

RURY PREIZOLOWANE
SYSTEM ZPU MIĘDZYRZECZ



CATALOGUE OF PRODUCTS



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1. GENERAL INFORMATION ABOUT THE USE OF PREINSULATED PIPES AND FITTINGS.

ZPU Miedzyrzecz preinsulated pipes and fittings are used in the construction of district heating networks, which serve to transmit a heating medium from a source of power to a place of delivery. Preinsulated pipes and fittings are resistant to the action of a medium of constant working temperature up to 165 °C with operating pressure up to 2.5 MPa.

ZPU Miedzyrzecz preinsulated pipes and fittings are a bonded construction consisting of a steel main pipe located centrally in a protective polyethylene casing pipe of high density (PEHD) or polyethylene casing pipe of high density (PEHD) with a diffusion barrier and polyurethane (PUR) thermal insulation filling up the space between the pipes.

In standard production, the pipes are 6 or 12 metres long with diameter DN of up to 1000 mm. Ends of the preinsulated pipes and fittings are not insulated within the length of 150 mm (± 10 mm) for diameters up to DN 200, and within the length of 200 mm (± 10 mm) for diameters of DN 250 and greater.

ZPU Miedzyrzecz preinsulated pipes and fittings with a galvanized steel main pipe are used for hot water transfer and are produced with a length of 6 m and diameter up to DN 200

ZPU Miedzyrzecz preinsulated pipes and fittings meet the requirements of the following standards:

Heating networks – System of preinsulated combined pipes for district water heating networks buried directly in the ground – ...

- PN-EN 253...** – **Pipe assembly** of steel service pipe, polyurethane thermal insulation and outer casing of polyethylene,
- PN-EN 448...** – **Fittings** – assemblies of steel service pipes, polyurethane thermal insulation and outer casing of polyethylene,
- PN-EN 488...** – **Steel valve assembly** for steel service pipes with polyurethane thermal insulation and outer casing of polyethylene,
- PN-EN 489...** – **Joint assembly** for steel service pipes with polyurethane thermal insulation and outer casing of polyethylene,
- PN-EN 14419...** – **Surveillance** and emergency signalisation systems,
- PN-EN 13941** – **Design and installation of preinsulated bonded pipe systems for district heating.**

The usability in civil engineering of the product named: "***ZPU Miedzyrzecz* preinsulated pipes, fittings, steel valve assemblies and compensators as well as joint assemblies for underground and on-the-ground networks**" has been approved based on ITB Technical Approval N° AT-15-8610/2011 issued by the Building Research Institute in Warsaw. The approval is valid until 29 March 2016.

2. SPECIFICATION OF MATERIALS USED IN THE PRODUCTION OF ZPU MIEDZYRZECZ PREINSULATED PIPES AND FITTINGS

Main pipe

A steel pipe with a seam or seamless for pressure applications:

The specification of steel main pipes according to the **PN-EN 253** standard:

	Diameter	EN standard	Material
<ul style="list-style-type: none"> • <u>with seam</u> - electric resistance welding 	≤ 323,9 mm	EN 10217-1 or EN 10217-2	P235TR1 or P235TR2 or P235GH
- electric resistance welding	> 323,9 mm	EN 10217-2	P235GH
- hidden arc welding	all	EN 10217-5	P235GH
<ul style="list-style-type: none"> • <u>without seam</u> - seamless 	all	EN 10216-2	P235GH

- yield point	235 MPa
- tensile strength	360 ÷ 500 MPa
- density	7850 kg/m ³
- guaranteed leaktightness	5 MPa

Control documents based on acceptance inspection - **Certificate 3.1** (EN 10204)

The outside surface of steel pipes is cleaned by **shot peening** in order to increase adhesion of the rigid polyurethane foam (PUR).

Ends of a steel main pipe are prepared for welding by bevelling.

In case of using the pipes for transmitting hot service water, steel pipes are galvanized according to PN-EN 10240 and PN-EN ISO 1461 standards.

Thermal insulation

Insulation is made of rigid polyurethane foam (PUR) which evenly fills the spaces between the pipes on the whole length. Insulation is made according to the requirements of the **PN-EN 253** standard.

- blowing agent	cyclopentane
- thermal conductivity factor λ_{50}	≤ 0.029 W/mK
- foam density	≥ 60 kg/m ³
- compressive strength	
in radial direction with 10% deformation	≥ 0.3 MPa
- resistance to temperature	≤ 165 °C

Casing

Casing is made of a polyethylene pipe of high density (PEHD) or a polyethylene pipe of high density (PEHD) with a diffusion barrier according to the requirements of the **PN-EN 253** standard:

- density	≥ 945 kg/m ³
- yield point	≥ 19 MPa
- ultimate elongation	≥ 350 %
- thermal conductivity factor λ_{50}	> 0.43 W/mK

The internal surface of the polyethylene pipes is activated with **corona treatment** in order to improve adhesion of the rigid polyurethane foam.

3. PIPELINE LEAK DETECTION SYSTEM

ZPU Miedzyrzecz preinsulated pipes and fittings can be equipped with an installation of a pipeline leak detection system. The installation consists of wires which are built in the thermal insulation. The system monitors the entire length of a pipeline and signals any places of thermal insulation moistness.

4. GENERAL RULES OF INSTALLING PREINSULATED PIPES IN GROUND

Preinsulated pipes and fittings are placed directly in ground in narrow excavations on at least 10 cm thick sand beds. Before steel Main pipes are welded, elements of joint assembly providing thermal insulation need to be installed at each joint.

After main pipes have been welded and all leak tightness tests have been conducted, thermal insulation and joint airtight sealing need to be completed.

A ready network made of preinsulated pipes is subject to technical acceptance. After that, it is backfilled with sand (at least 10 cm above the upper surface of pipes' surface). The subcrust and backfilling must be thickened in order to provide uniform conditions of work for a pipeline. Having stabilised the backfilling, the entire part of an excavation should be filled in with subsoil. Minimum covering of a pipeline is 40 cm.

5. QUALITY ASSURANCE

Designing, development processes, manufacture, delivery, installation and service of ZPU Miedzyrzecz preinsulated pipes and fittings for underground heating networks are supervised by quality and environmental management systems which meet all the requirements of **PN-EN ISO 9001:2009 and PN-EN ISO 14001:2005**.

The **CERTIFICATE OF QUALITY AND ENVIRONMENTAL SYSTEMS No. JS-96/5/2012**, issued by the Polish Centre of Research and Certification in Warsaw, and **EUROHEAT & POWER no 1/15**, proves that our products and services fulfil all requirements of the above-mentioned standards.

6. DIMENSIONS OF MAIN AND CASING PIPES

During the manufacturing process of *ZPU Miedzyrzecz* preinsulated pipes, fittings and steel valve assemblies, main pipes and casing pipes of the following cross-section dimensions are used:

Steel main pipe				Polyethylene casing pipe					
		seamless	with seam	Standard insulation		Plus insulation		Plus-plus insulation	
DN	Dz	g	g	Dzp	gp	Dzp	gp	Dzp	gp
<i>mm</i>									
20	26.9	2.6	2.6	90	3.0	110	3.0	125	3.0
25	33.7	2.6	2.6	90	3.0	110	3.0	125	3.0
32	42.4	2.6	2.6	110	3.0	125	3.0	140	3.0
40	48.3	2.6	2.6	110	3.0	125	3.0	140	3.0
50	60.3	2.9	2.9	125	3.0	140	3.0	160	3.0
65	76.1	2.9	2.9	140	3.0	160	3.0	180,200	3.0,3.2
80	88.9	3.2	3.2	160	3.0	180,200	3.0,3.2	225	3.4
100	114.3	3.6	3.6	200	3.2	225	3.4	250	3.6
125	139.7	4.0	3.6	225	3.4	250	3.6	280,315	3.9,4.1
150	168.3	4.5	4.0	250	3.6	280,315	3.9,4.1	400	4.8
200	219.1	6.3	4.5	315	4.1	355,400	4.5,4.8	450	5.2
250	273.0	7.1	5.0	400	4.8	450	5.2	500	5.6
300	323.9	7.1	5.6	450	5.2	500	5.6	520	5.8
350	355.6	8.0	5.6	500	5.6	520	5.8	560	6.0
400	406.4	8.8	6.3	520	5.8	560	6.0	630	6.6
450	457.0	10.0	6.3	560	6.0	630	6.6	710	7.2
500	508.0	11.0	6.3	630	6.6	710	7.2	900	8.7
600	610.0	11.0	7.1	800	7.9	900	8.7	-	-
700	711.0	12.5	8.0	900	8.7	1000	9.4	-	-
800	813.0	14.2	8.8	1000	9.4	-	-	-	-
900	914.0	16.0	10.0	1100	10.2	-	-	-	-
1000	1016.0	17.5	11.0	1200	11.0	-	-	-	-
1200	1219.0	20.0	12,5	1400	12,5	-	-	-	-

NOTE: Dimensions of main and casing pipes might be different from the data presented in the table above in case of different requirements in the design or technical specification.

In case of protective casing made of a polyethylene pipe with a diffusion barrier, the available scope of diameters varies from Dzp=90 to Dzp=500.

DN - nominal diameter,

Dz, Dzp; - outer diameter,

g - minimum wall thickness of steel main pipes,

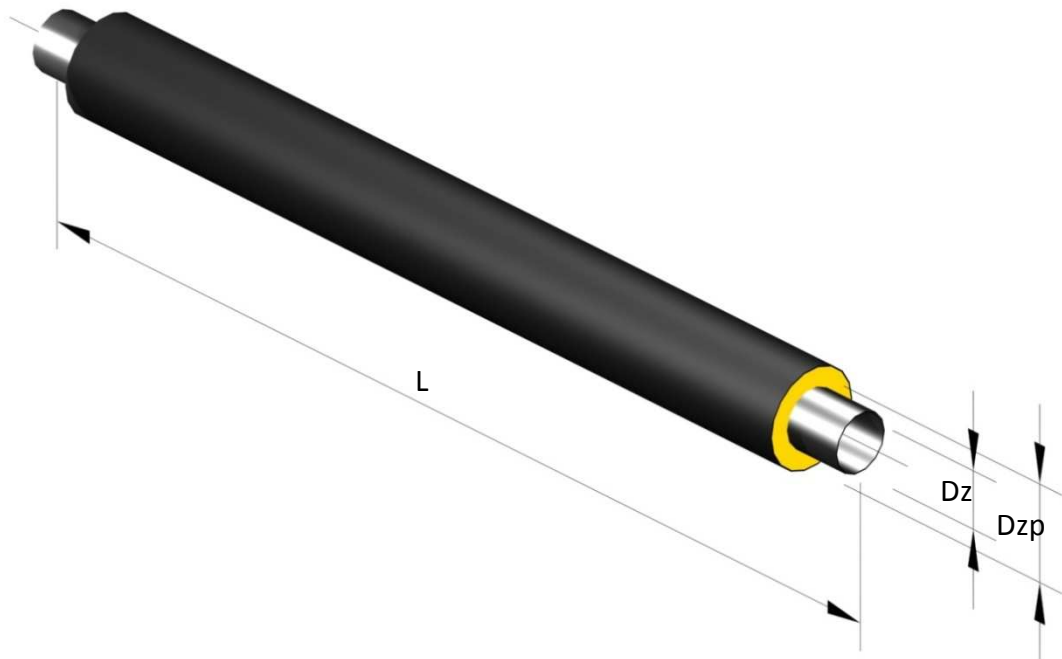
gp; - minimum wall thickness of a polyethylene pipe and a polyethylene pipe with a diffusion barrier.

When placing orders for preinsulated products, please indicate: name of a product, type of steel main pipe (with seam or seamless), black or galvanized, type of casing (made of polyethylene PEHD pipe or polyethylene PEHD pipe with a diffusion barrier), type of thermal insulation, geometrical dimensions (diameter, wall thickness), type of pipeline leak detection system, and in the case of pipes, also their length and symbols given in the catalogue.

The tables included specify the dimensions and catalogue numbers of preinsulated pipes, elbows, flat, raising and parallel T-pieces for the main pipe up to DN 800, and of others products up to DN 600 with standard insulation.

7. PREINSULATED PIPES

7.1. STRAIGHT PREINSULATED PIPES

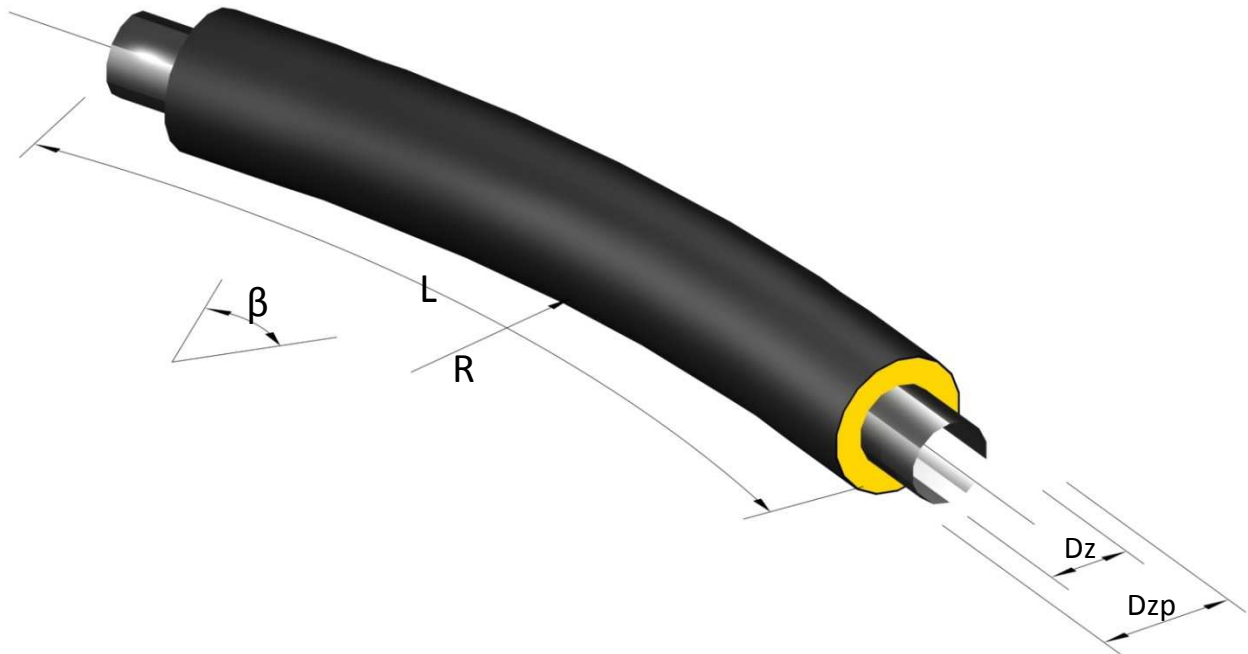


NOTE:

- ✓ The pipes can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 1

Main pipe		Casing pipe		Length	Mass	Catalogue symbol
Nominal diameter	Outer diameter		L			
DN <i>mm</i>	Dz <i>mm</i>	Dzp <i>mm</i>		<i>m</i>	<i>kg</i>	
20	26.9	90	6	2	R - 20/ 90	
25	33.7	90	6	3	R - 25/ 90	
32	42.4	110	6 ; 12	4	R - 32/110	
40	48.3	110	6 ; 12	4	R - 40/110	
50	60.3	125	6 ; 12	6	R - 50/125	
65	76.1	140	6 ; 12	7	R - 65/140	
80	88.9	160	6 ; 12	9	R - 80/160	
100	114.3	200	6 ; 12	13	R - 100/200	
125	139.7	225	6 ; 12	16	R - 125/225	
150	168.3	250	6 ; 12	21	R - 150/250	
200	219.1	315	6 ; 12	31	R - 200/315	
250	273.0	400	6 ; 12	44	R - 250/400	
300	323.9	450	6 ; 12	57	R - 300/450	
350	355.6	500	6 ; 12	64	R - 350/500	
400	406.4	520	6 ; 12	77	R - 400/520	
450	457.0	560	6 ; 12	86	R - 450/560	
500	508.0	630	6 ; 12	98	R - 500/630	
600	610.0	800	6 ; 12	140	R - 600/800	
700	711.0	900	6 ; 12	183	R - 700/900	
800	813.0	1000	6 ; 12	225	R - 800/1000	

