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System description

1. General

PREMANT is the registered name for a pre-insulated plastic casing pipe system used to transport district heat, and PREMANT DUO is a special version of this system. It is a pipe system for direct installation in the ground, without channels.

PREMANT DUO district heating pipe is available with a medium pipe made of welded or seamless steel, as specified by the customer. It is suitable to transport heating water, domestic hot water, water/glycol mixtures and other fluids. Due to the connected pipes and the limited maximum temperature, the use of this system for steam or condensate is restricted.

Heat insulation for PREMANT DUO district heating pipe is provided by a rigid polyurethane foam that can withstand temperatures of up to 144 °C. A PE-HD casing pipe provides external protection. All three components form one fixed unit, so this pipe system is a member of the composite pipe family.

PREMANT DUO district heating pipe is available in two categories of insulation thickness. Depending on the dimensions, it can be supplied in lengths of 6 m, 12 m and (16 m). The construction units and all the relevant preformed parts such as bends, T-pieces and fixed points, etc., are prefabricated in the factory. The result is a modular system that is correspondingly simple to plan and install.

All the components are connected together on site with circumferential seams. Supplementary insulation of the weld seam and the weld-on ends is provided by means of joint sleeves. The supplementary insulation work is usually carried out by BRUGG / GERMAN PIPE itself or by qualified specialist companies on our behalf. During the planning phase, we offer support based on our system experience to system users who request this.

PREMANT DUO district heating pipe, and the preformed parts and fittings, are manufactured according to the latest standards (EN 15698, EN 448 and EN 488).

Important note on statics and stability:

PREMANT DUO district heating pipe is designed for a temperature difference of 100 Kelvin between the flow and the return. When planning double pipe systems, it must be ensured that this value is not exceeded. In particular, the stated value must not be exceeded when starting up plants that have been cooled down.

In order to compensate for the difference in expansion between the flow and return pipes, both pipes must be permanently connected to each other. This is especially important:

- on free pipe ends in buildings, shafts and other structures
- on free pipe ends in end sleeves
- in/ahead of bends, branches, reductions, drainers, vents and
- in/ahead of shut-offs.

With PREMANT DUO district heating pipes, these **fixing plates** are installed in the factory on **all DUO preformed parts and fittings**. No further joints to absorb forces are required in straight sections of pipe between two bends. For reasons related to production, welded spacers are used in pipe rods, but these spacers do not perform any static functions.

When installing PREMANT DUO pipes, **fixing plates must be installed on site** in the following situations:

- at the end of house lead-ins
- on all ends of fitting bends and branches
- on the larger side of reduction pieces (except for pre-insulated reduction pieces)

Please contact your BRUGG partner for information on design and execution.

All the illustrations are schematic representations, and they do not correspond to the original components in every detail.

2. Range of applications

Max. continuous operating temperature	
T_{Bmax} :	130 °C
Max. temperature difference between flow and return	
t_{Bmax} :	100 K
Max. permitted operating pressure	
p:	25 bar

System description

1. Medium pipe

Bars: steel pipes with longitudinal or helical seam welds
Quality: P235TR1 or P235GH as per (EN 10220/ EN 10217-1) or EN 10217-2
Standard: EN 15698-1
Test certificate: EN 10204-3.1
Welding bevel: From wall thickness > 3.2 mm, as per DIN 2559-1 codes 21 and 22

Preformed parts: **T-pieces** are flared, or are produced with a welded T-piece as per EN 10253 (formerly DIN 2615); material as appropriate to the straight welded pipes.
Quality: P235TR1 or P235GH as per EN 10220/ EN 10217
Standard: EN 448
Factory certificate: EN 10204-2.2
Test certificate: EN 10204-3.1
Welding bevel: From wall thickness > 3.2 mm, as per DIN 2559-1, codes 21 and 22

Bends are made from cold-bent (seamless or welded) steel pipes, or with welded bends as per EN 10253 (formerly DIN 2605).

Quality: P235TR1 or P235GH as per EN 10220/ EN 10217
Standard: EN 448
Factory certificate: EN 10204-2.2
Acceptance test certificate: EN 10204-3.1
Welding bevel: From wall thickness > 3.2 mm, as per DIN 2559-1, codes 21 and 22

System description

2. Thermal insulation

Material: Polyurethane foam (pentane-blown), manufactured from 3 components: polyol, isocyanate and cyclopentane
High-pressure plants are used for mixing and metering.

PUR insulation	Reference temperature °C	PREMANT value	Test standard
Pressure resistance	-	≥ 0.3 MPa	EN 253
Thermal conductivity	50	≤ 0.0260 W/mK	DIN 52612
Percentage of closed cells	-	≥ 96 %	
Water absorption after 24 hours	-	≤ 10 %	

2.1 Supplementary insulation

Standard: EN 489
Execution:

- Executed by trained installation staff
- Polyurethane foam is used to foam and seal the sleeve joints
- Sealing with shrink-on sleeve or electro-welding joint
- Connecting the monitoring wires
- Installing the expansion pads, consisting of an elastic foam material which is resistant to ageing

3. Casing pipe

Quality: PE-HD, GM 5010 T3 or equivalent
Standard: EN 15698-1
Factory certificate: EN 10204-2.2

Dimensions of PE-HD casing pipes		
Outer Ø mm	Pipe mm	Preformed parts mm
125	3.0	4.0
140	3.0	4.0
160	3.0	4.0
180	3.0	4.0
200	3.2	4.0
225	3.5	4.0
250	3.9	5.0

Dimensions of PE-HD casing pipes		
Outer Ø mm	Pipe mm	Preformed parts
280	4.4	5.0
315	4.5	6.3
355		5.1
400		5.3
450		5.6
500		6.3
560		7.0
630		7.6

4. Monitoring wires

Brandes system: 1 x CrNi, red, insulated and perforated, Ø 0.8 mm / 0.5 mm²
1 x Cu, green, insulated, Ø 1.0 mm / 0.8 mm²
Nordic system: 1 x Cu, bare: 1.5 mm²
1 x Cu, tinned: 1.5 mm²
Task: Identification and location of moisture by means of resistance or pulse measurements

Heat loss

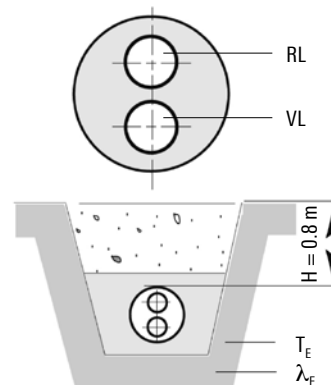
Insulation thickness 1

Heat loss q [W/m] for VL and RL together										
PREMANT DUO	U-value W/mK	Average operating temperature TB [°C]								
		50 °C	60 °C	70 °C	80 °C	90 °C	100 °C	110 °C	120 °C	130 °C
26.9/ 26.9 - 125	0.17	7.0	8.7	10.5	12.2	13.9	15.7	17.4	19.2	20.9
33.7/ 33.7 - 140	0.19	7.8	9.7	11.7	13.6	15.6	17.5	19.5	21.4	23.3
42.4/ 42.4 - 160	0.22	8.6	10.8	12.9	15.1	17.2	19.4	21.6	23.7	25.9
48.3/ 48.3 - 160	0.26	10.5	13.2	15.8	18.4	21.1	23.7	26.3	29.0	31.6
60.3/ 60.3 - 200	0.25	10.2	12.7	15.2	17.8	20.3	22.8	25.4	27.9	30.5
76.1/ 76.1 - 225	0.31	12.5	15.6	18.7	21.8	24.9	28.1	31.2	34.3	37.4
88.9/ 88.9 - 250	0.36	14.5	18.1	21.8	25.4	29.0	32.6	36.3	39.9	43.5
114.3/114.3 - 315	0.37	14.6	18.3	21.9	25.6	29.2	32.9	36.5	40.2	43.8
139.7/139.7 - 400	0.33	13.4	16.7	20.1	23.4	26.8	30.1	33.5	36.8	40.2
168.3/168.3 - 450	0.42	16.6	20.8	25.0	29.1	33.3	37.4	41.6	45.7	49.9
219.3/219.3 - 560	0.47	18.9	23.6	28.3	33.0	37.7	42.4	47.1	51.8	56.6

Caution: In contrast to the single pipes heat losses the losses for both pipes listed together here.

