van Walraven



INSTALLATION

PPR

Plastic Piping Systems

vanwalraven.com

PPR

PPR is available in several versions

* PPR Superflux solid-wall (1)
* PPR Faser fiber-T SDR 7.4 (2)
* PPR Faser fiber-C SDR 11 (3)

All compatible with the same injection-molded fittings.

Application range for Aquatechnik piping systems

- Recommended due to technical advantages
- Possible use
- Not suitable

	PPR Superflux (1) solid-wall	(2) PPR Faser fiber-T SDR7.4	PPR(3) Faser fiber-C SDR 11
High-temperature drinking water	●	●	●
Low-temperature drinking water	●	●	●
Heating	●	●	●
Cooling	●	●	●
Chilled water	●	●	●
Swimming pools	●	●	●
Heating/cooling for sports facilities	●	●	●
Chemical transport*	●	●	●
Rainwater	●	●	●
Irrigation	●	●	●
Compressed air	●	●	●
Radiant floor heating & cooling	●	●	●
Marine	●	●	●
District heating**	●	●	●
Civil geothermal systems	●	●	●
Industrial geothermal systems	●	●	●
Agriculture	●	●	●
UV exposure	●	●	●
Fire resistance	●	●	●

*After a technical company evaluation

**At high temperature (max 90°C)

PPR Superflux SDR 7.4 solid-wall pipe

With its wide range of diameters and extensive pipe selection, this system can be used across a broad variety of civil and industrial applications, including sanitary, heating, irrigation, and compressed-air systems. The pipes are suitable for transporting hot and cold drinking water at the temperatures and working pressures listed in the tables on page 10.

It's ideal for transporting aggressive fluids, thanks to its excellent resistance to corrosive agents such as alkalis and acids. If you're transporting chemicals, please confirm suitability with our sales department.

STANDARDS AND CERTIFICATIONS

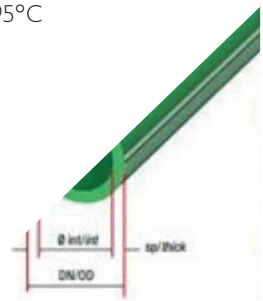
This product complies with key international standards, including:

- EN ISO 15874
- DIN 8077/8078
- ASTM F2389

It meets all organoleptic requirements for drinking-water transport for human consumption, as well as the conveyance of hot and cold fluids, heating, cooling, and compressed air.

Features

Material:
PP-R80 Super
Thermal conductivity at 20°C:
λ 0.220 W/mK
Linear thermal
expansion coefficient:
λ 0.15 mm/mK
Internal resistance/roughness:
0.007 mm
Color:
green with gray stripe
Size range:
20 to 125 mm
Temperature resistance:
10–95°C



Item	SDR	DN/OD	Ø	Wall Thickness	DN	H2O Content	Weight	Length	Quantity per bundle
			mm	mm		l/m	Kg/m	m	m
172700	7,4	20	14.4	2,8	15	0.163	0.151	4.0	100.0
172701	7,4	25	18.0	3.5	20	0.254	0.232	4.0	100.0
172702	7,4	32	23.2	4.4	25	0.423	0.375	4.0	40.0
172703	7,4	40	29.0	5.5	32	0.661	0.58	4.0	40.0
172704	7,4	50	36.2	6.9	40	1.029	0.896	4.0	20.0
172705	7,4	63	45.8	8.6	50	1.647	1.410	4.0	20.0
172706	7,4	75	54.4	10.3	-	2.324	1.993	4.0	20.0
172707	7,4	90	65.4	12.3	65	3.359	2.855	4.0	12.0
172708	7,4	110	79.8	15.1	80	5.001	4.311	4.0	8.0
172709	7,4	125	90.8	17	-	6.475	5.313	4.0	4.0

Features

Material:
PP-RCT WOR super fiber-reinforced
Thermal conductivity at 20°C:

λ 0.190 W/mK
Linear thermal
expansion coefficient:
λ 0.035 mm/mK
Internal resistance/roughness:
0.007 mm
Color:
20–125 mm green with red stripe, white on the inside. 160–200 mm white with red stripe
Size range:
20 to 200 mm
Temperature resistance:
10–95°C

PPR Faser fiber-T SDR 7.4 multilayer pipe

Thanks to the wide diameter range and broad selection of pipes, the system can be used across a wide variety of civil, industrial, and service applications for plumbing/sanitary, heating, irrigation, and compressed-air systems. The pipes are suitable for transporting hot and cold drinking water at the temperatures and working pressures listed in the tables on page 9.