7.2. FACTORY-BENT PREINSULATED PIPES**NOTE:**

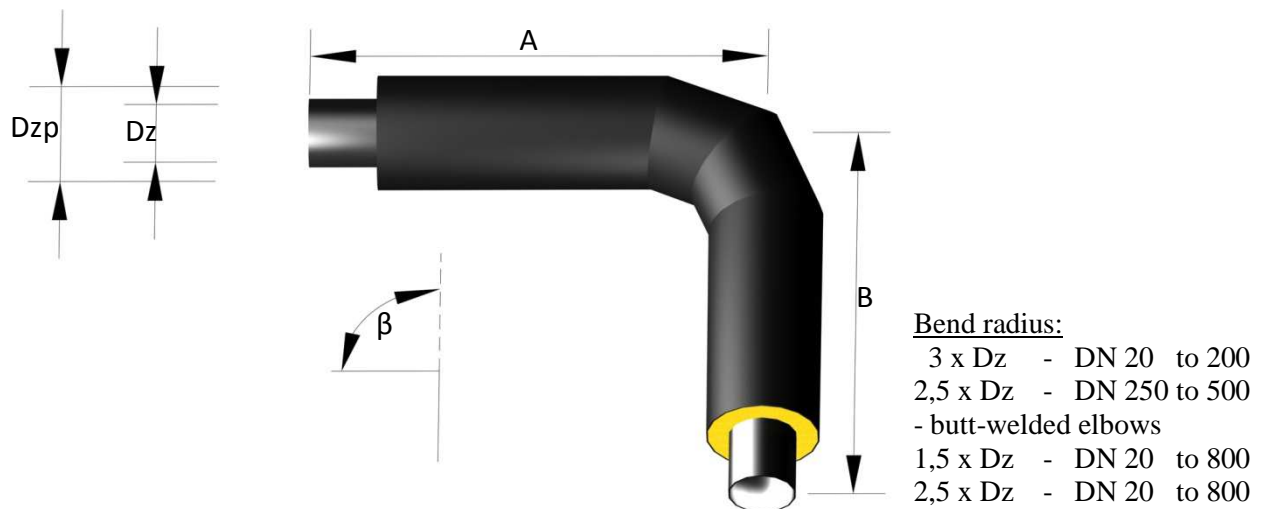
- ✓ When placing an order, please specify pipe's diameter, bend radius (R), bend angle (β) and pipe's length (L) as well as bend direction ("left" or "right").
- ✓ Maximum bend angles and minimum bend radius are given in Table 8 "Static calculations and designing".
- ✓ Permissible tolerance of bend angle is $\pm 2^\circ$.
- ✓ The pipes can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 2

Main pipe		Casing pipe	Length	Mass	Catalogue symbol
Nominal diameter	Outer diameter				
DN	Dz	Dzp	L	m	
mm	mm	mm	m	kg	
100	114.3	200	12	13	RG - 100/200
125	139.7	225	12	16	RG - 125/225
150	168.3	250	12	21	RG - 150/250
200	219.1	315	12	31	RG - 200/315
250	273.0	400	12	44	RG - 250/400
300	323.9	450	12	57	RG - 300/450
350	355.6	500	12	64	RG - 350/500
400	406.4	520	12	77	RG - 400/520
450	457.0	560	12	86	RG - 450/560
500	508.0	630	12	98	RG - 500/630

8. PREINSULATED FITTINGS

8.1. ELBOW



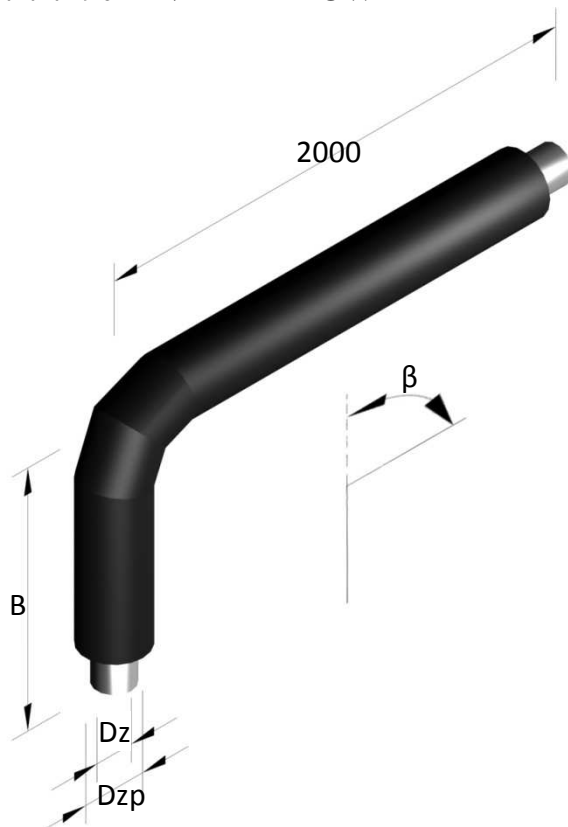
NOTE:

- ✓ Standard range of preinsulated elbows includes the following angles (β) 90°, 75°, 60°, 45°, 30°, 15°.
- ✓ Bend angle β should be indicated when giving a catalogue symbol, e.g. K-100/45; K-100/30.
- ✓ Butt-welded elbows – manufactured by hot bending of a steel pipe, followed by butt-welding of two straight sections of the steel pipe on both ends.
- ✓ The elbows can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 3

Main pipe		Casing pipe		Length of arms	Weight	Catalogue symbol
Nominal diameter	Outer diameter		A			
DN	Dz	Dzp		mm	kg	
20	26.9	90	1000	5	K - 20/90	
25	33.7	90	1000	6	K - 25/90	
32	42.4	110	1000	8	K - 32/90	
40	48.3	110	1000	8	K - 40/90	
50	60.3	125	1000	11	K - 50/90	
65	76.1	140	1000	13	K - 65/90	
80	88.9	160	1000	17	K - 80/90	
100	114.3	200	1000	24	K - 100/90	
125	139.7	225	1000	30	K - 125/90	
150	168.3	250	1000	39	K - 150/90	
200	219.1	315	1000	56	K - 200/90	
250	273.0	400	1000	77	K - 250/90	
300	323.9	450	1500	156	K - 300/90	
350	355.6	500	1500	175	K - 350/90	
400	406.4	520	1500	210	K - 400/90	
450	457.0	560	1500	231	K - 450/90	
500	508.0	630	1500	261	K - 500/90	
600	610.0	800	1500	365	K - 600/90	
700	711.0	900	2000	480	K - 700/90	
800	813.0	1000	2000	585	K - 800/90	

8.1.1. 90° ENTRY ELBOW



Elbow radius:

- cold bent elbows:

3 x Dz - DN 20 to 200

2,5 x Dz - DN 250 to 300

-butt-welded elbows:

1,5 x Dz - DN 20 to 300

2,5 x Dz - DN 20 to 300

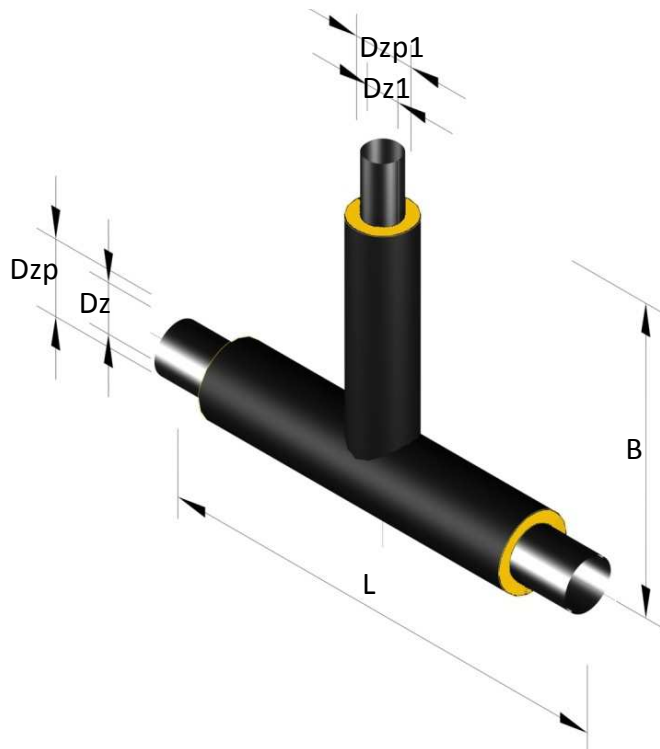
NOTE:

- ✓ Butt-welded elbows –manufactured by hot bending of a steel pipe, followed by butt-welding of two straight sections of the steel pipe on both ends.
- ✓ The elbows can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 3.1.

Main pipe		Casing pipe		Length of arm	Mass	Catalogue symbol
Nominal diameter	Outer diameter		B			
DN	Dz	Dzp		mm	kg	
mm	mm	mm	mm			
20	26.9	90	1000	8	KW - 20/90	
25	33.7	90	1000	9	KW - 25/90	
32	42.4	110	1000	12	KW - 32/90	
40	48.3	110	1000	13	KW - 40/90	
50	60.3	125	1000	17	KW - 50/90	
65	76.1	140	1000	21	KW - 65/90	
80	88.9	160	1000	26	KW - 80/90	
100	114.3	200	1000	37	KW - 100/90	
125	139.7	225	1000	46	KW - 125/90	
150	168.3	250	1000	59	KW - 150/90	
200	219.1	315	1000	86	KW - 200/90	
250	273.0	400	1000	121	KW - 250/90	
300	323.9	450	1500	183	KW - 300/90	

8.2. FLAT T-PIECE



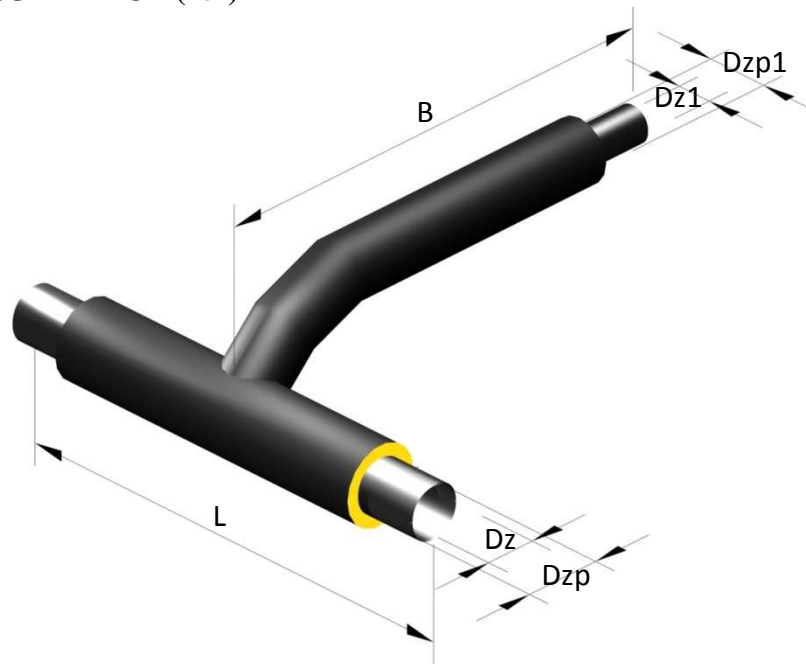
NOTE:

- ✓ Standard range of flat T-pieces includes branches of any possible diameter configuration.
- ✓ T-pieces can be manufactured with a reduction of main pipe diameter.
- ✓ Steel parts – during the production process forged T-piece, T-piece with drawn collar, T-piece directly welded or reinforced T-pieces with increased wall thickness or T-pieces with welded saddle can be used according to PN-EN 13941.
- ✓ The T-pieces can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 4

Main pipe			Branch pipe		Length		Catalogue symbol
main			casing	main			
Nominal diameter	Outer diameter		Outer diameter				
DN	Dz	Dzp	Dz1	Dzp1			
mm	mm	mm	mm	mm	L	B	
20	26.9	90	26.9	90	1000	1000	TP - 20/20
25	33.7	90	26.9	90	1000	1000	TP - 25/20
32	42.4	110	33.7	90	1000	1000	TP - 32/25
40	48.3	110	42.4	110	1000	1000	TP - 40/32
50	60.3	125	48.3	110	1000	1000	TP - 50/40
65	76.1	140	60.3	125	1000	1000	TP - 65/50
80	88.9	160	76.1	140	1000	1000	TP - 80/65
100	114.3	200	88.9	160	1500	1000	TP - 100/80
125	139.7	225	114.3	200	1500	1000	TP - 125/100
150	168.3	250	139.7	225	1500	1000	TP - 150/125
200	219.1	315	168.3	250	1500	1000	TP - 200/150
250	273.0	400	219.1	315	2000	1000	TP - 250/200
300	323.9	450	273.0	400	2000	1500	TP - 300/250
350	355.6	500	323.9	450	2000	1500	TP - 350/300
400	406.4	520	355.6	500	2000	1500	TP - 400/350
450	457.0	560	406.4	520	2000	1500	TP - 450/400
500	508.0	630	457.0	560	2000	1500	TP - 500/450
600	610.0	800	508.0	630	2000	1500	TP - 600/500
700	711.0	900	610.0	800	2500	1500	TP - 700/600
800	813.0	1000	711.0	900	2500	1500	TP - 800/700

8.3. RAISING T-PIECE (45°)



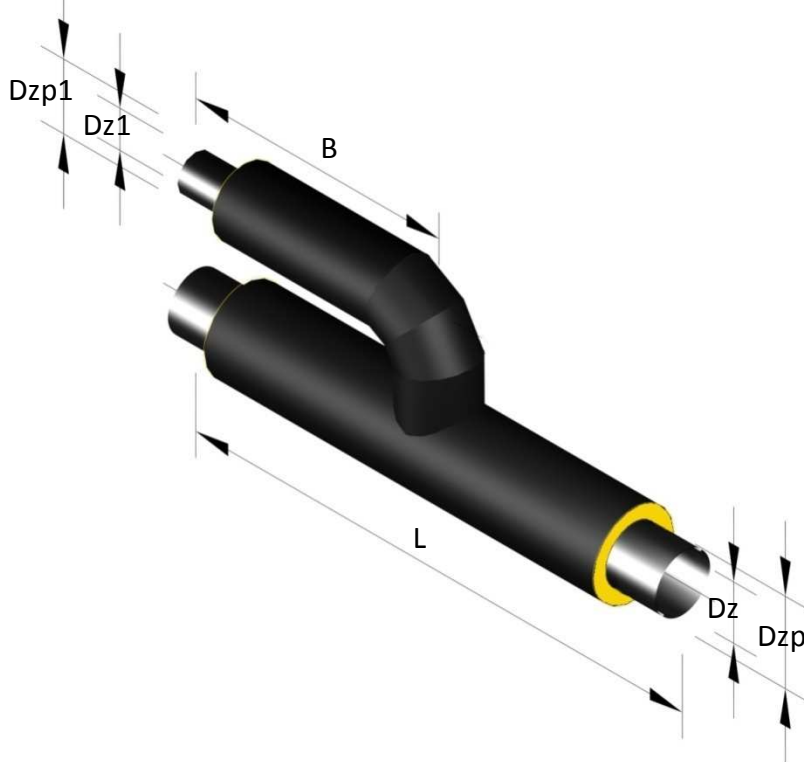
NOTE:

- ✓ Standard range of raising T-pieces includes branches of any possible diameter configuration.
- ✓ T-pieces can be manufactured with a reduction of main pipe diameter, as “left” or “right”.
- ✓ Minimum bore between casing pipes is 50 mm.
- ✓ Steel parts – during the production process forged T-piece, T-piece with drawn collar, T-piece directly welded or reinforced T-pieces with increased wall thickness or T-pieces with welded saddle can be used according to PN-EN 13941.
- ✓ The T-pieces can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 5

Main pipe			Branch pipe		Axis spacing	Length		Catalogue symbol
main	casing		main	casing		L	B	
Nominal diameter	Outer diameter		Outer diameter					
DN	Dz	Dzp	Dz1	Dzp1	H			
mm	mm	mm	mm	mm	mm	mm	mm	
20	26.9	90	26.9	90	140	1000	1000	TW - 20/20
25	33.7	90	26.9	90	140	1000	1000	TW - 25/20
32	42.4	110	33.7	90	150	1000	1000	TW - 32/25
40	48.3	110	42.4	110	160	1000	1000	TW - 40/32
50	60.3	125	48.3	110	168	1000	1000	TW - 50/40
65	76.1	140	60.3	125	183	1000	1000	TW - 65/50
80	88.9	160	76.1	140	200	1000	1000	TW - 80/65
100	114.3	200	88.9	160	230	1500	1000	TW - 100/80
125	139.7	225	114.3	200	262	1500	1000	TW - 125/100
150	168.3	250	139.7	225	288	1500	1000	TW - 150/125
200	219.1	315	168.3	250	332	1500	1000	TW - 200/150
250	273.0	400	219.1	315	408	2000	1000	TW - 250/200
300	323.9	450	273.0	400	475	2000	1500	TW - 300/250
350	355.6	500	323.9	450	525	2000	1500	TW - 350/300
400	406.4	520	355.6	500	560	2000	1500	TW - 400/350
450	457.0	560	406.4	520	590	2000	1500	TW - 450/400
500	508.0	630	457.0	560	645	2000	1500	TW - 500/450
600	610.0	800	508.0	630	765	2000	1500	TW - 600/500
700	711.0	900	610.0	800	900	2500	2000	TW - 700/600
800	813.0	1000	711.0	900	1000	2500	2000	TW - 800/700

8.4. PARALLEL T-PIECE



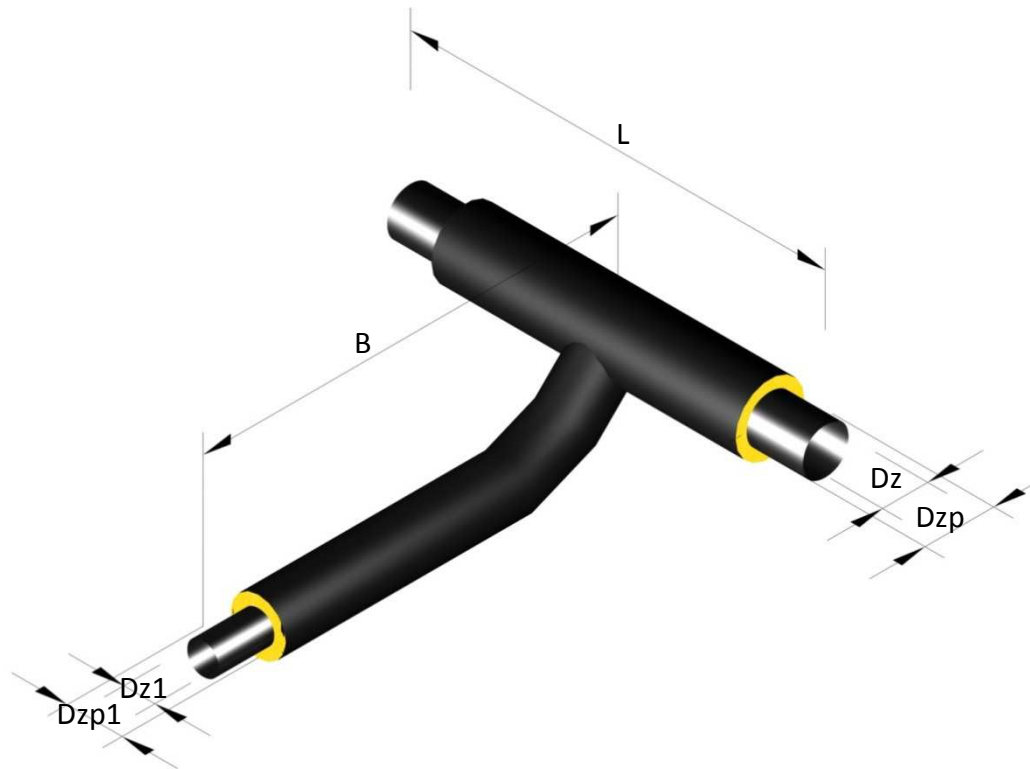
NOTE:

- ✓ Standard range of parallel T-pieces includes branches of any possible diameter configuration.
- ✓ T-pieces can be manufactured with a reduction of main pipe diameter.
- ✓ Steel parts – during the production process forged T-piece, T-piece with drawn collar, T-piece directly welded or reinforced T-pieces with increased wall thickness or T-pieces with welded saddle can be used according to PN-EN 13941.
- ✓ The T-pieces can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 6

Main pipe			Branch pipe			Axis spacing	Length	Catalogue symbol
Nominal diameter	main	casing	main	casing	h			
	Outer diameter	Outer diameter	Outer diameter	Outer diameter				
DN	Dz	Dzp	Dz1	Dzp1	h	H	L	
mm	mm	mm	mm	mm	mm	mm	mm	
20	26.9	90	26.9	90	100	190	1000	TR - 20/20
25	33.7	90	26.9	90	100	190	1000	TR - 25/20
32	42.4	110	33.7	90	100	200	1000	TR - 32/25
40	48.3	110	42.4	110	100	210	1000	TR - 40/32
50	60.3	125	48.3	110	100	218	1000	TR - 50/40
65	76.1	140	60.3	125	100	233	1000	TR - 65/50
80	88.9	160	76.1	140	100	250	1000	TR - 80/65
100	114.3	200	88.9	160	100	280	1500	TR - 100/80
125	139.7	225	114.3	200	100	313	1500	TR - 125/100
150	168.3	250	139.7	225	120	358	1500	TR - 150/125
200	219.1	315	168.3	250	150	433	1500	TR - 200/150
250	273.0	400	219.1	315	170	528	2000	TR - 250/200
300	323.9	450	273.0	400	200	625	2000	TR - 300/250
350	355.6	500	323.9	450	240	715	2000	TR - 350/300
400	406.4	520	355.6	500	260	770	2000	TR - 400/350
450	457.0	560	406.4	520	300	840	2000	TR - 450/400
500	508.0	630	457.0	560	350	945	2000	TR - 500/450
600	610.0	800	508.0	630	400	1115	2000	TR - 600/500
700	711.0	900	610.0	800	650	1500	3000	TR - 700/600
800	813.0	1000	711.0	900	750	1700	3000	TR - 800/700

8.5. DESCENDING T-PIECE – DRAIN



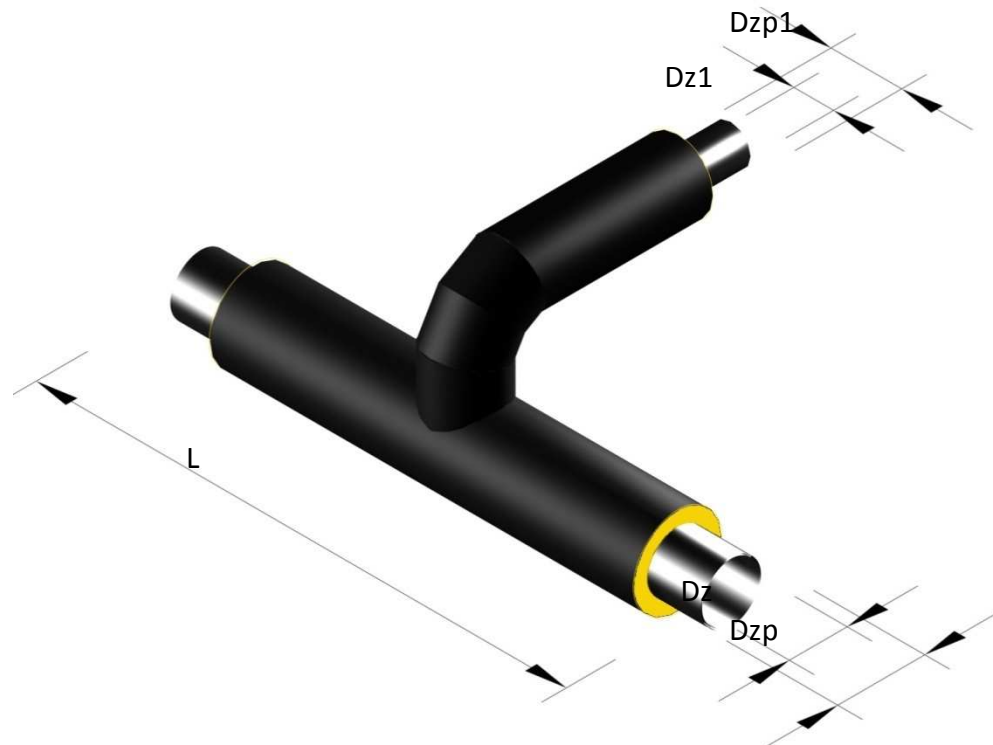
NOTE:

- ✓ Minimum bore between casing pipes is 50 mm.
- ✓ Steel parts – during the production process forged T-piece, T-piece with drawn collar, T-piece directly welded or reinforced T-pieces with increased wall thickness or T-pieces with welded saddle can be used according to PN-EN 13941.
- ✓ The T-pieces can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 7

Main pipe			Drain pipe		Axis spacing	Length		Catalogue symbol
main	casing		main	casing		L	B	
Nominal diameter	Outer diameter		Outer diameter					
DN	Dz	p	Dz1	Dzp1	H	L	B	
mm	mm	mm	mm	mm	mm	mm	mm	
20	26.9	90	26.9	90	140	1000	1000	TO - 20/20
25	33.7	90	26.9	90	140	1000	1000	TO - 25/25
32	42.4	110	33.7	90	150	1000	1000	TO - 32/25
40	48.3	110	42.4	90	150	1000	1000	TO - 40/25
50	60.3	125	42.4	90	158	1000	1000	TO - 50/25
65	76.1	140	48.3	110	175	1000	1000	TO - 65/40
80	88.9	160	48.3	110	185	1000	1000	TO - 80/40
100	114.3	200	48.3	110	205	1500	1000	TO - 100/40
125	139.7	225	48.3	110	218	1500	1000	TO - 125/40
150	168.3	250	48.3	110	230	1500	1000	TO - 150/40
200	219.1	315	60.3	125	270	1500	1000	TO - 200/50
250	273.0	400	60.3	125	313	1500	1000	TO - 250/50
300	323.9	450	60.3	125	338	1500	1500	TO - 300/50
350	355.6	500	88.9	160	380	1500	1500	TO - 350/80
400	406.4	520	88.9	160	390	1500	1500	TO - 400/80
450	457.0	560	114.3	200	430	1500	1500	TO - 450/100
500	508.0	630	114.3	200	465	1500	1500	TO - 500/100
600	610.0	800	114.3	200	550	1500	1500	TO - 600/100

8.6. VENT T-PIECE



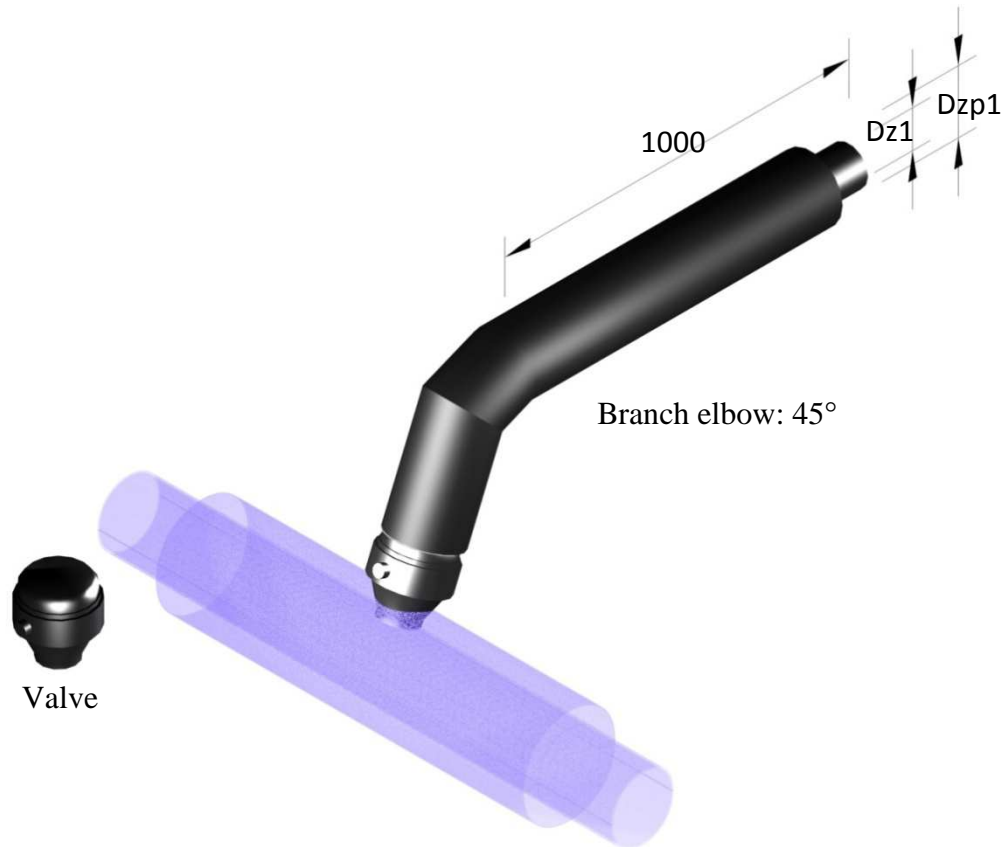
NOTE:

- ✓ Steel parts – during the production process forged T-piece, T-piece with drawn collar, T-piece directly welded or reinforced T-pieces with increased wall thickness or T-pieces with welded saddle can be used according to PN-EN 13941.
- ✓ The T-pieces can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 8

Main pipe			Drain pipe		Axis spacing	Length	Catalogue symbol
main	casing		main	casing			
Nominal diameter	Outer diameter		Outer diameter				
DN	Dz	Dzp	Dz1	Dzp1	H	L	
mm	mm	mm	mm	mm	mm	mm	
20	26.9	90	26.9	90	190	1000	TD - 20
25	33.7	90	26.9	90	190	1000	TD - 25
32	42.4	110	33.7	90	200	1000	TD - 32
40	48.3	110	33.7	90	200	1000	TD - 40
50	60.3	125	33.7	90	208	1000	TD - 50
65	76.1	140	33.7	90	215	1000	TD - 65
80	88.9	160	33.7	90	225	1000	TD - 80
100	114.3	200	33.7	90	245	1500	TD - 100
125	139.7	225	33.7	90	258	1500	TD - 125
150	168.3	250	33.7	90	270	1500	TD - 150
200	219.1	315	33.7	90	303	1500	TD - 200
250	273.0	400	33.7	90	345	1500	TD - 250
300	323.9	450	33.7	90	370	1500	TD - 300
350	355.6	500	48.3	110	405	1500	TD - 350
400	406.4	520	48.3	110	415	1500	TD - 400
450	457.0	560	48.3	110	435	1500	TD - 450
500	508.0	630	48.3	110	470	1500	TD - 500
600	610.0	800	48.3	110	555	1500	TD - 600

