc/Al/PE-HD Platinum multilayer pipes.

KAN-them Push offers a comprehensive selection of fittings with slide rings:

1. elbows and tees, couplings,
2. elbows, tees and other fittings with 15 mm brass nickel-plated pipes for connecting to radiators and fixtures,
3. fittings with male and female threads, union adapters,
4. tap connections,

Fittings are made of advanced PPSU material or high quality brass.

Push fittings

Push fittings for connecting radiators*

Threaded Push fittings

ISO 9001

Push fittings – tap and valve connections*

* Methods of connecting radiators and taps using KAN-therm Push System fittings are presented in a separate chapter titled Water supply and heating distribution installation joints in the KAN-therm System.

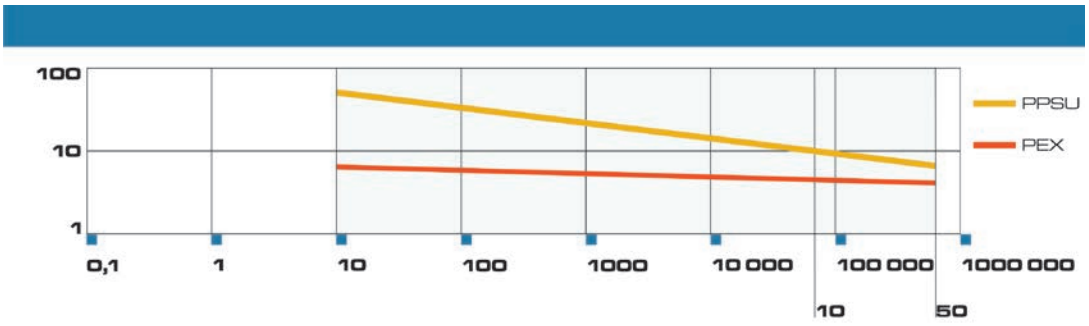
PPSU – Perfect installation material

Polyphenylsulfone (PPSU) is a reliable structural material, used to construct installations, f.i. as a building material in joints and fittings, pump enclosures, exchanger elements, components and inserts of intake taps for many years now.

In the KAN-therm Push System, PPSU is used to manufacture elbows, tees, couplings and tap connections.

- its neutral character in contact with water and food, proven by numerous tests carried out by world leading testing institutions (NSF, WRc)
- high resistance to ageing processes as a result of high temperature and pressure impact, allowing for the use of this material in hot tap water and central heating installations and guaranteeing over 50-year life span of our fittings
- proper resistance to water erosion, even for water with very high chlorine content and very high temperatures
- no permanent deformations of the material subjected to mechanic impacts in high temperatures, which determines the stability of fittings in time (resistance to material creeping), and thus the tightness of joints.
- high resistance to impacts and mechanic loads
- small weight compared to metal fittings.

Durability of PPSU fittings is higher compared to plastic pipes



Contact with substances containing solvents, thread sealants

Avoid direct contact of KAN-therm System elements with solvents or materials containing solvents, such as varnish, aerosol, assembly foam, adhesive. In unfavorable circumstances, these substances could potentially damage the plastic components of pipes. Make sure that substances sealing the joints, cleaning solutions or solutions used to insulate KAN-therm System components do not contain any compounds which could cause tension fractures. These are ammonia, solutions containing ammonia, aromatic solvents and compounds retaining oxygen (e.g. ketone or ether) or chlorinated hydrocarbons. Do not use assembly foams manufactured out of methacrylate, isocyanate, or acrylate. In threaded joints, use an amount of tow which leaves the ending of thread bare and visible. Too much tow may disrupt the thread. Winding tow just above the first coil of the thread will prevent the tow from tangling up and the thread from being damaged.

Notice!

Do not use chemical sealants or adhesives.

Execution of Push joints with slide rings

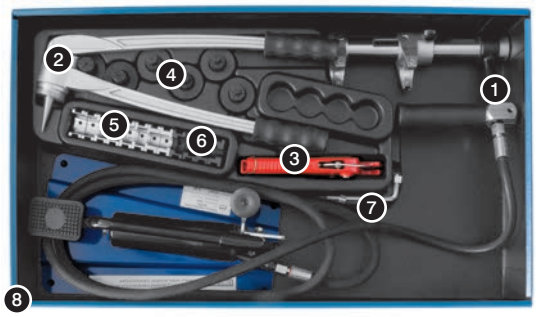
Tools

Use only original **KAN-therm** tools to execute all joints in the **KAN-therm Push System**. The tools are available as single elements or in complete sets.

Before starting any works, please read all instruction manuals for the tools. Instruction manuals are located in tool packs or in tool boxes. A set of tools includes:

- a pipe cutter
- an expander for pipe (manual or battery-powered)
- a set of expander heads
- manual chain press with a set of 12 – 25 mm inserts or a hydraulic pedal press, or a battery-powered press
- a set of inserts in various configurations, depending on the type of fittings connected (see notice below)
- a tool box.

A set with hydraulic press and pedal drive



1. hydraulic press with pedal drive
2. pipe expander
3. pipe cutter
4. a set of expander heads (12x2; 14x2; 18x2; 18x2.5; 25x3.5; 32x4.4)*
5. a set of inserts for slide rings (12, 14, 18, 25) – 2 pieces each
6. a set of inserts for plastic fittings (T12, T14; T18; T25) – 1 piece each
7. an allen key
8. tool box

* only for PE-RT and PE-Xc pipes

A set with manual chain press

1. manual chain press
2. pipe expander
3. PE-RT and PE-Xc pipe cutter
4. a set of expander heads (12x2; 14x2; 18x2; 18x2.5; 25x3.5; 32x4.4)
5. a set of inserts for slide rings (12, 14, 18, 25) – 2 pieces each
6. a set of inserts to plastic fittings (T12, T14, T18, T25) – 1 piece each
7. two pairs of forks for connecting the following diameters: 12-18mm and 25-32mm
8. tool box

* only for PE-RT and PE-Xc pipes; there is a possibility of ordering a set with expander heads adapted to Platinum pipes

A set with battery-powered press

1. AAP102 battery-powered press – 1 piece
2. AXI102 battery-powered expander – 1 piece
3. 12V 1,5Ah battery (standard) – 2 pieces
4. Charger – 1 piece
5. Tool box – 1 piece
6. Press insert box – 1 piece
7. Press insert (for PPSU Push tees and elbows) 12x2, 14x2, 18x2 (18x2.5), 25x3.5 (1 piece each)
8. Press insert (for Push joints) – code: 12x2, 14x2, 18x2 (18x2.5), 25x3.5 (2 pieces each)
9. Expander head – 12x2, 14x2, 18x2, 18x2.5, 25x3.5, 32x4.4 (1 piece each)*.

* only for PE-RT and PE-Xc pipes

Push Platinum expanding heads

Use standard tool sets with Push Platinum expander heads to connect Platinum pipes. Our Push Platinum expander heads have a distinctive silver stripe on the circumference, with a Platinum inscription on. **Do not use these expander heads for PE-RT or PE-Xc pipes**!

Push Platinum expander heads - for diameters **14**, **18**, **25**, **32**

Assembly of Push joints

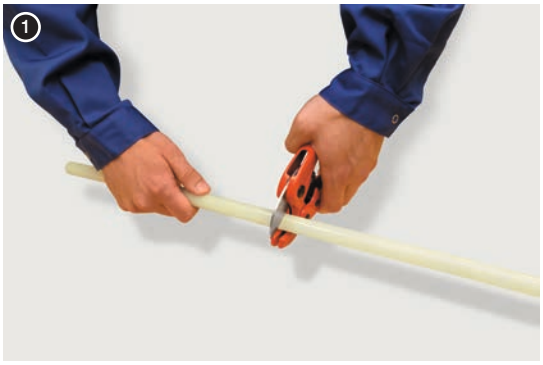
1. Cut the PE-Xc or PE-RT pipe perpendicularly to the axis at a required length, using pipe cutter designed for plastic pipes. Other tools or pipe cutters (also blunt or chipped pipe cutters) are not acceptable).

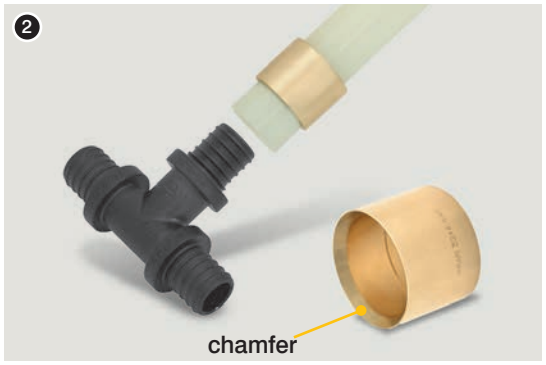
2. Slide the ring onto the pipe with the chamfered end facing the fitting.

3. Mount head on manual or battery-powered expander, adapting the size of the head to the type of the pipe and proper diameter. Expand the pipe with the expander in three stages.
I – incomplete expansion, expander rotation by 30°;
II – incomplete expansion, expander rotation by 15°;
III – full pipe expansion.

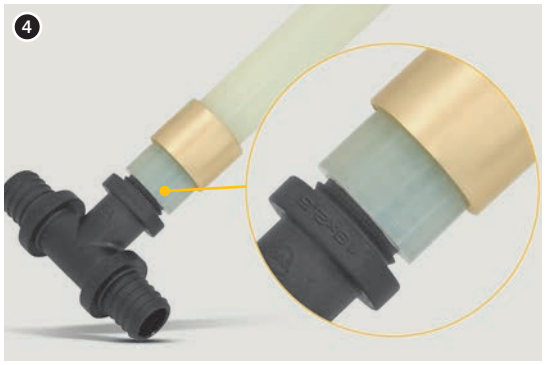
In temperatures below 5°C, we recommend heating the expanded pipe ending with hot (up to 90°C) air or water. The clamp ring must not be in the vicinity of the pipe expansion area.

4. Directly (!) after expanding, slide the fitting into the pipe, up to the last groove on the stub of the fitting (do not push the pipe up to the collar of the fitting). Do not apply lubricants.





Use Push Platinum expander heads for multilayer Platinum pipes!



5. Slide the ring using a manual press...
6. ...hydraulic press with pedal drive or...

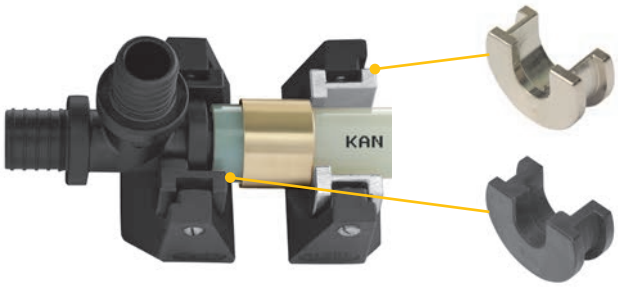
7. ...a battery-powered press. Grab fittings only by their collars. Do not slide two rings at the same time. Before starting to slide rings onto pipe joints, make sure you mounted the right inserts on press forks – see notice below.

8. After sliding the ring up to the collar of the fitting, stop the process. The joint is ready for a pressure test.

Assembly of PPSU fittings

To mount Ø12, 14, 18, 25 mm fittings made of PPSU, use only black inserts marked with the letter T (code PT8471, PT8469, PT 8468, PT8467) at the side of the fitting, and common nickel-plated inserts (code PT8471, PT8469, PT 8468, PT8467) at the side of the ring. Plastic fitting should be supported by a collar, at which the ring is slid. Do not execute joints with two rings at the same time!

Notice
When assembling a Ø32 mm PPSU fitting, use a common nickel-plated Ø25 mm insert (code P8467) at the side of the fitting, and bare press fork (without insert) at the side of the ring.



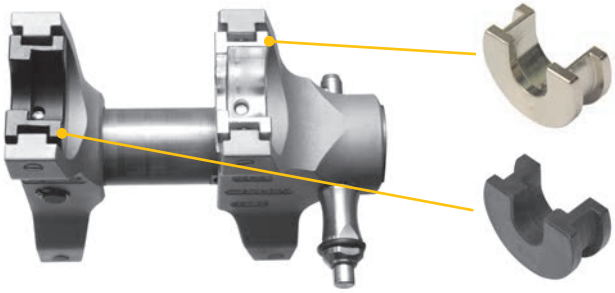
common nickel-plated insert P, e.g. for Ø14 mm P8469

common black insert PT, e.g. for 14 mm diameters, PT8469

common nickel-plated insert Ø25 mm P8467

press clamp

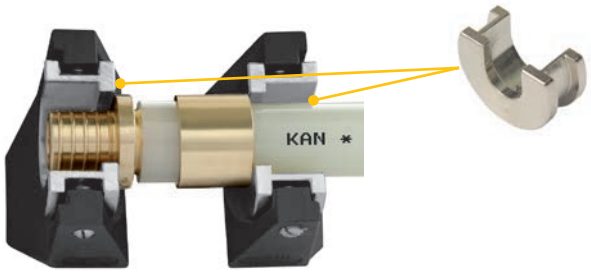
Notice
In order to ensure correct assembly of KAN-therm Push System fittings using the Novopress battery-powered press, it is important to ensure correct assembly of inserts on press forks.



Assembly of brass fittings

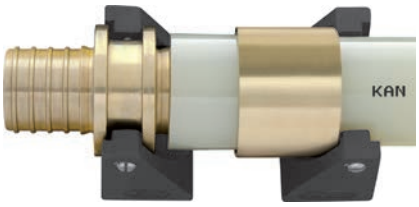
Assembly of brass elements is performed using nickel-plated inserts (with the exception of 32 mm diameters):

— for joints, tees couplings and elbows Ø12, 14, 18, 25 mm, apply nickel-plated, common inserts of the following codes: P8471, P8469, P8468, P8467. Assembly on the stub of Ø32 mm fittings shall be made using forks without inserts,



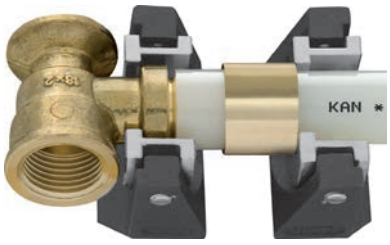
common nickel-plated insert P, e.g. for 14 mm diameters P8469

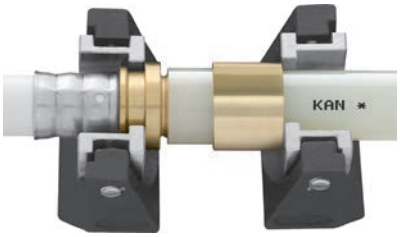
— for brass joints Ø32 mm, apply bare forks, without inserts,

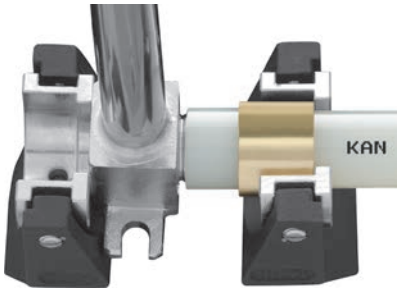


assembly of a Ø32 mm joint without the use of inserts

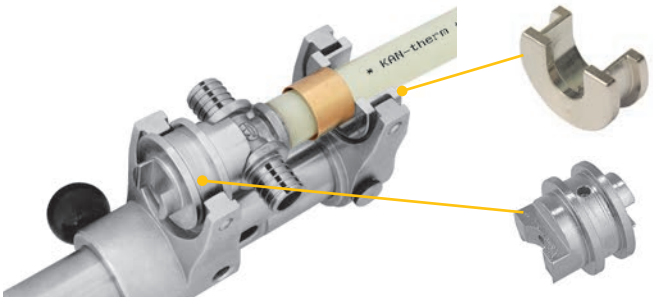
— assembly of other brass elements (threaded fittings, tap connections (with the exception of angle connections) and connections to radiators may be executed with the use of common nickel-plated inserts with the following codes: P8471, P8469, P8468, P8467,







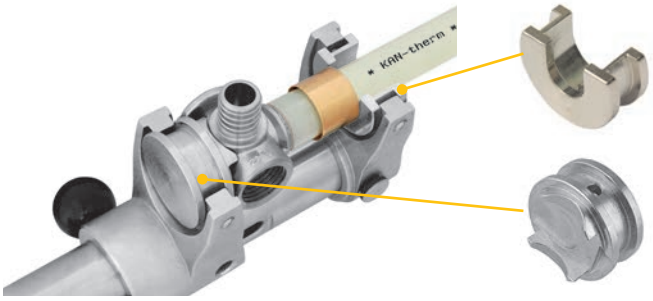
— for Ø14, 18, 25 mm tees apply positive nickel-plated inserts coded correspondingly P8465, P8463, P8468, P8464 at the side of the fittings. At the side of the ring, apply common nickel-plated inserts.



common nickel-plated insert, e.g. for Ø18 mm P8468

shaped nickel-plated insert, e.g. for Ø18 mm P8463

Notice
Tool sets do not include shaped inserts. Shaped inserts fits only hydraulic press with pedal drive.



common nickel-plated insert, e.g. for Ø18 mm P8468

shaped nickel-plated insert, e.g. for Ø18 mm P8463

If a need arises to disassemble an installation fragment (ill-executed joint, modernization), there is a possibility of recovering a disassembled fitting (only the brass one). The fitting must be cut out of the installation with fragments of pipes connected to it. Then the joint needs to be warmed with a blow of hot air. After examining the technical condition of the fitting, it may be reused.

KAN-therm PE-RT and PE-Xc pipes and KAN-therm Platinum pipes may be bent maintaining a radius not smaller than 5D (outer dimensions). In the case of Platinum pipes and the use of a bending spring, the radius may be decreased to 3D. The first bend may be executed at a distance from the nearest joint at least 10D.

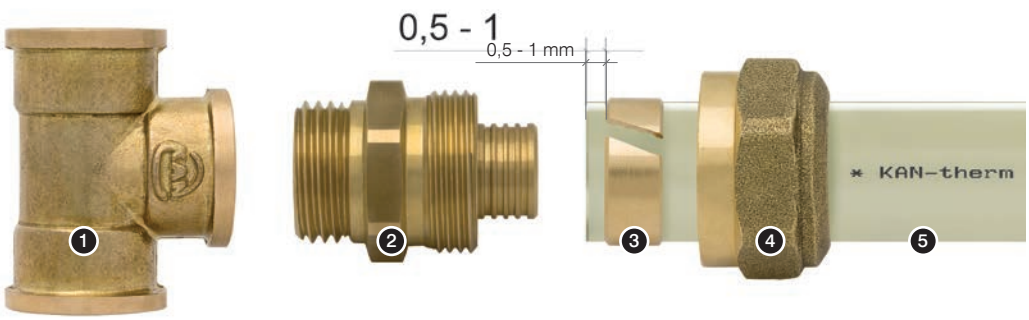
Screwed clamping joints (couplings)

Screwed clamping joints

Joints in connections of this type are made of brass. A joint consists of a joint body with a stub, which a pipe ending is mounted on, a brass, diagonally cut ring and a threaded clamping nut. Such joints are compatible with brass KAN-therm fittings with female threads, such as elbows, tees, tap connections, manifolds without nipples (without fixtures), as well as fixtures with female threads.

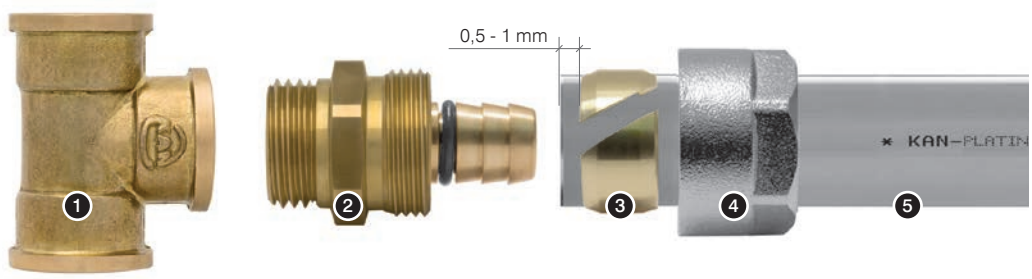
Elements of a screwed joint for PE-RT and PE-Xc pipes.

1. Fitting – e.g. tee with female thread.
2. Joint body with male thread
3. Diagonally cut ring
4. Clamping nut
5. PE-RT or PE-Xc pipe
Notice: screwedjoints for PE-RT / PE-Xc and Platinum pipes are not interchangeable



Elements of a screwed joint for Platinum pipes.

1. Fitting – e.g. tee with female thread
2. Joint body with male thread (with an O-Ring)
3. Diagonally cut ring
4. Clamping nut
5. PE-Xc/Al/PE-HD Platinum pipe.
Notice: screwed joints for PE-RT / PE-Xc and Platinum pipes are not interchangeable!



Joints and fixtures with female threads compatible with screwed joints.

Joins are to be executed in the following order:

1. Screw the body of the joint into the fitting (fixture), sealing the thread with tow or tape
2. Insert the clamping nut onto the pipe, and then mount a ring on the ending of the pipe, whereas the edge of the ring should be located 0.5 to 1.0 mm away from the edge of the pipe
3. Slide the pipe onto the stub of the fitting until it stops (do not apply any lubricants, do not twist the fitting)
4. Screw the clamping nut on the ring.

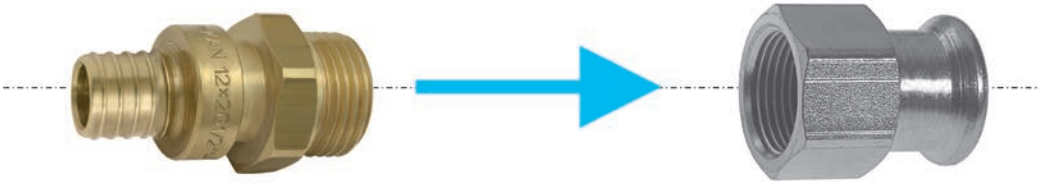
Such joint may be disassembled, provided that, after sliding the stub of the fitting out of the pipe, you must cut off the ending of the pipe and execute a new joint afterwards.

The principle of connecting threaded KAN-therm elements

Notice
Do not connect brass elements with female threads (cylindrical form) with piping elements with male threads (cone form), due to safety reasons. In unfavorable conditions, the brass body might break. Assume a principle that KAN-therm joints and fittings with female threads should not be connected to elements from outside the system.

Brass System KAN-therm Push or System KAN-therm Press male thread fitting

System KAN-therm Steel or KAN-therm Inox female thread fitting

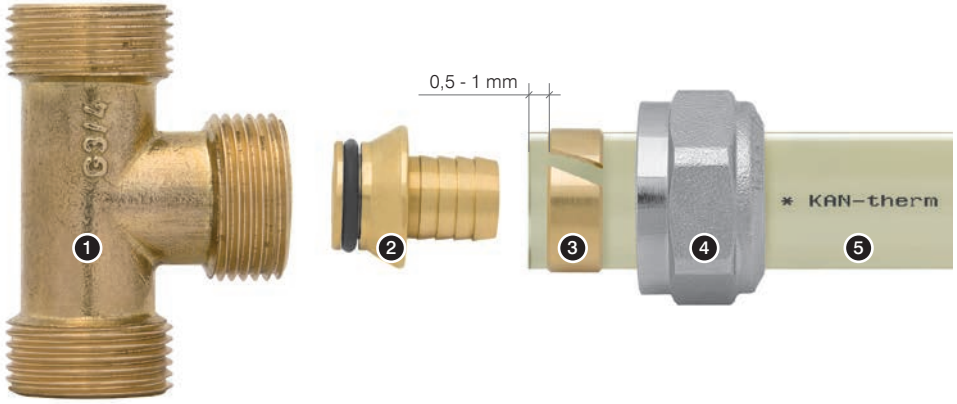


Screwed clamping joints – union adapters

It is a variation of screwed joints, in which the basic element is a cone ended stub with O-Ring sealing. Such joint does not require any additional sealants. The joint may be disassembled, provided that the pipe mounted on the stub is not removed. There are two types of joints available: 1 – for PE-RT and PE-Xc pipes; 2 – for multilayer Platinum pipes.

Elements of a screwed union joint

1. Fitting – e.g. tee with male thread
2. Union adapter body (with a black O-ring)
3. Diagonally cut ring
4. Clamping nut
5. PE-RT or PE-Xc pipe



Elements of a Platinum screwed union joint

1. Fitting – e.g. tee with male thread
2. Union adapter body (with an O-ring)
3. Diagonally cut ring
4. Clamping nut
5. PE-Xc/Al/PE-HD Platinum pipe

Union joints are compatible with:

- the KAN-therm 9012 series of fittings with male threads
- KAN-therm manifolds equipped with special ¾" nipples
- combined radiator valves

Fittings and fixtures with male threads compatible with screwed union adapters

Notice
Do not execute screwed joints inside flooring. They must be located in easily accessible places.

Table of contents

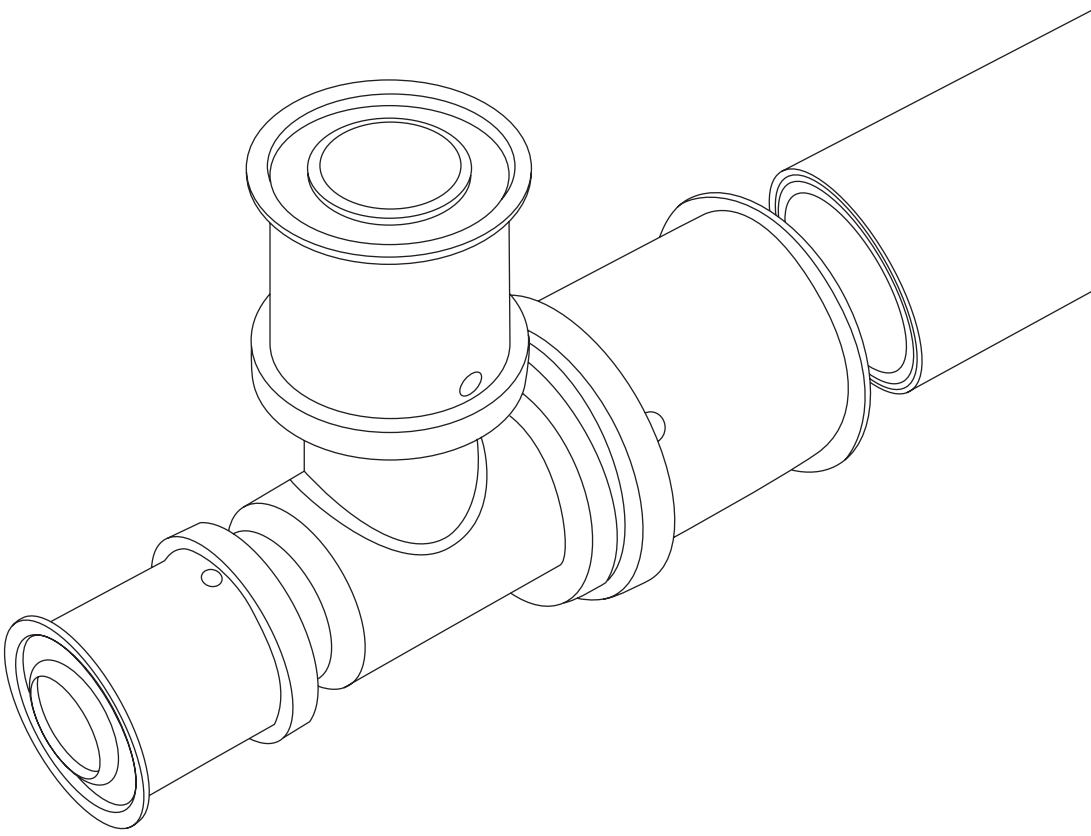
2 KAN-therm Press

Ø 16-63 mm

KAN-therm

Press / Press LBP

Innovativeness and uniqueness
- One system, six functions



ISO 9001

2 KAN-therm Press

2.1 General information

KAN-therm Press is a state-of-the-art, complete installation system consisting of multilayer polyurethane pipes and PE-Xc and PE-RT pipes with anti-diffusion coating, as well as PPSU or brass fittings of Ø(14)16-63 mm in diameter. The Press technique for connecting pipes is based on pressing a steel ring on a pipe mounted on a stub of a fitting or coupling.

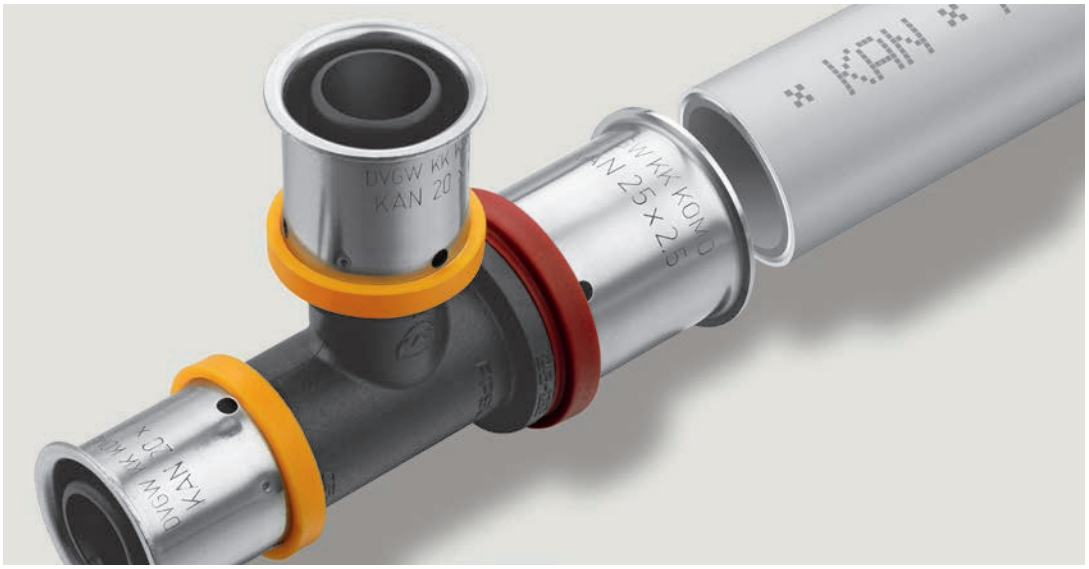
The stub is equipped with O-rings ensuring complete tightness of the joint and reliable operation of the installation.

The system is designed for indoor water supply installations (cold and hot tap water), central heating installations (cooling installations), technological heating installations and industrial installations (compressed air).

KAN-therm Press is characterized by:

- high operating parameters (max. working temperature of 90°C, permissible failure temperature – 100°C)
- very low thermal elongation of multilayer pipes
- complete lack of oxygen diffusion to installation water
- guaranteed durability for over 50 years
- universal pipe applications (one pipe for combined water supply and heating installations)
- resistance to pressure shock
- high smoothness of internal surfaces
- resistance to scaling
- physiological and microbiological neutrality in potable water installations
- environmentally friendly materials
- easy and quick installation
- easy and quick assembly (in the case of LBP fittings, pipe endings do not need chamfering or calibration)
- low installation weight
- possibility of executing joints in structural partitions
- feature of signaling accidentally ill-pressed LBP fittings
- universal application – possibility of using multilayer pipes and PE-Xc and PE-RT pipes interchangeably.

KAN-therm Press



2.2 Pipes in the KAN-therm Press System

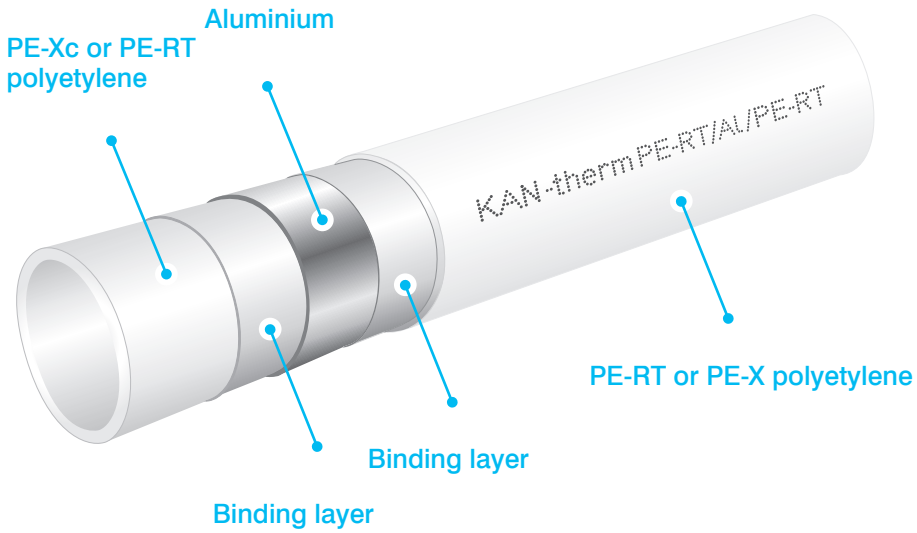
Multilayer pipes

Multilayer KAN-therm pipes are offered in two variations of identical structures, differing in terms of the type of internal, base pipes – PE-RT/Al/PE-RT (PE-HD) pipes (diameters Ø14 – 40 mm) and PE-X/Al/PE-X pipes (Ø50 – 63 mm).

Multilayer pipes consist of the following layers: internal layer (base pipe) made of polyethylene of increased thermal resistance PE-RT (or PE-X), ultrasound butt-welded middle layer aluminum tape, and the external layer (shielding) made of polyethylene (PE-HD, PE-RT or PE-X). An adhesive binding layer is applied between the aluminum and plastic layers. KAN-therm System Pipes of all diameters are offered in one pressure type (Multi Universal).

The aluminum layer serves as a anti-diffusion barrier and lowers the thermal pipe elongation index 8 times, as compared to uniform polyethylene pipes. Thanks to the butt welding of Al tape, pipes have perfect circular cross-section.

