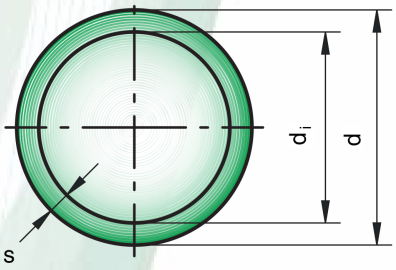
PP-R Pipe Pn 20, SDR 6

Sice many years the PP-R (polypropylene random copolymer) is the alternative to the use of other materials in the sanitary facilties sytems for the transportations of hot and cold fluids. The chemical and physical characteristics of polypropylene and the type of junction of the various elements through the welding, secures to the realized systems perfect seal and guarantee over time because it is a product of excellent quality.

The polypropylene is one of the most secure material because it does not transmit odor or taste, toxic substances or chemicals to water. It is nontoxic, hygienically perfect and it is harmless because it does not corrode, does not splint and does not crush. The polypropylene is in all effect ecological because it does not produce solid, liquid and gas wastes.



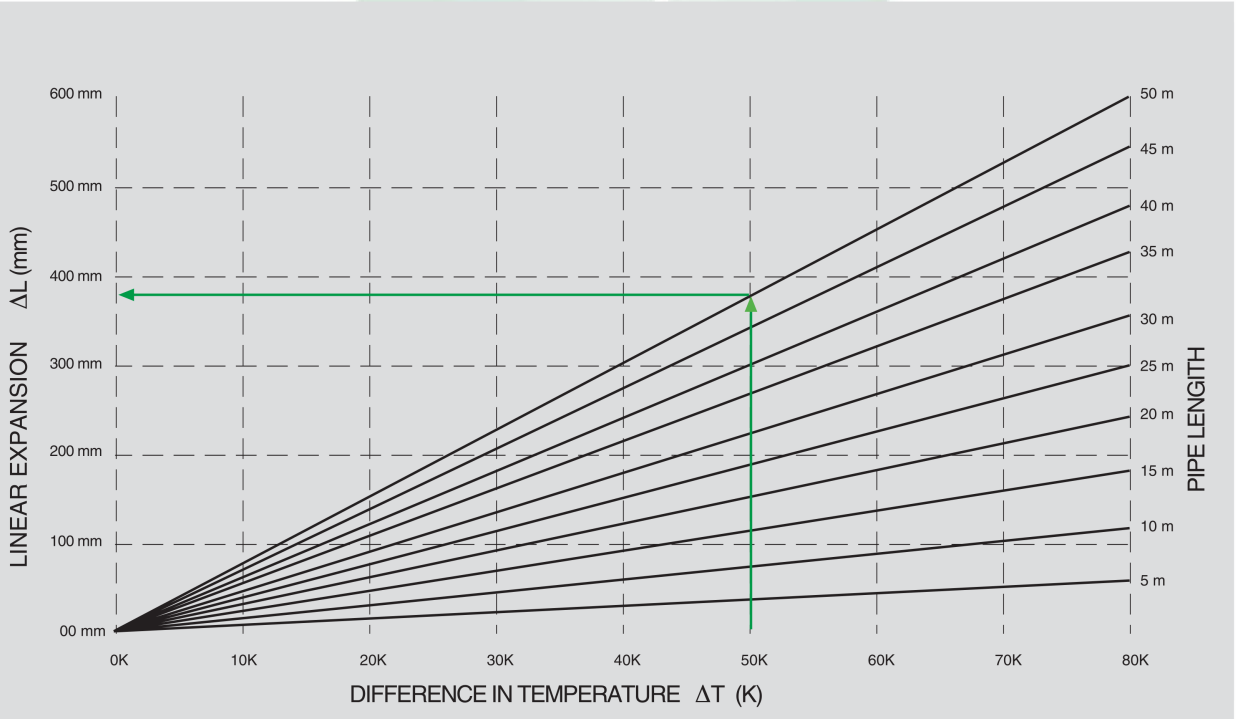
Pipe	Diameter	Wall Thickness	Internal content	Water content	Weight
Dimension	d	s	d_i	l/m	kg/m
	mm	mm	mm		
20 mm	20	3,4	13,2	0,137	0,174
25 mm	25	4,2	16,6	0,216	0,268
32 mm	32	5,4	21,2	0,353	0,437
40 mm	40	6,7	26,6	0,556	0,675
50 mm	50	8,4	33,2	0,876	1,047
63 mm	63	10,5	42,0	1,385	1,661
75 mm	75	12,5	50,0	1,963	2,351
90 mm	90	15,0	60,0	2,827	3,379
110 mm	110	18,3	73,4	4,231	5,037

