Install your **future**

SYSTEM **KAN-therm**

PP Green

High quality with
reasonable price

EN 25/01

∅ **20-500 mm**

1 SYSTEM KAN-therm PP Green

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1.1 General information

KAN-therm PP Green is a complete installation system consisting of pipes made of polypropylene PP-R (type 3) or PP-RCT (type 4) and fittings made of PP-R, a thermoplastic materials, with diameter range: 20–500 mm. Connecting elements is performed using the welding technique (thermal polyfusion) and electric welders. This welding technique creates continually uniform joints and therefore guarantees exceptional tightness and mechanical durability of the installation. The system is designed for indoor water supply installations (hot and cold potable water), heating, cooling and technological installations.

The KAN-therm PP Green system is characterized by:

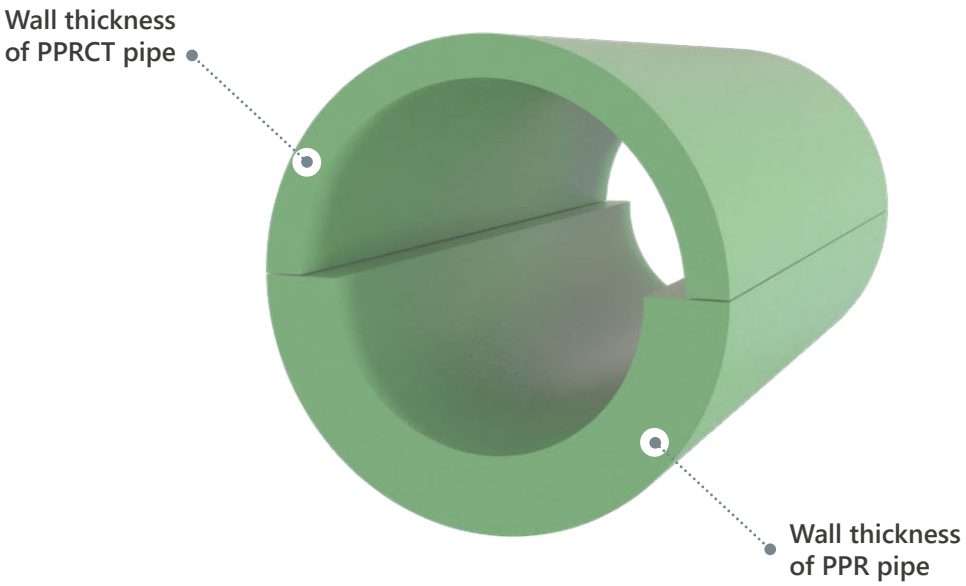
- high hygiene of all products (physiological and microbiological neutrality),
- high chemical resistance,
- resistance to material corrosion,
- low thermal conductivity (high thermal insulation of pipes),
- low specific weight,
- resistance to scaling,
- muffling vibrations and noises,
- mechanical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

1.2 KAN-therm PP Green pipes

KAN-therm PP Green pipes and fittings are manufactured of high quality PP-R random copolymer of polypropylene (formerly marked as polypropylene type 3) and pipes made of the latest generation material - PP-RCT (Random Crystallinity Temperature Polypropylene). Pipes and fittings made of the latest generation material - PP-RCT (Random Crystallinity Temperature Polypropylene).

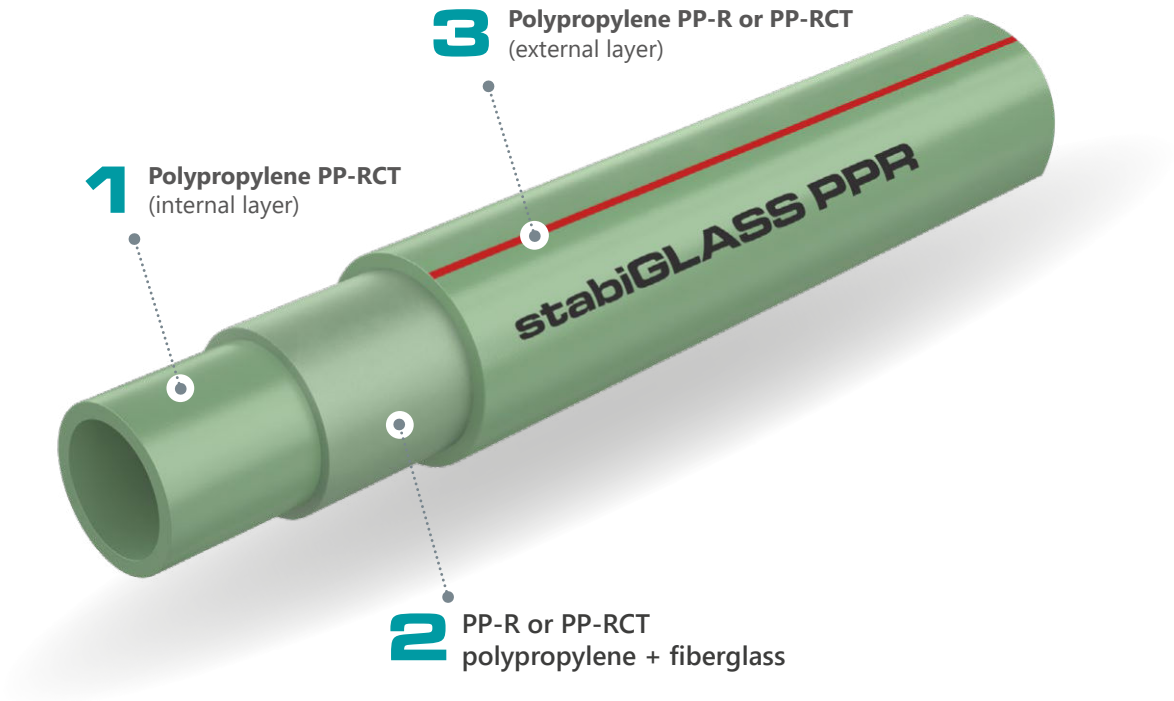
In terms of construction, we differentiate following types of pipes: uniform (homogenous PPR) and compound pipes: reinforced with a layer of glass fiber, the so-called stabiGLASS PPR or PPRCT pipes.

New PP-RCT material is characterized by uniqe crystalline structure thanks to which pipes made of this material are able to operate with relatively higher pressure and temperature that PP-R pipes, especially in long-term perspective. Such properties make PPRCT pipe with the same pressure class is distinguished with larger internal cross-section, which in turn translates into better hydraulic capabilities.



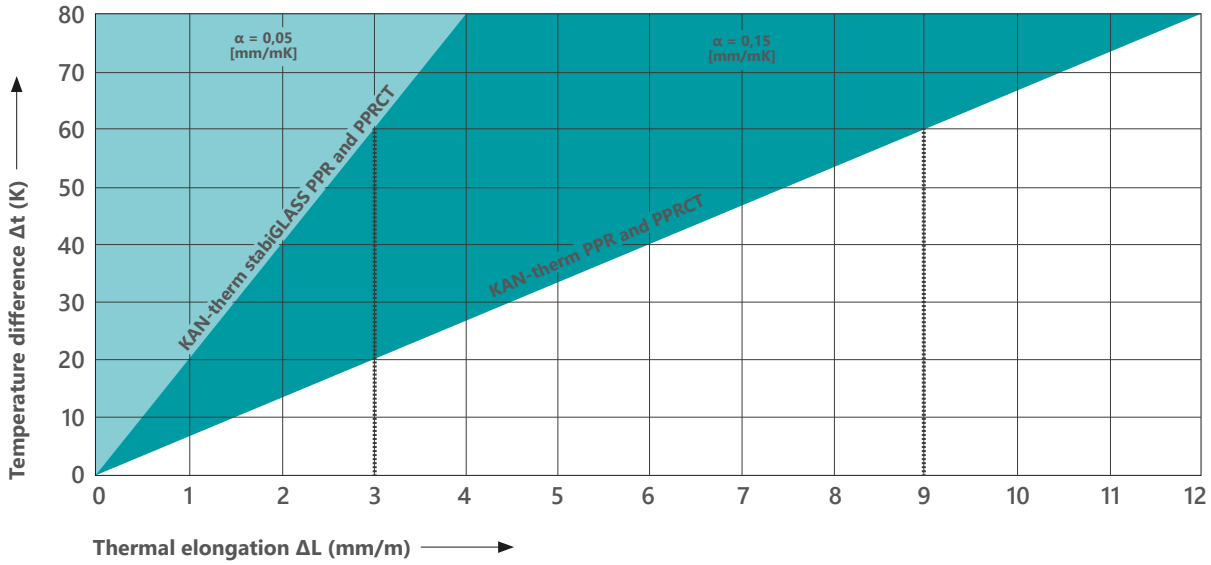
PPR and PPRCT pipe with equivalent pressure rating

KAN-therm PP Green stabiGLASS PPR or PPRCT pipes feature multilayer construction. Their internal layer, which is reinforced with glass fibre (40% of pipe wall thickness) determines very high durability of the pipe and its low thermal elongation α=(0,05 mm/m × K).



Construction of a stabiGLASS PPR and PPRCT*

*stabiGLASS PPRCT pipes (125–500 mm) are marked with white strips.



Comparison of the thermal expansion factor in uniform PPR and stabiGLASS PPR or PPRCT pipes.

Physical properties of KAN-therm PP Green pipe material

Property	Symbol	Unit	Value	
			PPR	PPRCT
linear elongation coefficient	α	mm/m × K	0,15 for uniform pipes 0,05 for stabiGLASS PPR pipes	0,15 for uniform pipes 0,05 for stabiGLASS PPRCT
thermal conductivity	λ	W/m × K	0,24	
density	ρ	g/cm³	0,90	
elasticity module		N/mm²	900	850
minimum bend radius	R_{min}	mm	8 × De	
internal wall roughness	k	mm	0,007	

Pipe marking, color

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

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

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

Pipe color: green;

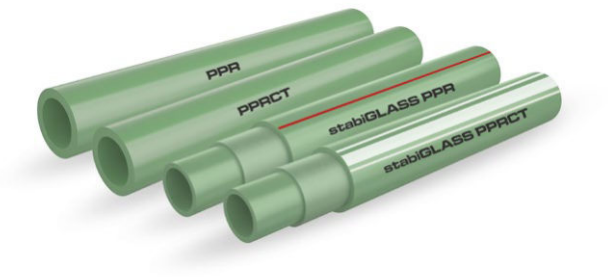
Pipe surface: mat.

Pipes are supplied 4 m or 5,8 m long bars (depending on the diameter).

