FOR THE PRODUCTS · FACTORY PRO AQUA · 10 years WARRANTY

CATALOG

PRO AQUA

PE-XA PIPES • AXIAL FITTINGS
DISTRIBUTION UNITS FOR WATER HEATING SYSTEMS

PRO AQUA®
PIPE SYSTEMS SINCE 1997

Table of Contents

YEARS OF GUARANTEE
FOR FACTORY PRO AQUA PRODUCTS

Factory PRO AQUA

ISO 9001
BUREAU VERITAS
Certification
№ RU003921

These products were manufactured under control established in the quality management system certified by Bureau Veritas Certification, and in compliance with ISO 9001:2015, certificate No.: RU003921

PRO AQUA plant is one of the largest Russian manufacturers, which for more than 20 years produces pipelines made of polypropylene and polyethylene for indoor and outdoor utility mains. Utility systems of PRO AQUA plant and its main brands are well known to technical specialists, construction and design organizations. The Company is equipped with modern high precision European equipment. The plant runs an accredited laboratory, which monitors quality of all products manufactured in the Company. Thanks to constant control, the products produced by the plant maintain consistently high quality. All products manufactured by the Company have a warranty period of 10 years. The quality management system of the plant complies with the international standard ISO 9001:2015 and its domestic equivalent GOST R ISO 9001-2015.

PRODUCTION LABORATORY

Production laboratory of PRO AQUA company is a business unit with the functions of technical control at all stages of the production process flow.

PRO AQUA factory is equipped with up-to-date measuring instruments and equipment for testing products made of polymeric materials from the leading European manufacturers (ZWICK; BINDER; SCITEQ). The laboratory is qualified by FBU "State regional center for standardization, metrology, and testing in the Moscow Region" for all the conditions required to perform measurements and tests in the area of activity assigned to the laboratory in accordance with GOST R ISO/IEC 17025-2006.

PRODUCTION EXPANSION

In 2020, a modern FAST PEX line was launched for production of cross-linked polyethylene PE-Xa pipes with DN 16, 20, 25, 32, 40. The line is equipped with unique technologies to continuously monitor the geometry and degree of pipe cross-linking.

Quality control

Production laboratory

Production laboratory of PRO AQUA is a business unit with the functions of technical control at all stages of the production process flow:

- incoming technical control and basic and auxiliary quality testing of raw materials, intended for the manufacture of products, for compliance with Standards requirements;
- technical control of product quality in the production process (operational control);
- acceptance, periodic and standard tests of the products for compliance with regulatory requirements;
- the production laboratory of PRO AQUA carries out research work related to development of new types of polymer materials and technologies for their processing in manufacturing of products;
- availability of its own production laboratory allows PRO AQUA to offer in-demand products of its own manufacture;
- to perform measurements and tests for product quality control, the production laboratory of PRO AQUA is equipped with modern measuring instruments and equipment for testing products made of polymer materials from leading European manufacturers (ZWICK; WINDER; SCITEQ);
- the production laboratory of PRO AQUA is qualified by FBU "State regional center for standardization, metrology, and testing in the Moscow Region" for all the conditions required to perform measurements and tests in the area of activity assigned to the laboratory in accordance with GOST R ISO/IEC 17025-2006, ISO 9001:2015.

PRO AQUA product tests

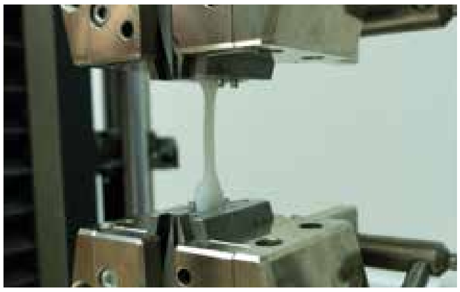
The laboratory of PRO AQUA carries out continuous quality control of all types of manufactured pipes through various tests and trials. When using raw materials for production of polymer pipes that must withstand long-term thermal and mechanical stresses, the deformation resistance and strength values that depend on temperature and pressure should be taken into account. To verify the material resistance to long-term loads, it is necessary to investigate the product mechanical behavior under different temperature conditions. The results of tests of production laboratory of PRO AQUA are shown below.

Pressure tensile strength test

In this test, pipe specimens are subjected to increasing internal pressure until the pipe bursts.

Durability test at constant internal pressure

This test verifies whether the pipes can withstand operation under emergency temperature conditions.



Tension test

On the test bench, the pipe and fitting connection is subjected to controlled stretching until the material breaks.

Control of the degree of cross-linking

It is carried out by the extraction method, in which the soluble part (non-cross-linked polyethylene) is dissolved in a reference solvent (extractant), thereby determining the relative amount of cross-links in a unit volume of polyethylene.

Cyclic testing

In this test, pipe and fitting joint specimens are subjected to alternating (cyclic) pressure and temperature simulating higher-than-normal operating conditions in order to obtain data on the strength and durability of the joints.

Products

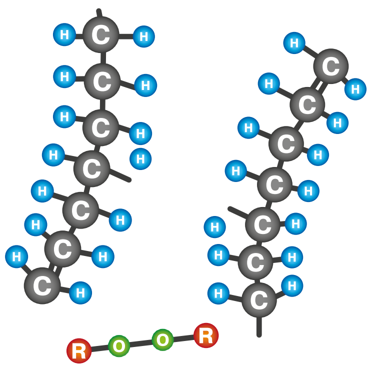
Cross-linked polyethylene PE-Xa pipes

The emergence of polymer pipelines in the second half of the last century was a real revolution in the construction industry. The comparative advantages of polymer pipelines are high corrosion resistance, absence of roughness and cross-section overgrowth, lower hydraulic resistance compared to metal pipes, low weight, ease of installation and dismantling, long service life.

High- and low-pressure polyethylene pipes became widespread in Europe by the early 1960s. However, insufficient high temperature resistance and strength characteristics prevented the use of these pipes in hot water supply and heating systems. The search for ways to increase the strength and high temperaure resistance properties of polymer pipes led to the idea of modifying polyethylene by so-called "cross-linking." Pipes made of "cross-linked" polyethylene are designated "PE-X," where the symbol "X" stands for cross-linking. Currently, three main industrial methods of cross-linking polyethylene are known. European and Russian standards have adopted the designations: PE-Xa (peroxide), PE-Xb (silane) and PE-Xc (electronic irradiation).

Peroxide method «A»

To produce cross-linked polyethylene using method "A," the polyethylene is melted together with antioxidants and peroxides before extruding. As the temperature rises, the peroxide decomposes to form free radicals (available bond molecules). Peroxide radicals take away one hydrogen atom each from polyethylene atoms, which leads to the appearance of an available bond at the carbon atom. In neighboring polyethylene macromolecules, carbon atoms that have available bonds combine, thereby forming cross-links. The advantage of this method is complete coverage of the polyethylene mass, as the peroxides are added to the initial melt, resulting in a uniform spatial lattice across the entire pipe cross-section. Also, this method achieves the highest cross-linking percentage.



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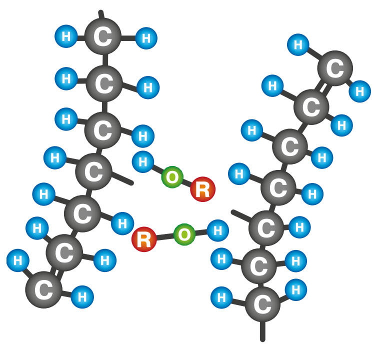

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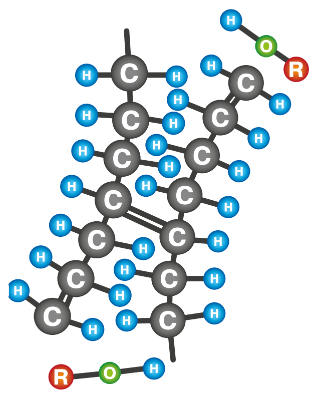
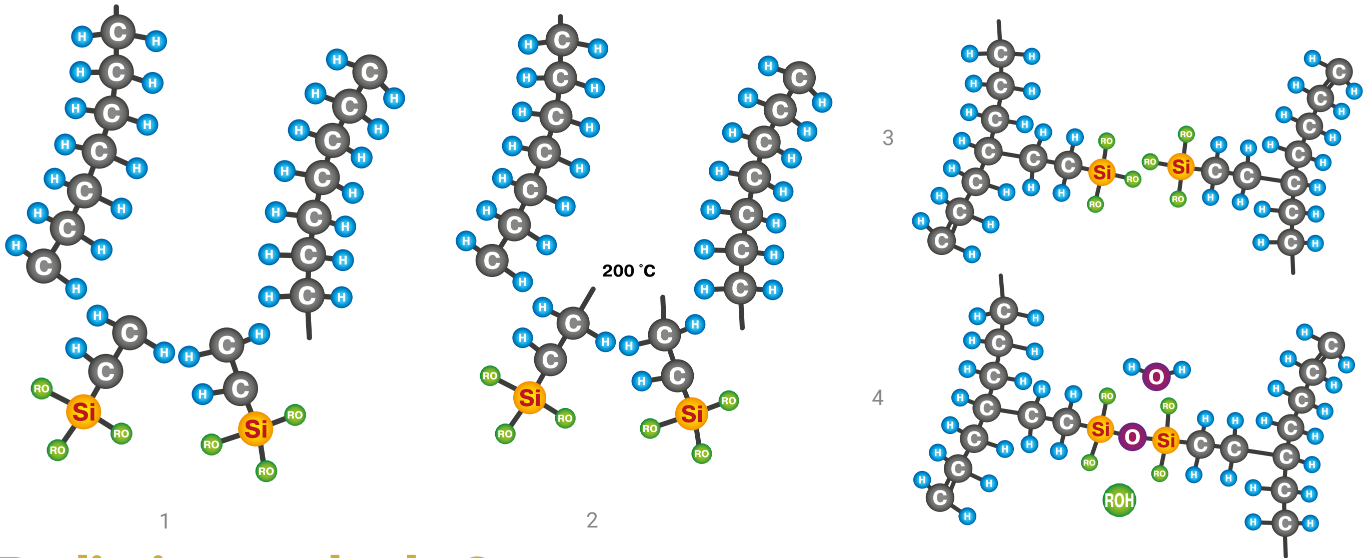


3

Silane method «B»

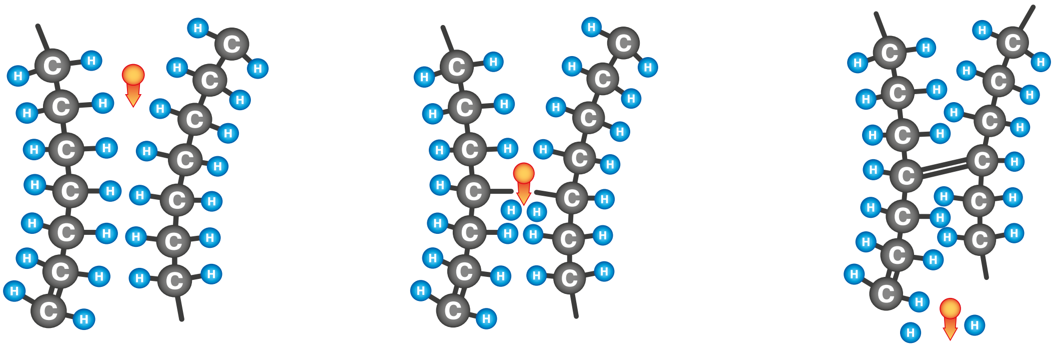
To produce cross-linked polyethylene using method "B," the polyethylene is blended with organic silanides (silanes) prior to extrusion. When heated, silanes break down, transforming its molecules into active radicals that replace the hydrogen atom in polyethylene macromolecules. The polyethylene is then treated with water or water vapor. In this case, organic radicals attach a hydrogen molecule from water and form a stable hydroxide (organic alcohol). Neighboring polymer radicals close through the Si-O bond to form cross-links. The final cross-linking process is performed after the extrusion process, i.e. already in the finished product stage. The rate of cross-linking depends on the rate of water diffusion, so a hot water or vapor bath is often used to speed up the reaction. Placing such baths in production shops is costly. Unfortunately, few manufacturers are ready for such investments and have to take the risk of supplying "non-cross-linked completely" polyethylene, because without the use of special baths, the process of polyethylene "complete cross-linking" can take up to 12 months.



1 2 3 4

Radiative method «C»

To produce cross-linked polyethylene using method "C," polyethylene is irradiated with electrons or beta-, gamma-rays. In the process of irradiation, a part of C-H bonds is broken, and free radicals are formed, which leads to appearance of intermolecular bonds similar to those obtained as a result of peroxide cross-linking according to method "A." The disadvantage of this method is that the pipes are irradiated after the extrusion process, and separate workshops often have to be used for this purpose. The process turns out to be quite expensive, time-consuming and not always safe. For example, in many European countries, the production of cross-linked polyethylene using radiative method "C" is prohibited. Another disadvantage of this method is the non-uniformity of cross-linking through the thickness of the polyethylene layer.



1 2 3

PRO AQUA cross-linked polyethylene PE-Xa pipes

Description

The PRO AQUA PE-Xa pipes for heating are made of cross-linked polyethylene by peroxide cross-linking method "A." The advantage of this method is that the polyethylene is cross-linked during the process of forming the pipe directly in the extruder, creating a uniform and strong three-dimensional structure across the entire pipe cross-section, which gives the PRO AQUA PE-Xa pipes the following advantages:

- resistance to high and low temperatures;
- resistance to increased pressure heads and abrasion;
- durability and chemical resistance;
- "shape memory" effect.

Further, the PRO AQUA PE-Xa pipes have the following advantages:

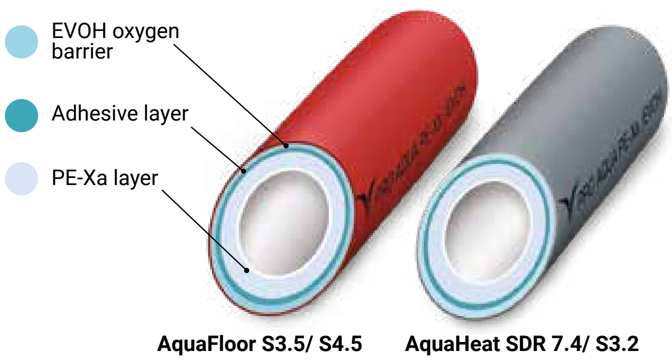
- equipped with an EVOH oxygen barrier;
- not subject to corrosion;
- high noise absorption capacity;
- absence of mineral deposits on pipe walls;
- high resistance to water hammers;
- light and flexible;
- easy installation.

PRO AQUA PE-Xa pipes are not adversely affected by building materials into which they can be embedded, e.g. concrete, lime mortar, gypsum.

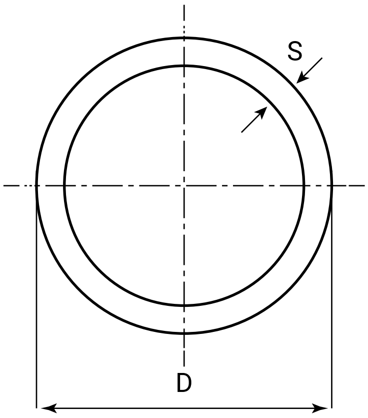
Also, all PRO AQUA PE-Xa pipes have a state registration certificate (SRC) and meet all safety standards for materials in contact with potable water.

Features

PRO AQUA range includes two types of pipes: red cross-linked PE-Xa S 3.5/S4.5 pipe and silver cross-linked PE-Xa SDR 7.4 pipe. Both types have a three-layer structure: a cross-linked polyethylene inner layer, a middle adhesive layer and an EVOH (ethylene-vinyl alcohol copolymer) outer anti-diffusion layer, which prevents penetration of oxygen into the heat transfer medium through the pipe wall.



Specifications



PE-Xa SDR 7.4 pipe

D, mm	S, mm	Volume, l/m
16	2,2	0,106
20	2,8	0,163
25	3,5	0,254
32	4,4	0,423
40	5,5	0,661

PE-Xa S3.5/S4.5 pipe

D, mm	S, mm	Volume, l/m
16	2,0	0,113
20	2,0	0,201

Code

PRO AQUA

AquaHeat PE-Xa

AquaHeat PE-Xa pipe with EVOH SDR 7.4, silver

De x S, mm	Meters per package	Code
16 x 2,2	120 м	PXA.04.06.120.S
16 x 2,2	240 м	PXA.04.06.240.S
16 x 2,2	500 м	PXA.04.06.500.S
20 x 2,8	120 м	PXA.04.08.120.S
25 x 3,5	50 м	PXA.04.10.050.S
32 x 4,4	50 м	PXA.04.12.050.S
40 x 5,5	50 м	PXA.04.14.050.S

PRO AQUA

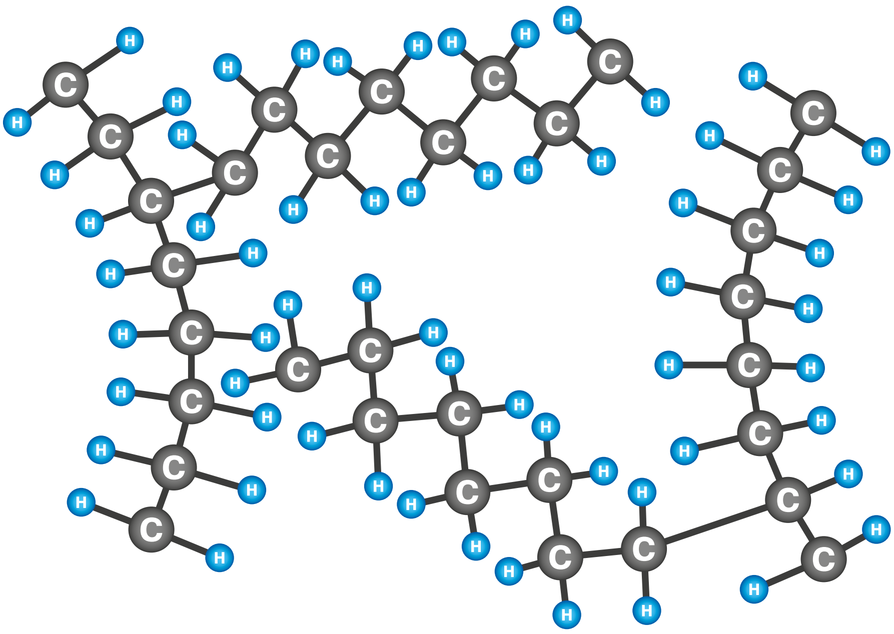
AquaFloor PE-Xa

AquaFloor PE-Xa pipe with EVOH S3.5/S4.5, red

De x S, mm	Meters per package	Code
16 x 2,0	100 м	PXA.03.06.100.R
16 x 2,0	200 м	PXA.03.06.200.R
16 x 2,0	500 м	PXA.03.06.500.R
20 x 2,0	100 м	PXA.03.08.100.R
20 x 2,0	200 м	PXA.03.08.200.R

Polyethylene of raised temperature resistance PE-RT pipes

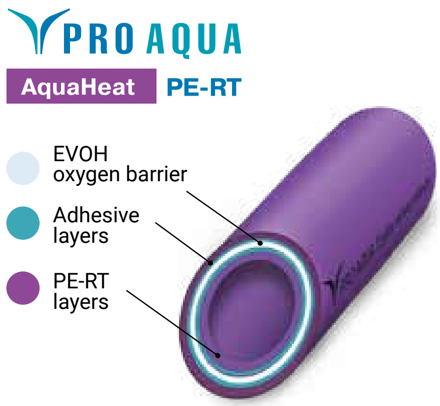
Octene (C8H16) is the copolymer in the polyethylene of raised temperature resistance (PE-RT). The octene molecule has a stretched and branched spatial structure. It is due to this structure that spatial cohesion is formed in the material, not through the formation of cross-linking interatomic bonds as in PE-X, but through the binding and intertwining of octene "branches."



Description

One of the latest innovations in the polymer pipe production technology was the development of heat-resistant PE-RT polyethylene, which increased the permissible operating temperature of the heat transfer medium to 95°C. This material was developed by The Dow Chemical Company and is a copolymer of ethylene with 1-octene, and it is the interlacing of the octene branches that makes the material cohesion. The PE-RT material comes in two types - Type I and Type II. Type II PE-RT can withstand pressure 20% higher than the previous generation, that is, than Type I. The PE-RT pipes of the second type are only slightly inferior to the PE-X pipes in terms of wear resistance, while the PE-RT pipes of the first type are more susceptible to long-term wear at high temperatures. If PE-X and PE-RT are compared to each other, PE-X is considered more durable because it resists high temperatures and pressure longer. Despite these differences, each of the listed types of pipes has found its application in the modern construction industry, meeting some or other of the requirements of state-of-the art technologies. In any case, when selecting a material for accident-free and long-term operation of engineering systems, it is necessary to take into account all its technical characteristics and properties.

The PE-RT pipe (Type II) is a new generation of pipes made of polymer materials with increased heat resistance.



Features

PRO AQUA PE-RT universal pipes for water supply and heating are made of polyethylene of raised temperature resistance PE-RT (Type II). Due to improvements in molecular structure and polymerization control capabilities, PE-RT (Type II) has exceptional long-term hydrostatic strength at high temperatures, which gives PRO AQUA PE-RT pipes the following advantages:

- resistance to high and low temperatures;
- resistance to increased pressure heads;
- durability and chemical resistance;
- shock resistance;
- high flexibility;
- possibility of connection with axial fittings (for violet pipe SDR 7.4).

Further, PRO AQUA PE-RT pipes have the following advantages:

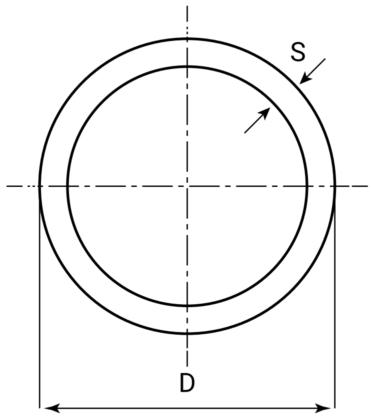
- equipped with an EVOH oxygen barrier;
- the oxygen barrier is protected by it being located in the middle part of the wall;
- not subject to corrosion;
- high noise absorption capacity;
- absence of mineral deposits on pipe walls;
- high resistance to water hammers;
- light and flexible;
- easy installation.

PE-RT AquaHeat pipes have found their main application in heating systems, but are also applicable in underfloor, wall and soil heating systems.

PE-RT pipes are intended for use in hot and cold water supply systems due to the absence of the EVOH oxygen barrier and can also be used in underfloor, wall and soil heating systems.

PRO AQUA PE-RT polymer pressure pipes system is designed for at least 50 years of operation, at a maximum pressure of 0.8 MPa. The maximum operating temperature of the heat transfer medium is 90°C.