Installation principles PP-R pipes

The linear expansion, described on the preceding pages, can be taken from the following tables and graphs.

Linear Expansion ΔL in (mm) for PP-R Pipes α = 0,150 mm/mK

PIPE LENGTH	DIFFERENCE IN TEMPERATURE ΔT = Te - Tm							
	10k	20k	30k	40k	50k	60k	70k	80k
	LINEAR EXPANSION ΔL (mm)							
5 m	8	15	23	30	38	45	53	60
10 m	15	30	45	60	75	90	105	120
15 m	23	45	68	90	113	135	158	180
20 m	30	60	90	120	150	180	210	240
25 m	38	75	113	150	188	225	263	300
30 m	45	90	135	180	225	270	315	360
35 m	53	105	158	210	263	315	368	420
40 m	60	120	180	240	300	360	420	480
45 m	68	135	203	270	338	405	473	540
50 m	75	150	225	300	375	450	525	600



Installation principles

Bending side

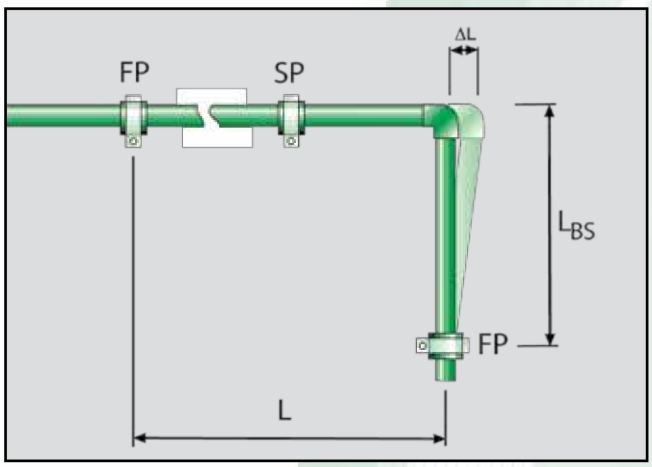
In most cases direction changes can be used to compensate for linear expansion in pipes.

The values of the bending side can be taken directly from the tables and graphs on the following pages.

Symbol	Meaning	
L_{BS}	Length of the bending side	[mm]
K	Material specific constant	15.0
d	Outside diameter	[mm]
ΔL	Linear expansion	[mm]
L	Pipe Length	[m]
FP	Fixed point	
SP	Sliding point	

Calculational determination of the bending side length

$$L_{BS} = K \times \sqrt{d \times \Delta L}$$



Expansion loop

If the linear expansion cannot be compensated by a change in direction, it will be necessary to install an expansion loop with long and straight pipelines.

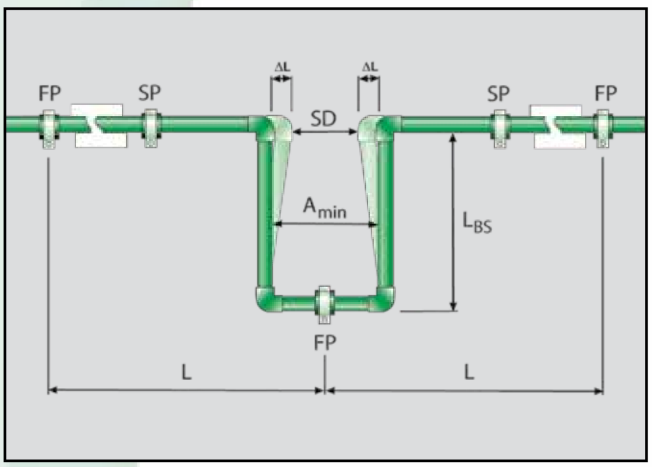
In addition to the length of the bending side L_{BS} the width of the pipe bend A_{min} must be considered.