Dimension parameters of KAN-therm PP Green pipes

KAN-therm PP Green system offers five types of pipes, differing in terms of wall thickness and structures (compound pipes):

PPR SDR7,4 pipes	(20–110 mm)
PPR SDR6 pipes	(20–110 mm)
PPRCT SDR9 pipes	(125–355 mm)
PPRCT SDR11 pipes	(125–500 mm)
PPRCT SDR17 pipes	(125–500 mm)
stabiGLASS PPR SDR7,4 pipes	(20–110 mm)
stabiGLASS PPRCT SDR9 pipes	(125–355 mm)
stabiGLASS PPRCT SDR11 pipes	(125–500 mm)
stabiGLASS PPRCT SDR17 pipe	(125–500 mm)



Tab. 1. KAN-therm PP Green PPR SDR7,4 (S3,2) pipes

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

Tab. 2. KAN-therm PP Green PPR SDR6 (S2,5) pipes

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

Tab. 3. KAN-therm PP Green stabiGLASS PPR SDR7,4 (S3,2) pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]	Capacity by unit [l/m]	Weight by unit [kg/m]
20 × 2,8	20	2,8	14,4	0,163	0,160
25 × 3,5	25	3,5	18,0	0,254	0,250
32 × 4,4	32	4,4	23,2	0,415	0,430
40 × 5,5	40	5,5	29,0	0,615	0,650
50 × 6,9	50	6,9	36,2	1,029	1,000
63 × 8,6	63	8,6	45,8	1,633	1,520
75 × 10,3	75	10,3	54,4	2,307	2200
90 × 12,3	90	12,3	65,4	3,358	3,110
110 × 15,1	110	15,1	79,8	4,999	4,610

Tab. 4. KAN-therm PP Green PPRCT SDR9 pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]
125 × 14	125	14	111
160 × 17,9	160	17,9	142,1
200 × 22,4	200	22,4	177,6
250 × 27,9	250	27,9	222,1
315 × 35,2	315	35,2	279,8

Tab. 5. KAN-therm PP Green PPRCT SDR11 pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]
125 × 11,4	125	11,4	113,6
160 × 14,6	160	14,6	145,4
200 × 18,2	200	18,2	181,8
250 × 22,7	250	22,7	227,3
315 × 28,6	315	28,6	286,4
400 × 36,3	400	36,3	363,7
450 × 40,9	450	40,9	409,1
500 × 45,4	500	45,4	454,6

Tab. 6. KAN-therm PP Green PPRCT SDR17 pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]
125 × 7,4	125	7,4	117,6
160 × 9,5	160	9,5	150,5
200 × 11,9	200	11,9	188,1
250 × 14,8	250	14,8	235,2
315 × 18,7	315	18,7	296,3
400 × 23,7	400	23,7	376,3
450 × 26,7	450	26,7	423,3
500 × 29,7	500	29,7	470,3

Tab. 7. KAN-therm PP Green stabiGLASS PPRCT SDR9 pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]
125 × 14	125	14	111
160 × 17,9	160	17,9	142,1
200 × 22,4	200	22,4	177,6
250 × 27,9	250	27,9	222,1
315 × 35,2	315	35,2	279,8

Tab. 8. KAN-therm PP Green stabiGLASS PPRCT SDR11 pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]
125 × 11,4	125	11,4	113,6
160 × 14,6	160	14,6	145,4
200 × 18,2	200	18,2	181,8
250 × 22,7	250	22,7	227,3
315 × 28,6	315	28,6	286,4
400 × 36,3	400	36,3	363,7
450 × 40,9	350	40,9	309,1
500 × 45,4	500	45,4	454,6

Tab. 9. KAN-therm PP Green stabiGLASS PPRCT SDR17 pipes

Size [mm]	External diameter D [mm]	Wall thickness s [mm]	Internal diameter d [mm]
125 × 7,4	125	7,4	117,6
160 × 9,5	160	9,5	150,5
200 × 11,9	200	11,9	188,1
250 × 14,8	250	14,8	235,2
315 × 18,7	315	18,7	296,3

Explanation of markings of uniform PPR pipes

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

S	SDR
5	11
3,2	7,4
2,5	6

1.3 Fittings and other elements of the system

The basic method of executing joints in polypropylene installations is thermal welding which, thanks to the use of proper fittings, allows connecting pipes (pipe couplings), closing the pipeline (end caps), redirecting the pipeline (elbows, bends, passing loops, tees), changing the diameter of the pipe (couplings and reducers), executing branch-offs (tees, four-ways), connecting devices and fixtures (collar joints and metal threaded joints). Ball valves with polypropylene couplings serve as the joints here.

All of the above mentioned elements allow connecting fittings to pipes or connecting two or more pipe sections, forming inseparable joints, requiring the pipe to be cut off if there is a need for disassembling the fitting. In order to execute a separated joint, sleeves for collar joints and union adapters must be used. All joints are universal and may be used with all types of KAN-therm PP Green pipes, irrespective of their wall thickness or structure.

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

- fittings (uniform) made of PP-R polypropylene (couplings, reducers, elbows, nipple elbows, tees),
- couplings with female and male metal threads ½" – 3" – used for connecting to devices and fixtures,
- sleeves for collar joints with loose collars, union adapters – for detacheable joints,
- expansion bends, mounting plates, ball valves,
- mounting elements – plastic or metal with rubber insert clamps.

1.4 Scope of use

Thanks to the properties of PP-R and PP-RCT material, the KAN-therm PP Green installation system has a wide spectrum of applications:

- cold (20 °C/1,0 MPa) and hot (60 °C/1,0 MPa) water installations in housing buildings, hospitals, hotels, office buildings, schools,
- central heating installations (temp. up to 90 °C, working pressure up to 0,6 MPa),
- compressed air installations,
- balneology installations,
- installations in agriculture and horticulture,
- pipelines in the industry, e.g. for transporting aggressive media and food products,
- ship installations.

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

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

KAN-therm PP Green installation

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

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

Certificates and technical approvals are available at www.kan-therm.com.

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

				PPR		PPRCT		
				SDR6 (S2,5)	SDR7,4 (S3,2), SDR7,4 (S3,2) stabiGLASS	SDR9 (S4)	SDR11 (S5)	SDR17 (S8)
Application (acc. to ISO 10508)	**Total time of exploitation, years**	**Time of operation years/hours**	**Operating temperature T °C**	**Maximum operating pressure (bar)**				
Hot domestic water **[application class 1]** T_d / T_{max} = 60/80 °C	50	49	60	10	8	8	6	4
		1	80					
	Time of operation at T_{mal}	100 hours	95					
Hot domestic water **[application class 2]** T_d / T_{max} = 70/80 °C	50	49	70	8	6	8	6	4
		1	80					
	Time of operation at T_{mal}	100 hours	95					
Radiant heating, low temperature radiator heating **[application class 4]** T_d / T_{max} = 60/70 °C	50	2,5	20	10	10	8	6	4
		20	40					
		25	60					
		2,5	70					
	Time of operation at T_{mal}	100 hours	100					
Radiator heating **[application class 5]** T_d / T_{max} = 80/90 °C	50	14	20	6	6	6	4	-
		25	60					
		10	80					
		1	90					
	Time of operation at T_{mal}	100 hours	100					

Tab. 10. Maximum operating pressure of PPR and PPRCT pipes depending on the temperature and service life of the installation (safety factor C=1,25) according to DIN 8077

Temperature [°C]	Time [years]	PP-R pipes		PP-RCT pipes		
		SDR7,4 / S3,2	SDR6 / S2,5	SDR17 / S8	SDR11 / S5	SDR9 / S4
10	1	33,4	42,1	14,4	22,8	28,8
	5	31,5	39,7	14	22,1	27,9
	10	30,7	38,6	13,8	21,9	27,5
	25	29,7	37,4	13,5	21,5	27,1
	50	28,9	36,4	13,4	21,2	26,7
20	1	28,5	35,9	12,5	19,9	25,0
	5	26,8	33,7	12,1	19,3	24,2
	10	26,1	32,8	12,0	19,0	23,9
	25	25,2	31,7	11,7	18,6	23,5
	50	24,5	30,9	11,6	18,4	23,1
40	1	20,6	25,9	9,3	14,8	18,6
	5	19,2	24,2	9,0	14,3	18
	10	18,7	23,5	8,8	14,1	17,7
	25	18,0	22,6	8,7	13,8	17,3
	50	17,4	22,0	8,5	13,6	17,1
60	1	14,7	18,5	6,7	10,7	13,5
	5	13,6	17,2	6,5	10,3	13,0
	10	13,2	16,6	6,4	10,1	12,7
	25	12,7	16,0	6,2	9,9	12,4
	50	12,3	15,5	6,1	9,7	12,2
70	1	12,3	15,5	5,7	9	11,3
	5	11,4	14,4	5,4	8,6	10,9
	10	11,1	13,9	5,3	8,5	10,7
	25	9,6	12,1	5,2	8,3	10,4
	50	8,1	10,2	5,1	8,1	10,2
80	1	10,3	13,0	4,7	7,5	9,5
	5	9,1	11,5	4,5	7,2	9
	10	7,7	9,7	4,4	7,0	8,9
	25	6,2	7,8	4,1	6,9	8,6
95	1	7,3	9,2	3,5	5,6	7,1
	5	4,9	6,2	3,3	5,3	6,7
	10	4,1	5,2	3,3	5,2	6,6

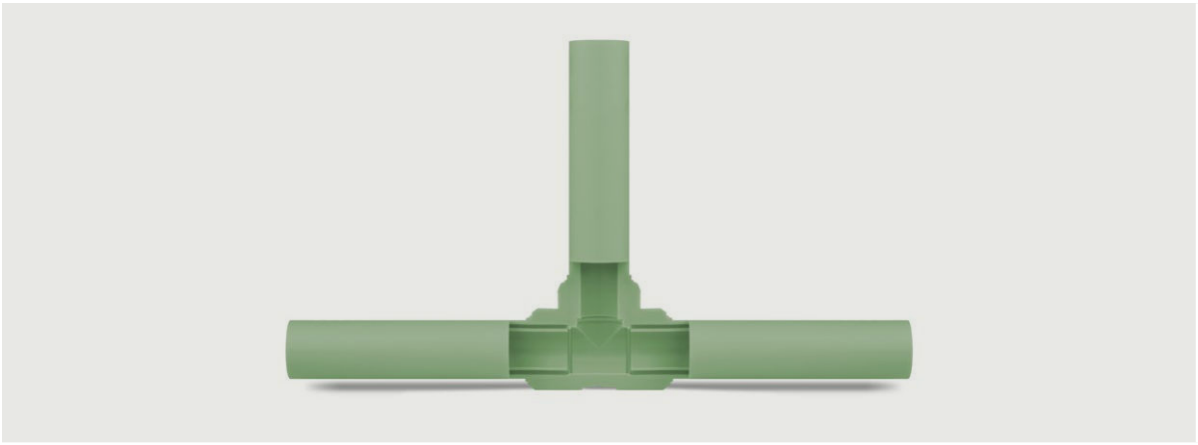
Note

Conditions of using the KAN-therm PP Green system in installations other than heating and water supply installations - chemical resistance.

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

1.5 Technique of connecting KAN-therm PP Green installations – welded joints

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



Cross-section of a welded joint

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

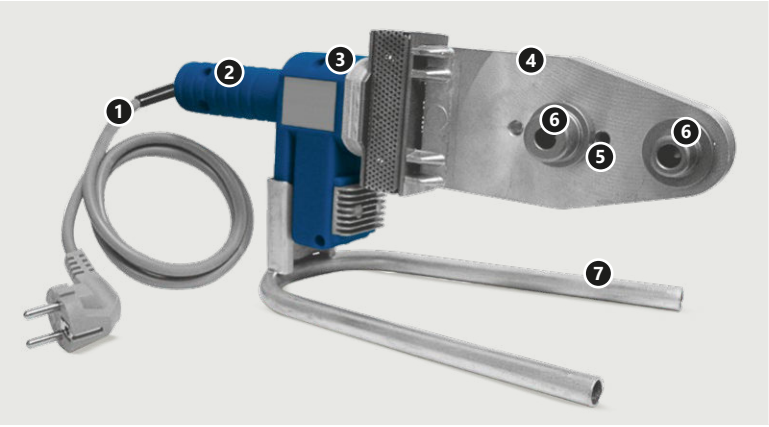
The process of heating (plasticizing) takes place with the use of an electric welder equipped with a heating plate with exchangeable (for each diameter) heating inserts covered with Teflon.

For socket fusion welding, depending on the diameter of the pipe, heating takes form 5 to 60 seconds. After this time, heated elements are removed from the inserts and the pipe is immediately mounted (without rotation!) inside the coupling at a depth which must be marked earlier. It is then that the particles of both elements penetrate one another and mix. A joint formed through thermal welding has impressive mechanic durability, exceeding the durability of the pipe itself (the cross section of the joint exceeds the cross section of the pipe).

Tools – preparation of the welder

Socket fusion welding tools

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



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

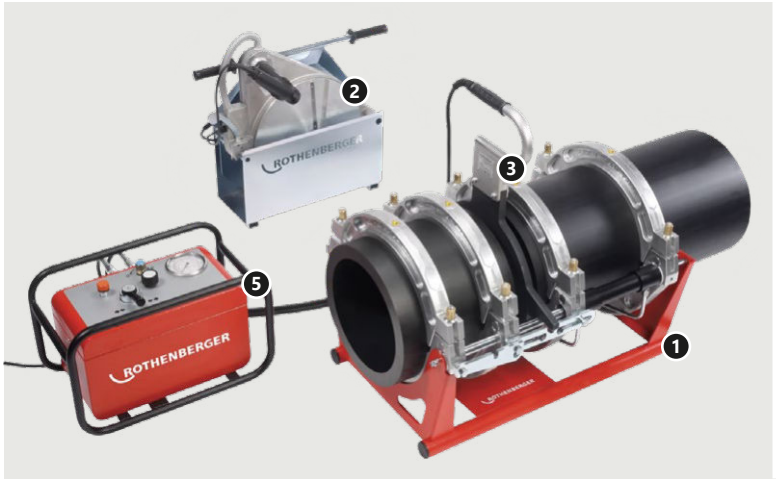
Welding temperature 260 °C

- Before starting any works, read the instruction manual to the corresponding welder type.
- Heating inserts (coupling and heating rod) must be screwed tightly using a wrench included in the set. They must contact the surface of the heating plate tightly. The inserts must not extend over the edge of the heating plate.
- Secure the inserts against scratching or polluting. Clean all pollutions with a natural cloth and rubbing alcohol.
- Connection to power supply is signaled by the lamp or diode on the casing lighting up.
- The required welding temperature (on the surface of inserts) is 260 °C. The temperature of the heating plate is higher (280-300 °C). When the device reaches the correct welding temperature, a thermostat control most often (depends on the model of the welder) signals it.
- After finishing all works, disconnect the welder from power supply and leave it to cool down. Do not cool the welder rapidly, e.g. using cold water, since this may lead to the damage of heating circuits.
- Do not use a power supply cable of small cross section or one which is too long. Voltage fluctuations might disturb the proper operation of the device.
- Do not use the power supply cable to transport or hang the welder. When out of work, place it on the stand included in the set.