Specifications



PE-RT SDR 7.4/S3.2 pipe

D, mm	S, mm	Volume, l/m
16	2,2	0,106
20	2,8	0,163
25	3,5	0,254
32	4,4	0,423
40	5,5	0,661

PRO AQUA
AquaTech PE-RT

AquaTech PE-RT SDR 7.4 single-layer pipe, white

De x S, mm	Meters per package	Code
16 x 2,2	100 м	PERT1S7416100
16 x 2,2	200 м	PERT1S7416200
16 x 2,2	300 м	PERT1S7416300
16 x 2,2	600 м	PERT1S7416600
20 x 2,8	100 м	PERT1S7420100
20 x 2,8	200 м	PERT1S7420200
25 x 3,5	50 м	PERT1S7425050
25 x 3,5	100 м	PERT1S7425100
32 x 4,4	50 м	PERT1S7432050

PRO AQUA
AquaHeat PE-RT

AquaHeat PE-RT five-layer pipe with EVOH SDR 7.4, violet

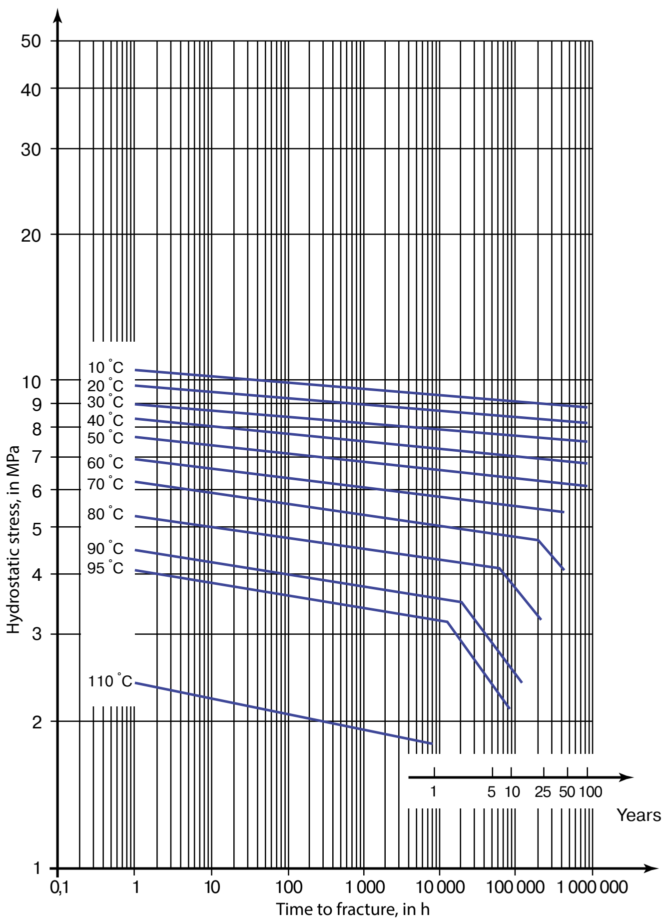
De x S, mm	Meters per package	Code
16 x 2,2	100 м	PERT5S7416100
16 x 2,2	200 м	PERT5S7416200
16 x 2,2	300 м	PERT5S7416300
16 x 2,2	600 м	PERT5S7416600
20 x 2,8	100 м	PERT5S7420100
20 x 2,8	200 м	PERT5S7420200
25 x 3,5	50 м	PERT5S7425050
25 x 3,5	100 м	PERT5S7425100
32 x 4,4	50 м	PERT5S7432050
40 x 5,5	50 м	PERT5S7440050

Reference curves for long-term durability of PE-RT pipes

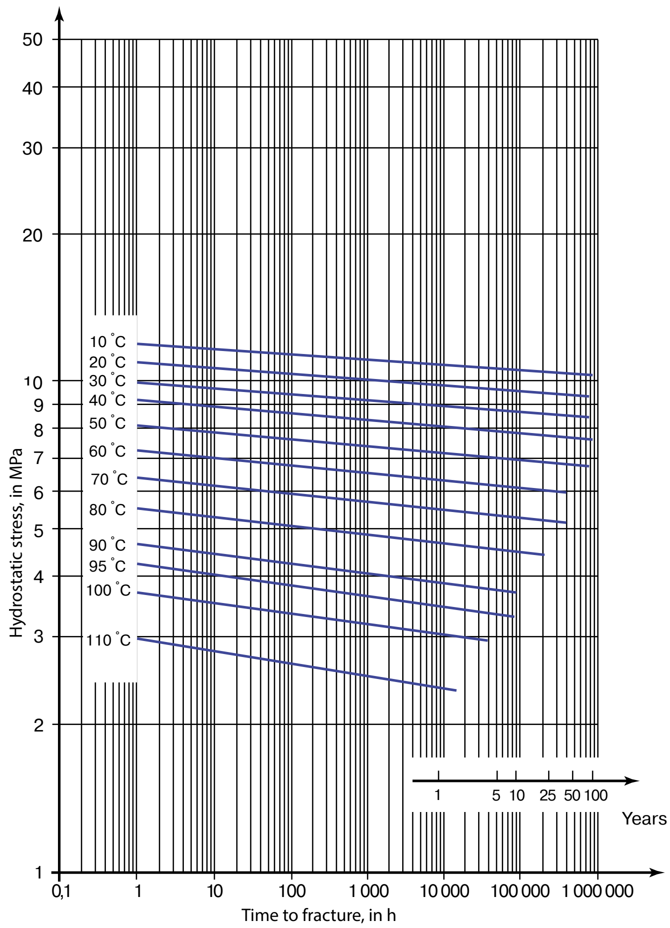
The figure shows graphs of long-term durability of polyethylene of raised temperature resistance PE-RT pipes (Type I) and polyethylene of raised temperature resistance PE-RT pipes (Type II) taken from GOST 32415-2013. As can be seen from the graphs, PE-RT (Type II) loses little of its durability over time, even at high temperatures. In this case, the drop on the durability graph is straightforward and easy to predict. PE-RT (Type I) has a kink in the graph, and at high temperatures this kink occurs after two years of operation. The kink point is called the critical point. When this point is reached, the material begins to actively accelerate the loss of durability. All of this causes a pipe that has reached the critical point to fail very quickly.

PE-RT pipes (Type II) are still predominantly used for underfloor heating systems. This is because the first generation (Type I) of the PE-RT pipes could not withstand temperatures over 60 degrees Celsius.

Type I



Type II



PRO AQUA axial fittings

Description

PRO AQUA axial fittings (with a slip-on sleeve) are designed, according to GOST 32415-2013, to connect polymer pipes PE-X and PE-RT series S3.2 (SDR 7.4) used in cold and hot water supply systems, water heating, including surface heating and snow melting systems. They are made of European grade CW617N brass resistant to dezincification.

The connection tightness is achieved by pressing the pipe wall against the fitting socket with a slip-on sleeve.

Specifications

- maximum operating temperature 95°C;
- maximum pressure 10 bar;
- service life not less than 50 years in all classes of operation according to GOST 32415-2013.

Features

The main advantages of axial fittings:

- high reliability;
- ease and speed of installation;
- threadless, non-detachable fittings may be embedded in building structures;
- absence of rubber O-rings;
- immediately ready for work and testing;
- minimal pressure losses due to the increased effective cross-section;
- universal fittings for potable water supply and heating;
- installation of connections with the special tool PRO AQUA PE-Xa;
- disassembly of the fitting for reuse is possible, a single, reliable connection technique that is not sensitive to installation site conditions;
- connection without rubber O-rings (the pipe material is the sealant);
- simple visual inspection;
- low local hydraulic resistance at the fittings due to the beading of pipe, there is no narrowing of the effective cross-section at the joints on the fittings;
- the connection can be pressurized immediately;
- the pipe does not require calibration and chamfering;
- uniform connection technique and universal tool for water supply and heating;
- non-detachable connection in accordance with SNiP 41-01-2003, SNiP 2.04.01-85*;
- joints may be sealed under plaster and screed according to DIN 18380 (VOB), SNiP 41-01-2003, SNiP 2.04.01-85*.

Code

Sleeve

Size	Code
16	AX10016ST
20	AX10020ST
25	AX10025
32	AX10032
40	AX10040
16	AX10016
20	AX10020

Coupling

Size	Code
16 × 16	AX11016
20 × 20	AX11020
25 × 25	AX11025
32 × 32	AX11032
40 × 40	AX11040

Reducing coupling

Size	Code
16 × 20	AX101620
16 × 25	AX102516
20 × 25	AX102520
25 × 32	AX103225
25× 40	AX102540
32 × 40	AX103240

Coupling M

Size	Code
16 × 1/2"	AX1701612
16 × 3/4"	AX1701634
20 × 1/2"	AX1702012
20 × 3/4"	AX1702034
25 × 1/2"	AX1702512
25 × 1"	AX1702501
25 × 3/4"	AX1702534
32 × 1"	AX1703201
32 × 3/4"	AX1703234
40 × 1 1/4"	AX17040114

Coupling F

Size	Code
16 × 1/2"	AX1801612
16 × 3/4"	AX1801634
20 × 1/2"	AX1802012
20 × 3/4"	AX1802034
25 × 3/4"	AX1802534
25 × 1"	AX1802501
32 × 1"	AX1803201

Coupling with union nut

Size	Code
16 × 1/2"	AX6001612
16 × 3/4"	AX6001634
20 × 1/2"	AX6002012
20 × 3/4"	AX6002034
25 × 3/4"	AX6002534
32 × 1"	AX6003201
40 × 1 1/2"	AX60040112

Coupling with union nut Eurocone

Size	Code
16 × 3/4"	AX6001634.EK
20 × 3/4"	AX6002034.EK

Elbow 90° M

Size	Code
16 × 1/2"	AX3301612
16 × 3/4"	AX3301634
20 × 1/2"	AX3302012
20 × 3/4"	AX3302034
25 × 3/4"	AX3302534
32 × 1"	AX3303201

Elbow 90° F

Size	Code
16 × 1/2"	AX3501612
16 × 3/4"	AX3501634
20 × 1/2"	AX3502012
20 × 3/4"	AX3502034
25 × 3/4"	AX3502534
32 × 1"	AX3503201

Elbow 90° with union nut

Size	Code
16 × 1/2"	AX3501612NG
20 × 1/2"	AX3502012NG
20 × 3/4"	AX3502034NG
25 × 3/4"	AX3502534NG

Elbow 90°

Size	Code
16 × 16	AX3009016
20 × 20	AX3009020
25 × 25	AX3009025
32 × 32	AX3009032
40 × 40	AX3009040

Reducing tee

Size	Code
16 × 20 × 16	AX8162016
20 × 16 × 20	AX8201620
20 × 20 × 16	AX8202016
20 × 25 × 20	AX8202520
20 × 16 × 16	AX8201616
20 × 25 × 16	AX8202516
25 × 16 × 16	AX8251616
25 × 16 × 25	AX8251625
25 × 20 × 16	AX8252016
25 × 20 × 20	AX8252020
25 × 20 × 25	AX8252025
25 × 25 × 16	AX8252516
25 × 25 × 20	AX8252520
25 × 32 × 25	AX8253225
25 × 20 × 32	AX8322025
25 × 25 × 32	AX8322525
25 × 16 × 20	AX8251620
32 × 16 × 32	AX8321632
32 × 20 × 32	AX8322032
32 × 25 × 32	AX8322532
40 × 20 × 40	AX8402040
40 × 25 × 40	AX8402540
40 × 32 × 32	AX8403232
40 × 32 × 40	AX8403240

Tee F

Size	Code
16 × 1/2" × 16	AX9161216
20 × 1/2" × 20	AX9201220

Tee

Size	Code
16 × 16 × 16	AX20016
20 × 20 × 20	AX20020
25 × 25 × 25	AX20025
32 × 32 × 32	AX20032
40 × 40 × 40	AX20040

Union connectors

Size	Code
16 × 2,2	AX411622E
20 × 2,8	AX412028E

Eurocone flat seal adapter

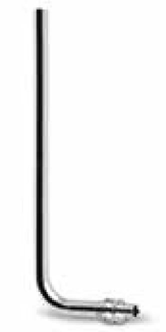
Size	Code
3/4"	AXB.650.EK

Elbow 90° with wall mount

Size	Code
16 × 1/2"	AX5001612
20 × 1/2"	AX5002012

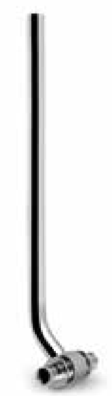
Long elbow with wall mount

Size	Code
16 × 1/2"	AX5001612L



L-type radiator tube

Size	Code
250 × 16	AX716250
300 × 16	AX716300
500 × 16	AX716500
750 × 16	AX716750
1000 × 16	AX7161000
250 × 20	AX720250
300 × 20	AX720300
500 × 20	AX720500
750 × 20	AX720750
1000 × 20	AX7201000



T-type radiator tube

Size	Code
250 × 16	AX416250
300 × 16	AX416300
500 × 16	AX416500
750 × 16	AX416750
1000 × 16	AX4161000
250 × 20	AX420250
300 × 20	AX420300
500 × 20	AX420500
750 × 20	AX420750
1000 × 20	AX4201000

Plug

Size	Code
16	AXB.630.16
20	AXB.630.20
25	AXB.630.25

Union connector G3/4-15

Size	Code
15 × 3/4"	AX415134

PPSU fittings with PVDF sleeves

Description

To connect PE-X and PE-RT polymer pipes of series S3.2 (SDR 7.4) according to GOST 32415-2013, in addition to brass fittings, fittings made of PPSU (polyphenylsulfone) with tension sleeves made of PVDF (polyvinylidenfluoride) are also used. The connection tightness is achieved by pressing the pipe wall against the fitting socket with a slip-on sleeve. Fittings are assembled using PRO AQUA standard tool for axial systems.

PPSU is a special thermoplastic with high impact strength and high chemical resistance to hot water while maintaining dimensional stability when exposed to high temperatures. This allows to use the PPSU fitting system in water heating systems, in cold and hot water supply systems as well as in surface heating and snow melting systems.

Specifications

- maximum operating temperature 90°C;
- maximum operating pressure 10 bar at 90°C;
- service life not less than 50 years in all classes of operation according to GOST 32415-2013.

Features

- high resistance to mechanical impact loads;
- the fittings are non-detachable and may be embedded in building structures;
- ease and speed of installation;
- absence of rubber O-rings;
- are not subject to corrosion and mineral deposits;
- immediately ready for work and testing;

Sleeve PVDF

Size	Code
16	AXP.100.16.E
20	AXP.100.20.E
25	AXP.100.25.E
32	AXP.100.32.E

Coupling

Size	Code
16	AXP.120.16
20	AXP.120.20
25	AXP.120.25
32	AXP.120.32

Reducing coupling

Size	Code
16 × 20	AXP.130.1620
16 × 25	AXP.130.1625
20 × 25	AXP.130.2025
25 × 32	AXP.130.2532

Elbow 90°

Size	Code
16	AXP.220.16
20	AXP.220.20
25	AXP.220.25
32	AXP.220.32

Tee

Size	Code
16	AXP.320.16
20	AXP.320.20
25	AXP.320.25
32	AXP.320.32

Reducing tee

Size	Code
16 × 20 × 16	AXP.330.162016
20 × 16 × 16	AXP.330.201616
20 × 16 × 20	AXP.330.201620
20 × 20 × 16	AXP.330.202016
20 × 25 × 16	AXP.330.202516
20 × 25 × 20	AXP.330.202520
25 × 16 × 16	AXP.330.251616
25 × 16 × 20	AXP.330.251620
25 × 16 × 25	AXP.330.251625
25 × 20 × 16	AXP.330.252016
25 × 20 × 20	AXP.330.252020
25 × 20 × 25	AXP.330.252025
25 × 25 × 16	AXP.330.252516
25 × 25 × 20	AXP.330.252520
32 × 16 × 32	AXP.330.321632
32 × 20 × 20	AXP.330.322020
32 × 20 × 25	AXP.330.322025
32 × 20 × 32	AXP.330.322032
32 × 25 × 20	AXP.330.322520
32 × 25 × 25	AXP.330.322525
32 × 32 × 20	AXP.330.323220

Installation tools for axial fittings

It is recommended to use specially designed PRO AQUA AXTOOL tool kits to install the PRO AQUA axial pipe and fitting system.

Hand-held universal tool for installation of axial fittings

Code	For pipes, D x S
AXTOOL-1632	16 x 2,2 20 x 2,8 25 x 3,5 32 x 4,4

Delivery set

- Hand-held pressing tool;
- Hand-held mechanical expander;
- 4 expansion attachments for S3.2 series pipes (SDR 7.4) with diameters from 16 to 32 mm;
- Pipe cutters with diameters from 16 to 32 mm;
- Suitcase for convenient storage and transportation of tools.

PRO AQUA AXTOOL tool set is designed to work with PE-X and PE-RT pipes of the S3.2 (SDR 7.4) series with diameters of 16, 20, 25 and 32 mm. The functional design of the hand-held pressing tool allows to work with two pipe diameters at the same time without changing attachments. The tool is autonomous and low-maintenance, so it does not require any special care except for maintenance (cleaning/lubrication), which should be performed at least once a year (according to SP 73.13330.2016 - Internal sanitary-technical systems of buildings). Due to the affordable price quote per kit, even a small installation organization will be able to perform the PRO AQUA piping installation work.

Cordless multifunctional pressing tool/expander for installation of axial fittings

Code	For pipes, D x S
AX.BTOOL1632C	16 x 2,2 20 x 2,8 25 x 3,5 32 x 4,4

Delivery set

- Cordless multifunctional hydraulic pressing tool/expander;
- 4 expansion attachments for S3.2 series pipes (SDR 7.4) with diameters from 16 to 32 mm;
- 4 pressing attachments for joints with diameters from 16 to 32 mm;
- 2 batteries; Charger;
- Pipe cutters with diameters from 16 to 32 mm;
- O-ring repair kit;
- Suitcase for convenient storage and transportation of tools.

PRO AQUA AX.BTOOL1632C cordless multifunctional tool is designed to work with PE-X and PE-RT pipes of S3.2 (SDR 7.4) series with diameters of 16, 20, 25 and 32 mm. It is powered by a lithium-ion battery, driven by an electric motor and controlled by a microcontroller. Thanks to the integrated high-pressure hydraulic system, the tool saves you efforts and reduces installation time.

The multifunctional design of this tool allows to install the joint with a single tool that combines an electric pressing tool and an electric pipe expander, and allows two pipe diameters to be handled at the same time without changing nozzles.

General installation rules

! PRO AQUA hand-held mechanical installation tool is used for installation.

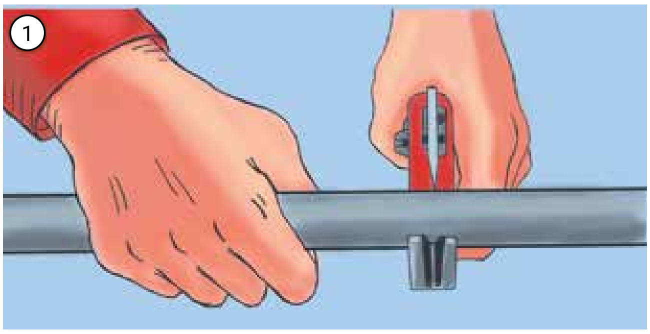
General installation rules

1. Installation should be carried out by specialized installation companies whose employees have received the necessary training.
2. Before proceeding with installation, these instructions must be read carefully and adhered to in the future.
3. When using any tool, the installer must carefully read and follow the operating and maintenance instructions attached to this tool.
4. To avoid damage to the pipes or deterioration of their quality due to the negative effects of UV rays, the pipes should not be unpacked prior to the installation work.
5. The plastic caps on the pipe ends should not be removed until the installation work has started, in order to avoid contamination of the inner surface of the pipes and the ingress of foreign particles.
6. Installation of joints and bending of pipes should be performed at an ambient temperature of at least -15°C for PE-Xa pipes, and at least +10°C for PE-RT pipes.
7. The use of grease, sealants, etc. is not permitted when installing the axial fittings.
8. The buried laying piping should be poured with concrete mortar or covered only after leak tests have been performed. The pipe must be under pressure of 0.3 MPa when poured with mortar.
9. Coiled pipes stored or transported at temperatures below 0°C should be kept for 24 hours at a temperature of at least +10°C before rolling out.

Advantages of PRO AQUA axial fittings

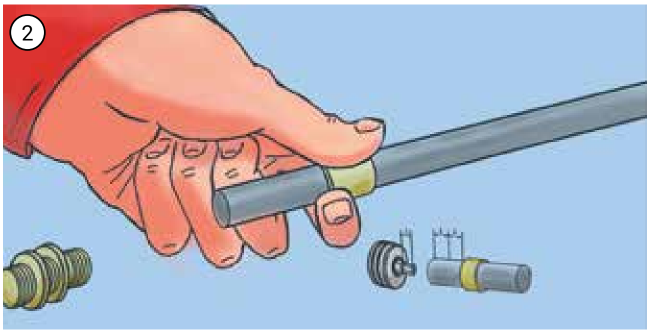
- uniform connection technique using slip-on sleeves;
- maintaining tightness for a long time;
- absence of O-rings (the pipe material itself serves as a seal);
- possibility of visual inspection of the connection;
- the system can be pressurized immediately after installation;
- no need for calibration;
- non-detachable connection, possibility of concealed installation anywhere (under plaster, in screed, etc.).

Installation procedure:



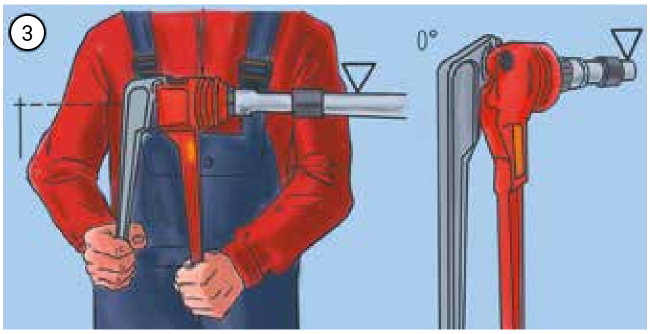
Cut the pipe to the desired length.

Use the special pipe cutters. The cutting angle should be 90°. There should be no burrs on the cut edges.

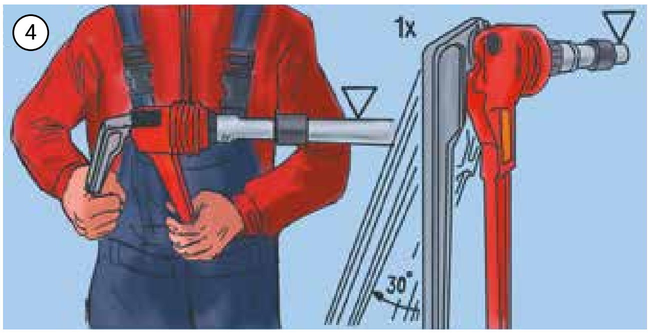


Put a sleeve on the pipe.

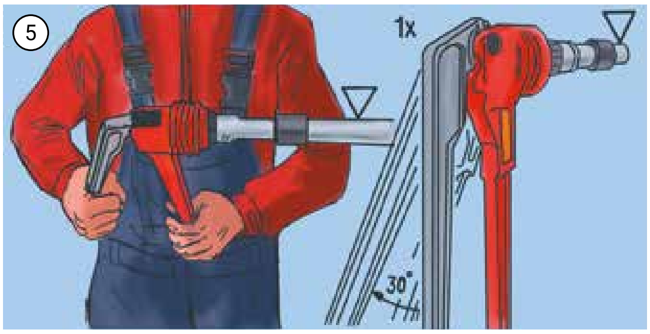
The chamfer inside the sleeve should be pointed toward the fitting. The connection should be made on a straight section of the pipe (no bends). When the pipe expands, the sleeve must be at a distance from the pipe edge equal to the length of at least 2 sleeves.



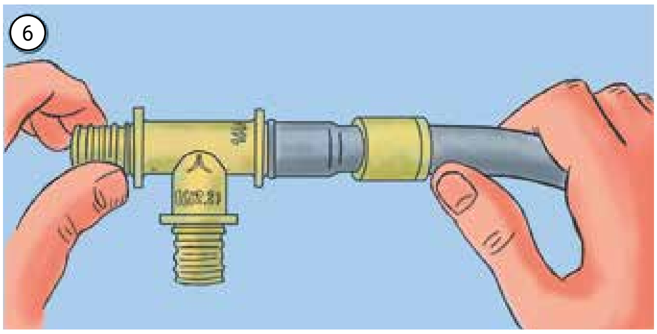
Insert the expander into the pipe as far as it will go and perform a single expansion by bringing the expander handles together by half (≈50%).



Expand the handles to the initial position, turn the expander by 30° and expand again by bringing the expander handles together more than halfway, but not to the end (≈70-75%).

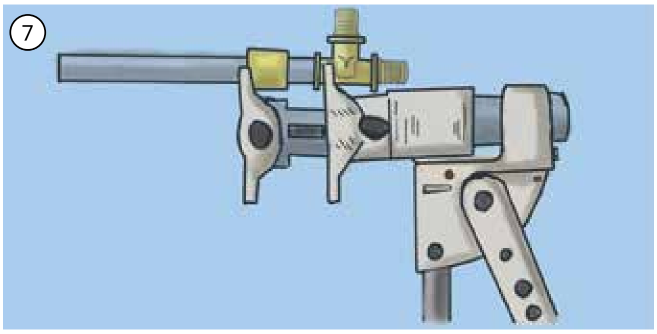


Extend the handles to the initial position again, turn the expander by 30° and expand the expander by bringing the expander handles together all the way (100%).



Insert the fitting socket into the expanded end of the pipe as far as it will go.

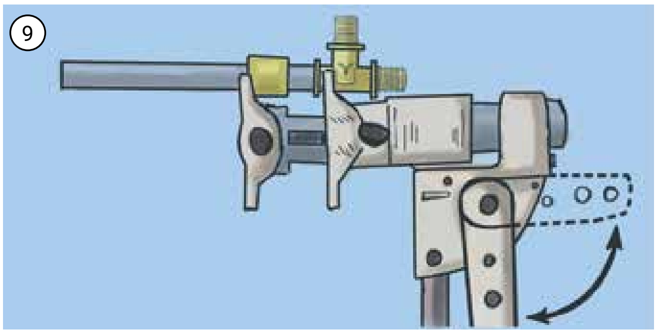
You should feel a slight resistance during this process. If you do not feel any resistance, then the pipe has been over-expanded, and it is necessary to wait a few seconds until the pipe is tight against the fitting socket.