Symbol	Meaning	
A_{min}	Width of the expansion loop	[mm]
SD	Safety distance	150 mm

The pipe bend A_{min} is calculated acc. to the following formula:

$$A_{min} = 2 \times \Delta L + SD$$

The width of the expansion loop A_{min} should be at least 210 mm.



Pre-stress / Bellow expansion joint

Pre-stress

Where space is limited, it is possible to shorten the total width A_{min} as well as the length of the bending side L_{BSV} by pre-stressing.

Pre-stress installations, if planned and carried out carefully, offer an optically perfect installation, as the linear expansion is hardly visible.

The side length L_{SV} is calculated acc. to the following calculation example:

Symbol	Meaning	Value	Measuring unit
L_{BSV}	Length of pre-stress	-	[mm]

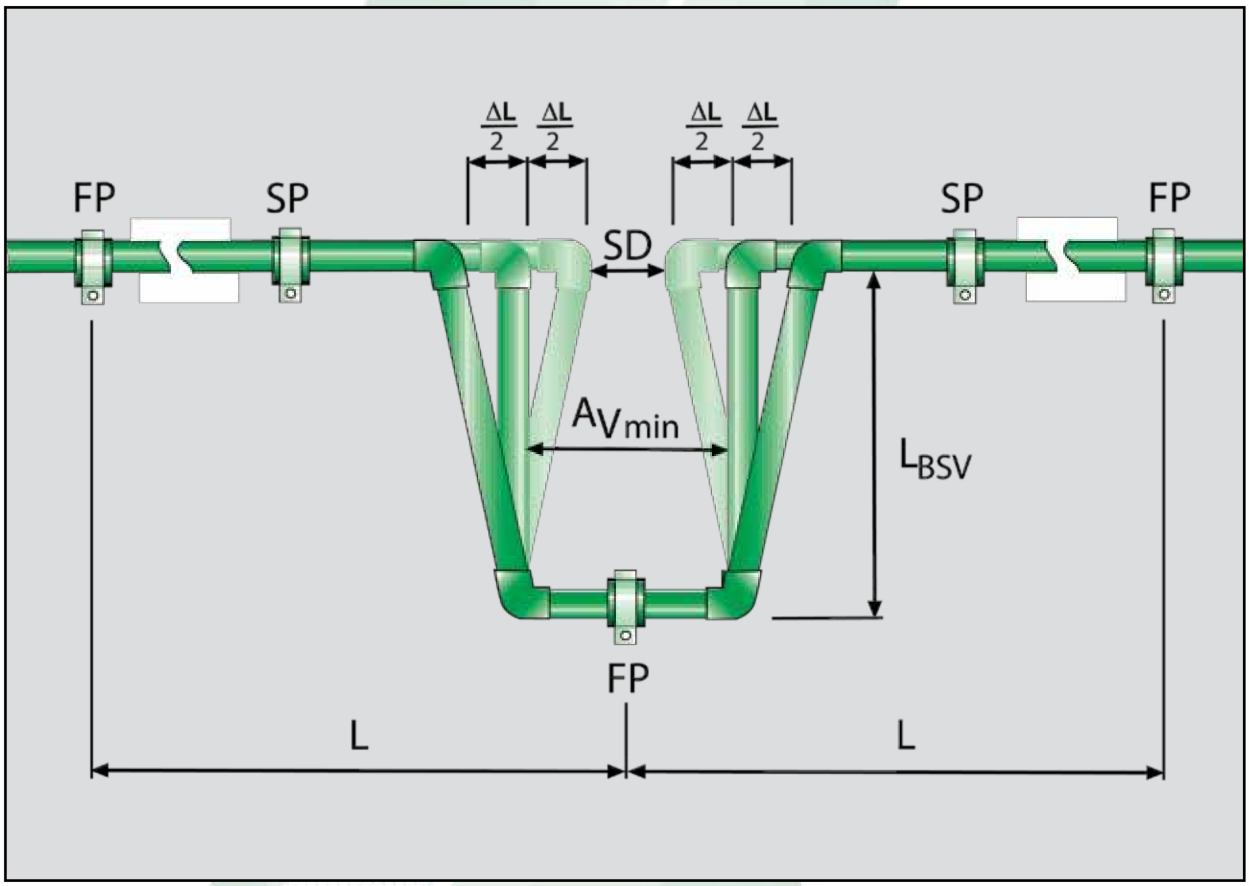
The side length of expansion loops wih pre-stress is calculated acc. to the following example:

$$L_{BSV} = K \times \sqrt{d \times \frac{\Delta L}{2}}$$

Bellow expansion joint

All bellow expansion joints for corrugated pipes designed for metal materials are unsuitable for PP-R-pipes.

When using axial expansion joints observe the manufacturers instructions.

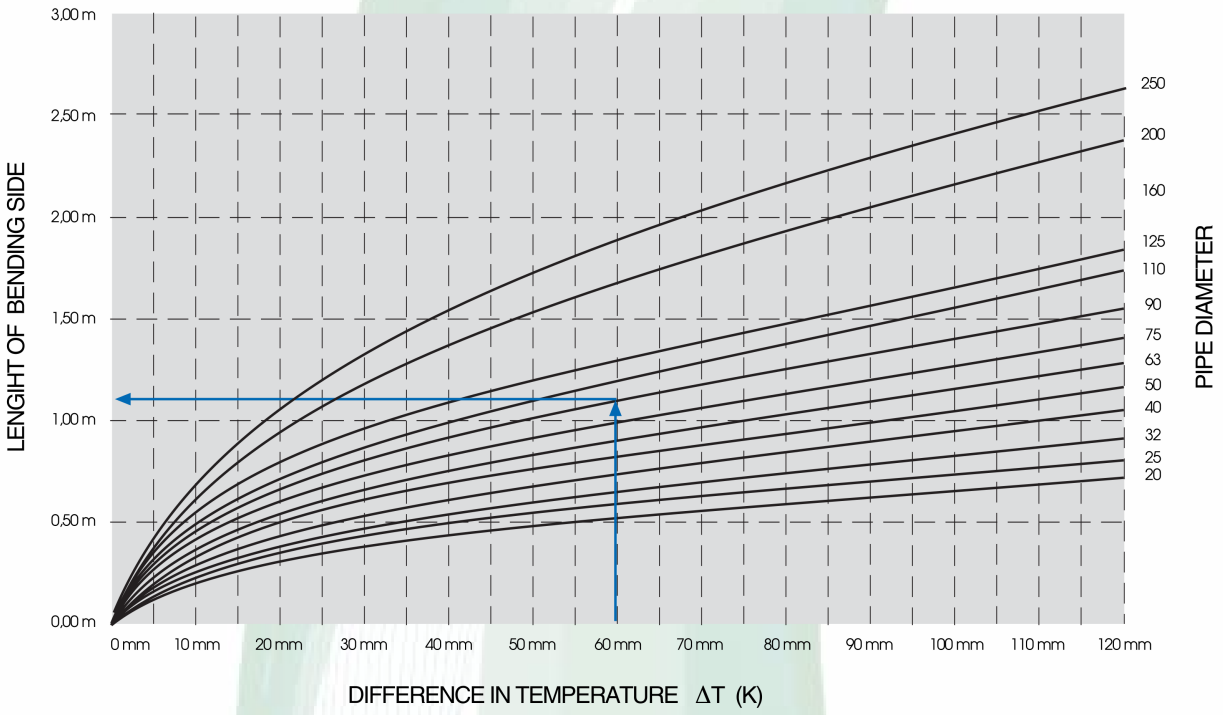


Installation principles

The length of the bending side L_{as} con be taken from the below tables and graphs in consideration of the applied pipe dimension and determined linear expansion