NOTICE

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

Butt-welding tools



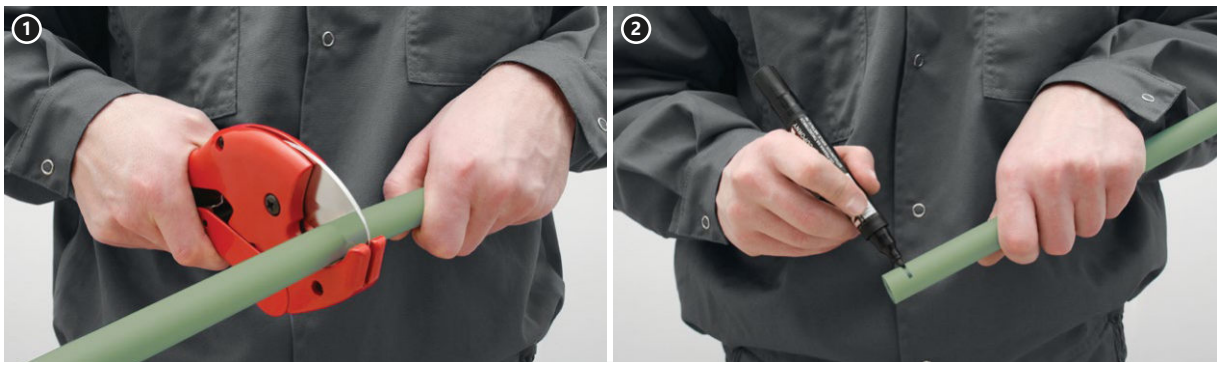
Basic butt-welding machinery should include:
1. A work surface bench
2. Facing element
3. Heating element
4. A drive system

KAN-therm PP Green offer does not include tools for butt-welding. Only use tools that comply the requirements of the DVS 2208-1 standard.

Tools – work safety

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

Preparation of elements for welding



1. Cutting the pipe.

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

2. Marking the depth of the weld.

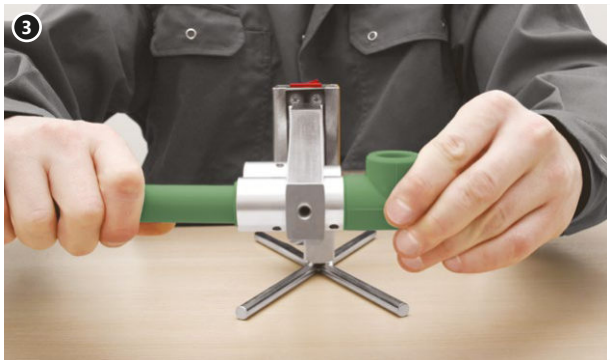
Mark (using a ruler or, a template and a pencil) the depth of the weld at the end of the pipe (PPR and stabiGLASS PPR pipes). Insufficient welding depth may weaken the joint. On the other hand, if the pipe is mounted too deep, it may become narrower (flange). The depths of welds are provided in the table.

1.6 Welding technique

General requirements for welding

Only the products coming from the same manufacturer can be welded together. Pipes and fittings should be heated simultaneously and not more than once. All operations during a welding process shall be performed without turning a pipe against a fitting and welding ends. It should be taken into account that welding time differs depending on elements' diameters. Welding below 0 °C should be avoided. Double, even flow-out on the whole weld surface indicates a good quality of a joint.

Socket fusion welding



3. Heating the pipe and the joint.

The surfaces to be heated must be clean and dry. Slide the pipe end (without rotation) into the heating sleeve, up to the marked depth of the weld. At the same time, slide the fitting (also without rotation) on the heating rod, until it stops. Start counting the heating time when the pipe and the fitting are mounted at their entire welding depths. After the lapse of a half of the heating time (according to the table), continue to heat the fitting and start heating the pipe, until the end of required heating time.

4. Connecting elements.

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

5. Stabilizing and cooling.

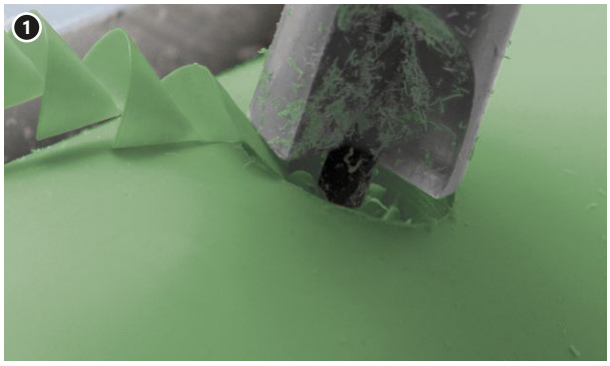
After the welding time has lapsed, the joint must be stabilized and cooling must be initiated (time of cooling is provided in the table). In this period, you must not apply any mechanic pressure on the pipe. After all joints have cooled down, connect the installation to water supply and conduct a pressure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

Tab. 11. Socket fusion welding parameters

External pipe diameter [mm]	Welding depth [mm]	Heating time [sek]		Binding time [sek]	Cooling time [min]
		SDR6-SDR11	SDR17		
20	14,0	5	-	4	2
25	15,0	7	-	4	2
32	16,0	8	-	6	4
40	18,0	12	-	6	4
50	20,0	18	-	6	4
63	24,0	24	-	8	6
75	26,0	30	-	10	8
90	29,0	40	-	10	8
110	32,5	50	-	10	8
125	35,0	60	35	10	8

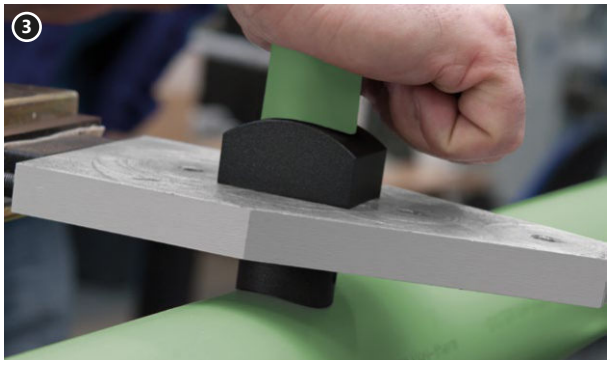
The time of heating in ambient temperatures below +5 °C should be increased by 50%.
Welding parameters are the same for both PP-R and PP-RCT materials.

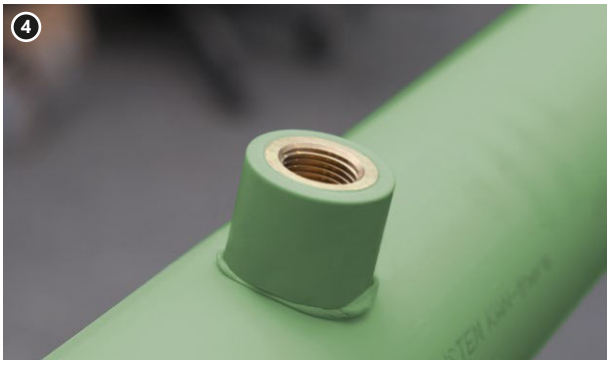
Installation of pipe saddle fittings PP Green



1. Drilling a hole under the pipe saddle fitting.

2. Processing the hole – removing the burrs made when drilling.





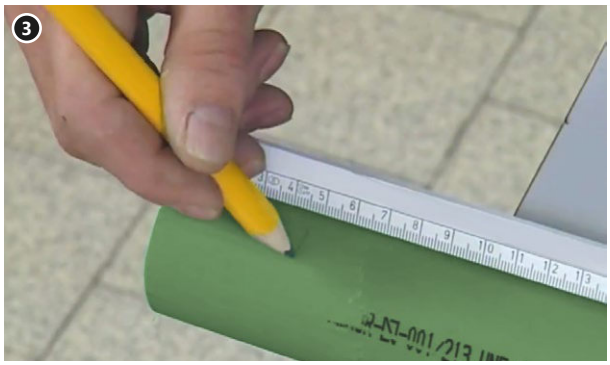
3. Welding the pipe saddle fitting.

4. Ready connection.

Connection technique - electrofusion welding (20–450 mm)

1. Pipe surface scraping.

2. Cleaning pipe surface with alcohol.



3. Insertion depth marking.

4. Insertion of pipe into the fitting.

5. Programming of welding machine via laser reader (welding machine will adjust parameters automatically).

6. Welding process start - do not rotate or mechanically stress the elements through all of welding and cooling process.

Detailed guidelines regarding electrofusion welding of polypropylene may be found in DVS 2207-11 Technical Code.

Connections technique - butt-welding (90–500 mm)

Butt-welding is a thermal polyfusion welding process in which components - pipes and fittings of the same sizes, wall thicknesses and materials are connected under controlled pressure forming homogenous connection.

A widely adapted standard setting out detailed guidelines for the butt welding of polypropylene plumbing components is DVS 2207-11.

Preparation for butt-welding

Before you start the welding prepare necessary welding machinery and its surfaces. Only use machinery and equipment that comply with the requirements of the DVS 2208-1 Technical Code. Read thoroughly user manual of butt-welding machinery.

Cleaning

Before any welding operation heating element as well as joint surfaces have to be cleaned. Use methyl alcohol for cleaning heating element before warming and the same to clean welding surfaces of pipes. No residues of cleaning agent must be present.

Surfaces planing

Mill the welding surfaces with planner by applying light hydraulic pressure until 3 continuous coils of cut material appear. Once operation is done, join pipes ends to verify its parallelism.

Tab. 12. Maximum gap width between pipes ends to be welded

External pipe diameter	Separation
[mm]	[mm]
≤355	0.5
400...<630	1.0

Conditions of environment

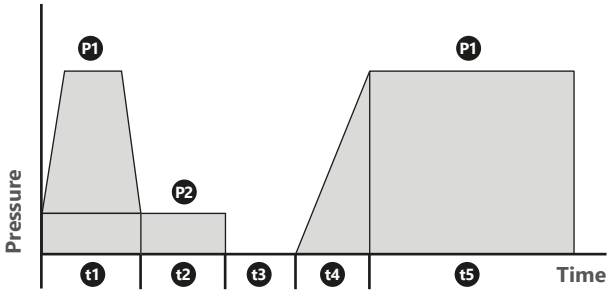
Make sure that environmental conditions will not affect negatively on welding process.

Pay special attention to:

- Low room temperatures (below 5 °C).
- Wind.
- Long sunlight exposure.

Extreme conditions in this regard may cause quicker cooling of heating element, complicate temperature regulation, temperature differences in heating areas as well as impair cooling process.

Butt-welding process



Welding process is done in cycles of temperature and pressure:
t1 – equalising
t2 – preheating without pressure
t3 – changeover
t4 – joining pressure build-up
t5 – joining (cooling)

Tab. 13. Butt-welding parameters at ambient temperature up to 40 °C and moderate air movement.