Grasp the connection with the tool.

The tool must be held at right angle, avoiding skewing of the fitting and the sleeve between the tool jaws.

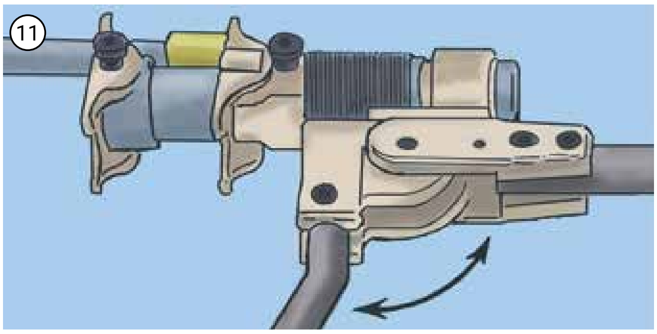
Move the tool safety catch to the upper position.



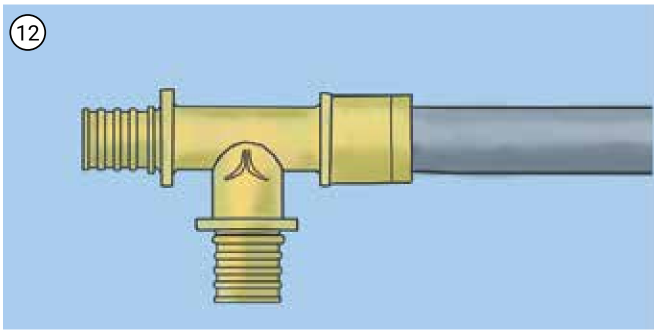
Bringing the tool handles together, push the sleeve up to the fitting flange (all the way).

The connection position should be observed during pressing-in to avoid skewing and/or misalignment.

Move the safety catch to the lower position



Bring the tool handles together again. Then sharply raise the movable tool handle by 90° to bring the tool to the initial position.

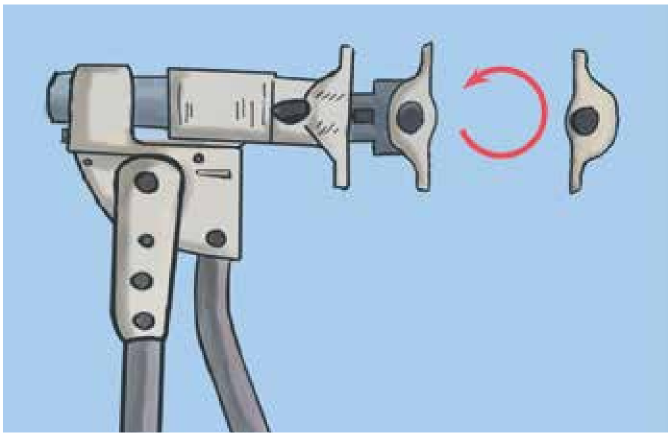


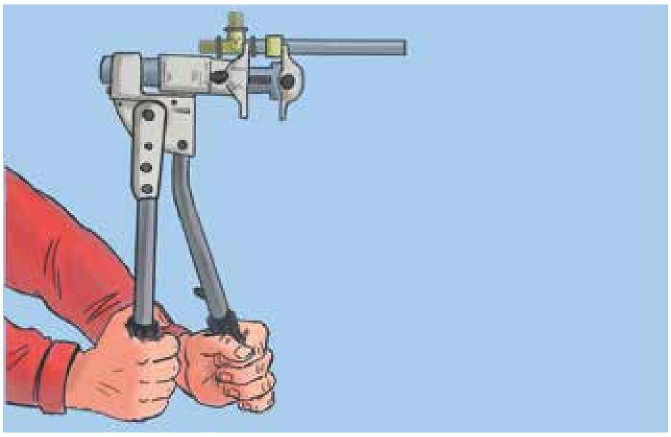
Visually inspect the finished connection for any imperfections.

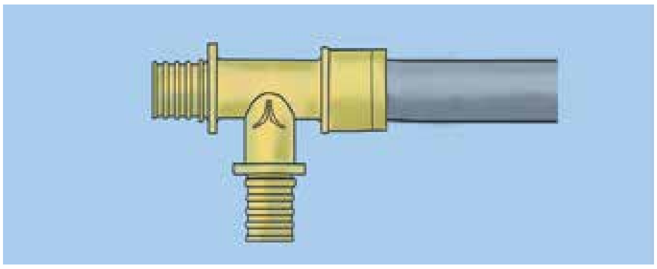
There should be no gap between the sleeve and the thrust flange.

When installing PRO AQUA short sleeves, it is necessary to do the following:

Remove the end attachment of the hand-held pressing tool, reverse it and secure it to the tool. Then slide the sleeve onto the fitting as far as it will go using a hand-held pressing tool. Keep the tool at right angle during the pressing-in process to avoid skewing of the fitting and the sleeve in the vise jaws and in relation to each other.

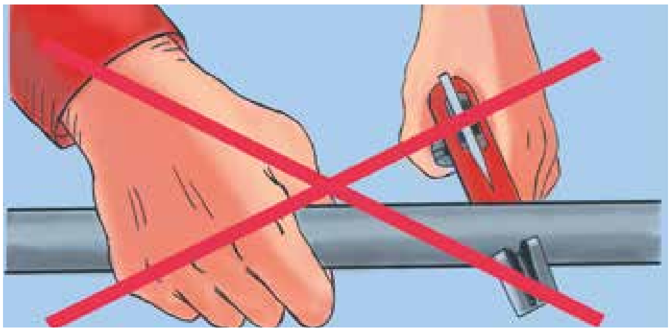




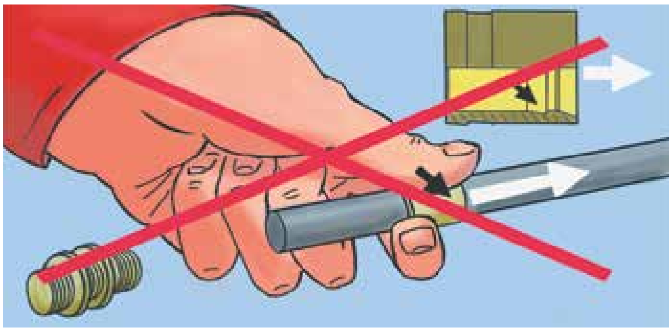


Visually inspect the finished connection for damages.

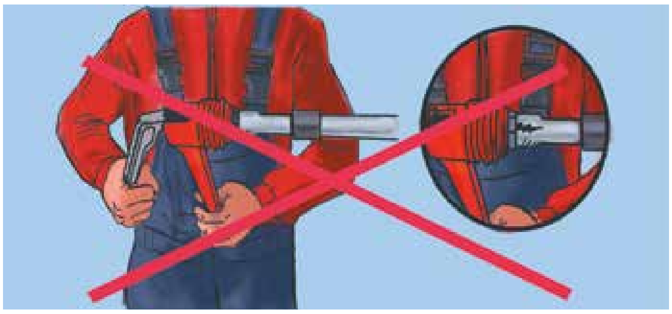
Main mistakes during installation



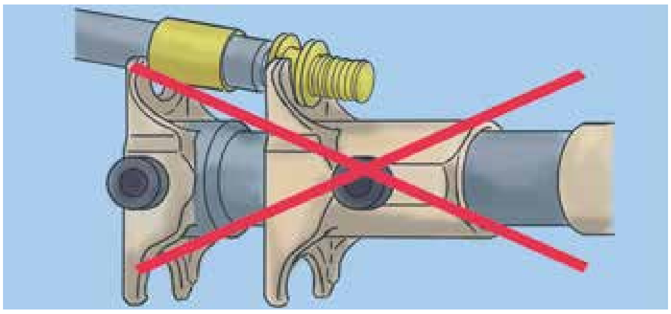
Cutting the pipe not at the right angle



The sleeve is put on "the wrong way": the chamfer inside the sleeve points in the opposite direction to the fitting



Single sharp expansion of the pipe with the expander handles brought together all the way



When pressing-in, the fitting and the sleeve are skewed (misalignment) or pressed between the jaws at an angle

A kink in the pipe due to small radius bending or carelessness can be repaired with a hot air gun.

For bending pipes, the hot air gun is supplemented with a so-called deflector cap, thanks to the shape of which the hot air flows around the pipe. The temperature should be selected within 120°C, and the tool itself is set to a reduced airflow.

Holding the pipe in the deflector cap area and slowly rotating it, gradually heat the kink point. Heating this pipe section too quickly can cause the outer layers of the pipe to overheat and consequently destroy the material structure before the inner layers become moldable.

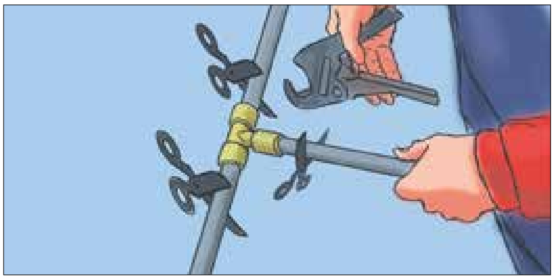
To prevent the hot pipe from kinking again, the pipe should be fixed in a straight position until it cools down.

! Pipes coated with the EVOH anti-diffusion layer may develop creases after restoration. In these areas, the anti-diffusion layer is peeling away from the PEX layer. This does not affect the pipe characteristics as the working layer is the PEX layer and not the EVOH.

Reuse of axial fittings

PRO AQUA brass axial fittings can be reused for the same systems from which they were removed

> ! Do not disassemble the fitting directly on the pipeline. First, the area with the fitting to be disassembled must be cut out.

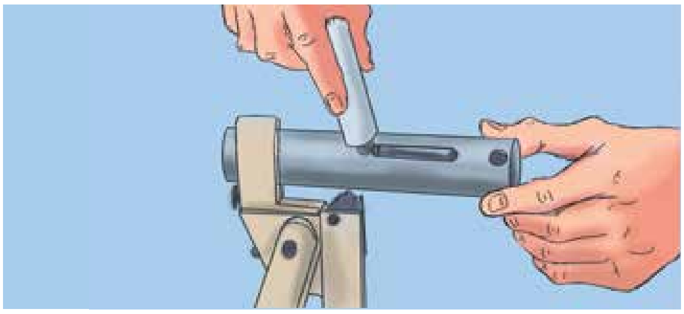


Disassembly procedure:

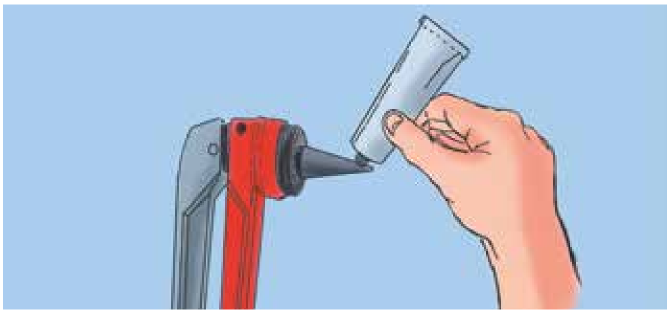
1. Warm up the cut brass fittings with an installation hot air gun;
2. When the temperature reaches about 180°C, remove the slip-on sleeve from the fitting body;
3. Remove the remainder of the pipe from the fitting socket;
4. Clean contaminants from the fitting and the sleeve.

> ! The fitting and the sleeve may only be reused if they are in perfect condition after cleaning!

PRO AQUA AXTOOL tool care



Regularly lubricate the inside of the presser cylinder, keeping the outside of the cylinder dry. Do not grease the pressing attachments (jaws).



Lubricate the expander cone regularly. Do not over-lubricate the cone to prevent excess grease from entering the pipe.

CAUTION: Do not apply lubricant to the expanding attachment segments that come in contact with the pipe. Keep the outer surfaces of the attachments clean.

Tool storage and maintenance conditions

- Never store a wet tool! After work, the tool should be dried and lubricated. It is recommended to keep the tool and attachments clean and dry in a plastic case (suitcase).
- Always keep the attachment (jaws) sets, expander heads and pressing tool cylinder clean. If they are dirty, clean them with a brush and then oil them.
- Inspect all attachments, expander and pressing tool for damage or visible wear-out before each use. Damaged tools or attachments are forbidden for use and should be sent for repair or replaced.
- Remove grease from the expander cone at regular intervals. There must be no grease on the surface of the expanding segments. If excess grease reaches the expanding segments, clean the segments thoroughly (e.g. with degreaser) and then dry them.

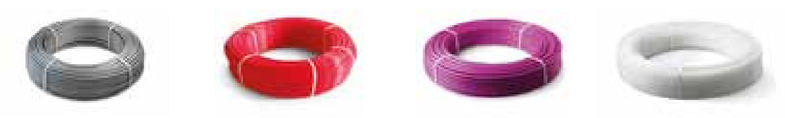
Specifications and hydraulic calculation

List of regulatory documents for design

When designing pipelines for cold, hot water supply and heating systems made of cross-linked polyethylene (PE-X) and heat-resistant polyethylene (PE-RT), the requirements of the following regulatory documents should be observed

СП 30.13330.2020	Internal water supply and sewage of buildings.
СП 40.102.2000	Design and installation of pipelines for water supply and sewage systems made of polymer materials.
СП 41.109.2005	Design and installation of internal water supply and heating systems of buildings using cross-linked polyethylene pipes.
СП 60.13330.2016	Heating, ventilation and air conditioning.
СП 73.13330.2016 (SNiP 3.05.01-85)	Internal plumbing systems of buildings.
СП 344.1325800.2017	Internal water supply and heating systems of buildings using cross-linked polyethylene pipes. Design and installation rules.
GOST 32415-2013	Thermoplastic pressure pipes and their connecting parts for water supply and heating systems.
GOST 30494-96	Residential and public buildings. Room microclimate parameters.
SP 50.13330.2012 (SNiP 23-02-2003)	Thermal protection of buildings.
SP 23-101-2004	Design of heat protection of buildings.
SP 61.13330.2012 (SNiP 41-03-2003)	Thermal insulation of equipment and pipelines.
SP 41-103-2000	Design of thermal insulation of equipment and pipelines.
SP 112.13330.2011 (SNiP 21-01-97*)	Fire safety of buildings and structures.
SP 118.13330.2012 (SNiP 31-06-2009)	Public buildings and facilities.
SP 131.13330.2012 (SNiP 23-01-99*)	Construction climatology.
SP 51.13330.2011 (SNiP 23-03-2003)	Noise protection.
SP 20.13330.2011 (SNiP 2.01.07-85*)	Loads and impacts.
SanPiN 2.1.4.1074-01	Drinking water. Hygienic requirements to water quality for centralized drinking water supply systems. Quality control. Hygienic requirements to safety assurance for hot water supply systems.
SanPiN 2.1.4.1175-02	Hygienic requirements to water quality for non-centralized water supply. Sanitary protection of sources.
SanPiN 2.1.2.2645-10	Sanitary and epidemiological requirements to housing conditions in residential buildings and premises.
SanPiN 2.2.4.548-96	Hygienic requirements to microclimate of industrial premises.
SP 3.1.2.2626 -10	Sanitary and epidemiological regulations. Legionellosis prevention.

Physical properties of PRO AQUA pipes made of the cross-linked polyethylene PE-Xa and heat-resistant polyethylene PE-RT



Material	Unit of measurement	AquaHeat PE-Xa	AquaFloor PE-Xa	AquaHeat PE-RT	AquaTech PE-RT
Color (surface)	-	Silver	Red	Violet	White
Use of EVOH	%	+	+	+	-
Degree of cross-linking	%	>70		-	
Average thermal elongation factor	mm/(m°C)	0,15			
Thermal conductivity	W/(m°C)	0,35		0,41	
Roughness of pipes	mm	0,007			
Density	kg/m³	960	940		
Moisture absorption	mg			≤0,01	
Elastic modulus, at 20°C	MPa	850		600-800	
Maximum operating pressure for class 2	bar	10	10 (6)*	10	
Maximum operating pressure for class 5	bar	10	8 (6)*	8	
Maximum operating temperature	°C	90	90	90	
Short-term maximum temperature (emergency)	°C	100	100	100	
Oxygen diffusion	g / m³ / day	≤0,1	≤0,1	≤0,1	
Building material class	-	B2	B2	B2	
Maximum / minimum installation temperature	°C	+50...-15	+50...-15	+50...+10	
Minimum bending radius without aids	-	8 x d	8 x d	8 x d	
Minimum bending radius with pipe swing locks	-	5 x d	5 x d	5 x d	
Size range	Ø D x s, mm	16 x 2,2	16 x 2,0	16 x 2,2	
		20 x 2,8	20 x 2,0	20 x 2,8	
		25 x 3,5	-	25 x 3,5	
		32 x 4,4	-	32 x 4,4	
		40 x 5,5	-	40 x 5,5	

* 6 bar for 20 x 2.0 pipes

Hydraulic calculation procedure

The purpose of the hydraulic calculation is to rationally select the diameter of the heating system pipes that will provide the design water flow rate at a given ΔP. Pressure losses in a pipeline section ΔP are the sum of linear pressure losses ΔPl in this section and the sum of local resistances ΔPm.

ΔP = **ΔPl** + **ΔPm**

Linear pressure losses [ΔPl] are frictional pressure losses due to the roughness of the pipe walls through which the operating medium travels. Graphs 1 and 2 show linear pressure losses in kPa per 1 m of pipe depending on the pipe diameter and the operating medium flow rate. In order to obtain the linear losses of a pipeline section, it is necessary to use the calculated flow rate and select a suitable pipe diameter and pressure losses per 1 m [R], then multiply these losses by the section length [l] and the correction factor of the operating medium temperature [c]:

ΔPl = **(R** x **l)** x **c**

Local resistances [ΔPm] are pressure losses at fittings, valves, bends and restrictions of the pipelines. Table x shows the local resistances factors [ξ] for the PRO AQUA axial fittings. The local resistances of a system section is the sum of all the local resistances in this section:

ΔPm = **∑ξ**

As a result, the formula for pressure losses in the pipeline section will have the following form:

ΔP = **ΔPl** + **ΔPm** = **(R** x **l)** x **c** + **∑ξ**

!

When selecting pipe diameters, the operating medium velocity [v] must be taken into account. This parameter directly affects erosion of the inner surface of pipes, noise level and occurrence of water hammers, so it is recommended to adhere to the following values:

- in supply lines to heaters: v ~ 0.5 m/s.
- in main pipelines and standpipes: v ~ 1.0-1.5 m/s.
- maximum water velocity in the pipe: v ~ 2.5 m/s.

Service life of PRO AQUA PE-Xa and PE-RT S 3.2 (SDR 7.4) pipes

The maximum service life of pipelines made of PRO AQUA PE-Xa cross-linked polyethylene and PRO AQUA PE-RT heat-resistant polyethylene is determined by the total operating time of the pipeline at temperatures $T_{oper,}$ $T_{max,}$ T_{emer} and is 50 years, according to GOST R 32415-2013, for each operating class.

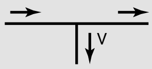
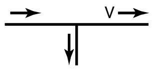
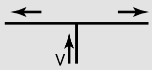
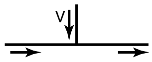
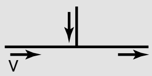
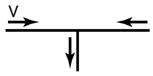
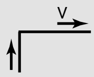
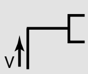
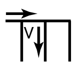
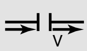
Operating class	T_{oper} °C	Time at $T_{oper,}$ year	$T_{max,}$ °C	Time at $T_{max,}$ h	$T_{emer,}$ °C	Time at $T_{emer,}$ h	Scope of application
1	60	49	80	1	95	100	Hot water supply (60°C)
2	70	49	80	1	95	100	Hot water supply (70°C)
4	20 40 60	2,5 20 25	70	2,5	100	100	High temperature underfloor heating. Low-temperature heating with heaters
5	20 60 80	14 25 10	90	1	100	100	High-temperature heating with heaters
CV	20	50	-	-	-	-	Cold water supply

Note:
T_{oper} - operating temperature or combination of temperatures of transported water, determined by the scope of application;
T_{max} - maximum operating temperature, the effect of which is limited in time;
T_{emer} - emergency temperature that occurs in emergency situations when control systems fail.

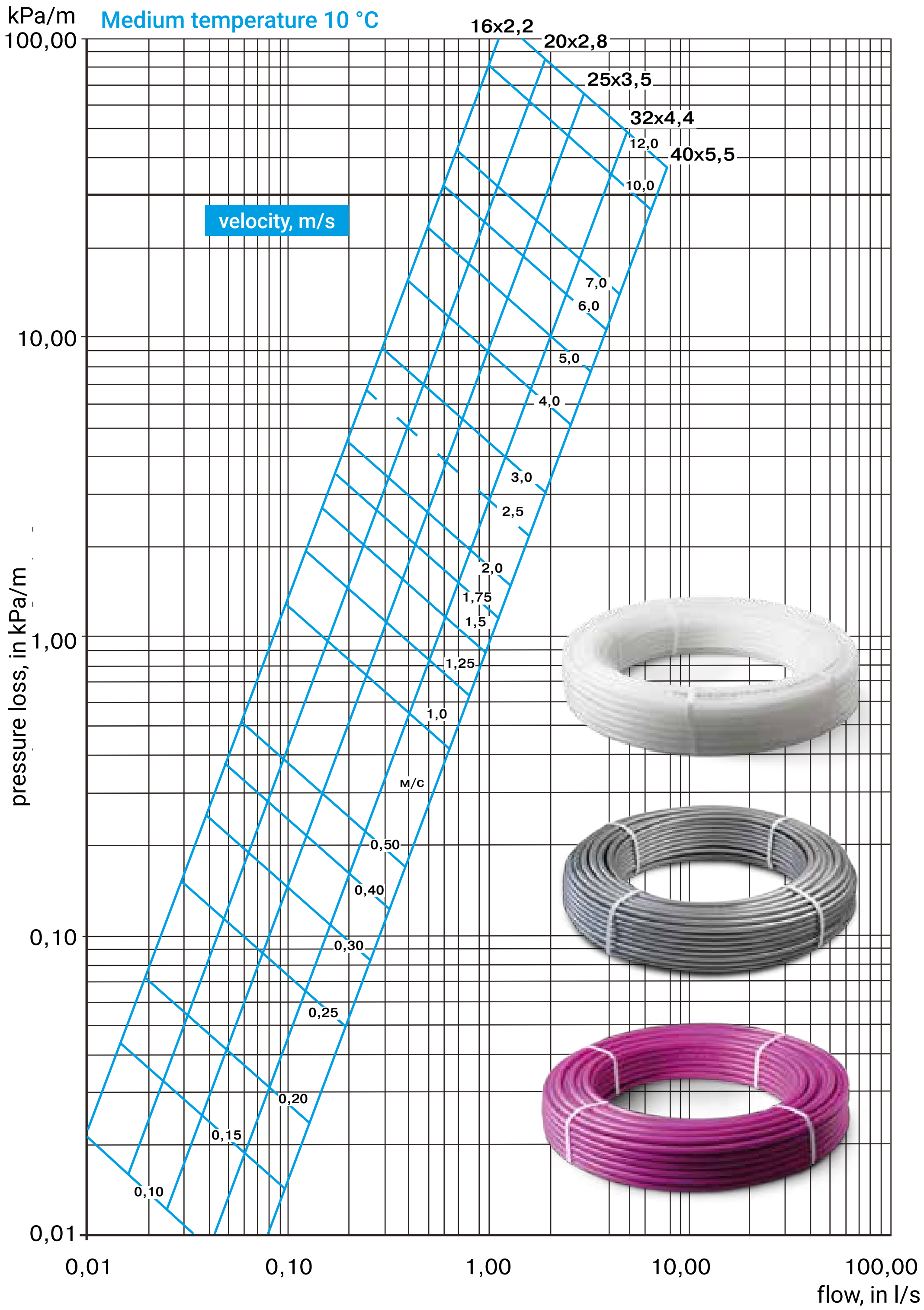
The maximum service life of the pipeline for each operating class is determined by the total operating time of the pipeline at temperatures $T_{oper,}$ $T_{max,}$ T_{emer} and is 50 years.
If the system operates under temperature conditions other than those given in the table above, then the service life of the pipes is determined according to GOST 32415-2013, Appendix B.