8.6.1. BRANCH – NECK TYPE – TAPPING VALVES



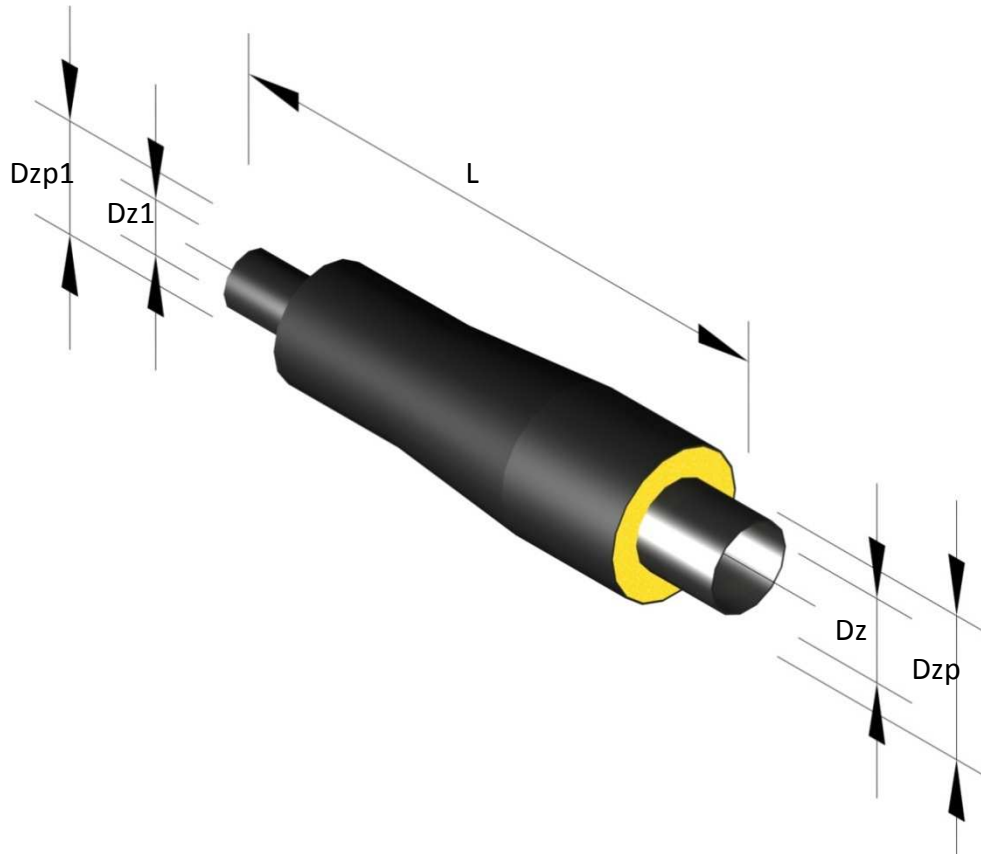
NOTE:

- ✓ Necks with a valve are used to make branches of diameters up to DN 200 mm from an existing main pipeline, the so-called "hot tapping valves".
- ✓ Necks without a valve are used to make branches from an existing closed main pipeline, the so-called "cold tapping valves".

TABLE 9

Main pipe			Branch elbow 45°		Neck valve	Catalogue symbol
main	casing		main	casing		
Nominal diameter	Outer diameter		Outer diameter		Diameter	
DN	Dz	Dzp	Dz1	Dzp1	DN	
mm	mm	mm	mm	mm	mm	
25	33.7	90	26.9	90	20	ZTG - 25/20
32	42.4	110	33.7	90	25	ZTG - 32/25
40	48.3	110	42.4	110	32	ZTG - 40/32
50	60.3	125	48.3	110	40	ZTG - 50/40
65	76.1	140	60.3	125	50	ZTG - 65/50
80	88.9	160	76.1	140	65	ZTG - 80/65
100	114.3	200	88.9	160	80	ZTG - 100/80
125	139.7	225	114.3	200	100	ZTG - 125/100
150	168.3	250	139.7	225	125	ZTG - 150/125

8.7. REDUCTION



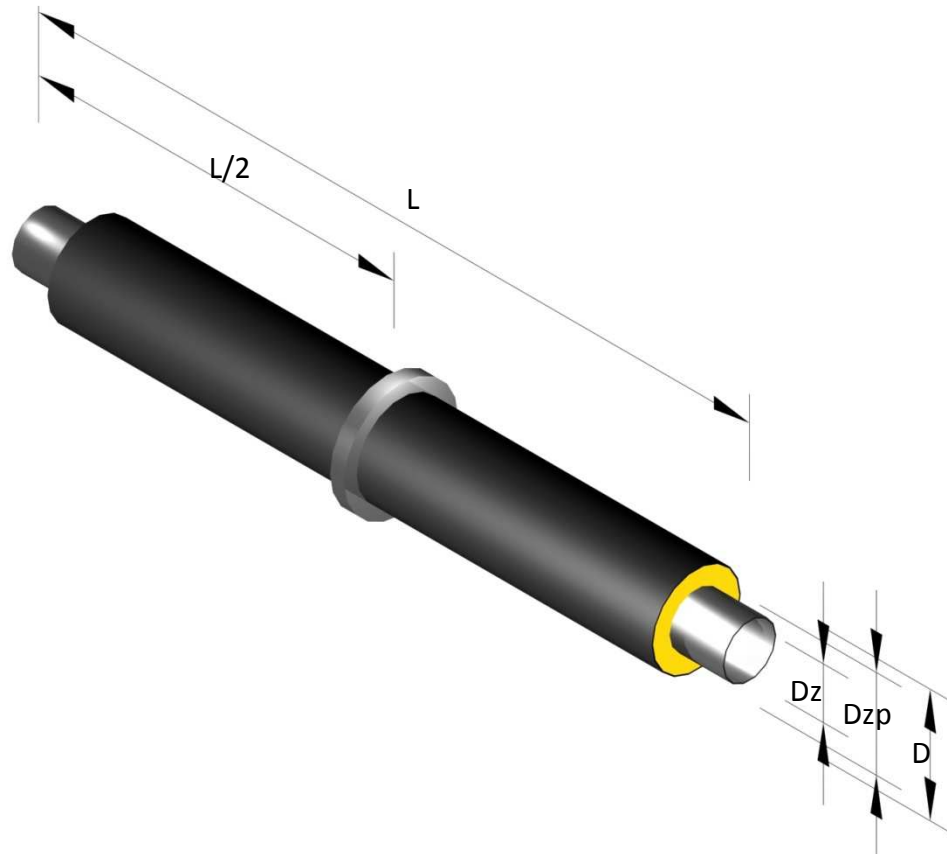
NOTE:

- ✓ Reductions are manufactured in all diameter configurations.
- ✓ The reductions can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 10

Main pipe			Reduced pipe		Length	Catalogue symbol
main	casing		main	casing		
Nominal diameter	Outer diameter		Outer diameter			
DN/DN1	Dz	Dzp	Dz1	Dzp1	L	
mm	mm	mm	mm	mm	mm	
25/20	33.7	90	26.9	90	1000	Z - 25/20
32/25	42.4	110	33.7	90	1000	Z - 32/25
40/32	48.3	110	42.4	110	1000	Z - 40/32
50/40	60.3	125	48.3	110	1000	Z - 50/40
65/50	76.1	140	60.3	125	1000	Z - 65/50
80/65	88.9	160	76.1	140	1000	Z - 80/65
100/80	114.3	200	88.9	160	1000	Z - 100/80
125/100	139.7	225	114.3	200	1000	Z - 125/100
150/125	168.3	250	139.7	225	1000	Z - 150/125
200/125	219.1	315	168.3	250	1000	Z - 200/150
250/200	273.0	400	219.1	315	1000	Z - 250/200
300/250	323.9	450	273.0	400	1500	Z - 300/250
350/300	356.6	500	323.9	450	1500	Z - 350/300
400/350	406.4	520	355.6	500	1500	Z - 400/350
450/400	457.0	560	406.4	520	1500	Z - 450/400
500/450	508.0	630	457.0	560	1500	Z - 500/450
600/500	610.0	800	508.0	630	1500	Z - 600/500

8.8. FIXED POINT



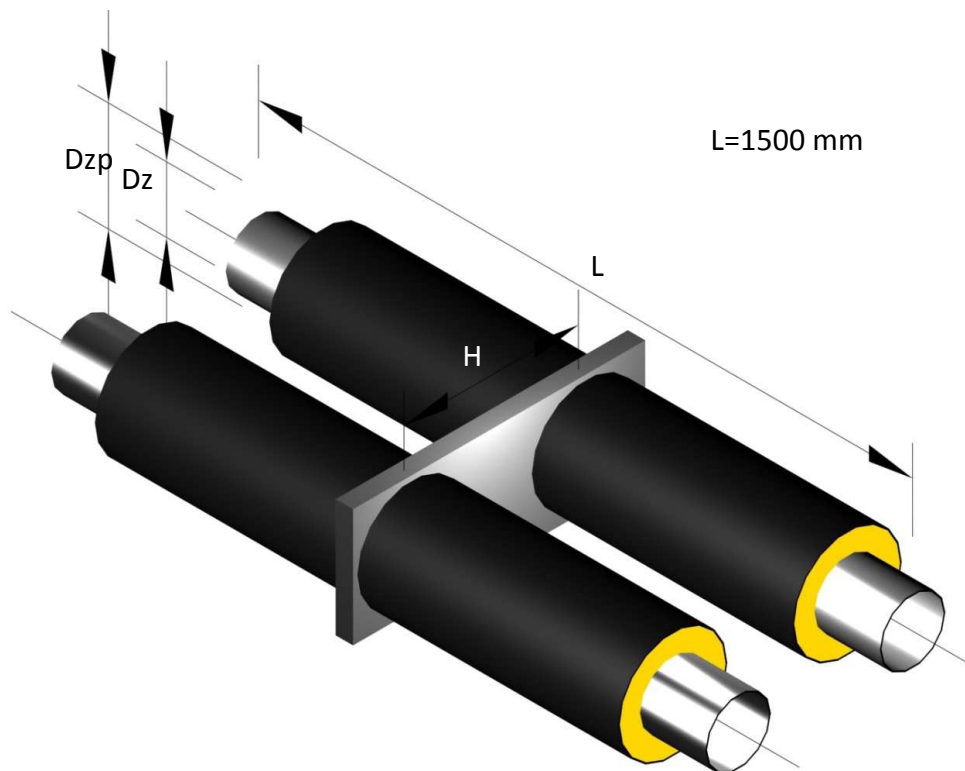
NOTE:

- ✓ Fixed points can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 11

Main pipe		Casing pipe		Ring outer diameter Length	Catalogue symbol	Main pipe
Nominal diameter	Outer diameter		D			
DN	Dz	Dzp	D	L		
mm	mm	mm	mm	mm		
20	26.9	90	140	2000	PS - 20	
25	33.7	90	140	2000	PS - 25	
32	42.4	110	140	2000	PS - 32	
40	48.3	110	140	2000	PS - 40	
50	60.3	125	170	2000	PS - 50	
65	76.1	140	200	2000	PS - 65	
80	88.9	160	220	2000	PS - 80	
100	114.3	200	260	2000	PS - 100	
125	139.7	225	300	2000	PS - 125	
150	168.3	250	320	2000	PS - 150	
200	219.1	315	400	2000	PS - 200	
250	273.0	400	500	2000	PS - 250	
300	323.9	450	560	2000	PS - 300	
350	355.6	500	610	2000	PS - 350	
400	406.4	520	690	3000	PS - 400	
450	457.0	560	760	3000	PS - 450	
500	508.0	630	840	3000	PS - 500	
600	610.0	800	960	3000	PS - 600	

8.9. FIXED POINT BUILT IN A WALL

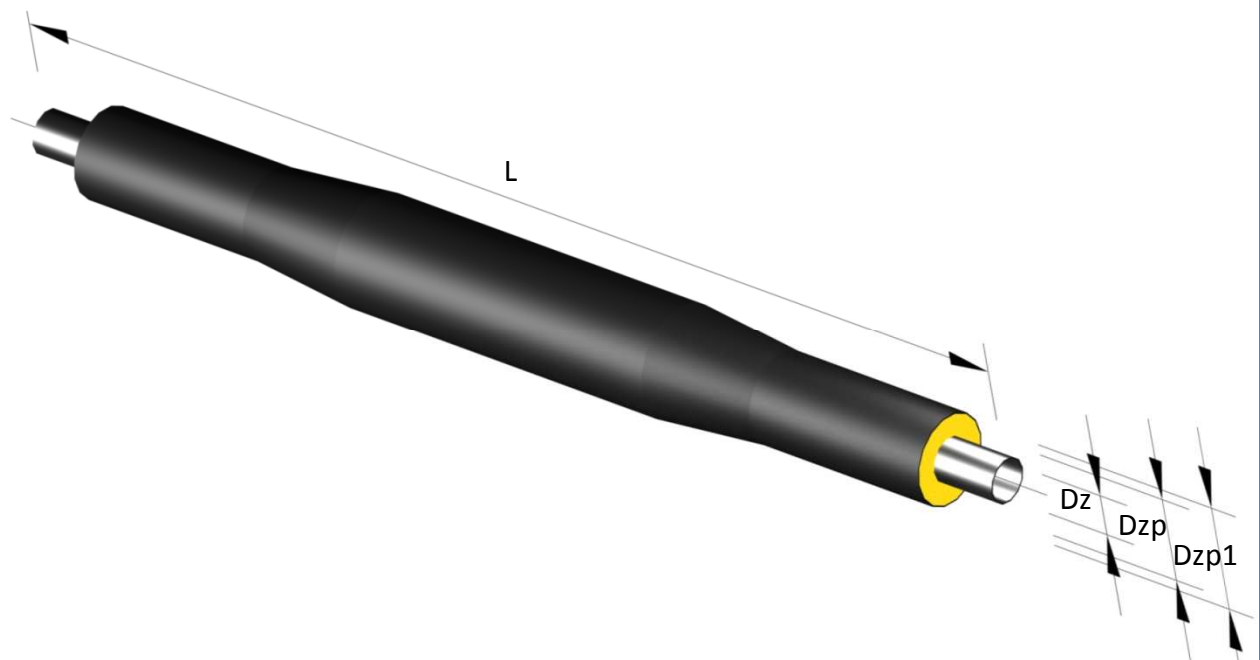


NOTE:

- ✓ The fixed points can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 12

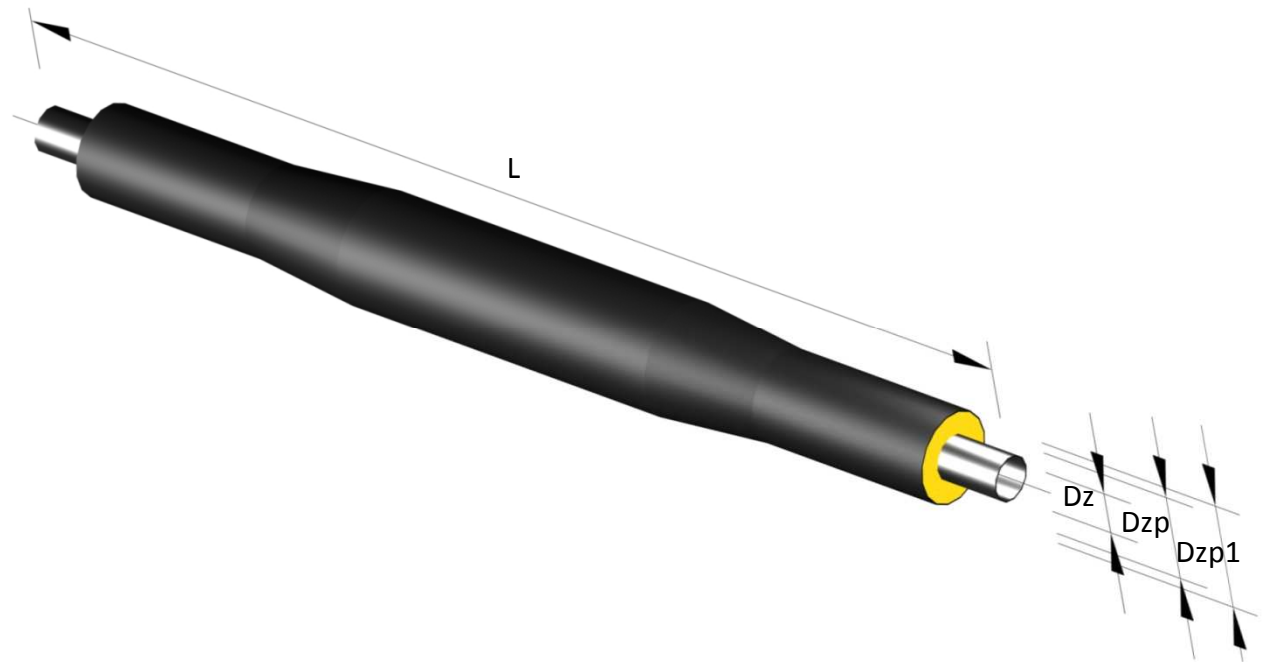
Main pipe		Casing pipe	Axis spacing	Plate dimensions		Catalogue symbol
Nominal diameter	Outer diameter			Height	Width	
DN	Dz	Dzp	H	b	c	
mm	mm	mm	mm	mm	mm	
20	26.9	90	240	110	350	PSS - 20
25	33.7	90	240	110	350	PSS - 25
32	42.4	110	260	130	390	PSS - 32
40	48.3	110	260	130	390	PSS - 40
50	60.3	125	275	145	420	PSS - 50
65	76.1	140	290	160	450	PSS - 65
80	88.9	160	310	180	490	PSS - 80
100	114.3	200	350	220	570	PSS - 100
125	139.7	225	375	245	620	PSS - 125
150	168.3	250	400	270	670	PSS - 150
200	219.1	315	465	335	800	PSS - 200
250	273.0	400	600	420	1020	PSS - 250
300	323.9	450	650	470	1140	PSS - 300
350	355.6	500	700	520	1240	PSS - 350
400	406.4	520	720	540	1280	PSS - 400
450	457.0	560	760	580	1360	PSS - 450
500	508.0	630	830	650	1500	PSS - 500
600	610.0	800	1000	820	1660	PSS - 600

8.10. AXIAL COMPENSATOR - PRESSURE 1.6 MPa**NOTE:**

- ✓ When placing an order, please specify compensation capacity of the compensator and working pressure.
- ✓ The compensators can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 13

Main pipe		Casing pipe	Length	Compensation capacity	Catalogue symbol
Nominal diameter	Outer diameter				
DN	Dz	Dzp/Dzp ₁	L	ΔL_k	
mm	mm	mm	mm	mm	
40	48.3	110/125	2000	100	KP - 40-100
50	60.3	125/140	2000	100	KP - 50-100
65	76.1	140/160	2000	100	KP - 65-100
80	88.9	160/200	2000	100	KP - 80-100
100	114.3	200/225	2500	125	KP - 100-125
125	139.7	225/250	2500	125	KP - 125-125
150	168.3	250/315	2500	125	KP - 150-125
200	219.1	315/400	2500	125	KP - 200-125
250	273.0	400/450	2500	125	KP - 250-125
300	323.9	450/500	2500	125	KP - 300-125
350	355.6	500/520	3000	125	KP - 350-125
400	406.4	520/560	3000	125	KP - 400-125
450	457.0	560/630	3000	125	KP - 450-125
500	508.0	630/710	3000	125	KP - 500-125
600	610.0	800/900	3000	125	KP - 600-125

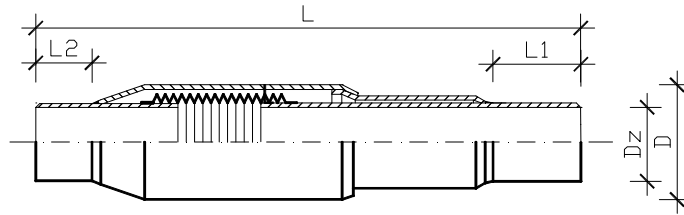
8.10.1. AXIAL COMPENSATOR - PRESSURE 2.5 MPa**NOTE:**

- ✓ When placing an order, please specify compensation capacity of the compensator and working pressure.
- ✓ The compensators can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 14

Main pipe		Casing pipe	Length	Compensation ability	Catalogue symbol
Nominal diameter	Outer diameter				
DN	Dz	Dzp/Dp ₁	L	ΔL_k	
mm	mm	mm	mm	mm	
80	88.9	160/200	2000	90	KP - 80-90
100	114.3	200/225	2500	90	KP - 100-90
125	139.7	225/250	2500	90	KP - 125-90
150	168.3	250/315	2500	90	KP - 150-90
200	219.1	315/400	2500	90	KP - 200-90
250	273.0	400/450	2500	90	KP - 250-90
300	323.9	450/500	2500	90	KP - 300-90
350	355.6	500/520	3000	90	KP - 350-90
400	406.4	520/560	3000	90	KP - 400-90
450	457.0	560/630	3000	90	KP - 450-90
500	508.0	630/800	3000	90	KP - 500-90
600	610.0	800/900	3000	90	KP - 600-90

8.10.2. SINGLE USE AXIAL COMPENSATOR



NOTE:

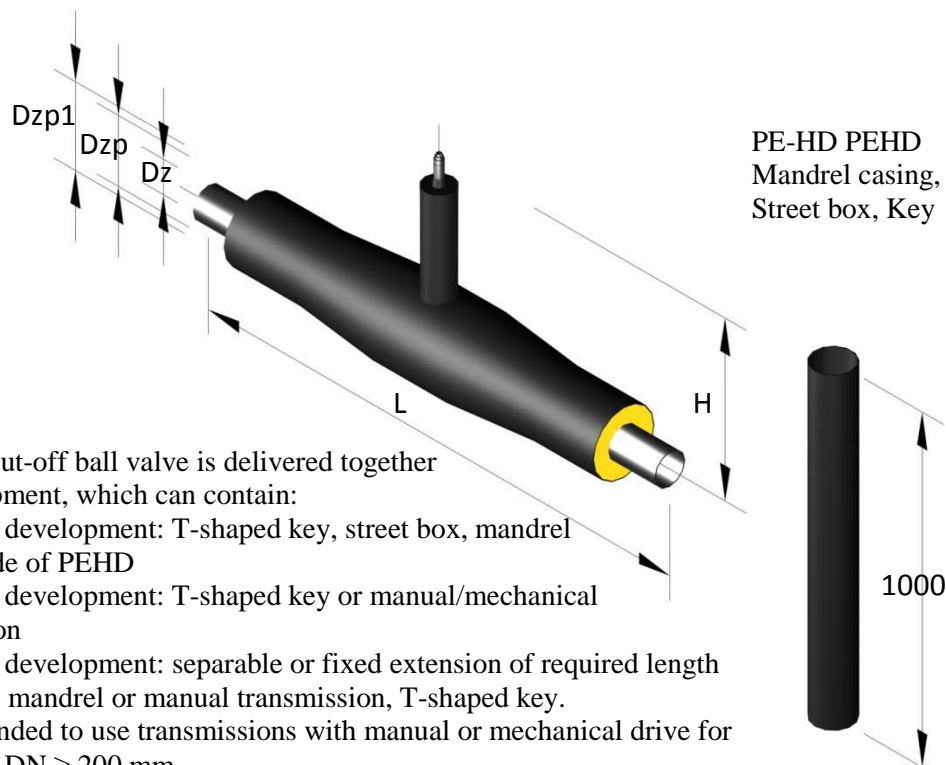
- ✓ Single use axial compensator is delivered **without preinsulation**.

TABLE 15

Main pipe		Dimensions			Length	Compensation ability		Catalogue symbol
Nominal diameter	Outer diameter					1.6 MPa	2.5 MPa	
DN	Dz	D	L ₁	L ₂	L	ΔL_k	ΔL_k	
<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	
40	48.3	76.1	100	80	450	50	50	KP - 40-50
50	60.3	88.9	100	80	450	50	50	KP - 50-50
65	76.1	108.0	105	80	500	70	70	KP - 65-70
80	88.9	121.0	105	80	500	70	70	KP - 80-70
100	114.3	159.0	100	80	600	80	80	KP - 100-80
125	139.7	177.8	100	80	600	80	80	KP - 125-80
150	168.3	205.0	90	80	630	100	100	KP - 150-100
200	219.1	267.0	105	80	700	120	120	KP - 200-120
250	273.0	323.9	100	80	700	120	120	KP - 250-120
300	323.9	373.0	110	80	730	140	140	KP - 300-140
350	355.6	406.4	110	80	785	140	-	KP - 350-140
400	406.4	457.2	110	80	785	140	-	KP - 400-140
450	457.0	519.0	110	80	820	150	-	KP - 450-150
500	508.0	568.0	110	80	820	150	-	KP - 500-150
600	610.0	671.0	110	80	800	150	-	KP - 600-150

9. PREINSULATED STEEL FIXTURES

9.1. CUT-OFF BALL VALVE



Preinsulated cut-off ball valve is delivered together with the equipment, which can contain:

- for ground development: T-shaped key, street box, mandrel casing made of PEHD
- for in-well development: T-shaped key or manual/mechanical transmission
- for in-well development: separable or fixed extension of required length from valve mandrel or manual transmission, T-shaped key.

It is recommended to use transmissions with manual or mechanical drive for cut-off valves $DN \geq 200$ mm

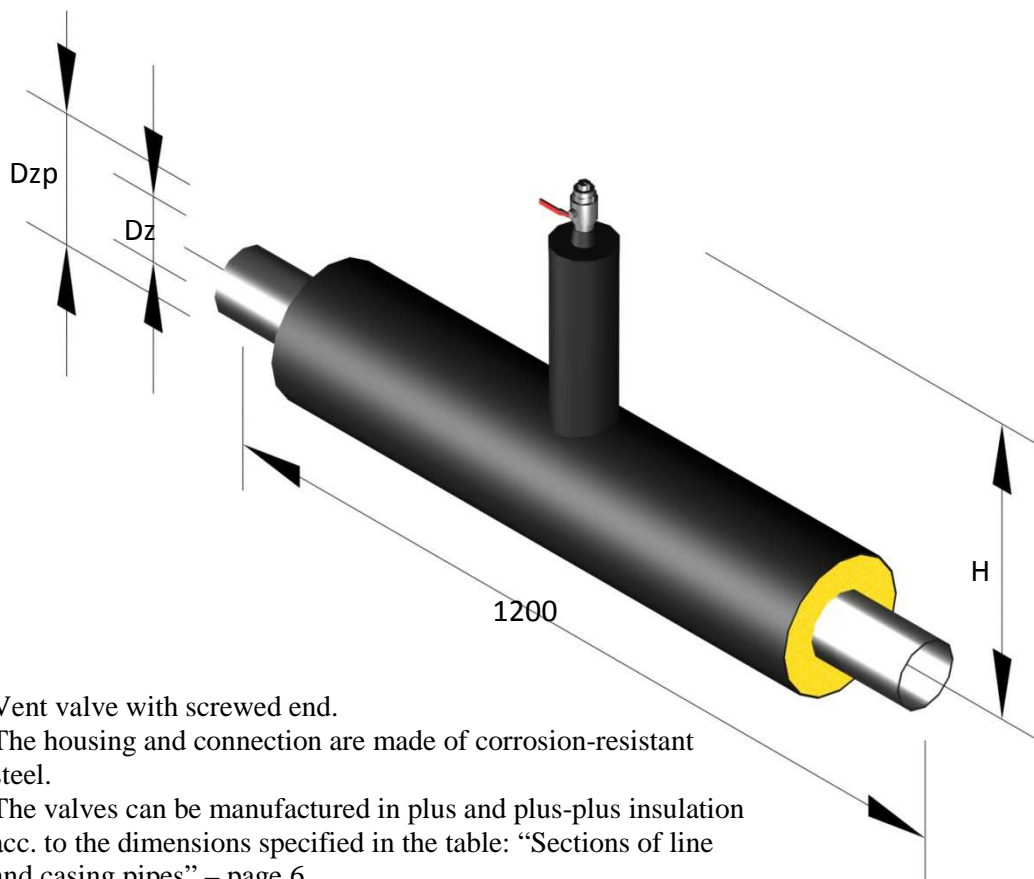
NOTE:

- ✓ The valves can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: „Dimensions of main and casing pipes” – page 6.

TABLE 16

Main pipe		Casing pipe		Cut-off valve		Catalogue symbol
Nominal diameter	Outer diameter		Diameter	Mandrel height	Length	
DN	Dz	Dzp/ Dzp ₁	Dz	H	L	
<i>Mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	
20	26.9	90/90	26.9	400	1500	ZK - 20
25	33.7	90/110	33.7	400	1500	ZK - 25
32	42.4	110/110	42.4	400	1500	ZK - 32
40	48.3	110/125	48.3	415	1500	ZK - 40
50	60.3	125/140	60.3	420	1500	ZK - 50
65	76.1	140/160	76.1	420	1500	ZK - 65
80	88.9	160/200	88.9	430	1500	ZK - 80
100	114.3	200/225	114.3	450	1500	ZK - 100
125	139.7	225/250	139.7	500	1500	ZK - 125
150	168.3	250/315	168.3	515	1500	ZK - 150
200	219.1	315/400	219.1	560	1500	ZK - 200
250	273.0	400/450	273.0	615	1500	ZK - 250
300	323.9	450/560	323.9	660	1800	ZK - 300
350	355.6	500/630	355.6	730	1800	ZK - 350
400	406.4	520/710	406.4	800	1800	ZK - 400
450	457.0	560/800	457.0	950	2000	ZK - 450
500	508.0	630/900	508.0	950	2500	ZK - 500
600	610.0	800/1000	610.0	1050	2500	ZK - 600

9.2. CUT-OFF VENT VALVE



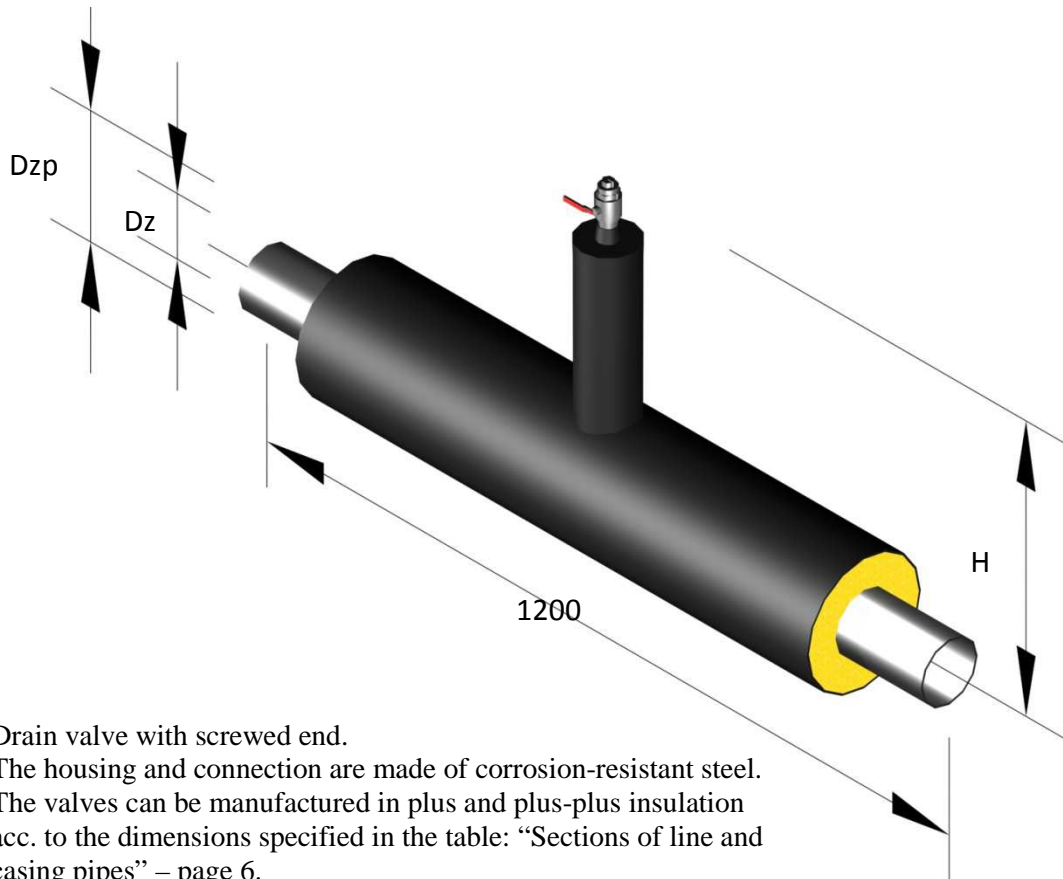
NOTE:

- ✓ Vent valve with screwed end.
- ✓ The housing and connection are made of corrosion-resistant steel.
- ✓ The valves can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: "Sections of line and casing pipes" – page 6.