Pipe wall thickness	Equalising Minimum bead up size on heating element (x)	Preheating	Changeover (maximum time)	Maximum time to achieve joining pressure	Cooling time
[mm]	[mm]	[s]	[s]	[s]	[min]
to 4.5	0,5	to 53	5	6	6.5
4,5 ... 7	0,5	53 ... 81	5 ... 6	6 ... 7	6,5 ... 9,5
7 ... 12	1,0	81 ... 135	6 ... 7	7 ... 11	9,5 ... 15,5
12 ... 19	1,0	135 ... 206	7 ... 9	11 ... 17	15,5 ... 24
19 ... 26	1,5	206 ... 271	9 ... 11	17 ... 22	24 ... 32
26 ... 37	2,0	271 ... 362	11 ... 14	22 ... 32	32 ... 45
37 ... 50	2,5	362 ... 450	14 ... 17	32 ... 43	45 ... 61

Temperature adjustment

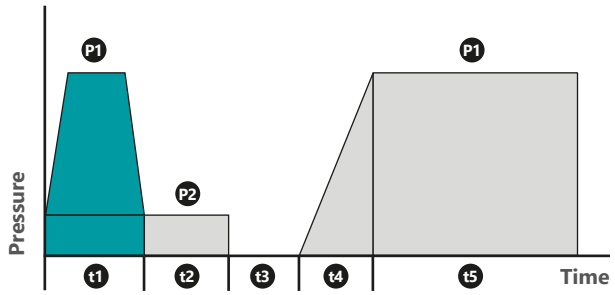
Set the temperature of the heating element before preparing the parts for welding.

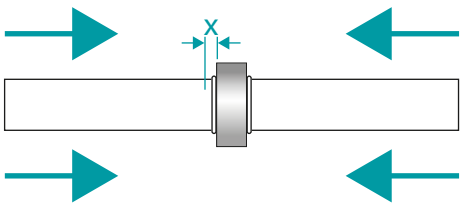
Welding temperature depends on thickness of the polypropylene pipe. First setting should be 210 °C ± 10 °C and further adjustments will be done on later steps.

Placing of pipes or fittings on the machine and alignment

- Assembly adequate to the diameter of the pipe clamping jaws in the machine clamps.
- In case of long pipe sections, place supporting rollers on the floor.
- Check the axial alignment of the elements on the machine.
- Verify the pipe sections alignment - it cannot exceed 10% of the pipe thickness.
- Once the pipes are clamped, determine the necessary pulling power for the hydraulic system by moving slowly the pipe section - read corresponding pressure on the display of the welding machine. When pipes are welded, the movement force should be added to joining force determined by the manufacturer.

t1 Equalising



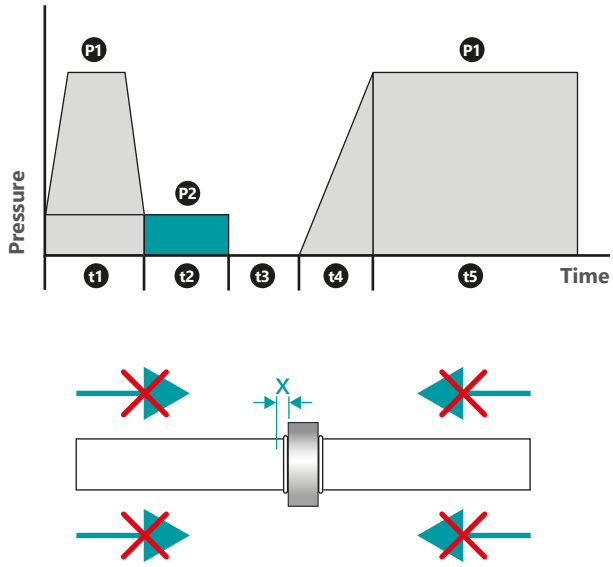


First stage of butt-welding is initial heating at pressure which ensure correct alignment between both ends of welded elements.

Press joint surfaces against heating element until all the surfaces lie plane-parallel to the heater. See table 13. for the bead up size which has to be obtained around entire circumference of the pipe.

Check the pressure and temperature in tables given by welding machine manufacturer.

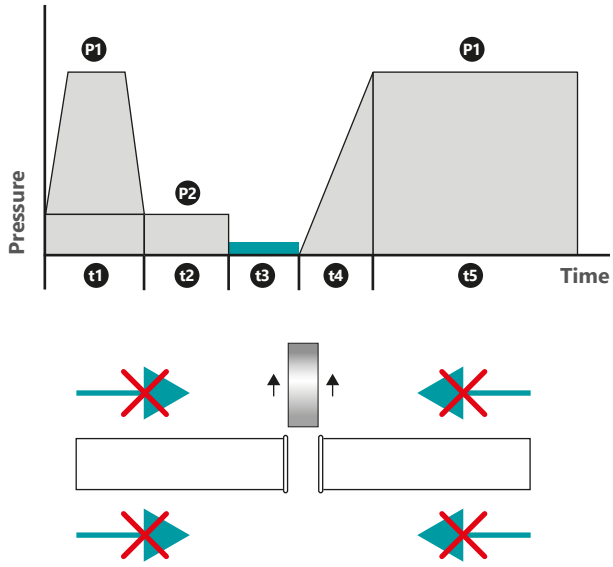
t2 Heating



Keep joining surfaces in contact with the heating element, with practically no pressure (≤ 0.01 N/mm2).
Heating time depends on the thickness of the pipe – see table 13.

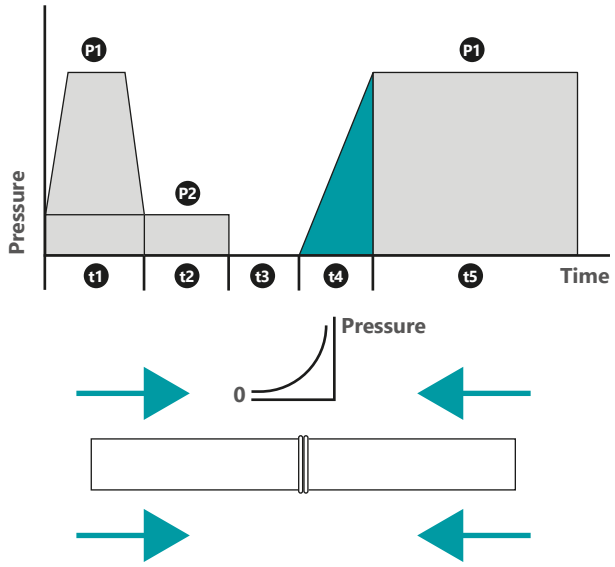
Heating temperature should be taken from table given by welding machine manufacturer.

t3 Changeover



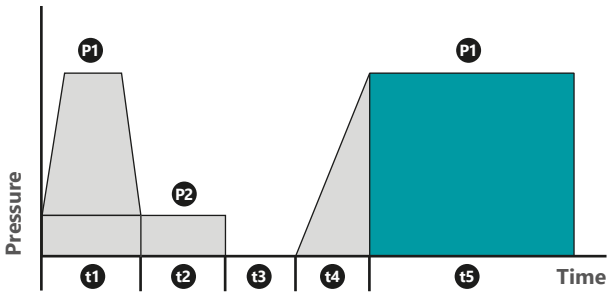
Remove the heating element as quick as possible – see maximal time in table 13.

t4 Pressure build-up



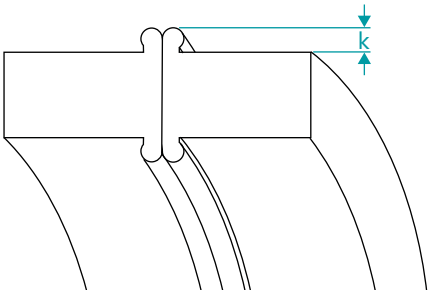
Face the joining surfaces of the pipes and once they have contact, slowly apply required pressure – see corresponding table plus add movement pressure.

t5 Cooling



Maintain the pressure against both pipes. Check the corresponding table for the temperature value.

Inspection



Visual inspection should be carried out right after butt-welding.
A consistent double outflow must be present after joining process.
See DVS 2202-1 Technical Code for detailed information regarding inspection of executed joints.

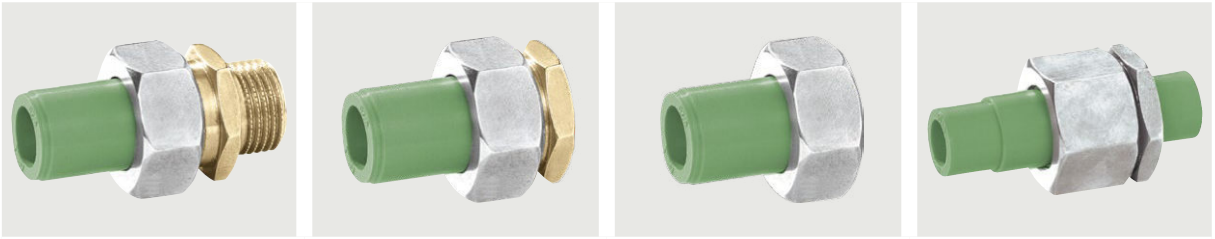
1.7 Fittings with metal threads and collars

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

KAN-therm PP Green fittings with brass threads

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

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



KAN-therm PP Green detachable fittings – male union adapter, female union adapter, half-union and union

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

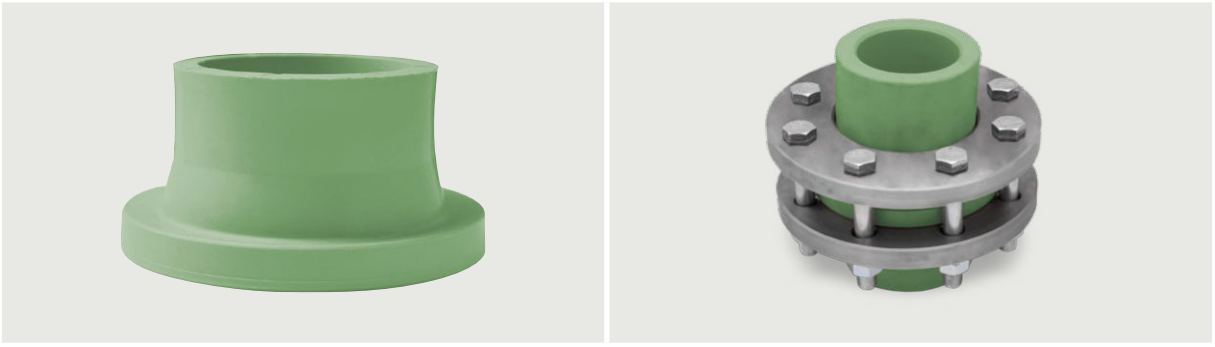
For large pipe diameters, use flange couplings to execute detachable joints. Flange couplings are used e.g. to connect devices to flange stubs (pumps, valves, water meters). In installations, KAN-therm PP Green adapters are used with loose flanges.

Thread sealing

It is advised to seal threaded connections with such an amount of hemp, that leaves the thread tops not covered. Using too much hemp may lead to thread damage. By winding hemp just after the first thread ridge you can avoid skew screwing and damaging the thread.

CAUTION! Do not use chemical sealants or glues.

It is necessary to assemble a separate, flat seal. The seal should be made of a material type suitable for the parameters of the medium running through the joint. The connection between flange adapter and pipe is done with a utilization of muff coupling or by other fitting.

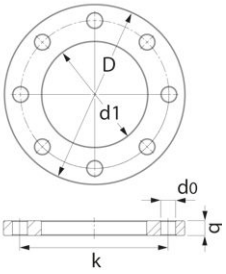


Ø110 mm flange joint

Flanges

Sleeve size	DN	D	d1	k	d0	q	N
Ø40	32	140	43	100	18	18	4
Ø50	40	150	53	110	18	18	4
Ø63	50	165	66	125	18	20	4
Ø75	65	185	78	145	18	20	8
Ø90	80	200	95	160	18	20	8
Ø110	100	220	114	180	18	22	8

N - number of bolt holes

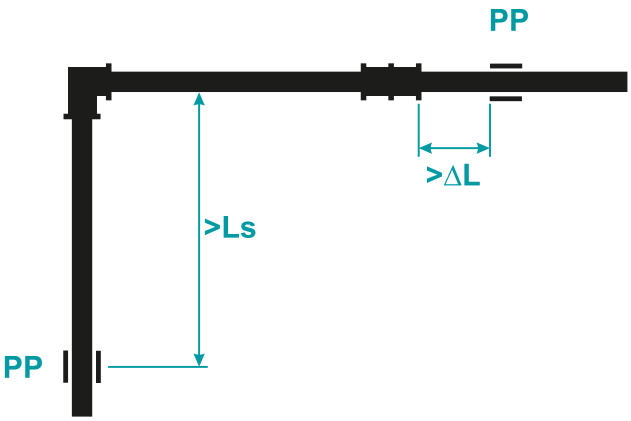


1.8 Pipelines fastening principles

PP shifting points

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

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



Correct location of shifting points.