Table of local resistance factors for PRO AQUA axial fittings

Local resistance factors ζ for PRO AQUA PE-Xa fittings

№	Local resistance type	Graphic symbol	Local resistance factor ζ				
			Pipeline outer diameter De, mm				
			16	20	25	32	40
1	Tee for branch		3,8	3,6	4,4	3,8	4,2
2	Tee for passage		1,0	0,9	1,1	0,9	1,0
3	Tee for flow separation		3,9	3,8	4,5	3,9	4,4
4	Tee for branch at flow merge		9,0	8,0	8,6	6,3	7,2
5	Tee for passage at flow merge		17,3	13,5	16,4	12,2	14,2
6	Tee at counter flow		9,8	9,2	9,6	7,3	8,5
7	Angle piece 90°		3,7	3,6	4,1	3,6	4,2
8	Reduction in diameter		0,6	0,6	0,6	0,6	0,5
9	Water socket		1,5	1,6	-	-	-
10	Water socket		1,0	1,1	-	-	-
11	Water socket		0,6	0,6	0,7	0,6	0,5

1. Graph of linear pressure losses in PRO AQUA PE-Xa (silver) SDR 7.4and PE-RT (violet) DR 7.4 pipes

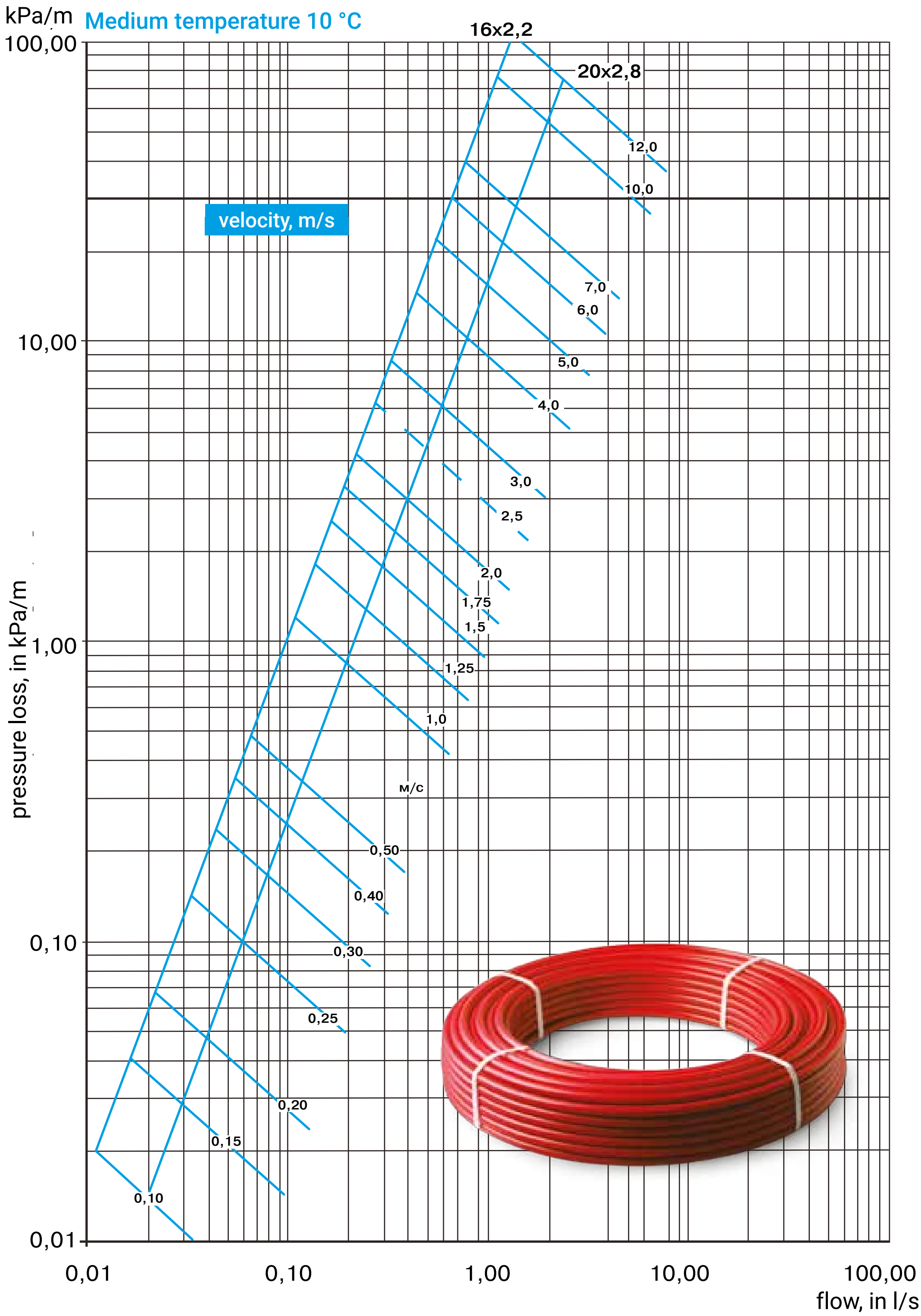


Correction factors for other water/heat transfer medium temperatures

Temperature, °C:	90	80	60	50	40	30	20	10
Factor:	0,76	0,78	0,80	0,82	0,84	0,87	0,91	1,00

— — — — — — Recommended maximum water velocity 2.5 m/s

2. Graph of linear pressure losses in PRO AQUA PE-Xa (red) S3.5 / S4.5 pipes



Correction factors for other water/heat transfer medium temperatures

Temperature, °C:	90	80	60	50	40	30	20	10
Factor:	0,95	0,98	1,00	1,02	1,10	1,14	1,20	1,25

— — — — — — Recommended maximum water velocity 2.5 m/s

Thermal elongation compensation

PRO AQUA PE-Xa and PE-RT pipes elongate when heated. This should be taken into account during design and installation. The elongation amount can be determined using the following formula:

$\Delta L = \Delta T \times L \times \alpha$

where:

L - length of pipe section, m;

ΔT - temperature difference of installation and operation, °C;

α - thermal elongation factor of PRO AQUA PE-Xa and PE-RT pipes

!

Stresses arising from the thermal elongation of PEX-a and PE-RT pipes are more than 200 times lower than those of metal pipes. Therefore, the arrangement of thermal elongation compensators is not required,

- The pipe is rigidly fixed, with distances between fixed fasteners ≤ 6 m;
- The pipe is embedded in concrete (floor/wall structures) or laid in a trough/channel.

The thermal elongation compensation in these cases is due to self-compensation - the pipe bending in transverse directions and transfer of insignificant forces to the fastening system.

!

PRO AQUA PE-Xa and PE-RT pipes are recommended to be embedded in concrete with either thermal insulation or a corrugated casing, unless, of course, there is no need of heat removal from the pipes. The thermal insulation / corrugated casing will reduce heat losses and protect the pipes from mechanical damages. Also, in this case it is not necessary to take measures to compensate for thermal elongations.

!

It is almost impossible to make the pipes supplied in coils "absolutely" straight without the use of additional steel troughs. This is due to the material high density as well as the shape memory effect. The thermal elongation compensation of such pipes should preferably be provided by self-compensation/bending.

To compensate for the thermal elongation of PRO AQUA pipes supplied in rods (straight sections), it is possible to use L- and U-shaped compensators.

Thermal elongation compensators

The calculation of the thermal elongation compensator is based on the formula:

$L_{BS} = C \times \sqrt{\Delta L \times d_S}$

where:

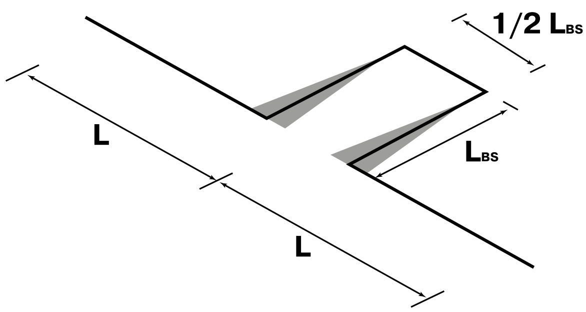
L_{BS} — compensator arm length, mm;

d_s — pipe outer diameter, mm;

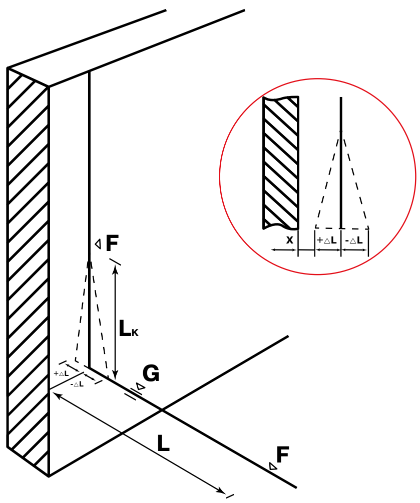
C — constant; (C=12 for PE-Xa and PE-RT pipes)

ΔL — length increase, mm.

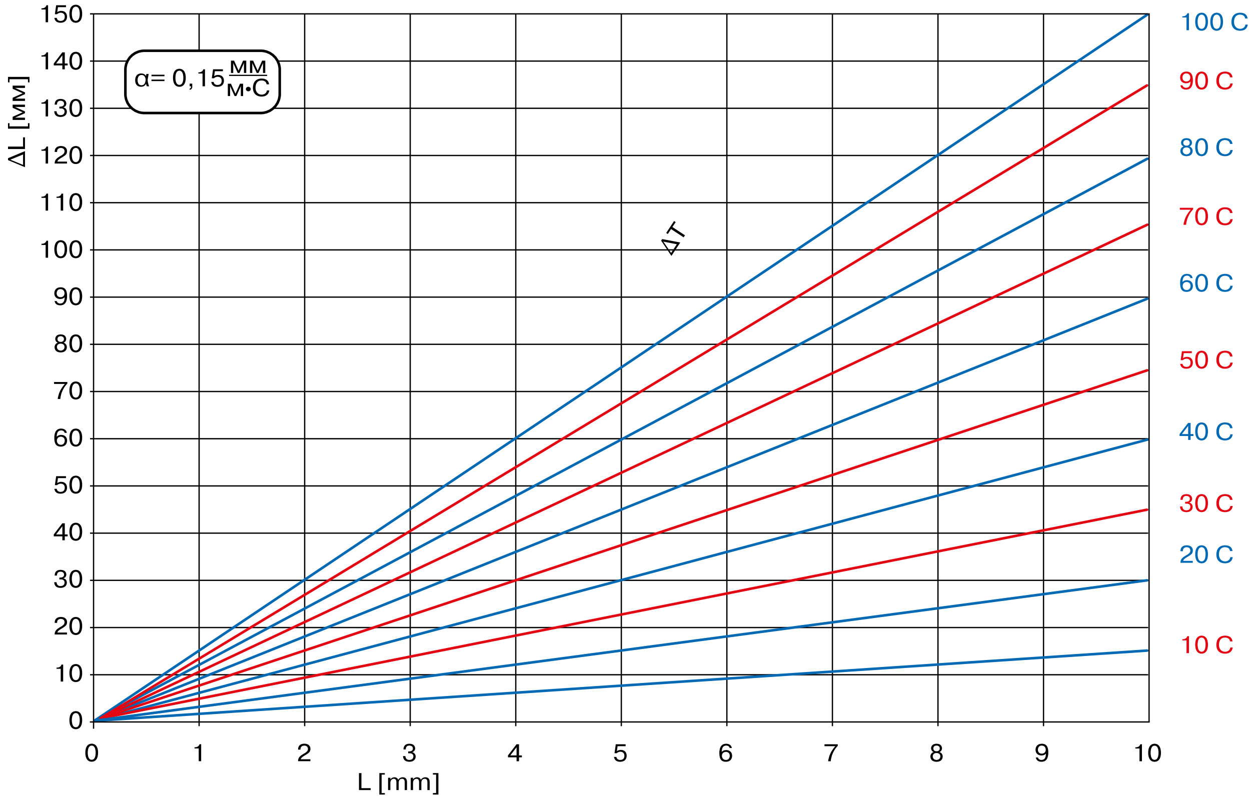
U-shaped thermal elongation compensator



L-shaped thermal elongation compensator



Thermal elongations



L Pipe lenght

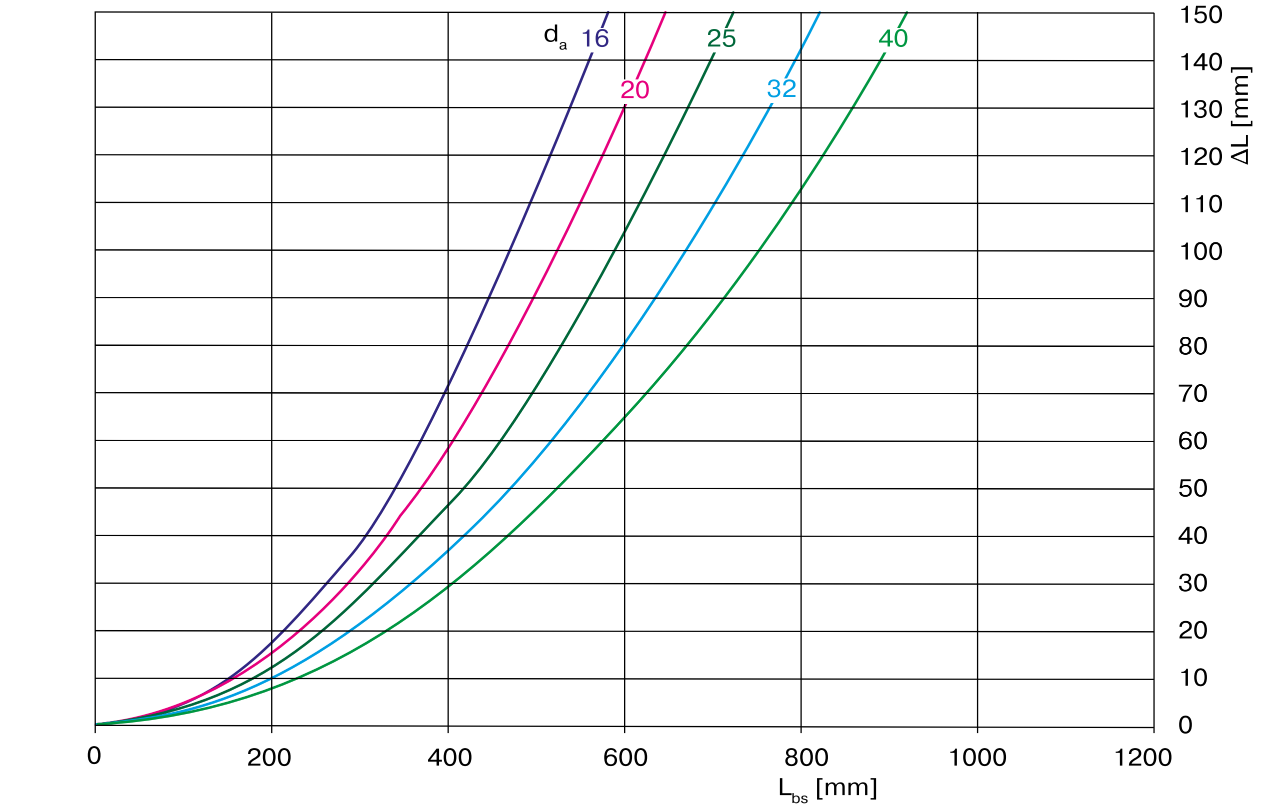
L_{bs} Compensator arm lenght

ΔT Temperature difference

ΔL Lenght increase

d_a Pipe outer diameter

Determination of the compensator arm length



Pipelines protection

Pro Aqua FLEXIGUARD protective corrugated pipes are designed for laying polymer pipes in sand-cement screed, on a "pipe-in-pipe" basis, to protect pressure pipes from external influences and mechanical damages during installation. This provides the possibility of compensating for linear elongation of pipes inside the casing, the possibility of replacing the pipe in case of mechanical damage, without opening the floor, reducing damage from leaks, as well as reducing heat loss of pipes.

The corrugated pipes are also used as protective sleeves in places where pipes cross the expansion joints of screed and building structures.

Pipe color is red or blue.

PRO AQUA
FlexiGuard CORRUGATED PIPES

Protective corrugated pipes

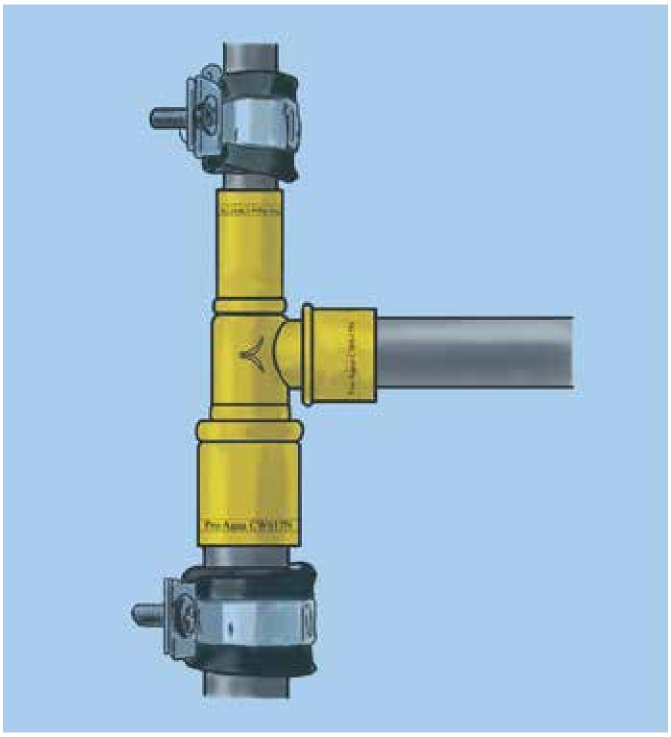
Code	Outer diameter (D1), mm	Inner diameter (D2), mm	Wall thickness (E1), mm	Wall thickness (E2), mm	Pipe size PEX/PE-RT, mm	Number of meters in a coil, m
PECP2516R PECP2516B	25	20	0,45	0,3	16	50
PECP2820R PECP2820B	28	23	0,5	0,35	20	50
PECP3525R PECP3525B	35	29	0,5	0,35	25	30
PECP4332R PECP4332B	43	37	0,5	0,35	32	30

Color	Code			
	Pipe 16	Pipe 20	Pipe 25	Pipe 32
Blue	PECP2516B	PECP2820B	PECP3525B	PECP4332B
Red	PECP2516R	PECP2820R	PECP3525R	PECP4332R

Fixing of pipelines Movable and fixed supports

It is recommended to use standard clamps as movable supports (fasteners) allowing longitudinal movement of pipes. It is recommended that the sliding supports are spaced no more than specified in the table.

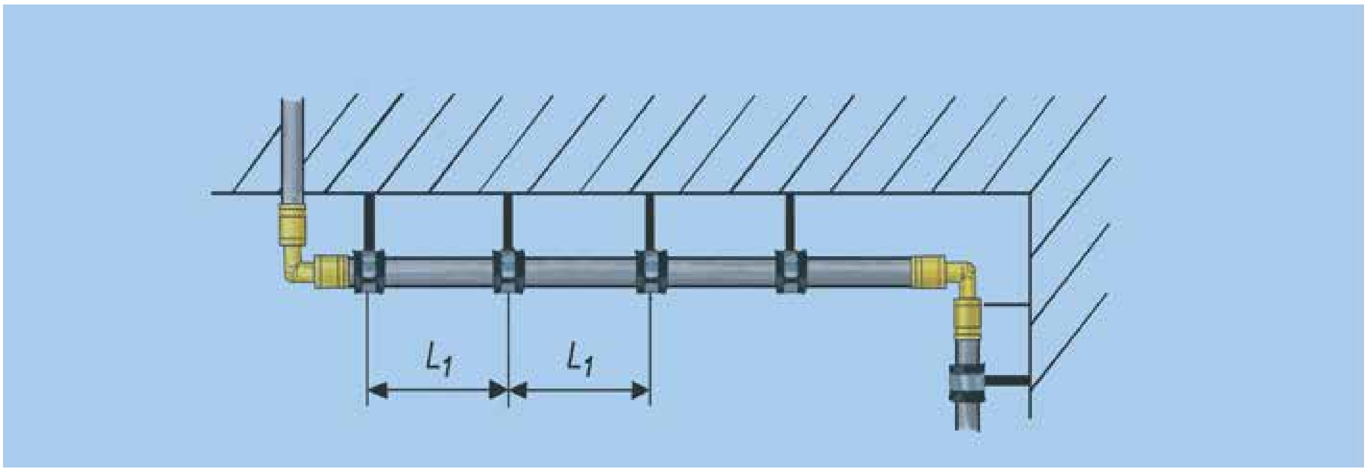
! Do not install the clamps directly on the slip-on sleeves!



Maximum permissible distance between sliding fasteners:

Pipe outer diameter, mm	Maximum distance L between sliding supports for horizontal laying, mm	L between sliding supports for vertical laying, mm
16	700	1000
20	700	1000
25	800	1200
32	900	1400
40	1000	1500

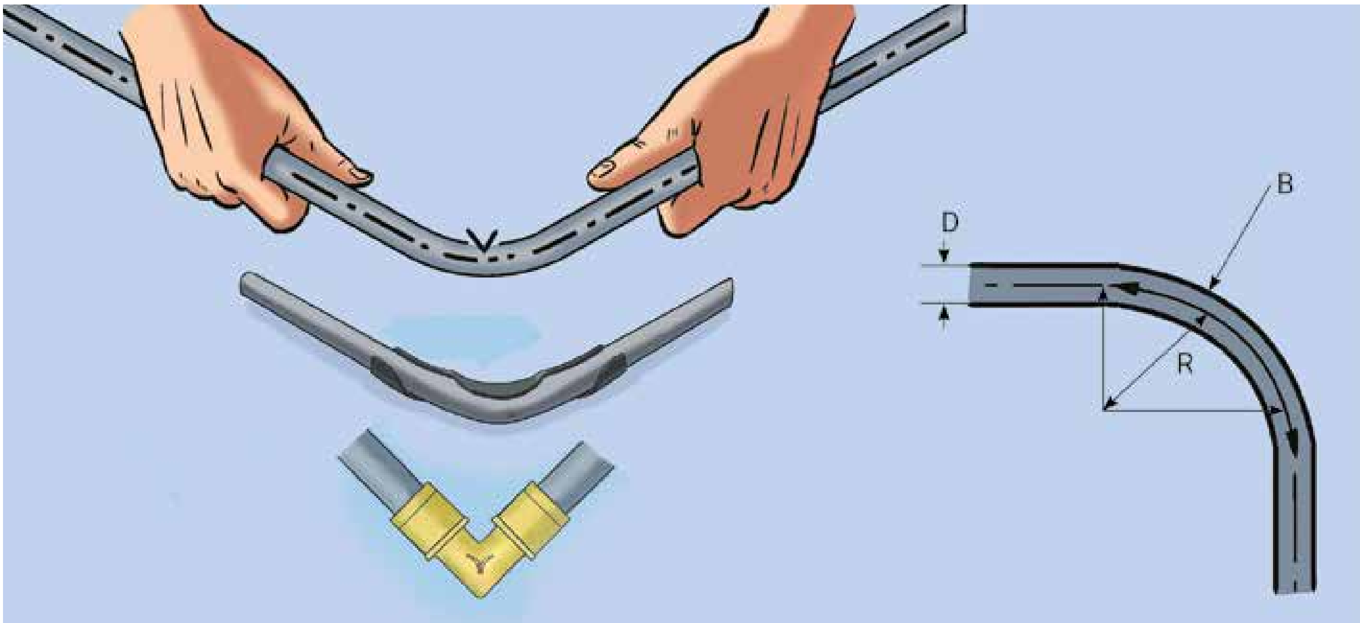
To arrange the fixed supports (fasteners), two sliding fasteners placed on both sides of the fitting are used. It is recommended that the fixed supports are spaced ≤6 m apart.



Pipe bend management

PRO AQUA PE-Xa and PRO AQUA PE-RT pipes can be bent:

- by bending the pipes by hand with a minimum radius of R = 8 x D;
- by bending the pipes by means of swing locks with a minimum radius of R = 5 x D;
- by using the axial fittings - angle pieces (for the SDR 7.4 pipes).