TABLE 17

Main pipe		Casing pipe		Vent valve		Catalogue symbol
Nominal diameter	Outer diameter		Diameter	Mandrel height		
DN	Dz	Dzp	D	H		
mm	mm	mm	mm	mm		
20	26.9	90	26.9	400	ZD - 20	
25	33.7	90	26.9	400	ZD - 25	
32	42.4	110	33.7	400	ZD - 32	
40	48.3	110	33.7	415	ZD - 40	
50	60.3	125	33.7	420	ZD - 50	
65	76.1	140	33.7	420	ZD - 65	
80	88.9	160	33.7	430	ZD - 80	
100	114.3	200	33.7	450	ZD - 100	
125	139.7	225	33.7	500	ZD - 125	
150	168.3	250	33.7	515	ZD - 150	
200	219.1	315	33.7	560	ZD - 200	
250	273.0	400	33.7	615	ZD - 250	
300	323.9	450	33.7	660	ZD - 300	
350	355.6	500	48.3	730	ZD - 350	
400	406.4	520	48.3	800	ZD - 400	
450	457.0	560	48.3	950	ZD - 450	
500	508.0	630	48.3	950	ZD - 500	
600	610.0	800	48.3	1050	ZD - 600	

9.3. CUT-OFF DRAIN VALVE



NOTE:

- ✓ Drain valve with screwed end.
- ✓ The housing and connection are made of corrosion-resistant steel.
- ✓ The valves can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: "Sections of line and casing pipes" – page 6.

TABLE 18

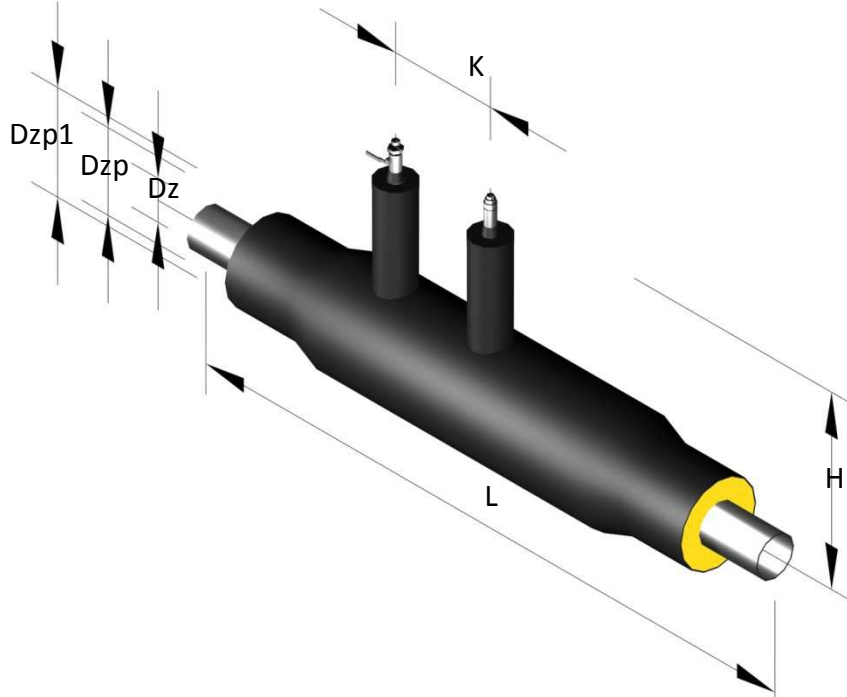
Main pipe		Casing pipe		Drain valve		Catalogue symbol
Nominal diameter	Outer diameter		Diameter	Mandrel height		
DN	Dz	Dzp	D	H		
mm	mm	mm	mm	mm		
20	26.9	90	26.9	400		ZO - 20
25	33.7	90	26.9	400		ZO - 25
32	42.4	110	33.7	400		ZO - 32
40	48.3	110	42.4	415		ZO - 40
50	60.3	125	42.4	420		ZO - 50
65	76.1	140	48.3	420		ZO - 65
80	88.9	160	48.3	430		ZO - 80
100	114.3	200	48.3	450		ZO - 100
125	139.7	225	48.3	500		ZO - 125
150	168.3	250	48.3	515		ZO - 150
200	219.1	315	60.3	560		ZO - 200
250	273.0	400	60.3	615		ZO - 250
300	323.9	450	60.3	660		ZO - 300
350	355.6	500	88.9	730		ZO - 350
400	406.4	520	88.9	800		ZO - 400
450	457.0	560	114.3	950		ZO - 450
500	508.0	630	114.3	950		ZO - 500
600	610.0	800	114.3	1050		ZO - 600

9.4. CUT-OFF BALL VALVE WITH VENT VALVE

Preinsulated cut-off ball valve is delivered together with the equipment, which can contain:

- for in-well development: T-shaped key
- for in-well development: portable or mechanical manual transmission
- for in-well development: separable or fixed extension of required length for valve mandrel or manual transmission, T-shaped key.

It is recommended to use transmissions with manual or mechanical drive for cut-off valves of $DN \geq 200$ mm



K - 250 mm for DN 40 to DN 125
K - 400 mm for DN 300 to DN 350

K - 300 mm for DN 150 to DN 250
K - 500 mm for DN 400 to DN 600

NOTE:

- ✓ Vent valve with screwed end.
- ✓ The housing and connection (ZD) are made of corrosion-resistant steel.
- ✓ The valves can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: "Sections of line and casing pipes" – page 6.

TABLE 19

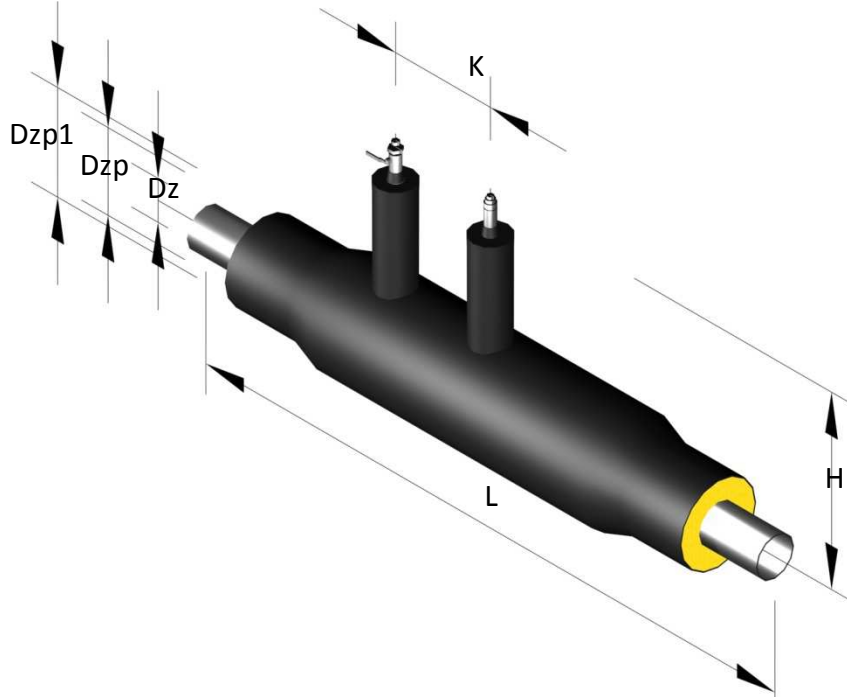
Main pipe			Valve		Mandrel height	Length	Catalogue symbol
main	casing		cut-off	vent			
Nominal diameter	Outer diameter		Outer diameter				
DN	Dz	Dzp/Dzp ₁	D	D	H	L	
mm	mm	mm	mm	mm	mm	mm	
40	48.3	110/125	48.3	33.7	415	1500	ZKD - 40
50	60.3	125/140	60.3	33.7	420	1500	ZKD - 50
65	76.1	140/160	76.1	33.7	420	1500	ZKD - 65
80	88.9	160/200	88.9	33.7	430	1500	ZKD - 80
100	114.3	200/225	114.3	33.7	450	1500	ZKD - 100
125	139.7	225/250	139.7	33.7	500	1500	ZKD - 125
150	168.3	250/315	168.3	33.7	515	1500	ZKD - 150
200	219.1	315/400	219.1	33.7	560	2000	ZKD - 200
250	273.0	400/450	273.0	33.7	615	2000	ZKD - 250
300	323.9	450/560	323.9	33.7	660	2500	ZKD - 300
350	355.6	500/630	355.6	48.3	730	2500	ZKD - 350
400	406.4	520/710	406.4	48.3	800	2500	ZKD - 400
450	457.0	560/800	457.0	48.3	950	2500	ZKD - 450
500	508.0	630/900	508.0	48.3	950	3000	ZKD - 500
600	610.0	800/1000	610.0	48.3	1050	3000	ZKD - 600

9.5. CUT-OFF BALL VALVE WITH DRAIN VALVE

Preinsulated cut-off ball valve is delivered together with the equipment, which can contain:

- for in-well development: T-shaped key
- for in-well development: portable or mechanical manual transmission
- for in-well development: separable or fixed extension of required length for valve mandrel or manual transmission, T-shaped key.

It is recommended to use transmissions with manual or mechanical drive for cut-off valves of $DN \geq 200$ mm



K - 250 mm for DN 40 to DN 125
K - 400 mm for DN 300 to DN 350

K - 300 mm for DN 150 to DN 250
K - 500 mm for DN 400 to DN 600

NOTE:

- ✓ Drain valve with screwed end.
- ✓ The housing and connection (ZO) are made of corrosion-resistant steel.
- ✓ The valves can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: "Sections of line and casing pipes" – page 6.

TABLE 20

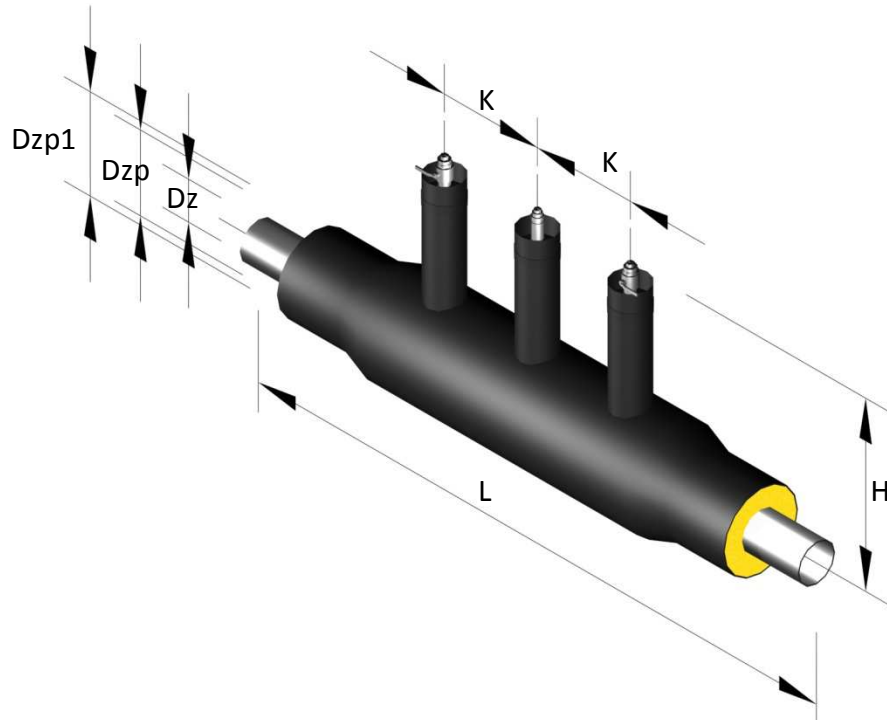
Main pipe			Valve		Mandrel height	Length	Catalogue symbol
main	casing		cut-off	drain			
Nominal diameter	Outer diameter		Outer diameter				
DN	Dz	Dzp/Dzp1	D	D	H	L	
mm	mm	mm	mm	mm	mm	mm	
40	48.3	110/125	48.3	42.4	415	1500	ZKO - 40
50	60.3	125/140	60.3	42.4	420	1500	ZKO - 50
65	76.1	140/160	76.1	48.3	420	1500	ZKO - 65
80	88.9	160/200	88.9	48.3	430	1500	ZKO - 80
100	114.3	200/225	114.3	48.3	450	1500	ZKO - 100
125	139.7	225/250	139.7	48.3	500	1500	ZKO - 125
150	168.3	250/315	168.3	48.3	515	1500	ZKO - 150
200	219.1	315/400	219.1	60.3	560	2000	ZKO - 200
250	273.0	400/450	273.0	60.3	615	2000	ZKO - 250
300	323.9	450/560	323.9	60.3	660	2500	ZKO - 300
350	355.6	500/630	355.6	88.9	730	2500	ZKO - 350
400	406.4	520/710	406.4	88.9	800	2500	ZKO - 400
450	457.0	560/800	457.0	114.3	950	2500	ZKO - 450
500	508.0	630/900	508.0	114.3	950	3000	ZKO - 500
600	610.0	800/1000	610.0	114.3	1050	3000	ZKO - 600

9.6. CUT-OFF BALL VALVE WITH VENT AND DRAIN

Preinsulated cut-off ball valve is delivered together with the equipment, which can contain:

- for in-well development: T-shaped key
- for in-well development: portable or mechanical manual transmission
- for in-well development: separable or fixed extension of required length for valve mandrel or manual transmission, T-shaped key.

It is recommended to use transmissions with manual or mechanical drive for cut-off valves of DN \geq 200 mm.