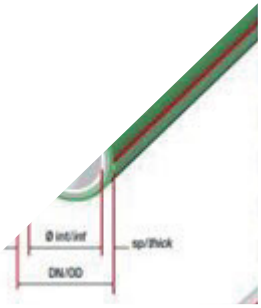
Fusio-technik Faser FIBER-T, SDR 7.4, made of PP-RCT WOR (White Oxidation Resistance), is specifically recommended for building sanitary, mechanical, compressed-air, and process-fluid systems.

STANDARDS AND CERTIFICATIONS

The product meets the requirements of the standards

- EN ISO 15874-2
- DIN 8077-8078
- ASTM F2389

(dimensions and pressure ratings for polypropylene pipes) for transporting hot and cold fluids for human consumption, heating, air conditioning, and mechanical systems in general. The fusio-technik system is also certified by leading authorities in Europe and worldwide. The first fiber-reinforced PP-R pipe certified by IIP, ICC-ES, and Lloyd's Register.





Item	SDR	DN/OD	Ø	Wall thickness	DN	H2O content	Weight	Roll length	Quantity per bundle
			mm	mm		l/m	Kg/m	m	m
173063	7,4	20	14.4	2,8	15	0,163	0.151	4,0	100,0
173064	7,4	25	18.0	3,5	20	0.254	0.232	4,0	100,0
173065	7,4	32	23.2	4,4	25	0.423	0.375	4,0	40,0
173066	7,4	40	29.0	5,5	32	0.661	0.58	4,0	40,0
173067	7,4	50	36.2	6,9	40	1.029	0.896	4,0	20,0
173068	7,4	63	45.8	8,6	50	1.647	1.410	4,0	20,0
173069	7,4	75	54.4	10,3	-	2.324	1.993	4,0	20,0
173070	7,4	90	65.4	12,3	65	3.359	2.855	4,0	12,0
173071	7,4	110	79.8	15,1	80	5.001	4.311	4,0	8,0
173072	7,4	125	90.8	17	-	6.475	5.313	4,0	4,0

PPR Fiber-C SDR 11 multilayer pipe

Fusio-technik fiber FIBER-COND, SDR 11, in PP-RCT WOR (White Oxidation Resistance), specially recommended for building mechanical systems: heating and air conditioning, compressed air, and technical fluids. Suitable for conveying drinking water. Thanks to the high performance of the raw materials used, systems can be built with thinner pipe walls than conventional solutions, increasing total water flow. Diffusion-tight due to PP-RCT WOR (White Oxidation Resistance).

STANDARDS AND CERTIFICATIONS

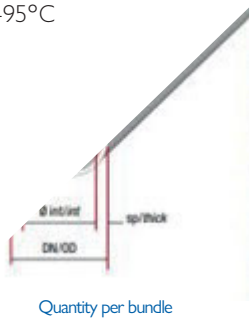
The product complies with key international standards, including:

- EN ISO 15874-2
- DIN 8077/8078
- ASTM F2389

Meets all organoleptic requirements for transporting drinking water for human consumption, as well as conveying hot and cold fluids, heating, cooling, and compressed air.

Specifications

Material:
PP-RCT WOR Superfiber reinforced
Thermal conductivity at 20°C:
λ 0.190 W/mK
Linear thermal expansion coefficient:
λ 0.190 mm/mK
Internal resistance/roughness:
0.007 mm
Color:
White with gray stripe
Sizes:
32 to 400 mm
Temperature resistance:
10–95°C