Lenght of bending side for PP-R STANDARD, PPR/FIBERGLASS, PP-R/ALUMINUM PIPES

PIPE DIAMETER (MM)	LINEAR EXPANSION											
	10	20	30	40	50	60	70	80	90	100	110	120
	LENGHT OF BENDING SIDE (M)											
20 mm	0,21	0,30	0,37	0,42	0,47	0,52	0,56	0,60	0,64	0,67	0,70	0,73
25 mm	0,24	0,34	0,41	0,47	0,53	0,58	0,63	0,67	0,71	0,75	0,79	082
32 mm	0,27	0,38	0,46	0,54	0,60	0,66	0,71	0,76	0,80	0,85	0,89	0,93
40 mm	0,30	0,42	0,52	0,60	0,67	0,73	0,79	0,85	0,90	0,95	0,99	1,04
50 mm	0,34	0,47	0,58	0,67	0,75	0,82	0,89	0,95	1,01	1,06	1,11	1,16
63 mm	0,38	0,53	0,65	0,75	0,84	0,92	1,00	1,06	1,13	1,19	1,25	1,30
75 mm	0,41	0,58	0,71	0,82	0,92	1,01	1,09	1,16	1,23	1,30	1,36	1,42
90 mm	0,45	0,64	0,78	0,90	1,01	1,10	1,19	1,27	1,35	1,42	1,49	1,56
110 mm	0,50	0,70	0,86	0,99	1,11	1,22	1,32	1,41	1,49	1,57	1,65	1,72
125 mm	0,53	0,75	0,92	1,06	1,19	1,30	1,40	1,50	1,59	1,68	1,76	1,84
160 mm	0,60	0,85	1,04	1,20	1,34	1,47	1,59	1,70	1,80	1,90	1,99	2,08
200 mm	0.67	0,95	1,16	1,34	1,50	1,64	1,77	1,90	2,01	2,12	2,22	2,32