Type of installation:
 Ground temperature:
 Coverage height:
 Soil conductivity:
 Conductivity of PE jacket:
 Conductivity of PUR foam:

1-pipe, laid in the ground
 $T_E = 10\text{ °C}$
 $H = 0.8\text{ m}$
 $\lambda_E = 1.2\text{ W/mK}$
 $\lambda_{PE} = 0.4\text{ W/mK}$
 $\lambda_{PUR} = 0.0260\text{ W/mK}$



Heat loss

Insulation thickness 2

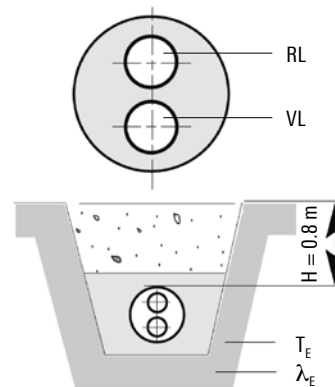
Heat loss q [W/m] for VL and RL together

PREMANT DUO	U-value W/mK	Average operating temperature TB [°C]								
		50 °C	60 °C	70 °C	80 °C	90 °C	100 °C	110 °C	120 °C	130 °C
26.9/ 26.9 - 140	0.15	6.1	7.7	9.2	10.8	12.3	13.8	15.4	16.9	18.4
33.7/ 33.7 - 160	0.17	6.6	8.3	9.9	11.6	13.2	14.9	16.5	18.2	19.8
42.4/ 42.4 - 180	0.18	7.3	9.2	11.0	12.9	14.7	16.5	18.4	20.2	22.0
48.3/ 48.3 - 180	0.22	8.6	10.8	12.9	15.1	17.3	19.4	21.6	23.7	25.9
60.3/ 60.3 - 225	0.21	8.4	10.5	12.6	14.8	16.9	19.0	21.1	23.2	25.3
76.1/ 76.1 - 250	0.25	10.1	12.6	15.2	17.7	20.2	22.8	25.3	27.8	30.3
88.9/ 88.9 - 280	0.28	11.1	13.9	16.7	19.5	22.2	25.0	27.8	30.6	33.4
114.3/114.3 - 355	0.28	11.1	13.8	16.6	19.4	22.1	24.9	27.7	30.4	33.2
139.7/139.7 - 450	0.26	10.4	13.0	15.5	18.1	20.7	23.3	25.9	28.5	31.1
168.3/168.3 - 500	0.31	12.4	15.5	18.7	21.8	24.9	28.0	31.1	34.2	37.3
219.3/219.3 - 630	0.33	13.0	16.3	19.6	22.8	26.1	29.3	32.6	35.8	39.1

Caution: In contrast to the single pipes heat losses the losses for both pipes listed together here.

Type of installation:
 Ground temperature:
 Coverage height:
 Soil conductivity:
 Conductivity of PE jacket:
 Conductivity of PUR foam:

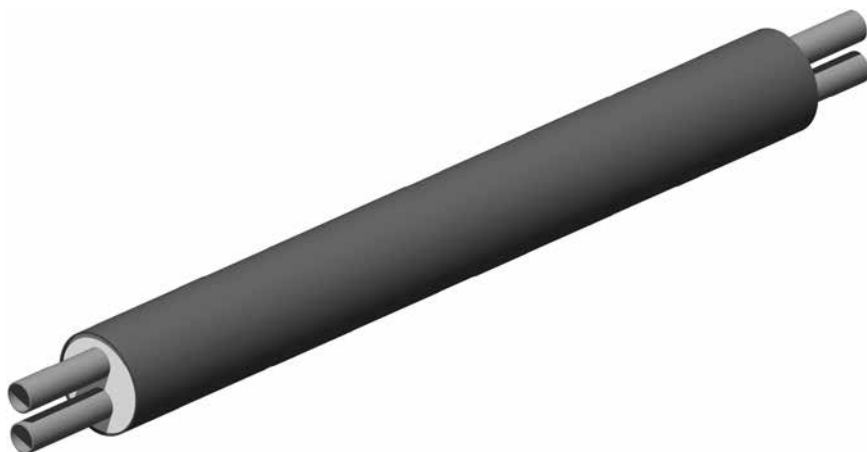
1-pipe, laid in the ground
 $T_E = 10\text{ °C}$
 $H = 0.8\text{ m}$
 $\lambda_E = 1.2\text{ W/mK}$
 $\lambda_{PE} = 0.4\text{ W/mK}$
 $\lambda_{PUR} = 0.0260\text{ W/mK}$



District heating pipe – DUO

Medium pipes, pre-insulated in the factory, with plastic casing pipe and 200 mm free pipe ends.

Key features of double pipes are: reduced heat loss, less outlay on underground construction work and faster completion times than single pipes. The temperature difference between the medium pipes causes stresses within the system. This results in additional static requirements which must be considered during installation.



Nominal width	Steel pipe d	Wall thickness s	Distance x	PE casing pipe		Weight		delivery lengths			Volume Inner pipe l/m
				D DS1	D DS2	D DS1	D DS2	6 m	12 m	16 m	
DN	mm	mm	mm	mm	mm	kg/m	kg/m				
20	26.9	2.6	19	125	140	5.1	5.4	•			2 x 0.37
25	33.7	2.6	19	140	160	6.3	6.9	•			2 x 0.64
32	42.4	2.6	19	160	180	8.0	8.6	•	•		2 x 1.02
40	48.3	2.6	19	160	180	8.8	9.4	•	•		2 x 1.38
50	60.3	2.9	20	200	225	12.5	13.6	•	•		2 x 2.28
65	76.1	2.9	20	225	250	15.9	17.2	•	•		2 x 3.82
80	88.9	3.2	25	250	280	20.2	22.0	•	•		2 x 5.35
100	114.3	3.6	25	315	355	30.3	33.3	•	•	•	2 x 9.01
125	139.7	3.6	30	400	450	41.5	46.0	•	•	•	2 x 13.8
150	168.3	4.0	40	450	500	54.3	59.4	•	•	•	2 x 20.2
200	219.1	4.5	45	560	630	70.1	77.2	•	•	•	2 x 34.7

x = clear distance between medium pipes

Elbow pipe



Elbow pipes are plastic casing pipes made to customer specifications and pre-insulated at the factory. Elbow pipes are produced as curved plastic casing pipes with a large radius and serve to optimise pipe routing when the direction changes.

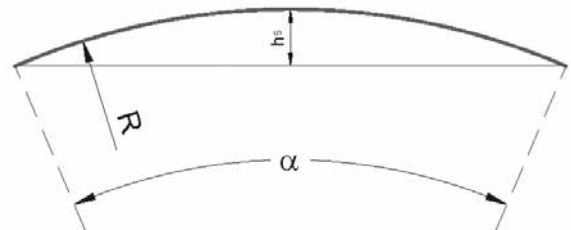
Elbow pipes behave in the same way as straight pipes; in other words, heat expansion does not cause any bending moment. The deflection angle "a" of the pipe routing or the bend radius "R" must be known in order to produce elbow pipes. All elbow pipes have straight ends between 1.2 and 2.0 m due to machine-based production.

The PUR foam is subject to lateral pressure as a consequence of heat expansion and the curve of the pipe. The magnitude of this pressure must not exceed the permissible force of 0.15 MPa. The outcome of this is a maximum permissible deflection angle "a" or a minimum bend radius "R".

The permissible values are contained in the following table.