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

PS fixed points

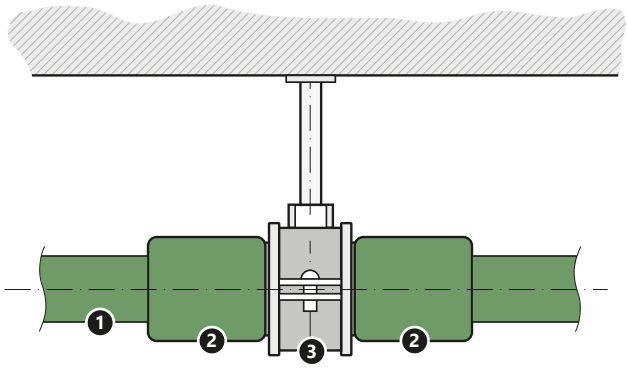
Fixed points allow pointing thermal elongations of a pipeline in a specific direction, and dividing it into smaller sections.

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

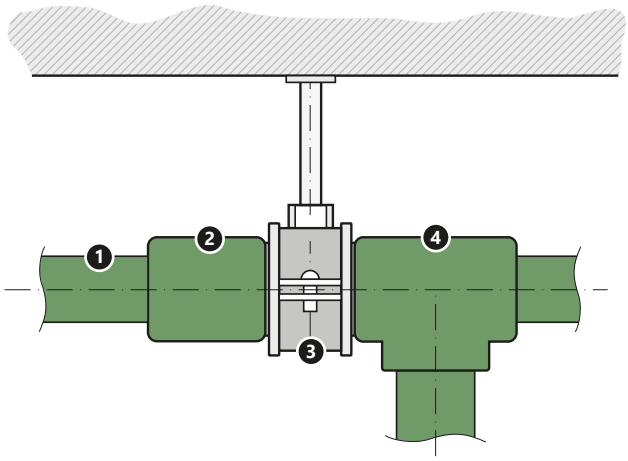
In the case of polypropylene KAN-therm PP Green pipelines, use one clamp situated in between fitting couplings.

Other solution for the implementation of fixed points is also allowed, provided that the circumferential clamping force ensures no axial movement of the pipelines while at the same time securing the installation pipes against mechanical damage.

The arrangement of fixed points results from the adopted solution of thermal elongation compensation of the installation and should be included in the technical design.



Example of execution of a fixed point on a straight section of a KAN-therm PP Green system pipeline
1. pipe
2. coupling
3. clamp



Example of execution of a fixed point next to a branch-off of a KAN-therm PP Green system pipeline
1. pipe
2. coupling
3. clamp
4. tee

Support spans

Maximum distances between supports for KAN-therm PP Green pipelines conducted at the surface of structural partitions and structures are provided in the tables. Fixed points, shifting points and passages through structural partitions in protective sleeves are considered supports.

Tab. 14. Maximum support span [m] KAN-therm PP Green PPR pipes (uniform)

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

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

Tab. 15. Maximum support span [m] KAN-therm PP Green stabiGLASS PPR pipes

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

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

Tab. 16. Maximum support span [m] KAN-therm PP Green stabiGLASS PPRCT SDR11 pipes

Medium temp. [°C]	External pipe diameter [mm]					
	125	160	200	250	315	400
20	205	210	220	225	230	250
50	175	180	190	200	205	220
70	155	160	170	175	185	195

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

Tab. 17. Maximum support span [m] KAN-therm PP Green stabiGLASS PPRCT SDR17 pipes

Medium temp. [°C]	External pipe diameter [mm]					
	125	160	200	250	315	400
20	185	190	200	205	210	230
50	170	175	180	190	200	210
70	140	145	155	160	170	180

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

1.9 Compensation of thermal elongation of pipelines

Linear thermal elongation

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

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

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

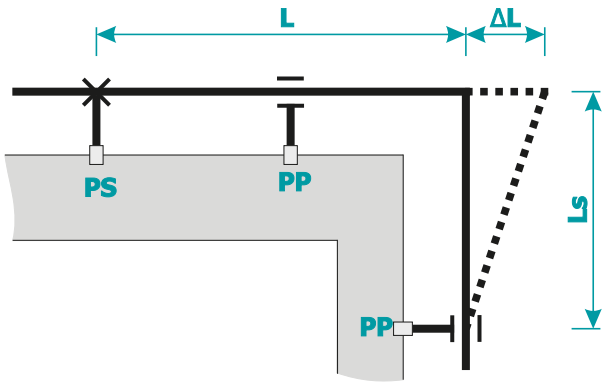
ΔL	change in pipe length	[mm]
α	elongation coefficient	[mm/m × K]
L	initial pipeline length	[m]
Δt	temperature difference: working temp. and assembly temp. of the pipeline	[K]

Value of coefficient α for KAN-therm pipes		
KAN-therm PP Green, PPR and PPRCT uniform pipes	α = 0,15	[mm/m × K]
KAN-therm PP Green, stabiGLASS PPR pipes	α = 0,05	[mm/m × K]

Compensation of elongations

Flexible arm

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



Pipe material constant for KAN-therm pipes

KAN-therm PPR and PPRCT	20

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

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

Where:

Ls – length of the flexisble arm [mm],

k – pipe material constant,

D – external pipe diameter [mm],

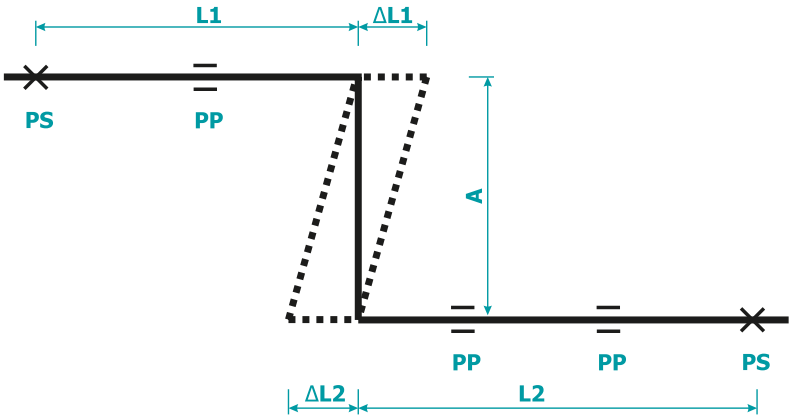
ΔL – change in pipe length [mm].

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

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

Compensators in KAN-therm system installations

Z-type compensator



Type Z compensator

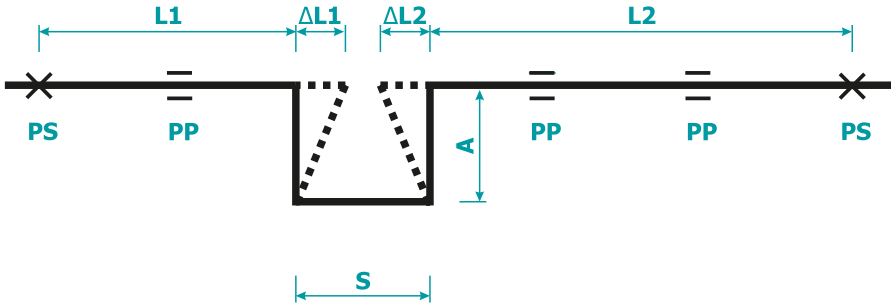
To calculate the length of the flexible arm **A = Ls** of the compensator, assume **Lz = L1 + L2** as the replacement length. For this length, calculate the elongation ratio ΔL and then the value of Ls. The length of arm A must not exceed the maximal span of mounts for a given pipeline diameter. Do no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

U-type compensator

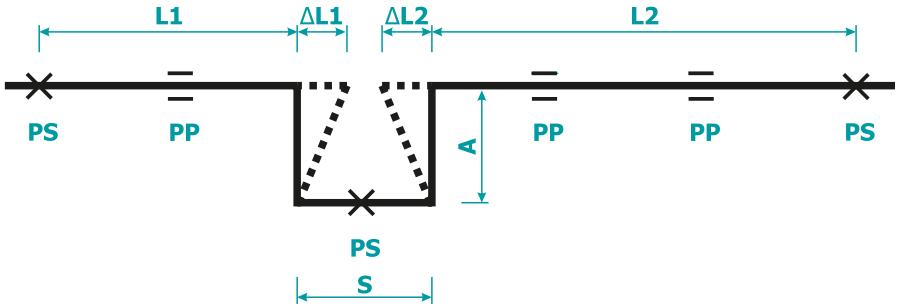
If it is impossible to compensate pipeline elongation by changing the route direction (the pipeline axis runs along one line along the entire length), an U-type compensator should be used.

Calculate the length of compensator arm **A** according to formula or data in the tables for determining the length of flexible arm, assuming that **A = Ls**.

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



U-type compensator



U-type compensator with fixed point

When dimensioning the compensator, follow these principles:

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

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

You may assume that:

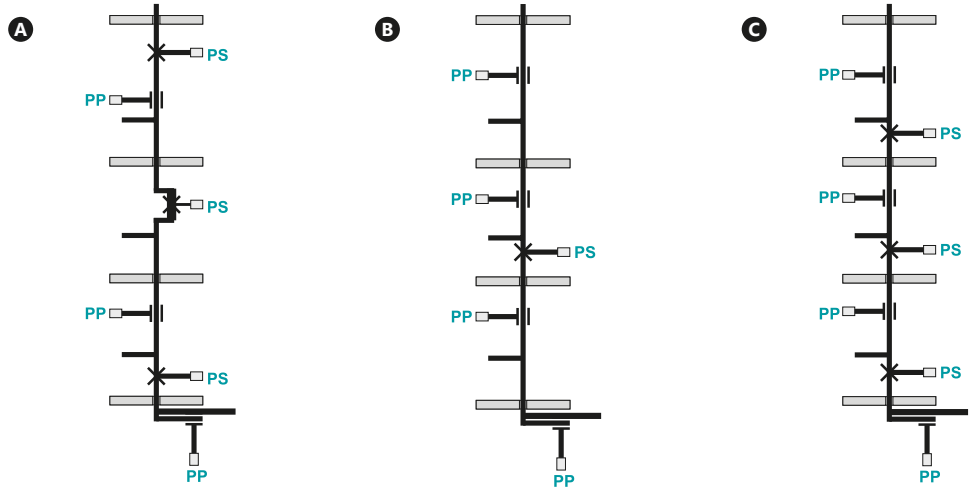
$$\mathbf{S = 2 \times g_{izol} + \Delta L1 + \Delta L2 + S_{min}}$$

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

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

Principles of compensating for installation riser – horizontal elongations

Figures **A, B, C** present examples of compensation solutions applied in installation risers.



A. Example of a riser structure applying an U-shaped compensator

B. Example of a riser structure applying a fixed point in the middle of the riser (concerns pipes KAN-therm PP Green stabiAL PPR pipes)

C. Example of a riser structure applying self-compensation

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

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

By dividing the riser (with fixed points) into considerably small sections (usually the length of the storey, but not longer than 4 m), the length of elongations is restrained, and the remaining tensions are transferred onto the clamps of fixed points. Slight sideways deviations of the pipelines may be limited by dense arrangement of shifting point clamps (denser, if the riser is assembled on plaster in visible places).

Compensation of sub-plaster/sub-flooring installation elongations

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

1.10 Connecting installation made of plastic pipes to the heat sources

In order to protect the elements of the piping made of polypropylene PP-R or PP-RCT against the direct effects of high temperature of the heat source or other device that may cause excessive heat generation, it is recommended to use a section of metal pipe with a length of not less than 1 m.

All heat sources connected to the installation made of polyprypylene PP-R or PP-RCT should be protected against exceeding the maximum temperature of 90 °C.

1.11 Rinsing, tightness tests and disinfection of KAN-therm installations

After completing, the KAN-therm PP Green installation should be rinsed and pressure tested. It should be done before pouring screed on the pipes, and covering the furrows and channels.

Perform a leak test with water. If the conditions do not allow conducting a water test (e.g. low temperatures), you may also conduct a compressed air test.