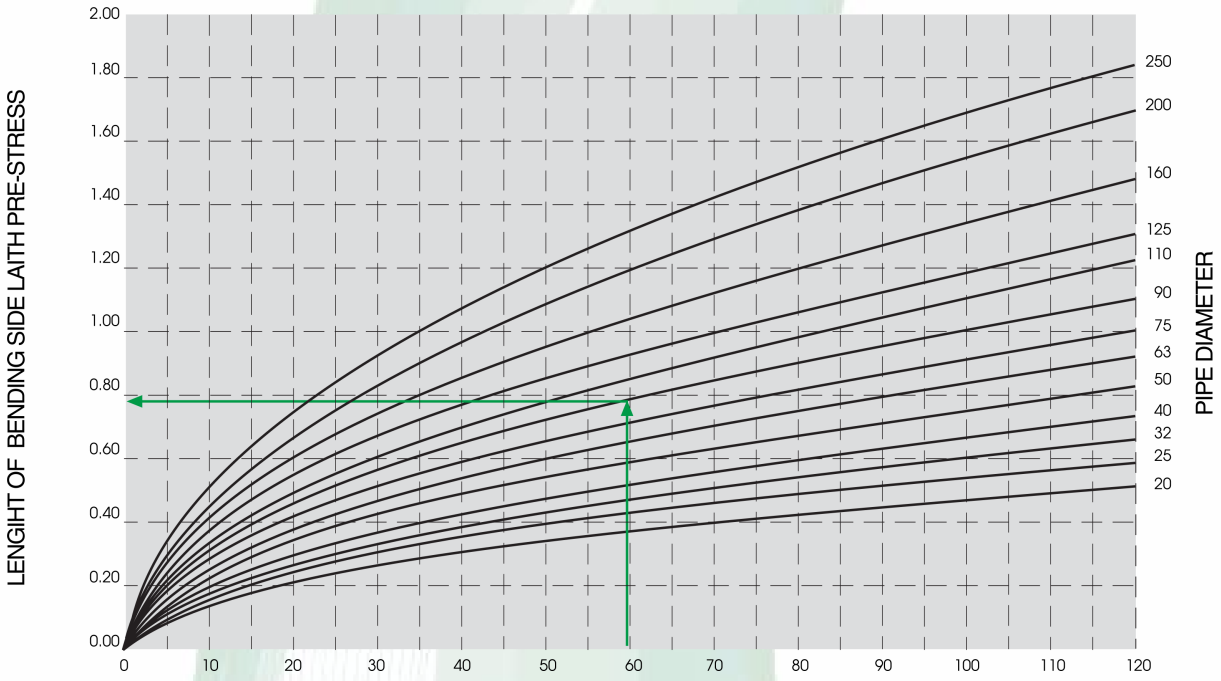


Installation Principles

The length of the bending side L_{as} con be taken from the below tables and graphs in consideration of the applied pipe dimension and determined linear expansion

Lentht of bending side for PP-R STANDARD, PPR/FIBERGLASS, PP-R/ALUMINUM PIPES WITH PRE-STRESS

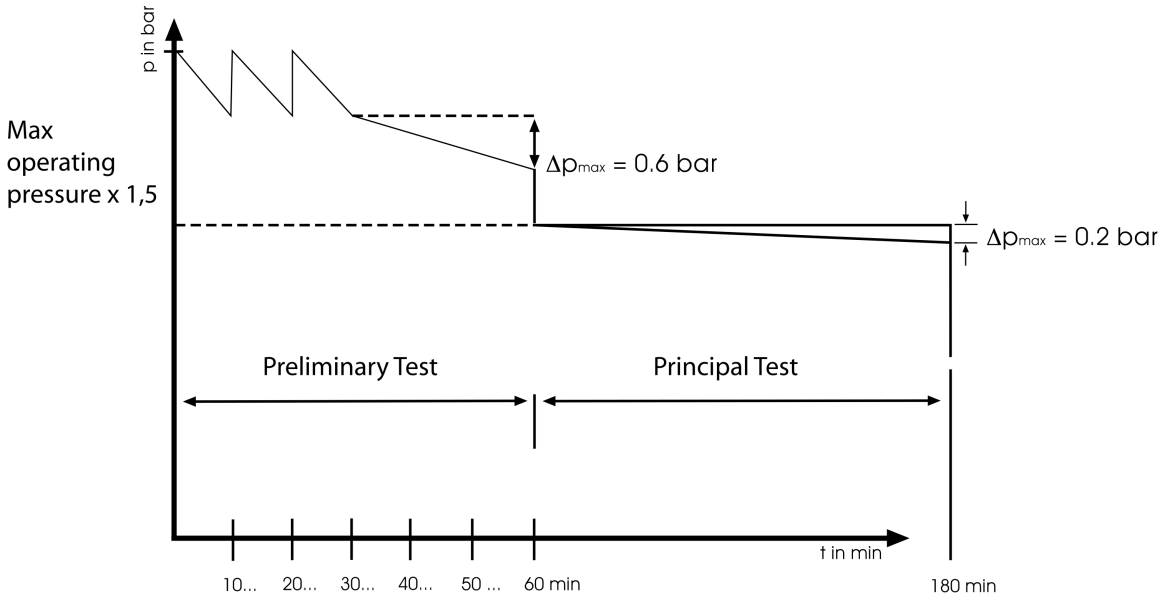
PIPE DIAMETER (MM)	LINEAR EXPANSION											
	10	20	30	40	50	60	70	80	90	100	110	120
	LENGIHT OF BENDING SIDE (M)											
20 mm	0,15	0,21	0,26	0,30	0,34	0,37	0,40	0,42	0,45	0,47	0,50	0,52
25 mm	0,17	0,24	0,29	0,34	0,38	0,41	0,44	0,47	0,50	0,53	0,56	0,58