Deflection angle for elbow pipes

Nominal width DN	Deflection angle		min.perm. radius R [m]
	minimum α [°]	maximal α	
32	10	33	20.8
40	8	31	22.2
50	6	29	23.7
65	5	24	28.6
80	3	20	34.4
100	3	18	38.2
125	3	16	43.0
150*	3	11	62.5
200	on request		



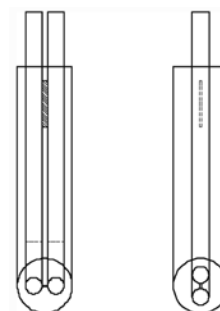
*DS1 only

Bend, with equal limbs, 90°

Design versions

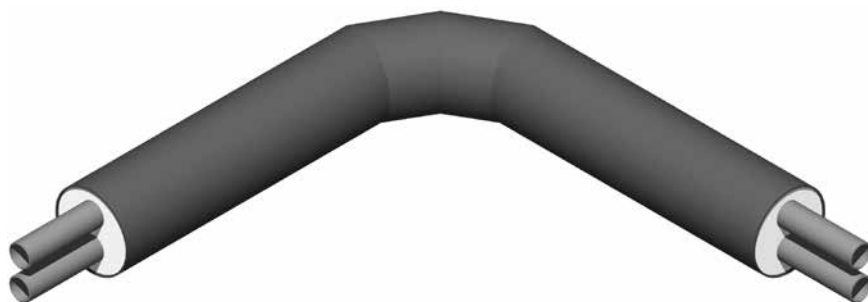
Two versions are offered for double pipe bends. When installing normal pipelines, "horizontal" bends are used whereas for house lead-ins and vertical projections, "vertical" bends are required.

The sketches on the right illustrate the design versions.



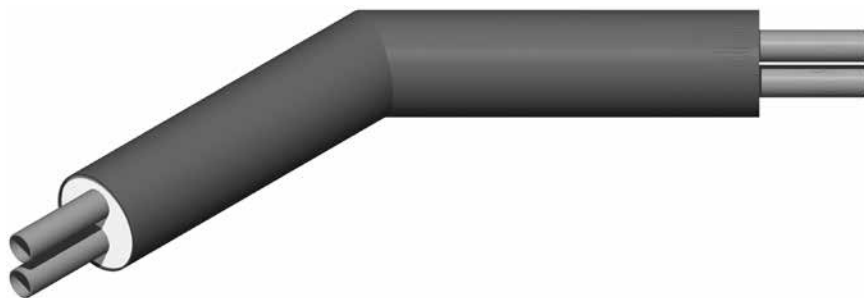
Horizontal

Vertical



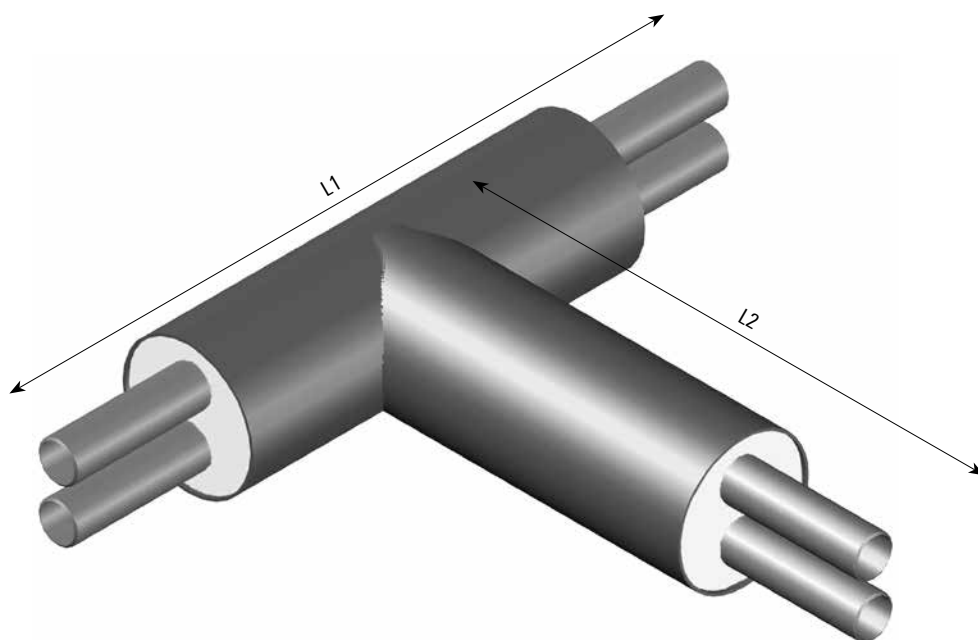
Nominal width	Diameter d	Limb length L	PE casing pipe	
			D DS1	D DS2
DN	mm	mm	mm	mm
20	26.9	1000	125	140
25	33.7	1000	140	160
32	42.4	1000	160	180
40	48.3	1000	160	180
50	60.3	1000	200	225
65	76.1	1000	225	250
80	88.9	1000	250	280
100	114.3	1000	315	355
125	139.7	1000	400	450
150	168.3	1000	450	500
200	219.1	1300	560	630

Bend, with equal limbs, 45°



Nominal width DN	Diameter d mm	Limb length L mm	PE casing pipe	
			D DS1 mm	D DS2 mm
20	26.9	1000	125	140
25	33.7	1000	140	160
32	42.4	1000	160	180
40	48.3	1000	160	180
50	60.3	1000	200	225
65	76.1	1000	225	250
80	88.9	1000	250	280
100	114.3	1000	315	355
125	139.7	1000	400	450
150	168.3	1000	450	500
200	219.1	1300	560	630

T-piece, 90°



Main pipe			Branch											
			DN	20	25	32	40	50	65	80	100	125	150	200
D (DS1)				125	140	160	160	200	225	250	315	400	450	560
D (DS2)				140	160	180	180	225	250	280	355	450	500	630
DN	D (DS1)	D (DS2)												
20	125	140	L2	600										
			L1	1000										
25	140	160	L2	600	600									
			L1	1000	1000									
32	160	180	L2	600	600	600								
			L1	1000	1000	1000								
40	160	180	L2	600	600	600	600							
			L1	1000	1000	1000	1000							
50	200	225	L2	700	700	700	700	700						
			L1	1000	1000	1000	1100	1100						
65	225	250	L2	700	700	700	700	700	700					
			L1	1000	1000	1000	1000	1200	1200					
80	250	280	L2	700	700	700	700	700	700	700				
			L1	1000	1000	1000	1000	1100	1300	1300				
100	315	355	L2	800	800	800	800	800	800	800	800			
			L1	1000	1000	1000	1000	1100	1100	1400	1400			
125	400	450	L2	900	900	900	900	900	900	900	900	900		
			L1	1000	1000	1000	1000	1100	1100	1100	1500	1500		
150	450	500	L2	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
			L1	1000	1000	1000	1000	1100	1100	1100	1200	1600	1600	
200	560	630	L2	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
			L1	1000	1000	1000	1000	1100	1100	1100	1200	1800	1800	1800

Figures in mm

Y-pipe, type G

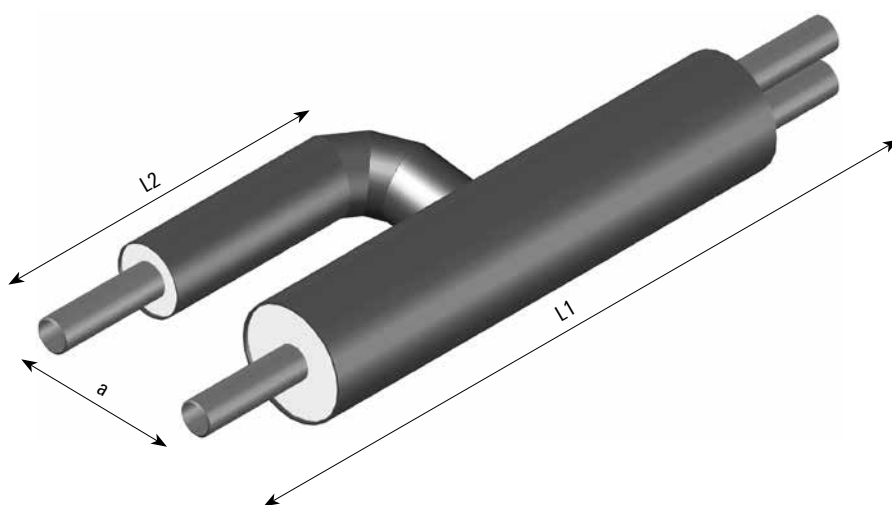
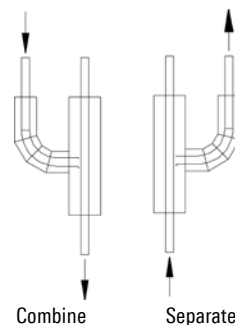
straight, insulation thickness 1

Y-pipes are used to produce a transition from conventional installation with two single pipes to the space-saving PREMANT DUO system.