Minimum bend radius when bending by hand (R = 8 x D)

Pipe outer diameter D, mm	Bend radius R, mm	Bend length B, mm
16	128	201
20	160	251
25	200	314
32	256	402
40	320	503

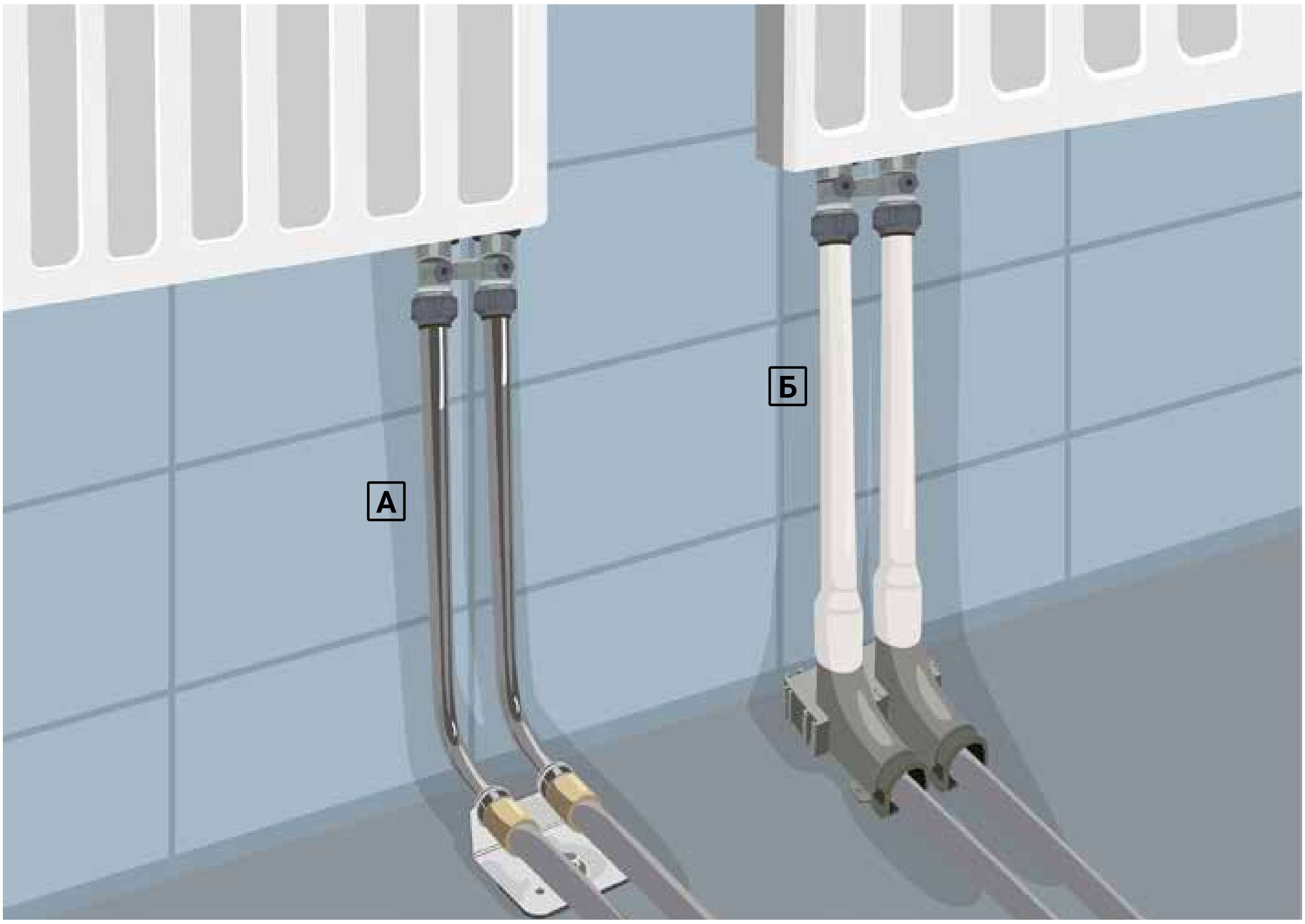
Minimum bend radius when using a swing lock (R = 5 x D)

Pipe outer diameter D, mm	Bend radius R, mm	Bend length B, mm
16	80	126
20	100	157
25	125	196
32	160	251
40	200	314

! When managing any bends, provision should be made for fixing pipes to building structures.

! Transmission of bending forces to the joints between pipes and fittings should be avoided.

! Bending PRO AQUA PE-Xa and PRO AQUA PE-RT pipes in hot condition (with a hot air gun) can damage the EVOH oxygen barrier layer. For PRO AQUA PE-Xa and PRO AQUA PE-RT pipes only cold bending is recommended (at an ambient temperature of at least +10°C, according to the current SP 41-109-2005).



Methods of connection to the radiator using: a - bracket for fixing L-shaped pipes, b - pipe swing lock "shoe"

Accessories

Pipe swing lock "shoe"

Code	For pipes
FXG.305.16.W	16-20

Pipe swing lock 90°

Code	For pipes
PA65000P	16
PA65020P	20

Pipe swing lock 45°

Code	For pipes
PA65000P45	16

Protective cover

Code	For pipes
FXG.300.16.W	16-20

Mounting plate

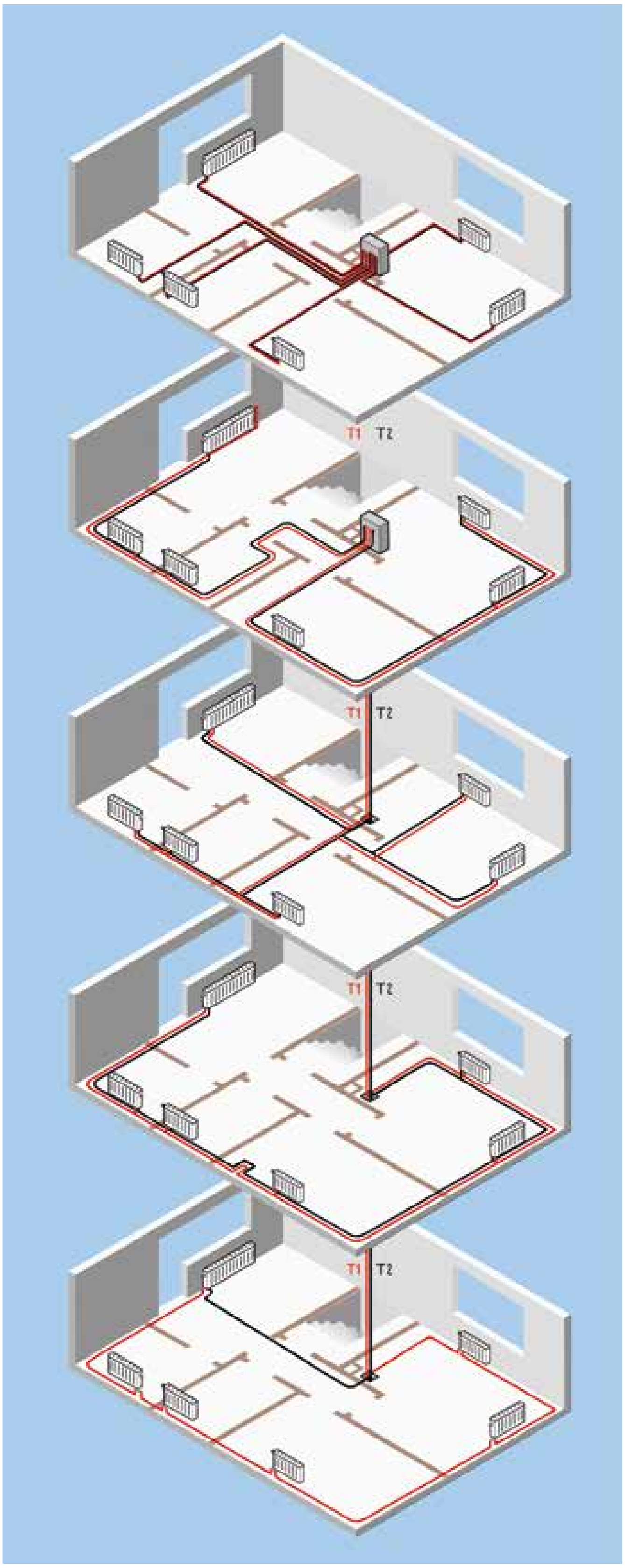
Code	For pipes
FXG.310.1620.S	16-20

Bracket for fixing L-shaped pipes

Code	For pipes
FXG.315.1625.S	16-20

Solutions in engineering systems

Radiator heating layout diagrams



1. Manifold radial layout

A two-pipe radial layout with separate supply lines to heaters between the supply and return manifolds. The advantage of this layout is the convenience of connecting/disconnecting and balancing the heaters. Also, this layout can be limited to one pipe size and no fittings.

2. Manifold perimeter layout

A two-pipe layout around the perimeter of room with connection of a group of heaters by means of a separate branch between the supply and return manifolds. Supply lines to the heaters are made by using tees. This is a combination of manifold and tee layouts. This layout will be convenient for connection of separate rooms/apartments in apartment buildings with individual heat metering.

3. Tee radial layout

A two-pipe radial layout with connection of heaters to standpipes through branches in the central part of room made with tees. It is a more economical version of the perimeter tee layout.

4. Perimeter tee layout

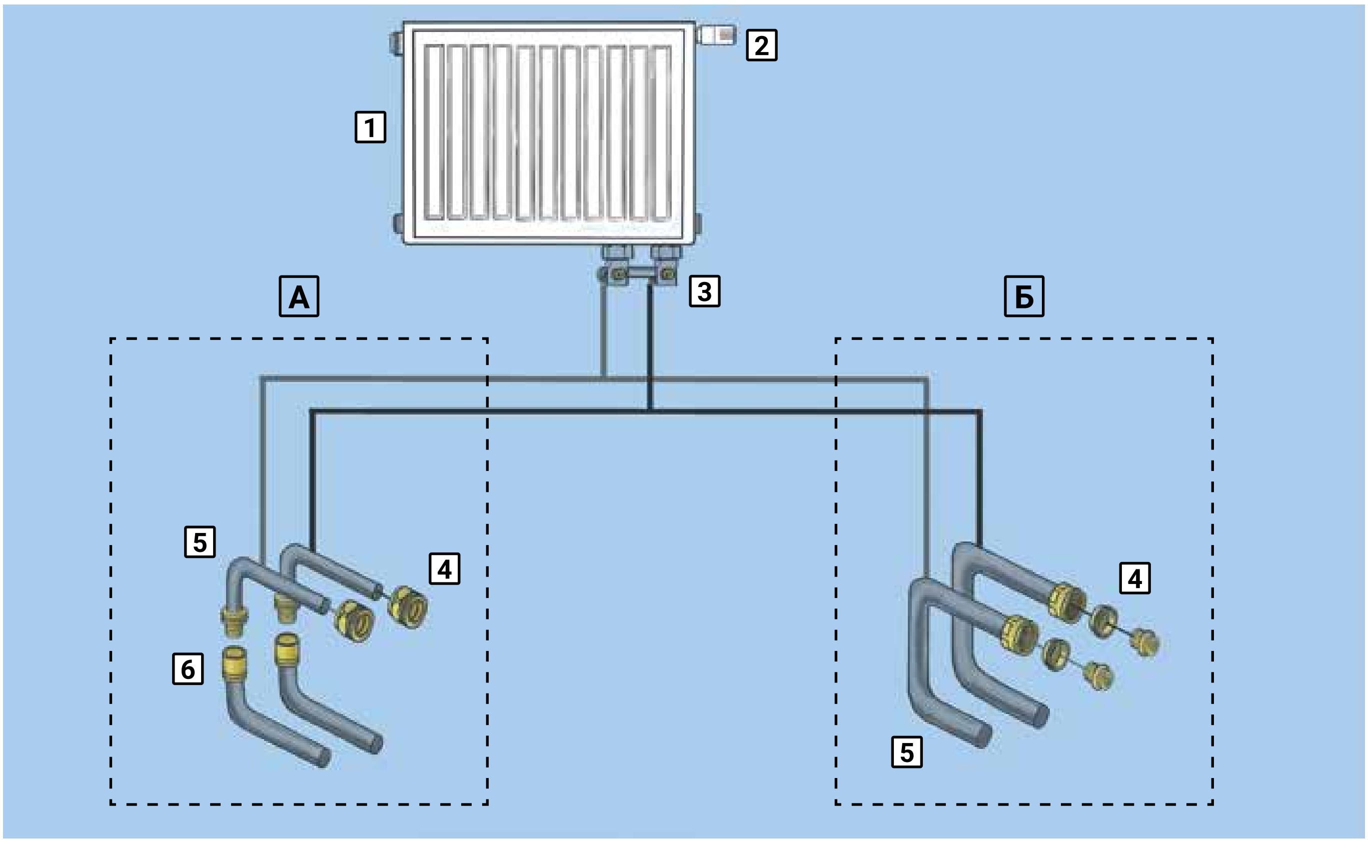
A two-pipe layout with connection of heaters to standpipes by a single branch laid around the perimeter of room. Supply lines to the heaters are made by using tees. This layout allows for both concealed and exposed (in base boards) pipe routing.

5. Single-pipe layout

A single-pipe layout with serial connection of heaters. The advantage of this layout is minimal cost, but there are difficulties with balancing the heaters and regulating their heat output. Also, the single-pipe systems are characterized by higher temperature, pressure and flow rate parameters.

Connection diagrams for heaters

Heater with bottom connection "from the wall"



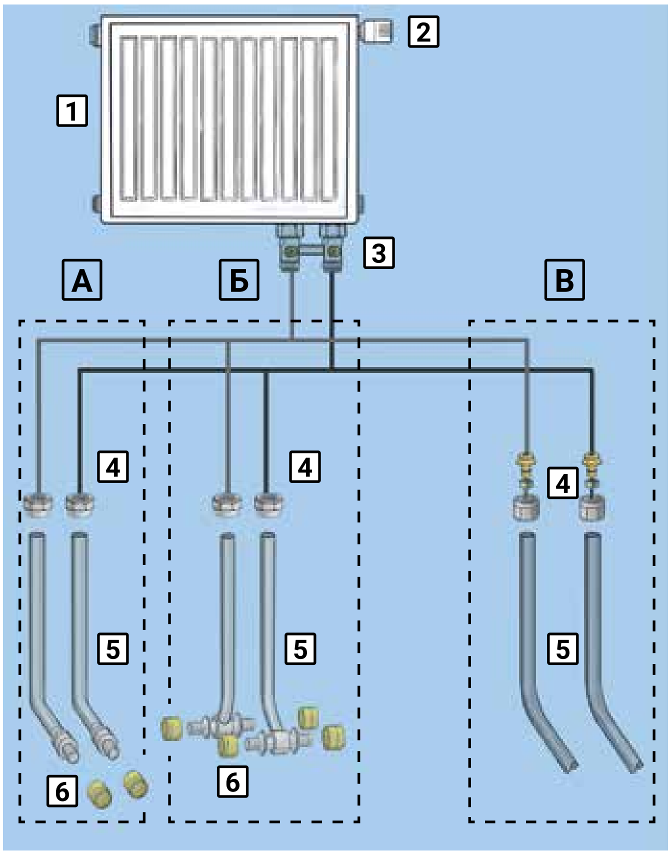
Specification A

№	Name	Item №	Qty
1	Steel panel radiator, bottom connection	-	1 pc
2	PRO AQUA thermal head, M30x1.5	INS1000TH	1 pc
3	PRO AQUA bottom connection unit, angle 1/2"x3/4" EK	INS201HVAX	1 pc
4	PRO AQUA radiator connection nut, 15x3/4" EK	AX415134	2 pc
5	L-shaped radiator connection pipe, 250x16	AX716250	2 pc
	Or 250x20	AX720250	
6	PRO AQUA 16 brass axial sleeve	AX10016ST	2 pc
	Or, D20	AX10020ST	

Specification B

№	Name	Item №	Qty
1	Steel panel radiator, bottom connection	-	1 pc
2	PRO AQUA thermal head, M30x1.5	INS1000TH	1 pc
3	PRO AQUA bottom connection unit, angle 1/2"x3/4" EK	INS201HVAX	1 pc
4	PRO AQUA brass Eurocone for pipe 16 x 2.2 (3/4" EK)	AX411622E	2 pc
	Or for pipe 20 x 2.8 (3/4" EK)	AX412028E	
5	PRO AQUA PE-Xa EVOH SDR 7.4 16x2.2 pipe	-	-
	Or 20x2.8	-	

Heater with bottom connection "from the floor"



Specification A

No.	Name	Item No.	Qty
1	Steel panel radiator, bottom connection	-	1 pc
2	PRO AQUA thermal head, M30x1.5	INS1000TH	1 pc
3	PRO AQUA bottom connection unit, straight 1/2"x3/4" EK	INS202HVSX	1 pc
4	PRO AQUA radiator connection nut, 15x3/4" EK	AX415134	2 pc
5	L-shaped radiator connection pipe, 250x16	AX716250	2 pc
	Or, 300x16	AX716300	
	Or, 500x16	AX716500	
	Or, 750x16	AX716750	
	Or, 1000x16	AX7161000	
	Or, 250x20	AX720250	
	Or, 300x20	AX720300	
	Or, 500x20	AX720500	
	Or, 750x20	AX720750	
	Or, 1000x20	AX7201000	
6	PRO AQUA Ø16 brass axial sleeve	AX10016ST	2 pc

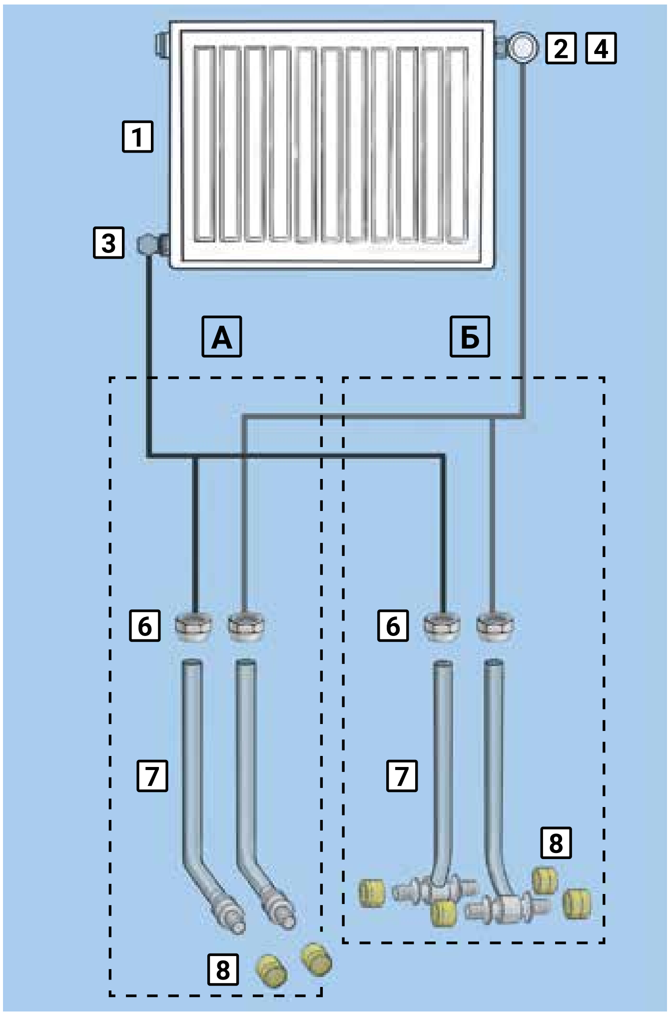
Specification B

No.	Name	Item No.	Qty
1	Steel panel radiator, bottom connection	-	1 pc
2	PRO AQUA thermal head, M30x1.5	INS1000TH	1 pc
3	PRO AQUA bottom connection unit, straight 1/2"x3/4" EK	INS202HVSX	1 pc
4	PRO AQUA radiator connection nut, 15x3/4" EK	AX415134	2 pc
5	T-shaped radiator connection pipe, 250x16	AX416250	2 pc
	Or, 300x16	AX416300	
	Or, 500x16	AX416500	
	Or, 750x16	AX416750	
	Or, 1000x16	AX4161000	
	Or, 250x20	AX420250	
	Or, 300x20	AX420300	
	Or, 500x20	AX420500	
	Or, 750x20	AX420750	
	Or, 1000x20	AX4201000	
6	PRO AQUA Ø16 brass axial sleeve	AX10016ST	4 pc
	Or, Ø20	AX10020ST	

Specification C

No.	Name	Item No.	Qty
1	Steel panel radiator, bottom connection	-	1 pc
2	PRO AQUA thermal head, M30x1.5	INS1000TH	1 pc
3	PRO AQUA bottom connection unit, straight 1/2"x3/4" EK	INS202HVSX	1 pc
4	PRO AQUA brass Eurocone for pipe 16 x 2.2 (3/4" EK)	AX411622E	2 pc
	Or for pipe 20 x 2.8 (3/4" EK)	AX412028E	
5	PRO AQUA PE-Xa EVOH SDR 7.4 16x2.2 pipe	-	-
	Or, 20x2,8	-	
6	Pipe swing lock D16	PA65000P	2 pc
	Or, D20	9-7100-020-00-08-10	

Heater with side connection "from the floor"



Specification A

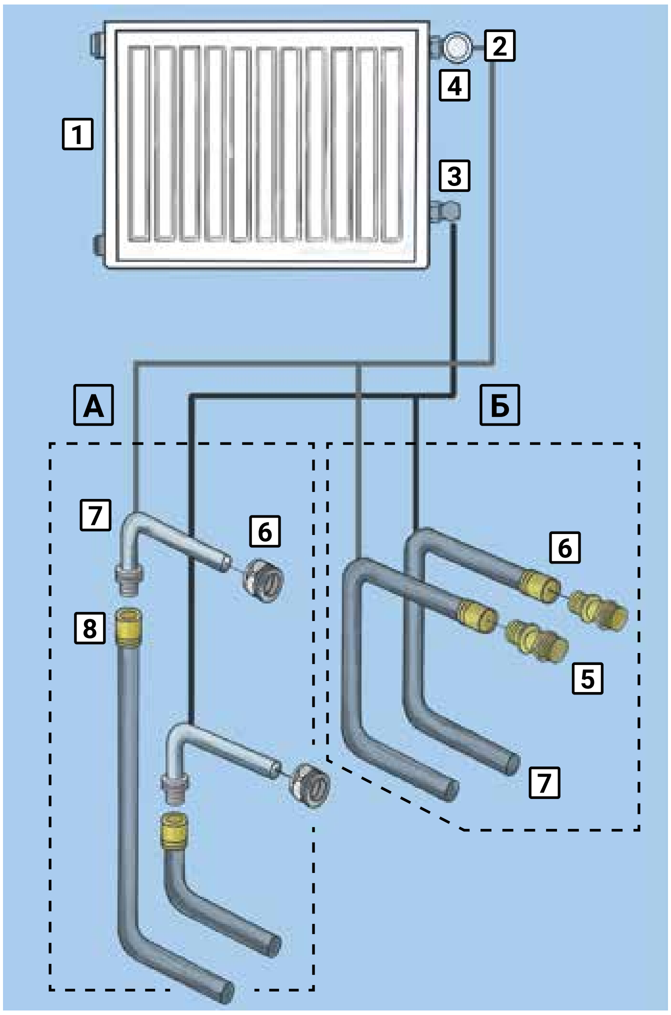
No.	Name	Item No.	Qty
1	Steel panel radiator, side connection	-	1 pc
2	PRO AQUA thermal head, M30x1.5	INS1000TH	1 pc
3	PRO AQUA 1/2" shut off control valve, angle	LVA-M15-F15X	1 pc
4	PRO AQUA 1/2" thermostatic valve, angle	INS101AT12X	1 pc
	PRO AQUA brass threaded angle piece, male-female thread, 1/2"	02-M15-F15X	2 pc
5	PRO AQUA brass threaded nipple for Eurocone, male thread 1/2" x 3/4" EK	21-M15-M20EX	2 pc
6	PRO AQUA radiator connection nut, 15x3/4" EK	AX415134	2 pc
7	L-shaped radiator connection pipe, 250x16	AX716250	2 pc
	Or, 300x16	AX716300	
	Or, 500x16	AX716500	
	Or, 750x16	AX716750	
	Or, 1000x16	AX7161000	
	Or, 250x20	AX720250	
	Or, 300x20	AX720300	
	Or, 500x20	AX720500	
	Or, 750x20	AX720750	
	Or, 1000x20	AX7201000	
8	PRO AQUA Ø16 brass axial sleeve	AX10016ST	2 pc
	Or, Ø20	AX10020ST	

Specification B

No.	Name	Item No.	Qty
1	Steel panel radiator, side connection	-	1 pc
2	PRO AQUA thermal head, M30x1.5	INS1000TH	1 pc
3	PRO AQUA 1/2" shut off control valve, angle	LVA-M15-F15X	1 pc
4	PRO AQUA 1/2" thermostatic valve, angle	INS101AT12X	1 pc
	Pro Aqua brass threaded angle piece, male-female thread, 1/2"	02-M15-F15X	2 pc
5	PRO AQUA brass threaded nipple for Eurocone, male thread 1/2" x 3/4" EK	21-M15-M20EX	2 pc
6	PRO AQUA radiator connection nut, 15x3/4" EK	AX415134	2 pc

