PRE-INSULATED PIPES AND ACCESSORIES CATALOGUE

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IZO CLASSIC

The most common method of production. The insulation consist of polyurethane foam and PEHD casing pipe.

STEEL MAIN PIPE

Material: P 235 GH, P 265 GH, St 37.0,

Standard:

SRPS EN 10216-2:2014 – seamless steel pipe

SRPS EN 10217-2:2008 – electro-welded steel pipe

SRPS EN 10217-5:2008 – electro-welded steel pipe under a protective layer

Shape and dimensions according to: SRPS EN 10220:2005

Pipe ends: DIN 2559-1, SRPS ISO 6761:2004

Lengths: DN 20 – DN80: L = 6 m

DN 100 - DN 700: L = 6 m, 12 m

Density: 7850 kg/m^3

Modulus of elasticity: 2,06 . 105 N/mm^2

Yield strength: 235 N/mm^2

Tensile strength: 350 N/mm^2

Thermal conductivity: 46 - 54,5 W/mK

PUR INSULATION

Rigid polyurethane foam (PUR) is produced by mixing polyalcohol (polyol) with additive content and isocyanate (MDI). The mixture is pressed into the pipe using a high-pressure filling technique.

Cyclopentane is used as a foaming agent.

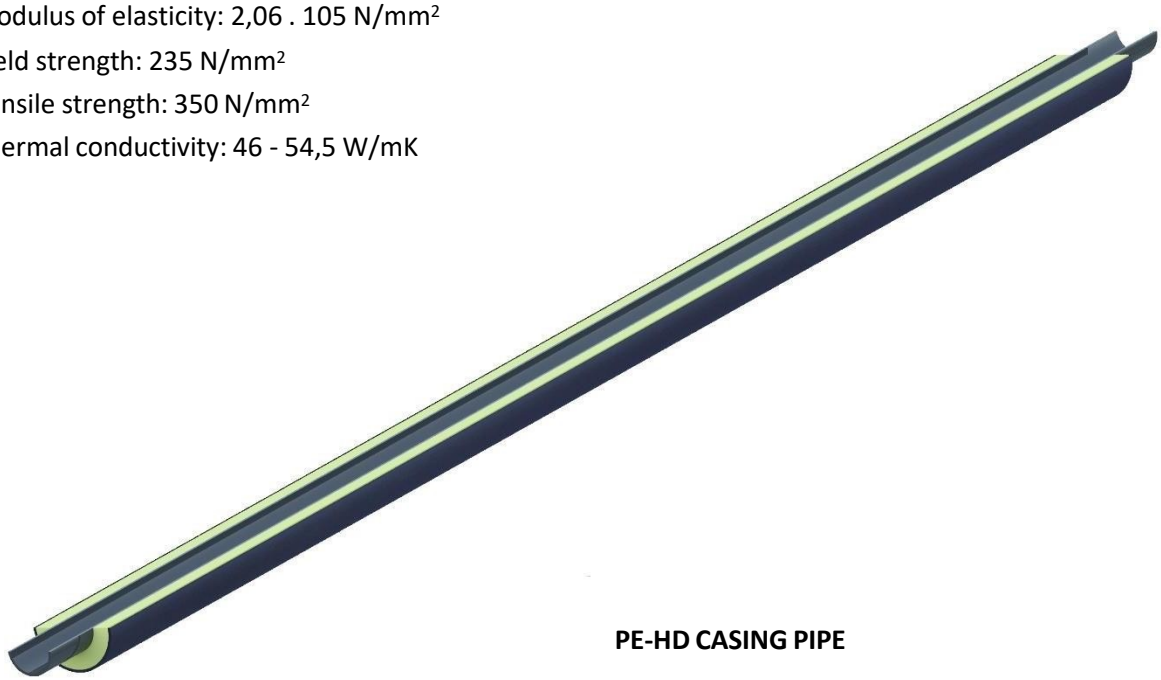
The PUR foam in the system is fully compliant with SRPS EN 253:2020 (EN 253:2019).

Density: ≥ 60 kg/m3

Compressive strength: ≥ 0,3 MPa

Shear strength: ≥ 0,12 Mpa

Thermal conductivity coefficient (+50°C): 0,026 W/mK



PE-HD CASING PIPE

Material: PE-HD (high density polyethylene)

Dimesions: according to standard SRPS EN 253:2020 (EN 253:2019)

Density (+20°C): 952 kg/m3

Thermal conductivity coefficient: 0,43W/mK

Coefficient of thermal expansion: $1{,}8 \cdot 10^{-4}\ K^{-1}$

Melt flow rate (MFR 190/5): 0,42 g/10 min

The material contains a UV protection agent

IZO SPIRO

Pre-insulated systems intended for above ground pipelines.

The working pipe is insulated with polyurethane foam in a casing made of folding steel sheet.

STEEL MAIN PIPE

Material: P 235 GH, P 265 GH, St 37.0,

Standard:

SRPS EN 10216-2:2014 – seamless steel pipe

SRPS EN 10217-2:2008 – electro-welded steel pipe

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The PUR foam in the system is fully compliant with SRPS EN 253:2020 (EN 253:2019).

Density: ≥ 60 kg/m3

Compressive strength: ≥ 0,3 MPa

Shear strength: ≥ 0,12 Mpa

Thermal conductivity coefficient (+50°C): 0,026 W/mK

CASING MADE OF FOLDING STEEL SHEET

Material: Aluminum or galvanized steel sheet, according to SPRS EN-10346:

Steel sheet thickness: 0,5-1mm

IZO TWINS

Pre-insulated system where both working pipes (distribution and return) are located in the same casing PE-HD pipe.

Suitable for use in smaller, home installations, due to space savings.

STEEL MAIN PIPE

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Standard:

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SRPS EN 10217-2:2008 – electro-welded steel pipe

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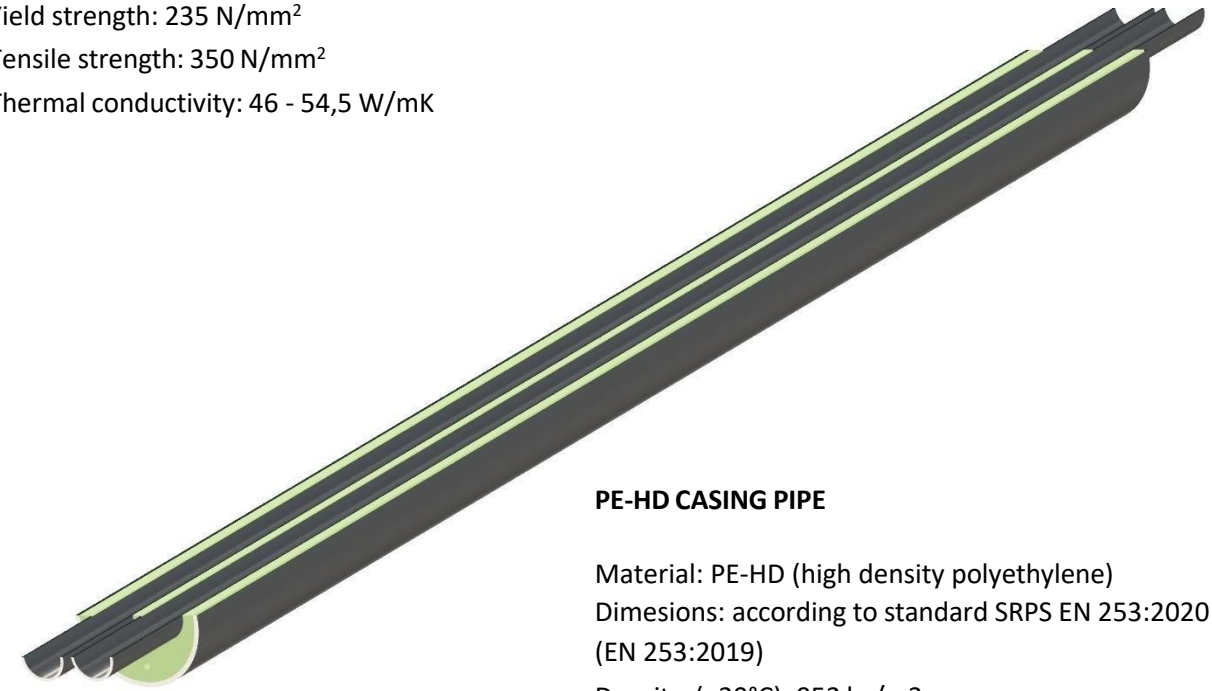
Compressive strength: ≥ 0,3 MPa

Shear strength: ≥ 0,12 Mpa

Thermal conductivity coefficient (+50°C): 0,026 W/mK



PE-HD CASING PIPE

Material: PE-HD (high density polyethylene)

Dimesions: according to standard SRPS EN 253:2020 (EN 253:2019)

Density (+20°C): 952 kg/m3

Thermal conductivity coefficient: 0,43W/mK

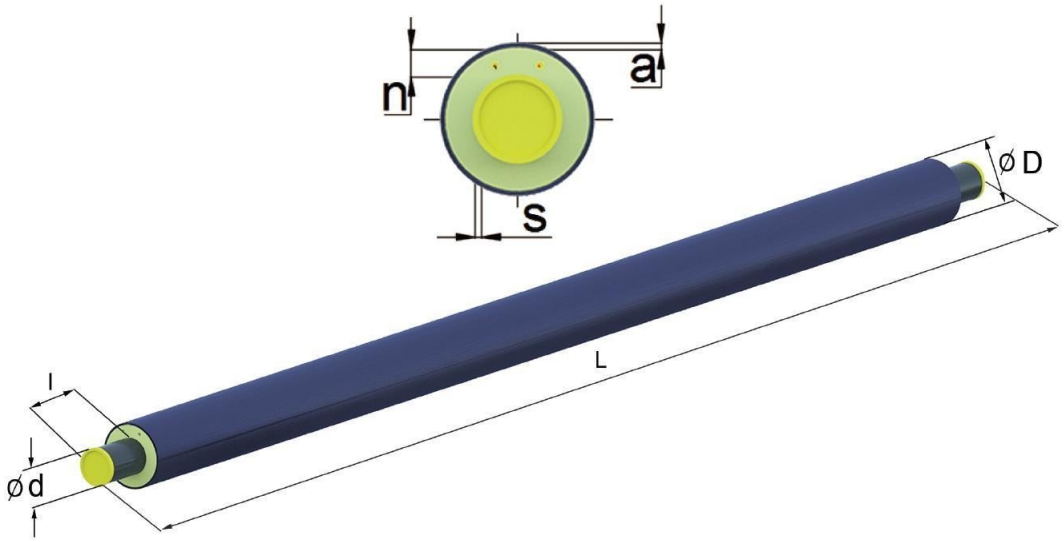
Coefficient of thermal expansion: 1,8·10^{-4} K^{-1}

Melt flow rate (MFR 190/5): 0,42 g/10 min

The material contains a UV protection agent

1. IZO CLASSIC

1. PRE-ISNULATED PIPE



X – nominal diameter of the main pipe

Ø d x s – diameter and thickness of the main pipe

Ø D x a – diameter and thickness of the PE-HD casing pipe

L – length of the main pipe

Pipe intended for rigidly connected pipelines of the district heating system, suitable for laying directly in the ground.

The service life of the system is 30 years with proper installation, at an operating temperature of 120˚C (max. 140˚C) and a maximum operating pressure of 25 bar.

The product complies with SRPS EN 253 and SRPS EN 13941 standards.

Pipes are made in lengths of 6 and 12 m.

Pipes are produced with the Nordic leakage detection system, in accordance with

SRPS EN 14419:2012

In table 1.1. the dimensions of the pipes from the basic offer are shown.