The upper pipe (preferably the return) runs straight through the Y-pipe, whereas the lower pipe is angled outwards at 90°. With type G, the double and single pipes have parallel axes. Fixing plates are positioned on the side of the double pipe connection.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.



A reducing sleeve must be used on single pipe side, to connect the pipe that passes straight through.

Nominal width	Diameter	Overall (installed) length	Junction	Distance	PE casing pipe	
	d mm		L1 mm	L2 mm	a mm	D1 mm
20	26.9	1000	450	250	125	90
25	33.7	1000	460	250	140	90
32	42.4	1000	480	300	160	110
40	48.3	1200	480	300	160	110
50	60.3	1200	500	300	200	125
65	76.1	1200	510	350	225	140
80	88.9	1400	510	400	250	160
100	114.3	1400	510	450	315	200
125	139.7	1400	530	450	400	225
150	168.3	1500	580	550	450	250
200	219.1	1800	700	660	560	315

Y-pipe, type G

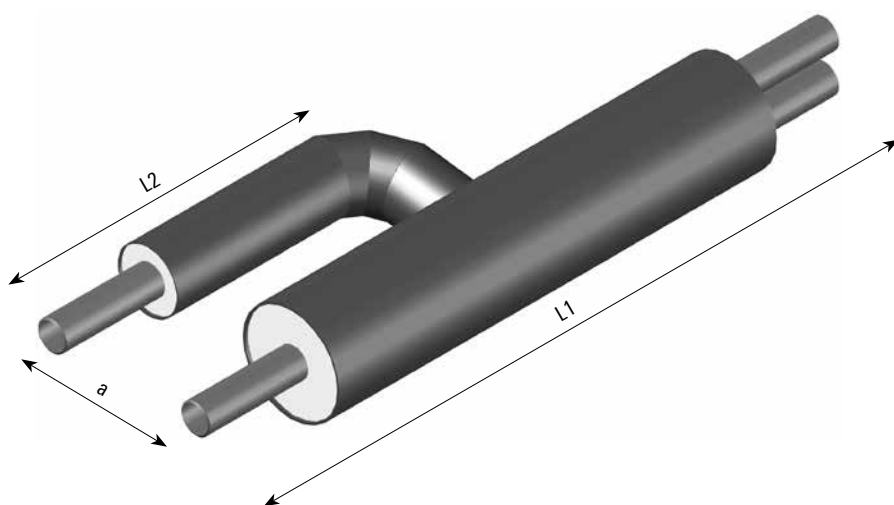
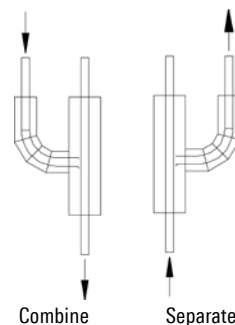
straight, insulation thickness 2

Y-pipes are used to produce a transition from conventional installation with two single pipes to the space-saving PREMANT DUO system.

The upper pipe (preferably the return) runs straight through the Y-pipe, whereas the lower pipe is angled outwards at 90°. With type G, the double and single pipes have parallel axes. Fixing plates are positioned on the double pipe connection side.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.



A reducing sleeve must be used on single pipe side, to connect the pipe that passes straight through.

Nominal width	Diameter	Overall (installed) length	Junction	Distance	PE casing pipe	
	d mm		L1 mm	L2 mm	a mm	D1 mm
20	26.9	1000	450	250	140	110
25	33.7	1000	460	250	160	110
32	42.4	1000	480	300	180	125
40	48.3	1200	480	300	180	125
50	60.3	1200	500	300	225	140
65	76.1	1200	510	350	250	160
80	88.9	1400	510	400	280	180
100	114.3	1400	510	450	355	225
125	139.7	1400	530	450	450	250
150	168.3	1500	580	550	500	280
200	219.1	1800	700	660	630	355

Y-pipe, type W

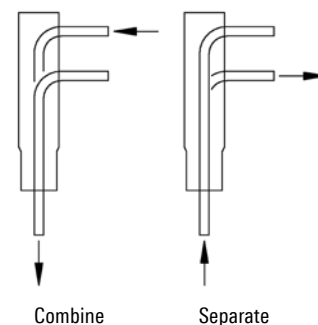
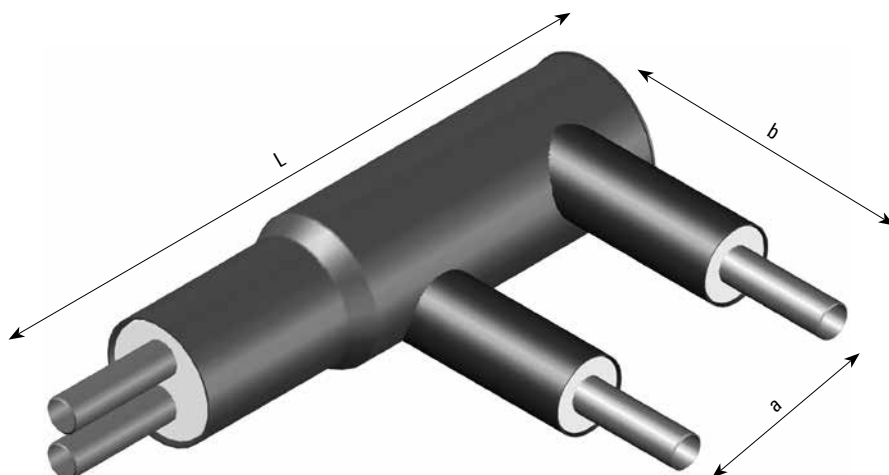
angled, insulation thickness 1

Y-pipes are used to make a transition from a conventional installation with two single pipes to the space-saving PREMANT DUO system.

With type W, the double and single pipes run at an angle of 90°. Fixing plates are positioned on the double pipe connection side.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.



Nominal width	Diameter	Overall (installed) length	Junction	Distance	PE casing pipe	
	d		b	a	D1	D2
DN	mm	L	mm	mm	mm	mm
20	26.9	1000	500	320	125	90
25	33.7	1000	500	320	140	90
32	42.4	1000	500	340	160	110
40	48.3	1000	500	340	160	110
50	60.3	1000	550	355	200	125
65	76.1	1100	550	420	225	140
80	88.9	1200	600	440	250	160
100	114.3	1350	600	480	315	200
125	139.7	1450	650	505	400	225
150	168.3	1600	700	530	450	250
200	219.1	2000	750	700	560	315

Y-pipe, type W

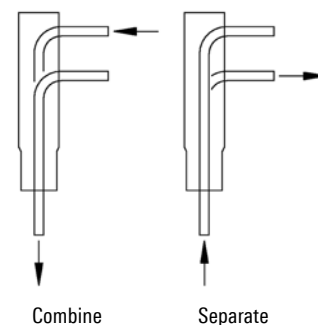
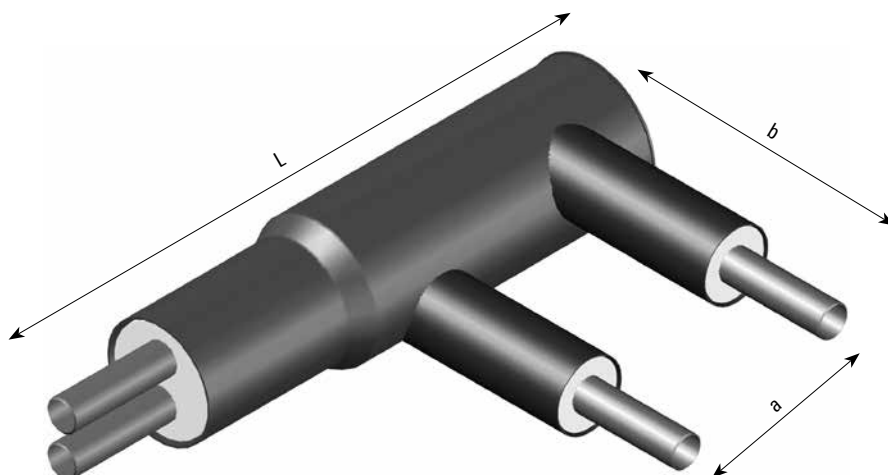
angled, insulation thickness 2

Y-pipes are used to make a transition from a conventional installation with two single pipes to the space-saving PREMANT DUO system.