No.	Name	Item No.	Qty
7	T-shaped radiator connection pipe, 250x16	AX716250	2 pc
	Or, 300x16	AX416300	
	Or, 500x16	AX416500	
	Or, 750x16	AX416750	
	Or, 1000x16	AX4161000	
	Or, 250x20	AX420250	
	Or, 300x20	AX420300	
	Or, 500x20	AX420500	
	Or, 750x20	AX420750	
	Or, 1000x20	AX4201000	
8	PRO AQUA 16 brass axial sleeve	AX10016ST	2 pc
	Or, 20	AX10020ST	

Heater with side connection "from the wall"



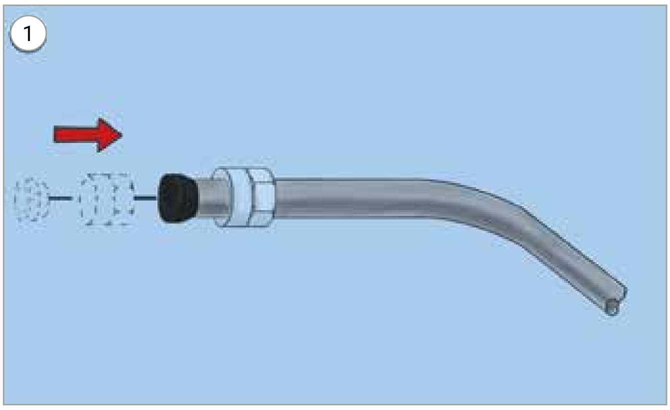
Specification A

No.	Name	Item No.	Qty
1	Steel panel radiator, side connection	-	1 pc
2	Pro Aqua thermal head, M30x1.5	INS1000TH	1 pc
3	Pro Aqua 1/2" shut off control valve, angle	LVA-M15-F15X	1 pc
4	PRO AQUA 1/2" thermostatic valve, angle	INS101AT12X	1 pc
5	Pro Aqua brass threaded nipple for Eurocone, male thread 1/2" x 3/4" EK	21-M15-M20EX	2 pc
6	Pro Aqua radiator connection nut, 15x3/4" EK	AX415134	2 pc
7	L-shaped radiator connection pipe, 250x16	AX716250	2 pc
	Or, 250x20	AX720250	
8	Pro Aqua 16 brass axial sleeve	AX10016ST	2 pc
	Or, 20	AX10020ST	

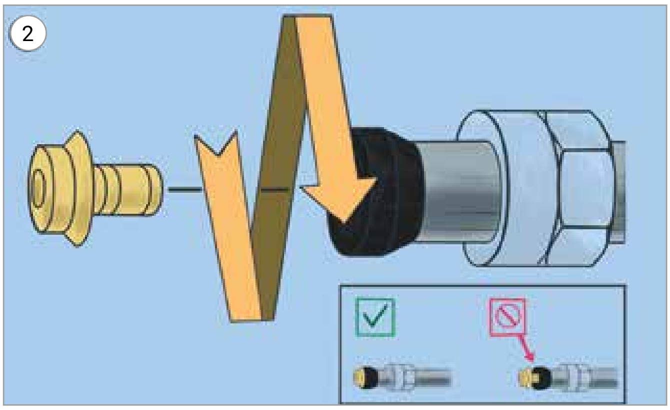
Specification B

No.	Name	Item No.	Qty
1	Steel panel radiator, side connection	-	1 pc
2	Pro Aqua thermal head, M30x1.5	INS1000TH	1 pc
3	Pro Aqua 1/2" shut off control valve, angle	LVA-M15-F15X	1 pc
4	PRO AQUA 1/2" thermostatic valve, angle	INS101AT12X	1 pc
5	Pro Aqua brass axial coupling with male thread, 16 x 1/2"	AX1701612	2 pc
	Or, 20 x 1/2"	AX1702012	
6	Pro Aqua 16 brass axial sleeve	AX10016ST	2 pc
	Or, 20	AX10020ST	
7	Pro Aqua PE-Xa EVOH SDR 7.4 16x2.2 pipe	-	-
	Or, 20x2,8	-	-

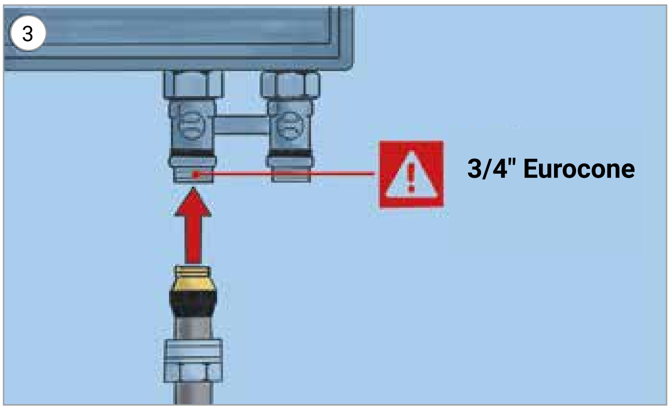
Installation of 3/4" Eurocone clamping adapters for Pro Aqua SDR 7.4 pipes



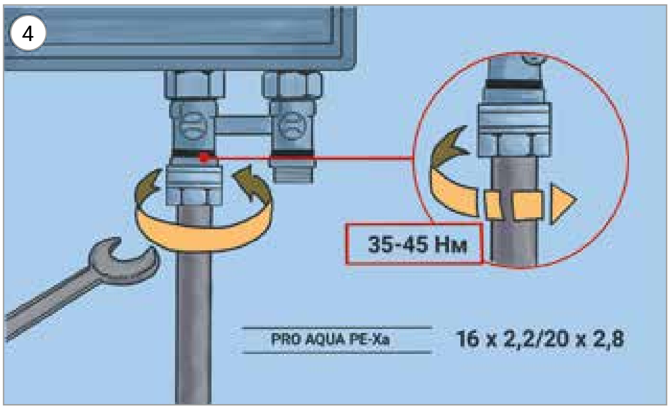
Place the fitting nut and then the fixing ring on the pipe.



Insert the fitting socket into the pipe, turning it clockwise until it stops.



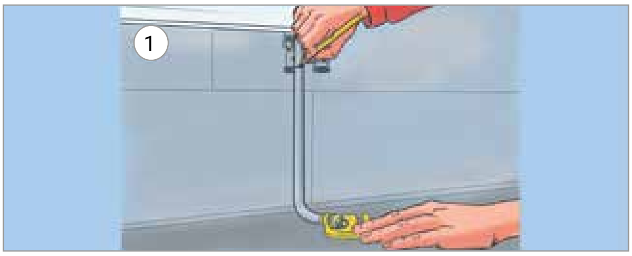
Ensure that the standard and size of the thread for which the connection is intended matches 3/4" Eurocone.



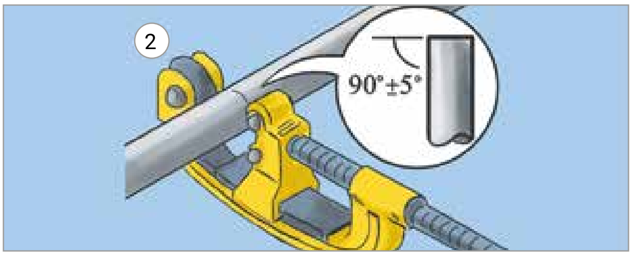
Tighten the fitting nut.

Axial twisting of the pipe when screwing in the fitting should be avoided. If the pipe is twisted, unscrew the fitting nut completely, return the pipe to its normal position and retighten the nut.

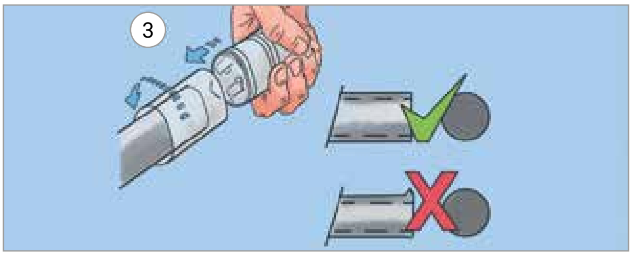
Installation of the clamping adapter for T- and L-pipes for connection of the radiator with 15 x 3/4" Eurocone



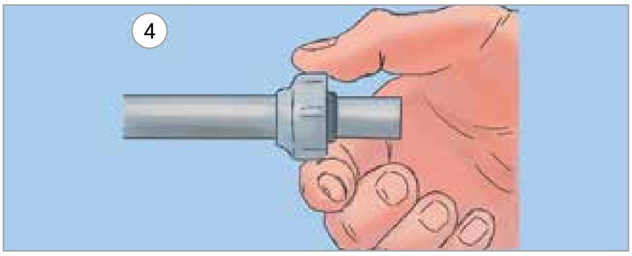
Measure the length of the connecting pipe, taking into account that the pipe must be inserted into Eurocone as far as it will go.



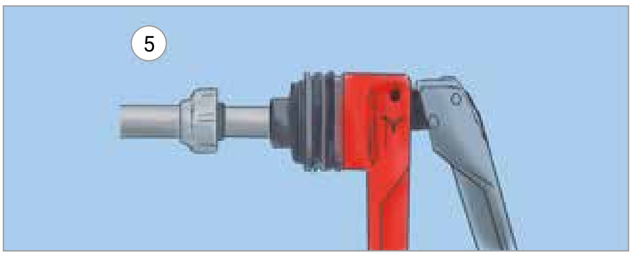
Cut the connecting pipe straight and at right angle.



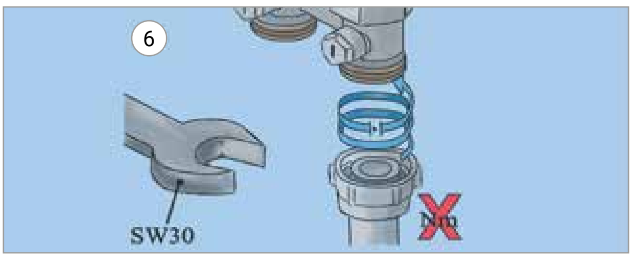
Remove any burrs.



Slide the threaded clamp connection onto the connecting pipe.



Insert the expansion attachment (size 15 x 1.0) inside the connecting pipe and make the beading.



Insert the connecting pipe all the way into Eurocone, fit and tighten the union nut.

When using the G 3/4"-15 threaded clamp connection, no tightening force is required because the threaded clamp connections are tightened all the way.

Surface heating

General provisions and features

A water underfloor heating system is an organized system of pipelines in the floor that converts different types of energy into heat in a controlled manner.

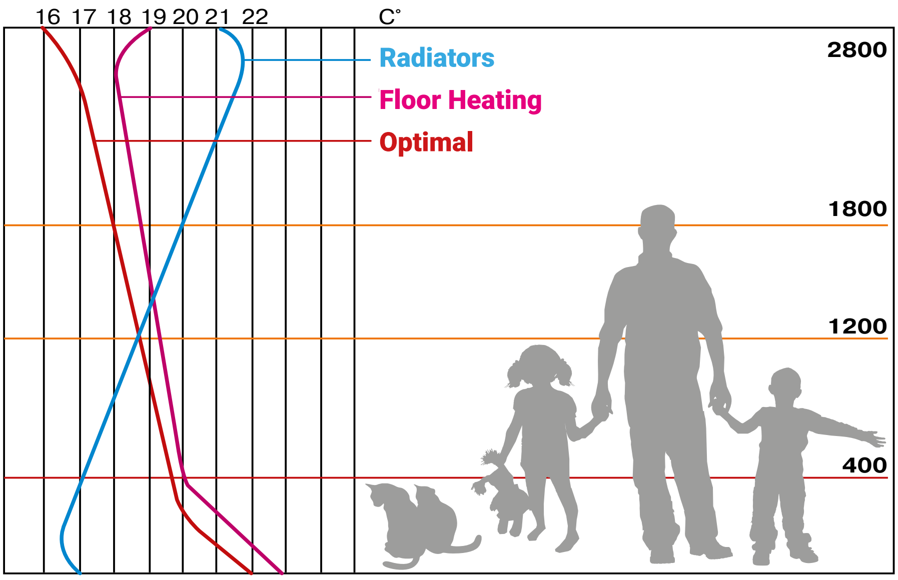
The advantages of the water underfloor heating, compared to the "classic" radiator heating:

- Energy efficiency. Since heat in a room with the water underfloor heating is distributed evenly from bottom to top, there is a vertical temperature distribution that is close to a perfect curve (see the heat distribution graph). Since there is no need to heat the upper layers of air, the heat losses through the upper parts of walls and through the upper ceilings are significantly reduced. In addition, the average temperature in the room is reduced by about 20°C, which in turn leads to 15-20% savings on heating the room. The use of various kinds of automation further increases the efficiency of the water underfloor heating system.
- Healthy, comfortable microclimate and complete safety. Heat is transferred in a room by means of thermal radiation. In contrast to the radiator heating, the convection component is minimal. There is no circulation of dust or currents of air. The low temperature of the floor surface prevents the room air from becoming too dry. At the same time, underfloor heating is safe, the risk of burn or injury is minimized.
- Aesthetics and versatility. Profitable use of space due to the absence of standpipes and visible heaters. Suitable for virtually any floor covering. It is possible to implement a variety of design ideas for your home.

The water underfloor heating also has its disadvantages (specifics):

- System cost. Generally, the cost of the underfloor heating system and the labor expense to install it will be somewhat higher than the cost of a radiator-only system.
- Delayed action. Due to long heating/cooling times, a temporary over-/under-capacity of heat output can occur when there is a large diurnal difference in atmospheric temperatures. This disadvantage disappears if a weather-dependent automation is installed in the system.
- Limitation of floor area as a heater. We can utilize a very specific usable floor area without going beyond the limitations of the system in terms of the temperature of the heat transfer medium in the pipe and the floor surface.
- All of these disadvantages can be completely avoided by competent design and professional installation.

Heat distribution graph (for a room with ceiling height 2.8 m)

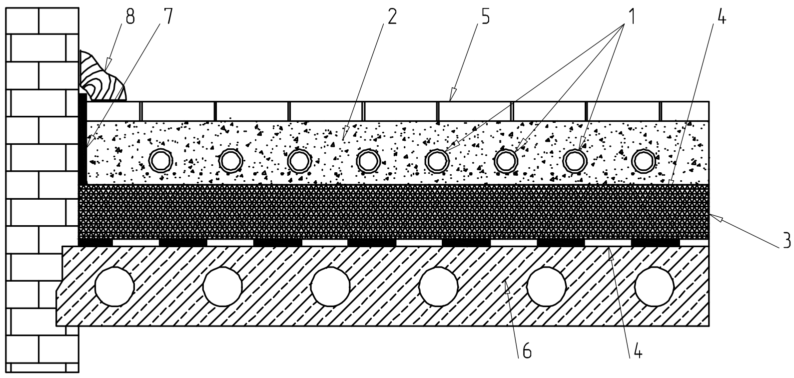


Methods of installing water underfloor heating

Two methods are commonly used for the installation of water underfloor heating:

- By means of sand-cement screed or "wet" method - monolithic slab of concrete or sand-cement mortar with pipelines embedded in it.

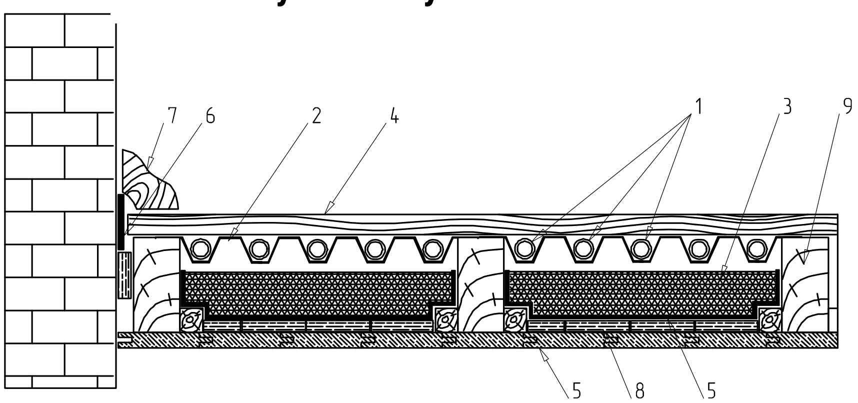
Layers of "wet" method



No.	Name
1	Underfloor heating pipes
2	Cement screed with plasticizer
3	Thermal insulation
4	Vapor barrier
5	Upper floor covering
6	Floor slab
7	Damping tape
8	Base board

- Underfloor heating on wooden floors or "dry" method - there is no screed in this case, and the heat distribution from pipelines is provided by metal heat distributing plates. This construction is used mainly in rooms with wooden floors to reduce the load on them.

Layers of "dry" method



No.	Name
1	Underfloor heating pipes
2	Reflector-distributor
3	Thermal
4	Upper floor covering
5	Finishing ceiling cladding
6	Damping tape
7	Base board
8	Floor panel
9	Joists

Screed requirements for wet method

As a rule, the screed is made of concrete or sand-cement mixture with addition of a special plasticizer. The plasticizer significantly increases the screed strength and reduces the risk of shrinkage cracks. Also, to avoid cracks it is necessary to use a layer of thermal insulation under the screed with a density of at least 40 kg/m3.

> **!** The screed thickness over the pipes must be at least 30 mm. Or 20 mm if there is an additional armor layer (reinforcing mesh) above the pipelines.

> **!** It is not recommended to install a screed layer of more than 10-15 cm, as a thick layer takes up a significant part of the heat, significantly reducing the efficiency factor, and the system becomes more inertial. This recommendation does not apply to industrial areas where the screed thickness is determined by many other factors and conditions.

Requirements for thermal insulation

When installing the water underfloor heating system, a thermal insulation layer under the pipelines ensures uniform heating over the entire area and minimizes heat losses down to the floor slabs.

Also, the thermal insulation layer must have a density of at least 40 kg/m3 in order to successfully absorb the loads from the upper floor structure.

! When calculating the thickness of the thermal insulation layer, care should be taken to ensure that heat losses downwards do not exceed 10-15% of the total heat flux of the underfloor heating.

Peculiarities of pipelines fastening

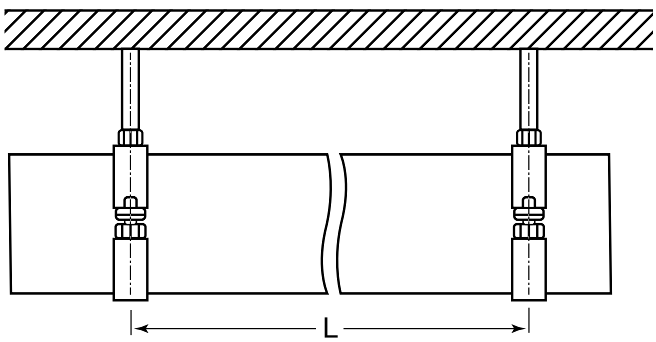
The most convenient and modern solution is thermal insulation boards with molded protrusions (locks) for fastening pipes. It is a ready-to-use thermal insulation system with high thermal resistance. Quick and reliable overlapping of the boards allows to form an integral thermal insulation layer in a short period of time in the "underfloor heating" construction with the subsequent arrangement of sand-cement screed. The pipes can be installed on the straight and on the diagonal without additional accessories, and different laying pitches can be used. The locks hold the pipe and prevent it from moving during the pouring of the cement screed.

The next fastening option is to fix the pipe to the reinforcing mesh using plastic clamps (ties). This option is used when the insulation boards do not have fixing protrusions.

Harpoon (anchor) brackets, which fix the pipe to the flat thermal insulation, are a quite convenient and interesting solution for fastening. The brackets are installed using a special mechanical tool - a tucker.

Important elements in the fastening system are swing locks, which are recommended to be installed at the places where pipes exit from the screed to connect to the manifold. The use of swing locks will protect the pipes from damage and also reduce the risk of cracking of the screed at the pipe outlets.

Maximum permissible distance between sliding fasteners:



Pipe outer diameter, mm	Maximum distance L between sliding supports for horizontal laying, m	Maximum distance L between sliding supports for vertical laying, mm
16	700	1000
20	700	1000
25	800	1200
32	900	1400
40	1000	1500

Buried laying

Installation of pipes in a protective corrugated casing

The installation of pipes in a protective corrugated casing is mainly used for buried pipe laying when using the manifold laying. This method of installation will reduce unwanted heat losses from the pipe, protect it from mechanical influences, and allow the pipe to be replaced without opening the floor or wall. If the pipe is laid in a casing, there is no need to take measures to compensate for thermal elongation. Compensation will occur due to the effect of "self-compensation", i.e. bending of the pipe in the casing space. In this case, the maximum elongation/contraction forces in the pipe should be considered.

- Sand-cement mixture and concrete should be avoided between the outer surface of the pipe and the inner surface of the casing.
- The spacing of the casing fasteners must not exceed 1 m.
- If necessary, the internal space between the pipe and the casing can be filled up with a standard silicone sealant at the places where the pipe exits the casing.
- The casing and the PEX pipe can be laid both together and separately. If the casing is laid first, check that the casing is not deformed before it is closed inside the building structures. In addition, make sure that the casing is properly secured before inserting the pipe into it.

Also, the thermal insulation layer must have a density of at least 40 kg/m3 in order to successfully absorb the loads from the upper floor structure.

!

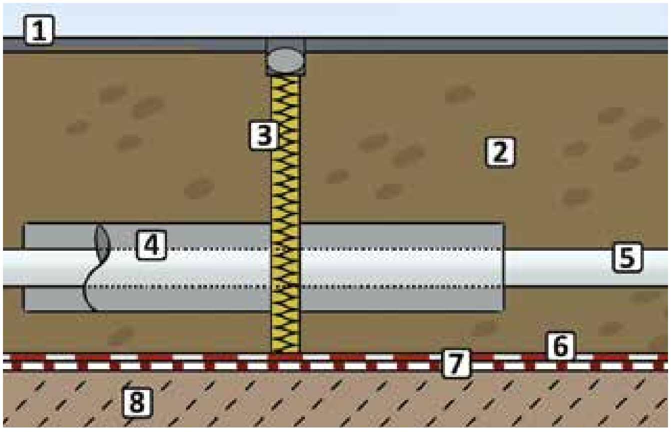
Pulling through and replacing the pipe in the protective corrugated casing

- It will be easier to insert the pipe into the casing if the end of the pipe is cut at a sharp angle.
- If it is difficult to insert the pipe into the casing, it is possible to insert the pipe using a wire previously threaded through the casing.
- To facilitate pulling out the pipe and pulling through a new one, it is recommended to make turning radii of the protective corrugated casing of at least 8 pipe diameters.
- When installing pipes in the casing, take care that concrete or mortar does not enter the pipe or casing.
- Removing an old pipe is easier if it is first softened by blowing warm air or running warm water.
- The installation of a new PEX pipe can be done at the same time as the removal of the old pipe by connecting the pipes together.

Installation of pipes embedded in sand-cement mortar or concrete

It is possible to lay the pipes in sand-cement mortar or concrete without additional insulation because the resulting expansion and contraction forces are very weak compared to, for example, steel pipes and do not lead to cracks in the mortar or concrete as a result of elongation. In this case, the maximum elongation/contraction forces in the pipe should be considered. Compensation will occur due to frictional (bonding) forces between the pipe wall and the concrete.

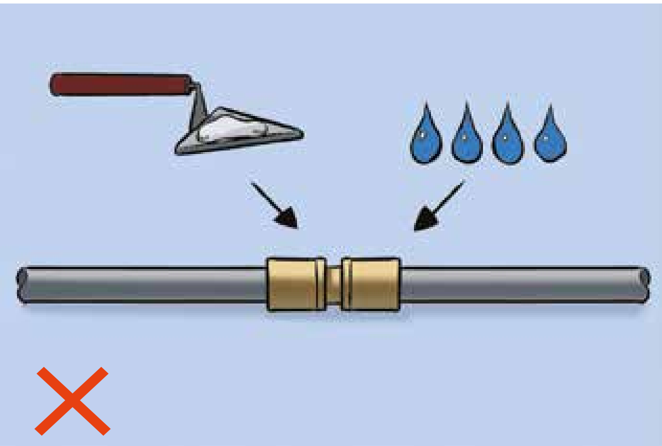
- The pipe should be secured in position before embedment, especially where the pipe exits from the wall or floor.
- Where the pipes are laid without additional insulation, high temperatures can occur on the floor surface, which can cause discomfort and adversely affect the floor covering. This should be taken into account during design and installation.
- Where the pipes cross the expansion joints of the concrete pour, a protective sleeve at least 400 mm long (200 mm on each side of the joint) must be installed. This option is also applicable to laying of the pipe in the casing or insulation where there is sufficient space to compensate for linear elongation.