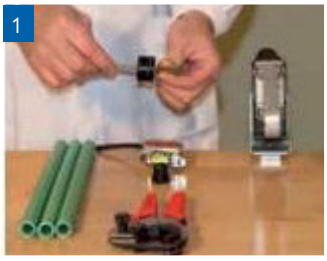
Item	SDR	DN/OD	Ø	Thickness	DN	H2O cont.	Weight	Rod length	Quantity per bundle
			mm	mm		L/min	kg/m	m	m
173060	11	32	26.2	2.9	25	0,539	0.289	4.0	40.0
173061	11	40	32.6	3,7	32	0.835	0.438	4.0	40.0
172717	11	50	40.8	4,6	40	1.307	0.680	4.0	20.0
172718	11	63	51.4	5,8	50	2.075	1.070	4.0	20.0
172719	11	75	61.4	6,8	65	2961	1.499	4.0	20.0
172720	11	90	73.6	8,2	80	4.254	2.171	4.0	12.0
172721	11	110	90.0	10,0	-	6.362	3.282	4.0	8.0
172722	11	125	102.2	11,4	100	8.203	4.054	5,8	4.0
172723	11	160	130.8	14,6	125	13.437	6.733	5,8	5,8

Processing PPR

The PPR system can be processed in different ways, depending on the diameter.

	Dimensions (mm)																		
Ø	20	25	32	40	50	63	75	90	110	125	160	200	250	315	355	400	500	560	630
Socket fusion	•	•	•	•	•	•	•	•	•	•									
Butt fusion											•	•	•	•	•	•	•	•	•
Electrofusion	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

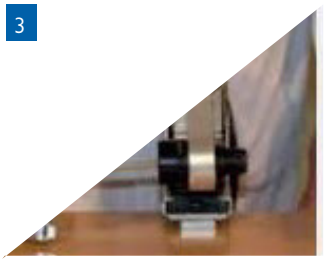
1 **Socket fusion**



Install and secure the dies on the polyfusion welding machine, and make sure they're in perfect condition: dies with damaged Teflon, deformed surfaces, or buildup of (non-removable) welding residue must be replaced.



Switch on the polyfusion welder and wait until it reaches operating temperature.



Lock the dies again.



Carefully cut the pipe square. Use cutting tools intended for plastics, such as shears or rotary pipe cutters.



Use the designated markings to indicate the weld depth and insertion direction.



Start welding by pressing the pipe and fitting into the dies at the same time until they reach the stop. Work straight (axially) without twisting. Keep the pipe and fitting in the dies until the heating time has elapsed (see the welding time table on the next page).



Once the heating time is complete, remove the parts from the dies and assemble them, observing the maximum assembly times (see the welding time table on the next page).

Welding time table

Working time table

OD pipe Ø	Weld depth	Heating times	Heating times	Assembly	Cooling
mm	mm	sec. DVS	sec.≤ +5°C	sec.	min.
20	14.0	5	8	4	2
25	15.0	7	11	4	2
32	16.5	8	12	6	4
40	18.0	12	18	6	4
50	20.0	18	27	6	4
63	24.0	24	36	8	6
75	26.0	30	45	8	8
90	29.0	40	60	8	8
110	32.5	50	75	10	8
125	40.0	60	90	10	8

Note:

a) Heating times are intended as a pause once the pipe and fitting have reached the stop in the dies.

b) Do not push the parts any further once they have reached the stop.

c) For outdoor temperatures below +5°C, use the times shown in the dedicated column.

2. Socket fusion

1



Connect the unit and install the clamping inserts for the pipe diameter being processed.

2



Bring the pipe ends together and make sure they are perfectly aligned.

3



Mount the facing tool on the machine and machine both ends.

4



Install the heating plate.

5



Assemble the heating plate. Heat according to the welding times in the table above.

6



Remove the plate, join the pipes, and let the joint cool according to the welding time table.

3. Electrofusion

1



Remove the electrofusion coupling from the packaging. Keep the label for the correct electrofusion machine settings.

2



Measure the length of the coupling and divide the result by two.

3



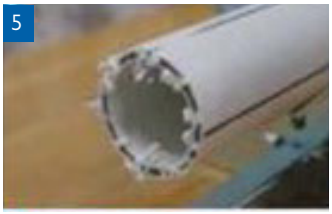
Add 1 cm to the measured value so the section of the main pipe that must be scraped is clearly defined. Mark this measurement on the pipe with a suitable marker.

4



Scrape off at least 0.1 mm for pipes up to 63 mm, and at least 0.2 mm for larger diameters.

5



Remove any burrs.