With type W, the double and single pipes run at an angle of 90°. Fixing plates are positioned on the double pipe connection side.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.

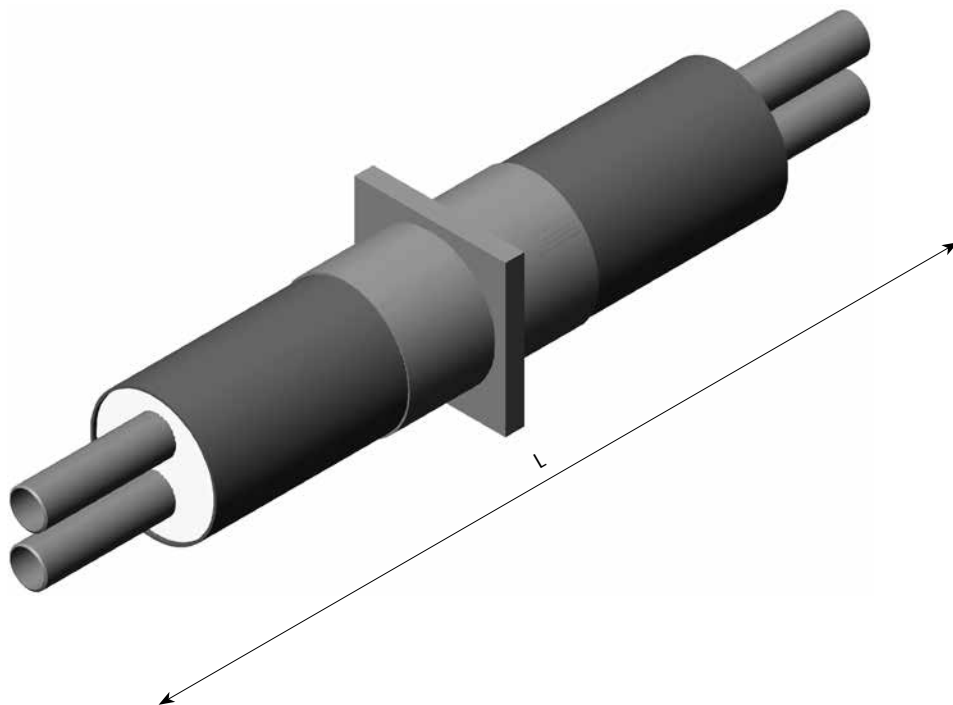


Nominal width	Diameter	Overall (installed) length	Junction	Distance	PE casing pipe	
	d		b	a	D1	D2
DN	mm	L	mm	mm	mm	mm
20	26.9	1000	500	320	140	110
25	33.7	1000	500	320	160	110
32	42.4	1000	500	340	180	125
40	48.3	1000	500	340	180	125
50	60.3	1000	550	355	225	140
65	76.1	1100	550	420	250	160
80	88.9	1200	550	440	280	180
100	114.3	1350	600	480	355	225
125	139.7	1450	600	505	450	250
150	168.3	1600	700	530	500	280
200	219.1	2000	750	700	630	355

Fixed point

Pre-insulated in the factory, design as per EN 448, steel quality and dimensions of steel pipe and PE outer casing correspond to those of the straight pipe.

The anchor is a square steel plate that is designed according to the load it must take. The medium pipe and the anchor plate are thermally and electrically separated from each other.



Nominal width	Diameter d	Overall (installed) length L	PE casing pipe	
			D DS1*	D DS2
DN	mm	mm	mm	mm
20	26.9	2000		140
25	33.7	2000		160
32	42.4	2000		180
40	48.3	2000		180
50	60.3	2000		225
65	76.1	2000		250
80	88.9	2000		280
100	114.3	2000		355
125	139.7	2000		450
150	168.3	2000		500
200	219.1	2000		630

* Due to the internal structure of the electrical isolation, DUO fixed points only in DS2 are available. When DUO fixed points in DS1 systems be installed, so shrink-on sleeves (7.345) are necessary to connect the jacket pipes.

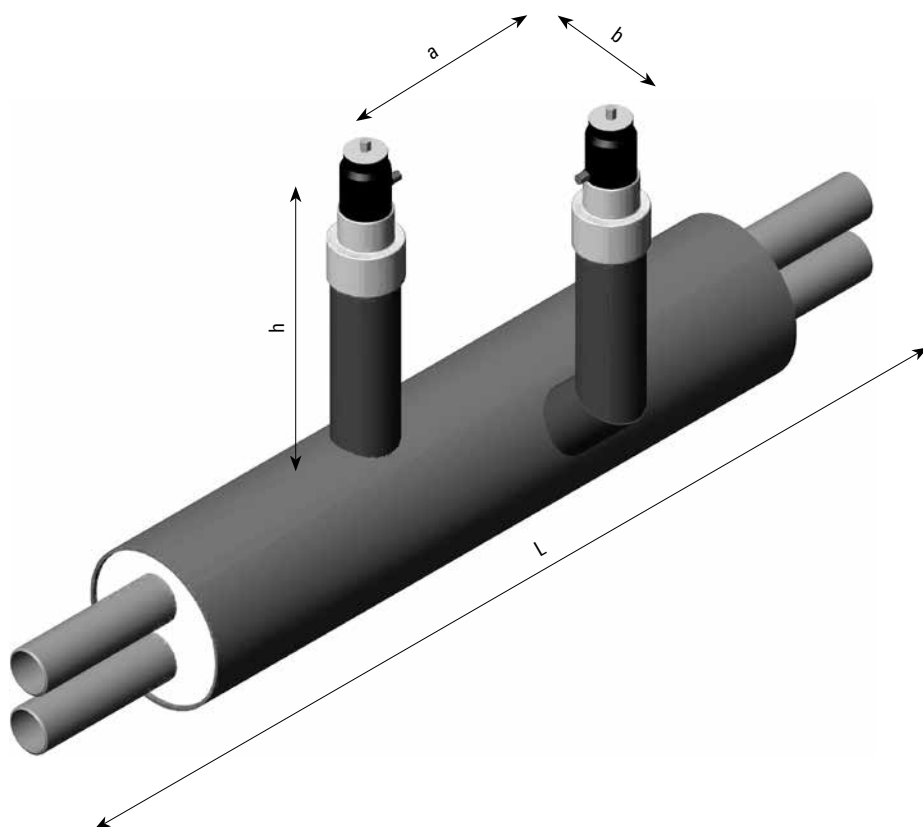
Vent

Pre-insulated in the factory, design as per EN 448, produced with a T-piece as per DIN 2615-1.

With inbound and outbound venting ball valves made of stainless steel. A heat-shrunk end cap is used for frontal insulation protection on the vent nozzle. The nozzle height is 600 mm above the top of the base pipe.