Table 1.1. Pre-insulated pipe - IZO CLASSIC

Nominal diameter	Outer diameter of the main pipe	Thickness of the main pipe	Lenght of the main pipe	Insulation calass 1		Insulation calass 2		Insulation calass 3		Thickness of the PE-HD pipe	Catalogue No.
				Outer diameter of the PE-HD pipe	PUR insulation thickness	Outer diameter of the PE-HD pipe	PUR insulation thickness	Outer diameter of the PE-HD pipe	PUR insulation thickness		
DN	Ød (mm)	s (mm)	L (m)	ØD (mm)	n (mm)	ØD (mm)	n (mm)	ØD (mm)	n (mm)	a (mm)	
15	21,3	2	6	90	33	110	43	125	50	3	0100
20	26,9	2	6	90	29	110	39	125	46	3	0101
25	33,7	2,3	6	90	25	110	35	125	43	3	0102
32	42,4	2,6	6	110	31	125	38	140	46	3	0103
40	48,3	2,6	6	110	28	125	35	140	43	3	0104
50	60,3	2,9	6	125	29	140	37	160	47	3	0105
65	76,1	2,9	6	140	29	160	39	200	49	3	0106
80	88,9	3,2	6	160	33	200	43	200	52	3	0107
100	114,3	3,6	6, 12	200	40	225	52	250	64	3,2	0108
125	139,7	3,6	6, 12	225	39	250	52	315	66	3,4	0109
150	168,3	4	6, 12	250	37	315	52	315	69	3,6	0110
200	219,1	4,5	6, 12	315	44	400	63	400	86	4,1	0111
250	273	5	6, 12	400	59	450	83	500	107	4,8	0112
300	323,9	5,6	6, 12	450	58	500	82	560	111	5,2	0113
350	355,6	5,6	6, 12	500	66	560	95	630	129	5,6	0114
400	406,4	6,3	6, 12	560	70	630	104	710	123	6	0115
450	457	6,3	6, 12	560	45	630	79	710	119	6	0116
500	508	6,3	6, 12	630	53	710	93	800	135	6,6	0117
600	610	7,1	6, 12	710	42	800	84	900	132	7,2	0119
700	711	8	6, 12	800	34	900	82	1000	144	7,9	0120
800	813	8,8	6, 12	1000	80	1100	130	1200	180	9,4	0121
900	914	10	6, 12	1100	79	1200	138	-	-	10,2	0122
1000	1016	11	6, 12	1200	77	-	-	-	-	11	0123
from DN 1000, on demand											

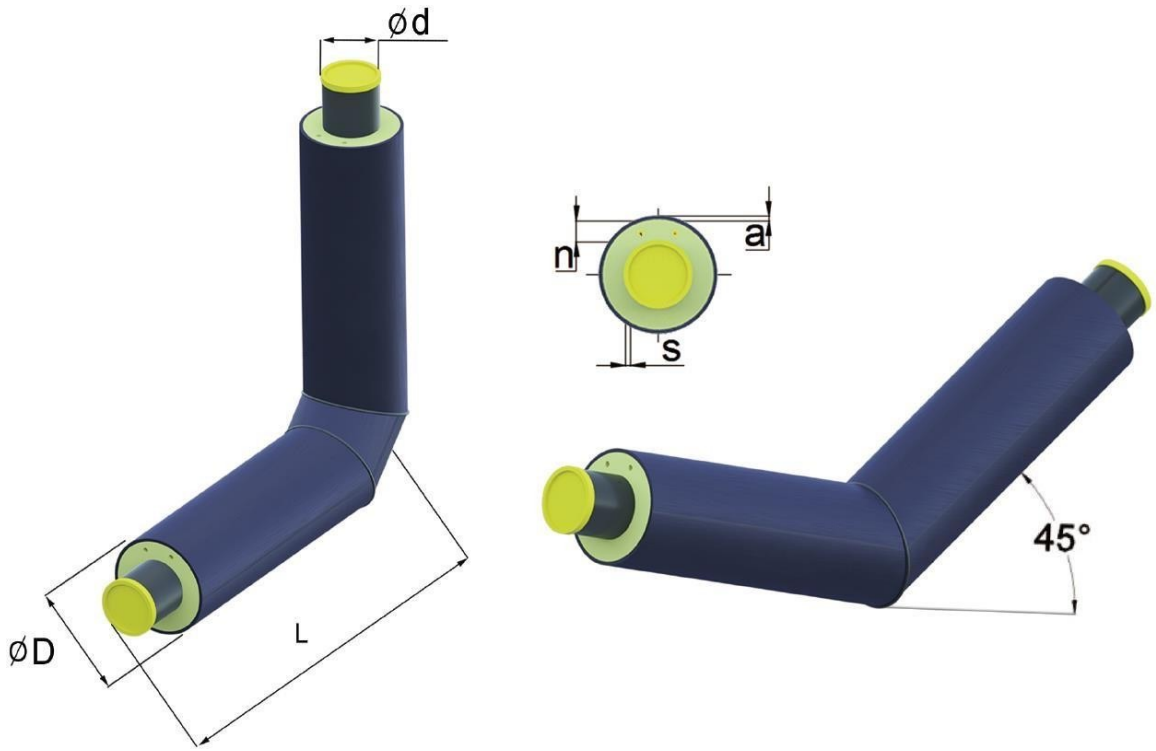
Lengths of free ends l (without insulation):

≤ DN 80 l = 150÷180 ± 10 mm

≥ DN 100 l =150÷200 ± 10 mm

At the request of the investor, we also produce pipes of other diameters and wall thicknesses of the main pipe, length, insulation thickness, leakage detection system.

1.2. PRE-INSULATED ELBOW



X – nominal diameter of the main pipe

Ø d x s – diameter and thickness of the steel pipe

Ø D x a – diameter and thickness of the PE-HD pipe

R – bending radius of the elbow

α – bending angle of the angle

L – arm length of the elbow

Pre-insulated elbows intended for rigidly connected pipelines of the district heating system, suitable for laying directly in the ground.

The service life of the system is 30 years with proper installation, at an operating temperature of 120˚C (max. 140˚C) and a maximum operating pressure of 25 bar.

The product complies with SEPS EN 448 and SRPS EN 13941 standards.

Pre-insulated elbows are manufactured with the Nordic Leakage Detection System.

In table 1.2. the dimensions of the pre-insulated elbows from the basic offer and the bending angle of 90˚ are shown.

Table 1.2. Pre-insulated elbow - IZO CLASSIC

Nominal diameter	Outer diameter of the main pipe	Thickness of the main pipe	Arm lenght of the elbow		Insulation calass 1		Insulation calass 2		Insulation calass 3		Thickness of the PE-HD pipe	Catalogue No.	
			L (mm)		Outer diameter of the PE-HD pipe	PUR insulation thickness	Outer diameter of the PE-HD	PUR pipe insulation thickness	Outer diameter of the PE-HD	PUR pipe insulation thickness			
DN	Ød (mm)	s (mm)	R=1,5D	R=3D	ØD (mm)	n (mm)	ØD (mm)	n (mm)	ØD (mm)	n (mm)	a (mm)	R=1,5D	R=3D
15	21,3	2	400	450	90		110		125		3	0200	0300
20	26,9	2	400	450	90	29	110	39	125	46	3	0201	0301
25	33,7	2,3	400	450	90	25	110	35	125	43	3	0202	0302
32	42,4	2,6	400	500	110	31	125	38	140	46	3	0203	0303
40	48,3	2,6	450	500	110	28	125	35	140	43	3	0204	0304
50	60,3	2,9	450	550	125	29	140	37	160	47	3	0205	0305
65	76,1	2,9	450	600	140	29	160	39	200	49	3	0206	0306
80	88,9	3,2	500	600	160	33	200	43	200	52	3	0207	0307
100	114,3	3,6	500	700	200	40	225	52	250	64	3,2	0208	0308
125	139,7	3,6	550	700	225	39	250	52	315	66	3,4	0209	0309
150	168,3	4	600	850	250	37	315	52	315	69	3,6	0210	0310
200	219,1	4,5	700	1000	315	44	400	63	400	86	4,1	0211	0311
250	273	5	750	1150	400	59	450	83	500	107	4,8	0212	0312
300	323,9	5,6	850	1300	450	58	500	82	560	111	5,2	0213	0313
350	355,6	5,6	900	1400	500	66	560	95	630	129	5,6	0214	0314
400	406,4	6,3	1000	1550	560	70	630	104	710	123	6	0215	0315
450	457	6,3	1050	1700	560	45	630	79	710	119	6	0216	0316
500	508	6,3	1150	1850	630	53	710	93	800	135	6,6	0217	0317
600	610	7,1	1300	2150	710	42	800	84	900	132	7,2	0219	0319
700	711	8	1450	2450	800	34	900	82	1000	144	7,9	0220	0320
800	813	8,8	1600	2800	1000	80	1100	130	1200	180	9,4	0221	0321
900	914	10	1800	3100	1100	79	1200	138	-	-	10,2	0222	0322
1000	1016	11	2000	3400	1200	77	-	-	-	-	11	0223	0323
form DN 1000, on demand													

At the request of the investor, we also produce elbows of other diameters and wall thicknesses of the main pipe, the length of the arms, the thickness of the insulation, the leakage detection system, the bending radius, the bending angles.

1.2. PRE-INSULATED BRANCH

The company also produces pre-insulated branches. In the basic

offer, we produce branches in one of the following ways:

1) Pass-through pipe with an outlet in the form of a welding neck

The basic design of T-pieces using the method of forming the neck for welding and with a "V" weld. The advantage of this design is the greater strength of the "V" weld compared to a regular corner weld and a more suitable shape for fluid flow.

2) Forged T-piece

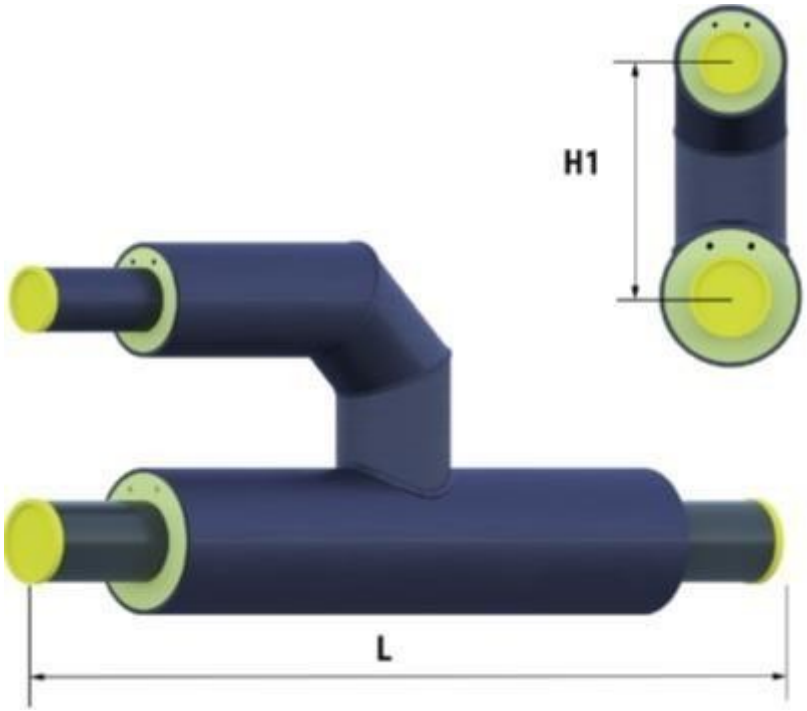
In the case of a branch of the same nominal diameter as the main pipe a welded suitable forged T-piece is used in accordance with SRPS EN 10253-2:2011.