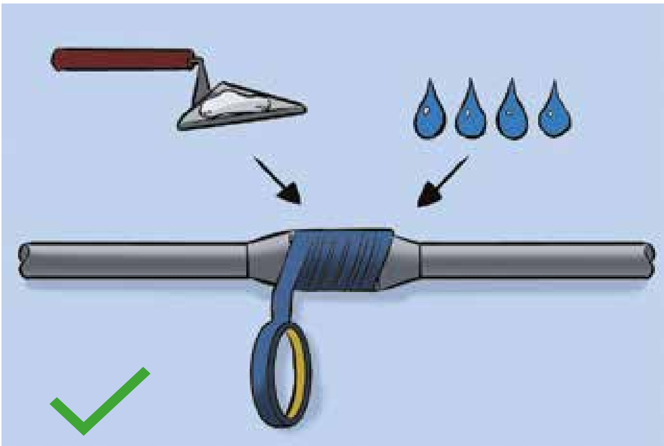


Design of expansion joint

1. Flooring
2. Screed
3. Damping tape
4. Protective casing
5. Pipe
6. Waterproofing
7. Additional waterproofing
8. Thermal insulation/base layer (reinforced concrete slabs)

Non-detachable connections of Pro Aqua PE-Xa and PE-RT pipes can be embedded into concrete, but the brass fittings should be protected from the alkaline medium of the concrete mixture, with pH ≥ 12.5 and wet conditions.
If the operating conditions of the fitting are not known, it is recommended to always protect the brass fittings against corrosion.





! Threaded connections **MUST NOT** be embedded in concrete/screed, otherwise manholes should be arranged where they are installed.

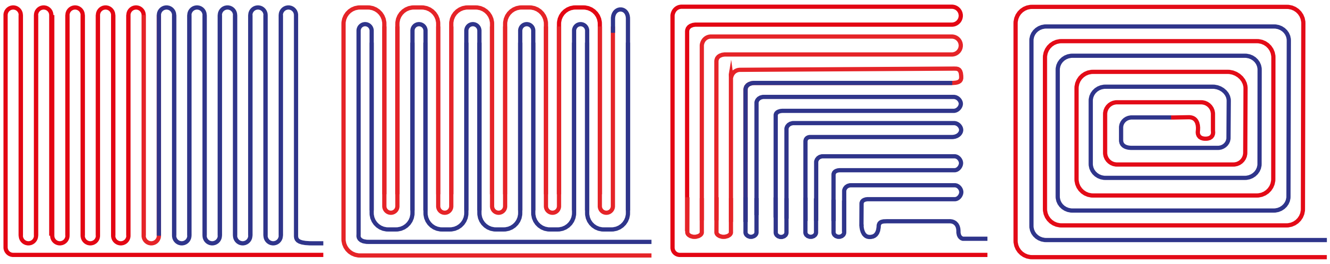
Types of laying of underfloor heating pipes

According to the principle of laying pipes, there are two most common methods: "snail" and "snake."

The laying method is selected based on a variety of factors, depending on the room shape, the desired heat output, the location of built-in furniture, building partitions, structures, etc. In most cases, however, the "snail" laying method will be the preferred option.

Compared to other methods, the "snail" has some advantages:

- The pipe flow rate for the same area is ≈ 10% less;
- Due to fewer pipe bends, the hydraulic losses are lower by ≈ 15%;
- Uniform heating-up of the floor over the entire room area.



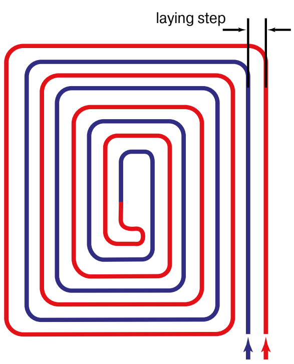
> **!** The "snake" laying method will be the best solution in case it is required to heat up areas of one room with different values. For example, the area near the window or street wall should be heated up more strongly, and you should start laying the pipe in a "snake" pattern on this side.

> **!** Regardless of the type of laying, it is recommended to lay the underfloor heating pipes in such a way that !the heat transfer medium flows to the coldest areas of the room (windows, exterior walls) first. Pipes are laid with a minimum 150 mm clearance from walls and partitions (usually by the size of the laying pitch).

> **!** To avoid high hydraulic resistance and difficulties in balancing the circuits, it is not recommended to use underfloor heating loops with lengths exceeding 80 meters for 16 x 2.0 pipes and 100 meters for 20 x 2.0 pipes.

The laying pitch of the underfloor heating loops and the diameter of the pipes depend directly on the required heat output and should be determined by thermotechnical and hydraulic calculations.

> **!** It is recommended not to assume the laying pitch of the loops to be less than 100 mm, as in practice it is difficult to implement due to the limited radius of the pipe bend, and a pitch of more than 300 mm is not recommended, as there is a noticeable unevenness of warming-up of the underfloor heating.

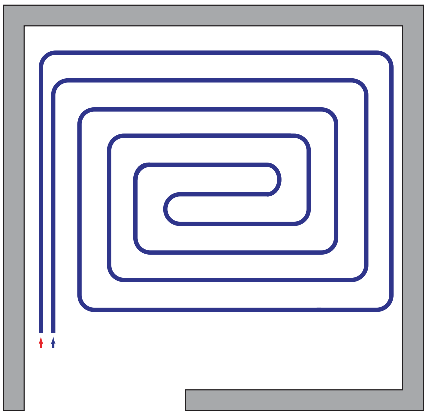


For convenience of calculations there is a table with pipe flow rate (in linear meters) depending on the laying pitch:

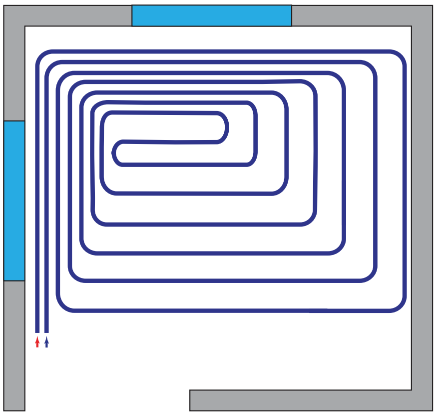
Laying pitch, mm	Pipe flow rate per 1 m2, l.m.
100	10
150	6,7
200	5
250	4
300	3,4

Arrangement of peripheral areas

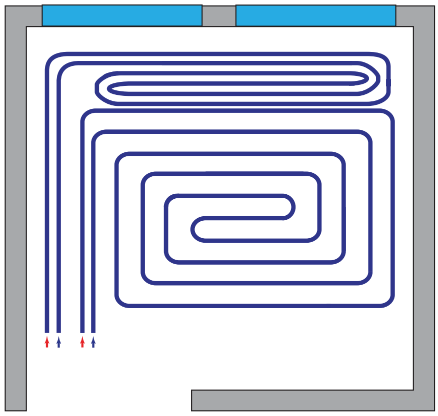
If the heat output of the underfloor heating is not sufficient to cover the heat losses of the room, the lack of heat output should be compensated for by arrangement of peripheral areas. These are sections with a reduced pipe laying pitch or sections with a separate loop, which have an increased surface temperature and are mainly installed along the exterior walls at a width of no more than 1 meter.



Loop without the peripheral area



Reduced pitch in the peripheral area



Separate loop in the peripheral area

The floor surface temperature in the peripheral areas must not exceed 31°C or the temperature for which the floor covering is designed.

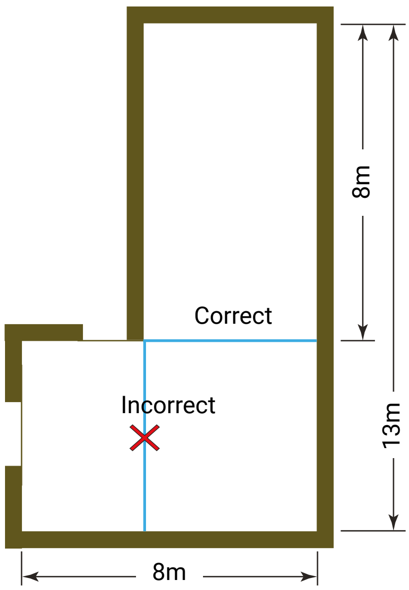
Expansion joints

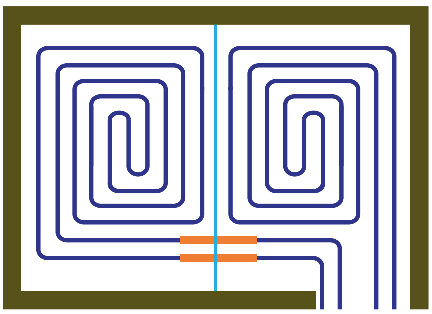
In case of "wet" arrangement of the underfloor heating, the expansion joints are made of elastic material, usually polyethylene foam damping tape. The damping tape thickness can generally be calculated using the formula:

B = 0,55 x L
where:

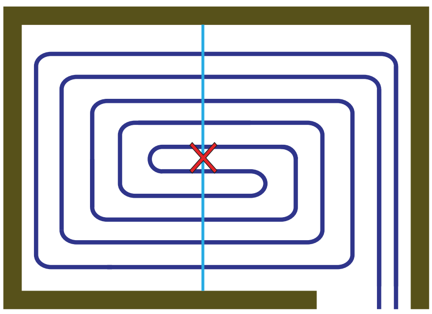
B - joint thickness in mm; L - room length in m.
The expansion joints should be used in the following locations: along walls and partitions (around the perimeter of the room);

- along walls and partitions (around the perimeter of room);
- if the total floor area is more than 40 m2;
- under doorways (if the underfloor heating loops are located on both sides of the doorway, the damping tape should be installed in two layers);
- if one side of the room is longer than 8 m (elongated corridor);
- if there are internal corners in the room.





Correct



Incorrect

Distribution units for water heating systems

Purpose and scope of application

The assemblies are used in the water heating systems for distribution and metering (if a heat meter is installed) of heat energy by individual consumers.
The assembly allows to make hydraulic integration of consumers with each other.
The assemblies allow to automatically maintain the pressure differential at the inlet and outlet of the apartment heating system, thus hydraulically integrating the operation of the assembly with other elements of the building heating system.
The assemblies allow to perform service operations: air discharge, heat transfer medium cleaning, drainage and system filling.
The assemblies are connected to the standpipes of the building heating system. Horizontal apartment one-pipe and two-pipe heating systems are connected to the assemblies outputs.

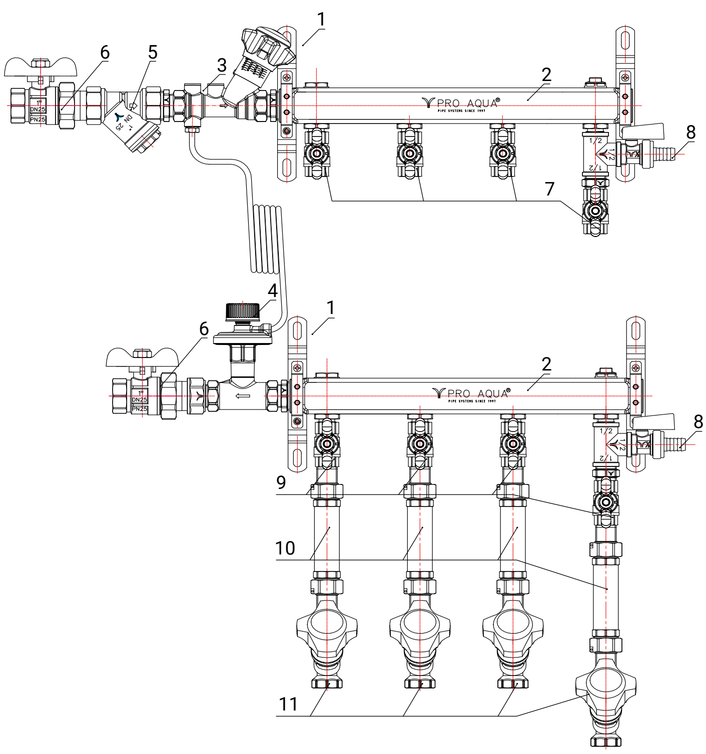
Specifications

№	Characteristic	Unit of measurement	Value
1	Operating pressure	bar	10
2	Test pressure	bar	15
3	Maximum operating temperature	°C	95
4	Number of pipe bends on manifolds	pcs	2÷8
5	Supported differential pressure range	kPa	5-30
6	Center-to-center distance between manifold pipe bends	mm	100
7	Operating medium		Water
8	Manifold material		Stainless steel AISI 304
9	Manifold diameter	mm	40, 50

Code

Distribution units for water heating systems PRO AQUA DN40-4R-20-ABV15/15-BV15-Air-HM		
Manifold diameter	40-50	
Number of pipe bends	2-8	
Connection side	R-L	Which side is the standpipe from the manifold
Diameter of connection to standpipes	20-32	Diameter of taps and a filter at the lead-in, 1 gauge larger than the balancing diameter
Diameter of balancing pair (Automatic balancing valves)	15/15-25/25	Assembly type: ABV - with automatic balancing at the lead-in; MBV - with manual balancing at the lead-in. When there is no partner valve, the balancing valve diameter is indicated.
Diameter of balancing valves at pipe bends (Balancing valves)	15	Pipe bend type: BV - with manual balancing valves; RV - with shut-off control (radiator) valves. In case of an irregular assembly with pipe bends of different diameters, the diameters are indicated from left to right - 15/20/15/20/20.
Air vent	Air	By default the assemblies are supplied with manual air vents, if automatic air vents are used - Airvernt is added at the end of the nomenclature.
Heat meters	HM	If the assembly is equipped with heat meters, HM is added at the end of the nomenclature.

Design



No.	Name	Quantity
1	Pair of high brackets for manifolds	2
2	Stainless steel manifold	2
3	Static balancing valve	1
4	Automatic balancing valve	1
5	Strainer	1
6	Full bore ball valve with a union	2
7	Full bore ball valve	(number of pipe bends)
8	Drain ball valve with a hose nozzle	2
9	Full bore ball valve for connecting a temperature sensor	(number of pipe bends)
10	Repair insert for a heat meter	(number of pipe bends)
11	Static balancing valve	(number of pipe bends)

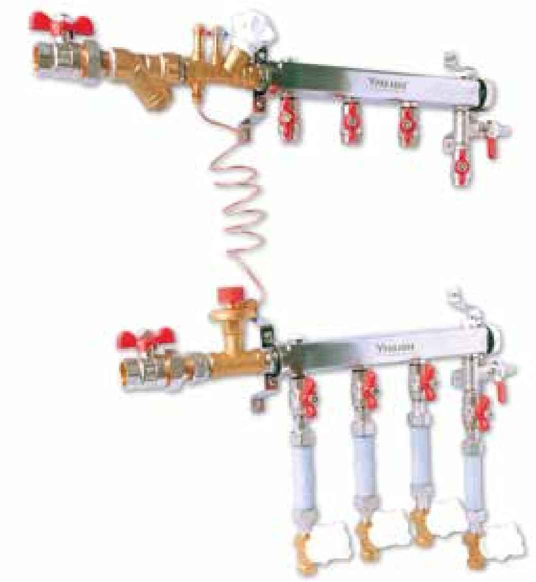
Design options for Distribution units for water heating systems

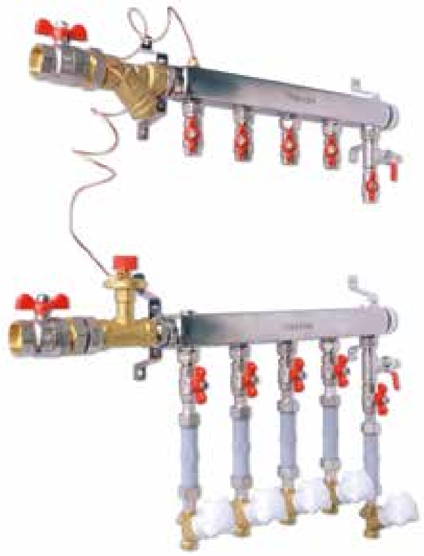
Distribution units for water heating systems with balancing valves on pipe bends

- Connecting the impulse tube to the partner valve;
- Manual balancing valves on the pipe bends;
- From 2-8 pipe bends with the manifold DN 40;
- From 3-8 pipe bends with the manifold DN 50.

With the partner valve, the following can be done:

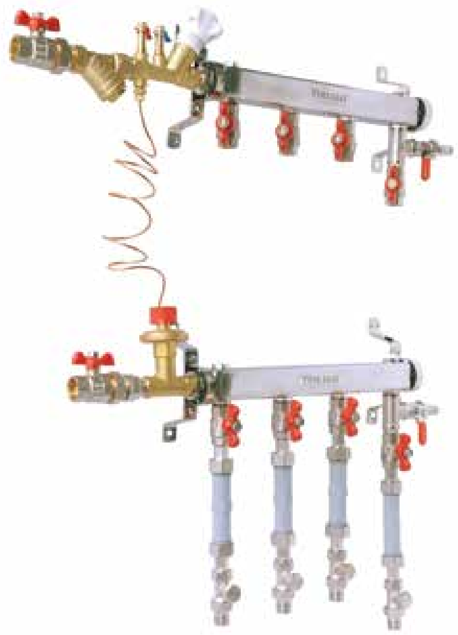
- Measurement of the current flow rate per storey;
- Measurement of the current differential, the differential pressure maintained by the differential pressure regulator - diagnostics of its correct operation;
- Flow rate limitation at a stage when the thermostatic valves settings have not yet been adjusted.

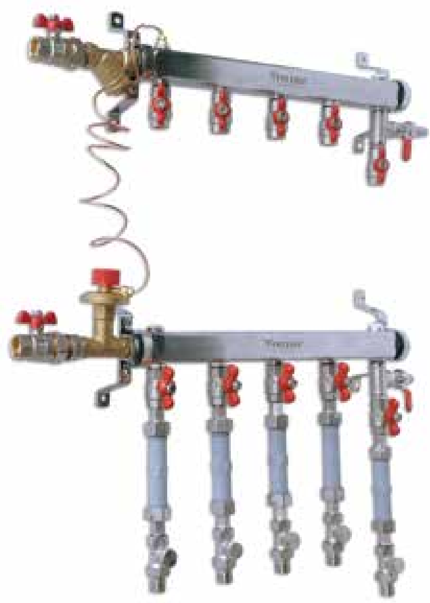




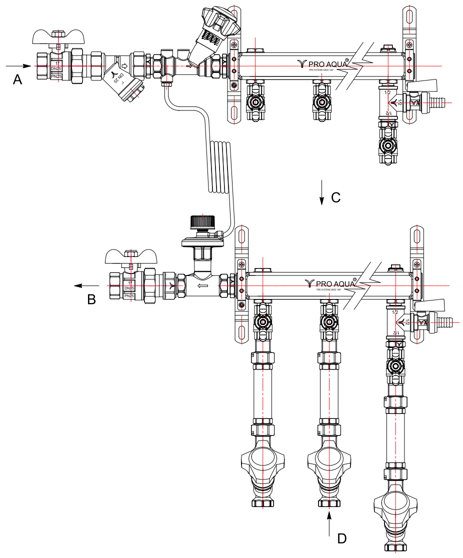
Distribution units for water heating systems with shut off control valves on pipe bends

- Connecting the impulse tube to the manifold;
- Manual shut off control valves on the pipe bends.
- From 2-8 pipe bends with the manifold DN 40;
- From 3-8 pipe bends with the manifold DN 50.





Hydraulic characteristics



№	Characteristic	Value for assembly with DN connection		
		20mm	25mm	32m
1	Assembly throughput capacity in the A-B line (manifolds, supply and return nozzles);	1,55	2,4	4,15
2	Assembly throughput capacityin the C-D line (a pipe bend with an insert); Kvs m³/hour	2,1	2,1	2,1
3	Partner valve throughput capacity;	2,7	5,5	7

For presetting, use the diagram to determine a setting value for the required flow rate Q as a function of the differential pressure Δp for the respective valve size.

In order to set a flow rate design value, it is necessary to use pressure losses vs. flow rate diagrams.

Calculation diagram of the balancing valve presetting in the C-D line

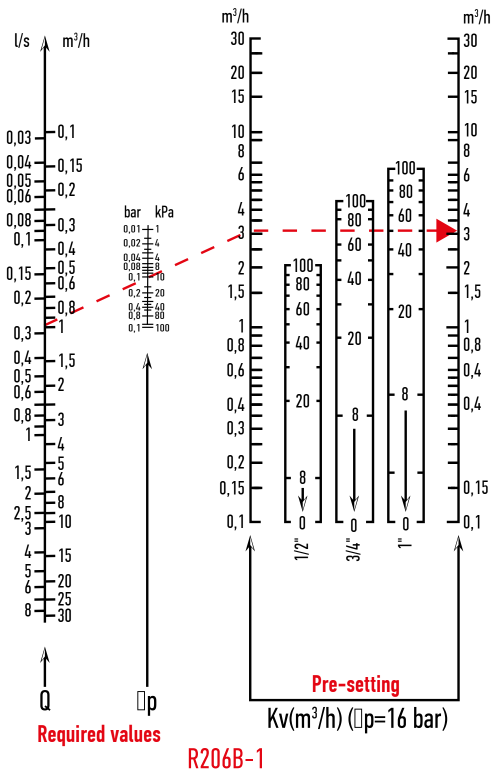
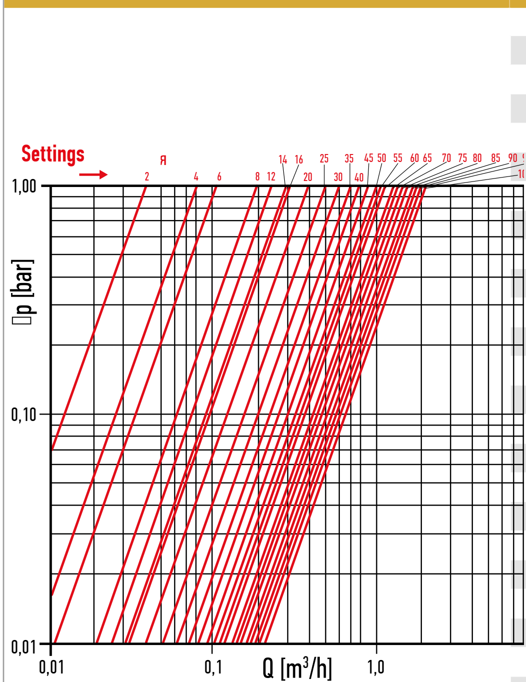


Diagram of pressure losses vs. flow rate in the C-D line with the pipe bend DN 15 when a repair insert is installed



Installation positions	Kv
100	2,10
95	2,00
90	1,85
85	1,75
80	1,65
75	1,55
70	1,45
65	1,35
60	1,25
55	1,15
50	1,05
45	0,94
40	0,83
35	0,73
30	0,62
25	0,52
20	0,42
16	0,33
14	0,29
12	0,25
8	0,17
6	0,12
4	0,08
2	0,04

Presetting calculation diagram for a partner valve

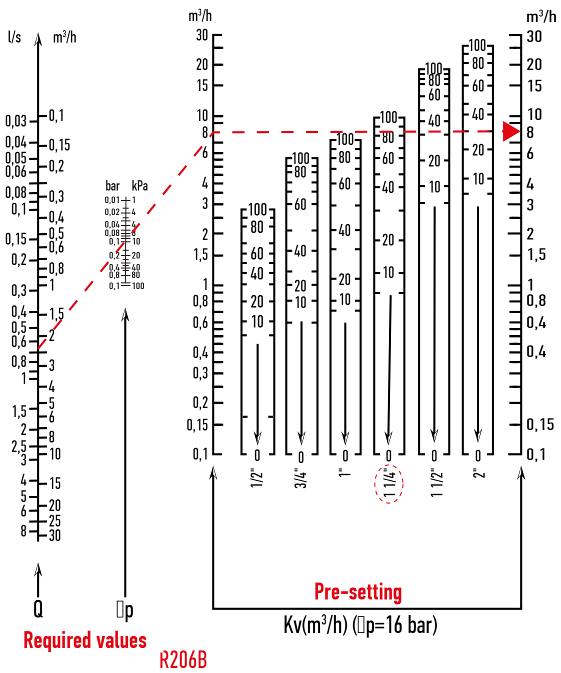
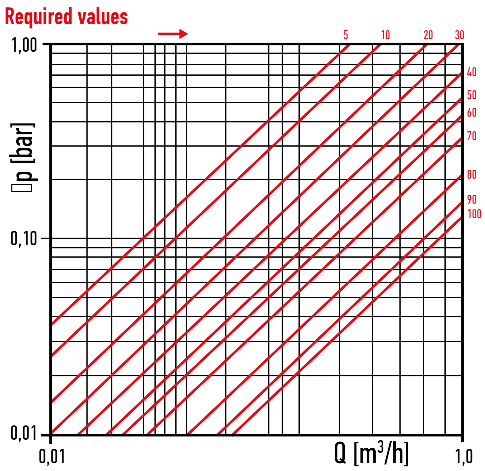
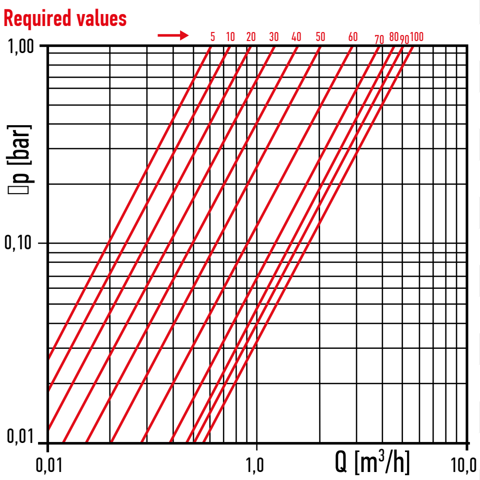