Cross-section of a multilayer KAN-therm pipe



Physical properties of multilayer pipes

Property	Symbol	Unit	Value
linear elongation coefficient	α	mm/m × K	0,023 – 0,025
thermal conductivity	λ	W/m × K	0,43
minimal bending radius	R_{min}		5 × D
internal wall roughness	k	mm	0,007

Multilayer KAN-therm pipes

ISO 9001

Marking of e.g. PE-RT pipes

All pipes are marked with permanent descriptions with a 1-m span, containing i. a. the following indications:

Marking description	Example of marking
Name of manufacturer and/or trademark:	KAN, Multi Universal, KAN-therm
Nominal external diameter x wall thickness	16 × 2
Pipe structure (material)	PE-RT/Al/PE-HD
Pipe code	0.9416
Number of standard or Technical Certificate	KIWA KOMO, DVGW
Application class/es with design pressure	Class 2/10 bar, Class 5/10 bar
Date of production	18.08.09
Other manufacturer markings, e.g. running meter, batch number	045 m

Notice – other, additional markings, e.g. numbers of certificates (e.g. DVGW) may also be inscribed on the pipe.

Pipe color: white.

Depending on pipe diameter, pipes are supplied in 200, 100, 50, 25 rolls (scope 14-40 mm) in cardboard boxes. Pipes in diameter 32-63 mm are also offered in 5 m bars.

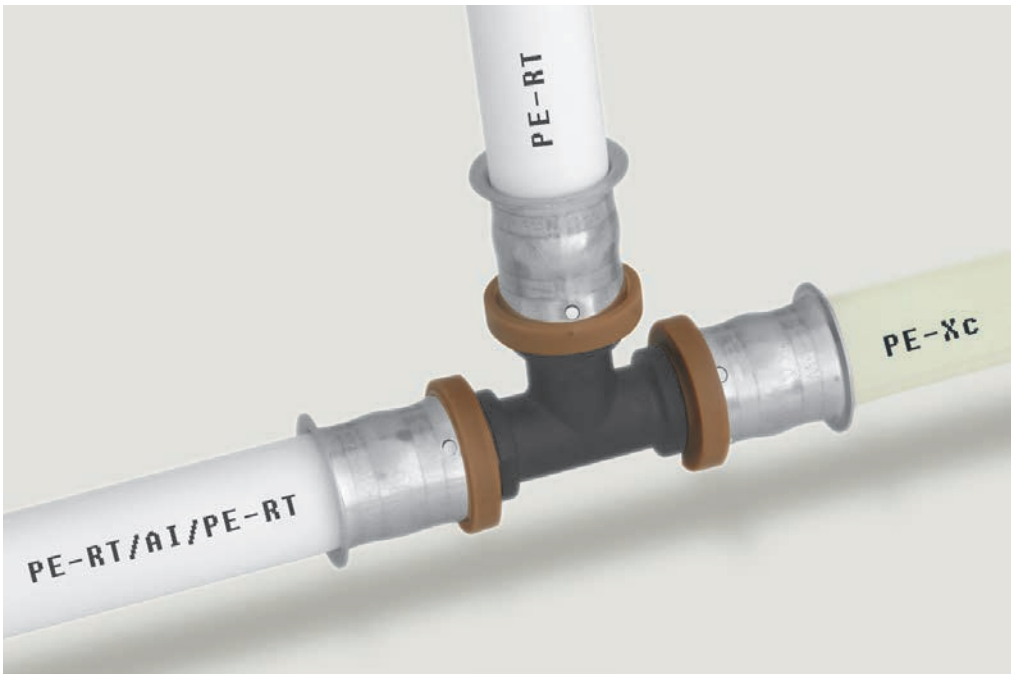
Dimension parameters of multilayer pipes

DN	External diameter × wall thickness mm × mm	Wall thickness mm	Internal diameter mm	Weight by unit kg/m	Number in roll/bar m	Water capacity l/m
			PE-RT/Al/PE-HD Multi Universal			
14	14 × 2,0	2,0	10	0,102	200	0,079
16	16 × 2,0	2,0	12	0,129	200	0,113
20	20 × 2,0	2,0	16	0,152	100	0,201
25	25 × 2,5	2,5	20	0,239	50	0,314
26	26 × 3,0	3,0	20	0,296	50	0,314
32	32 × 3,0	3,0	26	0,365	50	0,531
40	40 × 3,5	3,5	33	0,510	25	0,855
			PE-RT/Al/PE-HD Multi Universal			
32	32 × 3,0	3,0	26	0,365	5m/50	0,531
40	40 × 3,5	3,5	33	0,510	5m/50	0,855
			PE-RT/Al/PE-RT Multi Universal			
14	14 × 2,0	2,0	10	0,102	200	0,079
16	16 × 2,0	2,0	12	0,129	200	0,113
20	20 × 2,0	2,0	16	0,152	100	0,201
25	25 × 2,5	2,5	20	0,239	50	0,314
26	26 × 3,0	3,0	20	0,296	50	0,314
32	32 × 3,0	3,0	26	0,365	50	0,531
40	40 × 3,5	3,5	33	0,510	25	0,855
			PE-RT/Al/PE-RT Multi Universal			
32	32 × 3,0	3,0	26	0,365	5m/50	0,531
40	40 × 3,5	3,5	33	0,510	5m/50	0,855
			PE-X/Al/PE-X Multi Universal			
50	50 × 4,0	4,0	42	0,885	5m/20	1,385
63	63 × 4,5	4,5	54	1,265	5m/20	2,290

PE-Xc and PE-RT pipes with anti-diffusion coating

The structure of KAN-therm Press LBP fittings allows for executing joints with the use of both multilayer PE-RT/Al/PE-HD, PE-RT/Al/PE-RT pipes and uniform PE-Xc and PE-RT pipes with anti-diffusion barrier. PE-Xc and PE-RT pipes may be used in heating installations (application class 4 and 5 according to ISO 10508).

KAN-therm Press LBP fittings are universal – may be used to connect multilayer pipes and PE-Xc and PE-RT pipes



The structure and properties of these pipes is presented in the Guide to Pipes in the KAN-therm Push System.

Dimension parameters of PE-Xc and PE-RT pipes

DN	External diameter × wall thickness mm × mm	Wall thickness mm	Internal diameter mm	Size S series	Weight by unit kg/m	Number in roll m	Water capacity l/m
			KAN-therm PE-Xc pipes				
16	16 × 2,0	2,0	12,0	3,50	0,094	200	0,113
20	20 × 2,0	2,0	16,0	4,50	0,117	200	0,201
			KAN-therm PE-RT pipes				
16	16 × 2,0	2,0	12,0	3,50	0,094	200	0,113
20	20 × 2,0	2,0	16,0	4,50	0,117	200	0,201

Scope of use

KAN-therm Press pipes and fittings are in full compliance with all applicable standards, which guarantees their long-term and reliable operation as well as full security of assembly and use of the installation.

- PPSU and brass Press joints utilizing pressed rings and screwed brass fittings: compliance with PN EN ISO 21003-3:2009, approved for use by the National Institute of Hygiene,
- PE-X/Al/PE-X pipes: compliance with PN-EN ISO 21003-2:2009, approved for use by the National Institute of Hygiene,
- PE-RT/Al/PE-RT pipes: compliance with PN-EN ISO 21003-2:2009, approved for use by the National Institute of Hygiene,
- PE-Xc pipes: compliance with PN-EN ISO 15875-2:2004; approved for use by the National Institute of Hygiene,
- PE-RT pipes: compliance with PN-EN ISO 22391-2:2010; approved for use by the National Institute of Hygiene.

The working parameters and scopes of use of multilayer KAN-therm pipe installations are presented in the table.

Application (acc. to ISO 10508)	Dimensions	Pipe type	Joint system	
			Press	Screwed
Cold tap water. Hot tap water [Application class 1(2)] T_{rob}/T_{max} = 60(70)/80 °C P_{rob} = 10 bar	14 × 2,0	PE-RT/Al/PE-HD Multi Universal or PE-RT/Al/PE-RT Multi Universal	-	+
	16 × 2,0 20 × 2,0 25 × 2,5 26 × 3,0		+	+
Floor heating, low-temperature radiator heating [Application class 4] T_{rob}/T_{max} = 60/70 °C P_{rob} = 10 bar	32 × 3,0 32 × 3,0 40 × 3,5 40 × 3,5		+	-
Radiator heating [Application class 5] T_{rob}/T_{max} = 80/90 °C P_{rob} = 10 bar	50 × 4,0 63 × 4,5	PE-X/Al/PE-X Multi Universal	+	-
For all classes T_{awarii} = 100 °C				

Notice

Working parameters were assumed on the basis of ISO 10508 standard, defining the application classes in heating installations and hot tap water installations.

The working parameters and scopes of use of KAN-therm PE-Xc and PE-RT Press LBP installations are presented in the table:

Application (acc. to ISO 10508)	Dimensions	Pipe type
Low--temperature radiator heating [Application class 4] T_{rob}/T_{max} = 60/70 °C P_{rob} = 6 bar	16 × 2,0 20 × 2,0	PE-Xc
Radiator heating [Application class 5] T_{rob}/T_{max} = 80/90 °C P_{rob} = 6 bar	16 × 2,0 20× 2,0	PE-RT

PE-RT and PE-Xc pipes may only be used with KAN-therm Press LBP joints and union adapters designed for use with these pipes.

2.3 Joints in multilayer KAN-therm pipe installations

The basic method of connecting pipes in the KAN-therm System is using the "press" technique utilizing a pressed steel ring. Screwed joints may also be used to connect pipes to devices and fixtures.

Press joints

The execution of press joints is based on pressing a steel ring located on the stub of a fitting. The stub is equipped with O-ring sealing made of synthetic EPDM rubber, resistant to high temperatures and pressure. The ring is pressed with a manual or electric press tool equipped, depending on the diameter of the pipe, with "U", "C", or "TH" profile jaws (standard pressing). Such a connection allows for conducting the installation in structural partitions (in flooring finishing coats and under layers of plaster).

Depending on their diameter, KAN-therm press fittings are offered in two structural variations –

KAN-therm Press and new generation KAN-therm Press LBP fittings. They differ in terms of outer appearance, methods of assembly and some functions:

- KAN-therm Press LBP fittings (with colored spacers) – diameters 16, 20, 25, 26, 32 mm
- KAN-therm Press fittings (without colored spacers) – diameters 40, 50 and 63 mm

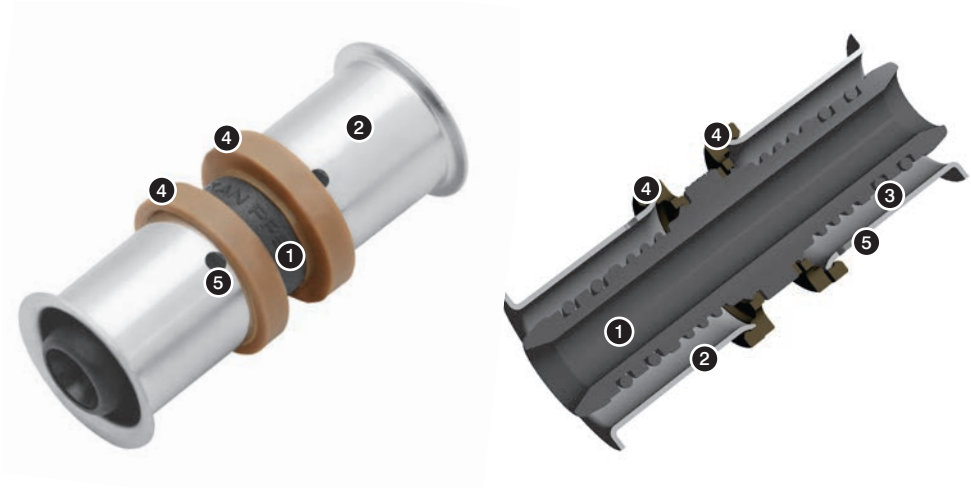
Structure and features of KAN-therm Press LBP fittings

Thanks to their special structure, KAN-therm Press LBP fittings are characterized by:

- a function of signaling ill-pressed LBP joint
- possibility of using "U" or "TH" profile jaws interchangeably
- elimination of need to chamfer the edge of the pipe
- precise jaws positioning on the ring
- colorful, plastic identification rings

View and cross-section of a KAN-therm Press LBP fitting

1. Coupling body
2. Pressed stainless steel ring with inspection holes
3. EPDM O-rings
4. Color plastic spacer
5. Inspection holes in the steel ring



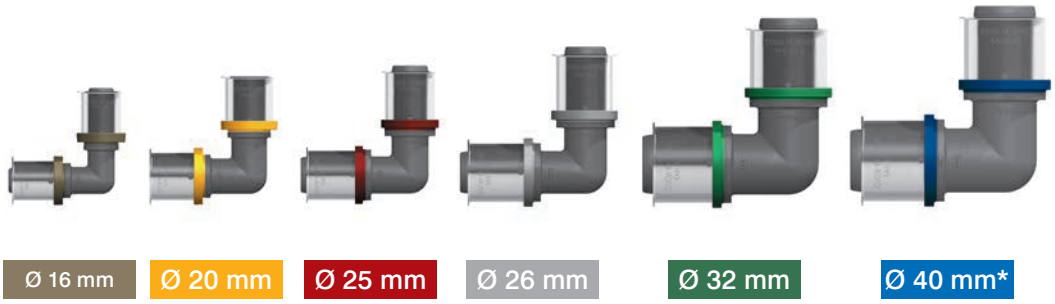
LBP – „Leak Before Press" – an ill-executed joint is signaled by a water leak at the stage of preliminary non-pressurized installation filling, before the pressure test. This function complies with DVGW guidelines ("controlled leak").

LBP function in action – leak before press

Identification of KAN-therm Press LBP fittings

Each KAN-therm Press LBP fitting is equipped with a special plastic ring, the color of which depends on the diameter of the pipe being connected. This solution facilitates the identification of the fitting and, in consequence, installation works at the construction site and in the warehouse. Irrespective of the color identification, each stub has a marking stating the diameters of pipes to be connected.

The dimensions of pipes (external diameter x wall thickness) are also inscribed on the steel rings.



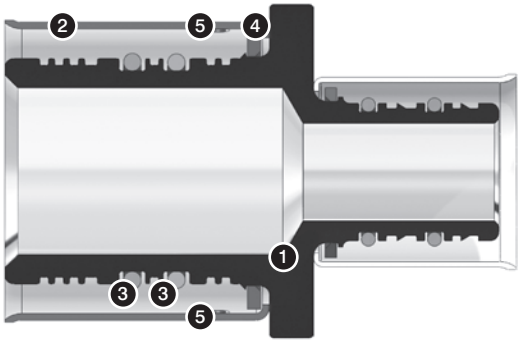
*40 mm fittings do not posses LBP function itself

Features of KAN-therm Press joints

All fittings of nominal diameter – 40, 50 and 63 mm (including 40, 50 and 63 mm stubs of reduction joints) have traditional structure and are marked as KAN-therm Press fittings. They are distinguished by the lack of a colored plastic ring, the lack of LBP function and a slightly different method of assembly in terms of pipe ending treatment and positioning of jaws (presented in the following part of the Guide).

View and cross-section of KAN-therm Press joint

1. Coupling body
2. Pressed stainless steel ring
3. EPDM O-rings
4. Rings positioning the steel ring on the body
5. Inspection holes in the steel ring



KAN-therm pressed fittings – assortment

The KAN-therm system offers a wide selection of pressed fittings with integrated steel rings:

- elbows and tees, couplings
- elbows, tees and other fittings with 15 mm nickel-plated pipes for connecting to radiators and fixtures
- fittings with male and female threads, and union adapters
- tap connections
- interconnector couplings.

KAN-therm press fittings are offered in two structural variations:

KAN-therm Press LBP Fittings (diameters 16–40 mm)

KAN-therm Press LBP pressed fittings

KAN-therm Press LBP pressed fittings with 15 mm pipes for connecting to radiators*

KAN-therm Press LBP pressed fittings with threads and union adapters*

***The application of KAN-therm Press System fittings for connecting radiators and water supply taps is described in the chapter titled Connections of water supply and heating installation devices in the KAN-therm System.**

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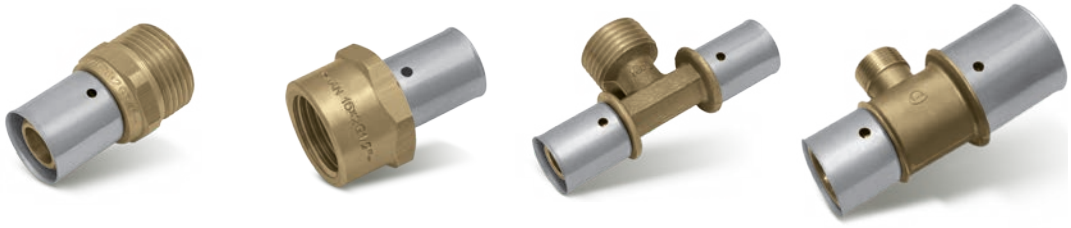
KAN-therm Press LBP pressed fittings – tap connections*

KAN-therm Press LBP pressed couplings – interconnectors

KAN-therm Press Fittings (diameters 50–63 mm)

KAN-therm Press fittings

Threaded KAN-therm Press fittings



*The application of KAN-therm Press System fittings for connecting radiators and water supply taps is described in the chapter titled Connections of water supply and heating installation devices in the KAN-therm System.

KAN-therm Press fittings are made of Polyphenylsulfone (PPSU), a reliable structural material, or high quality brass. PPSU is used to manufacture elbows, tees and tap connections. The properties and advantages of PPSU are discussed in the chapter KAN-therm Push System. PPSU – perfect installation material.

Avoid direct contact of KAN-therm System elements with solvents or materials containing solvents, such as varnish, aerosol, polyurethane foam, adhesive. In unfavorable circumstances, these substances could potentially damage the plastic components of pipes. Make sure that substances sealing the joints, cleaning solutions or solutions used to insulate KAN-therm System components do not contain any compounds which could cause tension fractures. These include ammonia, solutions containing ammonia, aromatic solvents and compounds retaining oxygen (e.g. ketone or ether) or chlorinated hydrocarbons. Do not use assembly foams manufactured out of methacrylates, isocyanates, or acrylate. In threaded fittings, use a proper amount of tow as to leave the ending of the thread bare and visible. Too much tow may disrupt the thread. Winding tow just above the first coil of the thread will prevent the tow from tangling up and the thread from being damaged.

Notice!

Do not use chemical sealants or adhesives.

A setting of KAN-therm press fittings in terms of available diameters, pressing profiles and pipe preparation methods

Fitting structure	Scope of diameters		Pressing profile	Pipe ending treatment method	
				diameter calibration	edge chamfering
KAN-therm Press LBP 	Color of spacer	16	U or TH	no	no
		20		no	no
		25		recommended	no
		26	C or TH	recommended	no
		32	U or TH	recommended	no
		40		yes	yes
KAN-therm Press 	16*		U	yes	yes
	20*			yes	yes
	25*			yes	yes
	26*		C	yes	yes
	32*		U	yes	yes
	40			yes	yes
	50		TH	yes	yes
	63			yes	yes

*fittings offered while stock lasts

Execution of Press joints with pressed rings

Tools

Use only original KAN-therm tools to execute all joints in the KAN-therm Press System or other tools recommended by KAN – see table below.

Size	Manufacturer	Press type	Jaws/tongs	Fork profile
14–40 mm	Novopress	Comfort – Line ACO 102 Basic – Line AFP 101	mini jaws 14–40 mm	Ø 14–40 mm – U, TH profile Ø 50–63 mm – TH profile
14–63 mm	Novopress	Comfort – Line ECO 202 Comfort – Line ACO 202 Basic – Line EFP 202 Basic – Line AFP 202 Basic – Line EFP 2 adapter ZB 201 adapter ZB 203	jaws 14–32 mm jaws for adapters 40–63 mm	
14–20 mm	Klauke	MP20	inserts 14 – 20 mm	Ø 14–40 mm – U profile Ø 14–32 mm – TH profile Ø 63 mm – TH profile Uwaga: Ø 40–50 TH profile (KSP 11) – non-compatible with the KAN-therm System
14–32 mm	Klauke	i-press mini MAP2L mini MAP1 AHP700LS PKMAP2 HPU32 MP32	mini jaws 14 – 32 mm jaws for mini inserts 14 – 32 mm 14 – 32 mm inserts	
14–63 mm	Klauke	i-press medium UAP3L UAP2 UNP2 i-press medium UAP4L HPU2 AHP700LS PKUAP3 PKUAP4	14 – 40 mm tongs 14 – 32 mm tongs for inserts 40 – 63 tongs for inserts	
14–25, 26 mm	REMS	Eco – Press	14 – 25, 26 mm tongs	Ø 14–40 mm – U, TH profile Ø 50–63 mm – TH profile
14–40 mm	REMS	Mini – Press ACC	mini tongs 14 – 40 mm	
14–63 mm	REMS	Power – Press E Power – Press 2000 Power – Press ACC Akku – Press Akku – Press ACC	14 – 63 mm tongs	

Tools offered by the KAN-therm System available as single elements or in complete sets.

Each set includes:

1. cutter or pipe cutter for multilayer pipes.
2. single calibrators (for diameters **14**, **16**, **20** and **25** (**26**) mm) and universal

3. manual "separated" press with exchangeable jaws for diameters **16**, **20**, **25** (**26**) mm
4. Electric, network presses or battery-powered presses compatible with exchangeable jaws **16**, **20**, **25**, (**26**), **32**, **40**, **50**, **63** mm

5. Set – manual press separated + jaws.
6. Set – battery-powered press + jaws.

5

6

7. Battery-powered press "Mini" for diameters **16** – **32** mm
8. Press jaws

7

8

Notice

Depending on the structure of the fitting (KAN-therm Press / KAN-therm Press LBP) and its diameter, the following jaw profiles must be used for pressing:

KAN-therm Press LBP fittings (all diameters):

— "U" or "TH" profile ("C" or "TH" for diameter 26 mm).

KAN-therm Press fittings:

— "U" profile – for diameters: 16, 20, 25, 32, 40 mm
— "C" profile – for diameter: 26 mm
— "TH" profile – for diameters: 50 and 63 mm.

U profile C profile TH profile

Tools – work safety
Before starting any works, make sure you read the instruction manual and learn the principles of safe work. All tools must be used according to their dedication and the manufacturer's instruction manual. During the use of tools, one must observe the terms of regular inspections and all applicable safety regulations. Using tools against their designed use may lead to their damage or to the damage of accessories and pipes. It may also lead to the occurrence of leakages in installation joints.

Assembly of KAN-therm Press LBP fittings with diameters: 16, 20, 25, 26, 32 and 40 mm

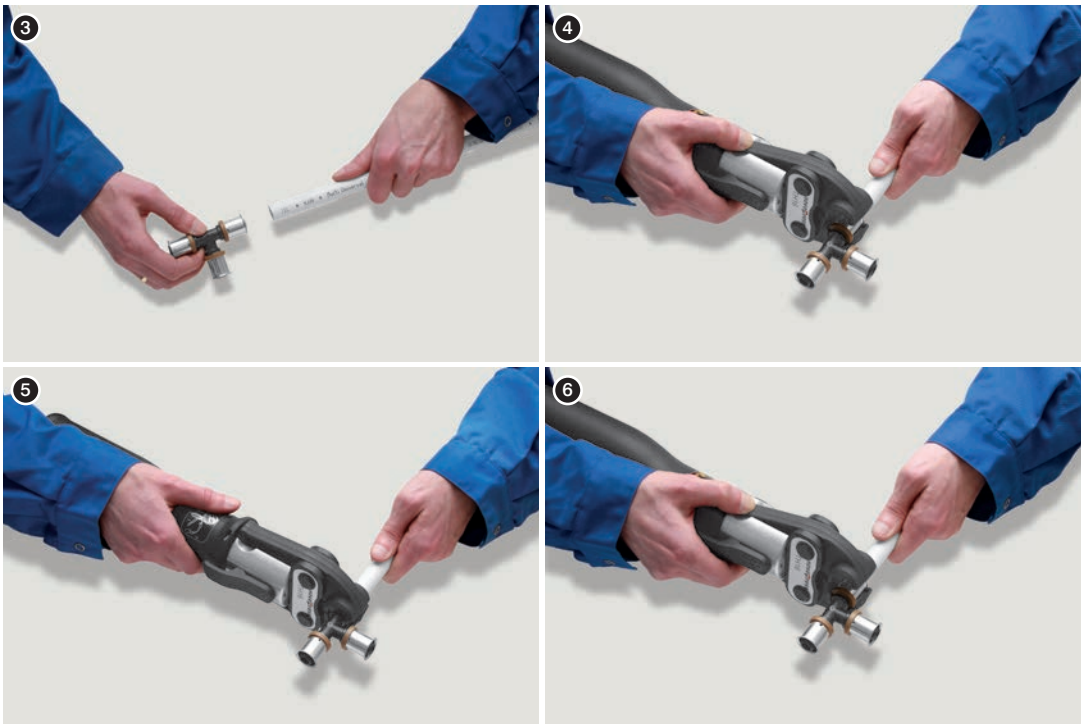
Notice

The assembly of offered (until stock lasts) KAN-therm Press fittings of 16, 20, 25, 26 and 32 mm diameter without the colored spacers requires a different preparation of the pipe for the execution of the joint and a different positioning of the jaws. The procedure of executing such joints is identical as for 40, 50 and 63 mm pipes and has been presented in the chapter titled "Assembly of KAN-press joints in pipes of 40, 50 and 63 mm in diameter".

1. Using a pipe cutter for multilayer pipes or a round pipe cutter, cut the pipe perpendicularly to its axis at the required length.
Notice!
Use only sharp, non-chipped cutting tools.
2. Give the pipe its desired shape. Bend the pipe using an inner or outer spring. Observe the minimum radius R > 5Dz requirement. When using mechanic pipe benders for diameters **14** – **20** mm, the radius is R > 3.5 Dz. Execute all bends at a distance of 10 Dz from the nearest joint.

In the case of KAN-therm Press LBP fittings, pipe endings do need not to be chamfered, provided that sharp cutting tools are used and that the pipe is mounted using a proper shape fitting. For bigger diameters (25 and more), we suggest the use of a calibrator to allow the pipe to slide easily onto the stub.

3. Slide the pipe into the fitting until it stops – axis mount of the pipe on the stub of the fitting is required. Check the depth of the fit – the edge of the pipe must be visible in inspection holes.
4. Place the jaws precisely on the steel ring between the plastic spacer and the collar of the steel ring, perpendicularly to the axis of the stub ("U" type profile). In the case of the "TH" profile, the jaws are positioned on the plastic spacer (the spacer must be embraced by the external groove of the jaw). In both cases, the structure of the joint makes it impossible for the jaws to slide off in the process of pressing.
5. Start the drive of the press machine and seal the joint. The process of pressing ends when the jaws of the tool completely close on the joint. A ring may be pressed on a pipe only once.
6. Unlock the jaws and remove the tool from the ring.The joint is ready for a pressure test.



Notice

Press joints must be executed above ambient temperature of 0°C. Before starting any works, read the instruction manuals for all tools and learn the principles of safe work.

Assembly of KAN-therm Press LBP fittings with diameters 50 and 63 mm

1. Using a pipe cutter for multilayer pipes or a round pipe cutter, cut the pipe perpendicularly to its axis at the required length.

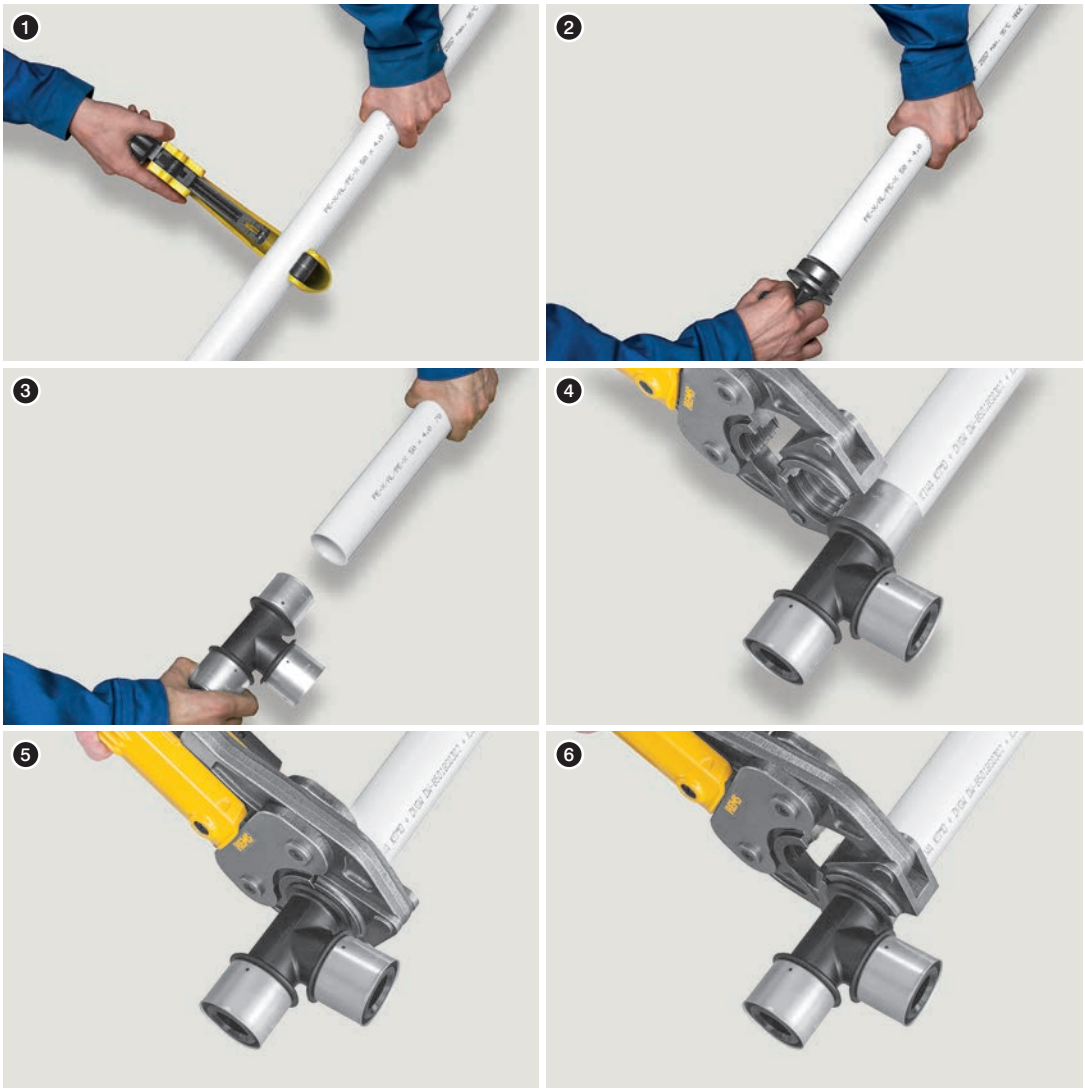
2. Calibrate the pipe and chamfer its inner edge using a calibrator. The aluminum layer should remain intact. The edge of the pipe must not have any chips or splinters.

3. Slide the pipe into the fitting until it stops. Check the depth of the joint – the inspection holes must be completely covered by the pipe.

4. Place the jaws perpendicularly on the steel ring so that it adjoins the collar of the fitting. The collar must not be embraced by the jaws.

5. Start the drive of the press machine and seal the joint. The process of pressing ends when the jaws of the tool completely close on the fitting. A ring may be pressed on a pipe only once.

6. Unlock the jaws and remove the tool from the ring. The joint is ready for a pressure test.



Notice

Press joints should be be executed above ambient temperature of 0°C, however it is possible to perform connections in lower temperatures - see chapter 5.1. Before starting any works, read the instruction manuals for all tools and learn the principles of safe work.

Screwed joints for multilayer pipes

Screwed joints for multilayer KAN-therm pipes are executed using two types of fittings:

- "barrel" union adapter (inlet connection)
- union adapter with diagonally cut ring.

Screwed fittings (inlet connections)

Fittings of this type are made of brass. Each fitting consists of a body with a stub equipped with two O-rings (used for fitting pipe ends) and a sealing cone (Eurokonus type), as well as a threaded nut. Such joints are compatible with KAN-therm brass fittings with male threads, such as elbows, tees, tap connections (9012 series) with specially formed sockets (for sealing cone threads with O-rings).

Dimensions of nut threads – 1/2" (for diameters 14 and 16), 3/4" (for diameters 14, 16 and 20), 1" (for diameters 20, 25 and 26)

1. Union adapter (inlet connection)
2. Fittings with male threads

1. Using a pipe cutter for multilayer pipes or a round pipe cutter, cut the pipe perpendicularly to its axis at the required length.
2. Give the pipe its desired shape. Bend the pipe using an inner or outer spring. Observe the minimum radius R > 5 Dz requirement. When using mechanic pipe benders for diameters **14** – **20** mm, the radius is R > 3.5 Dz. Execute all bends at a distance of 10 Dz from the nearest joint.
3. Calibrate the pipe and chamfer its inner edge using a calibrator. The aluminum layer should remain intact. The edge of the pipe must not have any chips or splinters.
4. Slide the nut onto the pipe. Slide the stub of the fitting into the pipe until it clearly stops. The depth of the joint is c.a. 9 mm for pipes of **14**, **16**, **20** mm in diameter and 12 mm for pipes of **25** (**26**) mm in diameter.
5. Slide the fitting and the pipe into the socket of the shape fitting until it clearly stops.
6. Screw the nut on the fitting using a wrench.

Notice

When modernizing an installation, it is possible to disassemble the joint (cut off the used pipe ending). There is, however, no possibility of reusing the inlet connection. Do not lay such joints in flooring. They must be located in easily accessible places.