32 mm	0,19	0,27	0,33	0,38	0,42	0,46	0,50	0,54	0,57	0,60	0,63	0,66
40 mm	0,21	0,30	0,37	0,42	0,47	0,52	0,56	0,60	0,64	0,67	0,70	0,73
50 mm	0,24	0,34	0,41	0,47	0,53	0,58	0,63	0,67	0,71	0,75	0,79	0,82
63 mm	0,27	0,38	0,46	0,53	0,60	0,65	0,70	0,75	0,80	0,84	0,88	0,92
75 mm	0,29	0,41	0,50	0,58	0,65	0,71	0,77	0,82	0,87	0,92	0,96	1,01
90 mm	0,32	0,45	0,55	0,64	0,71	0,78	0,84	0,90	0,95	1,01	1,06	1,10
110 mm	0,35	0,50	0,61	0,70	0,79	0,86	0,93	0,99	1,06	1,11	1,17	1,22
125 mm	0,38	0,53	0,65	0,75	0,84	0,92	0,99	1,06	1,13	1,19	1,24	1,30
160 mm	0,42	0,60	0,73	0,85	0,95	1,04	1,12	1,20	1,27	1,34	1,41	1,47
200 mm	0,47	0,67	0,82	0,95	1,06	1,16	1,25	1,34	1,42	1,50	1,57	1,64