3) Welded pipe extension

In special cases, when another method of execution is not technically feasible, a branch with a fillet weld is used. It is also possible to make it with additional reinforcement of the welded joint (welding of additional fitting - collar).

In the event of a requirement for greater strength of the branches, it is possible to deliver T-pieces with a greater thickness pipe wall.

1.3.1. PRE-INSULATED P BRANCH



X – nominal diameter of the main pipe

Y – nominal diameter of the branch pipe

Ø dx x sx – diameter and wall thickness of the amin pipe

Ø dy x sy – diameter and wall thickness of the branch pipe

L – length of the main pipe

Standard lengths of the main branch pipe:

< DN 300 – L = 1000 mm

≥ DN 300 – L = 1500 mm

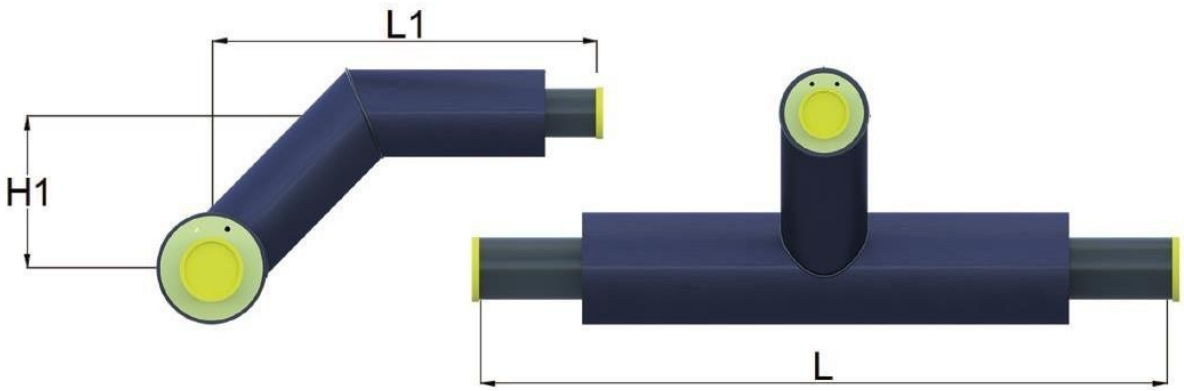
In table 1.3.1. the dimensions of the diameter, the arms of the branches and the distance between the axes of the main pipe and the branch, pre-insulated P branches from the basic offer are shown.

Table 1.3.1. Pre-insulated P branch – IZO CLASSIC

DN of the branch pipe	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	Catalogue No.	
DN of the main pipe	The distance between the axes of the main pipe and the branch pipe H1 (mm)																Main pipe	Branch pipe
25	210																0402	-02
32	220	230															0403	-03
40	220	230	230														0404	-04
50	227	237	237	245													0405	-05
65	235	245	245	252	260												0406	-06
80	245	255	255	262	270	280											0407	-07
100	265	275	275	282	290	300	320										0408	-08
125	277	287	287	294	302	312	332	365									0409	-09
150	290	300	300	307	315	325	345	377	390								0410	-10
200	322	332	332	339	347	357	377	389	446	483							0411	-11
250	365	375	375	382	390	400	420	432	455	507	600						0412	-12
300	390	400	400	407	415	425	445	457	500	532	625	700					0413	-13
350	415	425	425	432	440	450	470	502	547	607	657	695	750				0414	-14
400	445	455	455	462	470	480	500	532	545	637	680	755	780	810			0415	-15
450	480	490	490	497	505	515	535	567	580	652	695	705	730	795	830		0416	-16
500	500	510	510	517	525	535	555	587	600	672	715	740	765	795	850	870	0417	-17

At the request of the investor, we produce pre-insulated P branches of other diameters and wall thicknesses of the main pipe and branch, length of arms, length of the main pipe and branch, insulation thickness, leakage detection system.

1.3.2. PRE-INSULATED T-45˚ BRANCH



X – nominal diameter of the base pipe

Y – nominal diameter of the branch

Ø dx x sx – diameter and wall thickness of the base pipe

Ø dy x sy – diameter and wall thickness of the branch

L – length of the base pipe

Table 1.3.2. Pre-insulated T-45˚ branch – IZO CLASSIC

DN of the branch pipe	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	Catalogue No.	
DN of the main pipe	The distance between the axes of the main pipe and the branch pipe H1 (mm)															Main pipe	Branch pipe
25	135															0502	-02
32	138	155														0503	-03
40	137	150	157													0504	-04
50	142	154	156	173												0505	-05
65	147	158	160	171	192											0506	-06
80	154	165	167	177	191	213										0507	-07
100	169	179	181	190	202	215	253									0508	-08
125	178	188	189	198	210	222	248	283								0509	-09
150	187	197	198	207	218	229	254	275	315							0510	-10
200	211	221	222	230	241	252	275	293	316	386						0511	-11
250	242	252	253	259	272	282	304	322	342	389	473					0512	-12
300	261	271	272	280	290	300	322	338	358	401	460	533				0513	-13
350	279	289	290	298	308	319	340	356	375	417	472	521	578			0514	-14
400	301	311	312	320	330	341	361	378	396	436	489	531	561	644		0515	-15
450	327	337	338	346	356	366	387	403	421	460	511	550	577	629	718	0516	-16

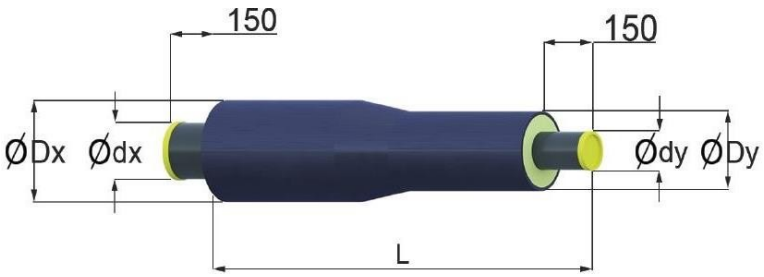
Standard lengths of the main branch pipe:

< DN 300 – L = 1000 mm

≥ DN 300 – L = 1500 mm

At the request of the investor, we produce pre-insulated T-45˚ branches of other diameters and wall thicknesses of the main pipe and branch, length of arms, length of the main pipe and branch, insulation thickness, leakage detection system.

1.4. PRE-INSULATED REDUCER



X – nominal diameter of the base pipe
Y – nominal diameter of the reduced tube
Ø dx x sx – diameter and wall thickness of the base pipe
Ø dy x sy – diameter and wall thickness of the reduced tube
L – reducer length

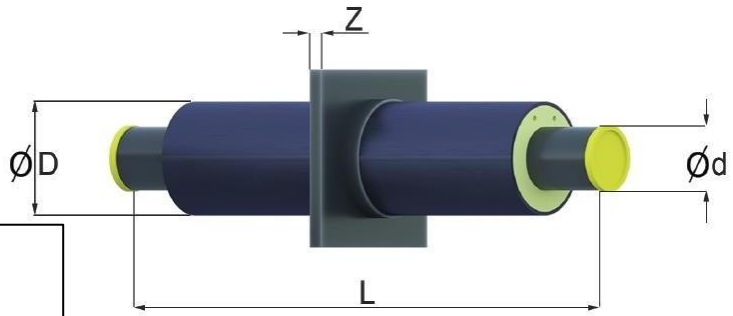
Table 1.4. Pre-insulated reducers - IZO CLASSIC

DN_X	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**	**300**	**350**	**400**	**Catalogue No.**	
DN_Y	**Outer diamters of the pipes $Ød_x$ / $Ød_y$ (mm)**															**Main pipe**	**Reduced pipe**
15	26,9/ 21,3	33,7/ 21,3	42,4/ 21,3	48,3/ 21,3												1000	-00
20		33,7/ 26,9	42,4/ 26,9	48,3/ 26,9	60,3 /26,9											1001	-01
25			42,4/ 33,7	48,3/ 33,7	60,3/ 33,7	76,1/ 33,7										1002	-02
32				48,3/ 42,4	60,3/ 42,4	76,1/ 42,4	88,9/ 42,4									1003	-03
40					60,3/ 48,3	76,1/ 48,3	88,9/ 48,3	114,3/ 48,3								1004	-04
50						76,1/ 60,3	88,9/ 60,3	114,3/ 60,3	139,7/ 60,3							1005	-05
65							88,9/ 76,1	114,3/ 76,1	139,7/ 76,1	168,3/ 76,1						1006	-06
80								114,3/ 88,9	139,7/ 88,9	168,3/ 88,9	219,1/ 88,9					1007	-07
100									139,7/ 114,3	168,3/ 114,3	219,1/ 114,3	273,0/ 114,3				1008	-08
125										168,3/ 139,7	219,1/ 139,7	273,0/ 139,7	323,9/ 139,7			1009	-09
150											219,1/ 168,3	273,0/ 168,3	323,9/ 168,3	355,6/ 168,3		1010	-10
200												273,0/ 219,1	323,9/ 219,1	355,6/ 219,1	406,4/ 219,1	1011	-11
250													323,9/ 273,0	355,6/ 273,0	406,4/ 273,0	1012	-12
300														355,6/ 323,9	406,4/ 323,9	1013	-13
350															406,4/ 355,6	1014	-14

Standard reduction lengths:
< DN 300 – L = 1000 mm
≥ DN 300 – L = 1500 mm

At the request of investors, we produce pre-insulated reductions of other diameters and wall thicknesses of working pipes, pipe length, insulation thickness, leakage detection systems..

1.5. PRE-INSULATED ANCHOR



X – nominal pipe diameter

Ø d x s – diameter and wall thickness of the working pipe

L – length of the anchor

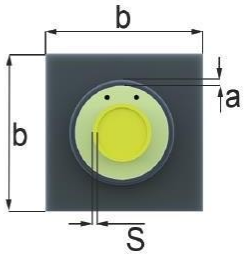


Table 1.5. Pre-insulated anchor IZO CLASSIC

Nominal diameter	Outer diameter of the main pipe	Thickness of the main pipe	Thickness of anchor plate	Dimension of anchor plate	Insulation calass 1		Insulation calass 2		Insulation calass 3		Thickness of the PE-HD pipe	Catalogue No.
					Outer diameter of the PE-HD pipe	PUR insulation thickness	Outer diameter of the PE-HD pipe	PUR insulation thickness	Outer diameter of the PE-HD pipe	PUR insulation thickness		
DN	Ød (mm)	s (mm)	z (mm)	bxb (mm)	ØD (mm)	n (mm)	ØD (mm)	n (mm)	ØD (mm)	n (mm)	a (mm)	
15	21,3	2	15	200x200	90		110		125		3	0600
20	26,9	2	15	200x200	90	29	110	39	125	46	3	0601
25	33,7	2,3	15	200x200	90	25	110	35	125	43	3	0602
32	42,4	2,6	15	200x200	110	31	125	38	140	46	3	0603
40	48,3	2,6	15	200x200	110	28	125	35	140	43	3	0604
50	60,3	2,9	20	250x250	125	29	140	37	160	47	3	0605
65	76,1	2,9	20	250x250	140	29	160	39	200	49	3	0606
80	88,9	3,2	20	250x250	160	33	200	43	200	52	3	0607
100	114,3	3,6	25	330x330	200	40	225	52	250	64	3,2	0608
125	139,7	3,6	25	330x330	225	39	250	52	315	66	3,4	0609
150	168,3	4	25	380x380	250	37	315	52	315	69	3,6	0610
200	219,1	4,5	25	500x500	315	44	400	63	400	86	4,1	0611
250	273	5	30	600x600	400	59	450	83	500	107	4,8	0612
300	323,9	5,6	30	700x700	450	58	500	82	560	111	5,2	0613
350	355,6	5,6	30	700x700	500	66	560	95	630	129	5,6	0614
400	406,4	6,3	30	800x800	560	70	630	104	710	123	6	0615
450	457	6,3	30	800x800	560	45	630	79	710	119	6	0616

Standard reduction lengths:
≤ DN 200 – L = 1500 mm
≥ DN 250 – L = 2000 mm

At the request of the investor, we produce pre-insulated anchors of other diameters and wall thicknesses of the working pipe, pipe length, dimensions of the steel plate for anchoring, insulation thickness, leakage detection system.