Screwed fittings with diagonally cut rings

Fittings of this type are made of brass. Each fitting consists of a body with a stub equipped with an O-ring (used for mounting pipe ends), a diagonally cut brass ring and a threaded nut. Such fittings are compatible with KAN-therm brass shape fittings with male threads, such as elbows, tees, tap connections (9012 series) with specially formed sockets.

1. Joint with ½" male thread for connecting 16×2 pipes for manifolds.
2. Screwed union adapter with diagonally cut ring for PE-RT and PE-Xc pipes.

Mounting the pipe on the stub is performed in an identical way as in the case of the screwed joint (inlet connection) described above. Remember to slide on the diagonally cut ring after applying the nut. Then, remember to move the ring towards the edge of the pipe before screwing in the nut. The diameters of pipes connected and corresponding nut dimensions are: Ø16 G½", Ø16 G¾", Ø20 G¾" (for multilayer pipes) and Ø16 G¾", Ø20 G¾" (for PE-RT and PE-Xc pipes).

Notice

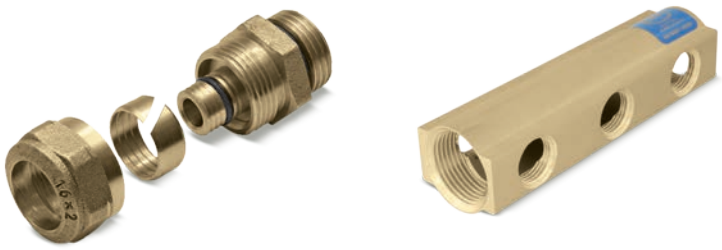
1. Pay special attention to the precise fit of the pipe inside the socket of the fitting and the tightness of the nut.
2. Do not lay such joints in flooring. They must be located in easily accessible places.
3. When modernizing an installation, it is possible to disassemble the joint (cut off the used pipe ending). There is also a possibility of reusing the union adapter (provided that the ring is replaced with a new one).

All above mentioned union adapters are compatible with:

- the KAN-therm 9012 series of fittings with male threads
- KAN-therm manifolds equipped with special ½" and ¾" nipples".

To connect 16 × 2 mm multilayer pipes directly to the manifold body (without nipples), use a pressed fitting with a diagonally cut ring with ½" male thread. The thread is equipped with an O-ring, making additional sealants redundant.

Fitting with ½" male thread for connecting to 16×2 pipes to manifolds.



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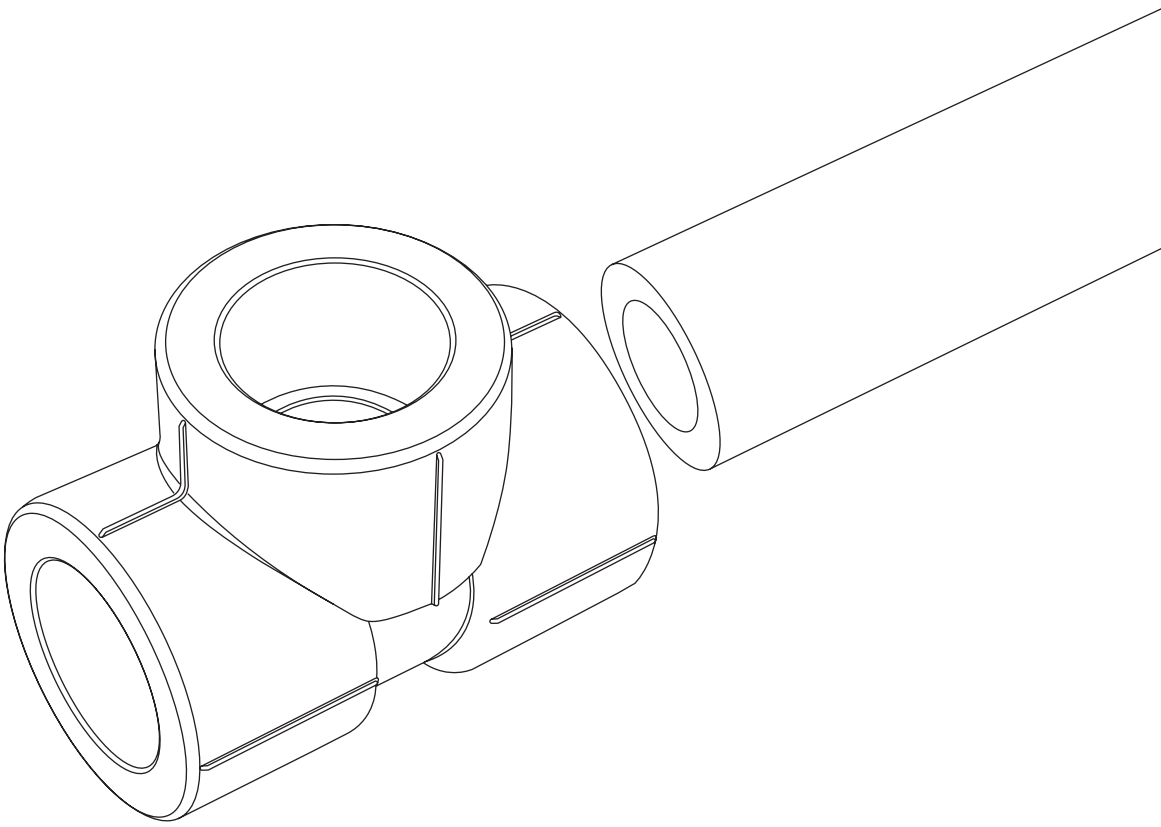
3 KAN-therm PP

Ø 16 - 110 mm

KAN-therm

PP

High quality with
reasonable price



ISO 9001

3 KAN-therm PP

3.1 General information

KAN-therm PP is a complete installation system consisting of pipes and fittings made of polypropylene PP-R (type 3), a thermoplastic material, with diameter range : 16-110 mm. Connecting elements is performed using the coupling welding technique (thermal polyfusion) and electric welders. This welding technique creates continually uniform joints and therefore guarantees exceptional tightness and mechanic durability of the installation. The system is designed for indoor water supply installations (hot and cold tap water), heating installations and technological installations.

The KAN-therm PP system is characterized by:

- high hygiene of all products (physiological and microbiological neutrality
- high chemical resistance
- resistance to material corrosion
- low thermal conductivity (high thermal isolation of pipes)
- low specific weight
- resistance to scaling
- muffling vibrations and noises
- mechanic durability
- uniform joints
- high usage durability.

3.2 KAN-therm PP Pipes

KAN-therm PP pipes and joints in the are manufactured of high quality PP-R polypropylene (Random copolymer), formerly marked as polypropylene type 3.

In terms of structure, we differentiate two types of pipes: uniform (homogenous) and multilayer pipes (Stabi).

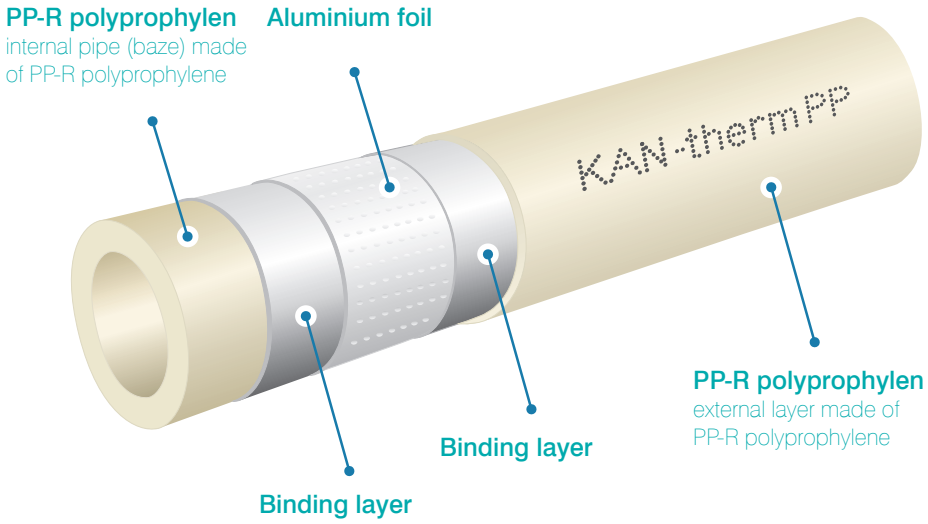
KAN-therm PP Stabi Al pipes consist of a PP-R base pipe made of polypropylene, which is coated with a layer of perforated aluminum tape, 0.13 mm thick, overlapping and additionally covered with a protective layer of polypropylene. For increased durability of the aluminum-polypropylene joint, double adhesive binding layers are applied.

KAN-therm PP

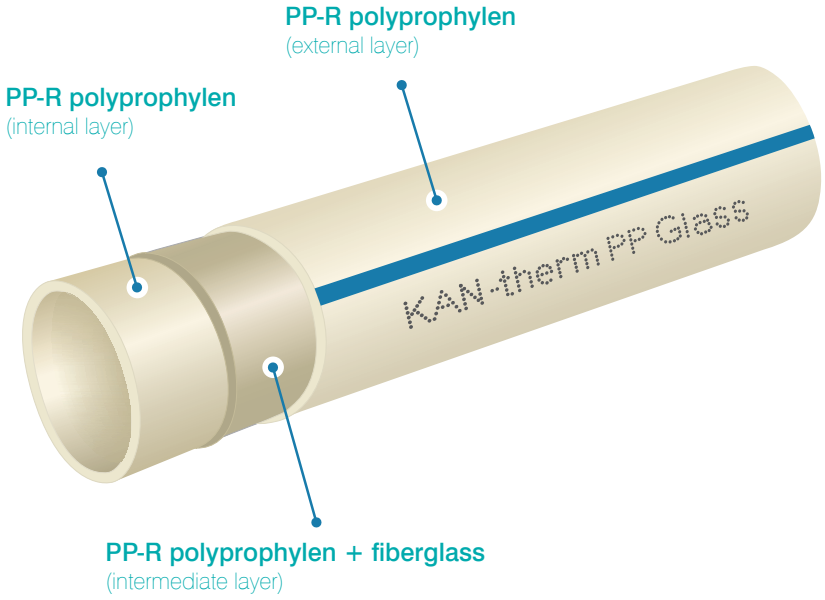
The basic function of the aluminum insert in KAN-therm PP Stabi compound pipes is to significantly reduce the thermal elongations of pipes (= 0.03 mm/mxK; for uniform pipes = 0.15 mm. mxK). The aluminum layer also serves as additional protection against the diffusion of oxygen from the environment.

KAN-therm PP Glass pipes also feature multilayer structure. Their internal layer, which is reinforced with fiberglass (40% of pipe wall thickness) determines very high durability of the pipe and its low thermal elongation).

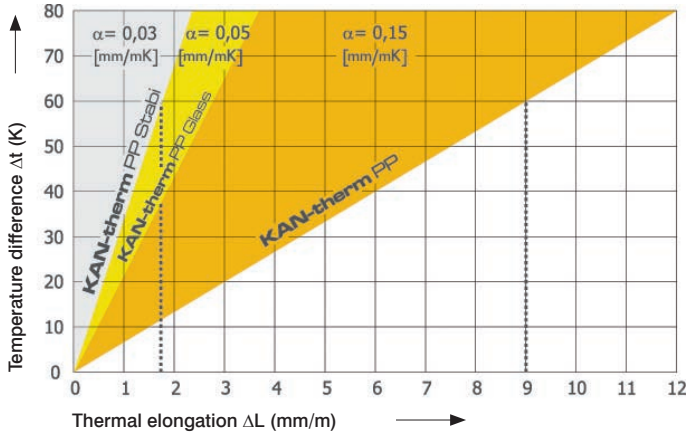
Structure of a KAN-therm Stabi Al twin pipe



Structure of a KAN-therm PP Glass twin pipe



Comparison of the thermal expansion factor in uniform and twin KAN-therm PP Stabi and Glass pipes



Physical properties of KAN-therm PP pipe material

Property	Symbol	Unit	Value
linear elongation coefficient	α	mm/m × K	0,15
			0,03 for Stabi Al pipes
			0,05 for Glass pipes
thermal conductivity	λ	W/m × K	0,24
density	ρ	g/cm³	0,90
elasticity module		N/mm²	900
internal wall roughness.	k	mm	0,007

Pipe marking, color

Our pipes are marked in a continuous manner with inscriptions with a 1-meter span, containing i. e. the following indications:

Marking description	Example of marking
Name of manufacturer and/or trademark:	KAN, KAN-therm
Nominal external diameter x wall thickness	16×2,7
Pipe structure (material)	PP-R
Pipe code	04000316
Number of standard or Technical Certificate	PN-EN 15874
Pressure/dimension ratio	PN20 SDR6
Application class/es with design pressure	Class 1/10 bar – 2/8 bar – 4/6 bar – 5/6 bar
Date of production	18.08.09
Other manufacturer markings, e.g. running meter, batch number	045 m

Notice – other, additional markings, e.g. numbers of certificates (e.g. DVGW) may also be inscribed on the pipe.

Pipe color: gray; pipe surface: mat or coarse (Stabi Al pipes). KAN-therm PP Glass pipes are gray with a blue stripe.

Pipes are supplied in bars, 4 m long.

Dimension parameters of KAN-therm PP pipes

KAN-therm PP System offers six types of pipes, differing in terms of wall thickness and structures (twin pipes):

PN 10 uniform pipes	(20 –110 mm)
PN 16 uniform pipes	(20 –110 mm)
PN 20 uniform pipes	(16 –110 mm)
PN 16 Stabi Al pipes	(20 – 75 mm)
PN 20 Stabi Al pipes	(16 –110 mm)
PN 16 Glass pipes	(20 –110 mm)
PN 20 Glass pipes	(20 –110 mm)

KAN-therm PP PN10 pipes (S5/SDR11)

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]	Capacity by unit [l/m]	Weight by unit [kg/m]
20 × 1,9	20	1,9	16,2	0,206	0,107
25 × 2,3	25	2,3	20,4	0,327	0,164
32 × 3,0	32	3,0	26,0	0,531	0,267
40 × 3,7	40	3,7	32,6	0,834	0,441
50 × 4,6	50	4,6	40,8	1,307	0,638
63 × 5,8	63	5,8	51,4	2,075	1,010
75 × 6,9	75	6,9	61,2	2,941	1,420
90 × 8,2	90	8,2	73,6	4,254	2,030
110 × 10,0	110	10,0	90,0	6,362	3,010

KAN-therm PP PN16 pipes (S3,2/SDR7,4)

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]	Capacity by unit [l/m]	Weight by unit [kg/m]
20 × 2,8	20	2,8	14,4	0,163	0,148
25 × 3,5	25	3,5	18,0	0,254	0,230
32 × 4,4	32	4,4	23,2	0,415	0,370
40 × 5,5	40	5,5	29,0	0,615	0,575
50 × 6,9	50	6,9	36,2	1,029	0,896
63 × 8,6	63	8,6	45,8	1,633	1,410
75 × 10,3	75	10,3	54,4	2,307	2,010
90 × 12,3	90	12,3	65,4	3,358	2,870
110 × 15,1	110	15,1	79,8	4,999	4,300

KAN-therm PP PN20 pipes (S2,5/SDR6)

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]	Capacity by unit [l/m]	Weight by unit [kg/m]
16 × 2,7	16	2,7	10,6	0,088	0,110
20 × 3,4	20	3,4	13,2	0,137	0,172
25 × 4,2	25	4,2	16,6	0,216	0,266
32 × 5,4	32	5,4	21,2	0,353	0,434
40 × 6,7	40	6,7	26,6	0,556	0,671
50 × 8,3	50	8,3	33,4	0,866	1,050
63 × 10,5	63	10,5	42,0	1,385	1,650
75 × 12,5	75	12,5	50,0	1,963	2,340
90 × 15,0	90	15,0	60,0	2,827	3,360
110 × 18,3	110	18,3	73,4	4,208	5,040

KAN-therm PP PN16 Stabi Al pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]	Capacity by unit [l/m]	Weight by unit [kg/m]
20×2,8	20 (21,7)*	2,8	14,4	0,163	0,194
25×3,5	25 (26,7)*	3,5	18	0,254	0,292
32×4,4	32 (33,7)*	4,4	23,2	0,415	0,462
40×5,5	40 (41,6)*	5,5	29	0,615	0,682
50×6,9	50 (51,6)*	6,9	36,2	1,029	1,003
63×8,6	63 (64,5)*	8,6	45,8	1,633	1,540
75×10,3	75 (76,5)*	10,3	54,4	2,307	2,590

* in brackets: average external diameter of the pipe with Al foil and protective shield

KAN-therm PP PN20 Stabi Al pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]	Capacity by unit [l/m]	Weight by unit [kg/m]
16 × 2,7	16 (17,8)*	2,7	10,6	0,088	0,160
20 × 3,4	20 (21,8)*	3,4	13,2	0,137	0,218
25 × 4,2	25 (26,9)*	4,2	16,6	0,216	0,328
32 × 5,4	32 (33,9)*	5,4	21,2	0,353	0,520
40 × 6,7	40 (41,9)*	6,7	26,6	0,556	0,770
50 × 8,3	50 (51,9)*	8,3	33,4	0,866	1,159
63 × 10,5	63 (64,9)*	10,5	42,0	1,385	1,770
75 × 12,5	75 (76,9)*	12,5	50,0	1,963	2,780
90 × 15,0	90 (92)*	15,0	60,0	2,830	3,590
110 × 18,3	110 (112)*	18,3	73,4	4,210	5,340

* in brackets: average external diameter of the pipe with Al foil and protective shield

External dimensions of twin pipes with aluminum foil differ from the dimensions of uniform pipes (external diameter is slightly bigger due to the thickness of Al foil and the thickness of the PP-R protective shield). The nominal size of these pipes corresponds to the external diameters of base pipes.

KAN-therm PP PN16 Glass pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]	Capacity by unit [l/m]	Weight by unit [kg/m]
20 × 2,8	20	2,8	14,4	0,163	0,160
25 × 3,5	25	3,5	18,0	0,254	0,250
32 × 4,4	32	4,4	23,2	0,415	0,430
40 × 5,5	40	5,5	29,0	0,615	0,650
50 × 6,9	50	6,9	36,2	1,029	1,000
63 × 8,6	63	8,6	45,8	1,633	1,520
75 × 10,3	75	10,3	54,4	2,307	2,200
90 × 12,3	90	12,3	65,4	3,358	3,110
110 × 15,1	110	15,1	79,8	4,999	4,610

KAN-therm PP PN20 Glass pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]	Capacity by unit [l/m]	Weight by unit [kg/m]
20 × 3,4	20	3,4	13,2	0,137	0,218
25 × 4,2	25	4,2	16,6	0,216	0,328
32 × 5,4	32	5,4	21,2	0,353	0,520
40 × 6,7	40	6,7	26,6	0,556	0,770
50 × 8,3	50	8,3	33,4	0,866	1,159
63 × 10,5	63	10,5	42,0	1,385	1,770
75 × 12,5	75	12,5	50,0	1,963	2,780
90 × 15,0	90	15,0	60,0	2,830	3,590
110 × 18,3	110	18,3	73,4	4,210	5,340

Explanation of markings of uniform PP pipes

S	dimension series according to ISO 4	S = (D-s)/2s
SDR	standard dimension ratio	SDR = 2 × S+1 = D/s
D(dn)	nominal external pipe diameter	in brackets: markings acc. to standard
s(en)	nominal wall thickness	
PN	pipe pressure series	

S	SDR	PN
5	11	10
3,2	7,4	16
2,5	6	20

3.3 Fittings and other elements of the system

The basic method of executing joints in polypropylene installations is thermal coupling welding which, thanks to the use of proper fittings, allows for connecting pipes (pipe couplings), closing the pipeline (end caps), redirecting the pipeline (elbows, bends, passing loops, tees), changing the diameter of the pipe (couplings and reducers), executing branch-offs (tees, four-ways), connecting devices and fixtures (collar joints and metal threaded joints). Ball valves with polypropylene couplings serve as the joints here. All of the above mentioned elements allow for connecting fixtures to pipes or connecting two or more pipe sections, forming inseparable joints, requiring the pipe to be cut off if there is a need for disassembling the fitting. In order to execute a separated joint, sleeves for collar joints and union adapters must be used. All joints are universal and may be used with all types of KAN-therm PP pipes, irrespective of their wall thickness or structure.

KAN-therm PP System, apart from pipes, consists of the following elements:

- shape fittings (uniform) made of PP-R polypropylene (couplings, reducers, elbows, nipple elbows, tees)
- couplings with female and male metal threads ½" – 3" – used for connecting to devices and fixtures,
- sleeves for collar joints with loose collars, union adapters – for separated joints,
- expansion bends, mounting plates, ball valves,
- mounting elements,
- tools for pipe bending, treatment and welding.

3.4 Scope of use

Thanks to the properties of PP-R, the KAN-therm PP Installation System has a wide spectrum of applications:

- cold (20°C/1.0 MPa) and hot (60°C/1.0 MPa) water installations in housing buildings, hospitals, hotels, office buildings, schools
- central heating installations (temp. up to 90°C, working pressure up to 0.6 MPa)
- compressed air installations
- balneology installations
- installations in agriculture and horticulture
- pipelines in the industry, e.g. for transporting aggressive media and food products
- ship installations.

The scope of use assumes new installations, as well as repair, modernization and exchange projects.

Thanks to special properties of polypropylene (physiological and microbiological neutrality, resistance to corrosion, resistance to scaling, immunity to vibrations, very good thermal insulation of pipes), KAN-therm PP System Installations are widely used, particularly in water supply installations, when mounting water supply risers and installation levels. This refers to both hot and cold tap water installations in housing buildings, hospitals, hotels, office buildings, schools, on ships, etc.

KAN-therm PP installations

KAN-therm PP installations are irreplaceable when replacing old, corroded water supply installations. They are also used in renovations of old heating installations.

Pipes and joints in the KAN-therm PP System are in full compliance with applicable standards, which guarantees their long-term and reliable operation as well as full security of assembly and use of the installation.

- KAN-therm Stabi Al pipes: technical certificate AT-15-8286/2011, approved for use by the National Institute of Hygiene,
- KAN-therm PP uniform polypropylene pipes and joints: compliance with PN-EN ISO 15874, approved for use by the National Institute of Hygiene,
- KAN-therm Stabi Glass pipes: technical certificate AT-15-8635/2011, approved for use by National Institute of Hygiene.

The working parameters and scopes of use of multilayer KAN-therm PP pipe installations in heating and water supply installations are presented in the table.

Application (acc. to ISO 10508)	Permissible [bar]	Pipe type
Cold tap water T = 20 °C	according to pipe parameters	S5 (PN10) S3,2 (PN16) S2,5 (PN20) PN 16, 20 Stabi Al & Glass
Hot tap water [Application class 1(2)] T_D/T_{max} = 60(70)/80 °C P_{rob} = 8/10 bar	8	S3,2 (PN16)
	10	S2,5 (PN20) PN 16, 20 Stabi Al & Glass
Floor heating, low-temperature radiator heating [Application class 4] T_D/T_{max} = 60/70 °C P_{rob} = 6 bar	6	S2,5 (PN20) S3,2 (PN16) PN16, 20 Stabi Al & Glass
Radiator heating [Application class 5] T_D/T_{max} = 80/90 °C P_{rob} = 6 bar	4	S3,2 (PN16)
	6	S2,5 (PN20) PN16, 20 Stabi Al & Glass

Notice

Description of application classes is presented in chapter "**KAN-therm Push** – Scope of use".

Scope of use of the KAN-therm PP system in installations other that heating and water supply installations - chemical resistance

Elements of the KAN-therm PP system are characterized by high chemical resistance. You should remember, however, that the chemical resistance feature of polypropylene depends on the type and concentration of substances, as well as other factors, e.g. temperature and pressure of the medium, and ambient temperature. Chemical resistance of the couplings (metal) must not be compared to the resistance of PP-R elements. Due to this fact, couplings are not applicable for all industrial usages. Before deciding on the application of KAN-therm PP pipes and joints in installations conducting substances other than water, please contact the KAN's Technical Department.

3.5 Technique of connecting KAN-therm PP installations – welded joints

Welding is the basic technology used for connecting KAN-therm PP polypropylene pipelines. The welding process is based on plasticizing the elements to be connected under high temperature (to a certain depth), and then joining, under right pressure, the plasticized layers and, finally, cooling the entire area to a temperature of hardening.

1. Cross-section of a welded joint
2. and 3. KAN-therm PP tools

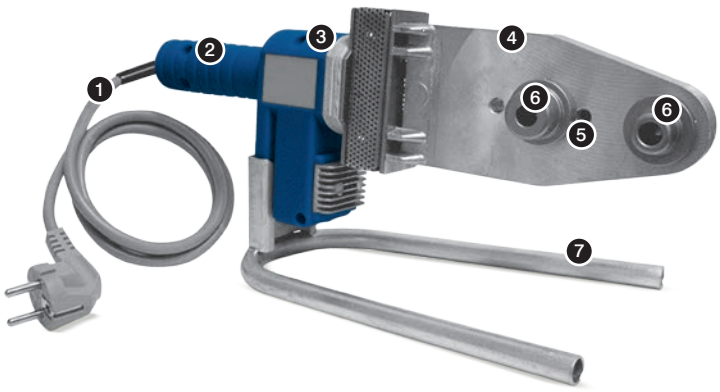
Plasticization of layers to be connected takes place at 260°C in a temporal function, taking into account the need to warm up a layer of material (external surface of the pipe and internal surface of the coupling) and a required depth. The essence of the process of welding polypropylene, also called thermal polyfusion, is relocating and mixing the polymer chains of plasticized and then pressed layers of elements being connected. Maintaining proper conditions in this process (temperature, time, pressure force and area, cleanness of elements being connected) guarantees proper execution of the joint and its durability. The process of heating (plasticizing) takes place with the use of an electric welder equipped with a heating plate with exchangeable (for each diameter) heating inserts covered with Teflon.

Depending on the diameter of the pipe, heating takes from 5 to 50 seconds. After this time, heated elements are removed from the inserts and the pipe is immediately mounted (without rotation!) inside the coupling at a depth which must be marked earlier. It is then that the particles of both elements penetrate one another and mix. A joint formed through thermal welding has impressive mechanic durability, exceeding the durability of the pipe itself (the cross section of the joint exceeds the cross section of the pipe).

Tools – preparation of the welder

In order to execute a polypropylene joint, use a welder designed to work under 230 V. This device consists of a power supply cable (1), a grip (2) with an in-built thermostat and controls (diodes) (3) and a heating plate (4), which heating inserts (6) are mounted to. The power of KAN-therm welders is 800 or 1600 W.

Welder elements
1. Power supply cable
2. Welder grip
3. Power supply and thermostat controls
4. Heating plate
5. Openings in the heating plate
6. Heating inserts
7. Stand



Welding temperature 260 °C

1. Before starting any works, read the instruction manual to the corresponding welder type.
2. Heating inserts (coupling and heating rod) must be screwed tightly using a wrench included in the set. They must contact the surface of the heating plate tightly. The inserts must not extend over the edge of the heating plate.
3. Secure the inserts against scratching or polluting. Clean all pollutions with a natural cloth and rubbing alcohol.
4. Connection to power supply is signaled by the lamp or diode on the casing lighting up.
5. The required welding temperature (on the surface of inserts) is 260°C. The temperature of the heating plate is higher (280-300°C). When the device reaches the correct welding temperature, a thermostat control (most often – depends on the model of the welder) signals it.
6. After finishing all works, disconnect the welder from power supply and leave it to cool down. Do not cool the welder too fast, e.g. using cold water, since this may lead to the damage of heating circuits.

7. Do not use a power supply cable of small cross section or one which is too long. Voltage fluctuations might disturb the proper operation of the device.

8. Do not use the power supply cable to transport or hang the welder. When out of work, place it on the stand included in the set.

NOTICE

Due to varying tolerances of pipes and fittings by other manufacturers, to ensure the execution of a sealed and durable joint, we suggest the use of original tools, particularly heating inserts, as offered within the KAN-therm PP System.

Tools – work safety.
All tools must be used according to their dedication and the manufacturer's instruction manual. During the use of tools, one must observe the terms of regular inspections and all applicable safety regulations. Using tools against their designed use may lead to their damage or to the damage of their accessories.
It may also lead to the occurrence of leakages in installation joints.

Preparation of elements for welding

1. Cutting the pipe.
Use a pipe cutter, (or for bigger diameters) a round pipe cutter or a mechanic saw with a blade adapted to cutting polypropylene to cut the pipe. When cutting the pipe with a saw, remove all chips from the surface and from the interior of the pipe.

2. Marking the depth of the weld.
Mark (using a meter, a template and a pencil) the depth of the weld at the end of the pipe. Insufficient welding depth may weaken the joint. On the other hand, if the pipe is mounted too deep, it may become narrower (flange). The depths of welds are provided in the table.

3. Removing foil.
In the case of KAN-therm Stabi Al pipes, before welding, remove the layer of aluminum using a scraper (together with the PP protective shield and binding layers). Slide the end of the Stabi pipe into the hole of the scraper and, applying rotary motion, scrape off the layer of aluminum until the scraper ceases to produce chips. The length of the section with the foil removed signals the depth of the weld, hence there is no need to mark it, as in point 2. Always check for aluminum or binding layer (adhesive) remains on the surface. Scraper blades must not be blunt or chipped. Replace used blades with new, spare ones. Use a uniform pipe PN20 section with diameter corresponding to the diameter of the scraper as a reference for cutting depth.

Welding parameters

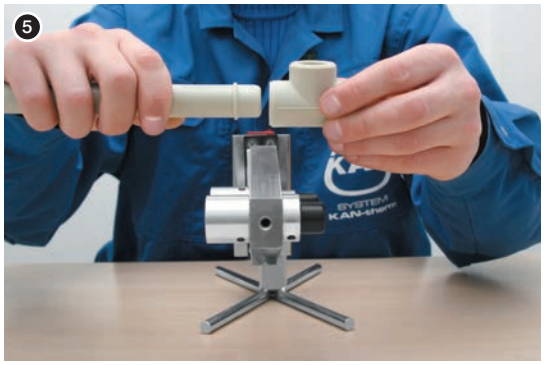
External pipe diameter [mm]	Welding depth [mm]	Heating time [sek]	Binding time [sek]	Cooling time [min]
16	13,0	5	4	2
20	14,0	5	4	2
25	15,0	7	4	2
32	16,0	8	6	4
40	18,0	12	6	4
50	20,0	18	6	4
63	24,0	24	8	6
75	26,0	30	10	8
90	29,0	40	10	8
110	32,5	50	10	8

Notice

The time of heating thin-walled pipes (PN10) is shorter by half (the time of heating joints remains unchanged). The time of heating in ambient temperatures below +5°C should be increased by 50%.

Welding technique

4. Heating the pipe and the joint.
The surfaces to be heated must be clean and dry. Slide the pipe end (without rotation) into the heating sleeve, up to the marked depth of the weld. At the same time, slide the fitting (also without rotation) on the heating rod, until it stops. Start counting the heating time when the pipe and the fitting are mounted at their entire welding depths. In the case of thin-walled PN10 pipes, heat the fitting first (holding the heating plate on the other side with an object which does not conduct high temperatures). After the lapse of a half of the heating time (according to the table), continue to heat the fitting and start heating the pipe, until the end of required heating time.



5. Connecting elements.
After heating take the pipe and fitting out of heating inserts in a continuous manner and immediately, without rotating, connect them. The marked welding border should then be covered by outflowing excess material. Do not heat beyond the marked welding border, since it could result in a narrowing or even a clog in the joint. When connecting elements, the joint can be slightly adjusted on the axis (up to a few degrees). Rotating elements being connected is absolutely prohibited.

6. Stabilizing and cooling.
After the welding time has lapsed, the joint must be stabilized and cooling must be initiated (time of cooling is provided in the table). In this period, you must not apply any mechanic pressure on the pipe. After all joints have cooled down, connect the installation to water supply and conduct a pressure test.

Fittings with metal threads and collars

Apart from welded joints, KAN-therm PP offers threaded and collar joints.

KAN-therm PP fittings with brass threads

The most basic elements with metal threads are PP-R polypropylene fittings (couplings, elbows, tees) with brass "inserts" with male and female threads. They form inseparable joints. UnScrewing a joint like this requires the pipe to the cut off. Such joints are used for connecting installations to heating and water supply devices and fixtures. Joints with 1" and bigger female and male threads are equipped with a six-sided mount for a flat wrench, allowing devices to be screwed-in and – out without applying excessive pressure on the weld and the fitting itself.

The group of separated joints, allowing for performing multiple, exchangeable connections, includes KAN-therm PP union adapters (used e.g. to connect water meters) and "semi-unions" with specially formed stubs (for mounting rubber seals) and metal nuts.

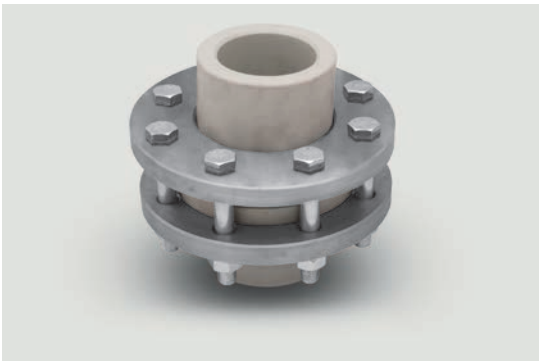
KAN-therm PP separable fittings – union adapter, half union and double union

KAN-therm PP also offers double union adapters (with two PP-R couplings) allowing for mounting flanges on the pipe. An additional coupling with internal diameter corresponding to the external diameter of the pipe is required to connect these joints with the pipe.