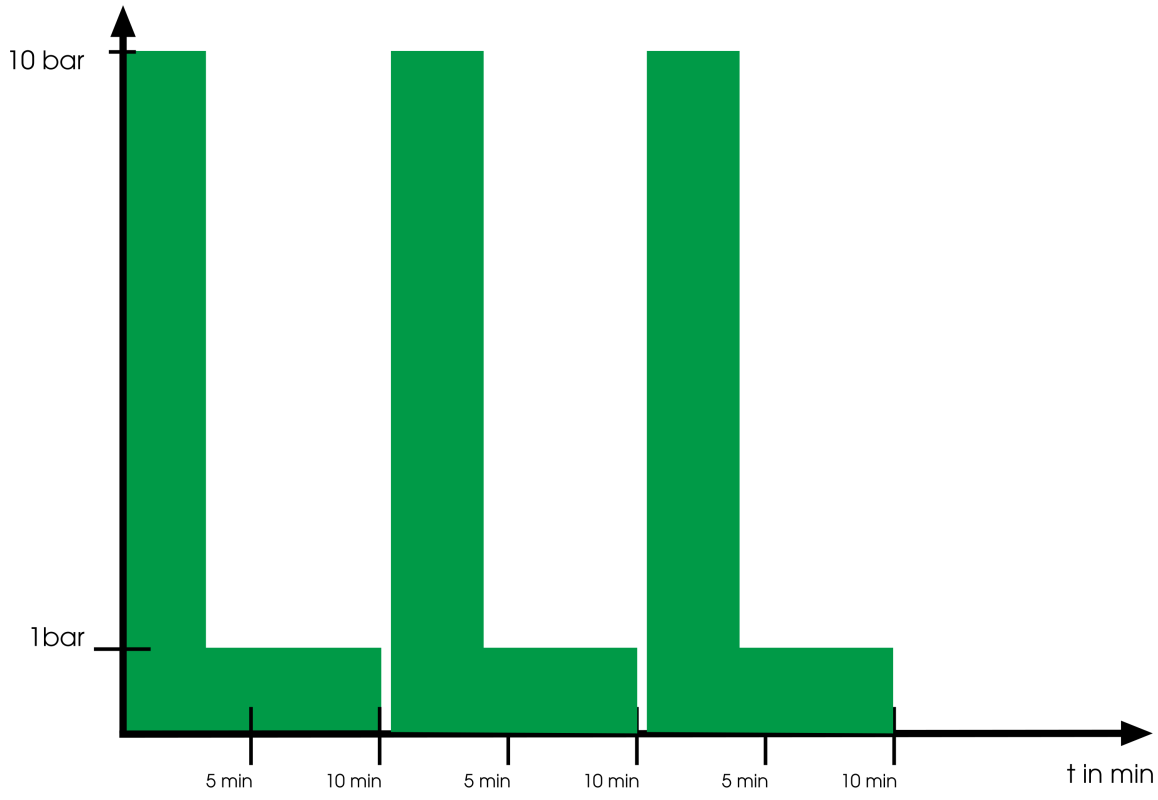


Installation Principles

Pressure test / Test control

PRELIMINARY- AND PRINCIPAL TEST





Permissible working pressure for potable water installations
Fluid transported: water acc. to DIN 2000

Temperature	Service life	PIPE SDR 11	PIPE SDR 6	FASER COMPOSITE PIPE
			STABI COMPOSITE PIPE	
		Sovrappressioni di esercizio ammissibili in bar		
20°C 68°F	1	15,0	30,0	28,6
	5	14,1	28,1	26,8
	10	13,7	27,3	26,1
	25	13,3	26,5	25,3
	50	12,9	25,7	24,5
30°C 86°F	1	12,8	25,5	24,3
	5	12,0	23,9	22,8
	10	11,6	23,1	22,0
	25	11,2	22,3	21,3
	50	10,9	21,8	20,7
40°C 104°F	1	10,8	21,5	20,5
	5	10,1	20,2	19,2
	10	9,8	19,6	18,7
	25	9,4	18,8	18,0
	50	9,2	18,3	17,5
50°C 122°F	1	9,2	18,3	17,5
	5	8,5	17,0	16,2
	10	8,2	16,5	15,7
	25	8,0	15,9	15,2
	50	7,7	15,4	14,7
60°C 140°F	1	7,7	15,4	14,7
	5	7,2	14,3	13,7
	10	6,9	13,8	13,2
	25	6,7	13,3	12,6
	50	6,4	12,7	12,1
Potable water (cold) / Potable water (warm)				
65°C 149°F	1		14,6	13,9
	5		13,6	12,9
	10		13,1	12,5
	25		12,6	12,0
	50		11,1	10,6
70°C 158°F	1		13,0	12,4
	5		11,9	11,4
	10		11,7	11,1
	25		10,1	9,6
	30		8,8	9,3
	50		8,5	8,1
75°C 167°F	1		12,3	11,7
	5		11,4	10,8
	10		10,5	10,0
	25		8,4	8,0

Faser and Stabi composite pipe: high working stress at lower wall thickness and higher flow rate

SDR = Standard Dimension Ratio (diameter/wall thickness ratio)
SDR = 2 x S + 1? d/s
(S = Pipe series index from ISO 4065)

Legend

Designation	Symbol	Unit
Induced stress (σ = sigma)	$\sigma_{V\wedge}$	N/mm ^{2}
Pressure	p	mbar (bar)
Safety-factor	Sf	-
Linear expansion (Δ = delta)	Δ L	mm
Pipe length	L	m
Expansion coefficient (α = alpha)	α	mm/mK
Working temperature	T_W	°C
Installation temperature	T_M	°C
Difference in temperatur (D = delta)	ΔT	K
Length of the bending side	L_S	mm
Bending side with pre-press	L_{SV}	mm
Material specific constant	K	mm
Width of the expansion loop	A_{min}	mm
Safe distance	SA	mm
Area	A	mm^2
Circulatory	$\dot{V}$	l/s
Pressure gradient	R	mbar/m
Minimum pressure of flow	$p_{min\ Fl}$	mbar (bar)
Flow rate	v	m/s
Cold Water Volume Rate	K_V	m^3/h
Coefficient of loss (ζ = Zeta)	ζ	-
Diameter	d	mm
Internal diameter	d_a	mm
External diameter	d_i	mm
Wall thickness	s	mm
Insulation thickness	s_i	mm