1.6. PRE-INSULATED SHUT-OFF VALVES

In the production program of the company there is also a pre-insulated shut-off valvesintended for rigidly connected pipelines, suitable for installation directly in the ground.
They are produced as spindle ball valves with a long stem, in accordance with SRPS EN 448.
The ends for welding are prepared according to DIN 2559-1.
On special request, it is possible to deliver a control T key (DN 20 - DN 150) or a manual tightening torque booster, and possibly a complete valve with a gearbox (for larger dimensions than DN 200).

Table 1.6. Pre-insulated shut off valves - IZO CLASSIC

Nominal diameter	Outer diameter of the main pipe	Thickness of the main pipe	Maximum height of the valve	Catalogue No.
DN	Ød (mm)	s (mm)	h_{max} (mm)	
25	33,7	2,3	480	0702
32	42,4	2,6	485	0703
40	48,3	2,6	494	0704
50	60,3	2,9	500	0705
65	76,1	2,9	505	0706
80	88,9	3,2	515	0707
100	114,3	3,6	525	0708
125	139,7	3,6	545	0709
150	168,3	4	565	0710
200	219,1	4,5	585	0711
250	273	5	625	0712
300	323,9	5,6	664	0713
350	355,6	5,6	742	0714
400	406,4	6,3	793	0715

Standard valve lengths are:

< DN 300 – L = 1500 mm

≥ DN 300 – L = 2000 mm

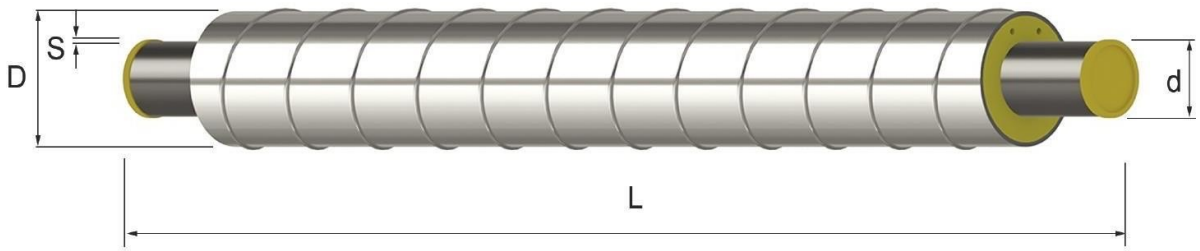
X – nominal valve diameter

L – installation measure

Y – nominal diameter of service valves

2. IZO SPIRO

1. PRE-INSULATED PIPE



IZO SPIRO pipes and fittings are intended for above ground installation.

The outer protective tube is made of aluminum or steel sheet, which provides these systems with a long service life and great resistance to various atmospheric influences.

Table 2.1. Pre-insulated pipe - IZO SPIRO

Nominal diameter	Outer diameter of the main pipe	Thicjness of the main pipe	Lenght of the main pipe	Insulation calass 1		Insulation calass 2		Insulation calass 3		Catalogue No.
				Outer diameter of the PE-HD pipe	PUR insulation thickness	Outer diameter of the PE-HD pipe	PUR insulation thickness	Outer diameter of the PE-HD pipe	PUR insulation thickness	
DN	Ød (mm)	s (mm)	L (m)	ØD (mm)	n (mm)	ØD (mm)	n (mm)	ØD (mm)	n (mm)	
20	26,9	2	6	90	29	110	39	125	46	0801
25	33,7	2,3	6	90	25	110	35	125	43	0802
32	42,4	2,6	6	110	31	125	38	140	46	0803
40	48,3	2,6	6	110	28	125	35	140	43	0804
50	60,3	2,9	6	125	29	140	37	160	47	0805
65	76,1	2,9	6	140	29	160	39	200	49	0806
80	88,9	3,2	6	160	33	200	43	200	52	0807
100	114,3	3,6	6, 12	200	40	225	52	250	64	0808
125	139,7	3,6	6, 12	225	39	250	52	315	66	0809
150	168,3	4	6, 12	250	37	315	52	315	69	0810
200	219,1	4,5	6, 12	315	44	400	63	400	86	0811
250	273	5	6, 12	400	59	450	83	500	107	0812
300	323,9	5,6	6, 12	450	58	500	82	560	111	0813
350	355,6	5,6	6, 12	500	66	560	95	630	129	0814
400	406,4	6,3	6, 12	560	70	630	104	710	123	0815
450	457	6,3	6, 12	560	45	630	79	710	119	0816
500	508	6,3	6, 12	630	53	710	93	800	135	0817
600	610	7,1	6, 12	710	42	800	84	900	132	0818
700	711	8	6, 12	800	34	900	82	1000	144	0819

At the request of the investor, we produce pre-insulated IZO SPIRO pipes of other diameters and wall thicknesses of the main pipe, the length of the main pipe, the dimensions of the outer protective pipe, the thickness of the insulation, the leakage detection system.

2.2. PRE-INSULATED ELBOW

IZO SPIRO prefabricated insulated elbows are produced with a standard bending angle of 90°.

At the request of investors, we produce pre-insulated IZO SPIRO elbows with

other diameters and wall thickness of the main pipe, arm length, angles and bending radius,

the size of the outer protective pipe, the thickness of the insulation, the leakage detection system.

Nominal diameter	Outer diameter of the main pipe	Thickness of the main pipe	Arm length	
			L (mm)	
DN	Ød (mm)	s (mm)	R=1,5D	R=3D
15	21,3	2	400	450
20	26,9	2	400	450
25	33,7	2,3	400	450
32	42,4	2,6	400	500
40	48,3	2,6	450	500
50	60,3	2,9	450	550
65	76,1	2,9	450	600
80	88,9	3,2	500	600
100	114,3	3,6	500	700
125	139,7	3,6	550	700
150	168,3	4	600	850

2.3. SPIRO JOINT

It is intended for the insulation of pipelines made of IZO SIRO elements, in places of welded joints.

The set contains the following parts:

1. Bent cover sheet 1 pc.
2. Sealing material 1 pc.
3. Threads 9 pcs.
4. Tin stopper cap 1 pc.

PUR components (depending on dimensions)

Spiro couplings are supplied as standard in a length of 500mm. The tin stopper is attached with 4 rivets.

3. ONE TIME COMPENSATOR

The company also offers compensators intended for prestressed district heating pipelines.

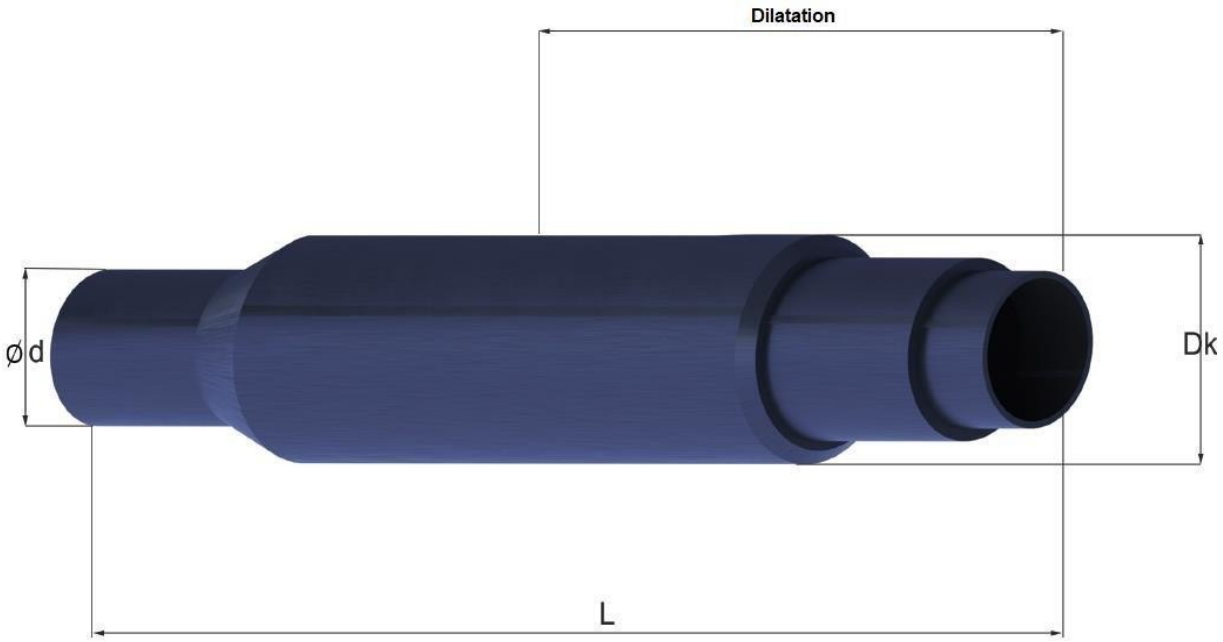


Table 3.1. ONE TIME COMPENSATOR

Nominal diameter	Outer diameter of the main pipe	Lenght	Dilatation	Maximum outer diameter Dk	Catalogue No.
DN	Ød (mm)	L (mm)	(mm)	(mm)	
40	48,3	275	50	73,0	0901
50	60,3	275	50	86,0	0902
65	76,1	335	70	106,0	0903
80	88,9	345	70	122,0	0904
100	114,3	390	80	139,7	0905
125	139,7	400	80	168,3	0906
150	168,3	475	100	193,7	0907
200	219,1	515	120	268,0	0908
250	273,0	515	120	323,9	0909
300	323,9	650	140	355,6	0910
350	355,6	650	140	406,4	0911
400	406,4	650	140	457,2	0912
450	457,2	660	150	508,0	0913
500	508,0	660	150	560,0	0914
600	610,0	690	150	675,0	0915

4. IZO TWINS

1. TWINS PIPE

The company also has the IZO TWINS system in its production program, intended for laying pipelines in narrow trenches. This system is suitable for district heating pipelines that need to be installed inurban areas, as well as in parts of routes where trenching is limited by existing installations or buildings.

In table 4.1. the dimensions of the IZO TWINS pipes from the basic offer are shown.