For large pipe diameters, use collar couplings to execute separable joints. Collar couplings are used e.g. to connect devices to collar stubs (pumps, valves, water meters). In installations, KAN-therm PP couplings are used with loose collars.

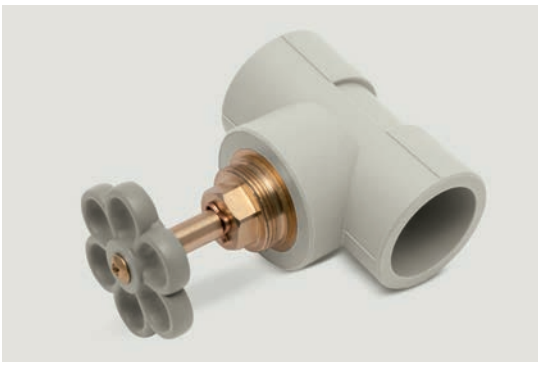
An important element of these joints is the O-ring mounted on a special, profiled face surface of the coupling. The seal should be made of a material type suitable for the parameters of the medium running through the joint. In the case of collar couplings with channels, sealing is provided by an EPDM O-ring mounted on the fitting. For collar couplings without channels, it is necessary to assemble a separate, flat seal.

Ø110 mm collar joint



KAN-therm PP offers a wide selection of cut-off valves and fixtures welded into pipelines:

KAN-therm PP valves



- ball valves
- cut-off globe vales
- globe vales for subplaster assembly.

3.6 Transport and storage of KAN-therm PP System elements

- Store and transport pipes in vertical position, preventing them from bending
- Maximum storage height – 1.2 m
- During storage, pipes and joints must not be exposed to sun rays (they must be protected against heat and UV rays)
- Store pipes away from sources of strong heat
- Protect pipes and joints from the access of chemical substances (e.g. paint or organic solvents, steam containing chlorine)
- Protect pipes against shocks or mechanic impacts, particularly their endings. Do not throw or drag pipes during transport.
- Be extra careful when transporting or carrying pipes in temperatures below zero (in these conditions pipes are more vulnerable to mechanic damages, especially PN10 and Glass pipes)
- Protect pipes and fittings against polluting (particularly with oil or grease).

Table of contents

4 KAN-therm Steel and KAN-therm Inox

Ø 12 - 108 mm
Ø 15 - 168 mm

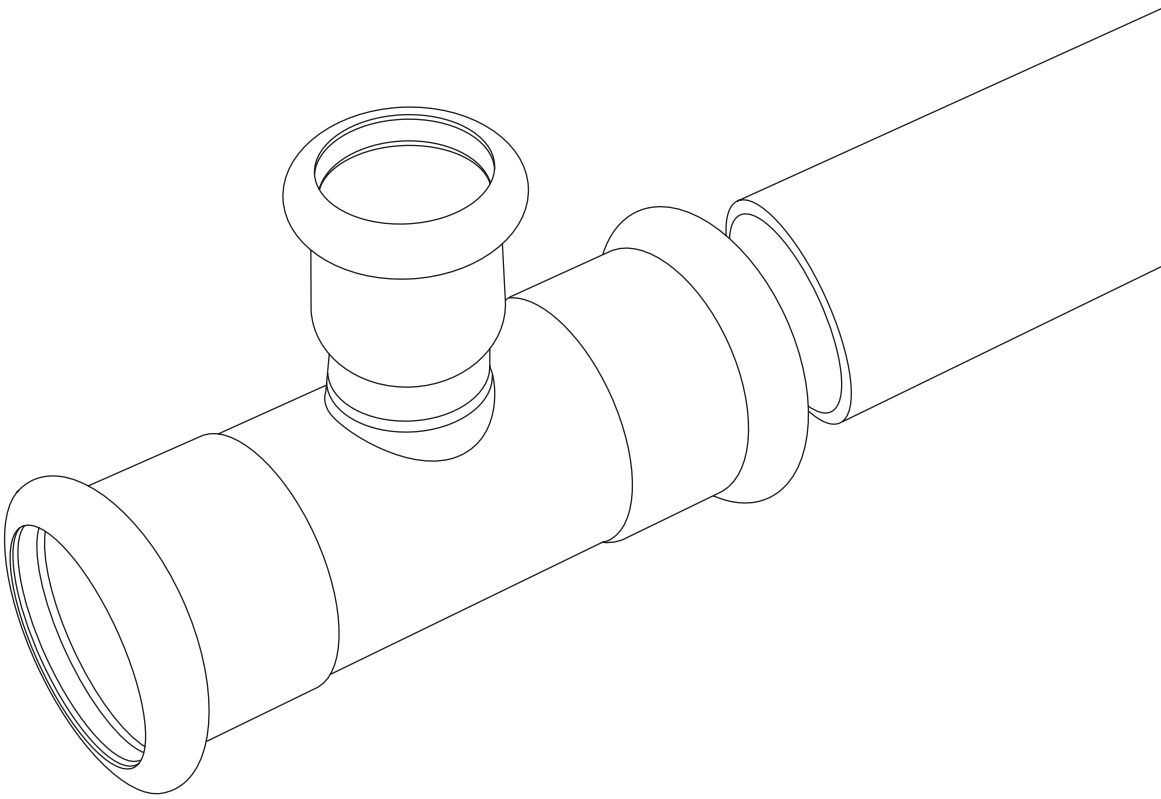
SYSTEM **KAN-therm**

Steel

Traditional material in modern technology

Inox

Prestigious material, Giga possibilities



ISO **9001**

4 KAN-therm Steel and KAN-therm Inox

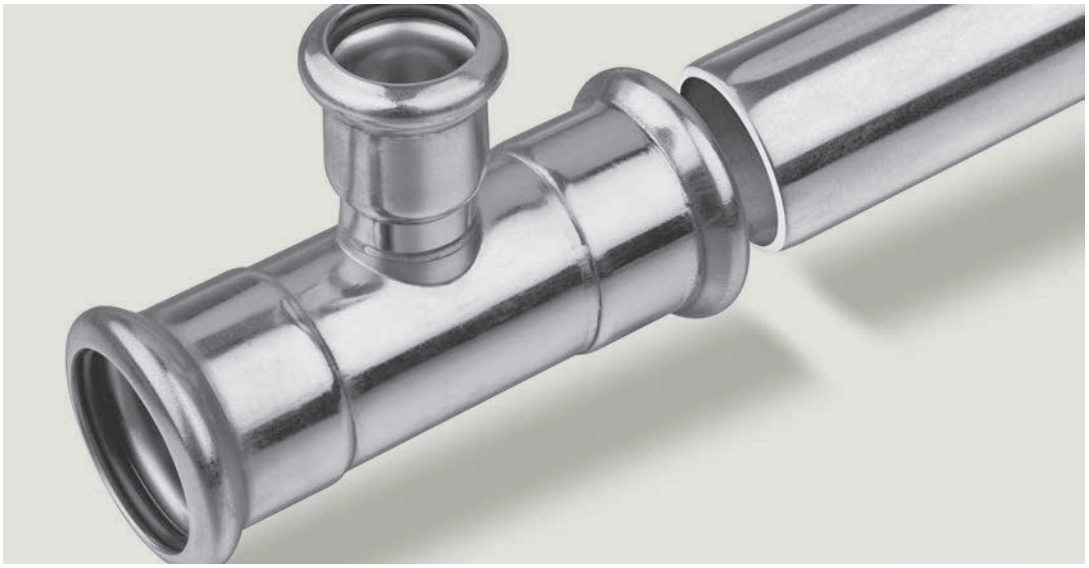
4.1 General information

KAN-therm Steel and Inox are complete, state-of-the-art installation systems consisting of precise pipes and joints manufactured out of high quality carbon steel (coated with an anti-corrosive zinc layer) – KAN-therm Steel and or stainless steel – KAN-therm Inox. Assembly of these installations bases on the "Press" technique, in which joints are pressed on the pipe. Special pressure seals (O-rings) provide tightness of joints. O-rings are made of high quality synthetic rubber resistant to high temperatures and a three-point type "M" pressing system, which guarantees reliable, uninterrupted operation of the system. Steel and Inox systems are used in indoor installations (new and renovated) in housing buildings, public buildings and industrial facilities.

KAN-therm steel systems are characterized by:

- easy and quick assembly, without the need to use open fire,
- large scope of diameters of pipes and joints, from 12 to 108 mm (168.3 for Inox pipes)
- broad working temperature tolerance: from -35°C to 135°C,
- resistance to high pressure, up to 25 bars,
- small flow resistance in pipes and joints,
- possibility of connecting with plastic KAN-therm systems,
- small pipe and joint weight,
- resistance to mechanic pressures and impacts,
- no fire threat during assembly and use (flammability class A)
- esthetic value of installations,
- signaling of ill-executed joints in the installation.

KAN-therm Inox



4.2 KAN-therm Steel

Pipes and fittings – characteristics

Pipes (thin-walled, with seam) and fittings are made of low-carbon (RSt 34-2) steel, material no. 1.0034 according to PN-EN 10305-3. The pipe is coated with a layer of zinc (Fe/Zn 88), 8-15 μm thick and additionally secured with a passivating layer of chromium. Zinc is applied through hot dip galvanization, which guarantees ideal adhesion to the wall, also during pipe bending. System KAN-therm Steel Sprinkler pipes used in fire protection systems are made of carbon steel double-side galvanized (Sendzimir method) with layer thickness 15-27 μm (275 g/m^2). For transport and storage, pipes are additionally coated on the inside and outside with a layer of oil. Joints are offered with pressed ends and O-ring seals, or with pressed and threaded ends with female or male threads, according to PN-EN 10226-1.

Physical properties of KAN-therm Steel pipes

Property	Symbol	Unit	Value	Remarks
Linear elongation coefficient	α	mm/m × K	0,0108	$\Delta t = 1$ K
Thermal conductivity	λ	W/m × K	58	
Minimal bending radius	R_{min}		3,5 × D	max. diameter 28 mm
Internal wall roughness	k	mm	0,01	

Pipe diameters, lengths, weight and capacity

Scope of diameters Ø12 to Ø108 mm, for wall thickness from 1.2 to 2 mm.

Pipe length 6 m +/- 25 mm, end-capped.

Dimensions, weight by unit, water capacity of KAN-therm Steel pipes

DN	External diameter × Wall thickness mm × mm	Internal diameter mm × mm	Weight by unit kg/m	Capacity by unit l/m
10	12×1,2	9,6	0,320	0,072
12	15×1,2	12,6	0,409	0,125
15	18×1,2	15,6	0,498	0,192
20	22×1,5	19,0	0,759	0,284
25	28×1,5	25,0	0,982	0,491
32	35×1,5	32,0	1,241	0,804
40	42×1,5	39,0	1,500	1,194
50	54×1,5	51,0	1,945	2,042
	64×1,5*	61,0	2,312	2,922
	66,7×1,5	63,7	2,412	3,187
65	76,1×2,0	72,1	3,659	4,080
80	88,9×2,0	84,9	4,292	5,660
100	108×2,0	104,0	5,235	8,490

* availability by individual arrangements

Scope of use

- closed heating installations (new installations and replacements)
- closed chilled water installations (notice – see chapter Internal corrosion)
- technological heat installations
- closed solar installations (Viton O-rings) (notice – see chapter External corrosion)
- fuel oil installations (Viton O-rings)
- compressed air installations (non-humid) (see 4.8).

Standard parameters of heating installations for the KAN-therm Steel System are defined in Technical Certificate AT-15-7543/2014: working pressure 16 bar, working temperature 90°C.

In industrial installations, there is a possibility of increasing the working pressure up to 25 bar (ask KAN's Technical Department for further information or approval). Maximum working temperature (without temporal limitations) is 135°C. When using Viton O-rings, working temperature may be increased to 200°C (parameters and scopes of use of Viton O-rings are presented in chapter Sealants – O-rings).

Examples of KAN-therm Steel installations

4.3 KAN-therm Inox

Pipes and fittings – characteristics

Pipes are made of thin-walled alloy steel, chromium-nickel-molybdenum X5CrNiMo 17 12 2 No. 1.4401, AISI 316 or X2CrNiMo 17 12 2 No. 1.4404, AISI 316L or X2CrMoTi18-2 No. 1.4521, AISI 444. Fittings are made of chromium-nickel-molybdenum steel No. 1.4404, AISI 316L. Molybdenum content determines the pipe's high resistance to corrosion. According to Directive EU 98, inclusion of nickel in the alloy does not result in exceeding the permissible values of nickel content in potable water (0.02 mg/l).

Joints are offered with pressed ends and O-ring seals, or with pressed and threaded ends with female or male threads, according to PN-EN 10226-1.

Physical properties of KAN-therm Inox pipes

Property	Symbol	Unit	Value	Remarks
Linear elongation coefficient	α	mm/m × K	0,0166	$\Delta t = 1$ K
Thermal conductivity	λ	W/m × K	15	
Minimal bending radius	R_{min}		3,5 × D	max. diameter 28 mm
Internal wall roughness	k	mm	0,015	

Pipe diameters, lengths, weight and capacity

Scope of diameters Ø15 to Ø168.3 mm, for wall thickness from 1.0 to 2 mm.

Dimensions, weight by unit, water capacity of standard KAN-therm Inox pipes (Pipes 1.4401; 1.4404)

DN	External diameter × Wall thickness mm × mm	Wall thickness mm	Internal diameter mm	Weight by unit kg/m	Number in bar m	Capacity by unit l/m
12	15 × 1,0	1,0	13,0	0,352	6	0,133
15	18 × 1,0	1,0	16,0	0,427	6	0,201
20	22 × 1,2	1,2	19,6	0,627	6	0,302
25	28 × 1,2	1,2	25,6	0,808	6	0,515
32	35 × 1,5	1,5	32,0	1,263	6	0,804
40	42 × 1,5	1,5	39,0	1,527	6	1,195
50	54 × 1,5	1,5	51,0	1,979	6	2,042
65	76,1 × 2,0	2,0	72,1	3,725	6	4,080
80	88,9 × 2,0	2,0	84,9	4,368	6	5,660
100	108 × 2,0	2,0	104,0	5,328	6	8,490
125	139,7 × 2,0	2,0	135,7	7,920	6	14,208
150	168,3 × 2,0	2,0	164,3	9,541	6	20,893

Dimensions, weight by unit, water capacity of standard KAN-therm Inox pipes (Pipes 1.4521)

DN	External diameter × Wall thickness mm × mm	Wall thickness mm	Internal diameter mm	Weight by unit kg/m	Number in bar m	Capacity by unit l/m
12	15 × 1,0	1,0	13,0	0,352	6	0,133
15	18 × 1,0	1,0	16,0	0,427	6	0,201
20	22 × 1,2	1,2	19,6	0,627	6	0,302
25	28 × 1,2	1,2	25,6	0,808	6	0,514
32	35 × 1,5	1,5	32,0	1,263	6	0,804
40	42 × 1,5	1,5	39,0	1,527	6	1,194
50	54 × 1,5	1,5	51,0	1,979	6	2,042

Scope of use

Permissible uses of KAN-therm Inox System installations in the domestic systems are defined by applicable standards and Technical Certificate AT-15-7543/2014:

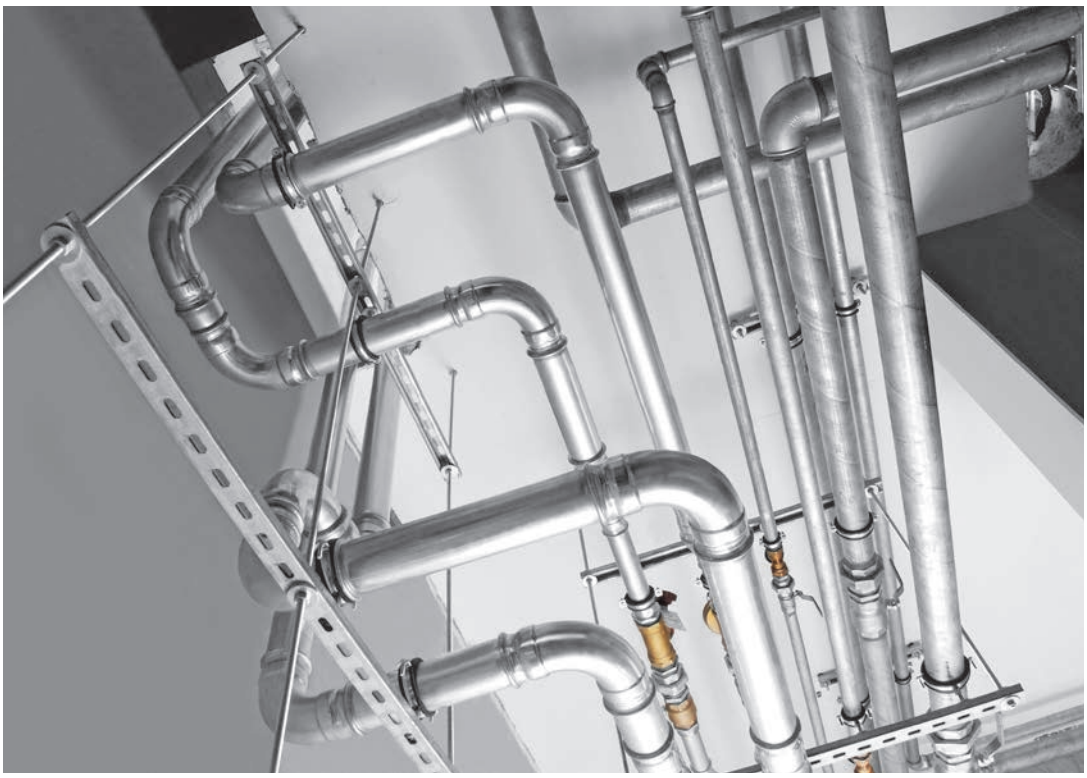
- for heating installations (both open and closed): working pressure 16 bar, working temperature 90°C
- for hot and cold tap water installations: working pressure 16 bar, working temperature 60°C.

Maximum working temperature, when using standard EPDM seals, is 135°C and maximum working pressure is 16 bar. However, when using Viton O-rings, it is possible to increase the working temperature tolerance to -30°C - 200°C, also in the case of non-typical media. In industrial installations, there is a possibility of increasing the working pressure up to 25 bar (ask KAN's Technical Department for further information or approval). Thanks to this, the scope of use of KAN-therm Inox pipes and fittings made of stainless steel is even wider (parameters and scopes of use of O-ring seals are presented in chapter Sealants – O-rings).

- hot and cold tap water installations (National Institute of Hygiene approval)
- sprinkler systems (water and air)
- conditioned water installations (desalted, softened, decarbonated, deionized, demineralized and distilled)
- open and closed heating systems (water, glycol)
- open and closed ice-cold water installations (max. dissolved chloride contents 250 mg/l)
- solar installations (Viton O-rings – working temperature up to 200°C)
- fuel oil installations (Viton O-rings)
- compressed air installations up to 16 bar (see 4.8)
- condensate installations applying the condensation technique for gas fuels (pH 3.5 to 5.2)
- technological installations in the industry.

The use of KAN-therm Inox pipes and fittings outside the scope of indoor water supply and heating installations, e.g. for media of non-typical chemical contents should be consulted on with KAN's Technical Department (available questionnaire); Please provide i. a. the chemical content of the medium, maximum temperature and working pressure, as well as ambient temperature in the questionnaire.

Exemplary KAN-therm Inox installation



4.4 Sealants – O-rings

KAN-therm Steel and Inox pressed fittings are, by standard, equipped with O-rings made of ethylene-propylene EPDM rubber observing the requirements of PN-EN 681-1. In the case of special uses, special Viton or-rings may be supplied. Working parameters and scopes of use are presented in the table.

Material	Color	Working parameters	Use
EPDM ethylene-propylene rubber	black	max working pressure: 16 bar working temperature: -35°C to 135°C short-term: 150°C (-20 °C to 110 °C for dia 139,7 and 168,3 mm)	installations: - potable water - hot water - central heating - conditioned water - with glycol solutions up to 50% - fire fighting - compressed air (with no oil)
FPM/Viton fluoride rubber	green	max working pressure: 16 bar working temperature: -35°C to 200°C short-term: 230°C (-20 °C to 200 °C for dia 139,7 and 168,3 mm)	installations: - solar - compressed air - fuel oil - fuel - with vegetable fat Notice: do not use in tap water and pure, hot water installations.
FPM/Viton fluoride rubber	gray	max working pressure: 9 bar working temperature: up to 175°C short-term: 190°C	Inox installations: - steam - scope of diameters 15-54 mm

The possibility of using Viton O-rings should be consulted on with KAN's technical department. Replacement of O-rings in between Inox and Steel fittings is not allowed.

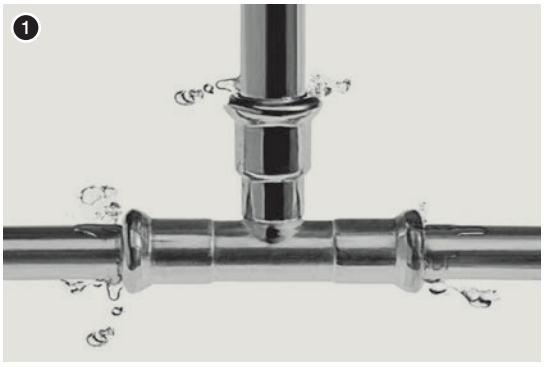
In order to facilitate mounting KAN-therm Steel pipes inside the fittings, O-rings are covered with Teflon (up to Ø54) and talcum powder (Ø76.1 – Ø108). O-rings in Inox fittings are covered with talcum powder (all diameters). If, however, the use of another lubricant proves necessary, use water or soap. Do not cover O-rings with grease, oil or fat. These substances might damage the joints. This also refers to contact with some types of paint used to cover pipes and fittings. Therefore, if required to paint the installation, use Viton O-rings instead.

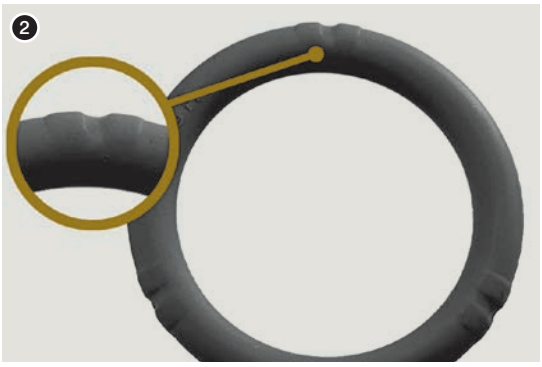
The durability of KAN-therm Steel and Inox O-rings has been tested and proven by the DVGW institute. According to test results, the life span of an O-ring should be no shorter than 50 years.

12 to 54 mm KAN-therm Steel and Inox joints are equipped with special LBP O-rings which guarantee fast detection of ill-executed joints in the installation during the preliminary stage of connecting to water supply (LBP function – Leak Before Press). Ill-executed joints are signaled by water leaks. This useful function results from the unique structure of O-rings having 3 special notches on the circumference. To ensure a fully functional and tight joint, after locating the leak, just press the joint.

For joints above 54 mm, LBP function is performed by joints of specific shape.

1. O-ring action with the LBP function of leakage detection
2. LBP O-rings with a function of leakage detection





4.5 Durability, resistance to corrosion

Installation technology distinguishes various types of corrosion: chemical, electrochemical, internal or external, spot corrosion, corrosion produced by stray currents, etc. Such phenomena may be caused by specific physical and chemical factors related to the quality of installation materials, parameters of conducted media, external conditions, as well as the structure of the installation. Below, we present a few guidelines to be taken into account when designing, assembling and using KAN-therm Steel and Inox installations in order to avoid undesirable corrosive phenomena in metal installations.

The probability of occurrence of metal corrosion caused by stray currents (direct current passing through the pipeline material to the ground, disrupting the natural insulation layers, such as walls, pipe shields, etc.) is very small. This phenomenon is additionally reduced by introducing equipotential connections to the installation.

Internal corrosion

KAN-therm Steel Installations

KAN-therm Steel pipes and fittings are made of high quality thin-walled carbon steel and are designed for use in closed installations. Oxygen dissolved in water facilitates corrosion, this is why its content in installation water should be maintained at a level below 0.1 mg/l.

In closed installations, access of oxygen from the environment is completely limited. A small amount of oxygen introduced in water when filling the installation will settle on the internal surface of pipes during their use, which will result in creating a thin layer of iron oxide, a natural anticorrosive layer. Therefore, draining water-filled installations should be avoided. If, after a pressure test, the installation is to be drained and remain unused for a longer period of time, we recommend using compressed air in pressure tests.

Any use of anti-frosts or corrosion inhibitors should be agreed on with KAN.

KAN-therm Inox Installations

KAN-therm Inox pipes and fittings are perfect for transporting potable water (both cold and hot). They may also be used with conditioned water (softened, deionized, distilled), even water with conductivity below 0.1 μS/cm.

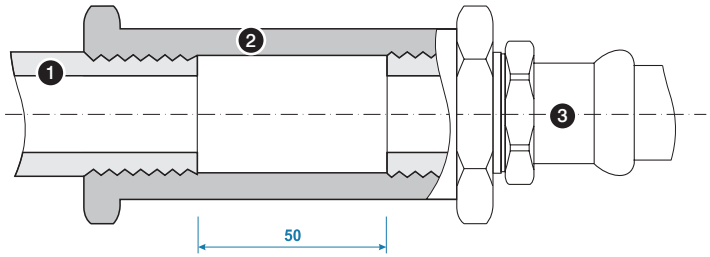
Stainless steel is resistant to nearly all components of the media transported in installations. Pay special attention to chlorides dissolved in water (halogens), since their action depends on their concentration and temperature (max 250 mg/l in "room" temperature). No elements should be subjected to contact with highly concentrated ions of dissolved chlorides in temperatures above 50°C. This is why you should:

- avoid sealants containing halogens which could dissolve in water (use plastic sealing tape, e.g. PARALIQ PM 35)
- avoid contact with oxygenated water with high chloride content (potable water with up to 0.6 mg/l

chlorine content does not cause any adverse phenomena, the maximum permitted chlorine content in potable water is 0.3 mg/l). Water installations in the Inox system may be disinfected with a chlorine solution on the condition that its concentration in water does not exceed 1.34 mg/l, and that the installation is flushed twice after disinfection.

— local water heating by increased pipe wall temperature (e.g. heating cables in water supply installations) may lead to the precipitation of sediments on the internal surface of pipes, including chloride ions, which increase the risk of pit corrosion. In such case, the temperature of pipe wall should not exceed 60°C permanently. Periodic (max 1 hour a day) water heating up to 70°C for the purpose of thermal disinfection is permissible.

Direct connections of stainless steel elements with zinc-plated steel (fixtures, joints) may result in contact corrosion of zinc-plated steel. Therefore, a bronze or brass manifold (e.g. fixture) of at least 50 mm must be used.



Principle of connecting KAN-therm Inox elements with zinc-plated steel

1. Steelpipe zinc-plated
2. Bronze or brass
3. Join with a KAN-therm Inox thread

In KAN-therm Inox and Steel systems, the is a possibility of using other materials (with intermediate elements, such as threaded or collar joints) depends on the type of installation.

Possibility of connecting KAN-therm Steel and Inox systems with other elements

Installation type		Pipes/fittings			
		Brass	Bronze/Brass	Carbon steel	Stainless steel
Steel	closed	yes	yes	yes	yes
	open	no	no	no	no
Inox	closed	yes	yes	yes	yes
	open	yes	yes	no	yes

External corrosion

Situations, in which Steel and Inox installations are exposed to external corrosion, are rather rare in indoor installations in the construction industry.

KAN-therm Inox Installations

External corrosion of KAN-therm Inox system elements may occur only when pipes or fittings are located in humid environment containing or producing chlorine compounds or other halides. Corrosive processes are intensified in temperatures above 50°C.

This is why:

— on contact with structural elements (e.g. mortar, insulation) producing chlorine compounds

— when pipes are surrounded by an environment containing gas chlorine or its compounds, or water containing salt (brine) or other halogens.

use water-sealed anticorrosive coating (e.g. thermal insulation with closed pores, the joints of which are water-sealed).

KAN-therm Steel Installations

KAN-therm Steel pipes and fittings are zinc-plated on the outside. This layer may be considered an efficient anticorrosive shield on short-term contact with water. Upon longer contact with water from the outside, pipes and fittings must be equipped with waterproof insulation.

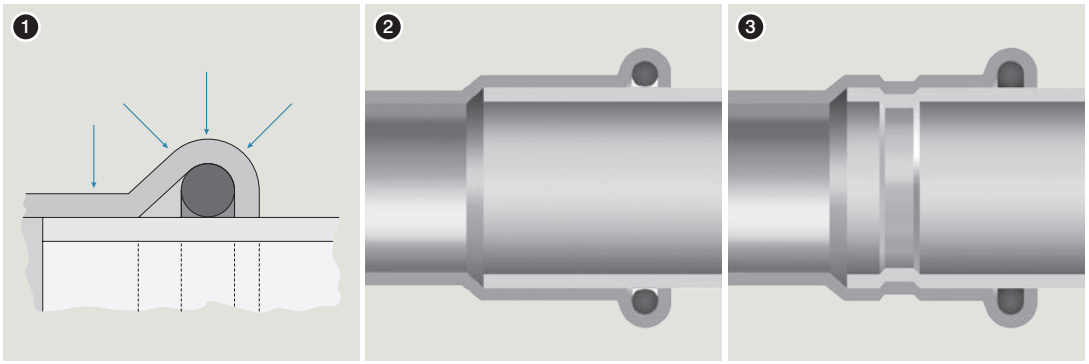
In case of long-lasting humidity, there is a potential threat of external corrosion of pipes and fittings. Therefore, the insulation layer must not contain any humidity from e.g. rainwater penetrating the coating or steam condensates (which is particularly common with mineral wool insulation layers). Insulation must be fully waterproof for the entire duration of pipeline use.

Correctly used insulation, blocking water penetration and protecting pipes and fittings from getting wet provides proper protection against corrosion. The use of paint coating (suitable for zinc-plated finishing) is permissible provided that water-soluble paint or varnish is used. At every use, learn the manufacturer's specification as regards the use of paint layers and the lack of negative impact on KAN-therm elements. Do not lay KAN-therm Steel pipes in floor slabs or walls (even when shielded).

4.6 Technique of Press joints

KAN-therm Inox and Steel Systems are based on the "Press" technique of executing joints, utilizing M-profiled jaws. This technique allows for:

- applying three-surface pressure on the O-ring, which ensures its correct deformation and adhesion to the pipe surface,
- fully enclosing the inner space, in which the O-ring is settled – through screwing the edge of the fitting onto the surface of the pipe, which prevents pollutions from penetrating the interior of the fitting. Such structure serves as a natural mechanic shield to the seal and reinforcement to the joint,
- controlling the state of the joint through the structure of the O-ring socket in the vicinity of the fitting edge.



1. KierPressure directions in a "Press" joint
2. Cross-section of a joint before pressing
3. Cross-section of the joint after pressing

Tools

In order to ensure a correct, water-tight connection, use proper tools. We suggest the use of cutters, graders and press machines as well as jaws offered by the KAN-therm System. There is a possibility of using other tools recommended by KAN (see table below).

Pressing tools for use with the KAN-therm Steel/Inox System

Size	Manufacturer	Press type	Jaws/tongs
12–28 mm	Novopress	Presskid (12 V) AFP 101 (9,6 V) ACO 102 (12 V)	Presskid 12-28 mm jaws with inserts PB1 12-28 mm forks (AFP 101/ACO 102)
12–54 mm	Novopress	ECO 1 Pressboy (230 V) ECO 201/202 (230 V) ACO 1 Pressboy (12 V) ACO 3 Pressmax (12 V) ACO 201 (14,4 V) ACO 202 (18 V) EFP 2 (230 V) EFP 201/202 (230 V) AFP 201/202 (14,4V)	PB2 ECOTEC 12-54 mm forks Jaw kits and adapters (ZB 201/ZB 203) 35-54 mm: • jaw kits: HP35, 42 and 54 (with adapter ZB 201/ZB 203) • Snap On jaw kits: HP35, 42, and 54 (with adapter ZB 201) • Snap On jaw kits: HP35, 42, and 54 (with adapter ZB 203) Jaw kits for ACO 3 are compatible with ZB 302/ZB 303 adapter • jaw kits: HP35, 42 and 54 (with adapter ZB 302/ZB 303) • Snap On jaw kits: HP35, 42 and 54 (with adapter ZB 303)
12-108 mm	Novopress	ECO 3 Pressmax (230 V) ECO 301 (230 V)	ECO 3 / ECO 301: 12-54 mm forks Jaw kits and adapters (ZB 302/ZB 303) 35-54 mm: • jaw kits: HP35, 42 and 54 (with adapter ZB 302/ZB 303) • jaw kits: HP35, 42, and 54 (with adapter ZB 302) • Snap On jaw kits: HP35, 42, and 54 (with adapter ZB 303) Jaw kits and adapters 76.1-108 mm • jaw kits 76.1-88.9 88.9 mm (only one adapter ZB 321) • jaw kits 108 mm (two adapters required: ZB 321 and ZB 322) **IMPORTANT**: Press in two stages.
76,1–108 mm	Novopress	Hydraulic-Press-System HCP /HA 5 ACO 401 (18 V)	Jaw kits HCPL 76.1-108 mm Jaw kits ACO 401: HP401 76.1-108 mm
12–28 mm	Klauke	MAP1 “Klauke Mini” (9,6 V) MAP2L “Klauke Mini” (18 V)	Mini Klauke tongs: 12-28 mm (28 mm fork marked as “Only VHS”)
12–54 mm	Klauke	UAP2 (12 V) UNP2 (230 V) UP75 (12 V) UAP3L (18 V)	Tongs: 12-54 mm (KSP3) Jaw kits and adapters: 42-54 mm (KSP3) **IMPORTANT**: New M-Klauke Jaw kits (without pressing inserts) may be used as well as old M-Klauke Jaw kits (with pressing inserts).
12-108 mm	Klauke	UAP4 (12 V) UAP4L (18 V)	Tongs: 12-54 mm (KSP3) Jaw kits and adapter: 42-54 mm (KSP3) Jaw kits and adapter: 76.1-108 mm (LP – KSP3)
66,7–108 mm	Klauke	UAP100 (12 V) UAP100L (18 V)	Jaw kits: HP 76.1-108 mm (KSP3)
12–35 mm	REMS	Mini Press ACC (12V)	REMS Mini Press tongs: 12-35 mm*
12–54 mm	REMS	Powerpress 2000 (230 V) Powerpress E (230 V) Powerpress ACC (230 V) Accu-Press (12 V) Accu-Press ACC (12 V)	REMS tongs: 12-54 mm* (4G) Fork chains and adapter: 42-54 mm (PR3-S)

* only 18 and 28 mm forks marked as “108” (Q1 2008) or newer allowed

Depending on the pressures in the pressing process, we distinguish two types of presses, differing in terms of jaws structure: designed for 12-54 mm (diameter) pipes and for 64-108 mm pipes. Presses may be electrically-powered (battery or network power supply).