Before starting the test:

- disconnect fixtures and devices which could distort the results of the test (e.g. retention reservoirs, safety valves) or which could get damaged during the test,
- thoroughly rinse the installation, rinsing the installation should be performed with treated water or with the medium to be ultimately transported through the installation. During the flushing process, it should be ensured that the full capacity of the installation is replaced at least once,
- fill the installation with clear water and de-air it,
- stabilize water temperature in comparison to air temperature.

Use a pressure guage with a scope exceeding the working pressure by 50% and minimum graduation of 0,1 bar. The pressure guage should be mounted on the lowest point of the installation. Ambient temperature of the installation should not change.

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

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

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

Test pressure value P_{op} [bar]		
	Hydraulic test	Compressed air test
Heating and chilled water installations	P_{work} +2 [bar] but not less than 4 [bar]	preliminary test 110 mbar Main test 1,5 to 3,0 [bar]*
Water supply installations	P_{proj}·x1,1[bar]	

* The maximum test pressure with compressed air is limited to 3,0 [bar] for safety reasons. It is acceptable to use a higher pressure, not exceeding the permissible operating pressure of the particular system in the compressed air installation, on the condition that the safety of personnel is ensured.

P_{op} - pressure at which the tightness test is performed

$P_{proj.}$ - maximum allowable pressure for the installation system

P_{work} - system operating pressure

Step 1a - Preliminary test with reduced pressure		
Preliminary test pressure	1.0 to 4.0 bar	
Preliminary test time	Enabling a visual check of all connections	
Acceptance conditions	No moisture or leakage	
Step 2a -Preliminary test with test pressure P_{op} - medium water		
Duration of the test	30 min (Maintain the testpressure within this period, equalize if necessary). After 30 minutes, reduce the pressure to the value 0.5 time the test pressure	Not present
Acceptance conditions	No moisture or leakage	
Step 3a - Main test with test pressure P_{op} × 0.5 - medium water		
Duration of the test	30 min	
Acceptable pressure drop	0,0 [bar]	
Acceptance conditions	No moisture or leakage and pressure drop	
Step 1b -Tightness test - compressed air		
Test pressure	110 mbar	
Duration of the test	Up to a pipe capacity of 100 litres, the test period is at least 30 minutes (for each additional 100 litres, the test period must be increased by 10 minutes.)	
Acceptance conditions	No pressure drop at the measuring instruments	
Step 2b - Load test with increased pressure - compressed air		
Test pressure	≤DN50 maximum 3 bar >DN50 maximum 1,5 bar	
Duration of the test	10 min	
Acceptance conditions	No pressure drop	

*It is permissible to use a test pressure of more than 3 bar for compressed air provided that a positive results is obtained during the tightness test and then during the load test with increased pressure and provided that the safety of personnel is ensured.

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

The air used for the test cannot contain any oils. The maximal pressure value for the pre-test is 3 bar (0,3 MPa). Ambient temperature of the installation should not change (max ±3 °C). All leaks revealed can be traced acoustically or with the use of a foaming liquid. Test results are considered positive when no installation leaks are detected and no pressure drops occur on the manometer.

Caution:

Some of the foaming agents used to locate leaks during leak testing with compressed air may adversely affect the material of pipes and fittings. Before using them, consult with KAN Technical Department.

1.12 KAN-therm PP Green installation disinfection

KAN-therm PP Green is suitable for the construction of drinking water installations and have the necessary hygiene certificates. The selection of construction materials does not affect the multiplication of pathogenic organisms or deterioration of the properties of drinking water.

However, due to errors in the construction process or during the use of the installation, as well as periods of downtime or contamination of tap water, it may be necessary to disinfect the installation. It should be remembered that disinfection removes only the effects of contamination - before it is carried out, the causes of contamination of the medium must be removed.

Thermal disinfection

Thermal disinfection is performed with clean, treated water at an increased temperature. In order to effectively carry out thermal disinfection, it must be ensured that at all points of tap water consumption there is an outflow of water at a temperature of 70 °C in not less than 3 minutes. Care must be taken to ensure that the permissible operating parameters (maximum permissible temperature as a function of operating pressure) of the relevant installation system are not exceeded at any point in the installation. At the same time, it is necessary to ensure the safety of all users of the given installation (minimize the risk of burns).

Please note that the operation of the installation at elevated temperatures shortens the service life of the construction materials used, therefore it should be performed only periodically.

Chemical disinfection

Chemical disinfection is carried out at ambient temperature (not higher than 25 °C) with the use of reagent doses and exposure time specified by the compound manufacturer. Before using a chemical agent, it is necessary to obtain a written confirmation that it does not adversely affect the components of the installation. During chemical disinfection, water should not be drawn from the system for drinking purposes.

Examples of chemical disinfection agents approved for use with KAN-therm PP Green:

Name of the substance	Max. permissible concentration	Time of reaction
Hydrogen peroxide H_2O_2	150 mg/l of active ingredient	max. 12 h
Sodium hypochlorite NaOCl	50 mg/l of active ingredient	
Calcium hypochlorite $Ca(OCl)_2$	50 mg/l of active ingredient	
Chlorine dioxide ClO_2	6 mg/l of active ingredient	

The above-mentioned concentrations and reaction times of the substances must not be exceeded at any point in the installation.

Use personal protective equipment when dosing chemicals. It is unacceptable to use a combination of thermal disinfection and chemical disinfection.

1.13 Transport, storage and handling

Components of plastic piping systems must be protected against impact, falling, blow or any other mechanical damage during their transport and installation.
Store and transport pipes in horizontal position, preventing them from bending.
Maximum storage height – 1,2 m. Be extra careful when transporting or carrying pipes in temperatures below 0 °C (in these conditions pipes are more vulnerable to mechanic damages, especially stabiGLASS PPR pipes).

Protect pipes against shocks or mechanic impacts, particularly their endings.
Do not throw or drag pipes during transport.
Only the components that are not damaged or contaminated, during storage or transportation, may be used for installation works.

Protect pipes and fittings against polluting (particularly with oil or grease).
Protect pipes and joints from the access of chemical substances (e.g. paint or organic solvents, steam containing chlorine).

A minimum temperature for plastic piping installation, as regards welding, is +5 °C. At lowers temperatures it is difficult to provide working conditions for high quality pipe joints.

Pipeline crossings are made by means of the components specially designed for this purpose.

Joining of plastic parts is done by polyfusion welding which results in a high-quality homogeneous joint.
Joining must be performed under specified working conditions with the use of apropriate tools.
It is not recommended to weld KAN-therm PP Green components together with other brand products (no warranty).

Components must not be exposed to open fire.

During storage, pipes and joints must not be exposed to sun rays (they must be protected against heat and UV rays).

Detailed information about storage and transport of components can be found at en.kan-therm.com.

1.14 Safety

Pipes and fittings in KAN-therm PP Green system holds a set of necessary approvals and comply with current standards and normatives, which ensures long - lasting and trouble - free operation and full security of the installation. KAN-therm runs production in compliance with European EN ISO 15874.

- KAN-therm PP Green pipes complies with EN ISO 15874-2:2013 and positive hygienic result.
- KAN-therm PP Green fittings and valves complies with EN ISO 15874-3:2013 and positive hygienic result.
- System KAN-therm PP Green is granted with 10-years material warranty.
- Pipes and fittings of KAN-therm PP Green system also holds positive opinion of international certification units.

SYSTEM KAN-therm PP Green

Pipes

PPR pipe SDR7.4 - straight bars

GROUP: L

Size [mm]	*	Code			UM
20×2,8		2029203002	4	160	m
25×3,5		2029203004	4	100	m
32×4,4		2029203006	4	60	m
40×5,5		2029203008	4	40	m
50×6,9		2029203010	4	28	m
63×8,6		2029203012	4	16	m
75×10,3		2029203014	4	12	m
90×12,3		2029203016	4	8	m
110×15,1		2029203000	4	4	m

Note:
Application class 1; 8 bar.
Application class 2; 6 bar.
Application class 4; 10 bar.
Application class 5; 6 bar.

PPR pipe SDR6 - straight bars

GROUP: L

Size [mm]	*	Code			UM
20×3,4		2029206018	4	160	m
25×4,2		2029206020	4	100	m
32×5,4		2029206022	4	60	m
40×6,7		2029206024	4	40	m
50×8,3		2029206026	4	28	m
63×10,5		2029206028	4	16	m
75×12,5		2029206030	4	12	m
90×15,0		2029206032	4	8	m
110×18,3		2029206014	4	4	m

Note:
Application class 1; 10 bar.
Application class 2; 8 bar.
Application class 4; 10 bar.
Application class 5; 6 bar.

PPR pipe stabiGLASS SDR7.4 - straight bars

GROUP: M

Size [mm]	*	Code			UM
20×2,8		2029204007	4	100	m
25×3,5		2029204008	4	80	m
32×4,4		2029204009	4	60	m
40×5,5		2029204010	4	28	m
50×6,9		2029204011	4	20	m
63×8,6		2029204012	4	12	m
75×10,3		2029204013	4	8	m
90×12,3		2029204014	4	8	m
110×15,1		2029204006	4	4	m

Note:
Application class 1; 8 bar.
Application class 2; 6 bar.
Application class 4; 10 bar.
Application class 5; 6 bar.

coil bar pipes in tube bag carton box pallet N new ! available soon

* custom-made - lead time max 4 weeks | ** availability as agreed | *** while stock lasts

PPRCT pipe SDR9 - straight bars

GROUP: M

	Size [mm]	*	Code	6	666	UM
N	125×14		2029348042	5.8	249.4	m
N	160×17,9		2029348043	5.8	150.8	m
N	200×22,4		2029348044	5.8	81.2	m
N	250×27,9		2029348045	5.8	63.8	m
!	315×35,2		2029348046	5.8	23.2	m

PPRCT pipe SDR11 - straight bars

GROUP: M

	Size [mm]	*	Code	6	666	UM
N	125×11,4		2029348024	5.8	249.4	m
N	160×14,6		2029348025	5.8	150.8	m
N	200×18,2		2029348026	5.8	81.2	m
N	250×22,7		2029348027	5.8	63.8	m
N	315×28,6		2029348028	5.8	17.4	m
N	400×36,3		2029348030	5.8	17.4	m
N	450×40,9		2029348031	5.8	11.6	m
N	500×45,4		2029348032	5.8	11.6	m

PPRCT pipe SDR17 - straight bars

GROUP: M

	Size [mm]	*	Code	6	666	UM
N	125×7,4		2029348033	5.8	249.4	m
N	160×9,5		2029348034	5.8	150.8	m
N	200×11,9		2029348035	5.8	81.2	m
N	250×14,8		2029348036	5.8	63.8	m
N	315×18,7		2029348037	5.8	17.4	m
N	400×23,7		2029348039	5.8	17.4	m
N	450×26,7		2029348040	5.8	11.6	m

PPRCT pipe stabiGLASS SDR9 - straight bars

GROUP: M

	Size [mm]	*	Code	6	666	UM
N	125×14		2029192018	5.8	249.4	m
N	160×17,9		2029192019	5.8	150.8	m
N	200×22,4		2029192020	5.8	81.2	m
N	250×27,9		2029192021	5.8	63.8	m
!	315×35,2		2029192022	5.8	23.2	m

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PPRCT pipe stabiGLASS SDR11 - straight bars

GROUP: M

	Size [mm]	*	Code			UM
N	125×11,4		**2029192000**	5.8	249.4	m
N	160×14,6		**2029192001**	5.8	150.8	m
N	200×18,2		**2029192002**	5.8	81.2	m
N	250×22,7		**2029192003**	5.8	63.8	m
N	315×28,6		**2029192004**	5.8	17.4	m
N	400×36,3		**2029192006**	5.8	17.4	m
N	450×40,9		**2029192007**	5.8	11.6	m
N	500×45,4		**2029192008**	5.8	11.6	m

PPRCT pipe stabiGLASS SDR17 - straight bars

GROUP: M

	Size [mm]	*	Code			UM
N	125×7,4		**2029192009**	5.8	249.4	m
N	160×9,5		**2029192010**	5.8	150.8	m
N	200×11,9		**2029192011**	5.8	81.2	m
N	250×14,8		**2029192012**	5.8	63.8	m
N	315×18,7		**2029192013**	5.8	17.4	m
N	400×23,7		**2029192015**	5.8	17.4	m
N	450×26,7		**2029192016**	5.8	11.6	m
N	500×29,7		**2029192017**	5.8	11.6	m

coil | bar | pipes in tube | bag | carton box | pallet | N new | ! available soon

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Connectors

PP/Push saddle SDR6

GROUP: N

Size [mm]	*	Code			UM
63 / 18×2,0		2009238035	20	160	pc.
75 / 18×2,0		2009238036	20	160	pc.
90 / 18×2,0		2009238037	20	160	pc.
110 / 18×2,0		2009238038	20	160	pc.