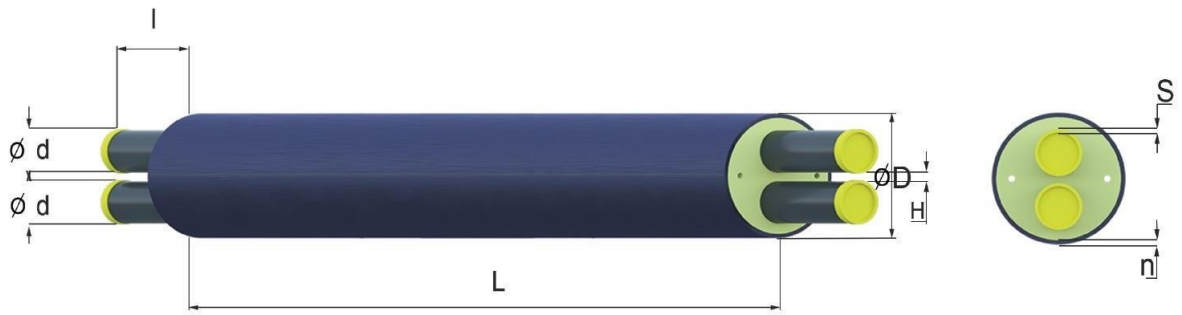


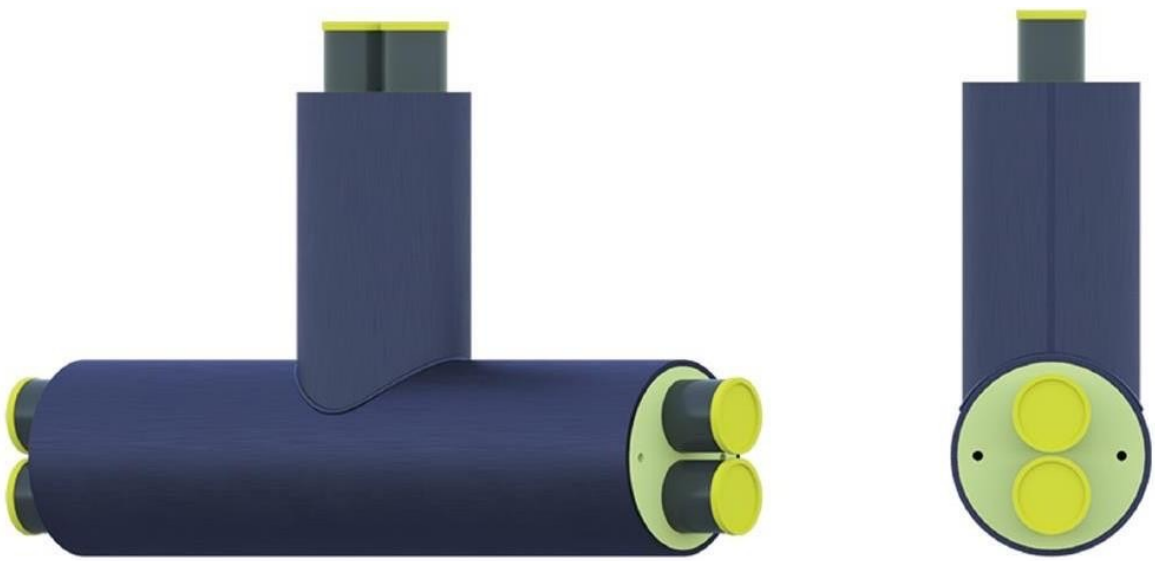
Table 4.1. Pre-insulated pipes - IZO TWINS

Nominal diameter	Outer diamter of the main pipes	Thickness of the main pipes	Main pipes lenght	The distance between main pipes	Insulation class 1	Insulation class 2	Thickness of the PE-HD pipe	Catalogue No.
					Outer diamter of the PE-HD pipe	Outer diamter of the PE-HD pipe		
DN	Ød (mm)	s (mm)	L (m)	h (mm)	ØD (mm)	ØD (mm)	a (mm)	
25+25	33,7	2,6	6	19	140	160	3	2002
32+32	42,4	2,6	6	19	160	180	3	2003
40+40	48,3	2,6	6	19	160	180	3	2004
50+50	60,3	2,9	6	20	200	225	3,2; 3,4	2005
65+65	76,1	2,9	6	20	225	250	3,4; 3,6	2006
80+80	88,9	3,2	6	25	250	280	3,6; 3,9	2007
100+100	114,3	3,6	6, 12	25	315	355	4,1; 4,5	2008
125+125	139,7	3,6	6, 12	30	400	450	4,8; 5,2	2009
150+150	168,3	4	6, 12	40	450	500	5,2; 5,6	2010
200+200	219,1	4,5	6, 12	45	560	630	5,6; 6,6	2011
250+250	273	5	6, 12	45	710	800	7,2; 7,9	2012

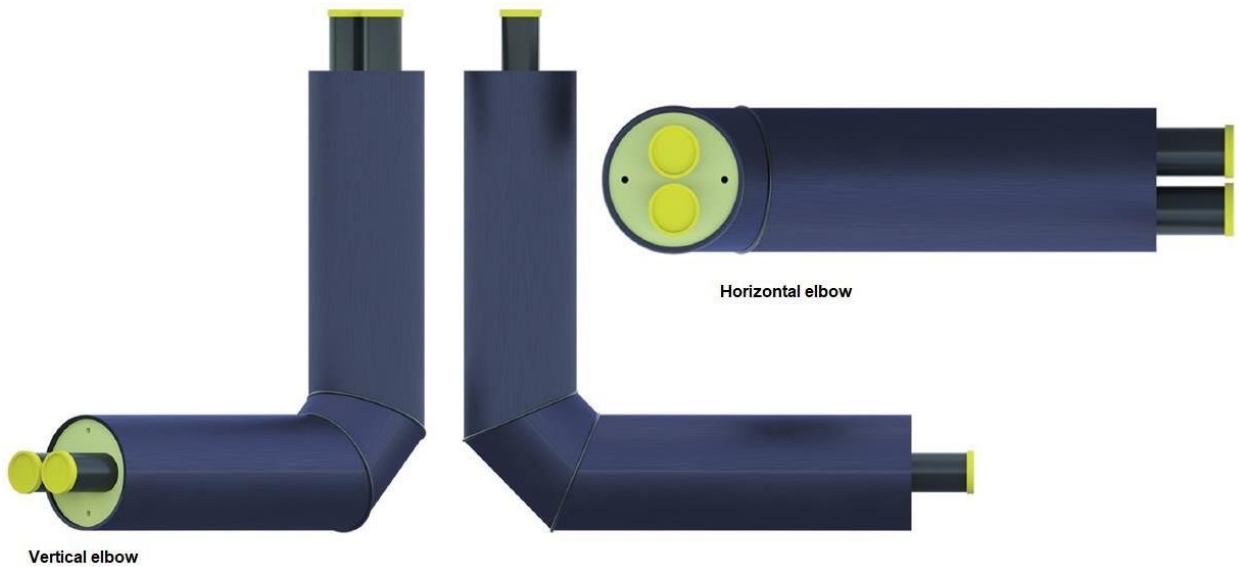
At the request of the investor, we produce IZO TWINS pipes of different diameters and wall thicknesses of main pipes, length, thickness of insulation, material of outer casing, leakage detection system.

The company offers IZO TWINS pre-insulated fittings and pre-insulated shut-off valves.

4.2. IZO-TWINS T BRANCH

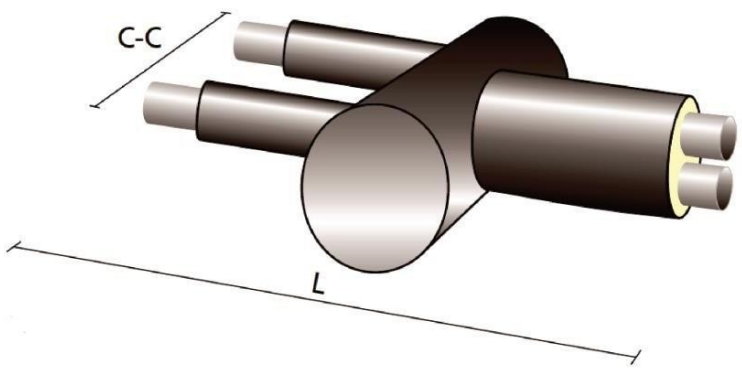


4.3. IZO-TWINS ELBOWS

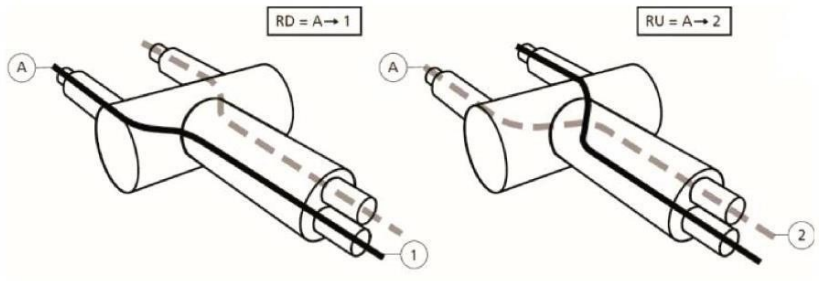


4.4. IZO-TWINS Y CROSSING PIECE

The Y crossing piece is used when switching from the standard IZO-CLASSIC to the IZO-TWINS system, or vice versa.



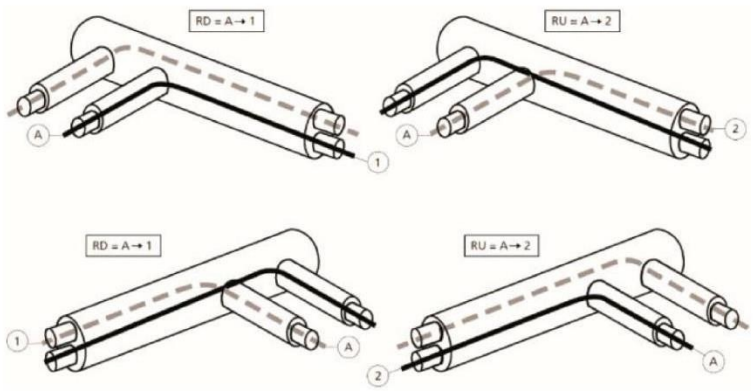
DN	C-C (mm)	L (mm)
25	240	1500
32	240	1500
40	240	1500
50	275	1500
65	275	1500
80	380	1500
100	450	1500
125	450	1500
150	450	1500
200	550	2000



When ordering, it is mandatory to indicate the direction of the Y crossing piece according to the following diagram.

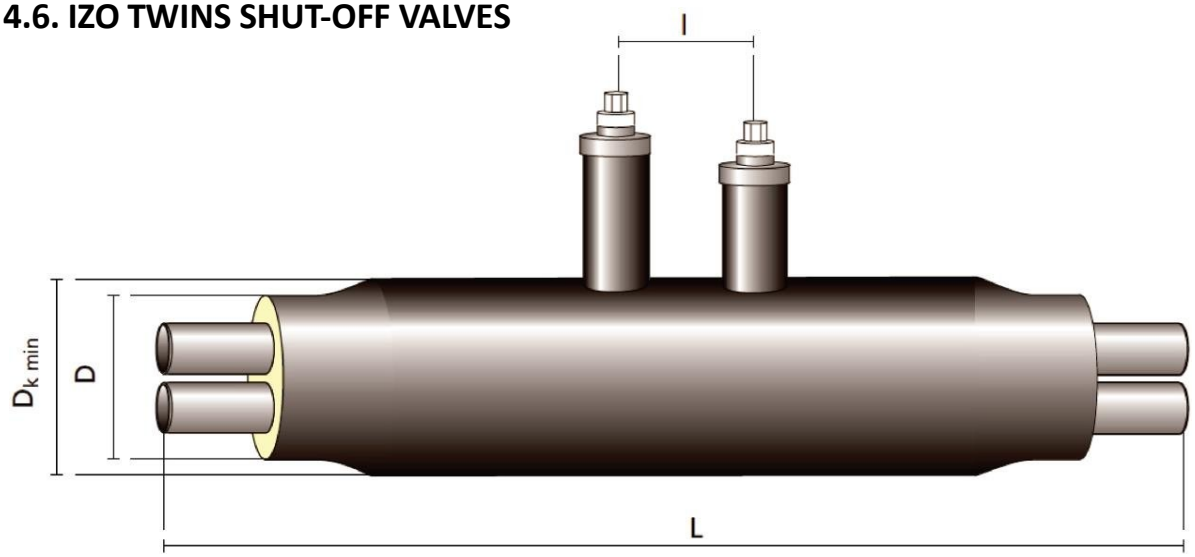
4.5. IZO-TWINS F CROSSING PIECE

The F crossing piece is used when switching from the standard IZO-CLASSIC to the IZO-TWINS system, or vice versa.