The standard design for this vent fitting is as follows:

- non-insulated stainless steel ball valve with inner thread and plug
- reduced through passage
- for key operation

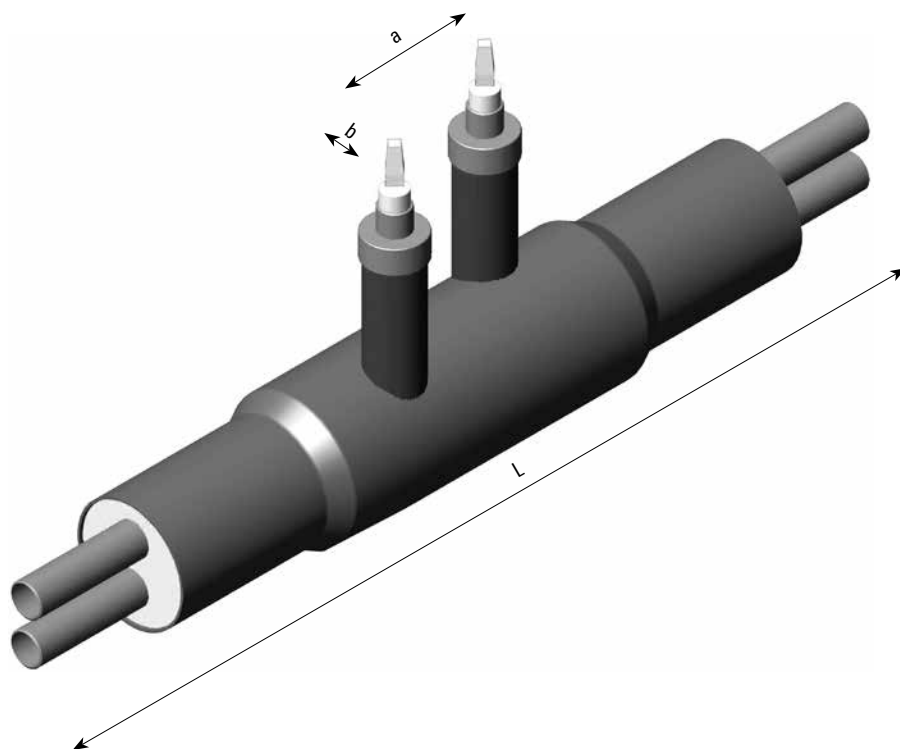


Nominal width	Diameter d	Overall (installed) length L	Distance a	Offset b	Height h	PE casing pipe		Vent	
						D DS1	D DS2	DN	D
DN	mm	mm	mm	mm	mm	mm	mm	DN	mm
25	33.7	1200	200	100	600	140	160	25	90
32	42.4	1200	200	100	600	160	180	25	90
40	48.3	1200	200	100	600	160	180	25	90
50	60.3	1200	200	140	600	200	225	25	90
65	76.1	1200	200	140	600	225	250	32	110
80	88.9	1200	200	140	600	250	280	32	110
100	114.3	1400	200	100	600	315	355	32	110
125	139.7	1400	200	100	600	400	450	40	110
150	168.3	1400	200	100	600	450	500	40	110
200	219.1	1400	200	175	600	560	630	40	110

Ball valve

Pre-insulated shut-off fittings for direct installation in the ground, design as per EN 488, pre-insulated in the factory, frontal insulation protection on the dome with heat-shrunk end cap, ball valve with fully welded housing, yield strength fitting, version for max. axial stress up to 300 N/mm².

Ball valves can be supplied with reduced or full-size through passages. The stem height depends on the desired brand of ball valve. A socket wrench or plug-on gear is used for operation. Fixing plates are installed on both sides of the connection.



Nominal width	Diameter	Overall (installed) length	Junction	Distance	PE casing pipe	
	d				L	D1
DN	mm	mm	mm	mm	mm	mm
20	26.9	2000	225	50	125	140
25	33.7	2000	225	55	140	160
32	42.4	2000	225	65	160	180
40	48.3	2000	225	85	160	180
50	60.3	2000	225	110	200	225
65	76.1	2000	225	145	225	250
80	88.9	2100	225	165	250	280
100	114.3	2300	225	225	315	355
125	139.7	2500	225	275	400	450
150	168.3	2800	300	315	450	500
200	219.1	not available*				

* will be integrated into subsequent UNO pipes

Sleeve joints

Shrink sleeve, non-cross-linked/cross-linked

1. PE shrink sleeve, non-cross-linked

The non-cross-linked shrink sleeve consists of a heat-shrunk PE sleeve pipe and the following accessories:

- Shrink-on collars
- Permanently elastic sealing strip, butyl rubber
- Venting plug
- Welded-in PE plug

The shrink sleeves are pushed onto the casing pipe when the pipe is being laid, before the medium pipe weld seams are made. The connection points are then fitted with additional insulation by trained fitting staff who have been tested as per AGFW Worksheet FW 603.

This produces a watertight, non-positive connection between the casing pipe and the sleeve. The sealing strip and the shrink-on collars are used to double-seal the sleeve joint. Technical requirements as per EN 489, AGFW Worksheet FW401, parts 6, 14, 16 and 17.

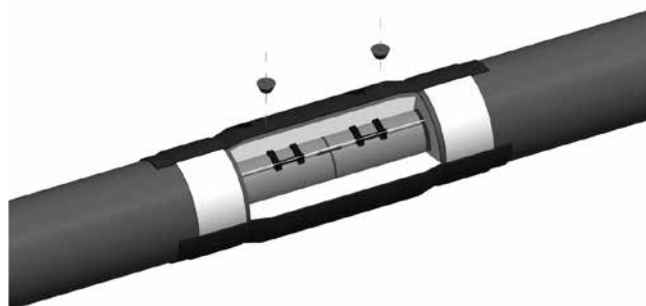
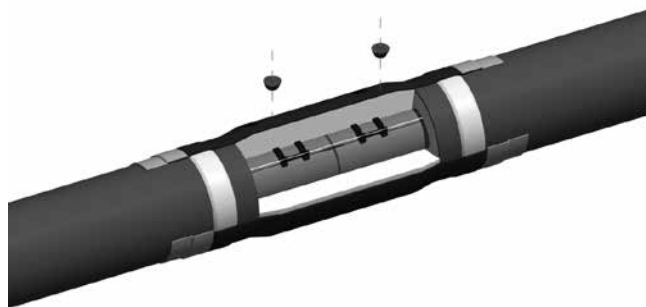
Nominal width:	125 ... 630
Length:	700, 1000, 1400 mm

2. Shrink sleeve made of cross-linked PE

The cross-linked shrink sleeve consists of molecular cross-linked polyethylene, so only limited welding is possible. The very high shrinkage capacity of this material, combined with the sealing strip inserted between the casing pipe and the sleeve, produces a very strong non-positive connection.

Because this type of sleeve can withstand high mechanical loads, it is especially suitable for plastic casing pipe sections that are subject to higher stresses (e.g. frequent load alternation, pipes laid in the groundwater zone).

Nominal width:	125 ... 630
Length:	700 mm



Sleeve joints

Reduction sleeves, fitting sleeves and shrink-on end sleeves

3. Shrink-on reduction sleeves

For reasons related to statics, shrink-on reduction sleeves to insulate steel reduction joints that are welded in by the pipelayer (provided by the customer or others) are designed to reduce the dimension by a maximum of three steps. Their structure corresponds to that of the non-cross-linked PE shrink sleeve, and they must be pushed onto the outer casing before the medium pipe is welded.

The non-cross-linked reduction shrink sleeve consists of a heat-shrunk PE sleeve pipe and the following accessories:

- Shrink-on collars
- Permanently elastic sealing strip, butyl rubber
- Venting plug
- Welded-in PE plug



Nominal D mm	Reduction joint D			Length L mm
	mm	mm	mm	
140	125			700
160	140	125		700
180	160	140	125	700
200	180	160	140	900
225	200	180	160	900
250	225	200	180	900

Nominal D mm	Reduction joint D			Length L mm
	mm	mm	mm	
280	250	225	200	900
315	280	250	225	900
355	315	280	250	900
400	355	315	280	900
450	400	355	315	900
500	450	400	355	1200
560	500	450	400	1200
630	560	500	450	1200

4. Fitting sleeve

Fitting sleeves made of non-cross-linked PE are used when lack of space makes it impossible to push the joint sleeves on. The fitting sleeve is separated in the axial direction and it can then be moved into position over the points where the pipes are connected. This separation point is welded to guarantee the tightness of the sleeve.