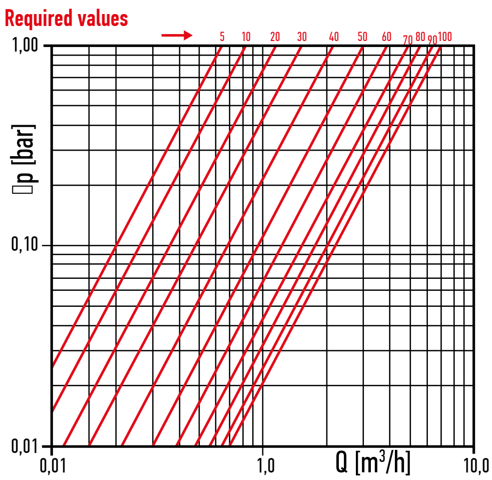
Diagram of pressure losses vs. flow rate for a partner valve



R206B 1/2" Installation positions	Kv
100	2,70
95	2,54
90	2,48
85	2,34
80	2,18
75	1,99
70	1,71
65	1,59
60	1,48
55	1,41
50	1,33
45	1,28
40	1,19
35	1,09
30	0,98
25	0,92
20	0,83
15	0,73
10	0,63
5	0,53



R206B 3/4" Installation positions	Kv
100	5,50
95	5,20
90	5,00
85	4,80
80	4,57
75	4,35
70	3,95
65	3,50
60	2,88
55	2,37
50	2,00
45	1,81
40	1,58
35	1,39
30	1,24
25	1,10
20	0,96
15	0,85
10	0,75
5	0,62

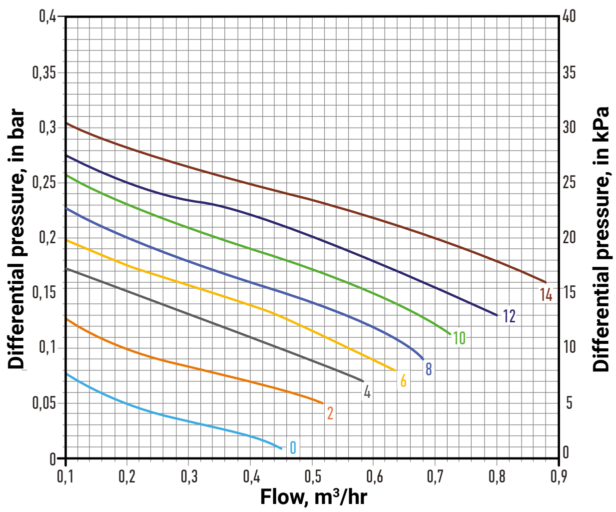


R206B 1" Installation positions	Kv
100	7,00
95	6,59
90	6,25
85	5,95
80	4,49
75	5,03
70	4,86
65	4,29
60	3,89
55	3,32
50	2,92
45	2,50
40	2,14
35	1,81
30	1,47
25	1,37
20	1,14
15	0,98
10	0,83
5	0,64

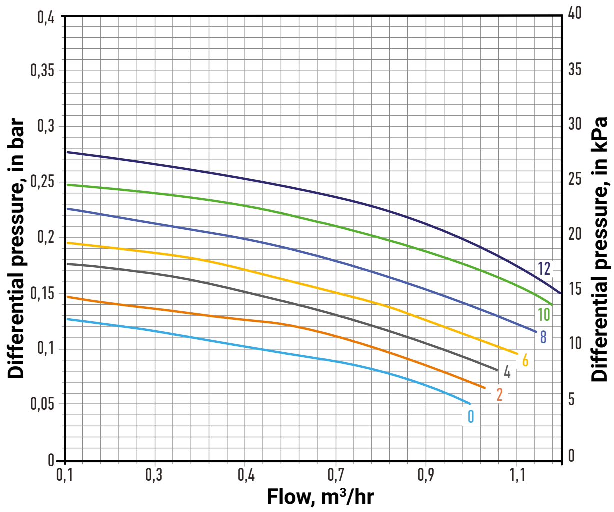
Use the diagrams and setting tables to set the required differential pressure.

Number of turns of the key clockwise (from a fully open position)	R206CY203		R206CY204		R206CY205	
	Q_{min} m³/ hour	Q_{max} m³/ hour	Q_{min} m³/ hour	Q_{max} m³/ hour	Q_{min} m³/ hour	Q_{max} m³/ hour
0	0,05	0,45	0,1	1	0,1	1,2
2	0,05	0,52	0,1	1,03	0,1	1,25
4	0,05	0,58	0,1	1,06	0,1	1,3
6	0,05	0,64	0,1	1,1	0,1	1,4
8	0,05	0,68	0,1	1,15	0,1	1,46
10	0,05	0,73	0,1	1,18	0,1	1,55
12	0,05	0,8	0,1	1,2	0,1	1,6
14	0,05	0,8				

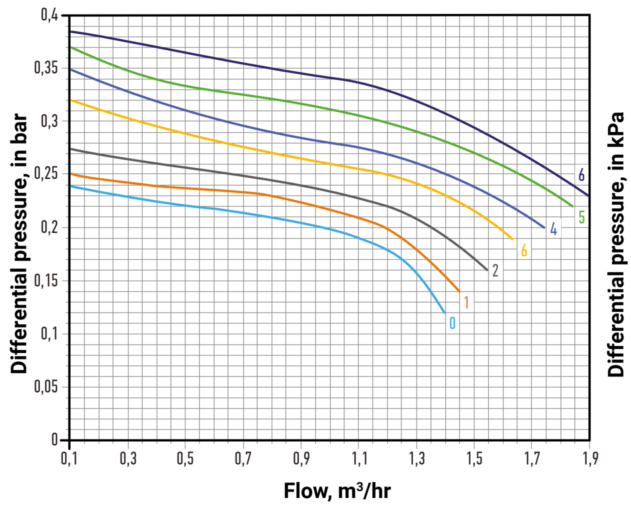
R206CY203



R206CY204



R206CY205



Installation

The assembly connecting nozzles should not be subjected to loads from the pipeline (bending, compression, stretching, torsion, skewing, vibration). The misalignment of connected pipelines should not exceed 3 mm for lengths up to 1 m plus 1 mm for each subsequent meter.

The assembly should be installed in a location accessible for maintenance so that the heat meter dial is 1.3-1.6 m above the floor.

The assembly is filled with the heat transfer medium through the supply pipeline. Filling the system through the return pipeline may cause clogging of the heat meters. When filling the storey system with the heat transfer medium, open the ball valve on the supply manifold smoothly, then open the air vent on the supply manifold and keep it open until all the air is discharged from the manifold. Then all air vents installed on radiators on the storey shall be opened one by one and the radiators are vented. Next, the return manifold air vent is opened and the system is finally vented. After this operation, open the tap on the return manifold.

After the system has been filled with the heat transfer medium, the shut-off control valve and differential pressure regulators, as well as the balancing and adjustment valves on the apartment pipe bends, are adjusted to the design throughput capacity and differential pressure.

When installing the assembly, the requirements of SP 73.13330.2016 should be observed.

Operating and maintenance instructions

- The assembly should be operated under the conditions outlined in the specification table.
- All elements of the assembly are maintained in accordance with the instructions in the data sheets for these products.
- For maintenance, replacement and installation of the heat meter,
- this assembly is provided with fittings for emptying manifolds and air discharge.
- The ball valves of the assembly should be fully opened and closed at least once every six months.
- In order to clean the filter it is necessary to close the inlet cock and the cocks on all nozzles, empty the manifold with the filter through the drain cock, then unscrew the filter plug and clean the mesh. In case of severe clogging, the filter element should be replaced.
- Do not allow the heat transfer medium to freeze inside the assembly.

Pipes

PRO AQUA
AquaHeat PE-Xa

AquaHeat PE-Xa pipe with EVOH SDR 7.4, silver

De x S, mm	Meters per package	Item No.
16 x 2,2	120 м	PXA.04.06.120.S
16 x 2,2	240 м	PXA.04.06.240.S
16 x 2,2	500 м	PXA.04.06.500.S
20 x 2,8	120 м	PXA.04.08.120.S
25 x 3,5	50 м	PXA.04.10.050.S
32 x 4,4	50 м	PXA.04.12.050.S
40 x 5,5	50 м	PXA.04.14.050.S

PRO AQUA
AquaFloor PE-Xa

AquaFloor PE-Xa pipe with EVOH S3.5/S4.5, red

De x S, mm	Meters per package	Item No.
16 x 2,0	100 м	PXA.03.06.100.R
16 x 2,0	200 м	PXA.03.06.200.R
16 x 2,0	500 м	PXA.03.06.500.R
20 x 2,0	100 м	PXA.03.08.100.R
20 x 2,0	200 м	PXA.03.08.200.R

PRO AQUA
AquaHeat PE-RT

AquaHeat PE-RT five-layer pipe with EVOH SDR 7.4, violet

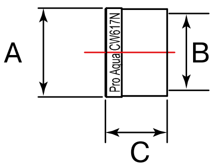
De x S, mm	Meters per package	Item No.
16 x 2,2	100 м	PERT5S7416100
16 x 2,2	200 м	PERT5S7416200
16 x 2,2	300 м	PERT5S7416300
16 x 2,2	600 м	PERT5S7416600
20 x 2,8	100 м	PERT5S7420100
20 x 2,8	200 м	PERT5S7420200
25 x 3,5	50 м	PERT5S7425050
25 x 3,5	100 м	PERT5S7425100
32 x 4,4	50 м	PERT5S7432050
40 x 5,5	50 м	PERT5S7440050

PRO AQUA
AquaTech PE-RT

AquaTech PE-RT SDR 7.4 single-layer pipe, white

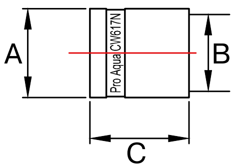
De x S, mm	Meters per package	Item No.
16 x 2,2	100 м	PERT1S7416100
16 x 2,2	200 м	PERT1S7416200
16 x 2,2	300 м	PERT1S7416300
16 x 2,2	600 м	PERT1S7416600
20 x 2,8	100 м	PERT1S7420100
20 x 2,8	200 м	PERT1S7420200
25 x 3,5	50 м	PERT1S7425050
25 x 3,5	100 м	PERT1S7425100
32 x 4,4	50 м	PERT1S7432050

Fittings



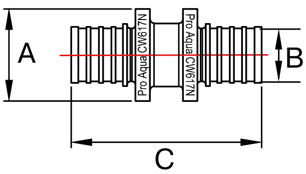
Sleeve

Dimensions	A, mm	B, mm	C, mm	Item No.
16	21,5	16,8	15	AX10016
20	25	20,8	18	AX10020



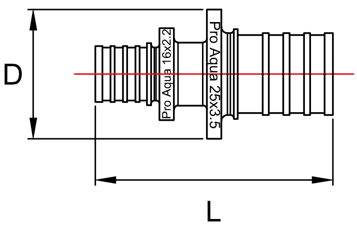
Sleeve

Dimensions	A, mm	B, mm	C, mm	Item No.
16	21,5	16,8	24	AX10016ST
20	25	20,8	25	AX10020ST
25	30,5	25,5	27,5	AX10025
32	39	32,8	34	AX10032
40	48,7	41,5	37	AX10040



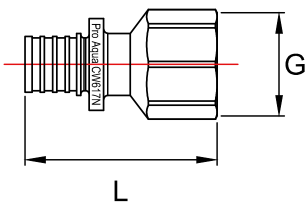
Coupling

Dimensions	A, mm	B, mm	C, mm	Item No.
16 x 16	21,5	10	44	AX11016
20 x 20	26	12,5	53,5	AX11020
25 x 25	31	15	68	AX11025
32 x 32	39,5	20	82,5	AX11032
40 x 40	48,6	23,5	91	AX11040



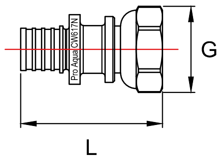
Reducing coupling

Dimensions	D, mm	L, mm	Item No.
16 x 20	22/25,6	48	AX101620
25 x 16	22/31	56,5	AX102516
25 x 20	26/31	66	AX102520
32 x 25	31,2 / 39,8	81	AX103225
32 x 40	39,8/48,6	91,8	AX103240



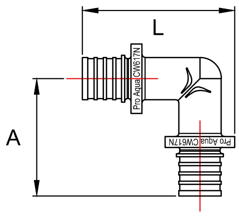
Coupling F

Dimensions	L, mm	G, mm	Item No.
16 x 1/2"	46,5	25	AX1801612
16 x 3/4"	42	30	AX1801634
20 x 1/2"	48,5	26	AX1802012
20 x 3/4"	54	34	AX1802034
25 x 3/4"	63	34	AX1802534
25 x 1"	64,5	40	AX1802501
32 x 1"	71	40	AX1803201



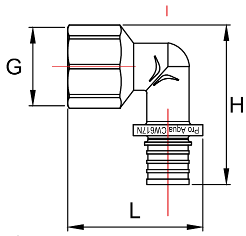
Coupling with union nut

Dimensions	G, mm	L, mm	Item No.
16 x 1/2"	26	31,5	AX6001612
16 x 3/4"	30	36	AX6001634
20 x 1/2"	26	35,5	AX6002012
20 x 3/4"	30	35,5	AX6002034
25 x 3/4"	30	43,5	AX6002534
32 x 1"	39	51	AX6003201



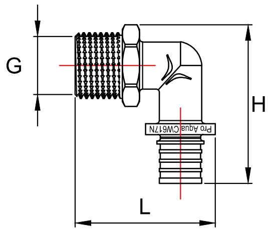
Elbow 90°

Dimensions	A, mm	L, mm	Item No.
16 x 16	37,5	44,3	AX3009016
20 x 20	44,5	53,8	AX3009020
25 x 25	55	65,8	AX3009025
32 x 32	65,2	79,2	AX3009032
40 x 40	72	88,5	AX3009040



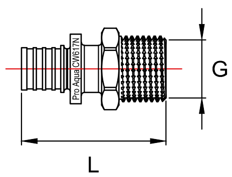
Elbow 90° with union nut

Dimensions	H, mm	L, mm	G, mm	Item No.
16 x 1/2"	53,8	35,3	26	AX3501612
16 x 3/4"	54,8	37,6	33	AX3501634
20 x 1/2"	58,3	58,3	26	AX3502012
20 x 3/4"	60	39,1	33	AX3502034
25 x 3/4"	69,5	42	33	AX3502534



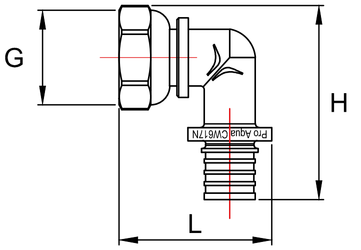
Elbow 90° M

Dimensions	H, mm	L, mm	G, mm	Item No.
16 x 1/2"	46	37,3	21	AX3301612
16 x 3/4"	50,3	37,3	26,4	AX3301634
20 x 1/2"	52,3	40,8	21	AX3302012
20 x 3/4"	55	42,3	26,4	AX3302034
25 x 3/4"	65,5	45	26,4	AX3302534
32 x 1"	79,2	56	33,2	AX3303201



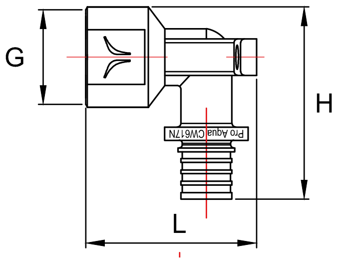
Coupling M

Dimensions	L, mm	G, mm	Item No.
16 x 1/2"	46	21	AX1701612
16 x 3/4"	47	26,4	AX1701634
20 x 1/2"	51	21	AX1702012
20 x 3/4"	52	26,4	AX1702034
25 x 1"	65	33,2	AX1702501
25 x 1/2"	61,7	21	AX1702512
25 x 3/4"	61	26,4	AX1702534
32 x 1"	71,5	33,2	AX1703201
32 x 3/4"	69,5	26,4	AX1703234
40x11/4"	82	40,9	AX17040114



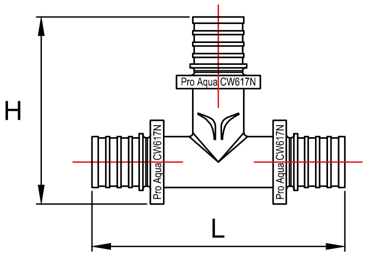
Elbow 90° with union nut

Dimensions	G, mm	H, mm	L, mm	Item No.
16 x 1/2"	26	45,8	28,8	AX3501612NG
20 x 1/2"	26	49,9	31,5	AX3502012NG
20 x 3/4"	30	52,3	36,3	AX3502034NG
25 x 3/4"	30	62	40,5	AX3502534NG



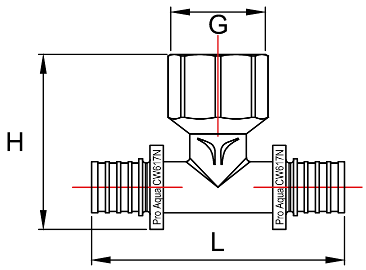
Long elbow with wall mount

Dimensions	L, mm	H, mm	G, mm	Item No.
16 x 1/2"	45,5	37	27	AX5001612
20 x 1/2"	53,25	47,5	27	AX5002012



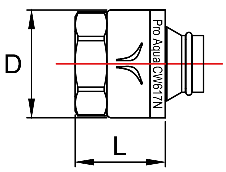
Tee

Dimensions	L, mm	H, mm	Item No.
16 x 16 x 16	67	45,3	AX20016
20 x 20 x 20	80	52,8	AX20020
25 x 25 x25	100	66	AX20025
32 x 32 x 32	119,4	79,4	AX20032



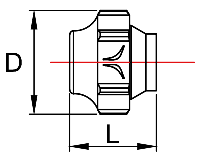
Tee F

Dimensions	L, mm	H, mm	G, mm	Item No.
16 x 1/2" x 16	80	31,8	30	AX9161216
20 x 1/2" x 20	90	34,5	30	AX9201220



Union connectors

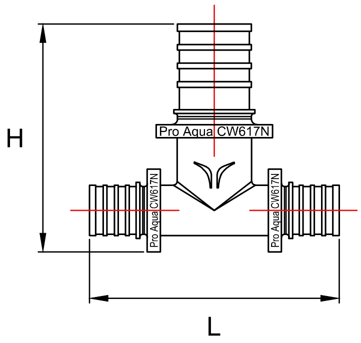
Dimensions	D, mm	L, mm	Артикул
16 x 2,2 (3/4" евроконус)	29,5	19,5	AX411622E
20 x 2,8 (3/4" евроконус)	29,5	19,5	AX412028E



Union connector G3/4-15

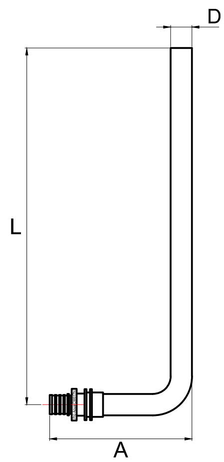
Dimensions	D, mm	L, mm	Артикул
15 x 3/4	34	20	AX415134

Reducing tee



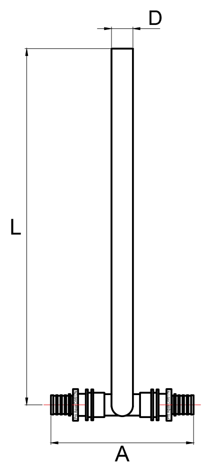
Dimensions	H, mm	L, mm	Item No.
16 x 20 x 16	71	50,8	AX8162016
20 x 16 x 16	73	48,8	AX8201616
20 x 16 x 20	77	48,3	AX8201620
20 x 20 x 16	75	52,8	AX8202016
25 x 16 x 25	94	54	AX8251625
25 x 20 x 25	97	57,5	AX8252025
20 x 25 x 16	79,5	62,8	AX8202516
20 x 25 x 20	82	62,3	AX8202520
25 x 16 x 16	83	54	AX8251616
25 x 20 x 16	84	58	AX8252016
25 x 20 x 20	88,5	58	AX8252020
25 x 25 x 16	88	66	AX8252516
25 x 25 x 20	91,5	65,5	AX8252520
25 x 32 x 25	105	71,5	AX8253225
32 x 16 x 32	110,4	61	AX8321632
32 x 20 x 25	103,5	64,9	AX8322025
32 x 20 x 32	111	65	AX8322032
32 x 25 x 25	107	67,5	AX8322525
32 x 25 x 32	114	72,5	AX8322532
40 x 20 x 40	120,8	71,3	AX8402040

L-type radiator tube



Dimensions	A, mm	L, mm	Item No.
250 x 16	107,5	285±2	AX716250
300 x 16	107,5	335±2	AX716300
500 x 16	107,5	535±2	AX716500
750 x 16	107,5	785±2	AX716750
1000 x 16	107,5	1035±2	AX7161000
250 x 20	110,5	285±2	AX720250
300 x 20	110,5	335±2	AX720300
500 x 20	110,5	535±2	AX720500
750 x 20	110,5	785±2	AX720750
1000 x 20	110,5	1035±2	AX7201000

T-type radiator tube



Dimensions	A,mm	L, mm	Item No.
250 x 16	68	301±2	AX416250
300 x 16	68	351±2	AX416300
500 x 16	68	551±2	AX416500
750 x 16	68	801±2	AX416750
1000 x 16	68	1051±2	AX4161000
250 x 20	77	302,5±2	AX420250
300 x 20	77	352,5±2	AX420300
500 x 20	77	552,5±2	AX420500
750 x 20	77	802,5±2	AX420750
1000 x 20	77	1052,5±2	AX4201000

Axial system installation tool

Hand-held universal tool for axial fittings

Code	For pipes, D x S
AXTOOL-1632	16 x 2,2 20 x 2,8 25 x 3,5 32 x 4,4

Cordless universal tool for axial fittings

Code	For pipes, D x S
AX.BTOOL1632C	16 x 2,2 20 x 2,8 25 x 3,5 32 x 4,4

Accessories

Bracket for underfloor heating

Code	For pipes, D
FCH2004	16 - 20

Pipe swing lock 90°

Code	For pipes
PA65000P	16
PA65020P	20

Pipe swing lock "shoe"

Code	For pipes	Turning angle
FXG.305.16.W	16-20	90

Pipe swing lock 45°

Code	For pipes
PA65000P45	16

The pipe swing lock is designed to fix the pipe shape at an angle of 45 or 90 degrees where the pipeline is connected to the manifold cabinet, radiator, heating convector and other equipment. This product provides reliable protection of the pipe from kinks and bends, as well as from external damages at the bending points.

The pipe swing lock "shoe" is equipped with fasteners for fixing with self-tapping screws to the surface of the floor, walls or ceiling.

Protective cover

Code	For pipes
FXG.300.16.W	16-20

It is designed to protect pipes from UV radiation and physical influence when connected to a radiator.

Mounting plate

Code	For pipes
FXG.310.1620.S	16-20

Double plate with long mounting bracket and universal holes. It is designed for easy attachment of water sockets to the wall.

Bracket for fixing L-shaped pipes

Code	For pipes
FXG.315.1625.S	16-20

Angle piece for fixing the L-shaped pipes to the flooring underlay with a center-to-center distance of 50 mm.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