6



Clean the pipe ends.

7



Slide the pipe ends into the coupling until they reach the stop.

8



Connect the coupling to the electrofusion unit using the connectors.

9



Set the electrofusion unit to the correct temperature and voltage values by scanning the barcode on the label or entering the values manually on the designated display. **CAUTION:** keep a safe distance during electrofusion welding.

Item	OD Pipe ∅	Voltage	Warm-up Times	Cooling
mm	mm	V	sec.	min.
173005	40	20	122	10
173006	50	40	87	10
173007	63	40	165	15
173008	75	40	150	15
173009	90	40	125	20
173010	110	38	190	20
173011	125	40	160	20
173012	160	30	680	40
173013	200	30	16min	40
173014	250	30	27min	40

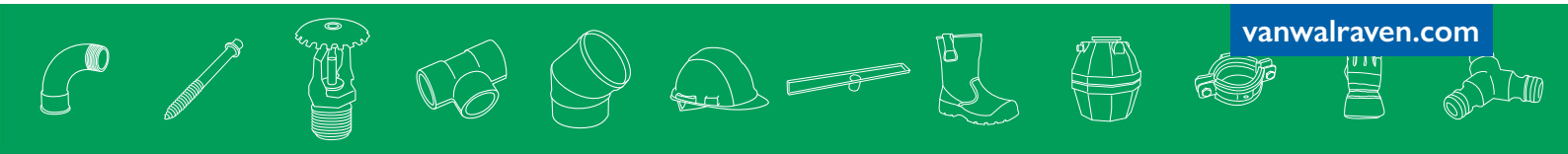
Sanitary Applications Overview

Temperature Resistance

Temperature	Years in Service	Solid-wall pipes SDR 7.4|*SF1.5 bar	Fiber strengthmultilayer pipes SDR 7.4|*SF1.5 bar	Fiber strength multilayer pipes SDR 11|*SF1.5 bar
10 °C	10	28.7	31.3	19.9
	25	26.2	30.4	19.3
	50	23.8	29.6	18.8
	100	23.2	28.0	17.7
20 °C	10	25.3	28.5	18.1
	25	23.2	27.4	17.4
	50	21.1	26.8	17.0
	100	20.5	25.3	16.1
30 °C	10	22.0	25.4	16.1
	25	20.2	24.5	15.5
	50	18.5	23.9	15.2
	100	17.8	22.7	14.4
40 °C	10	18.6	22.3	14.2
	25	17.2	21.5	13.7
	50	15.8	21.1	13.4
	100	15.1	20.1	12.8
50 °C	10	15.3	19.2	12.2
	25	14.2	18.7	11.8
	50	13.1	18.2	11.5
	100	12.4	17.5	11.1
60 °C	10	12.0	16.2	10.3*
	25	11.2	15.5	9.8*
	50	10.4	15.4	9.7*
70 °C	10	8.6	13.1	8.3*
	25	8.2	12.7	8.0*
	50	7.7	12.5	7.9*
80 °C	10	7.5	11.0	7.0*
	25	6.9	10.4	6.6*
90 °C	5	5.7	8.5	5.4*
	10	-	7.9	5.0*

*SF =safety factor

Note: For segmented fittings derived frombutt-welded pipe segments, a pressurereduction factor of 0.8 must be applied.



Application overview: closed-loop systems—heating, air conditioning, district heating