Tools – work safety

Before starting any works, make sure you read the instruction manual and learn the principles of safe work. All tools must be used according to their dedication and the manufacturer's instruction manual. During the use of tools, one must observe the terms of regular inspections and all applicable safety regulations. Using tools against their designed use may lead to their damage or to the damage of their accessories and pipes. It may also lead to the occurrence of leakages in installation joints.

Tool selection table: KAN-therm Steel and Inox

Producent	Press type		Diam-eter [mm]	Jaws/tongs		Adapter		Type of KAN-therm System			
	Description	Code		Description	Code	De-scrip-tion	Code	Steel	Inox	Steel Sprin-kler	Inox Sprin-kler
REMS	Power Press E Aku Press	ZAPR01 ZAPRAK	12	M12	570100	-	-	+	-	-	-
			15	M15	570110	-	-	+	+	-	-
			18	M18	570120	-	-	+	+	-	-
			22	M22	570130	-	-	+	+	-	-
			28	M28	570140	-	-	+	+	-	-
			35	M35	570150	-	-	+	+	-	-
			42	M42	570160	-	-	+	+	-	-
			54	M54	570170	-	-	+	+	-	-
KLAUKE	UAP100	UAP100	64	KSP3 64	BP64M	-	-	+	-	-	-
			66,7	KSP3 66,7	BP667M	-	-	+	-	-	-
			76,1	KSP3 76,1	BP761M	-	-	+	+	-	-
			88,9	KSP3 88,9	BP889M	-	-	+	+	-	-
			108	KSP3 108	BP108M	-	-	+	+	-	-
NOVOPRESS	ECO301	620570.5	12	M12	620572.7	-	-	+	-	-	-
			15	M15	620573.8	-	-	+	+		
			18	M18	620574.9	-	-	+	+	-	-
			22	M22	620575.1	-	-	+	+	+	+
			28	M28	620576.0	-	-	+	+	+	+
			35	HP 35 Snap On	634106.0	ZB 303	634111.5	+	+	+	+
			42	HP 42 Snap On	634107.1			+	+	+	+
			54	HP 54 Snap On	634108.2			+	+	+	+
			66,7	M 67	634139.0	ZB 323	634143.4	+	-	-	-
	ACO401	634008.1	76,1	HP 76,1	634009.2	-	-	+	+	+	+
			88,9	HP 88,9	634010.3	-	-	+	+	+	+
			108	HP 108	634011.4	-	-	+	+	+	+
			139,7	HP 139,7	BF139	-	-	-	+	-	-
			168,3	HP 168,3	BF168	-	-	-	+	-	-

REMS tools:

1. Aku Press
2. Power Press E
3. M12-54 mm jaw

KLAUKE tools:

1. UAP100 press machine
2. KSP3 64-108 mm press collar

NOVOPRESS tools:

1. ECO 301 press machine
2. M12-28 mm press jaw
3. HP 35 Snap On press collar
4. ACO 401 press machine
5. HP 42, HP 54 Snap On press collar
6. M67 press collar
7. HP 76,1 – 168,3 press collar
8. ZB 303 adapter
9. ZB 323 adapter

Preparation of pipes for pressing

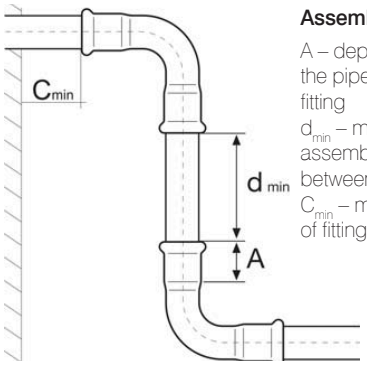
1. Cutting pipes

Cut pipes perpendicularly to the axis using a round pipe cutter. You may also use other tools, such as hand saws and electric saws designed for cutting carbon or stainless steel, provided that the cut is made perpendicularly and the edges of the pipe are not chipped. Breaking incompletely cut pipe sections is prohibited. Do not use torches or cutting discs for pipe cutting. When determining the length of pipe to be cut, remember to take into account the length of pipe which will be mounted inside the fitting.

2. Chamfering

Use a manual or electric chamfer (for bigger diameters – a semi-round steel file) to chamfer the internal and external edge of the pipe, removing all chips, which could potentially damage the O-ring during assembly.

Remove all metal shavings from the pipe, which could increase the risk of spot corrosion.



Assembly distances

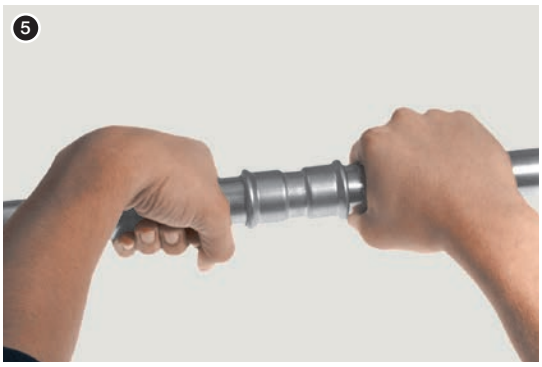
A – depth of mount of the pipe inside the fitting
d_{min} – minimal assembly depth in between fittings
C_{min} – minimal distance of fitting from wall

3. Marking the depth of the mount

In order to ensure the correct durability of your joint, maintain proper depth A (table, fig.) of mount of the pipe inside the fitting. Mark the required depth of mount on the pipe (or a fitting with bare end) using a marker. After executing the press, this marking must be visible right at the edge of the fitting.

Depth of mount of the pipe inside the fitting and minimal distance in between fittings

Ø [mm]	A [mm]	d_{min} [mm]	C_{min} [mm]
12	17	10	40
15	20	10	40
18	20	10	40
22	21	10	40
28	23	10	60
35	26	10	70
42	30	20	70
54	35	20	70
64	50	30	80
66,7	50	30	80
76,1	55	55	80
88,9	63	65	90
108	77	80	100
139,7	100	32	-
168,3	121	37	-



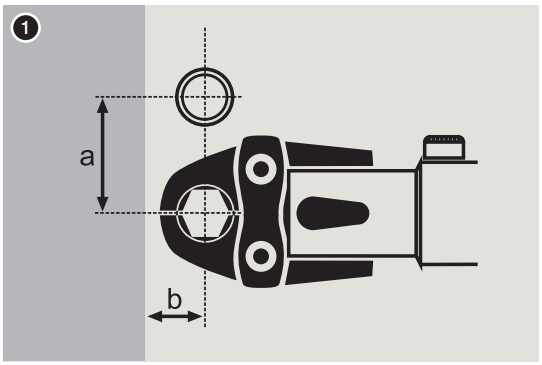
4. Inspection

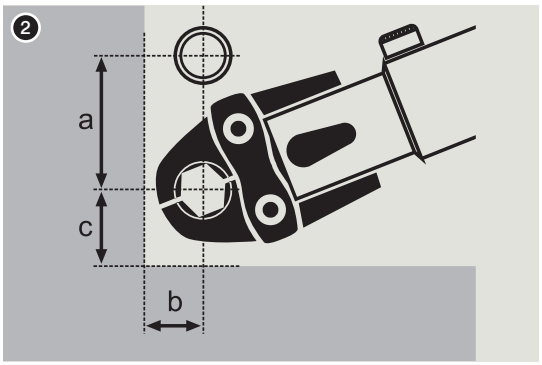
Prior to assembly, visually inspect the presence and condition of the O-ring. Check, if there are no chips or metal shavings or other pollutions on the pipe and the fitting, which could damage the seal during installation. Make sure if the distance between neighbouring fittings is above the permissible (d_{min}).

5. Mounting the pipe and the joint

Before pressing, insert the pipe into the joint up to the marked depth (slight rotation permissible). Do not use lubricants, greases or fats when mounting the pipe (water or a soap solution is permissible – recommended for pressure tests conducted with compressed air). When mounting multiple joints at the same time (mounting pipes inside fittings), before pressing the following joints, inspect the depth of mount marked on the pipe.

When assembling an installation, pay attention to the structure and dimensions of forks by ensuring minimal assembly distances in between pipes and structural partitions provided in the table and in figures.





Minimal assembly distances

Ø [mm]	Fig. 1		Fig. 2		
	a [mm]	b [mm]	a [mm]	b [mm]	c [mm]
12/15	56	20	75	25	28
18	60	20	75	25	28
22	65	25	80	31	35
28	75	25	80	31	35
35	75	30	80	31	44
42	140/115*	60/75*	140/115*	60/75*	75
54	140/120*	60/85*	140/120*	60/85*	85
64	145	110	145	110	100
66,7	145*	110	145*	100*	100*
76,1	140*	110*	165*	115*	115
88,9	150*	120*	185*	125*	125
108	170*	140*	200*	135*	135
139	290*	230*	290*	230*	230*
168	330*	260*	330*	260*	260*

* refers to 4-part forks

Pressing

Before starting any works, read all suitable instruction manuals and verify the proper operation of your tools. Select the size of your press jaw basing on the diameter of the joint.

Thanks to the innovative structure of LBP O-rings (leak before press), ill-executed joints will be signaled when filling the installation with water. After locating the leak, press the joint again. Use presses and pressing forks supplied by KAN-therm.

Consult on using presses other than offered by KAN-therm with KAN.

6. Pressing joints

Place the jaws on the joint so that its notch embraces the protruding part of the fitting (the space where the O-ring is located). After starting the press, the process takes place automatically and cannot be stopped. If, for any reason, the process of pressing is stopped, the joint needs to be disassembled (cut off) and a new one needs to be executed.

7. Pressing 76,1–108 mm joints - preparing the jaws

To press the three bigger diameters, use a special, four-part jaw (collar) and a Klauke or Novopress press machines. After taking the jaws out of the box, unlock it by pulling a special pivot. Next, open the jaws.

8. Mounting the jaws on the fitting

Mount the opened jaws on the fitting. The jaws are equipped with a special notch, which fits the collar on the fitting.

Notice

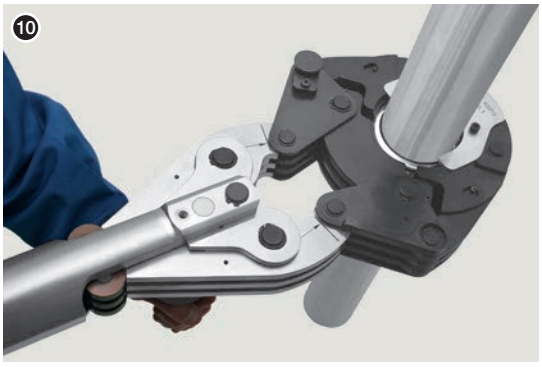
A label with the size of the jaws (visible on the figure) should be always located at the side of the pipe. Make sure, that pressing jaws and collars are clean and properly lubricated.

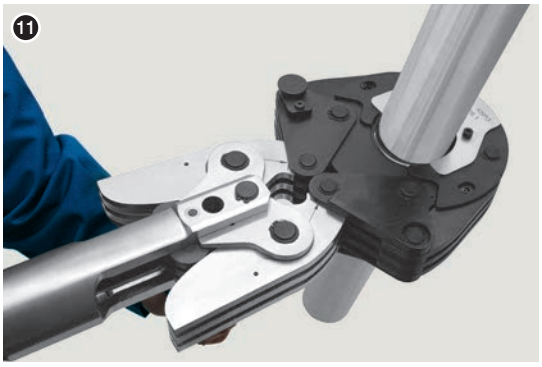
9. Securing the jaws on the fitting

After mounting the jaws on the fitting, lock them again by reinstalling the pivot. At this moment, the jaws are ready to be connected to the press machine.

10. Connecting the press machine to the jaws

The press machine must be connected to the jaws as shown in the figure. Be absolutely sure that the arms of the press machine are mounted until the end, fitting dedicated spots on the jaws, which are specially marked. A press machine connected this way may be started for the purpose of executing a fully pressed joint.





11. Pressing

The full time of executing one pressed joint is c.a. 1 min. After starting the press, the process takes place automatically and cannot be stopped. If, for any reason, the process of pressing is stopped, the joint needs to be disassembled (cut off) and a new one needs to be executed.

After executing the pressed joint, the press machine will automatically return to its primary position. After that, remove the arms of the press machine from the jaws. In order to demount the jaws from the fitting, remove the pivot and open the jaws. Store the jaws in a dedicated box, secured – locked.

Pipe bending

If need be, KAN-therm Steel and Inox pipes may be bent "cold", provided that the minimal bending radius R_{min} is observed:

$$R_{min} = 3{,}5 \times D$$

D – external diameter of the pipe

Do not bend the pipes "hot", due to the vulnerability of pipes processed this way to corrosion resulting from a change in the crystal structure of their material (KAN-therm Inox) and the possibility of damaging the zinc-plated layer of KAN-therm Steel pipes.

Use manual benders to bend the pipe. These may be electric or hydraulic. Do not "cold"-bend pipes with diameters exceeding Ø28 mm (use ready-made arches and elbows 90° and 45° supplied as part of the KAN-therm System).

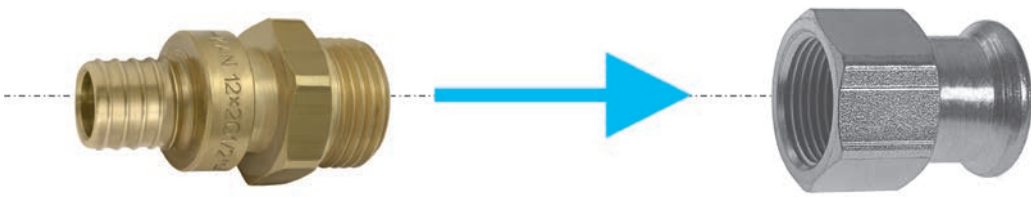
Do not weld or solder KAN-therm Inox pipes, since this process changes the structure of material, which might lead to corrosion. Welding KAN-therm Steel pipes is not recommended (the anti-corrosive zinc layer may be damaged).

Threaded fittings

The principle of connecting KAN-therm Inox/Steel joints with brass fittings

Brass join with external thread
KAN-therm Push, KAN-therm Press

Steel join with internal thread
KAN-therm Steel, KAN-therm Inox



KAN-therm Steel and Inox Systems offer a wide selection of fittings with male and female threads. Since fittings with male threads are equipped with cone threads (pipe), in threaded joints with brass shape fittings, you can only use male threads for brass joints, sealed with e.g. a small

amount of tow. It is suggested that the threaded (screwed) joint is executed before pressing the joint, so that no additional load is applied on the pressed joint. Do not use standard PTFE tape or any other solutions containing halides (e.g. chlorides) to seal threads in KAN-therm Inox installations.

4.7 Remarks to use

Electrical equipotential connections

Due to their limited electric conductivity, KAN-therm Inox/Steel pipes may not serve as additional protective pipelines in buildings. They cannot be used as grounding installations. Installations executed in the KAN-therm Steel System should be equipped with equipotential electric circuits. All electric connections in the building must be designed and executed by certified electricians.

Transport and storage

Elements of the KAN-therm Steel (carbon steel) and KAN-therm Inox (stainless steel) must be stored separately.

Do not store elements of the system directly on the ground (e.g. on soil or concrete).

Do not store elements of the system in the vicinity of chemical solutions.

Pipe bundles should be stored and transported on wooden pallets (avoid direct contact with other steel elements, e.g. pipe stands).

During transport, loading and unloading, be extra careful not to scratch or damage the pipes or fittings – do not: throw, drag or bend them.

Rooms designed for storing elements of the system must be dry.

During their storage, assembly and use, pipe surfaces must not be exposed to long-term, direct contact with water or humidity.

4.8 Custom applications

Compressed air systems

System KAN-therm Steel and its both side galvanized variant KAN-therm Steel Sprinkler allow for the construction of compressed air systems in Classes 1 to 3 according to ISO 8573 Part 1 (maximum moisture content 880 mg/m^3).

System KAN-therm Inox allows for construction of compressed air systems in Classes 1 to 6 according to ISO 8573 part 1, provided the appropriate O-ring sealing.

System KAN-therm		Class acc. to ISO 8573	Moisture content [mg/m^3]	Oil content [mg/m^3]	O-ring
Steel and Steel Sprinkler	Inox	1	3	0,01	EPDM*
		2	120	0,1	
		3	880	1	
		4	6000	5	
-		5	7800	25	
		6	9400	>25	FPM Viton (green)

* EPDM O-rings may be applied only for syntetic oils (mineral oils are not accepted)

Operating pressure of the compressed air installations made in above systems must not exceed:

- 16 bar for diameters: 12-54 mm,
- 10 bar for diameters: 66,7-168,3 mm.

In special cases, there is a possibility of performing compressed air installations running at higher pressures - for further information please contact KAN Technical Department.

Hydrant installations

System KAN-therm Inox may be used to build internal hydrant installations operating at pressure up to 16 bar without additional restrictions in accordance with the Technical Approval AT-15-7543/2014.

Fittings of System KAN-therm Steel with both side galvanized steel pipes of System KAN-therm Steel Sprinkler can be used to build a hydrant installation in accordance with the Technical Approval AT-15-7543/2014 under the following conditions:

- internal installations carried out in dry rooms without condensation,
- installations filled with clean treated water (other media are not allowed),
- installations constantly filled with water,
- installations without flow (without circulation and water intake or outlet until fire fighting has started),
- installations separated from drinking water systems with suitable protective devices (back flow preventers).

Failing to follow the manufacturer's instructions causes risk of corrosion and loss of material warranty.

Observe local regulations in force regarding the installation of hydrants.

NOTES

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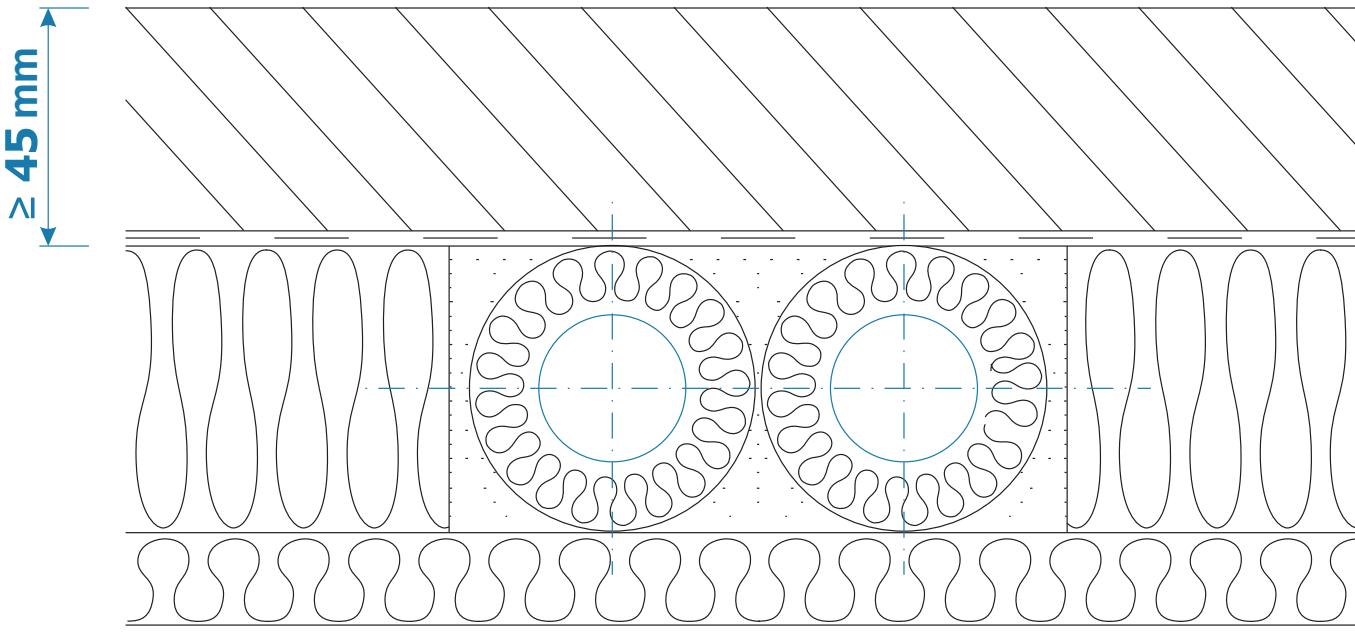
5 KAN-therm System guidelines for installation design and assembly

SYSTEM **KAN-therm**

Guidelines for installation design and assembly



ISO **9001**

5 KAN-therm System guidelines for installation design and assembly

5.1 Assembly of KAN-therm System at temperatures below 0 °C

The standard assembly of plastic KAN-therm System should be conducted at ambient temperatures above 0 °C. Guidelines given in the previous chapters of this guide should be observed.

Due to the changing weather conditions and ambient temperature which may occur on-site installation, in specific cases, it is permissible to perform assembly of plastic KAN-therm systems at an ambient temperature reaching up to -10 °C (assembly of KAN-therm Steel and KAN-therm Inox systems is normally permissible at ambient temperature -10 °C).

However, note the additional guidance necessary for the proper submission of the installation:

KAN-therm Push & KAN-therm Push Platinum:

- pay special attention to cutting tools for pipes - use only efficient pipe shears with clean, sharp cutting edges, keep cutting perpendicular to pipe axis,
- before expansion, pipe ends must be heated with hot water or air – pay special attention not to exceed 90 °C temperature of the pipe wall,
- due to the increased stiffness of the Platinum pipe, it may be necessary to cut approximately 5 cm of the tip of the tube unwound from the coil.

KAN-therm Press & Press LBP:

- pay special attention to pipe cutting tools - use only sharp scissors or pipe cutters with clean, sharp cutting edges, maintain cut perpendicular to pipe axis,
- perform calibration and edges chamfering of pipes for all connections (including LBP fittings),
- due to the increased stiffness of the multilayer pipe, it may be necessary to cut approximately 5 cm of the tip of the tube unwound from coils (issue does not affect pipes supplied in bars).

KAN-therm PP:

- pay special attention to pipe cutting tools - use only sharp scissors or pipe cutters with clean, sharp cutting edges, maintain cut perpendicular to pipe axis,
- pay special attention not to stress mechanically Glass fibre pipes,
- secure place of welding pipes and fittings from increased movements of air masses (secure from additional cooling by wind),
- strictly comply elongated by 50% time of heating the elements while observing the degree of plasticity of the heated material.

KAN-therm Steel:

- protect built system against the possibility of condensation inside the elements,
- in case of necessity of the pressure test at ambient temperatures below 0 °C, carry out test only on compressed air (draining is unacceptable after the pressure test of the system).

Additionally, during the installation of all piping systems:

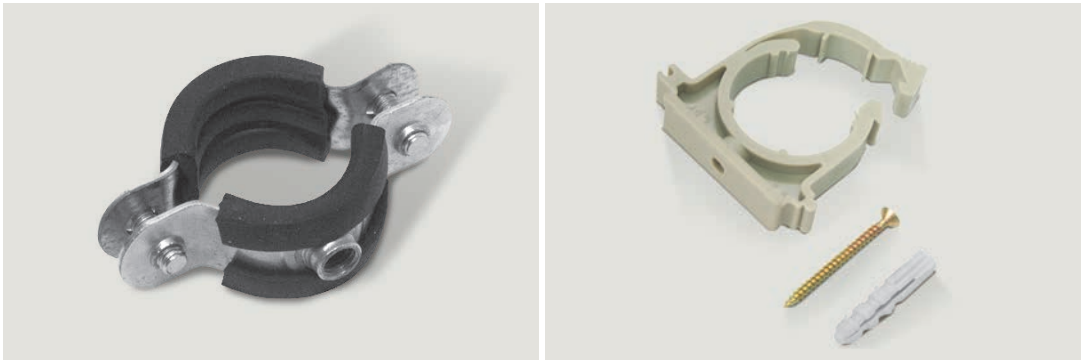
- read the terms of use of KAN-therm elements and installation tools,
- always avoid improper method of elements transportation or their mechanical stress,
- note the ambient environment temperature during assembly for correct calculations of thermal elongation and selection of expansion arms,
- follow the guidelines of power tools manufacturers according to the minimum operating temperature and required additional operations, it is prohibited to use power tools if water vapour condensation is possible,
- carry out pressure tests of installation with use of antifreeze agents – eg. glycol solutions, in case where there is possibility of medium freezing, immediately after the test drain the whole installation (NOTE – unacceptable for System KAN-therm Steel) or carry out pressure tests with dry compressed air (without oil content).

5.2 Mounting KAN-therm System pipelines

Clamps and grips

KAN offers various types of clamps for mounting KAN-therm System pipes to structural partitions. Their structure depends on the diameter of the pipe and its construction material, the working parameters of the installation and its layout.

Clamps used in the KAN-therm System



Clamps are made of plastic or metal. Plastic clamps must be used only as shifting points for KAN-therm Push, Press and PP System pipelines.

For pipelines laid in floor slabs or wall furrows, use plastic hooks and clamps with wall plugs.

Clamps for mounting KAN-therm Push, Press and PP System pipes in floor slabs

Metal grips (zinc plated steel) are equipped with elastic pads leveling out vibrations and noises. Such grips may serve as shifting points (PP) and fixed points (PS) in all KAN-therm installations with on-plaster mount. Metal clamps without elastic pads might damage the surface of plastic KAN-therm pipes or the protective zinc coating of Steel pipes, this is why they cannot be used. In the case of KAN-therm Inox pipes, clamp pads should not produce chlorides. Do not use pipe hooks for KAN-therm Steel systems.

Shifting and fixed point clamps are not to be mounted on joints.

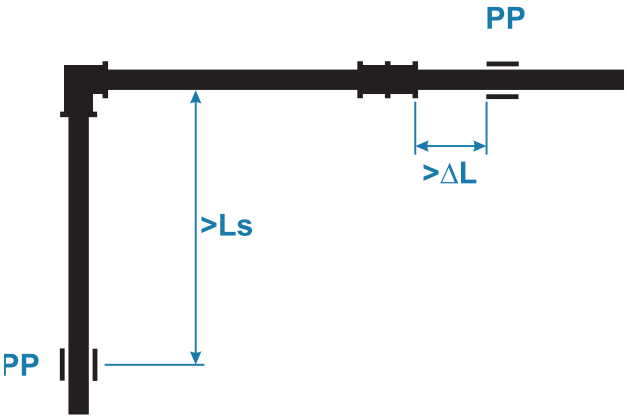
PP shifting points

Shifting (sliding) points should allow for unobstructed axial motion of pipelines (caused by the thermal elongation factor), which is why they should not be mounted next to joints (the minimal distance from the edge of a joint must be higher than the maximal elongation of the pipe section ΔL).

When changing the direction of the pipeline, a shifting point may be mounted at distance to the elbow, exceeding the length of the Ls flexible arm.

Correct location of shifting points.

Ls – length of the flexible arm,
ΔL – max elongation of the pipe section



PS fixed points

Fixed points allow for pointing thermal elongations of a pipeline in a specific direction, and for dividing it into smaller sections.

To form fixed points (PS) use zinc-plated steel clamps with elastic pads, ensuring precise and reliable stabilization of the pipe on its entire circumference. The clamp should fully and tightly enclose the pipe (the spacer should be removed). The structure of clamps should allow for the transfer of forces incurred by the pipe expanding and loads caused by the weight of the pipe and its content onto the clamp.

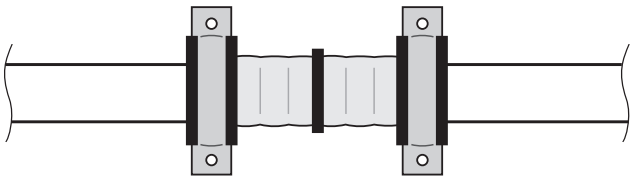
The structures mounting the clamps on structural partitions must also be strong enough to bear the above mentioned loads. For this purpose, use threaded rods with wall plugs, or expansion bolts.

To form a fixed point on the pipeline, use two clamps adjoining the edges of the joint (tee, connector, coupling). Fixed points are usually mounted next to pipeline of fixture branch-offs.

The assembly of a fixed point at a branch-off of a reducer is possible if the diameter of the branch-off is not smaller than one-dimension of the diameter of the main pipe.

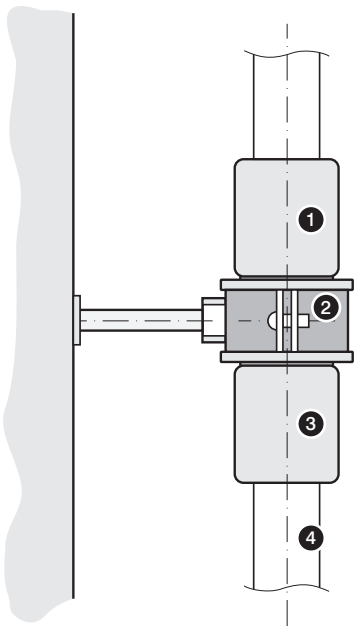
In the case of polypropylene KAN-therm PP pipelines, use one clamp situated in between fitting couplings.

Example of execution of a fixed point on a straight section of a KAN-therm Press, Push System pipeline



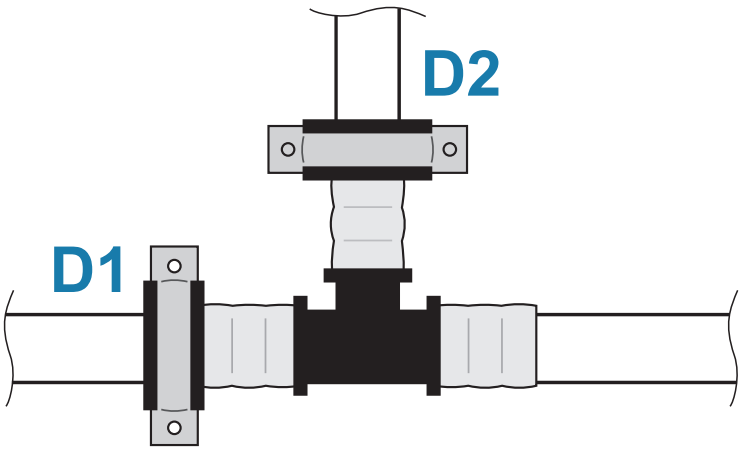
Example of execution of a fixed point on a straight section of a KAN-therm PP System pipeline

1. coupling
2. clamp
3. coupling
4. pipe



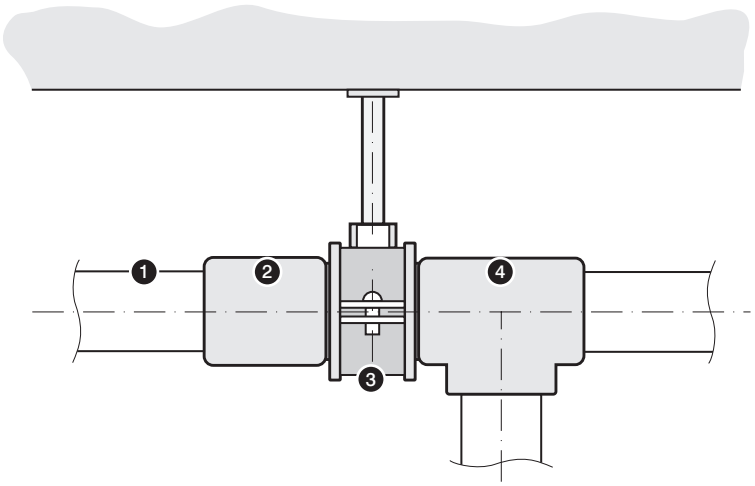
D2 ≥ D1

Example of execution of a fixed point next to a branch-off of a KAN-therm Press, Push System pipeline



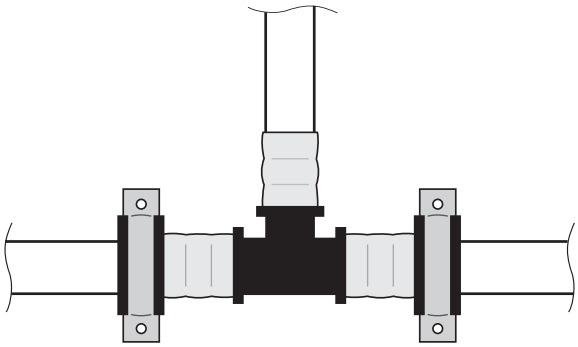
Example of execution of a fixed point next to a branch-off of a KAN-therm PP System pipeline

1. pipe
2. coupling
3. clamp
4. three-way

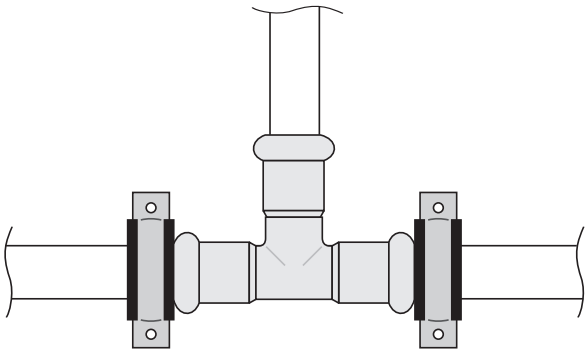


D2 < D1

Example of execution of a fixed point next to a branch-off of a KAN-therm Press, Push System pipeline



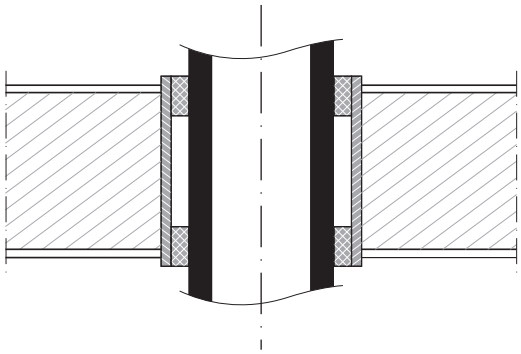
Example of execution of a fixed point next to a branch-off of a KAN-therm PP System pipeline



Passages through structural partitions

Passages of all KAN-therm Systems (Push, Press, PP, Steel, Inox) through structural partitions must be executed in protective sleeves made of material which does not damage the surface of pipes (e.g. thin-walled plastic pipes). The sleeve must be filled with permanently flexible material, which does not have any negative effect on pipe material.