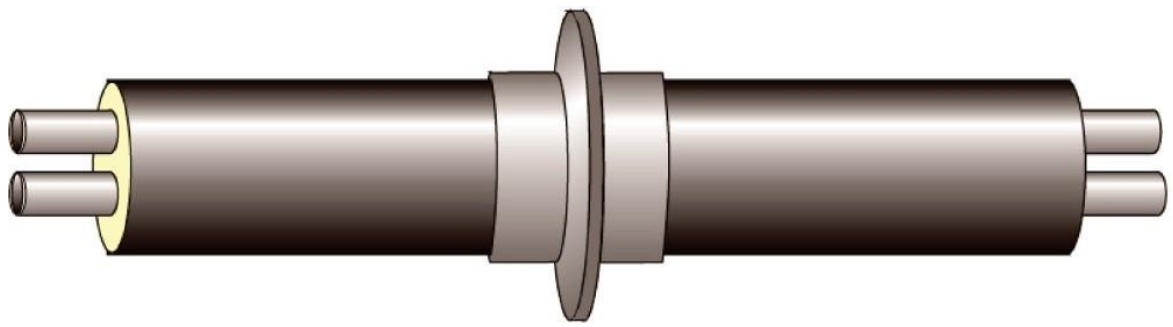
The F crossing piece can be made in one of the ways shown in the picture.

4.6. IZO TWINS SHUT-OFF VALVES



DN	L (mm)	l (mm)	D (mm)	D_{kmin} (mm)
25+25	1700	300	140	160
32+32	1700	300	160	180
40+40	1700	300	160	180
50+50	1700	300	200	225
65+65	1700	400	225	250
80+80	1700	400	250	280
100+100	1700	400	315	355
125+125	2000	430	400	450
150+150	2000	470	450	500
200+200	2500	630	560	630

4.7. IZO TWINS ANCHOR

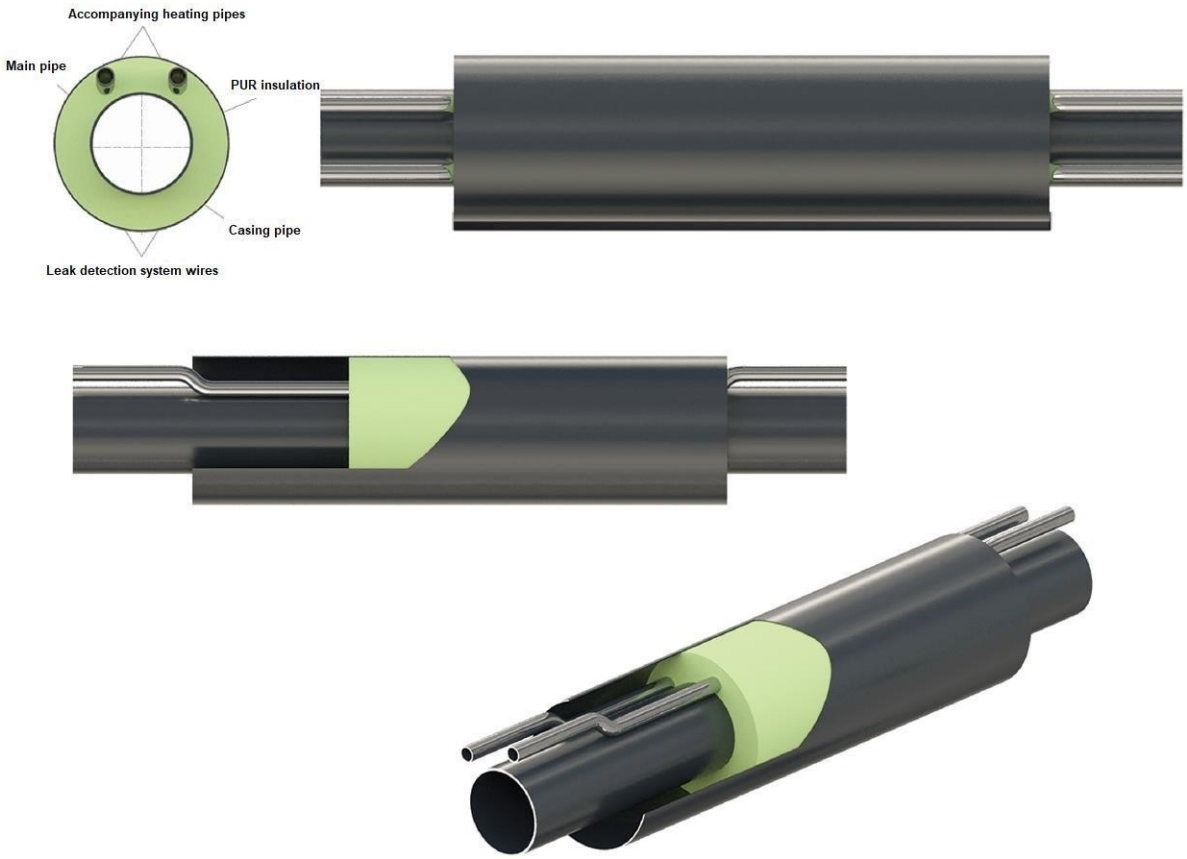


5. NON-STANDARD PRE-INSULATED PIPES

In addition to the IZO CLASSIC, IZO SPIRO and IZO TWINS systems, the company also producesother pre-insulated pipeline systems, as requested by investors.

We would like to mention following:

- Steel pre-insulated pipes and fittings with accompanying heating, for systems in which fluid heating is required during transport



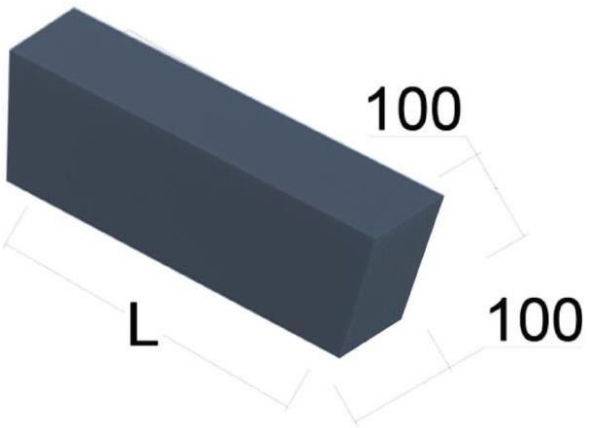
-For the special needs of investors, the working pipe in our pre-insulated systems can be made of the following materials:

- copper
- galvanized steel
- stainless steel
- polyethylene (PE 100)
- polypropylene (PPR)

6. ACCESSORIES

1. PUR BEDS AND EXPANSION PADS

PUR beds



They are made of expanded polyurethane. Designed for supporting pipelines in trenches during installation. Unlike wooden beds, these beds do not need to be removed from the trenches when backfilling.

In the basic offer, we have beds with dimensions of 100x100xL mm.

At the request of the investor, we also produce beds of other dimensions.

Density 60 - 80 kg/m3

Compressibility: 10% at a pressure of 3 kPa

25% at a pressure of 5 kPa

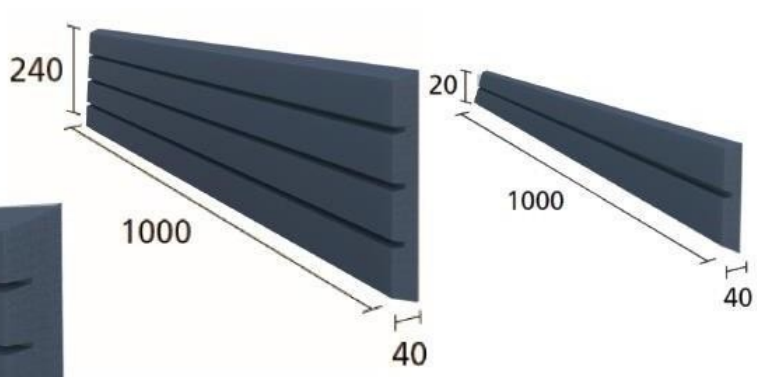
50% at a pressure of 11 kPa

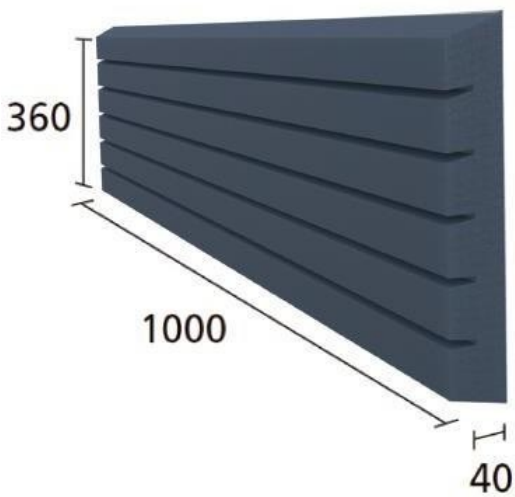
Expansion pads

made of expanded polyethylene are intended for accepting expansions of pipelines laid directly in the ground at the places of arches, branches, reductions, shut-off valves, end joints.

We supply expansion pads in the following dimensions:

- Size 1 – 40x120x1000
- Size 2 – 40x240x1000
- Size 3 – 40x360x1000





Density 30 ± 4 kg/m3

Water absorption vol.% ≤ 1.9

Compressibility:

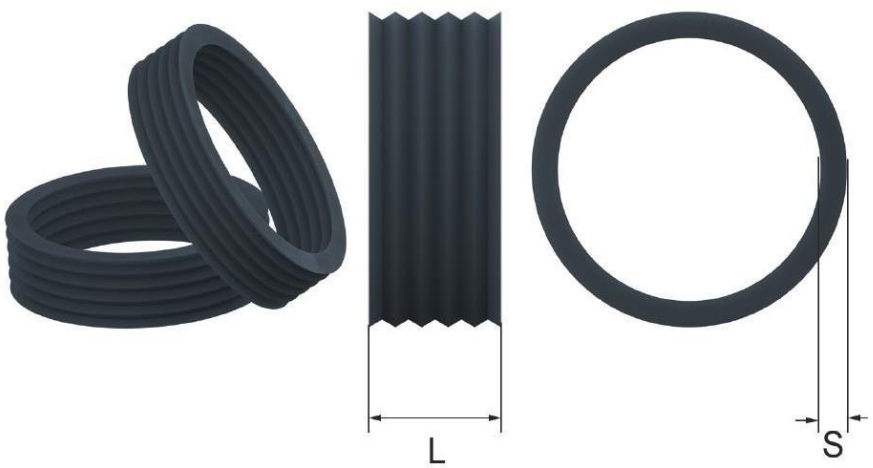
10% at a pressure of 16kPa

25% at a pressure of 35 kPa

50% at a pressure of 80 kPa

6.2. SEALING RINGS

A rubber sealing rings is placed around the casing pipe before welding of the pipeline and closing the wall around the pipeline. It is usually placed in the middle of the passage through the wall and serves as a seal against the penetration of moisture, but not gas or water under pressure.



Dimensions Ø 90 – 1000 mm

L = 50 mm

s = 20 mm

6.3. MARKING TAPE

Warning tape with the inscription "CAUTION PIPELINE", for marking pipelines in trenches during backfilling. It is recommended to place a warning tape 30 cm above the upper surface of the pipe.