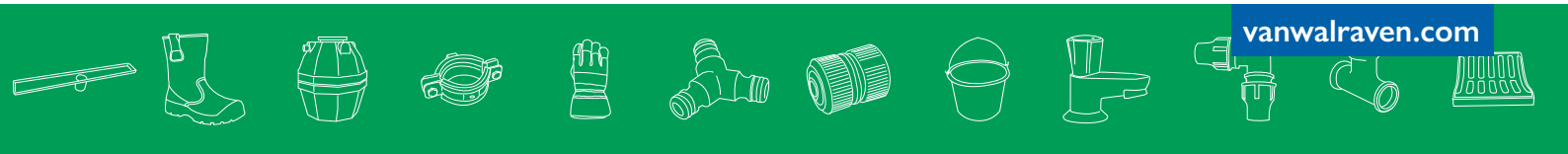
Temperature resistance

	Temperature	Years in service	Solid-wall pipes SDR 7.4 | *SF | 1.25 bar	Fiber-reinforced multilayer pipes SDR 7.4 | *SF 1.25 bar	Fiber-reinforced multilayer pipes SDR 11 | *SF 1.25 bar
Continuous temperature of 70°C, 30 days a year	75°C	5	11.0	16.2	10.3
		10	10.4	15.7	9.9
		25	9.9	15.2	9.6
		50	9.2	15.0	9.5
	80 °C	5	9.8	15.0	9.5
		10	9.6	14.8	9.4
		25	9.3	14.3	9.0
		50	9.1	14.0	8.9
	85 °C	5	8.9	13.8	8.7
		10	8.6	13.5	8.5
		25	8.2	13.0	8.2
		50	8.0	12.8	8.1
	95 °C	5	7.0	11.4	7.2
		10	6.6	10.9	6.9
		25	6.4	10.6	6.7
		50	6.2	10.4	6.6
Continuous temperature of 70°C, 60 days a year	75°C	5	10.6	16.0	10.1
		10	10.2	15.5	9.8
		25	9.9	15.2	9.6
		50	9.5	14.6	9.2
	80 °C	5	9.6	14.8	9.4
		10	9.3	14.3	9.0
		25	9.0	14.0	8.9
		50	8.6	13.4	8.5
	85 °C	5	8.7	13.5	8.5
		10	8.2	13.0	8.2
		25	8.0	12.8	8.1
		50	7.6	12.2	7.7
	95 °C	5	6.5	10.9	6.9
		10	6.3	10.6	6.7
		25	6.1	10.4	6.6
		50	5.7	9.8	6.2
Continuous temperature of 70°C, 30 days a year	75°C	5	10.2	15.5	9.8
		10	10.0	15.4	9.7
		25	9.6	14.7	9.3
		50	9.1	14.2	9.0
	80 °C	5	9.2	14.3	9.1
		10	9.1	14.2	9.0
		25	8.6	13.5	8.6
		50	8.2	13.0	8.2
	85 °C	5	8.2	13.0	8.2
		10	8.1	12.9	8.1
		25	7.7	12.3	7.8
		50	7.2	11.8	7.4
	95 °C	5	6.3	10.6	6.7
		10	6.2	10.5	6.6
		25	5.8	9.8	6.2
		50	5.4	9.4	5.9

*SF = safety factor

Note:
for applications using chilled water mixed with ethylene glycol or glycerin, -20°C. In that case, separate the pipes from the circulation pumps using expansion joints.

NOTE:
for segment fittings derived from butt-welded pipe segments, the pressure reduction factor of 0.8 must be applied.



Installation Principles and Pipe Clamping

Every pipe, whether made of plastic or metal, expands when the temperature of the fluid being transported rises. Linear expansion creates mechanical stresses that, if not properly controlled, can damage the system.

Installation outside Buildings

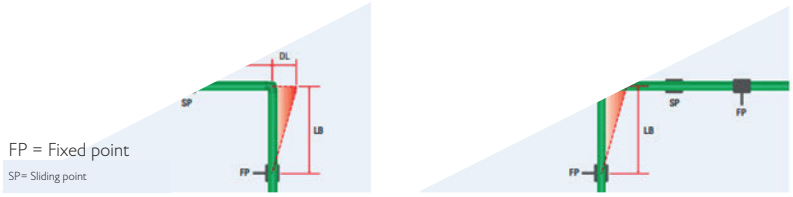
The installation of plumbing pipes, particularly outdoors, must be carried out in accordance with standards and local regulations, such as the EN 806 standard.
In the case of underground installation, the pipes are defined as self-compensating: the trench must be deep enough to prevent freezing, the pipe must be laid on a bed of sand and evenly covered with this sand. Furthermore, backfilling the trench must not damage the pipes, and they must be protected against crushing, especially where they are located beneath traffic areas. The installation must be equipped with an access point: special precautions must be taken in the case of sites with

a risk of pipe contamination. In these cases, the pipe must be protected. For exposed installation outside buildings, appropriate thermal insulation must be provided to prevent ice formation, and appropriate protection against direct UV radiation must be ensured.