Passage of a KAN-therm pipe through a structural partition



Support spans

Minimal distances in between supports for KAN-therm System pipelines conducted at the surface of structural partitions and structures are provided in the tables.

Fixed points, shifting points and passages through structural partitions in protective sleeves are considered supports.

Maximum support span [m] – Multilayer KAN-therm Press and KAN-therm Push Platinum pipes

Pipe layout	External pipe diameter [mm]							
	14	16	20	25/26	32	40	50	63
vertically	1,5	1,5	1,7	1,9	2,1	2,2	2,6	2,8
horizontally	1,2	1,2	1,3	1,5	1,6	1,7	2,0	2,2

Maximum support span [m] – KAN-therm Press and KAN-therm Push PE-RT, PE-Xc pipes

Pipe layout	External pipe diameter [mm]				
	12	14	18	25	32
vertically	1,0 (0,5)	1,0 (0,5)	1,0 (0,7)	1,2 (0,8)	1,3 (0,9)
horizontally	0,8 (0,4)	0,8 (0,4)	0,8 (0,5)	0,8 (0,6)	1,0 (0,7)

In brackets values for hot water

Maximum support span [m] – KAN-therm PP pipes

Medium temp. [°C]	External pipe diameter [mm]									
	16	20	25	32	40	50	63	75	90	110
20	0,50	0,60	0,75	0,90	1,00	1,20	1,40	1,50	1,60	1,80
30	0,50	0,60	0,75	0,90	1,00	1,20	1,40	1,50	1,60	1,80
40	0,50	0,60	0,70	0,80	0,90	1,10	1,30	1,40	1,50	1,70
50	0,50	0,60	0,70	0,80	0,90	1,10	1,30	1,40	1,50	1,70
60	0,50	0,55	0,65	0,75	0,85	1,00	1,15	1,25	1,40	1,60
80	0,50	0,50	0,60	0,70	0,80	0,95	1,05	1,15	1,25	1,40

For vertical pipeline sections, support span may be increased by 30%

Maximum support span [m] – KAN-therm Stabi Al pipes

Medium temp. [°C]	External pipe diameter [mm]									
	16	20	25	32	40	50	63	75	90	110
20	1,00	1,20	1,30	1,50	1,70	1,90	2,10	2,20	2,30	2,50
30	1,00	1,20	1,30	1,50	1,70	1,90	2,10	2,20	2,30	2,40
40	1,00	1,10	1,20	1,40	1,60	1,80	2,00	2,10	2,20	2,30
50	1,00	1,10	1,20	1,40	1,60	1,80	2,00	2,10	2,20	2,10
60	0,80	1,00	1,10	1,30	1,50	1,70	1,90	2,00	2,10	2,00
80	0,70	0,90	1,00	1,20	1,40	1,60	1,80	1,90	2,00	2,00

For vertical pipeline sections, support span may be increased by 30%

Maximum support span [m] – KAN-therm PP Glass pipes

Medium temp. [°C]	External pipe diameter [mm]								
	20	25	32	40	50	63	75	90	110
0	1,20	1,40	1,60	1,80	2,05	2,30	2,45	2,60	2,90
20	0,90	1,05	1,20	1,35	1,55	1,75	1,85	1,95	2,15
30	0,90	1,05	1,20	1,35	1,55	1,75	1,85	1,95	2,10
40	0,85	0,95	1,10	1,25	1,45	1,65	1,75	1,85	2,00
50	0,85	0,95	1,10	1,25	1,45	1,65	1,75	1,85	1,90
60	0,80	0,90	1,05	1,20	1,35	1,55	1,65	1,75	1,80
70	0,70	0,80	0,95	1,10	1,30	1,45	1,55	1,65	1,70

For vertical pipeline sections, support span may be increased by 30%

Maximum support span [m] – KAN-therm Steel/Inox pipes

Pipe layout	External pipe diameter [mm]												
	15	18	22	28	35	42	54	64	66,7	76,1	88,9	108	139	168
vertical/ horizontal	1,25	1,50	2,00	2,25	2,75	3,00	3,50	3,75	4	4,25	4,75	5,00	5,00	5,00

5.3 Compensation of thermal elongation of pipelines

Linear thermal elongation

Under the influence of temperature resulting from medium and ambient temperature drops, installation pipelines are expanded or shortened linearly during assembly (causing an axial motion of pipelines).

Vulnerability of pipes to linear elongation is defined by the thermal elongation coefficient α. Elongation (or shortening) of a pipeline section ΔL is calculated according to the following formula:

$$\Delta L = \alpha \times L \times \Delta t$$

ΔL	change in pipe length	[mm]
α	elongation coefficient	[mm/m × K]
L	initial pipeline length	[m]
Δt	temperature difference: working temp. and assembly temp. of the pipeline	[K]

Value of coefficient α for KAN-therm pipes		
KAN-therm Push System, PE-RT, PE-Xc pipes	α = 0,18	[mm/m × K]
KAN-therm Press System, PE/Al./PE pipes, KAN-therm Push, PLATINUM pipes	α = 0,025	[mm/m × K]
KAN-therm PP System, uniform PP-R pipes	α = 0,15	[mm/m × K]
KAN-therm PP System, PP-R/Al/PP-R Stabi Al pipes	α = 0,03	[mm/m × K]
KAN-therm PP System, Glass pipes	α = 0,05	[mm/m × K]
KAN-therm Inox System, stainless steel pipes	α = 0,0160	[mm/m × K]
KAN-therm Steel System, carbon steel pipes	α = 0,0108	[mm/m × K]

Changes in pipe length may be calculated basing on data included in one of the following tables.

Thermal elongation of multilayer KAN-therm Press pipes

L [m]	Linear elongation ΔL KAN-therm Press pipes Δt [K]									
	10	20	30	40	50	60	70	80	90	100
1	0,25	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50
2	0,50	1,00	1,50	2,00	2,50	3,00	3,50	4,00	4,50	5,00
3	0,75	1,50	2,25	3,00	3,75	4,50	5,25	6,00	6,75	7,50
4	1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00	9,00	10,00
5	1,25	2,50	3,75	5,00	6,25	7,50	8,75	10,00	11,25	12,50
6	1,50	3,00	4,50	6,00	7,50	9,00	10,50	12,00	13,50	15,00
7	1,75	3,50	5,25	7,00	8,75	10,50	12,25	14,00	15,75	17,50
8	2,00	4,00	6,00	8,00	10,00	12,00	14,00	16,00	18,00	20,00
9	2,25	4,50	6,75	9,00	11,25	13,50	15,75	18,00	20,25	22,50
10	2,50	5,00	7,50	10,00	12,50	15,00	17,50	20,00	22,50	25,00

Thermal elongation of KAN-therm Push pipes

L [m]	Linear elongation ΔL KAN-therm Push PE-Xc and PE-RT pipes Δt [K]									
	10	20	30	40	50	60	70	80	90	100
1	1,8	3,6	5,4	7,2	9,0	10,8	12,6	14,4	16,2	18,0
2	3,6	7,2	10,8	14,4	18,0	21,6	25,2	28,8	32,4	36,0
3	5,4	10,8	16,2	21,6	27,0	32,4	37,8	43,2	48,6	54,0
4	7,2	14,4	21,6	28,8	36,0	43,2	50,4	57,6	64,8	72,0
5	9,0	18,0	27,0	36,0	45,0	54,0	63,0	72,0	81,0	90,0
6	10,8	21,6	32,4	43,2	54,0	64,8	75,6	86,4	97,2	108,0
7	12,6	25,2	37,8	50,4	63,0	75,6	88,2	100,8	113,4	126,0
8	14,4	28,2	43,2	57,6	72,0	88,2	100,8	115,2	129,6	144,0
9	16,2	32,4	48,6	64,8	81,0	97,2	113,4	129,6	145,8	162,0
10	18,0	36,0	54,0	72,0	90,0	100,8	126,0	144,0	162,0	180,0

Thermal elongation of KAN-therm PP pipes

L [m]	Linear elongation ΔL KAN-therm PP pipes Δt [K]									
	10	20	30	40	50	60	70	80	90	100
1	1,5	3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5	15,0
2	3,0	6,0	9,0	12,0	15,0	18,0	21,0	24,0	27,0	30,0
3	4,5	9,0	13,5	18,0	22,5	27,0	31,5	36,0	40,5	45,0
4	6,0	12,0	18,0	24,0	30,0	36,0	42,0	48,0	54,0	60,0
5	7,5	15,0	22,5	30,0	37,5	45,0	52,5	60,0	67,5	75,0
6	9,0	18,0	27,0	36,0	45,0	54,0	63,0	72,0	81,0	90,0
7	10,5	21,0	31,5	42,0	52,5	63,0	73,5	84,0	94,5	105,0
8	12,0	24,0	36,0	48,0	60,0	72,0	84,0	96,0	108,0	120,0
9	13,5	27,0	40,5	54,0	67,5	81,0	94,5	108,0	121,5	135,0
10	15,0	30,0	45,0	60,0	75,0	90,0	105,0	120,0	135,0	150,0

Thermal elongation of KAN-therm PP Stabi Al pipes

L [m]	Linear elongation ΔL KAN-therm PP Stabi Al pipes Δt [K]									
	10	20	30	40	50	60	70	80	90	100
1	0,3	0,6	0,9	1,2	1,5	1,8	2,1	2,4	2,7	3,0
2	0,6	1,2	1,8	2,4	3,0	3,6	4,2	4,8	5,4	6,0
3	0,9	1,8	2,7	3,6	4,5	5,4	6,3	7,2	8,1	9,0
4	1,2	2,4	3,6	4,8	6,0	7,2	8,4	9,6	10,8	12,0
5	1,5	3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5	15,0
6	1,8	3,6	5,4	7,2	9,0	10,8	12,8	14,4	16,2	18,0
7	2,1	4,2	6,3	8,4	10,5	12,6	14,7	16,8	18,9	21,0
8	2,4	4,8	7,2	9,6	12,0	14,4	16,8	19,2	21,6	24,0
9	2,7	5,4	8,1	10,8	13,5	16,2	18,9	21,6	24,3	27,0
10	3,0	6,0	9,0	12,0	15,0	18,0	21,0	24,0	27,0	30,0

Thermal elongation of KAN-therm PP Glass pipes

L [m]	Linear elongation ΔL KAN-therm PP Glass pipes Δt [K]									
	10	20	30	40	50	60	70	80	90	100
1	0,5	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
2	1,0	2,0	3,0	4,0	5,0	6,0	7,0	8,0	9,0	10,0
3	1,5	3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5	15,0
4	2,0	4,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
5	2,5	5,0	7,5	10,0	12,5	15,0	17,5	20,0	22,5	25,0
6	3,0	6,0	9,0	12,0	15,0	18,0	21,0	24,0	27,0	30,0
7	3,5	7,0	10,5	14,0	17,5	21,0	24,5	28,0	31,5	35,0
8	4,0	8,0	12,0	16,0	20,0	24,0	28,0	32,0	36,0	40,0
9	4,5	9,0	13,5	18,0	22,5	27,0	31,5	36,0	40,5	45,0
10	5,0	10,0	15,0	20,0	25,0	30,0	35,0	40,0	45,0	50,0

Thermal elongation of KAN-therm Steel pipes

L [m]	Linear elongation ΔL KAN-therm Steel pipes Δt [K]									
	10	20	30	40	50	60	70	80	90	100
1	0,11	0,22	0,32	0,43	0,54	0,65	0,76	0,86	0,97	1,08
2	0,22	0,43	0,65	0,86	1,08	1,30	1,51	1,73	1,94	2,16
3	0,32	0,65	0,97	1,30	1,62	1,94	2,27	2,59	2,92	3,24
4	0,43	0,86	1,30	1,73	2,16	2,59	3,02	3,46	3,89	4,32
5	0,54	1,08	1,62	2,16	2,70	3,24	3,78	4,32	4,86	5,40
6	0,65	1,30	1,94	2,59	3,24	3,89	4,54	5,18	5,83	6,48
7	0,76	1,51	2,27	3,02	3,78	4,54	5,29	6,05	6,80	7,56
8	0,86	1,73	2,59	3,46	4,32	5,18	6,05	6,91	7,78	8,64
9	0,97	1,94	2,92	3,89	4,86	5,83	6,80	7,78	8,75	9,72
10	1,08	2,16	3,24	4,32	5,40	6,48	7,56	8,64	9,72	10,80
12	1,30	2,59	3,89	5,18	6,48	7,78	9,07	10,37	11,66	12,96
14	1,51	3,02	4,54	6,05	7,56	9,07	10,58	12,10	13,61	15,12
16	1,73	3,46	5,18	6,91	8,64	10,37	12,10	13,82	15,55	17,28
18	1,94	3,89	5,83	7,78	9,72	11,66	13,61	15,55	17,50	19,44
20	2,16	4,32	6,48	8,64	10,80	12,96	15,12	17,28	19,44	21,60

Thermal elongation of KAN-therm Inox pipes

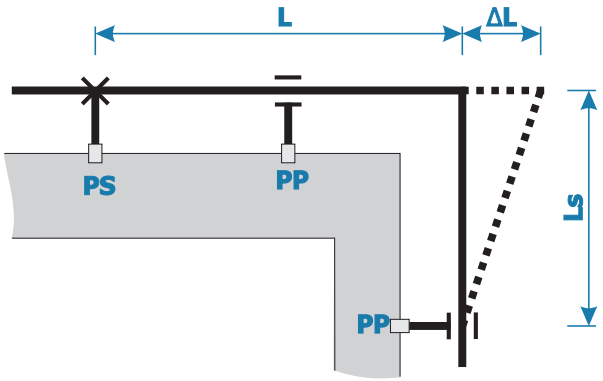
L [m]	Linear elongation ΔL KAN-therm Inox pipes Δt [K]									
	10	20	30	40	50	60	70	80	90	100
1	0,16	0,32	0,48	0,64	0,80	0,96	1,12	1,28	1,44	1,60
2	0,32	0,64	0,96	1,28	1,60	1,92	2,24	2,56	2,88	3,20
3	0,48	0,96	1,44	1,92	2,40	2,88	3,36	3,84	4,32	4,80
4	0,64	1,28	1,92	2,56	3,20	3,84	4,48	5,12	5,76	6,40
5	0,80	1,60	2,40	3,20	4,00	4,80	5,60	6,40	7,20	8,00
6	0,96	1,92	2,88	3,84	4,80	5,76	6,72	7,68	8,64	9,60
7	1,12	2,24	3,36	4,48	5,60	6,72	7,84	8,96	10,08	11,20
8	1,28	2,56	3,84	5,12	6,40	7,68	8,96	10,24	11,52	12,80
9	1,44	2,88	4,32	5,76	7,20	8,64	10,08	11,52	12,96	14,40
10	1,60	3,20	4,80	6,40	8,00	9,60	11,20	12,80	14,40	16,00
12	1,92	3,84	5,76	7,68	9,60	11,52	13,44	15,36	17,28	19,20
14	2,24	4,48	6,72	8,96	11,20	13,44	15,68	17,92	20,16	22,40
16	2,56	5,12	7,68	10,24	12,80	15,36	17,92	20,48	23,04	25,60
18	2,88	5,76	8,64	11,52	14,40	17,28	20,16	23,04	25,92	28,80
20	3,20	6,40	9,60	12,80	16,00	19,20	22,40	25,60	28,80	32,00

Compensation of elongations

Flexible arm

Thermal elongation of pipelines in installations is an undesirable phenomenon which has negative impact on the operation and durability, as well as the outer appearance of the installation. Therefore, as early as in the stage of designing an installation, you should assume specific compensation solutions, consisting of various compensators and properly arranged fixed and shifting points.

In on-plaster installations, redirecting the installation with the use of flexible (elastic) arms is used to compensate for the loads of thermal elongation. Tensions resulting from thermal elongation are transferred onto the arm, causing it to bend slightly.



Pipe material constant „k” for KAN-therm systems	
multilayer pipes	36
PE-Xc, PE-RT	15
PP-R	20
Steel/Inox	45

The required length of the flexible arm Ls is calculated in the following way:

$$Ls = k \times \sqrt{D \times \Delta L}$$

Where: Ls – length of the flexible arm [mm], k – pipe material constant, D – external pipe diameter [mm], ΔL – change in pipe length [mm].

Determine the length of the Ls arm basing on the tables below.

Length of the Ls flexible arm for multilayer KAN-therm pipes

Elongation ΔL [mm]	External pipe diameter D [mm]								
	14	16	20	25	26	32	40	50	63
5	301	322	360	402	410	455	509	569	639
10	426	455	509	569	580	644	720	805	904
15	522	558	624	697	711	789	882	986	1107
20	602	644	720	805	821	911	1018	1138	1278
30	738	789	882	986	1005	1115	1247	1394	1565
40	852	911	1018	1138	1161	1288	1440	1610	1807
50	952	1018	1138	1273	1298	1440	1610	1800	2020
60	1043	1115	1247	1394	1422	1577	1764	1972	2213
70	1127	1205	1347	1506	1536	1704	1905	2130	2391
80	1205	1288	1440	1610	1642	1821	2036	2277	2556
90	1278	1366	1527	1708	1741	1932	2160	2415	2711
100	1347	1440	1610	1800	1836	2036	2277	2546	2857

Length of the Ls flexible arm for KAN-therm PE-Xc and PE-RT pipes

Elongation ΔL [mm]	External pipe diameter D [mm]						
	12	14	16	18	20	25	32
5	116	125	134	142	150	168	190
10	164	177	190	201	212	237	268
15	201	217	232	246	260	290	329
20	232	251	268	285	300	335	379
30	285	307	329	349	367	411	465
40	329	355	379	402	424	474	537
50	367	397	424	450	474	530	600
60	402	435	465	493	520	581	657
70	435	470	502	532	561	627	710
80	465	502	537	569	600	671	759
90	493	532	569	604	636	712	805
100	520	561	600	636	671	750	849

Length of the Ls flexible arm for KAN-therm PP pipes

Elongation ΔL [mm]	External pipe diameter D [mm]									
	16	20	25	32	40	50	63	75	90	110
5	179	200	224	253	283	316	355	387	424	469
10	253	283	316	358	400	447	502	548	600	663
15	310	346	387	438	490	548	615	671	735	812
20	358	400	447	506	566	632	710	775	849	938
30	438	490	548	620	693	775	869	949	1039	1149
40	506	566	632	716	800	894	1004	1095	1200	1327
50	566	632	707	800	894	1000	1122	1225	1342	1483
60	620	693	775	876	980	1095	1230	1342	1470	1625
70	669	748	837	947	1058	1183	1328	1449	1587	1755
80	716	800	894	1012	1131	1265	1420	1549	1697	1876
90	759	849	949	1073	1200	1342	1506	1643	1800	1990
100	800	894	1000	1131	1265	1414	1587	1732	1897	2098
150	980	1095	1225	1386	1549	1732	1944	2121	2324	2569
200	1131	1265	1414	1600	1789	2000	2245	2449	2683	2966

In the KAN-therm PP System, you may also used ready-made loop compensators with 150 mm loop diameters:

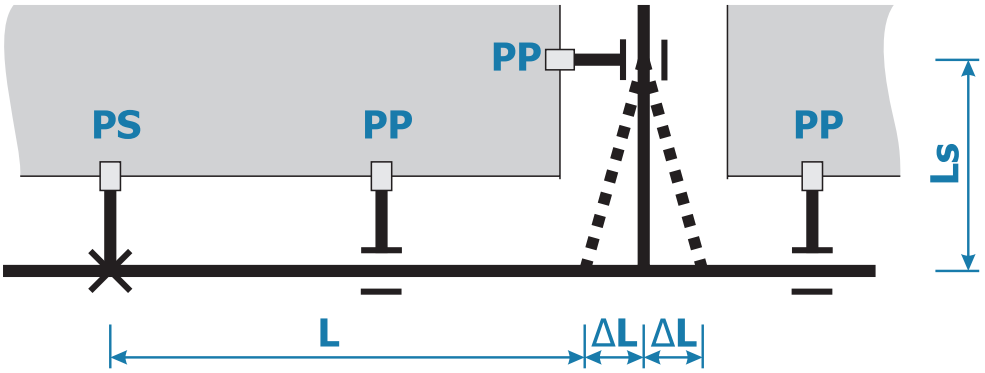
Nominal compensator diameter [mm]	Thermal elongation value possible to compensate [mm]
16	80
20	70
25	60
32	50

Length of Ls flexible arm for KAN-therm Steel/Inox pipes [mm]

Elongation ΔL [mm]	External pipe diameter D [mm]												
	12	15	18	22	28	35	42	54	64	66,7	76,1	88,9	108
2	220	246	270	298	337	376	412	468	509	520	555	600	661
4	312	349	382	422	476	532	583	661	720	735	785	849	935
6	382	427	468	517	583	652	714	810	882	900	962	1039	1146
8	441	493	540	597	673	753	825	935	1018	1039	1110	1200	1323
10	493	551	604	667	753	842	922	1046	1138	1162	1241	1342	1479
12	540	604	661	731	825	922	1010	1146	1247	1273	1360	1470	1620
14	583	652	714	790	891	996	1091	1237	1347	1375	1469	1588	1750
16	624	697	764	844	952	1065	1167	1323	1440	1470	1570	1697	1871
18	661	739	810	895	1010	1129	1237	1403	1527	1559	1665	1800	1984
20	697	779	854	944	1065	1191	1304	1479	1610	1644	1756	1897	2091
25	731	871	955	1055	1191	1331	1458	1653	1800	1724	1963	2121	2338
30	764	955	1046	1156	1304	1458	1597	1811	1972	1800	2150	2324	2561
35	795	1031	1129	1249	1409	1575	1725	1956	2130	1874	2322	2510	2767
40	825	1102	1207	1335	1506	1684	1844	2091	2274	1945	2483	2683	2958
45	854	1169	1281	1416	1597	1786	1956	2218	2415	2013	2633	2846	3137
50	882	1232	1350	1492	1684	1882	2062	2338	2546	2079	2776	3000	3307

Knowledge of the length of the Ls flexible arm is vital when assembling secure branch-offs on a pipeline subject to elongation (and when there is no fixed point on the branch-off). Applying a too short Ls section will cause excessive tensions in the vicinity of the tee and, in extreme case, may damage the joint (see point "Assembly of installation riser"). When planning a flexible arm (Ls), remember that its length should be lower to the maximum distance occurring between the clamps for a given pipeline diameter.

Making a flexible arm on a branch-off

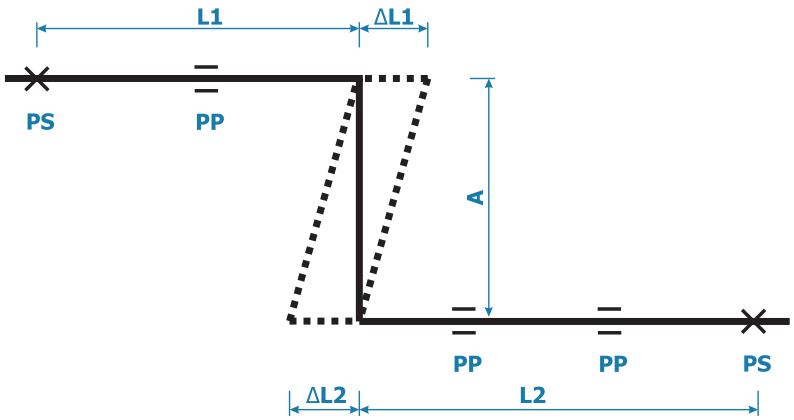


Compensators in KAN-therm System installations

Z-shaped compensator

Various types of compensators are used to eliminate the effects of thermal elongations of pipelines. Compensators presented here utilize the action of the flexible arm. If there is a possibility of shifting the axis of the pipeline, you may use a Z-shaped compensator.

Type Z compensator



To calculate the length of the flexible arm A = Ls of the compensator, assume **Lz = L1 + L2** as the replacement length. For this length, calculate the elongation ratio ΔL (from the template in the table) and then the value of Ls (from the template in the table. The length of arm A must not exceed the maximal span of mounts for a given pipeline diameter. Do no mount any clamps on it.

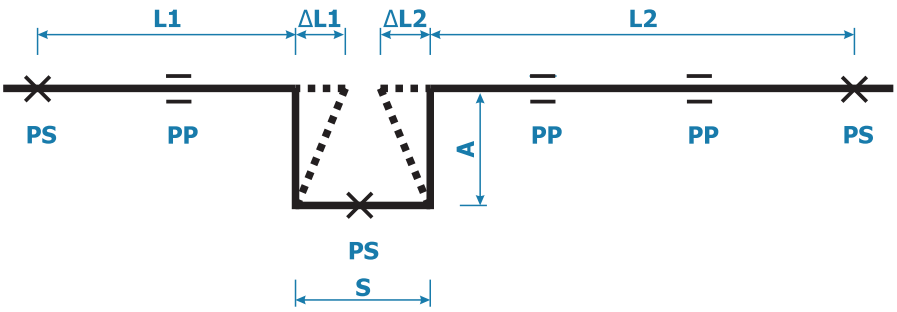
U-shaped compensator

If compensating for pipeline elongation through a change in pipeline direction (the axis of the pipeline runs along one line), use a U-shaped compensator. Calculate the length of compensator arm A according to formula or data in the tables for determining the length of flexible arm, assuming that A = Ls.

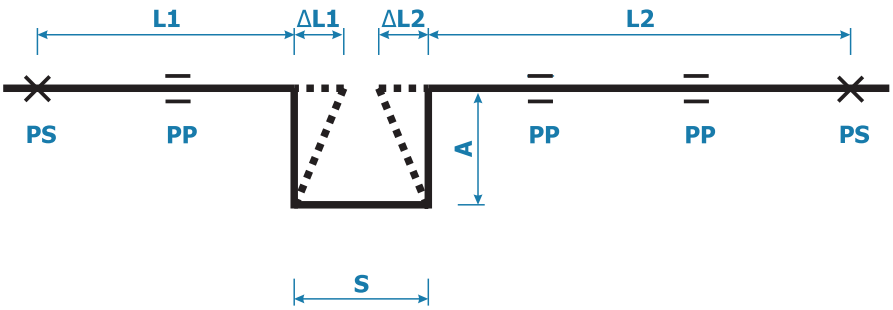
If the distances to the middle of the compensator to the nearest PS fixed points are not the same, assume the elongation ratio ΔL of the longer pipeline section, on which the compensator is mounted to determine the length of the arm A (in the figure, elongation ratio ΔL2 corresponds to section L2). The most optimal solution is to place the compensator in the middle of the pipeline section (L1 = L2).

In KAN-therm Steel and Inox steel pipe installations, it is possible to form a U-shaped compensator without a fixed point in between two arms.

Type U compensator



Type U compensator for steel pipes



In this case, the length of compensator arm **A** is assumed depending on:

A = Ls/1,8

where Ls is the length of the flexible arm calculated according to formula (or taken from the table) for **L = L1 + L2**.

When dimensioning the compensator, follow these principles:

You can build a U-shaped compensator using 4 90-degree system elbows and pipe sections.

In the case of multilayer KAN-therm Press pipes, build the compensator by bending the pipe suitably, maintaining the minimum radius R = 5 x D (do not bend pipes with diameters exceeding 32 mm).

The minimal width of a compensator S must ensure unobstructed operation of the arms of compensated sections L1 and L2 and take into account possible thickness of thermal coating (g_{izol}) for the pipeline.

You may assume that:

$$S = 2 \times g_{izol} + \Delta L1 + \Delta L2 + S_{min}$$

S_{min} = 150 – 200 mm
g_{izol} – insulation thickness

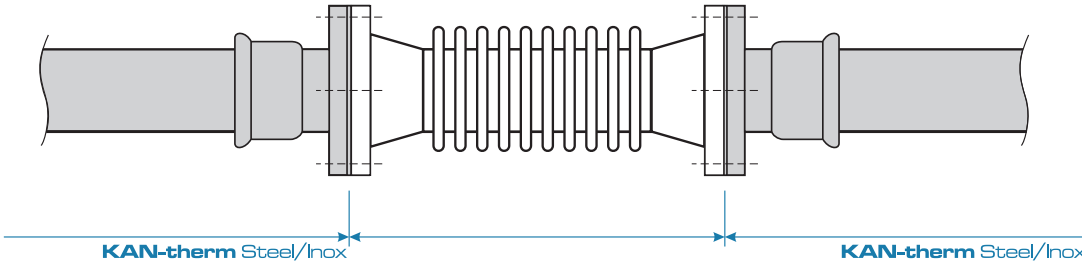
For Steel/Inox steel pipes, assume that:
S = ½ A

The length of the compensator should not exceed the maximum span of mounts for a given pipeline diameter. Do not mount any clamps on the arms.

Bellows compensators for KAN-therm Steel/Inox steel pipe installations

If there is no possibility of compensating for steel pipeline elongations through the use of flexible arms (type L, Z or U compensator), you can also use available axis bellows compensators. Selection and assembly of bellows compensators must be carried out according to manufacturer instruction manuals.

Bellows compensator for steel pipes (example)

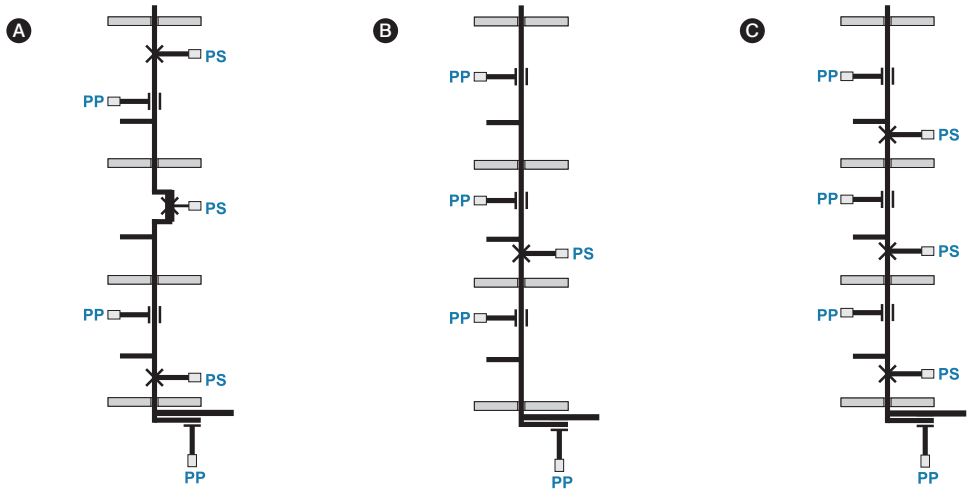


Principles of compensating for installation riser – horizontal elongations

When mounting installation risers/horizontals atop walls and inside installation shafts, you must consider their axis motion caused by temperature changes by carefully arranging fixed points and compensators and compensating for all tensions on branch-offs. This is why every installation subjected to elongations should be treated individually.

The solution you assume depends on the material of risers and branch-offs, the working parameters of the installation, the number of branch-offs on the riser, and the amount of space available (e.g. in the installation shaft). Figures a,b,c present examples of compensation solutions applied in installation risers.

A. Example of a riser structure applying a U-shaped compensator (concerns all KAN-therm Systems)
B. Example of a riser structure applying a fixed point in the middle of the riser (concerns KAN-therm Press, Steel, Inox System pipes and KAN-therm Stabi Al pipes)
C. Example of a riser structure applying self-compensation ("rigid" structure) (concerns KAN-therm PP and KAN-therm Push Systems)

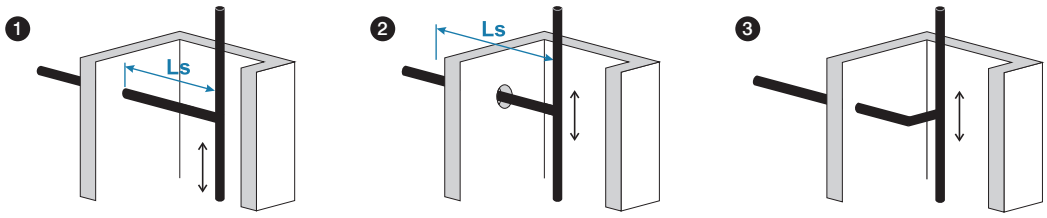


In each case, use a compensation arm of sufficient length in the riser connection. In the end of the riser, on the connection to the last container/valve, add a flexible arm of sufficient length.