K - 250 mm for DN 40 to DN 125
K - 400 mm for DN 300 to DN 350

K - 300 mm for DN 150 to DN 250
K - 500 mm for DN 400 to DN 600

NOTE:

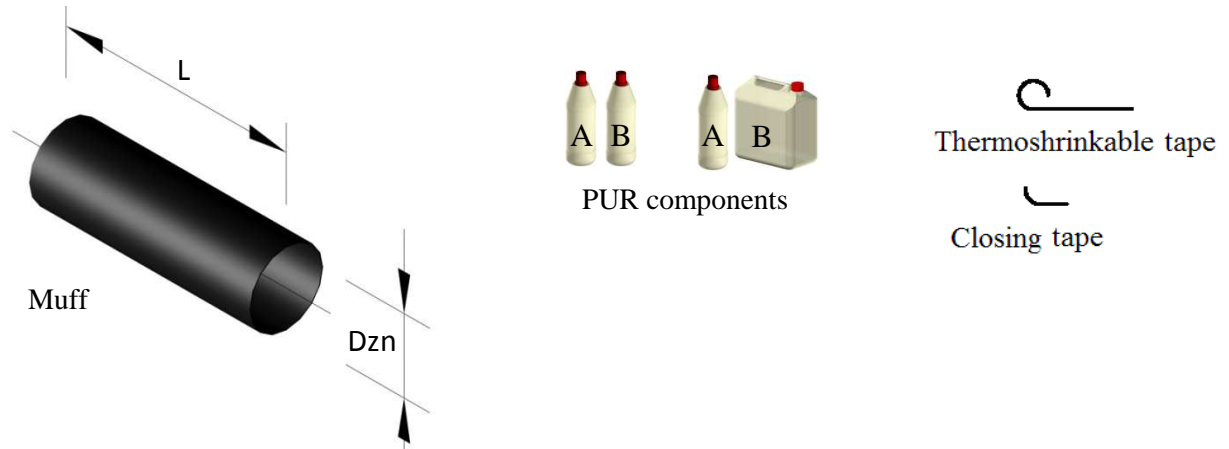
- ✓ Drain and vent valves with screwed ends.
- ✓ The housing and connection (ZD, ZO) are made of corrosion-resistant steel.
- ✓ The valves can be manufactured in plus and plus-plus insulation acc. to the dimensions specified in the table: "Sections of line and casing pipes" – page 6.

TABLE 21

Main pipe			Valve				Length	Catalogue symbol
main	casing		cut-off	vent	drain	Mandrel height		
Nominal diameter	Outer diameter		Outer diameter			H	L	
DN	Dz	Dzp/Dzp ₁	D	D	D	H	L	
mm	mm	mm	mm	mm	mm	mm	mm	
40	48.3	110/125	48.3	33.7	42.3	415	1500	ZKOD - 40
50	60.3	125/140	60.3	33.7	42.3	420	1500	ZKOD - 50
65	76.1	140/160	76.1	33.7	48.3	420	1500	ZKOD - 65
80	88.9	160/200	88.9	33.7	48.3	430	1500	ZKOD - 80
100	114.3	200/225	114.3	33.7	48.3	450	1500	ZKOD - 100
125	139.7	225/250	139.7	33.7	48.3	500	1500	ZKOD - 125
150	168.3	250/315	168.3	33.7	48.3	515	1500	ZKOD - 150
200	219.1	315/400	219.1	33.7	60.3	560	2000	ZKOD - 200
250	273.0	400/450	273.0	33.7	60.3	615	2000	ZKOD - 250
300	323.9	450/560	323.9	33.7	60.3	660	2500	ZKOD - 300
350	355.6	500/630	355.6	48.3	88.9	730	2500	ZKOD - 350
400	406.4	520/710	406.4	48.3	88.9	800	2500	ZKOD - 400
450	457.0	560/800	457.0	48.3	114.3	950	2500	ZKOD - 450
500	508.0	630/900	508.0	48.3	114.3	950	3000	ZKOD - 500
600	610.0	800/1000	610.0	48.3	114.3	1050	3000	ZKOD - 600

10. JOINT ASSEMBLY

10.1. MUFF MADE OF PEHD POLYETHYLENE PIPE SEALED WITH THERMOSHRINKABLE TAPE



NOTE:

- ✓ The muffs can be manufactured from PEHD polyethylene with a diffusion barrier.

STANDARD INSULATION

TABLE 22

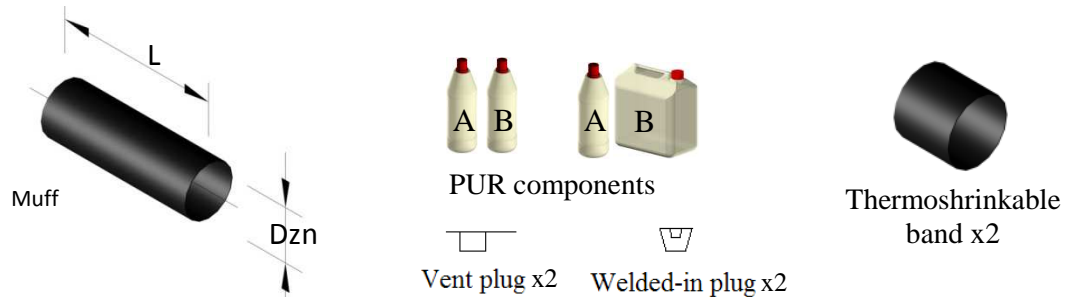
Nominal diameter of main pipe	Outer diameter of casing pipe	Outer diameter of muff	Catalogue symbol
DN	Dzp	Dzn	
mm	mm	mm	
20	90	100	N - 20/90
25	90	100	N - 25/90
32	110	120	N - 32/110
40	110	120	N - 40/110
50	125	135	N - 50/125
65	140	150	N - 65/140
80	160	173	N - 80/160
100	200	214	N - 100/200
125	225	240	N - 125/225
150	250	265	N - 150/250
200	315	333	N - 200/315

PLUS, PLUS-PLUS INSULATION

TABLE 22A

DN	Dzp	Dzn	Catalogue symbol
mm	mm	mm	
20	110,125	120	N - 20/110,125
25	110,125	120	N - 25/110,125
32	125,140	135	N - 32/125,140
40	125,140	135	N - 40/125,140
50	140,160	150	N - 50/140,160
65	160,180,200	173	N - 65/160,180,200
80	180,200,225	214	N - 80/180,200,225
100	225,250	240	N - 100/225,250
125	250,280,315	265	N - 125/250,280,315
150	280,315,400	333	N - 150/280,315,400

10.2. MUFFS MADE OF THERMOSHRINKABLE PEHD POLYETHYLENE PIPE SEALED WITH THERMOSHRINKABLE BANDS.



NOTE:

- ✓ The thermoshrinkable muffs can be manufactured from PEHD polyethylene with a diffusion barrier to maximum diameter of DN 315.

STANDARD INSULATION

TABLE 23

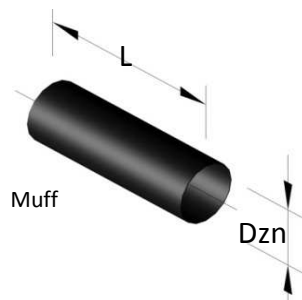
Nominal diameter of main pipe	Outer diameter of casing pipe	Outer diameter of muff	Length of muff	Catalogue symbol
DN	Dzp	Dzn	L	
mm	mm	mm	mm	
20	90	107	600	NT - 20/90
25	90	107	600	NT - 25/90
32	110	129	600	NT - 32/110
40	110	129	600	NT - 40/110
50	125	143	600	NT - 50/125
65	140	156	600	NT - 65/140
80	160	178	600	NT - 80/160
100	200	224	600	NT - 100/200
125	225	255	600	NT - 125/225
150	250	278	600	NT - 150/250
200	315	341	600	NT - 200/315
250	400	425	700	NT - 250/400
300	450	474	700	NT - 300/450
350	500	530	700	NT - 350/500
400	520	556	700	NT - 400/520
450	560	590	700	NT - 450/560
500	630	660	700	NT - 500/630
600	800	838	700	NT - 600/800

PLUS, PLUS-PLUS INSULATION

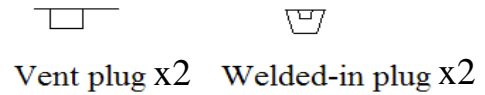
TABLE 23 A

DN	Dzp	Dzn	L	Catalogue symbol
mm	mm	mm	mm	
20	110,125	129	600	NT - 20/110,125
25	110,125	129	600	NT - 25/110,125
32	125,140	143	600	NT - 32/125,140
40	125,140	143	600	NT - 40/125,140
50	140,160	156	600	NT - 50/140,160
65	160,180,200	178	600	NT - 65/160,180,200
80	180,200,225	197,224	600	NT - 80/180,200,225
100	225,250	255	600	NT - 100/225,250
125	250,280,315	278	600	NT - 125/250,280,315
150	280,315,400	304,341	600	NT - 150/280,315,400
200	355,400,450	383,425	600	NT - 200/355,400,450
250	450,500	474	700	NT - 250/450,500
300	500,520	530	700	NT - 300/500,520
350	520,560	556	700	NT - 350/520,560
400	560,630	590	700	NT - 400/560,630
450	630,710	660	700	NT - 450/630,710
500	710,900	749	700	NT - 500/710,900

10.2.1. CROSS-LINKED MUFFS MADE OF THERMOSHRINKABLE PEHD POLYETHYLENE PIPE



PUR components



Vent plug x2 Welded-in plug x2

NOTE:

- ✓ MDKW with glue
- ✓ MDPW with glue and mastic

TABLE 23.1

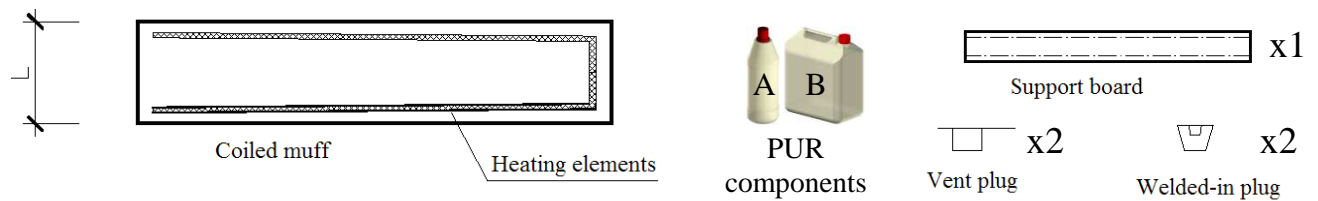
Nominal diameter	Outer diameter of casing pipe	Outer diameter of cross-linked muff	Catalogue symbol
DN	Dzp	Dzn	
<i>mm</i>	<i>mm</i>		
20	90	100	NTU - 20/90
25	90	100	NTU - 25/90
32	110	123	NTU - 32/110
40	110	123	NTU - 40/110
50	125	137	NTU - 50/125
65	140	150	NTU - 65/140
80	160	173	NTU - 80/160
100	200	213	NTU - 100/200
125	225	241	NTU - 125/225
150	250	268	NTU - 150/250
200	315	330	NTU - 200/315
250	400	424	NTU - 250/400
300	450	478	NTU - 300/450
350	500	538	NTU - 350/500
400	520	588	NTU - 400/520
450	560	588	NTU - 450/560

PLUS INSULATION

TABLE 23.1 A

DN	Dzp	Dzn	Catalogue symbol
<i>mm</i>	<i>mm</i>		
20	110	123	NTU - 20/110
25	110	123	NTU - 25/110
32	125	137	NTU - 32/125
40	125	137	NTU - 40/125
50	140	150	NTU - 50/140
65	160	173	NTU - 65/160
80	180,200	195,213	NTU - 80/180,200
100	225	241	NTU - 100/225
125	250	268	NTU - 125/250
150	280,315	295,330	NTU - 150/280,315
200	355,400	372,424	NTU - 200/355,400
250	450	478	NTU - 250/450
300	500	538	NTU - 300/500
350	520	588	NTU - 350/520
400	560	588	NTU - 400/560

10.3. ELECTRICALLY WELDED COILED MUFFS



NOTE:

- ✓ The above are available only with joint assembly installation performed by *ZPU Miedzyrzecz SERVICE*

TABLE 24

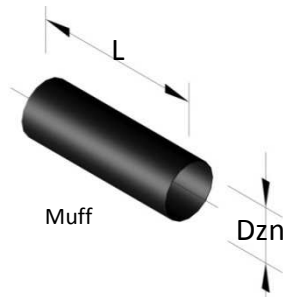
Nominal diameter	Outer diameter of casing pipe	Outer diameter of coiled muff	Outer diameter of casing pipe
DN	Dzp	Dzn	
mm	mm	mm	
20	90	98	NE - 20/90
25	90	98	NE - 25/90
32	110	118	NE - 32/110
40	110	118	NE - 40/110
50	125	133	NE - 50/125
65	140	148	NE - 65/140
80	160	168	NE - 80/160
100	200	208	NE - 100/200
125	225	233	NE - 125/225
150	250	258	NE - 150/250
200	315	323	NE - 200/315
250	400	408	NE - 250/400
300	450	458	NE - 300/450
350	500	512	NE - 350/500
400	520	532	NE - 400/520
450	560	572	NE - 450/560
500	630	642	NE - 500/630
600	800	816	NE - 600/800

INSULATION PLUS

TABLE 24 A

DN	Dwn	Dzn	Catalogue symbol.
mm	mm	mm	
20	110	118	NE - 20/110
25	110	118	NE - 25/110
32	125	133	NE - 32/125
40	125	133	NE - 40/125
50	140	148	NE - 50/140
65	160	168	NE - 65/160
80	200	208	NE - 80/200
100	225	233	NE - 100/225
125	250	258	NE - 125/250
150	315	323	NE - 150/315
200	355	408	NE - 200/400
250	450	458	NE - 250/450
300	500	512	NE - 300/500
350	520	532	NE - 350/520
400	560	572	NE - 400/560
450	630	642	NE - 450/630
500	710	726	NE - 500/710

10.3.1 ELECTRICALLY WELDED THERMOSHRINKABLE MUFFS



Heating element x2



Vent plug x2 Welded-in plug x2

TABLE 25

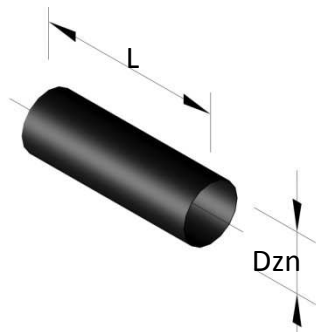
Nominal diameter	Outer diam. of casing pipe	Outer diam. of muff	Catalogue symbol
DN	Dzp	Dwn	
<i>mm</i>	<i>mm</i>	<i>mm</i>	
20	90	107	NTE - 20/90
25	90	107	NTE - 25/90
32	110	129	NTE - 32/110
40	110	129	NTE - 40/110
50	125	143	NTE - 50/125
65	140	156	NTE - 65/140
80	160	178	NTE - 80/160
100	200	224	NTE - 100/200
125	225	255	NTE - 125/225
150	250	278	NTE - 150/250
200	315	341	NTE - 200/315
250	400	425	NTE - 250/400
300	450	476	NTE - 300/450
350	500	528	NTE - 350/500
400	520	555	NTE - 400/520
450	560	591	NTE - 450/560
500	630	663	NTE - 500/630
600	800	839	NTE - 600/800

INSULATION PLUS

TABLE 25A

DN	Dzp	Dwn	Catalogue symbol.
<i>mm</i>	<i>mm</i>	<i>mm</i>	
20	110	129	NTE - 20/110
25	110	129	NTE - 25/110
32	125	143	NTE - 32/125
40	125	143	NTE - 40/125
50	140	156	NTE - 50/140
65	160	178	NTE - 65/160
80	180,200	224	NTE - 80/180,200
100	225	255	NTE - 100/225
125	250	278	NTE - 125/250
150	280,315	341	NTE - 150/280,315
200	355,400	383	NTE - 200/355,400
250	450	476	NTE - 250/450
300	500	528	NTE - 300/500
350	520	555	NTE - 350/520
400	560	591	NTE - 400/560
450	630	663	NTE - 450/630
500	710	746	NTE - 500/710

10.4. NECK INSULATION ASSEMBLY



PUR components



Thermoshrinkable sleeve x1

NOTE:

✓ It is used for standard, plus and plus-plus insulation of preinsulated branch connection from a preinsulated main pipeline using a neck method.