Note:
The external diameter of PP pipe is given to which the saddle is welded, as well as the connection pipe diameter.

Female saddle SDR6

GROUP: N

Size [mm]	*	Code			UM
63 Rp½"		2009238024	20	100	pc.
75 Rp½"		2009238025	20	100	pc.
90 Rp½"		2009238026	20	100	pc.
110 Rp½"		2009238018	20	100	pc.

Note:
The external diameter of PP pipe is given to which the saddle is welded, as well as the diameter and type of thread.

Looping compensation SDR6

GROUP: N

Size [mm]	*	Code		UM
20		2009036004	20	pc.
25		2009036005	15	pc.
32		2009036008	10	pc.

Note:
Loop diameter Ø150, length 370 mm.

Crossover SDR6

GROUP: N

Size [mm]	*	Code		UM
20		2009269001	200	pc.
25		2009269004	130	pc.
32		2009269006	75	pc.

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Coupling SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009245007	100	700	pc.
25		2009245009	50	550	pc.
32		2009245011	40	280	pc.
40		2009245013	30	180	pc.
50		2009245015	10	110	pc.
63		2009245017	-	60	pc.
75		2009245019	-	45	pc.
90		2009245021	-	24	pc.
110		2009245002	-	16	pc.

Coupling reducer SDR6

GROUP: N

Size [mm]	*	Code			UM
! 25 / 20		2009220122	50	550	pc.
! 32 / 25		2009220123	40	280	pc.

Nipple reducer SDR6

GROUP: N

Size [mm]	*	Code			UM
25 / 20		2009220015	100	900	pc.
32 / 20		2009220017	80	640	pc.
32 / 25		2009220019	80	560	pc.
40 / 20		2009220021	50	400	pc.
40 / 25		2009220023	50	350	pc.
40 / 32		2009220025	50	300	pc.
50 / 32		2009220001	30	180	pc.
50 / 40		2009220027	30	150	pc.
63 / 32		2009220029	-	100	pc.
63 / 40		2009220031	-	100	pc.
63 / 50		2009220033	-	100	pc.
75 / 50		2009220035	-	80	pc.
75 / 63		2009220037	-	50	pc.
90 / 50		2009220039	-	48	pc.
90 / 63		2009220041	-	45	pc.
90 / 75		2009220043	-	45	pc.
110 / 63		2009220003	-	27	pc.
110 / 75		2009220004	-	27	pc.
110 / 90		2009220005	-	27	pc.

Note:
Nipple reducers are intended for direct welding into the fitting socket from the bigger diameter side.
The smaller diameter is intended for direct connection with the pipe.

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Nipple reducer SDR9

GROUP: N

	Size [mm]	*	Code			UM
N	125 / 110		2009221000	-	20	pc.
N	160 / 110		2009221001	-	16	pc.
N	160 / 125		2009221002	-	8	pc.
N	200 / 160		2009221003	-	6	pc.
N	250 / 160		2009221009	1	3	pc.
N	250 / 200		2009221008	1	3	pc.
!	315 / 160		2009221012	1	1	pc.
!	315 / 200		2009221011	1	1	pc.
!	315 / 250		2009221010	1	1	pc.

Nipple reducer SDR11

GROUP: N

	Size [mm]	*	Code		UM
N	125 / 110		2009221004	1	pc.
N	160 / 110		2009221005	1	pc.
N	160 / 125		2009221006	1	pc.
N	200 / 160		2009221007	1	pc.

Electrofusion coupling SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009088005	20	120	pc.
25		2009088006	20	120	pc.
32		2009088007	20	120	pc.
40		2009088008	10	30	pc.
50		2009088001	5	20	pc.
63		2009088002	5	15	pc.
75		2009088003	4	8	pc.
90		2009088004	2	8	pc.
110		2009088000	1	4	pc.

Electrofusion coupling SDR9

GROUP: N

	Size [mm]	*	Code			UM
N	125		2009088057	1	10	pc.
N	160		2009088058	1	6	pc.
N	200		2009088059	1	3	pc.
N	250		2009088060	1	2	pc.
!	315		2009088054	-	1	pc.

Electrofusion coupling SDR13.6

GROUP: N

	Size [mm]	*	Code		UM
N	450		2009088056	1	pc.

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Electrofusion coupling SDR17

GROUP: N

Size [mm]	*	Code		UM
N 400		2009088055	1	pc.

Female connector SDR6

GROUP: N

Size [mm]	*	Code			UM
20 Rp½"		2009245028	20	180	pc.
20 Rp¾"		2009245030	30	150	pc.
25 Rp½"		2009245032	20	160	pc.
25 Rp¾"		2009245034	30	150	pc.
25 Rp1"		2009245207	-	80	pc.
32 Rp¾"		2009245038	20	60	pc.
32 Rp1"		2009245036	20	60	pc.
40 Rp1¼"		2009245039	-	60	pc.
50 Rp1½"		2009245041	-	35	pc.
63 Rp2"		2009245043	-	18	pc.
75 Rp2½"		2009245045	-	12	pc.
90 Rp3"		2009245047	-	8	pc.

Note:
Elements with 1" thread and bigger have a polygon for a wrench.

Male connector SDR6

GROUP: N

Size [mm]	*	Code			UM
20 R½"		2009245056	20	160	pc.
20 R¾"		2009245058	30	120	pc.
25 R½"		2009245060	20	140	pc.
25 R¾"		2009245062	20	100	pc.
25 R1"		2009245201	-	80	pc.
32 R1"		2009245064	20	60	pc.
32 R1¼"		2009245202	-	50	pc.
40 R1¼"		2009245067	-	50	pc.
50 R1½"		2009245069	-	36	pc.
63 R2"		2009245071	-	18	pc.
75 R2½"		2009245073	-	10	pc.
90 R3"		2009245075	-	6	pc.

Note:
Elements with 1" thread and bigger have a polygon for a wrench.

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Elbow 90° SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009068027	100	500	pc.
25		2009068029	50	350	pc.
32		2009068031	50	200	pc.
40		2009068033	20	100	pc.
50		2009068035	10	60	pc.
63		2009068037	-	32	pc.
75		2009068039	-	20	pc.
90		2009068041	-	12	pc.
110		2009068023	-	8	pc.

Elbow 90° SDR9

GROUP: N

	Size [mm]	*	Code		UM
N	125		2009068259	8	pc.
N	160		2009068260	5	pc.
N	200		2009068261	3	pc.
N	250		2009068262	1	pc.
!	315		2009068263	1	pc.
N	400		2009068264	1	pc.

Elbow 90° SDR11

GROUP: N

	Size [mm]	*	Code		UM
N	125		2009068272	1	pc.
N	160		2009068273	1	pc.
N	200		2009068274	1	pc.
N	250		2009068275	1	pc.
N	315		2009068276	1	pc.
N	400		2009068277	1	pc.

Nipple elbow 90° SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009068080	100	600	pc.
25		2009068081	50	400	pc.
32		2009068075	50	200	pc.

coil bar pipes in tube bag carton box pallet N new ! available soon

* custom-made - lead time max 4 weeks | ** availability as agreed | *** while stock lasts

Elbow 45° SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009068005	100	700	pc.
25		2009068007	50	400	pc.
32		2009068009	40	200	pc.
40		2009068011	20	140	pc.
50		2009068013	-	80	pc.
63		2009068015	-	40	pc.
75		2009068017	-	25	pc.
90		2009068019	-	14	pc.
110		2009068000	-	10	pc.

Elbow 45° SDR9

GROUP: N

	Size [mm]	*	Code		UM
N	125		2009068252	11	pc.
N	160		2009068253	6	pc.
N	200		2009068254	3	pc.
N	250		2009068255	1	pc.
!	315		2009068256	1	pc.

Elbow 45° SDR11

GROUP: N

	Size [mm]	*	Code		UM
N	160		2009068266	1	pc.
N	125		2009068265	1	pc.
N	200		2009068267	1	pc.
N	250		2009068268	1	pc.
N	315		2009068269	1	pc.
N	400		2009068270	1	pc.
N	450		2009068271	1	pc.

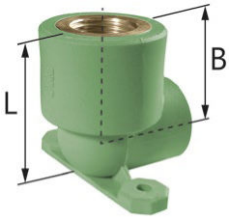
Nipple elbow 45° SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009068073	100	700	pc.
25		2009068074	50	450	pc.

Female directly fixed wallplate elbow - L = 45 mm SDR6

GROUP: N



Size [mm]	*	Code			UM
20 Rp½"		2009068085	20	140	pc.

Note:
B = 29 mm.

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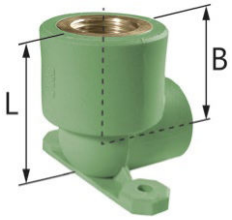
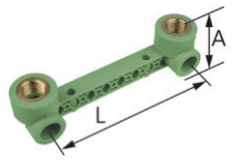


Female directly fixed wallplate elbow - L = 57 mm SDR6

GROUP: N

Size [mm]	*	Code			UM
25 Rp½"		**2009068086**	20	120	pc.

Note:
B = 36 mm.



PP-R double female directly fixed wallplate elbow 90° - L = 148,5 mm SDR6

GROUP: N

Size [mm]	*	Code			UM
N 20 Rp½"		**2009285000**	1	30	pc.
N 25 Rp½"		**2009285001**	1	30	pc.

Note:
20 Rp½" A = 45,5 mm
25 Rp½" A = 50,7 mm

Male elbow 90° SDR6

GROUP: N

Size [mm]	*	Code			UM
20 R½"		**2009068058**	30	90	pc.
20 R¾"		**2009068060**	30	90	pc.
25 R½"		**2009068062**	20	120	pc.
25 R¾"		**2009068064**	30	90	pc.
32 R¾"		**2009068067**	30	60	pc.
32 R1"		**2009068066**	15	45	pc.

Note:
A fitting with 1" thread and bigger has a polygon for a wrench.

Female elbow 90° SDR6

GROUP: N

Size [mm]	*	Code			UM
20 Rp½"		**2009068045**	20	140	pc.
20 Rp¾"		**2009068047**	30	120	pc.
25 Rp½"		**2009068049**	30	120	pc.
25 Rp¾"		**2009068051**	30	120	pc.
32 Rp¾"		**2009068054**	30	90	pc.
32 Rp1"		**2009068053**	15	45	pc.

Note:
A fitting with 1" thread and bigger has a polygon for a wrench.

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Tee SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009257006	80	400	pc.
25		2009257008	20	240	pc.
32		2009257010	20	140	pc.
40		2009257012	15	75	pc.
50		2009257014	5	30	pc.
63		2009257016	-	24	pc.
75		2009257018	-	15	pc.
90		2009257020	-	10	pc.
110		2009257000	-	6	pc.

Tee SDR9

GROUP: N

	Size [mm]	*	Code		UM
N	125		2009257126	5	pc.
N	160		2009257127	3	pc.
N	200		2009257128	2	pc.
N	250		2009257129	1	pc.
!	315		2009257130	1	pc.
N	400		2009257131	1	pc.
N	450		2009257132	1	pc.

Tee SDR11

GROUP: N

	Size [mm]	*	Code		UM
N	125		2009257133	1	pc.
N	160		2009257134	1	pc.
N	200		2009257135	1	pc.
N	250		2009257136	1	pc.
N	315		2009257137	1	pc.
N	400		2009257138	1	pc.
N	450		2009257139	1	pc.