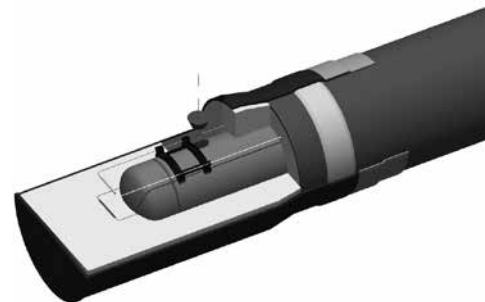
Nominal width:	125 ... 630
Length:	700, 1000, 1400 mm



5. Shrink-on end sleeve

The shrink-on end sleeve is used to insulate pipe closures in the ground and in buildings or shafts. It has the same structure as a non-cross-linked PE shrink-on sleeve, but is sealed on one side with a PE end cover.

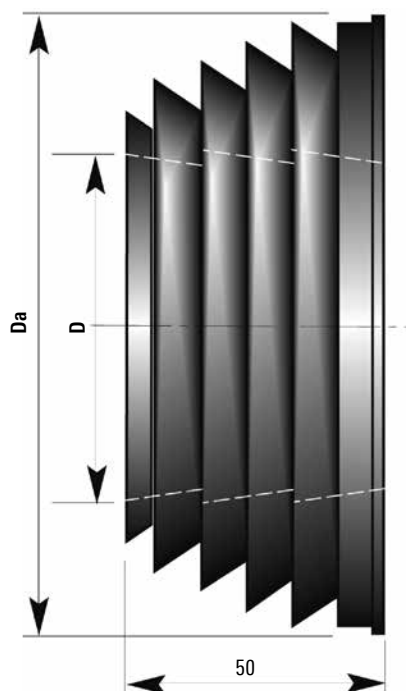
Nominal width:	125 ... 630
Length with closure	
with cap:	700 mm
with 1x ball valve:	1200 mm



In Switzerland, it is preferable not to use shrinkable end sleeves.

Wall sealing ring, pipe warning tape

Wall sealing ring



Data table: sealing ring

D	Da
90	133
110	153
125	168
140	183
160	203
180	223
200	240
225	265
250	290
315	355
355	395
400	440
450	490
500	540
560	600
630	670

Figures in mm

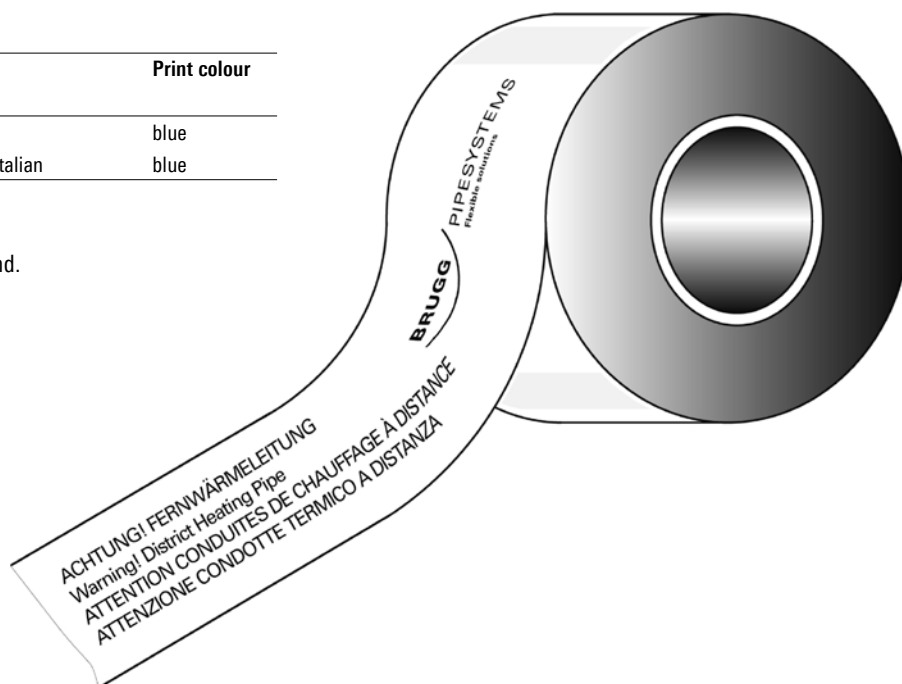
Pipe warning tape

Material width mm	Language	Print colour
40	German	blue
100	German/English/French/Italian	blue

Pipe warning tape to be laid in the ground.

Standard roll length, 250 m

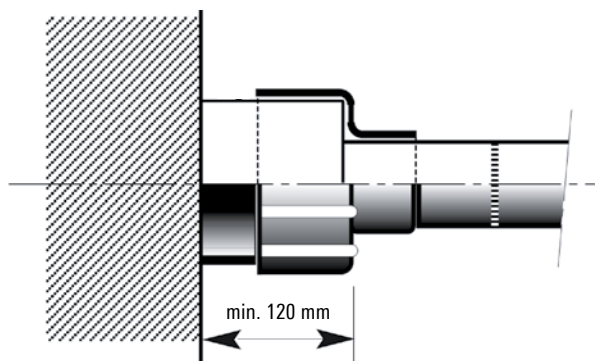
Installation depth; see sheet PRE 6.500



Shrink-on closure

Shrink-on closure/end cap

PREMANT DUO shrink-on closures protect the PUR insulation on the front of the PREMANT district heating pipes against splashing water in buildings and shafts. The shrink-on closure is not necessarily watertight in contact with water (flooding). The shrink-on closure also stops gas escaping from the PUR insulation at the end of the pipe.



Material:
Heat-shrunk, cross-linked polyolefin.
Coated with sealing adhesive

Important fitting note
PREMANT DUO shrink-on closures must be pushed onto the end of the PREMANT DUO district heating pipe before welding the inner pipes, and must be protected against the action of heat during welding.

Allocation of PREMANT DUO dimensions to type of shrink-on closure

Nominal width	Insulation thickness, DS1		Insulation thickness, DS2	
	Casing pipe mm	End cap Type	Casing pipe mm	End cap Type
DN 20- 20	125	2-30	140	2-50
25- 25	140	2-30	160	2-60
32- 32	160	2-70	180	2-70
40- 40	160	2-70	180	2-70
50- 50	200	2-90	225	2-90
65- 65	225	2-90	250	D-110
80- 80	250	D-110	280	D-120
100-100	315	D-120	355	D-130
125-125	400	D-130	450	D-140
150-150	450	D-140	500	D-140
200-200	560	D-355	630	D-355



Rigid foam bar



Nominal size	Thickness	Length
1	100 x 100 mm	1000 mm

Properties	Value	Unit
Material	Polystyrene	
Pressure resistance	150	kPa
Apparent (bulk) density	30	kg/m ³
Thermal conductivity group	040	

Rigid foam bars are used as supports for plastic casing pipes in the pipe trench. Rigid foam bars can remain sanded into the pipe trench.

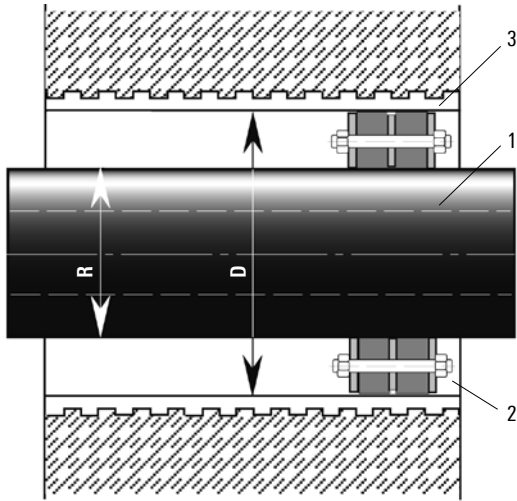
Rigid foam bars are only partially suitable for large pipes. They tend to break under high loads if they are not properly supported. In most cases, the additional outlay for a flat trench floor is not justified. For PREMANT DUO district pipe from DN 100 upwards, GERMAN PIPE recommends sandbags, sand beds or timber strips.