Pipes in buildings can be installed either exposed or concealed. In concealed installations, the effects of linear thermal expansion are not taken into account, as the pipes are expected to compensate for this on their own. In contrast, linear thermal expansion must be accounted for in exposed installations. When securing pipes made of synthetic material, specific sliding clamps must be used to allow the pipe to slide, and fixed clamps to lock the pipe in place. When creating the fixed point, ensure absolutely secure anchoring by using threaded rods of a suitable diameter and limited length. For vertical risers in the shaft, aesthetics are not a concern, but proper bracing is all the more important due to linear thermal expansion.

Due to linear thermal expansion.
The pipes must be equipped with fixed points. This is of fundamental importance near T-fittings: the fixed points must be placed both immediately after the fitting (in the direction of flow) and at the start of the branch. For the riser pipe, the bracket spacing must be increased by 20% compared to the tables. When installing exposed pipes with external anchoring (e.g., basements, boiler rooms, and power plants), straight and extended omega expansion joints or directional changes with bends must be used. For installations with many changes in direction or level and with short straight sections, the effects of expansion can be ignored, with only fixed points being secured.

Curved or L-shaped expansion compensators

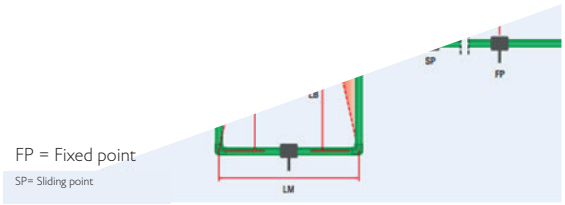


This is the most commonly used type of expansion joint, as it is usually possible to utilize the change in the pipe run to create it. The length of the curved sides of the expansion joint is calculated using the following formula:

LB= C ·˜(D Ð DL)

where:
LB = bend arm length (mm)
C = material constant (see data in the table)
D = outer pipe diameter (mm)
DL = linear thermal expansion (mm)

If it is not possible to compensate for changes in the pipe run (using curved or
L-shaped expansion joints), for example where there are long straight sections, omega- or U-shaped expansion joints must be fabricated.

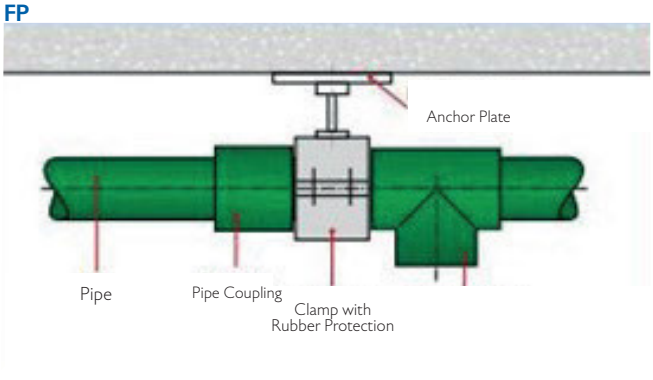


Pipe bracketing is an important step to keep thermal linear expansion within limits in a system. To compensate for expansion, expansion compensators can be used.

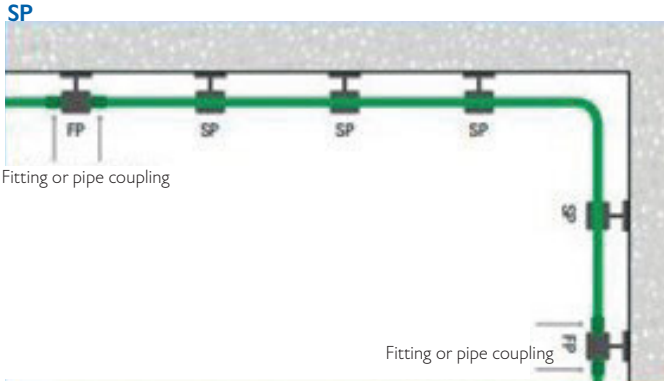
Correct placement and sizing of the clamp must be determined based on the pipe type used and the temperature of the fluid being conveyed. It's also important to know that, to eliminate and compensate for all effects caused by linear thermal expansion, you need supports that—besides being correctly sized—completely prevent any pipe movement (fixed points, for example near fittings) and supports that allow the pipe to slide. Make sure in this case, clamp it in such a way that valves and/or fittings do not hinder sliding.