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Reducing tee SDR6

GROUP: N

Size [mm]	*	Code			UM
25 / 20 / 20		2009260013	20	140	pc.
25 / 25 / 20		2009260016	20	140	pc.
25 / 20 / 25		2009260000	20	240	pc.
32 / 20 / 20		2009260021	20	200	pc.
32 / 20 / 32		2009260022	20	140	pc.
32 / 25 / 25		2009260024	20	140	pc.
32 / 25 / 32		2009260025	20	140	pc.
40 / 20 / 40		2009260028	20	80	pc.
40 / 25 / 40		2009260029	15	90	pc.
40 / 32 / 40		2009260031	15	90	pc.
50 / 20 / 50		2009260034	-	60	pc.
50 / 25 / 50		2009260035	-	65	pc.
50 / 32 / 50		2009260036	-	60	pc.
50 / 40 / 50		2009260039	-	50	pc.
63 / 32 / 63		2009260042	-	30	pc.
63 / 40 / 63		2009260044	-	22	pc.
63 / 50 / 63		2009260046	-	22	pc.
75 / 40 / 75		2009260002	-	17	pc.
90 / 50 / 90		2009260049	-	12	pc.
90 / 63 / 90		2009260051	-	10	pc.
90 / 75 / 90		2009260053	-	10	pc.
110 / 63 / 110		2009260003	-	8	pc.
110 / 75 / 110		2009260143	-	8	pc.
110 / 90 / 110		2009260141	-	8	pc.

Reducing tee SDR9

GROUP: N

	Size [mm]	*	Code		UM
N	160 / 110 / 160		2009260167	4	pc.
N	200 / 160 / 200		2009260168	2	pc.
N	250 / 160 / 250		2009260171	1	pc.
N	250 / 200 / 250		2009260172	1	pc.
!	315 / 160 / 315		2009260175	1	pc.
!	315 / 200 / 315		2009260174	1	pc.
!	315 / 250 / 315		2009260173	1	pc.

Reducing tee SDR11

GROUP: N

	Size [mm]	*	Code		UM
N	160 / 110 / 160		2009260169	1	pc.
N	200 / 160 / 200		2009260170	1	pc.

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Electrofusion reducing tee SDR9

GROUP: N

	Size [mm]	*	Code			UM
N	125 / 110 / 125		2009088062	1	6	pc.
N	160 / 125 / 160		2009088061	1	4	pc.

Side outlet tee SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009257037	40	360	pc.

Cross SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009057002	40	320	pc.
25		2009057007	20	140	pc.

Male tee SDR6

GROUP: N

	Size [mm]	*	Code			UM
	20 R½"		2009257035	20	120	pc.
N	25 R½"		2009257108	30	90	pc.
N	25 R¾"		2009257111	30	90	pc.

Female tee SDR6

GROUP: N

Size [mm]	*	Code			UM
20 Rp½"		2009257024	20	120	pc.
20 Rp¾"		2009257026	30	90	pc.
25 Rp½"		2009257028	20	180	pc.
25 Rp¾"		2009257030	30	180	pc.
32 Rp¾"		2009257033	15	60	pc.
32 Rp1"		2009257032	15	60	pc.

Note:
An element with 1" thread has a polygon for a wrench.

Union SDR6

GROUP: N

Size [mm]	*	Code			UM
20 G¾"		2009065000	20	200	pc.

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Female half union with flat sealing SDR6

GROUP: N

	Size [mm]	*	Code			UM
	20 G¾"		2009105002	50	400	pc.
	25 G1"		2009105004	20	100	pc.
N	32 G1¼"		2009105013	10	100	pc.

Female half union with flat sealing SDR6

GROUP: N

	Size [mm]	*	Code			UM
	20 Rp½"		2009271041	20	200	pc.
	20 Rp¾"		2009271042	20	200	pc.
	25 Rp¾"		2009271043	20	200	pc.

Female union SDR6

GROUP: N

	Size [mm]	*	Code			UM
N	20 G½"		2009271052	20	200	pc.
N	25 G¾"		2009271055	20	100	pc.
N	32 G1"		2009271058	20	80	pc.

Male union SDR6

GROUP: N

	Size [mm]	*	Code			UM
	20 G½"		2009271002	20	200	pc.
	20 G¾"		2009271004	20	200	pc.
	25 G¾"		2009271008	20	100	pc.
	25 G1"		2009271006	20	100	pc.
	32 G1"		2009271010	20	60	pc.
	40 G1¼"		2009271059	4	40	pc.
	50 G1½"		2009271060	4	32	pc.
	63 G2"		2009271061	2	16	pc.

Flange adapter SDR6

GROUP: N

	Size [mm]	*	Code			UM
	40		2009091012	1	40	pc.
	50		2009091013	1	30	pc.
	63		2009091014	1	20	pc.
	75		2009091015	1	15	pc.
	90		2009091016	1	10	pc.
	110		2009091011	1	6	pc.

Note:
The flange adapter is delivered with an EPDM seal.

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Flange adapter SDR9

GROUP: N

	Size [mm]	*	Code		UM
N	160		2009091024	8	pc.
N	200		2009091025	5	pc.
N	250		2009091026	3	pc.
!	315		2009091027	1	pc.

Flange adapter SDR11

GROUP: N

	Size [mm]	*	Code		UM
N	160		2009091031	1	pc.
N	200		2009091032	1	pc.
N	250		2009091033	1	pc.
N	315		2009091034	1	pc.

Steel flange PN16

GROUP: N

Size [mm]	*	Code		UM
40		1209091002	1	pc.
50		1209091003	1	pc.
63		1209091004	1	pc.
75		1209091005	1	pc.
90		1209091006	1	pc.
110		1209091001	1	pc.
160		1209091032	1	pc.
200		1209091033	1	pc.
250		1209091034	1	pc.
315		1209091035	1	pc.

Bend 90° SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009011002	30	300	pc.
25		2009011000	20	180	pc.
32		2009011001	15	180	pc.

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Stop end SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009025006	200	1000	pc.
25		2009025008	100	700	pc.
32		2009025010	50	500	pc.
40		2009025012	50	250	pc.
50		2009025014	-	170	pc.
63		2009025016	-	80	pc.
75		2009025018	-	50	pc.
90		2009025020	-	30	pc.
110		2009025000	-	20	pc.

Stop end SDR9

GROUP: N

	Size [mm]	*	Code			UM
N	125		2009250004	1	24	pc.
N	160		2009250000	-	16	pc.
N	200		2009250001	-	5	pc.
N	250		2009250005	1	24	pc.

Stop end SDR11

GROUP: N

	Size [mm]	*	Code		UM
N	160		2009250002	1	pc.
N	200		2009250003	1	pc.

Ball valve SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009278001	10	90	pc.
25		2009278002	10	50	pc.
32		2009278003	5	25	pc.
40		2009278005	5	15	pc.
50		2009278006	2	10	pc.
63		2009277002	2	8	pc.
75		2009277003	1	5	pc.

Globe valve SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009280006	1	30	pc.
25		2009280008	1	30	pc.
32		2009280010	1	30	pc.

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Concealed globe valve with a knob SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009280000	1	30	pc.
25		2009280002	1	40	pc.
32		2009280004	1	20	pc.
40		2009277004	5	15	pc.
63		2009277005	1	20	pc.

Note:
The valves are delivered in a set with two plastic clips to mark hot (red) or cold (blue) water.

Concealed globe valve with masking SDR6

GROUP: N

Size [mm]	*	Code			UM
20		2009280015	1	30	pc.
25		2009280016	1	30	pc.
32		2009280017	1	30	pc.

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Accessories

Pipe clip

GROUP: N

Size [mm]	*	Code			UM
20		2009107025	20	800	pc.
25		2009107026	20	700	pc.
32		2009107027	20	440	pc.
40		2009107028	20	300	pc.
50		2009107030	20	240	pc.
63		2009107031	20	120	pc.
75		2009107032	20	100	pc.
90		2009107033	10	60	pc.

Note:
Use only as sliding points.

Single pipe clamp with rubber insert

GROUP: A

Size [mm]	*	Code		UM
20-23		1700081028	100	pc.
25-28		1700081029	100	pc.
32-36		1700081030	50	pc.
40-44		1700081031	50	pc.
47-52		1700081032	50	pc.
57-63		1700081034	50	pc.
74-78		1700081035	25	pc.
85-91		1700081036	25	pc.
108-112		1700081023	25	pc.

Note:
The clamp has a double-threaded screw with a collar (8×70) a plastic dowel (Ø12) in the set.

Double pipe clamp with rubber insert

GROUP: A

Size [mm]	*	Code		UM
20-23		1700081020	50	pc.
25-28		1700081021	50	pc.
32-36		1700081022	50	pc.

Note:
The clamp has a double-threaded screw with a collar (8×70) a plastic dowel (Ø12) in the set.

Mounting plate

GROUP: N

Size [mm]	*	Code			UM
L = 150		2009210000	30	150	pc.
Mounting plate 150 mm - plate total lenght 215 mm, width 64 mm, depth 6 mm.					

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NOTES

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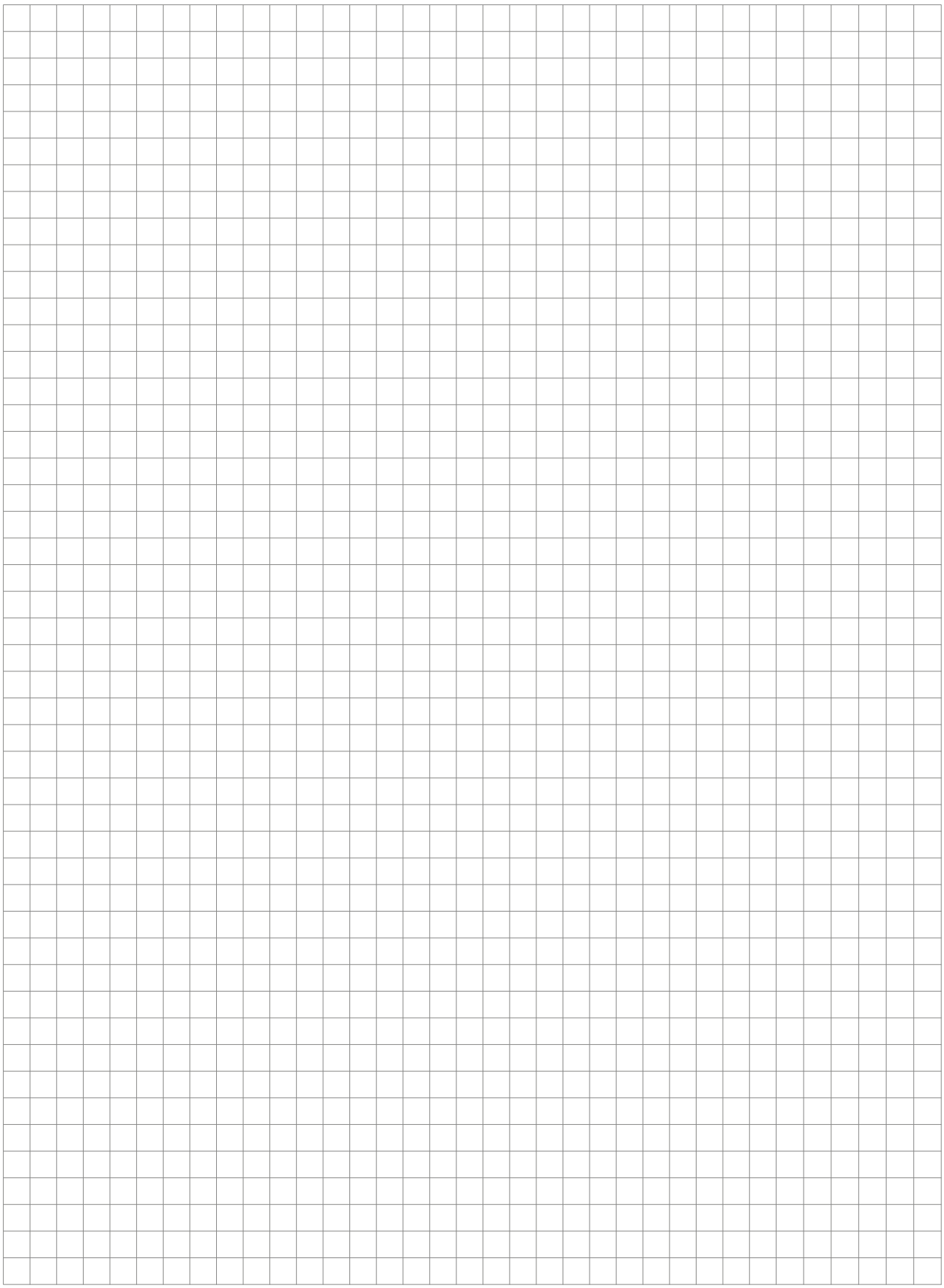
NOTES



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