The warning tape is supplied in rolls with a width of 120 mm and a length of 500 m.

6.4. JOINTS

Intended for insulation in places of welded joints in pipelines made of pre-insulated systems IZO CLASSIC or IZO TWINS.

In addition to protecting the PUR insulation from mechanical damage, the connectors also prevent the penetration of moisture inside the pre-insulated pipeline.

Choosing the right type of coupling essentially determines the quality and service life of the pipeline itself.

All types of joints, respecting the assembly processes, are suitable for sandy, clayey, dry and wet surfaces and meet the requirements of SRPS EN 489.

All materials required for assembly, including components for making polyurethane foam, are supplied as standard with the couplings.

In order to achieve the highest quality of couplings with larger dimensions and to achieve their correct mechanical and thermal insulation properties, the company also offers the service of machinefoaming of couplings directly on the construction site.

The company supplies the following types of couplings in its basic offer:

Heat shrinkable joint

suitable for less demanding pipeline laying conditions, due to the lower price it is the most commonly used type of coupling.

Cross-linked heat shrinkable joint

suitable for more demanding conditions with larger load and is recommended for use in cases where groundwater appears.

Electro welded heat shrinkable joint

suitable for the most demanding conditions and for terrains where groundwater appears.

Repair joint

Heat shrinkable joint welded longitudinally with an extruder, intended for more complicated repairs on existing hot pipes.

6.4.1. HEAT SHRINKABLE JOINT

The heat shrinkable joint shrinks to the diameter of the casing pipe after heating with a flame.

For the basic sealing, a butyl-rubber (MASTIC) tape is used, which is placed on the outer casing of the pipe before the coupling is installed. The ends of the joint are covered with heat shrinkable tape - CANUSA.

The heat shrinkable joint contains:

1. Heat shrinkable joint 1 pc.
2. MASTIC tape 2 pc.
3. Heat shrinkable tape CANUSA 2 pc.
4. Tape for closing 2 pc.
5. Air release plugs 2 pcs.
6. Plugs for welding 2 pcs.
7. Spacers for el. conductors 2 pcs.
8. Connectors for connecting el. conductor 2 pcs.

PUR components (quantity based on dimension)

The heat shrinkable joint is supplied in a protective white polyethylene film, which protects it from dirt and moisture. The protective film is removed before the coupling is heated. Before and after foaming, it is recommended to cover the joint with a protective film for protection from solar radiation, until the pipeline is buried.

Heat shrinkable joints are supplied in the following lengths as standard:

Outer diamter of the PE-HD pipe	Lenght of the heat-shrinkable joint
Ø 90 - 560 mm	600 mm
Ø 630 - 1000 mm	700 mm

Heat shrinkable joint for compensator

For the insulation of one time compensators, a heat shrinkable joint of the following length is supplied:

Outer diamter of the PE-HD pipe	Lenght of the heat-shrinkable joint
Ø 90 - 125 mm	880 mm
Ø 140 - 180 mm	950 mm
Ø 200 - 280 mm	1080 mm
Ø 315 - 400 mm	1120 mm
Ø 450 - 710 mm	1260 mm

6.4.2. CROSS-LINKED HEAT SHRINKABLE JOINT

After heating with a flame, the cross-linked heat shrinkable joint shrinks to the diameter of the casing pipe.

This joint has integrated MASTIC strips on the edges on each side. The material of this joint has a high shrinkage power, which ensures high connection forces during the entire service life of the pipeline.

With this type of joint, it is not necessary to use heat shrinkable tapes - CANUSA, which cover the ends of the joint.

The cross-linked heat shrinkable joint is supplied in a protective white polyethylene film, which protects it

from impurities and humidity. The protective film is removed before the coupling is heated.

The cross-linked heat shrinkable joint contains:

1. Cross-linked heat shrinkable joint 1 pcs.
2. Air release plugs 2 pcs.
3. Plugs for welding 2 pcs.
4. Connectors for connecting el. conductor 2 pcs.
5. Spacers for el. conductors 2 pcs.

PUR components (quantity based on dimension)

Standard lengths of cross-linked heat shrinkable joints are:

Outer diamter of the PE-HD pipe	Lenght of the heat-shrinkable joint
Ø 90 - 990 mm	600-700 mm
Ø 280 - 990 mm	600-750 mm

At the request of the investor, we can deliver other dimensions of cross-linked heat shrinkable joints.

According to the many years of experience of the company in the installation of heat shrinkablejoints, we recommend the installation of cross-linked heat shrinkable joints on pipelines with an outer diameter of casing pipes up to Ø315mm.

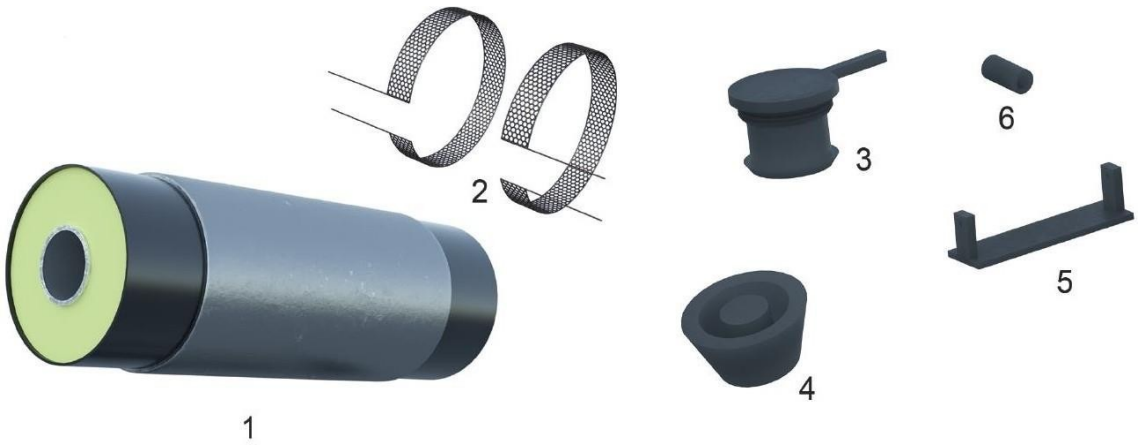
For pipelines with an outer diameter of casing pipes greater than Ø315 mm, we recommend the installation of electro welded heat shrinkable joints.

6.4.3. ELECTRO WELDED HEAT SHRINKABLE JOINT

The electro welded heat shrinkable joint combines the advantages of a joint that, after being heated by a flame shrinks to the size of the outer diameter of the casing pipe and the final electric welding of the plastic using heating elements.

Welding is performed using a special welding machine, controlled by a microcomputer, which adjusts the welding process according to external conditions. This creates a solid, high-quality joint around the entire circumference.

Electro welded heat shrinkable joint contains:



1. Heat shrinkable joint 1 pcs.
2. Heating elements for welding 2 pcs.
3. Air release plugs 2 pcs.
4. Plugs for welding 2 pcs.
5. Spacers for el. conductors 2 pcs.
6. Connectors for connecting el. conductor 2 pcs.

PUR components (quantity based on dimension)

Electro welded heat shrinkable couplings are supplied as standard in a length of 700 mm, and at the request of the investor we can also supply couplings of other lengths.

Electro welded heat shrinkable joint for compensator

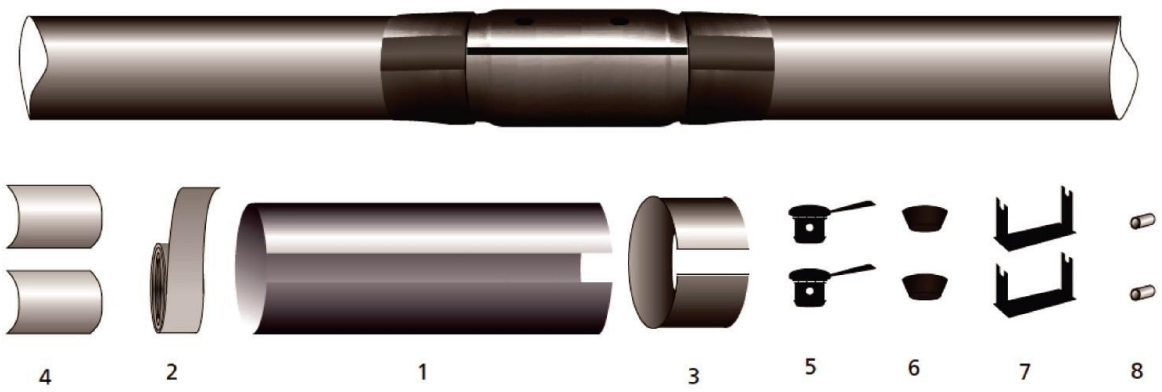
For the insulation of one time compensators, an electro welded heat shrinkable joint of the following dimensions is supplied:

Outer diamter of the PE-HD pipe	Lenght of the heat-shrinkable joint
Ø 90 - 125 mm	880 mm
Ø 140 - 180 mm	950 mm
Ø 200 - 280 mm	1080 mm
Ø 315 - 400 mm	1120 mm
Ø 450 - 710 mm	1260 mm

6.4.4. REPAIR JOINT

The repair joint is intended for more demanding repairs of existing pipelines, and is installed in the case when it is not possible to install one of the mentioned joints. It is possible to install the repair coupling even after welding the pipeline.

The repair kit contains:



1. Heat shrinkable joint 1 pc.
2. MASTIC tape 2 pc.
3. Heat shrinkable tape CANUSA 2 pc.
4. Tape for closing 2 pc.
5. Air release plugs 2 pcs.
6. Plugs for welding 2 pcs.
7. Spacers for el. conductors 2 pcs.
8. Connectors for connecting el. conductor 2 pcs.

PUR components (quantity based on dimension)

6.4.5. DOSING OF THE PUR COMPONENTS

Components:

MDI: Diphenylmethane diisocyanate, dark, viscous

Polyol: Polyether alcohol, light, light, viscous

Length of the foamed part: ≤ DN 350 = 350 mm

≥ DN 400 = 390 mm

Dosing of thw PUR components for IZO CLASSIC system							
DN	Outer diameter of the casing pipe (mm)	Ambient temperature ≥ 20˚C			Ambient temperature 5 – 20˚C		
		Polyol (kg)	Isocyanate (kg)	Total (kg)	Polyol (kg)	Isocyanate (kg)	Total (kg)
20	90	0,068	0,112	0,180	0,076	0,124	0,200
25	90	0,064	0,104	0,168	0,070	0,114	0,184
32	110	0,097	0,159	0,256	0,108	0,176	0,284
40	110	0,091	0,149	0,240	0,102	0,166	0,268
50	125	0,112	0,184	0,296	0,126	0,206	0,332
65	140	0,131	0,213	0,344	0,146	0,238	0,384
80	160	0,170	0,278	0,448	0,188	0,308	0,496
100	200	0,263	0,429	0,692	0,292	0,476	0,768
125	225	0,302	0,494	0,796	0,336	0,548	0,884
150	250	0,328	0,536	0,864	0,366	0,598	0,964
200	315	0,496	0,808	1,304	0,550	0,898	1,448
250	400	0,838	1,366	2,204	0,930	1,518	2,448
300	450	0,948	1,548	2,496	1,055	1,721	2,776
350	500	1,208	1,972	3,180	1,342	2,190	3,532
400	560	1,452	2,368	3,820	1,613	2,631	4,244
500	630	1,315	2,145	3,460	1,461	2,383	3,844
550	710	1,841	3,003	4,844	2,046	3,338	5,384
600	800	2,610	4,258	6,868	2,899	4,729	7,628
700	900	2,938	4,794	7,732	3,265	5,327	8,592
800	1000	3,242	5,290	8,532	3,602	5,878	9,480

In the case of an ambient temperature of 5-15˚C, the components must be heated to 25˚C, and the connection point to 20˚C.