Fixed points restrict pipe movement and divide the line into separate sections that expand linearly. When creating fixed points, take into account all forces acting on the pipe section at the same time (linear expansion, the weight of the material and fluid, and other additional loads). Fixed points must be stronger than a sliding clamp; we recommend always using fixed points where there are branches or shut-off components. Fixed points can also be placed at locations in the system of your choice; in that case, position them so changes in pipe direction can be used to help absorb linear expansion.

Clamp diagram: fixed point FP



Clamping diagram: fixed point FP + sliding point SP



Clamp spacing

For proper pipe clamping, the tables below list clamp spacing based on the temperature of the fluid being conveyed.

Note:

A clamp with a fixed point must always be installed near bends or tees. This is especially critical near tee branches: fixed points must be placed both directly after the fitting (in the direction of flow) and at the start of the branch.

SDR 7.4 single-layer fusio-technik clamp spacing (cm)

	Ø20	Ø25	Ø32	Ø40	Ø50	Ø63	Ø75	Ø90	Ø110	Ø125
0°C	80	100	120	140	165	190	205	220	250	280
20°C	60	75	90	100	120	140	150	160	180	210
30°C	60	75	90	100	120	140	150	160	180	210
40°C	60	70	80	90	110	130	140	150	170	200
50°C	60	70	80	90	110	130	140	150	170	200
60°C	55	65	75	85	100	115	125	140	160	190
70°C	50	60	70	80	95	105	115	125	140	160

Clamp spacing

The intermediate PP-R layer with fiberglass used to manufacture fusio-technik faser pipes significantly reduces linear thermal expansion compared with standard PP-R pipes; as a result, the pipes can be clamped at larger intervals than single-layer PP-R pipes.

Multilayer fusio-technik faser SDR 7.4 clamp spacing (cm)

	Ø20	Ø25	Ø32	Ø40	Ø50	Ø63	Ø75	Ø90	Ø110	Ø125	Ø160	Ø200
0°C	120	140	160	180	205	230	245	260	290	320	330	340
20°C	90	105	120	135	155	185	185	195	215	240	250	260
30°C	90	105	120	135	155	185	185	195	210	225	240	250
40°C	85	95	110	125	145	175	175	185	200	215	225	235
50°C	85	95	110	125	145	175	175	185	190	195	210	220
60°C	80	90	105	120	135	165	165	175	180	185	200	210
70°C	70	80	95	110	130	155	155	165	170	175	190	200

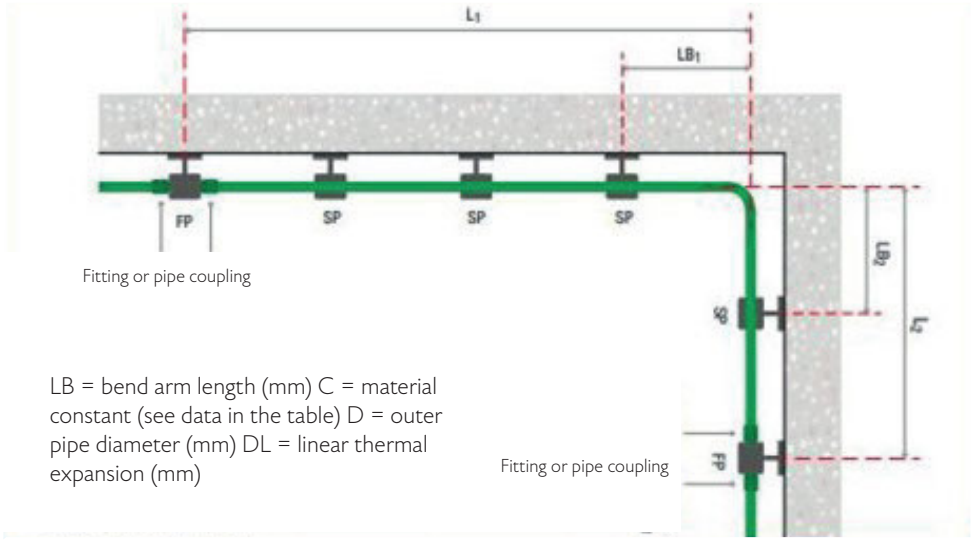
Multilayer fusio-technik faser SDR 11 clamp spacing (cm)