TABLE 26

		Branch pipe			symbol
main		casing	muff		
main Nominal diameter	Outer diameter				
DN mm	Dz mm	Dzp mm	Dzn mm		
25	33.7	90	100		NO - 25/90/100
32	42.4	110	120		NO - 32/110/120
40	48.3	110	120		NO - 40/110/120
50	60.3	125	135		NO - 50/125/135
65	76.1	140	150		NO - 65/140/150
80	88.9	160	173		NO - 80/160/173
100	114.3	200	214		NO - 100/200/214
125	139.7	225	240		NO - 125/225/240
150	168.3	250	265		NO - 150/250/265

10.5. STEEL ELBOW INSULATION ASSEMBLY

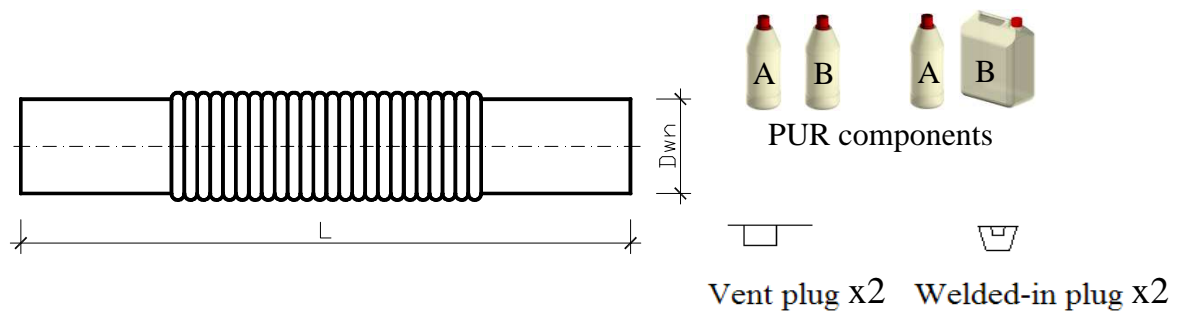


TABLE 27

Nominal diameter	Outer diameter of casing pipe	Outer diameter of muff	Length of muff	Catalogue symbol
DN	Dzp	Dwn	L	
mm	mm	mm	mm	
20	90	113	850	NH - 20/90
25	90	113	850	NH - 25/90
32	110	136	910	NH - 32/110
40	110	136	910	NH - 40/110
50	125	152	930	NH - 50/125
65	140	167	930	NH - 65/140
80	160	187	930	NH - 80/160

11. CLOSING OF INSULATION AND PIPELINE

11.1. PIPELINE END - CLOSING MUFF

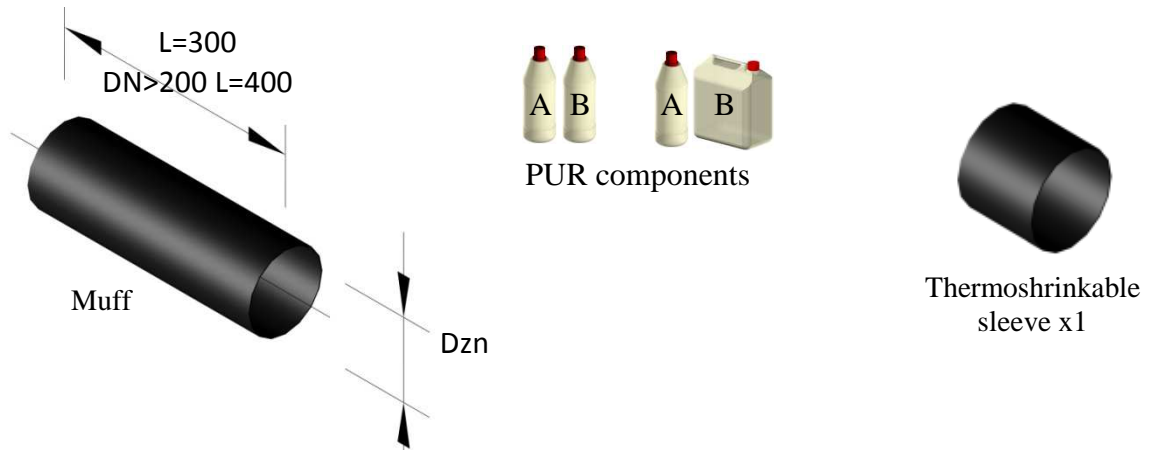


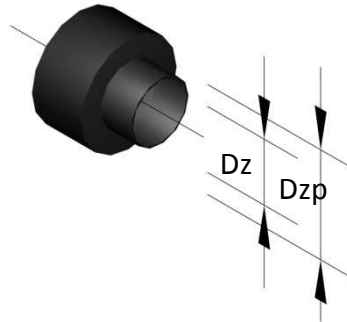
TABLE 28

Nominal diameter	Outer diameter of casing pipe	Outer diameter of muff	Catalogue symbol
DN	D_{zp}	D_{zn}	
<i>mm</i>	<i>mm</i>	<i>mm</i>	
20	90	100	NK - 20/90
25	90	100	NK - 25/90
32	110	120	NK - 32/110
40	110	120	NK - 40/110
50	125	135	NK - 50/125
65	140	150	NK - 65/140
80	160	173	NK - 80/160
100	200	214	NK - 100/200
125	225	240	NK - 125/225
150	250	265	NK - 150/250
200	315	333	NK - 200/315
250	400	420	NK - 250/400
300	450	472	NK - 300/450

INSULATION PLUS

TABLE 28A

DN	D_{zp}	D_{zn}	Catalogue symbol
<i>mm</i>	<i>mm</i>	<i>mm</i>	
20	110	120	NK - 20/110
25	110	120	NK - 25/110
32	125	135	NK - 32/125
40	125	135	NK - 40/125
50	140	150	NK - 50/140
65	160	173	NK - 65/160
80	200	214	NK - 80/200
100	225	240	NK - 100/225
125	250	265	NK - 125/250
150	315	333	NK - 150/315
200	355	380	NK - 200/355
250	450	472	NK - 250/450
300	500	529	NK - 300/500

11.2. INSULATION CLOSING - END CAP.**TABLE 29**

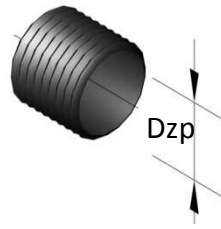
Outer diameter of Main pipe	Outer diameter of casing pipe	Catalogue symbol
Dz mm	Dzp mm	
26.9	90	E - 90
42.4	110	E - 110
60.3	125	E - 125
76.1	140	E - 140
88.9	160	E - 160
114.3	200	E - 200
139.7	225	E - 225
168.3	250	E - 250
219.1	315	E - 315
273.0	400	E - 400
323.9	450	E - 450
355.6	500	E - 500
406.4	520	E - 520
457.0	560	E - 560
508.0	630	E - 630
610.0	800	E - 800

12. WARNING TAPE

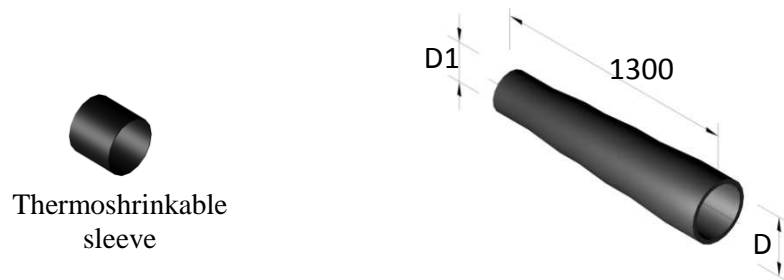
Warning tape is placed above a pipeline. It is delivered in rolls of 100 or more metres (multiple of a hundred). The warning tape has the following inscription "WARNING! HEATING PIPES" and the ZPU Miedzyrzecz logo

**TABLE 30**

	Colour	Width mm	Catalogue symbol
Warning tape	yellow	150	T - 150

13. WALL PASSAGE**13.1. RUBBER RING****TABLE 31**

Outer diameter of casing pipe	Catalogue symbol
Dzp <i>mm</i>	
90	P - 90
110	P - 110
125	P - 125
140	P - 140
160	P - 160
200	P - 200
225	P - 225
250	P - 250
315	P - 315
400	P - 400
450	P - 450
500	P - 500
520	P - 520
560	P - 560
630	P - 630
800	P - 800

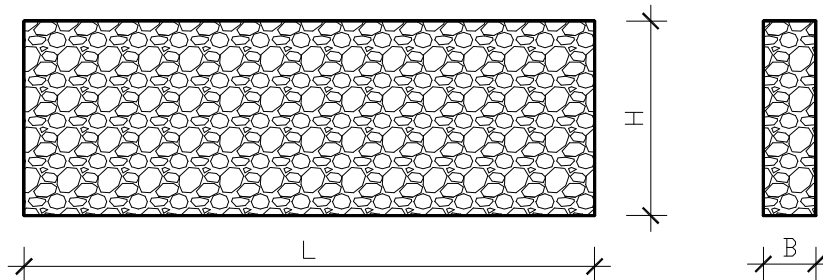
13.2. BRANCH PROTECTIVE PIPE – ADAPTER

Thermoshrinkable sleeve

TABLE 32

Outer diameter of casing pipe	Dimensions		Catalogue symbol
	D1	D	
Dzp <i>mm</i>	<i>mm</i>	<i>mm</i>	
90	110	160	A - 90
110	125	200	A - 110
125	140	225	A - 125
140	160	250	A - 140
160	200	315	A - 160
200	225	400	A - 200
225	250	450	A - 225
250	315	520	A - 250
315	400	560	A - 315

13.3. EXTENSION PADS - CUSHIONS.


TABLE 33

Type of the cushion	Dimensions			Catalogue symbol
	L mm	H mm	B mm	
R-70/250	1000	250	40	PK - 250
R-70/500	1000	500	40	PK - 500

Physical and mechanical characteristics of the cushion pads:

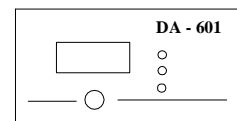
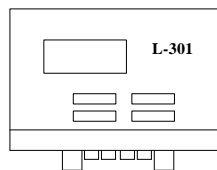
- | | |
|---------------------------------------|------------------------|
| - thermal conductivity λ_{25} | - 0,040÷0,042 W/mK |
| - apparent density | - 78 kg/m ³ |
| - resistant for stretching | - 80 kPa |
| - elongation at break | - 76 % |
| - hardness | - 348 N |
| - stiffness | - 9,2 kPa |

14. ELEMENTS OF PIPELINE LEAK DETECTION SYSTEM

14.1. IMPULSE SYSTEM – ZPU MIEDZYRZECZ

1. Appliances.

- L 301 four-circuit locator, length of controlled measured loop up to 1000 m (catalogue symbol: L 301)
- Signalling device – four-circuit DA-601 Detector, length of controlled measured loop up to 2500 m (catalogue symbol: DA - 601)



2. Compatible appliances:

- EMS-4000 – four-circuit locator, length of controlled measured loop up to 2500 m
- EMS-2000 – single-circuit locator, length of controlled measured loop up to 1000 m
- EMS-3000 – four-circuit detector, length of controlled measured loop up to 1000 m
- EMS-2020 – two-circuit detector, length of controlled measured loop up to 7000 m
- ACN-4N – four-circuit detector, length of controlled measured loop up to 2000 m
- ACN-4B – four-circuit detector (powered by 3-3,6V batteries), length of controlled measured loop up to 2000 m

❖ Devices delivered with the equipment.

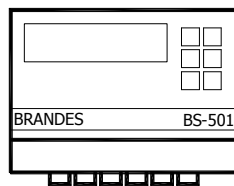
3. Elements of pipeline leak detection installation.

Name of element	Dimensions [mm]	Catalogue symbol
Clamping pipe connector	Φ 4 x 25	S - 4
Distance pad	19 x 90	H-19
	36 x 90	H-36
Thermoshrinkable insulating pipe	Φ 5 x 150	S-6
Earthing system	25 x 3 x 35	U-35
Universal junction box	35 x 35 x 50	UPP-1
Connection cable type K	length: 1, 2, 3, 4, 5, max 25 m	RG-63 (125 Ω)

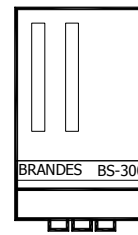
14.2. BRANDES RESISTANCE SYSTEM

1. Appliances.

- BS-501 four-circuit locator, length of controlled measured loop up to 1000 m
- BS-501/502 four-circuit locator, length of controlled measured loop up to 2000 m
- BS-304 four-circuit locator, length of controlled measured loop up to 400 m
- BS-300.11 two-circuit detector, length of controlled measured loop up to 1000 m
- LPS-2 four-circuit detector, length of controlled measured loop up to 2000 m
- LSP-2RI two-circuit detector, length of controlled measure loop up to 2000 m
- BS-MH3 Tester – measuring device with magnetic connector



Locator



Detector

2. Elements of installation cable connection for leakage detection.

Name of element	Catalogue symbol
Non-insulated clamping connector	BS-QU
Distance pad	BS-AH
Cable in Teflon insulation	BS-SL2
	BS-SL4
Thermoshrinkable jacket	BS-SRA
Junction box	BS-AD
Cable connection to pipe	BS-RFA
Measurement box	BS-MD

15. TECHNICAL INFORMATION

1. GUIDELINES – Statistical and designing calculations – ZPU Miedzyrzecz system.
2. INSTRUCTION – Performance of impulse installation for pipeline leak detection – ZPU Miedzyrzecz system.
3. INSTRUCTION – Performance of resistance installation for pipeline leak detection
BRANDES
4. INSTRUCTION – Performance and acceptance – ZPU Miedzyrzecz system.
5. INSTRUCTION – Performance of thermal insulation and joint assembly airtight sealing – ZPU Miedzyrzecz system.

16. BUSINESS INFORMATION

Manufacturer and seller:

ZAKŁAD PRODUKCYJNO USŁUGOWY KAZIMIERZ JOŃCA Sp. z o.o.

ul. Przemysłowa 2

66 - 300 MIEDZYRZECZ

Telephone numbers:

Secretary's office:	+ 48 95 7412965; 7428108
Deputy Commercial Director:	+ 48 95 7412704
Trade office:	+ 48 95 7412703; 7428114
Purchasing department:	+ 48 95 7428113; 7428115
Technical office:	+ 48 95 7428117
Fax:	+ 48 95 74128-99; 74281-08
E-mail:	zpu@zpu.pl
Website:	www.zpu.pl

When placing orders, please indicate: name of a product, type of steel main pipe, type of casing (made of polyethylene PEHD pipe or polyethylene PEHD pipe with a diffusion barrier), type of thermal insulation, type of pipeline leak detection system, and in the case of pipes, also their length and symbols given in the catalogue.

If it is necessary to use products with different geometrical parameters, orders for such products should be made individually.