If timber strips are used for alignment, it must be ensured that they are removed again after the welding work is completed, prior to sanding-in. Otherwise, the casing may be damaged due to thermal expansion.

Ring seal

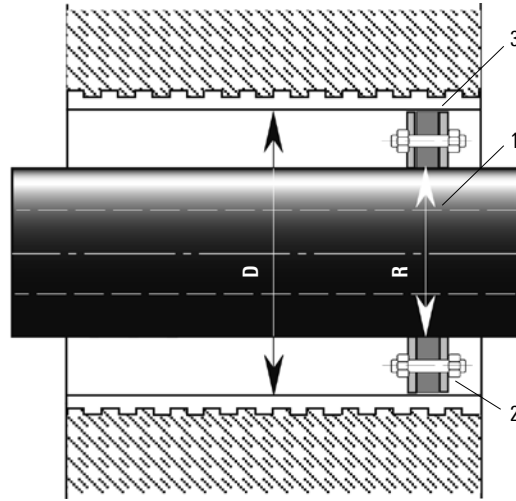
Seal against water (exerting pressure/not exerting pressure) in water-impermeable components

Wall leadthrough with double seal, impermeable to water exerting pressure



- 1 PREMANT DUO district heating pipe
- 2 Sealing kit, double seal
- 3 Liner pipe made of fibre cement or coated core bore

Wall leadthrough, impermeable to water not exerting pressure



- 1 PREMANT DUO district heating pipe
- 2 Sealing kit, single seal
- 3 Liner pipe made of fibre cement or coated core bore

Casing pipe diameter	Liner pipe
PE	Core bore
Ø R	Ø D
mm	mm
125, 140	200
160, 180	250
200, 225	300
250, 280	350
315	400
355	450
400	500
450	600
500	700
560	700
630	800

Core bores

Perfect bores are required for installation. As hairline cracks may be present in the concrete or could be caused by processing, it is advisable to seal the entire length of the borehole wall with suitable sealant (such as AQUAGARD).

Tightness can only be guaranteed if this recommendation is followed.

Installation / trench infill

To avoid deformations at the sealing point, it is especially important during installation and when filling the trench to ensure that no subsequent sinking of the pipe can occur. We also recommend that the pipe is supported or suspended inside the building. Tightness cannot be guaranteed unless these recommendations are followed.

Expansion pad

Description

In order to absorb expansion movements of the underground pipe system in bends, branches and reduction pieces, expansion pads must be applied to the outer PE casing in these areas. Expansion pads are manufactured from cross-linked closed-cell polyethylene, are permanently elastic, do not decay and are resistant to chemicals. The expansion zone is designed on the basis of pipe statics calculations.

Delivery

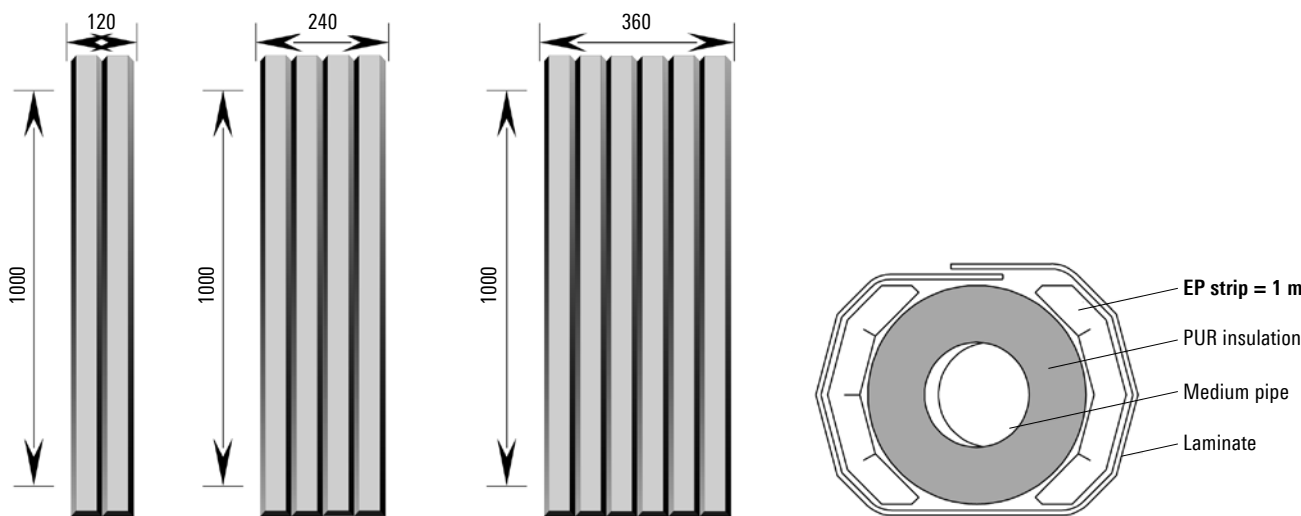
The delivery scope for an expansion zone of 1 m comprises 2 pieces of expansion pad strip, length 1000 mm, which are glued onto the outer casing at the 3 o'clock and 9 o'clock positions. Laminate is then wrapped around the entire zone in order to prevent sand or soil particles from penetrating between the expansion pad and the PE casing.

Material: Polyethylene particle foam

Nominal width:	Size I	120mm
	Size II	240mm
	Size III	360mm

Nominal thickness: 40 mm

Properties	Value	Unit
Apparent (bulk) density	32	Kg/m ³
Tensile strength	160	kPa
Compressive stress		
50 % deformation at 23 °C	100	kPa
Vibration fatigue test, 80,000 load changes		
- Change in thickness	2,4	%
- Change in hardness number	2,4	%
Absorption of water (volume fraction)		
- after 1d	2,0	%
- after 7d	3,0	%
Thermal conductivity at 10 °C	0,040	W/mK



Diameter Outer casing mm	Nominal size		Weight		Volume	
	Name	Existing designation	kg/unit	kg/m	m ³ /pce	m ³ /m
125 to 160	Size 1	I	0.154	0.307	0.0048	0.0096
180 to 280	Size 2	II	0.307	0.614	0.0096	0.0192
315 to 355	Size 3	III	0.461	0.922	0.0144	0.0288
400 to 450	Size 4	II+II	0.614	1.229	0.0192	0.0384
500 to 560	Size 5	II+ III	0.768	1.536	0.0240	0.0480
630	Size 6	III+ III	0.922	1.843	0.0288	0.0576

Assembly Foam



Characteristics	Value	Unit
Component A	Polyol	
Colour	ocker	
Density	1.04	kg/m ³
Solubility in water	yes	
Component B	Isocyanat	
Colour	brown	
Density	1.23	kg/m ³
Solubility in water	no	

Storage

The components of the foam system may only be stored and transported in the original canisters. The canisters have to be stored in a dry environment. They should stay airtight closed and sealed. Direct solar radiation and frost have to be avoided.

Are the foam components stored in a closed room, the room has to be ventilated. The minimum ventilation is an air change twice in 24 h. The temperature ought to be between 10 and 25 °C.

While storing together with other substances, these have to be basically compatible. Furthermore we refer to the "VCI-Konzept zur Zusammenlagerung von Chemikalien" of the "Verband der chemischen Industrie".

PUR-foam-components should not be stored for longer than 6 months.

Classification				
Substance	ADR/RID-class	Water hazard class	Storage class	Waste class EAK Code
Component A (Polyol)	3	1	Class 3	08 04 09
Component B (Isocyanat)	–	1	Class 10	08 05 01

Storage	Value	Unit
Temperature	10 ... 25	°C
Ventilation	twice	each 24 h
Period	< 180	Tage

Disposal

Basically a disposal of the fluent components should be avoided. The disposal of this product has to occur at all times in compliance with the standards of environmental protection and laws of waste disposal as well as the requirements of the local authorities. It is recommended to clarify the details with the responsible waste management company.