Each branch-off (e.g. radiator joint, water meter connection) should allow for bending (under the influence of vertical motion of the riser) so that tension around the tee is not critical. This may be executed through ensuring correct length of flexible arm (fig. 1, 2, 3). It is particularly essential during the assembly of installations in shafts. In the case of a correctly mounted fixed point near a branch-off tee, the requirement of ensuring a flexible arm on this branch-off is not essential.

In the case of KAN-therm Push and PP System pipes, you need not apply any compensation for changes in pipe length by placing fixed point clamps directly above each tee providing branch-off to the pipe. It is a so-called rigid mount (fig. c, p. 71).

Ensuring a flexible arm on riser branch-offs in installation shafts (examples)



By dividing the riser (with fixed points) into considerably small sections (usually the length of the storey, but not longer than 5 m), the length of elongations is restrained, and the remaining tensions are transferred onto the clamps of fixed points. Slight sideways deviations of the pipelines may be limited by dense arrangement of shifting point clamps (denser, if the riser is assembled on plaster in visible places).

Compensation of sub-plaster/sub-flooring installation elongations

In the case of conducting KAN-therm Press and Push System pipelines in layers of concrete (screed) or plaster, the thermal elongation of pipes phenomenon also applies. However, due to the fact that pipes are conducted in casing pipes or in insulation, the tensions caused by pipe elongation are not high, since the pipes have the space to bend in the casing which surrounds them (self-compensation phenomenon). Conducting pipes on small curves also has beneficial impact on thermal elongation. This principle should be particularly adhered to when there is a possibility of pipelines shrinking (e.g. cold water installation laid during hot summer) – when arranging a long, straight pipeline without bends or arches. In such case, there is a possibility of the pipe sliding out of the joint, e.g. a tee.

KAN-therm PP polypropylene pipes may be laid directly on floor mortar (if there are no limitations as regards thermal or noise insulation). In this case, the layer of concrete surrounding the pipe does not allow for thermal elongation and the pipe takes on all tensions (they will be lower than the critical value). More about conducting pipes in floor and plaster mortar in chapter Conducting KAN-therm installations in structural partitions.

5.4 Principles of laying KAN-therm installations

Thanks to a great diversity of solutions and a comprehensive offer of products, KAN-therm allows for designing and executing nearly each and every type of internal pressurized installations consisting of horizontals, risers and branch-offs. These elements may be conducted on the surface of plaster or floor slab surfaces (on-plaster mount) or placed in structural partitions (sub-plaster mount – in wall furrows and floor mortars). An indirect method of laying separating pipelines is conducting pipes in special baseboards.

On-plaster installations – risers and horizontals

On-plaster mounts on structural partitions are used when conducting installation horizontals in non-inhabited rooms (such as ceiling, garage) and when mounting installations risers e.g. in industrial and non-inhabited facilities or in installation shafts.

This mount is also used in renovations of old installations (e.g. replacement of old heating installations), utilizing KAN-therm PP and Steel/Inox Systems. Designing such installations, bear in mind that, apart from technical requirements, also the visual aspect is important. Therefore:

- select the proper type of pipes and joint system
- carefully develop the system of compensating for thermal elongations
- adopt a correct method of mounting pipelines, complying with the guidelines
- select the most suitable (depending on the destination of the installation and its environment) type of thermal insulation.

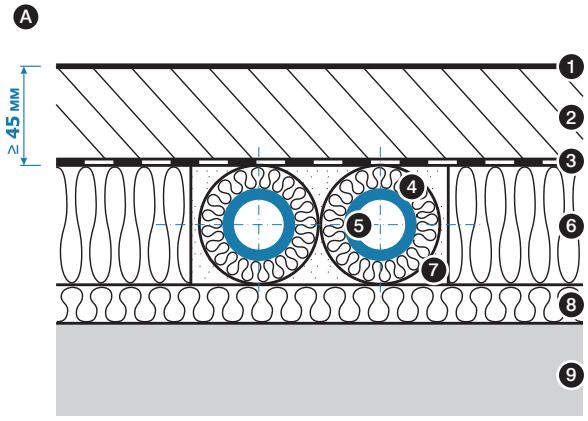
For on-plaster installations (risers and horizontals), we recommend multilayer pipes (in shafts) from the KAN-therm Press System, polypropylene KAN-therm PP pipes and joints, or steel pipes from the KAN-therm Steel and Inox systems.

Conducting KAN-therm installations in structural partitions

According to the requirements of modern construction practices, KAN-therm pipelines may be conducted in wall furrows filled with mortar and plaster, as well as various types of floor mortars. This refers to PE-RT, PE-Xc and PP-R pipelines, multilayer KAN-therm pipelines in separating installation and in tee installations with Push and Press joints and in welded KAN-therm PP installations.

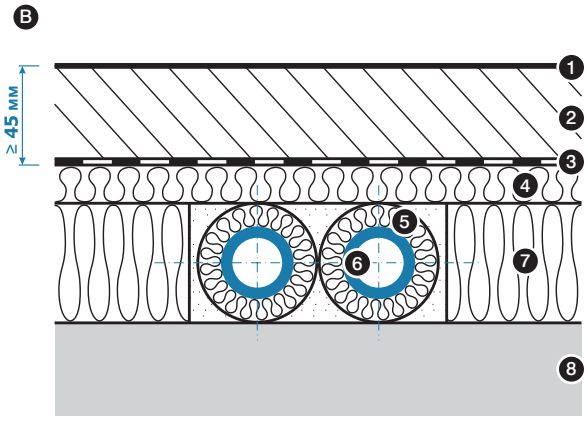
Examples of conducting pipes in flooring layers

A. On floor slabs above non-heated rooms



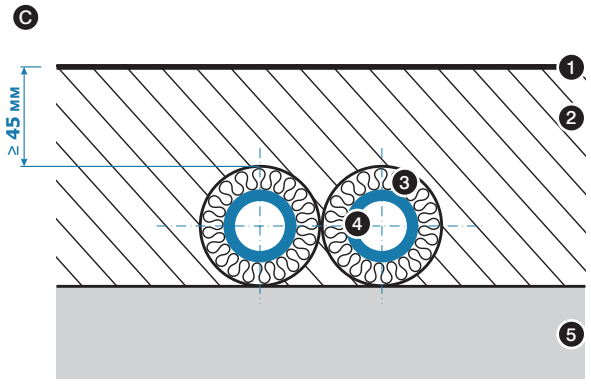
1. floor cover
2. concrete mortar
3. foil
4. thermal insulation of pipe
5. KAN-therm System pipe
6. thermal insulation
7. filling, e.g. sand, pellets
8. insulation
9. floor slab

B. On floor slabs above heated rooms



1. floor cover
2. concrete mortar
3. foil
4. noise insulation
5. thermal insulation of pipe
6. KAN-therm System pipe
7. thermal insulation
8. floor slab

C. Directly on concrete mortar



1. floor cover
2. concrete mortar
3. thermal insulation of pipe
4. KAN-therm System pipe
5. floor slab

Notice

Pipes conducted in floor mortar must be laid in pipe casings or, if thermal protection requirements force so, in thermal insulation (see chapter Thermal insulation of KAN-therm pipes). Insulation may be used to reduce heat loss, to prevent the floor layer to collect heat from the pipe (max. 29°C), and it may partially serve as noise insulation to the pipeline. You may also conduct KAN-therm PP pipes without casings in floor shafts, provided that a required mortar thickness is maintained.

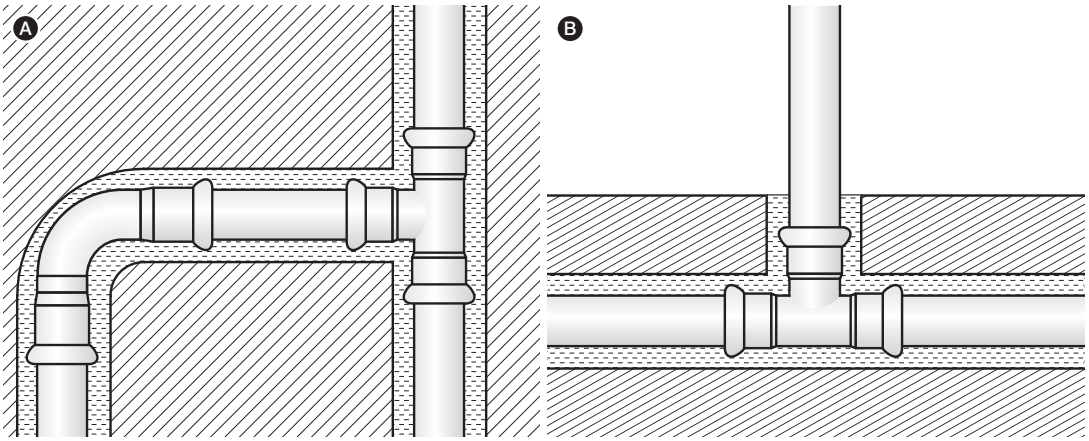
Minimal thickness of concrete layer above the pipe or insulation is 4.5 cm. Pipe installations conducted in shafts should not damage the noise insulation. In the case of conducting a pipeline in a casing (pipe-in-pipe) or in thermal insulation, its routing should include small curves in order to prevent the effects of thermal contractions of pipelines.

Pipelines must be mounted to the surface using single or double plastic hooks. Before the pipelines are covered with plaster or concrete, a pressure test must be carried out and protective coating must be installed. In the course of construction works, covering the installation with screed should be performed under pressure.

With sub-plaster installations, we recommend performing an inventory of the installation (e.g. using photographs) before executing any construction works. As a result, you will avoid accidentally damaging the pipes hidden in plaster or mortar.

Laying steel KAN-therm pipes

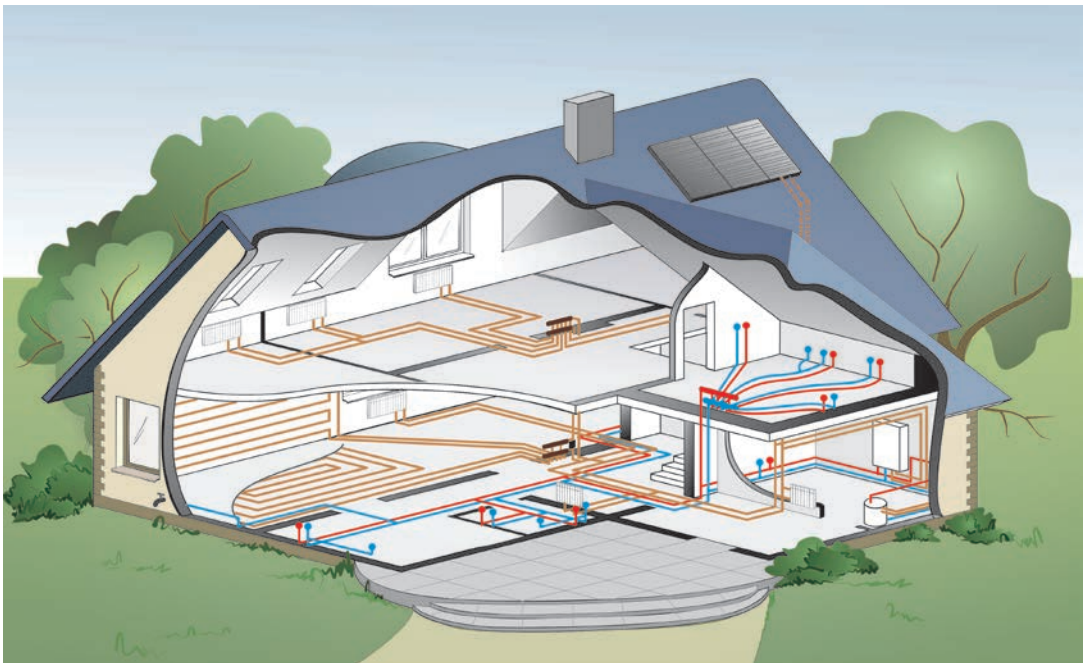
We do not recommend laying steel KAN-therm pipelines in plaster or mortar layers, due to the threat of corrosion and the occurrence of strong forces resulting from thermal elongation of pipes. KAN-therm Inox pipelines may be conducted in plaster or mortar layers provided that the required thermal elongation compensation is provided. To enable it, pipes and fittings should be laid in flexible material, e.g. waterproof foam insulation with closed cells. Pipe contact with any environment containing chlorine or chloride ions should also be eliminated.



Examples of conducting KAN-therm Inox installations
A. under plaster,
B. in flooring layers

Layout of KAN-therm installation

Due to a wide selection of pipe types and joint techniques, KAN-therm will allow for executing any type of water supply or heating installation. This concerns both new and renovated buildings.

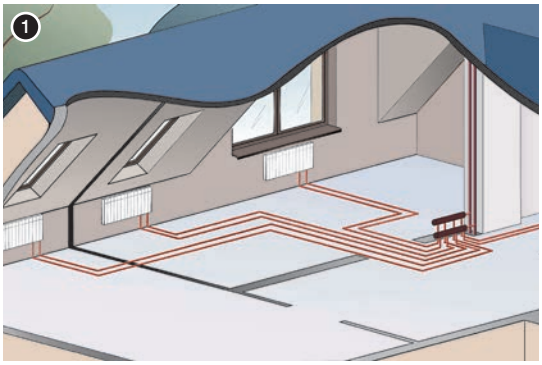


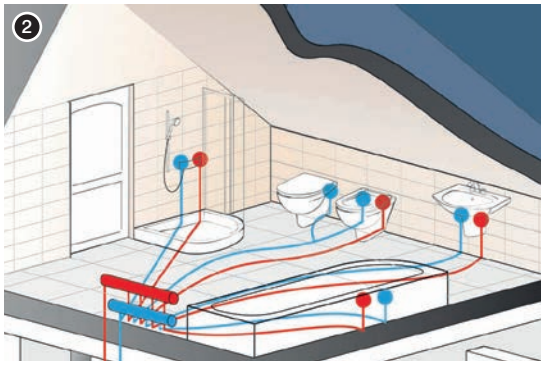
Distribution layout

Receivers (radiators, taps) are fed by separate pipes conducted in floor layers from a KAN-therm manifold. Manifolds are located in on-plaster or sub-plaster KAN-therm boxes or in installation shafts. There are no joints in a floor shaft. There is a possibility of cutting off a medium from each receiver. Use: radiator heating installations, hot and cold tap water installations. Pipe types: KAN-therm PE-RT, PE-Xc, multilayer pipes, in rolls. Receiver connections: KAN-therm Push, Press systems, screwed clamps. Manifold connections: multilayer KAN-therm pipes, KAN-therm PP, Steel, Inox pipes in bars.

Tee system

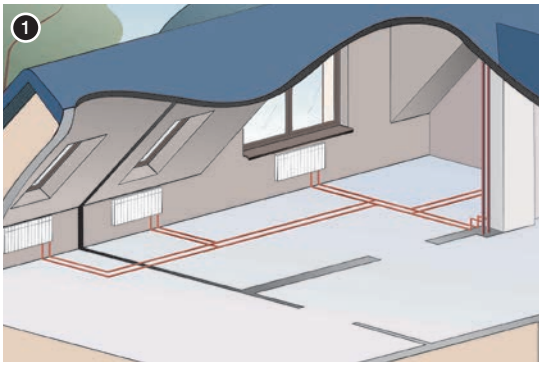
1. Manifold system on a heating installation.
2. Manifold system on a water supply installation.

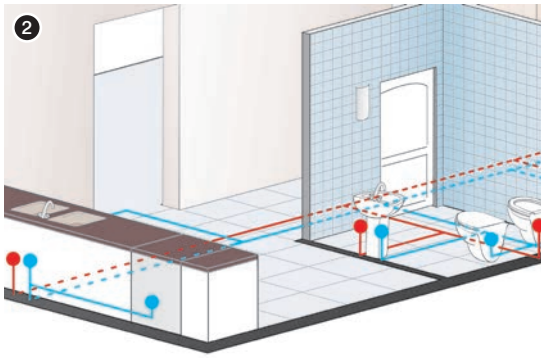




Receivers are fed from installation risers through a network of pipes conducted in floor layers and in walls. Pipe diameters are gradually decreased towards the receivers. There are pipe joints in floor layers (possibly under plaster). Compared to the manifold system, the number of pipes used to connect devices is lower, however, bigger diameters are used.

1. Tee system in a heating installation.
2. Tee system in a water supply installation.





Use: radiator heating installations, hot and cold tap water installations, new buildings.

Pipe type: KAN-therm PE-RT, PE-Xc, multilayer pipes, in rolls and bars.

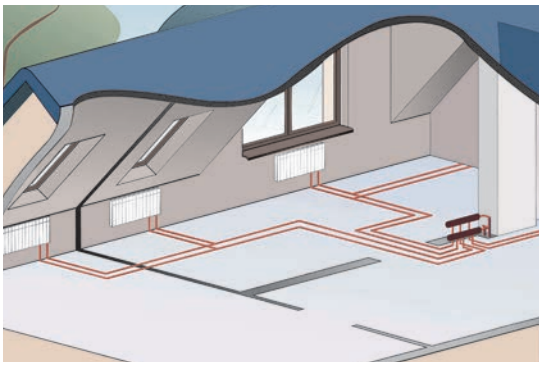
Receiver connections: KAN-therm Push, Press systems or welded PP systems (screwed joints may not be used).

Feed risers (horizontals): multilayer KAN-therm PP, Steel, Inox pipes in bars.

Manifold – tee system (mixed)

A system based on manifolds, but some manifold pipelines may branch-off. There is a possibility of reducing the number of manifold connections and thus to reduce the total length of pipelines. Tee connections – only Push and Press pressed joints or PP welded joints (screwed joints may not be used).

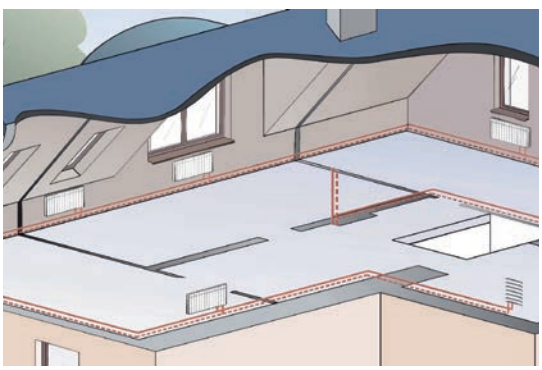
Manifold – tee system in a heating installation



Loop system

Receiver are fed by a single pipelines conducted in the vicinity of walls, forming one open or closed loop. Pipes may be conducted in floor layers, atop walls or in baseboards. There is a possibility of using them in one-pipe systems. In two-pipe systems, you may also design a simple Tichelmann hydraulic balancing installation. There is a possibility of using it in existing buildings.

Loop system in a two-pipe heating installation



Use: radiator heating installations, hot and cold tap water installations, technological installations, new and renovated buildings.

Pipe type: KAN-therm PE-RT, PE-Xc, multilayer pipes, in rolls and bars, KAN-therm Steel and Inox pipes (only atop walls).

Receiver connections: KAN-therm Push, Press systems or welded PP systems, screwed joints.

Tee connections – Push and Press, PP or screwed (only atop walls).

Feed risers: multilayer KAN-therm pipes, PP, Steel and Inox pipes, in bars..

"Vertical" system

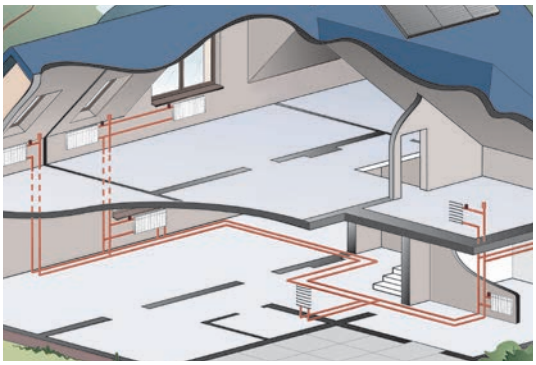
A traditional system for feeding receivers, rarely used in new construction projects. Each receiver (or a group of receivers e.g. a water supply junction) is powered by a separate riser. This system is primarily used in renovations of old installations. Use: radiator heating installations, hot and cold tap water installations, new and renovated buildings.

Pipe type: multilayer KAN-therm pipes, PP, Steel and Inox pipes, in bars.

Receiver connections: KAN-therm Press systems or welded KAN-therm PP systems, screwed joints.

Feed risers: multilayer KAN-therm pipes, PP, Steel and Inox pipes, in bars.

"Vertical" system in a heating installation



5.5 Device connections in the KAN-therm System

Radiator connections

Radiators in modern heating installations may be side-fed (type C) or bottom-fed (type VK). KAN-therm Systems offer a wide selection of joints and elements for connecting both types of radiators.

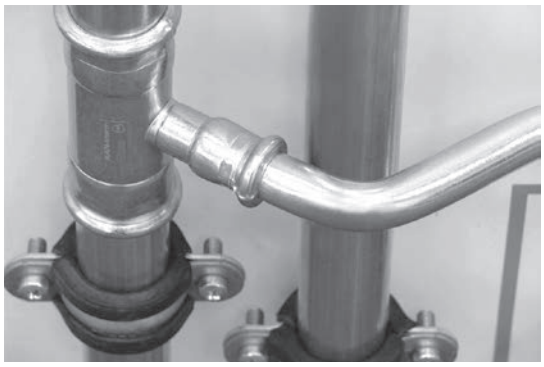
Side-fed radiators – on-plaster installation

A rare type of radiator connections, primarily used in renovations or replacements of old installations; pipes are connected to radiators with the use of standard system joints with threads. In the case of multilayer KAN-therm Press pipes or polypropylene KAN-therm PP pipes, connection pipes must be conducted on walls, maintaining the maximal distances in between clamps and observing the principles of compensating for elongations. We recommend conducting plastic connection pipes in wall furrows or to hide them behind covers.

In steel KAN-thern Steel and Inox heating installations, the predominant layout is riser – connection pipes – radiator, in which pipes are connected to radiators using system joints with threads. When modernizing an installation, radiator connections should "trace" the old steel connection pipes.

Side-fed radiators – sub-plaster installation

Radiator connection (connection pipe and return pipe) in the KAN-therm Steel System



KAN-therm Push, KAN-therm Press and KAN-therm PP Systems offer simple ways to connect side-fed radiators, as well as bathroom radiators (tab. Examples of side-fed radiator connections – sub-plaster installations).

Bottom-fed radiators – sub-plaster installation

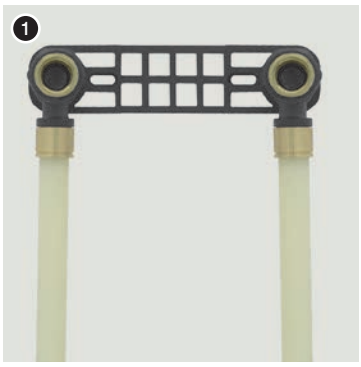
The most optimal solution for connecting bottom-fed radiators is offered by the KAN-therm Push and Press Systems, basing on special fittings (elbows and tees) with 15 mm copper pipes or 16 mm multilayer pipes (tab. Examples of bottom-fed radiator connections – sub-plaster installations).

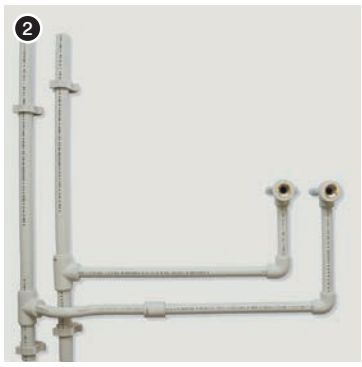
Water supply device connections

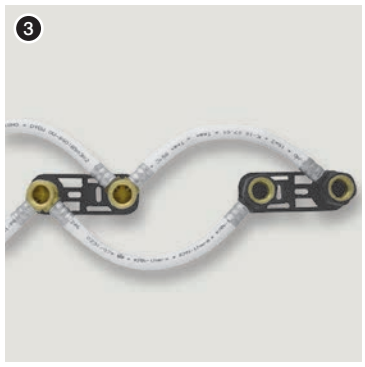
All KAN-therm Systems (with the exception of KAN-therm Steel) offer special fittings used for connecting water supply installation devices (tap connections).

Examples of KAN-therm Push and Press System connections are presented in the table.

1. KAN-therm Push System connection.
2. KAN-therm PP System tap connection.
3. KAN-therm Press System angle tap connection, screwed.







Connecting radiators

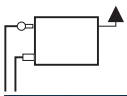
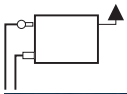
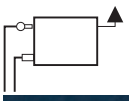
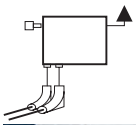
Diagram Description Photo	KAN-therm Connecting Element		Supplementary elements
	Push	Press	
SIDE-FED RADIATORS (TYPE C) – WALL CONNECTIONS			
Direct connection			
  wall connection using pressed union adapters	 Platinum Ø14 × 2 G¾" Ø18 × 2,5 G¾" only for Platinum pipes!	  Ø14 G½" Ø14 G¾" Ø16 G½" Ø14 G¾" Ø20 G¾"	 G½" nipple  G¾"×G½" reduction nipple  plastic guide
Direct connection			
  wall connection using press fittings with male thread	  Ø14 × 2 G¾" Ø18 × 2,5 G½" Ø18 × 2,5 G¾ only for Platinum pipes!		 plastic guide
Connection using supported elbows			
  single-sided wall connection  cross wall connection	 Ø12×2A Ø14×2A Ø18×2,5A  12×2 L=210 14×2 L=210 12×2 L=300 14×2 L=750 18×2,5 L=210 18×2,5 L=300 18×2,5 L=750	 16×2 L=210 16×2 L=300 16×2 L=750	 plastic guide  Ø15 G¾" copper pipe union  Ø15 G½" copper pipe union  G½"× G½" fitting

Diagram Description Photo	KAN-therm Connecting Element		Supplementary elements
	Push	Press	

BOTTOM-FED RADIATORS (TYPE VK) – FLOOR CONNECTIONS

Direct connection using pressed union adapters



without connection valves

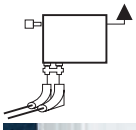
Ø12 × 2 G½"
Ø12 × 2 G¾"
Ø14 × 2 G½"
Ø14 × 2 G¾"
Ø16 × 2 G¾"
Ø18 × 2,5 G¾"

Ø14 × 2 G¾"
Ø16 × 2 G¾"
only for Platinum pipes!

Ø14 G½"
Ø14 G¾"
Ø16 G½"
Ø16 G¾"
Ø20 G¾"

plastic elbow

plastic pipe end cap



with simple connection valves (single or integrated)

Ø12 × 2A
Ø14 × 2A
Ø18 × 2,5A
*connection through an element with multilayer pipe using screwed fittings and union adapters (Press).

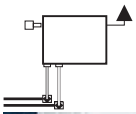
L=500
Ø16 × 2 /18 × 2,5

Ø16 G½"
Ø16 G¾"
Ø20 G¾

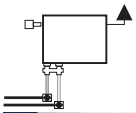
plastic elbow

plastic pipe end cap

Connection with simple elbows (single or double) and Cu 15 mm pipes



without connection valves



with connection valves

Ø12 × 2A
Ø14 × 2A
Ø18 × 2,5A

Ø12×2 L=200
Ø14×2 L=200
Ø12×2 L=300
Ø18×2,5 L=200
Ø18×2,5 L=300

Ø12×2 L=210
Ø14×2 L=210
Ø12×2 L=300
Ø14×2 L=750
Ø18×2,5 L=210
Ø18×2,5 L=300
Ø18×2,5 L=750

Ø16×2 L=200
Ø16×2 L=300

Ø16×2,5 L=210
Ø16×2,5 L=300
Ø16×2,5 L=750

Ø15 G¾" copper pipe union

G½"× G½" joint body

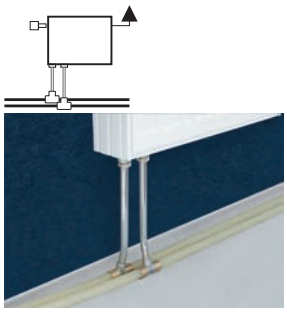
Ø15 G½" copper pipe union

Ø15 G½" copper pipe union

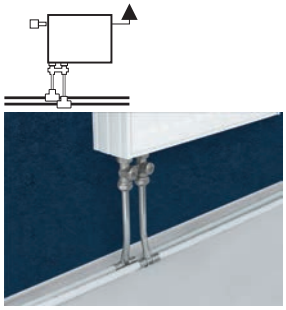
Diagram Description Photo	KAN-therm Connecting Element		Supplementary elements
	Push	Press	

BOTTOM-FED RADIATORS (TYPE VK) – FLOOR CONNECTIONS

Connections with Ø15 mm copper pipe



without connection valves



with connection valves

Ø12 × 2A
Ø14 × 2A
Ø18 × 2,5A
Ø25 ×3,5A
Ø32 × 4,4A

L=300
Ø14×2 /Ø14×2
Ø18×2,5 /Ø18×2,5
Ø25×3,5 /Ø25×3,5
Ø32×4,4 /Ø32×4,4

L=300 reduction
Ø18×2,5/Ø18×2,5 left
Ø18×2,5/Ø18×2,5 right
Ø25×3,5/Ø18×2,5 left
Ø25×3,5/Ø18×2,5 right
Ø32×4,4/Ø25×3,5 left
Ø32×4,4/Ø25×3,5 right

L=750
Ø14×2 /Ø14×2
Ø18×2,5 /Ø18×2,5
Ø25×3,5 /Ø25×3,5
Ø32×4,4 /Ø32×4,4

L=750 Redukcyjny
Ø18×2,5/Ø18×2,5 left
Ø18×2,5/Ø18×2,5 right
Ø25×3,5/Ø18×2,5 left
Ø25×3,5/Ø18×2,5 right
Ø32×4,4/Ø25×3,5 left
Ø32×4,4/Ø25×3,5 right

L=300
Ø16×2 /Ø16×2
Ø20×2 /Ø20×2
Ø20×2 /Ø16×2 left
Ø20×2 /Ø16×2 right

L=750
Ø16×2 /Ø16×2
Ø20×2 /Ø20×2
Ø20×2 /Ø16×2 left
Ø20×2 /Ø16×2 right

Ø15 G½" copper pipe ring

G½"× G½" fitting

Ø15 G½" copper pipe union

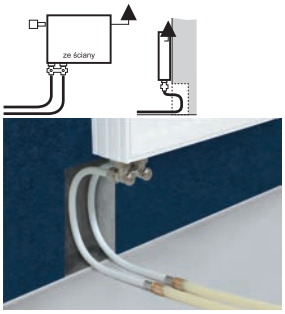
Ø15 G¾" copper pipe union

End cap for Cu Ø15 pipe

Diagram Description Photo	KAN-therm Connecting Element		Supplementary elements
	Push	Press	

BOTTOM-FED RADIATORS (TYPE VK) – WALL CONNECTIONS

Direct connection



to angle block

Ø12 × 2 G½"
Ø12 × 2 G¾"
Ø14 × 2 G½
Ø14 × 2 G¾"
Ø16 × 2 G¾"
Ø18 × 2,5 G¾"

L=500
Ø16×2 /Ø14×2
Ø16×2 /Ø14×2
Ø16×2 /Ø18×2,5

Ø14 × 2 G¾"
Ø18 × 2,5 G¾"
only for Platinum pipes!