Store the components in closed dry containers.

For the dosing of PUR components with non-standard connector lengths, the specified amounts of components are multiplied by the factor X:

$$X = \frac{new\ length\ of\ the\ foam\ part\ of\ the\ coupling(mm)}{standard\ length\ of\ the\ foam\ part\ of\ the\ coupling\ (mm)}$$

5. END CAP

Element designed to prevent moisture penetration into PUR insulation on non-insulated parts of IZO CLASSIC and IZO TWINS pipelines (ends of pipelines in heating substations, parts of pipelines in chambers, etc.)

The end cap must be put on the pipe before connecting the pipe to the rest of the system.

Before installing the end cap, it is necessary to clean and sand the surface of the casing and main pipe.

The end cap is retracted by the action of the burner flame from the casing pipe towards the main pipe.

Before shrinking the part that will cover the main pipe, it is necessary to wait for the heated part to completely cool down and shrink, in order to prevent air from being trapped under the cap.

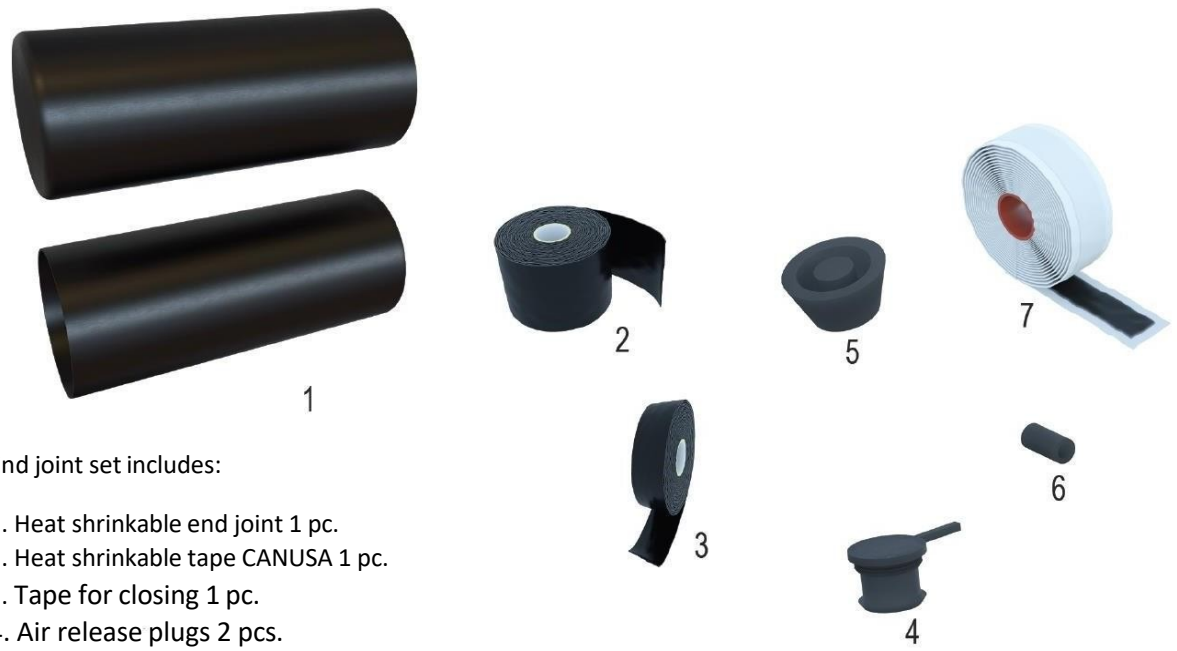
6. END JOINT

The set is used for the temporary completion of the route.

The end of the working pipe is closed by welding a steel plug of appropriate dimensions.

The threaded joint must not touch the steel plug. The inner space of the end joint must be

filled with PUR foam.



End joint set includes:

1. Heat shrinkable end joint 1 pc.
2. Heat shrinkable tape CANUSA 1 pc.
3. Tape for closing 1 pc.
4. Air release plugs 2 pcs.
5. Plugs for welding 2 pcs.
6. Connectors for connecting el. conductor 2 pcs.
7. MASTIC tape 1 pc.

7. LEAKAGE DETECTION SYSTEM

The pre-insulated systems of the company are supplied as standard with detection conductorsof the Nordic type, in accordance with the norm SRPS EN 14419.

These conductors enable electronic monitoring of leakage areas of both, main pipes and protective outer casing pipes.

To identify faults, copper detection conductors are used, which are embedded in insulating foam together with the main pipes.

All pipes and connecting elements of the system are equipped with at least two detection conductors, which are joined at the point of connection into units of appropriate length in order to ensure the functionality of the entire system.

Conductometry

Functioning of all types of detectors is based on conductometry, i.e. measuring the electrolytic conductivity of liquids. Penetration of liquid into the insulating intermediate layer (PUR) causes leakage current between the detection conductor and the pipe (or between two conductors). Exceeding the permissible value current is identified as a fault.

Reflectometry

The highest class of quality in the field of detectors of leaking places on pipelines is represented by devices that they work on the principle of reflectometry - measuring the reflection of electrical signals on lines. In the case of disruption of electrical homogeneity on the path of the detection conductor due to leakage current, short connection or isolation break, in the place of such a change there is a partial or complete reflection of the electric impulse. According to the length of the time interval between the generation and return of the electrical impulse, the device it determines the distance, and according to the amplitude of the reflection it determines the size and nature of the defect. Conductometric the process can also measure the change in electrical capacity caused by a liquid that gradually it penetrates the foam towards the detection conductor, but is still not in direct contact with it.

According to the method of application, detectors are divided into stable and portable, and according to their detection ability distance of faults, detectors are divided into indicating and localization detectors:

Stable - fixedly located in a suitable facility, they are used for continuous leak detection

Portable - serve for operational measurement in any place of access to the system

Indicative - they only warn of the fact that the controlled section of the pipeline has been determined

media leak

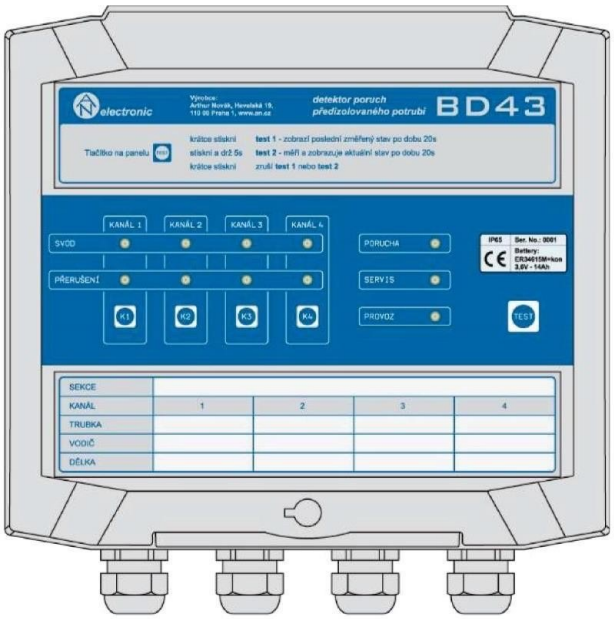
Localization - they can also determine the position of the insulation break.

For each type of pre-insulated pipeline detection system, it is necessary to choose a suitable type of measuring device.

To choose the appropriate type of measuring device, please contact the company's authorized

representatives, which will help you choose a suitable type of measuring device.

7.1. STABLE DETECTION DEVICE - BD43



The company is the general representative of the detection device manufactured by AN ELECTRONIC from the CzechRepublic.

Electronic device for immediate detection of moisture in pre-insulated pipelines.

Possibility of simultaneous and independent checking of up to four signal conductors up to 5000 m long.

The possibility of remote checking via the built-in signal relay.

The ability to adjust each of the 4 channels based on the length of the pipeline, which improves the sensitivity of the device.

History of actual measured values, contains resistance values, wire breaks for notification, battery period.

The lithium battery provides power for the device for up to 8 years.

The degree of protection of the device is IP65, intended for operation at ambient temperatures of -10˚C to +60˚C.

Device Specifications:

Channel number 4

The length of the signal wire for each channel is a maximum of 5000m

Recommended up to 1600m

Optimal up to 1000m

Limit conductivity (resistance)

for the occurrence of moisture in the system 10 µS per 1 km of signal wire

min. 1µS (1MΩ); max 10µS (10MΩ)

Limit conductance (resistance)

For the occurrence of a short circuit in the system 5mS (200Ω)

Remote signaling relay 100VDC/0.2A (inductive load 0.1A)

Power supply LI-SOCl2 batteries 3.6V/14Ah

Dimensions/weight 200x200x75mm/800g (with battery)

7.2. PORTABLE DETECTION DEVICE - BDP104

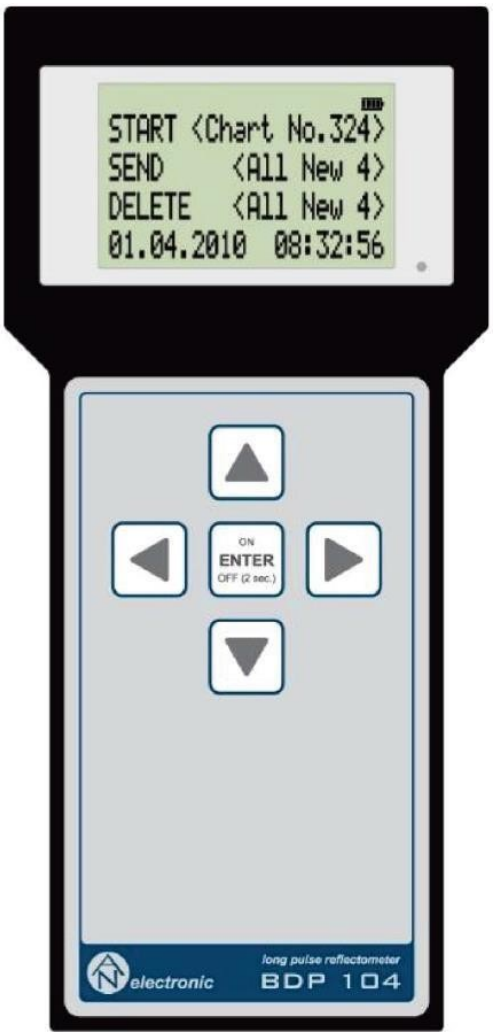
The company provides installation and adjustmentservices for leakage detection systems, as well as services for detecting and locating faults in pre-insulated systems.

Portable device for detecting, classifying and locating faults in pre-insulated systems.

Ability to detect and locate faults on pipelines up to 5000m long.

The possibility of saving reports (diagrams) in the device's memory (up to 1000 diagrams), as well as transferring reports to a PC via Bluetooth connection. All reports contain the exact date and time of creation.

Created reports can be viewed, compared, and printed using the RefMeter3.1 program.



Device Specifications:

Measurement ranges 50; 100; 200; 500; 1000; 2000; 5000m

Measurement accuracy 1% of the minimum range

Communication with PC Bluetooth, PC software RefMeter3.1

Display alphanumeric, illuminated, 4x20 characters

Battery power supply 1.5V AA (LR6), 4 pcs.

Operating conditions temperature 0ºC to 50ºC (IP65)

Dimensions/weight 210x100x40/420g (with batteries)

An example of a report (diagram) created using the BDP-104 device and the RefMeter 3.1 software.