	Ø32	Ø40	Ø50	Ø63	Ø75	Ø90	Ø110	Ø125	Ø160	Ø200	Ø250	Ø315	Ø315	Ø400
0°C	155	175	200	225	240	255	275	285	290	300	310	315	310	320
20°C	115	135	155	170	180	190	205	210	215	225	135	240	135	245
30°C	115	130	150	165	175	185	195	200	205	215	225	230	225	235
40°C	105	120	145	160	170	180	185	195	195	205	220	25	215	225
50°C	100	115	140	155	165	175	175	180	185	195	215	220	205	215
60°C	95	110	125	145	155	160	160	165	175	185	190	195	200	210
70°C	85	100	120	135	145	150	155	160	165	175	180	190	195	205



Pipe clamp examples

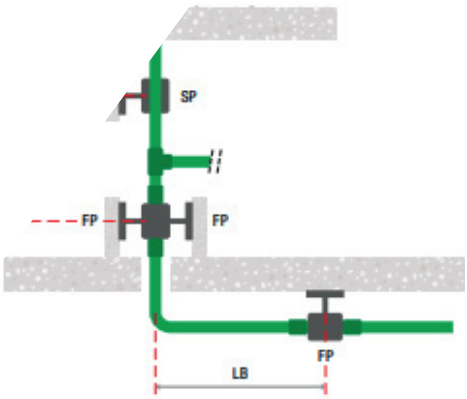
Example
Horizontal pipe distribution with fixed points of your choice and expansion compensation via changes in direction.



LB = bend arm length (mm) C = material constant (see data in the table) D = outer pipe diameter (mm) DL = linear thermal expansion (mm)

Example
Vertical distribution in multi-story buildings. Through ducts or shafts.

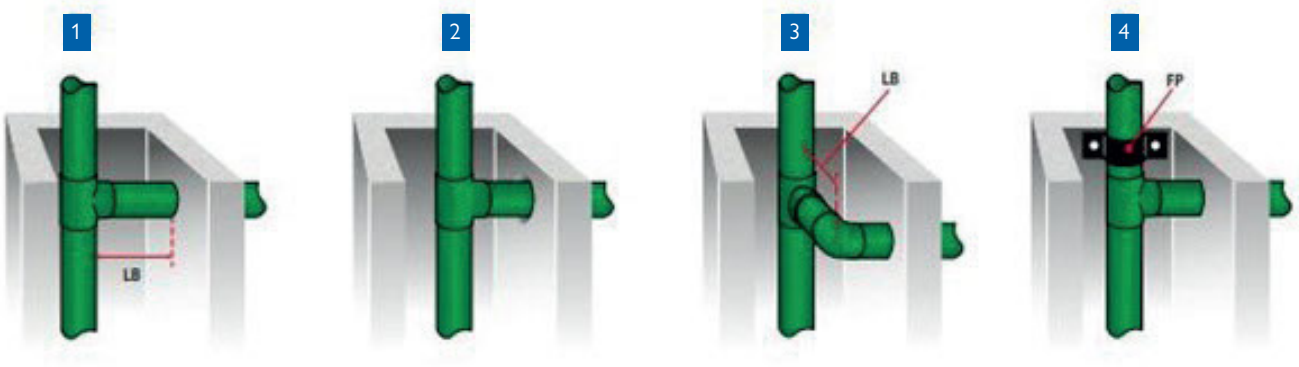
LB = bend arm length (mm)
C = material constant (see data in the table)
D = outer pipe diameter (mm)
DL = linear thermal expansion (mm)



Calculation for installation in compartments and through partition walls

When branching a vertical stack to multiple floors, account for pipe movement (from thermal expansion) and provide ways to accommodate that movement, as follows:

1. Position the stack pipe at the correct point in the shaft so the LB distance is calculated using the formula;
2. Leave enough room at branch connections to allow for expansion;
3. Install an expansion offset with an elbow;
4. In the stack, it is absolutely essential to have a fixed point immediately after the branch connection to prevent uncontrolled pipe movement.





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