Ø14 G½"
Ø14 G¾"
Ø16 G½"
Ø16 G¾"
Ø20 G¾"

Ø16 G½"
Ø16 G¾"
Ø20 G¾"

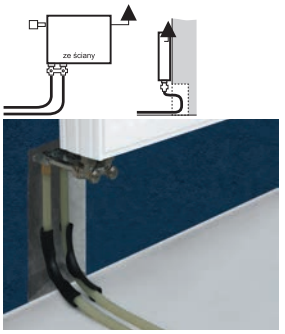
Ø15 G¾" copper pipe union

G½"× G½" fitting

Ø15 G½" copper pipe union

Ø15 G½" copper pipe ring

Connection with single or double fixed elbow with copper pipes



(with a Cu 15 mm pipe) for angle valve block

Ø12 × 2A
Ø14 × 2A
Ø18 × 2,5A

Ø12 × 2 L=210
Ø14 × 2 L=200
L=300
Ø18 × 2,5 L=200
L=300

Ø16 × 2 L=210
Ø16 × 2 L=300
Ø16 × 2 L=750

Ø16 × 2 L=200
Ø16 × 2 L=300

Ø15 G¾" copper pipe union

G½"× G½" fitting

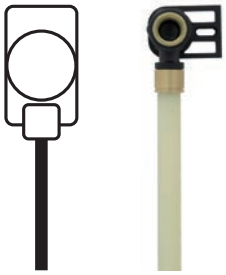
Ø15 G½" copper pipe union

Ø15 G½" copper pipe ring

Diagram Description Photo	KAN-therm Connecting Element		Supplementary elements
	Push	Press	

SYSTEM CONNECTIONS – SUB-PLASTER (IN FURROWS) AND ON-PLASTER INSTALLATIONS

Single connection



Ø12 × 2A
Ø14 × 2A
Ø18 × 2,5A

Ø12 × 2 G½"
Ø14 × 2 G½"
Ø18 × 2,5 G½"

Ø16 × 2 G½"
Ø20 × 2 G½"

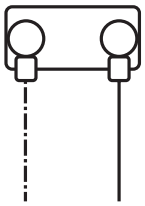
Ø16 × 2 G½"
Ø20 × 2 G½"

mounting plates

double
(L=50, 80, 150 mm)
double L=50

single
double (L=150 mm)
double (L=80 mm)
double (L=50 mm)

Double connection (tap)



Ø14 × 2 G½"
Ø18 × 2,5 G½"

Ø18 × 2,5 G½"

Joint with outlet

Ø18 × 2,5/Ø18 × 2,5
G½"

Ø14 × 2 G½"

mounting plates

double
(L=50, 80, 150 mm)
double L=50

single
double (L=150 mm)
double (L=80 mm)
double (L=50 mm)

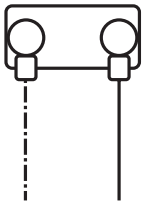
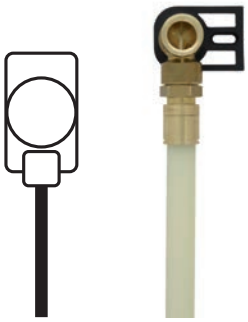
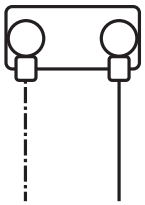
Diagram Description Photo	KAN-therm Connecting Element		Supplementary elements
	Push	Press	
SCREWED CONNECTIONS (UNION ADAPTERS) - ON-PLASTER INSTALLATIONS			
Single connection			
	 Ø14 × 2 G¾" Ø18 × 2,5 G¾" only for Platinum pipes!	 Ø14 G½", Ø14 G¾", Ø16 G½", Ø16 G¾", Ø20 G¾"	 G½" G¾" mounting plates
	 Ø14 × 2 G½" Ø14 × 2 G¾" Ø16 × 2 G¾" Ø18 × 2,5 G¾" (only for PE-RT and PE-Xc pipes)	 Ø16 G½", Ø16 G¾", Ø20 G¾"	 double (L=50, 80, 150 mm) double L=50
Double connection (tap)			
		 Ø16 × G¾"	
	 G½" × G¾	 G½" × G¾	 single double (L=150 mm) double (L=80 mm) double (L=50 mm)
	 G½"	 G½"	
Joint with outlet			
	 G ½"	 G ½"	 G½" G¾" mounting plates
	 G ½"	 G ½"	 double (L=50, 80, 150 mm) double L=50
			 single double (L=150 mm) double (L=80 mm) double (L=50 mm)

Diagram Description Photo	KAN-therm Connecting Element		Supplementary elements
	Push	Press	
SCREWED JOINTS WITH FITTINGS WITH FEMALE THREADS – ON-PLASTER INSTALLATIONS			
Single connection 	Ø14×2G½" Ø18×2,5G½" Ø25×3,5G½" Ø14×2" Ø18×2,5A Ø25×3,5AA 	 Ø16 × 2 G½" Ø20 × 2 G½"	mounting plates  double (L=50, 80, 150 mm) double L=50
	Ø14×2 G½" Ø14×2 G½" Ø16×2 G¾" Ø18×2,5 G¾" (only for PE-RT and PE-Xc pipes)	 Ø16 × 2 G½"	 single double (L=150 mm) double (L=80 mm) double (L=50 mm)
Double connection (tap)  	 G ½"	 G ½"	
	 G ½"	 G ½"	

5.6 KAN-therm installation pressure test

After finishing assembly, every KAN-therm installation must undergo a pressure test, which should be carried out before the pipes are covered with screed, before furrows and channels are filled. If the conditions do not allow for conducting a water test (e.g. low temperatures), you may also conduct a compressed air test.

Notice

If there is a need to empty a KAN-therm Steel installation after the test, we recommend conducting the test using compressed air.

Before starting the test:

- disconnect fixtures and devices which could distort the results of the test (e.g. retention reservoirs, safety valves) or which could get damaged during the test,
- thoroughly rinse the installation,
- fill the installation with clear water and de-air it,
- stabilize water temperature in comparison to air temperature.

Use a shield manometer with a scope exceeding the working pressure by 50% and minimum graduation of 0.1 bar. The manometer should e mounted on the lowest point of the installation. Ambient temperature of the installation should not change.

Test pressure values (depending on the type of installation) and test conditions for all KAN-therm Systems are presented in the table.

Test pressure value P_{pr} [bar]		
Heating installations	P_{rob} +2 but not less than 4 bar	
Water supply installations	P_{rob} ×1,5 but not less than 10 bar	
Test parameters	KAN-therm Push, Press, PP surface heating	KAN-therm Steel, Inox
Pre-test		
test time [min]	60 (including 3 times every 10 minutes in the first half, raise the test pressure to the primary value)	not applicable
permissible pressure drop [bar]	0.6	
test acceptance conditions	no drizzle or leaks	
Main test		
test time [min]	120	30
permissible pressure drop [bar]	0,2	0,0
test acceptance conditions	no drizzle or leaks	

After finishing the pressure test, you must write a report specifying the test pressure, the course of the test according to the procedure, pressure drop values and a statement whether the test ended with a positive (or negative result). The report can be written as a form.

After arriving at a positive result of the pressure test, heating installations and hot tap water installations must be tested with the use of hot water (hot pressure test).

Compressed air pressure test

According to the guidelines of the Technical Conditions for Execution and Commissioning of Heating and Water Supply Installations, in justified cases (e.g. danger of freezing or excessive corrosion), it is allowed to carry out a pressure test using compressed air only.

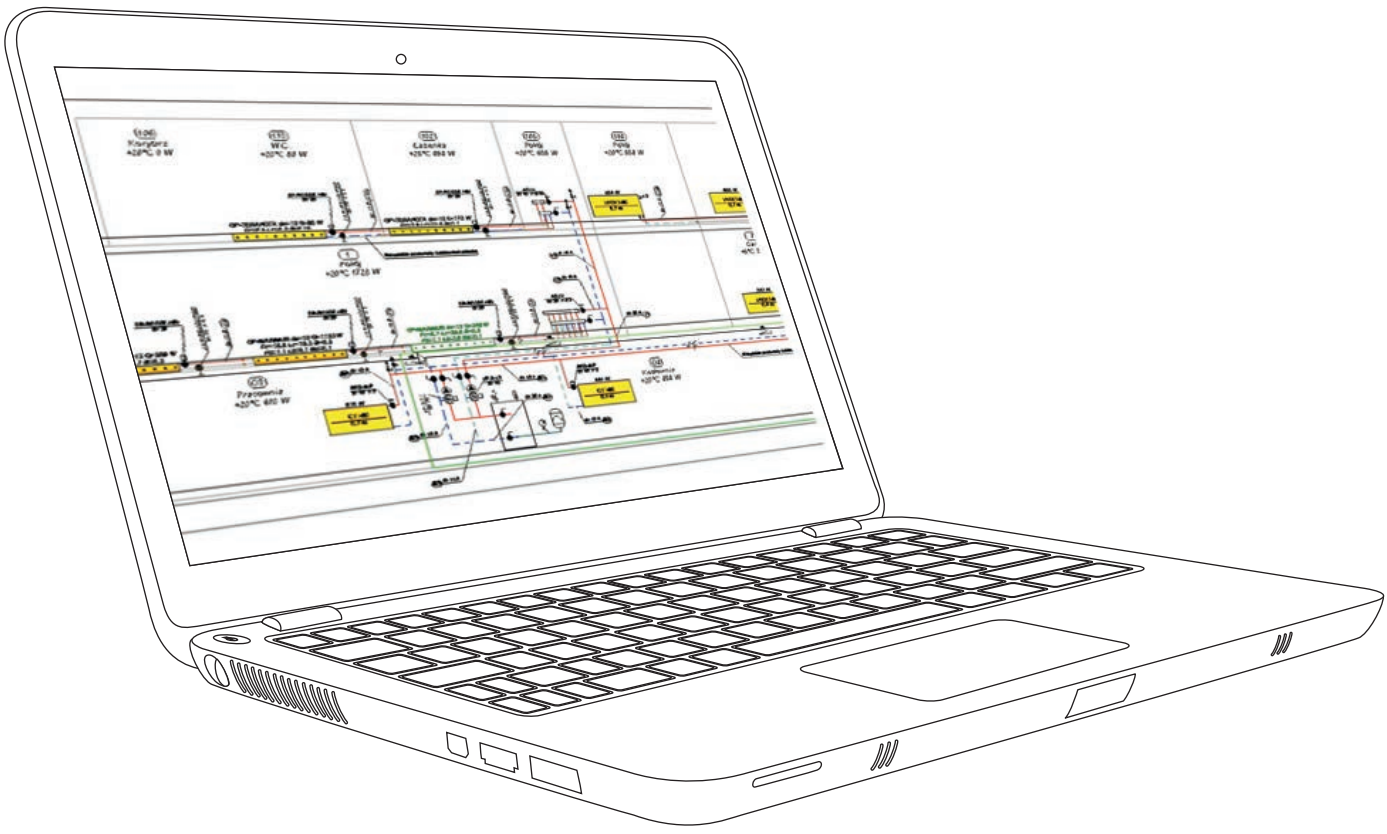
The air used for the test cannot contain any oils. The maximal pressure value for the pre-test is 3 bar (0.3 MPa). Ambient temperature of the installation should not change. (max +/- 3 K) All leaks revealed can be traced acoustically or with the use of a foaming liquid. Test results are considered positive when no installation leaks are detected and no pressure drops occur on the manometer.

Table of contents

6 KAN-therm System designing an installation

KAN-therm SYSTEM

Designing an installation



ISO 9001

6 KAN-therm System designing an installation

6.1 KAN-therm programs supporting the design process

The principles of designing KAN-therm water supply and heating installations are similar to all commonly used installations basing on appicable standards and guidelines for dimensioning. KAN recommends using free company programs supporting the design process and making all calculations as simple as ABC. The said programs contain catalogues of all available pipe types offered by KAN: PE-RT and PE-Xc from the KAN-therm Push System, multilayer pipes from the KAN-therm Press System and the KAN-therm Push Platinum System, polypropylene pipes from the KAN-therm PP System and carbon and stainless steel pipes from the KAN-therm Steel and Inox Systems. This way, designers get access to universal tools allowing them to set any dimensions for any available installation technique.

KAN ozc

KAN ozc – program facilitating the calculation of thermal energy demand and seasonal heating demand in buildings; the program allows for:

- calculating the heat transfer coefficient U for walls, floors, roofs and flat roofs,
- calculating the heat demand for particular rooms,
- calculating the heat demand for the entire building,
- calculating the seasonal heat demand for the purposes of heating installations in buildings,
- calculating the coefficients of seasonal demand for thermal energy.

Building Energy Proficiency Certificate Printout from the KAN ozc program

ŚWIADECTWO CHARAKTERYSTYKI ENERGETYCZNEJ
DLA BUDYNKU MIESZKALNEGO

WAŻNE DO: 21 marzec 2019 | NUMER:

BUDYNEK OCENIANY

RODZAJ BUDYNKU	Budynek wolnostojący
ADRES BUDYNKU	Warszawa, ul. Płomyka 28
CAŁOŚĆ/CZĘŚĆ BUDYNKU	Całość budynku
ROK ZAKOŃCZENIA BUDOWY	2005
ROK ODDANIA DO UŻYTKOWANIA	2005
ROK BUDOWY INSTALACJI	2005
LICZBA MIESZKAŃ	
POWIERZCHNIA UŻYTKOWA (A_k, m^2)	710,0
CEL WYKONANIA ŚWIADECTWA	☐ BUDYNEK NOWY ☐ BUDYNEK ISTNIEJĄCY ☑ SPRZEDAŻ ☐ ROZBUDOWA

OBLICZENIOWE ZAPOTRZEBOWANIE NA NIEODNAWIALNĄ ENERGIĘ PIERWOTNĄ [1]

EP - budynek oceniany
127,6 kWh/(m^2·rok)

0 50 100 150 200 250 300 350 400 450 500 >500

Wg wymagań WT2008
budynek nowy

STWIERDZENIE NIE DOTRZYMANIA WYMAGAŃ WG WT2008 [2]

ZAPOTRZEBOWANIE NA ENERGIĘ PIERWOTNĄ (EP)		ZAPOTRZEBOWANIE NA ENERGIĘ KOŃCOWĄ (EK)	
BUDYNEK OCENIANY	127,6 kWh/(m^2·rok)	BUDYNEK OCENIANY	157,6 kWh/(m^2·rok)
BUDYNEK WG WT2008	110,0 kWh/(m^2·rok)		

charakterystyka energetyczna budynku określana jest na podstawie porównania jednostkowej ilości nieodnawialnej energii pierwotnej EP niezbędnej do
1) zaspokojenia potrzeb energetycznych budynku w zakresie ogrzewania, chłodzenia, wentylacji i ciepłej wody użytkowej (efektywność całkowita) z
odpowiednią wartością referencyjną,
rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie
2) (Dz. U. Nr 75, poz. 690, z późn. zm.), spełnienie warunków jest wymagane tylko dla budynku nowego lub podlegającego.

Uwaga: charakterystyka energetyczna określana jest dla warunków klimatycznych odniesienia – stacja: Białystok
oraz dla normalnych warunków eksploatacji budynku podanych na str 2.

SPORZĄDZAJĄCY ŚWIADECTWO

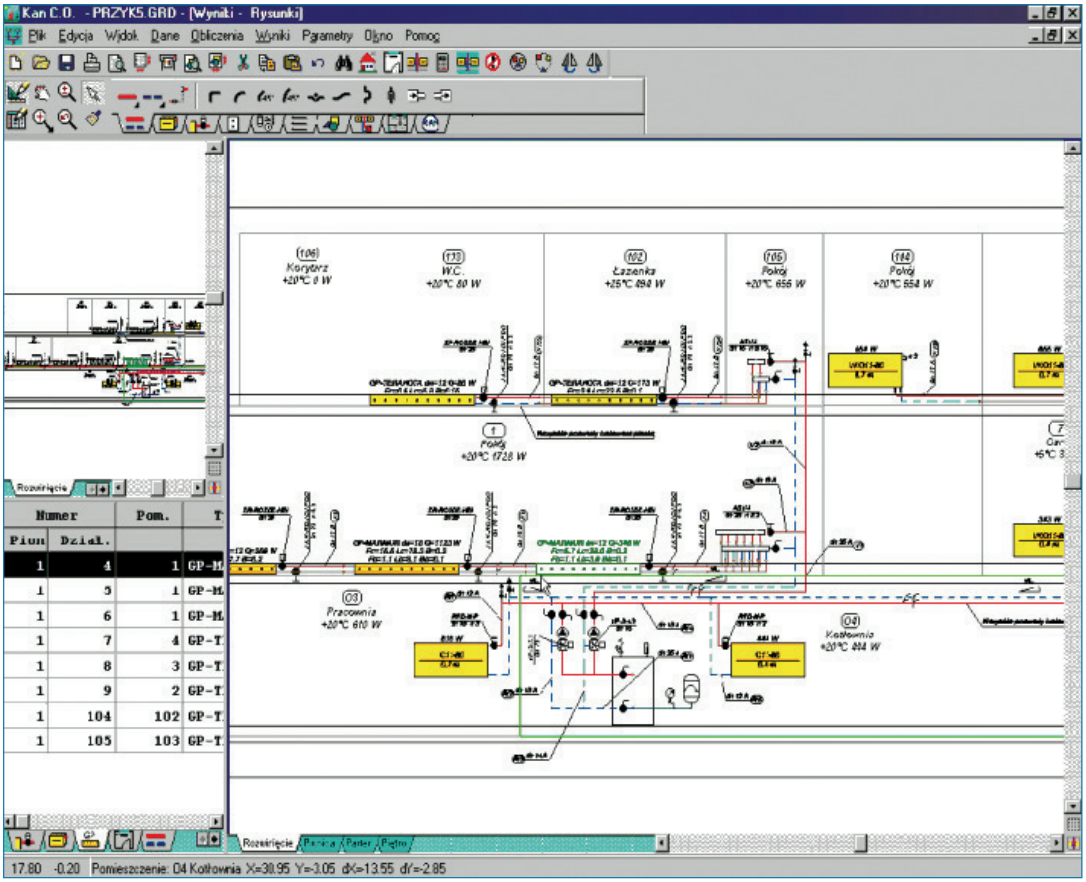
IMIĘ I NAZWISKO	
NR UPRAWNIEŃ BUDOWLANYCH ALBO NR WPISU DO REJESTRU	
DATA WYSTAWIENIA	30 grudzień 1899
DATA, PIECZĄTKA I PODPIS	21 marzec 2009

KAN co-Graf

KAN co-Graf – graphic design program enabling design and setting of central heating installations; the program allows for making full hydraulic calculations of installations:

- selects pipe diameters,
- defines hydraulic resistance values for particular circulations, taking into account gravitational pressure resulting from the cooling of water in the pipes and heat receivers,
- provides complete pressure loss in the installation,
- reduces pressure peaks in particular circulations,
- incorporates the need to provide sufficient hydraulic resistance to the plot with heat receiver (Dpg min),
- selects the settings of pressure drop regulators installed in spots chosen by the designer,
- automatically incorporates requirements regarding thermostatic valve authorities,
- calculates floor heating,
- writes a full material list of KAN-therm pipes and joints.

Installation development in the KAN co-Graf program

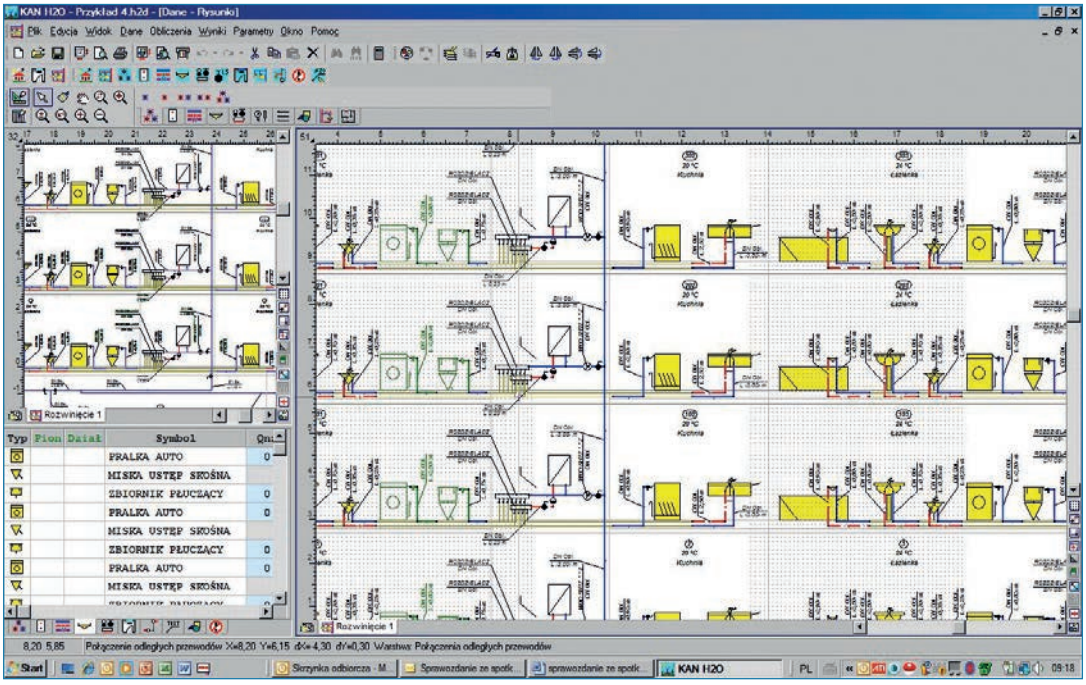


KAN H2O

KAN H2O – graphic design program for designing hot and cold tap water installations and circulations; the program allows for performing full hydraulic calculations of installations:

- calculates water flow in the pipes,
- selects pipe diameters,
- defines hydraulic resistance values for installation elements, required available pressure,
- calculates required flows in hot tap water circulations,
- sets flows in hot tap water circulation networks,
- selects valves, flanges,
- selects thermal insulation for pipes,
- uploads architectural layouts in the form of WMF, EMF, DXF, DWG files,
- uploads scanned drawings in the form of BMP, TIF, JPG, GIF, ICO, PNG files,
- allows for editing uploaded drawings – contrast levels, filtering, smoothing out edges, rotating, merging several drawings, scaling,
- saves developments and projections in DXF, DWG formats, thanks to which they may be opened by AutoCAD with division into layers and saving typical installation elements in the form of blocks,
- allows for writing full documentation for the project.

Development of an installation in the KAD H2O program



6.2 Hydraulic dimensioning of KAN-therm installations

Below, we present the basic formulas and interrelations as well as recommendations for traditional dimensioning of pipe diameters, calculating heat loss parameters and providing hydraulic balance to water supply and heating installations. Appendix to Guide "Tables for hydraulic calculations of KAN-therm water supply and heating installations" is an integral part of this chapter.

Dimensioning water supply installations

The course of designing KAN-therm installations is based on principles defined by specified standards. In contrast to traditional steel installations, thanks to the reduced roughness of the walls of plastic KAN-therm pipes and KAN-therm Inox pipes, the level of linear resistance is strongly reduced in general installation resistance rates. Hence, there is no need to increase pipe diameters to account for probable pipe scaling. Coefficient k of absolute roughness of pipes is the following:

- for KAN-therm PE-RT and PE-Xc, PE/Al/PE pipes and polypropylene PP-R pipes **k = 0.007 mm**
- for KAN-therm Inox pipes **k = 0,015 mm**

Calculation flow q of water in the installation is calculated according to formulas specified in the standard. For housing buildings, this calculation is defined basing on normative outflows from intakes specified in table 1 of the Appendix. After adding all normative outflows, we can calculate flow q or select it from the values specified in table 2 of the Appendix.

Estimated diameters of KAN-therm connection pipes to intake points

ŚreNominal diameter of intake point dn [mm]	Estimated diameters of connections to intake points			
	PE-Xc, PE-RT KAN--therm Push pipes	Multilayer KAN-therm Press pipes	PP-R KAN-therm PP pipes	Stainless steel KAN-therm Inox pipes
15	14×2; 18×2,5	14×2; 16×2	16×2,7; 20×1,9; 20×2,8; 20×3,4	15×1,0
20	25×3,5	20×2	20×1,9; 25×3,5; 25×4,2	18×1,0
25	32×4,4	25×2,5; 26×3	25×2,3; 32×4,4; 32×5,4	22×1,2

Having the q value of permissible speeds on a given section of the installation, we can preliminarily mark the diameter of the pipe. The following step is calculating pressure loss Δp which is a sum of linear resistance ΔpL = R x L and local resistance Z on pipeline sections.

Linear pressure loss is calculated for particular pipeline sections basing on the generally applied formula:

$$\Delta p_L = R \times L = \lambda \times \frac{L}{d} \times \frac{v^2}{2} \times \rho$$

where:

R [Pa/m]	linear pressure loss unit
λ	hydraulic linear resistance coefficient taking into account the pipe roughness coefficient
L [m]	length of a pipe of a given diameter
d [m]	internal diameter of the pipe
v [m/s]	average flow speed inside the pipe
ρ [kg/m³]	water density

In order to specify linear loss of pipeline directly (for various flows, pipe diameters and water temperatures 10° and 60°), use table 3 – 20 of the Appendix. Local loss Z is calculated basing on the following formula:

$$Z = \zeta \times \frac{v^2 \times \rho}{2}$$

where:

Z [Pa/m]	local loss (resistance) values
ζ	local resistance coefficient

Values of local resistance coefficients in KAN-therm Systems are provided in tables included in the "Appendix". ζ values are also provided for KAN-therm Inox fittings, together with replacement lengths corresponding to the local resistance values of these elements.

ζ values for other devices are specified in standard PN-76/M-34034 or by the manufacturers.

For plastic KAN-therm Push, Press and PP installations, the flow speed rates may exceed the values specified in the standard (in brackets):

Estimated flow speeds in KAN-therm water supply pipelines	[m/s]
in household water supply connections	v = 1,0 – 2,0 (1,5)
in manifold pipes	v = 1,0 – 2,0 (1,5)
in risers	v = 1,0 – 2,5 (2,0)
in sections to riser to devices	v = 1,5 – 3,0 (2,0)

A useful criterion for selecting pipe diameters may be the maximal permissible flow speed, depending on the duration of peak flow and the resistance coefficient of the fixtures mounted on the section of installation in calculation (acc. to DIN 1988).

Maximal flow speed in water supply installations

Pipe type	Maximal flow speed [m/s] for the duration of peak flow	
	≤ 15 min.	> 15 min.
Connections	2	2
Sections of distribution pipes with fixtures with low resistance coeff. (<2.5), e.g. ball valves	5	2
Sections of distribution pipes with fixtures with high resistance coeff. (>2.5), e.g. simple globe valves	2,5	2

Adopting higher speeds than in traditional metal pipe installations is possible thanks to considerably lower vulnerability of plastic KAN-therm pipes to vibrations and noise. We recommend the use of fixtures (valves) with low flow resistance rates.

In order to calculate the volume of hot and circulation water in pipes, assume the water capacity rates of KAN-therm pipes specified in tables "Dimension parameters of pipes" in chapters describing each KAN-therm System.

Dimensioning central heating installations

Hydraulic dimensioning of heating installations is based on selecting pipeline diameters as well as regulator diameters to ensure that a correct amount of medium reaches each heating device, and to ensure that the entire installation is hydraulically balanced.

Dimensioning of KAN-therm pipes for central heating installations should be carried out according to applicable standards, and to the "Guidelines for designing central heating installations: COBRTI INSTAL 2001.

A useful criterion for selecting pipe diameters in central heating installations may be the water flow speed coefficient, which would correspond to the linear economic pressure drops c.a. 150 – 250 Pa/m. Consider the principle that the water flow speed should not exceed the threshold of noise-free operation of the installation (with fixtures). An additional criterion may be the recommended speeds in particular installation pipes:

Estimated flow speeds in KAN-therm heating installation pipelines	[m/s]
in horizontals	up to 1,0 m/s
in risers	0,2 – 0,4 m/s
in radiator connections	0,4 m/s or more in connections without drops (to ensure pipe de-airing)

These are estimated values. The hydraulic resistance of an installation is the resultant of several criteria, among all, the requirement concerning maintaining the authority of thermostatic valves within the scope 0.3 – 0.7.

In small installations (single-family) houses, we usually encounter the phenomenon of excessive valve authority. In such case, assume higher water speeds in pipes, to ensure that a part of the required pressure is lost within the piping.

In large installations, we usually encounter insufficient thermostatic valve authority. In such case, assume lower speeds for pipes constituting common parts of installations (horizontals, risers) and provide bigger loads to room distribution systems (made of PE-RT and PE-Xc pipes or multilayer KAN-therm Push Platinum pipes or multilayer KAN-therm Press pipes) or apply pressure stabilizers and increase the loads in room systems.

In KAN-therm Push installations, due to hydraulic conditions and thermal proficiency of installations, we recommend PE-RT and PE-Xc pipes with 12 mm diameters for connecting radiators up to 2000W.

Pipe diameters should be selected so that the sum of pressures in every circulation with calculated streams of heating medium is equal to the active pressure rate.

The hydraulic loads of pipe plots consist of linear loads and the sum of local resistance rates Z on the plot:

$$\Delta p_L = R \times L + Z \quad \text{where} \quad Z = \Sigma \zeta \times \frac{v^2 \times \rho}{2}$$

Δp [Pa]	hydraulic resistance (pressure loss)
R [Pa/m]	linear resistance (pressure loss) on the plot
L [m]	length of a pipe of a given diameter
Z [Pa]	local resistance (pressure loss) on the plot
Σ ζ	sum of local resistance coefficients on the plot
v [m/s]	average flow speed inside the pipe
ρ [kg/m³]	water density

Unit pressure loss R in KAN-therm pipes, depending on the size of the water stream and average temperature, may be calculated using suitable tables included in Appendix "Tables for hydraulic calculations in KAN-therm water supply and heating installations". The values of local resistance coefficients for fittings in particular KAN-therm Systems are also presented in the tables included in the Appendix.

Additional remarks

1. When conducting radiator connections in floor layers, radiators should be equipped with proper vents (manual or automatic). In the case of manifold systems, also the manifolds should be equipped with vents.
2. Designing installations consisting of plastic pipes (KAN-therm Push and Press, PP), secure them against the rise (caused by failure) of water temperature above the permissible level.
3. In KAN-therm heating installations, there is a possibility of using a different medium to water, e.g. anti-frost liquids. When designing such installations, consider the physical properties of these liquids, which are different to the properties of water. After that, ask for manufacturer's recommendations regarding the resistance of their pipes and joints to these substances.

6.3 Thermal insulation of KAN-therm installations

Depending on the type of the pipeline, thermal insulation aims at reducing the value of heat loss (in heating and hot tap water installations) or to reduce the cold loss in cooling installations. In the case of cold water installations, thermal insulation prevents water inside the installation from heating and therefore blocks condensation on the pipeline. Thermal insulation of manifold pipes in central heating, hot tap water (including circulation pipes) and cold medium installations should observe the minimal requirements specified in the table. The values presented below apply to all KAN-therm piping systems, irrespective of the material type.

Minimal thickness of thermal insulation in heating, cooling and hot tap water installations

No.	Pipe type	External diameter of KAN-therm pipes				Minimal thickness of thermal insulation (λ= 0,035 W/(m × K)1)
		Push	Press	Steel/Inox	PP	
1	External diameter up to 22 mm	12, 14, 18, 25	14, 16, 20, 25, 26	12, 15, 18, 22	16, 20, 25, 32 (PN20)	20 mm
2	Internal diameter from 22 to 35 mm	32	32, 40	28, 35	32 (PN10, PN16), 40	30 mm
3	Internal diameter from 35 to 100 mm		50, 63	42; 54; 64; 66,7; 76,1; 88,9	50, 63, 75, 90, 110	equals the internal diameter of the pipe
4	Internal diameter above 100 mm			108; 139,7; 168,3		100 mm
5	Pipes and fixtures acc. to pos. 1-4 passing through walls or floor slabs, pipe crossings					½ of the requirements of pts. 1-4
6	Central heating pipes acc. to pos. 1-4, laid in structural components in between heated rooms with various users					½ of the requirements of pts. 1-4
7	Pipes acc. to pos. 6 laid in floor layer					6 mm
8	Ice-cold water installations inside buildings2)					50% of the require-ments of pts. 1-4
9	Ice-cold water installations outsi-de buildings2					100% of the require-ments of pts. 1-4

1) when applying insulation material with a different heat transfer coefficient than specified in the table, correct the thickness of insulation suitably,

2) thermal insulation executed as air-proof.

Notice

For KAN-therm cold water pipelines, the recommended thickness of insulation preventing water from heating and steam from condensing is provided in the table. Correct the values provided below for other values of thermal transfer coefficients of the insulation material.

Minimal thickness of thermal insulation in cold water installations

Pipeline location	Insulation thickness (λ= 0,04 W/(m × K)
Pipeline in non-heated room	4 mm
Pipeline in heated room	9 mm
Pipeline in channel without pipelines with hot or cold medium	4 mm
Pipeline in channel with pipelines with hot or cold medium	13 mm
Pipeline in wall furrow, vertical	4 mm
Pipeline in wall furrow, recess with pipelines with hot or cold medium	13 mm
Pipeline in floor layer (concrete screed)	4 mm

The thermal insulation material cannot have any negative impact on the pipes and joints. It should be chemically neutral in relation to the materials of these elements.

7 Information and safety tips

This technical information is valid from October 2014. Release date of this technical information is stated on the cover. To ensure personal safety and the proper functioning of our products, you should regularly check whether there is a newer version of the technical information. Current technical information is available on the website www.kan-therm.com as well as in the nearest Technical-Commercial Office of the KAN.

When installing, observe the applicable laws, standards, guidelines and national legislation as well as any instructions contained in the technical information.

Before you begin installation, read all instructions and safety guidelines and instructions of use and installation. When they are incomprehensible or doubts arise about their meaning, please contact the nearest Technical – Commercial Office of KAN. Provided installation and operating instructions should be preserved and handed over to future participants in the construction process or installation owner. Failure to follow the guidelines given in this document can lead to failure and damage to property or injuries.

Intended use

KAN-therm System must be designed, installed and operated in the manner described in this technical information and in accordance with applicable regulations. Other uses are unacceptable and will be considered as improper use of the products. This applies to both elements for the construction of piping systems and tools used for making connections.

Despite the use of the highest quality materials, KAN. can not ensure their adequacy for every application. It should be noted that in the case of water transport of high aggressiveness - high content of dissolved hydrogen bicarbonate or chloride can affect the brass alloys and accelerate their corrosion. In particular, do not exceed the permissible concentrations:

- chlorine ions (Cl^-)≤200 mg/l
- sulfate ions (SO_4^{2-})≤250 mg/l
- calcium carbonate ions ($CaCO_3^{2-}$)≤5 mg/l at pH≥7,7

For applications that are not included in this technical information (custom application), you should contact the Technical-Commercial Office of KAN to confirm possibility of such application.

Qualifications of participants in the construction process

Installation of KAN-therm systems should be be performed only by trained and authorized personnel with appropriate qualifications..

General precautions

Workplace and used parts and tools for making connections should be kept clean and in proper condition. Use only original parts of KAN-therm provided for the type of connection and purpose. Use of not original elements or an unauthorized tools, the use of components for other applications than those provided or cross their operating parameters limits can lead to failure, accidents or other hazards.

NOTES

SYSTEM **KAN-therm**

Optimal, complete multipurpose installation system consisting of state of the art, mutually complementary technical solutions for pipe water distribution installations, heating installations, as well as technological and fire extinguishing installations.

It is the materialization of a vision of a universal system, the fruit of extensive experience, the passion of KAN's constructors, strict quality control of our materials and final products, and vast knowledge of the market of installations to meet the requirements of energy efficient, sustainable construction.

Push Platinum

Push

Press LBP

PP

Steel

Inox

Sprinkler

Underfloor heating
and automation

Football
Stadium installations

Cabinets and manifolds

SYSTEM
KAN-therm

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