7 ACCESSORIES

7.1 Rigid and Flexible Compound Systems

7.2 Special Accessories Flexible Compound Systems

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7.1.1 One-Time-Compensator

EKO (One-time-compensator) - system will be used for thermal pre-stressing of **isoplus**-pipelines in case of already refilled pipe-trenches. The distances of the pipelines between the one-time-compensators have to be filled, only the required assembling hollow at the EKO will remain open. Normally the thermal pre-stressing will be carried out by using the operating medium, however mobile heating units may be used as well.

EKO is a component which will be welded into the PJP-pipeline. During the heating period alterations of the pipe length will occur, which will be reliably compensated by this system. Due to the welding of the EKO-guiding pipes, the prestressing of the pipeline will be fixed after the expansion compensation will be completed.

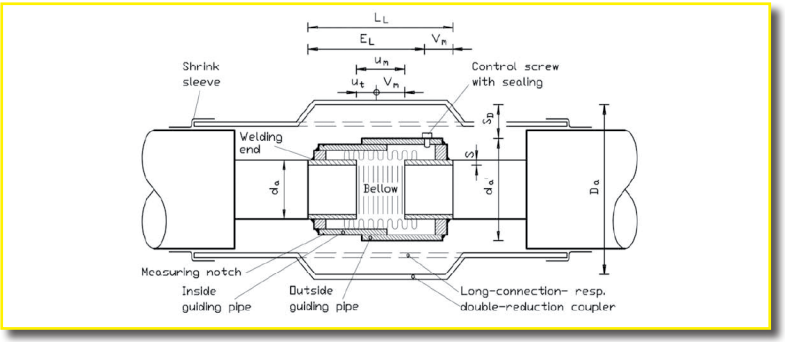
One-time-compensators will be used in case where the maximum pipe laying length **[L_{max}]** cannot be kept or/and natural expansion elements will be not possible due to lack of space. However a natural expansion side-leg (L-, Z- or U-elbow) should be provided at the beginning and at the end of an EKO-section, respectively an anchor may be provided at one side.

At the beginning or at the end of a section one-time-compensators cannot be used instead of L-, Z- or U-elbows for compensation of expansion. In order to reach the pre-stressing respectively the limitation of the axial tension at refilled pipe trenches, the EKO should be at the detention area. In case of trench sections smaller than the maximum permitted pipe-laying length an one-time-compensator will be ineffective. In case of designed mixed systems, i. e. EKO $\Rightarrow$ cold-laying can pipe-statically not determined.

Delivery length **[L_L]** has to be shortened before installation of EKO´s about the mechanical pre-stressing measure **[V_m]** In that way the real expansion expected from the pipeline **[u_L]** will be adjusted. For that the EKO has to be pressed together mechanical by use of a suitable gripping tool. On request EKO´s can be pre-stressed in the factory, starting from dimension DN 350 this will be made generally due to the high strengths.

Material: Bellow/inside pipe made of chromium-nickel-steel, material-No. 1.4541; welding ends, outside pipe and the like made of P235GH, material-No. 1.0345; delivery incl. inside-hexagon-screw with sealing; nominal pressure PN 25.

Dimensions EKO see **following page**
Assembling steps EKO see **chapter 10.2.9**



d_a	=	Steel pipe outside diameter PJP	u_m	=	maximum expansion compens.
s	=	Wall thickness welding end EKO	F	=	Spring rate axial
d_a'	=	EKO-outside diameter	A	=	effective bellow cross-section
D_a	=	Minimum-coupling diameter at EKO	G	=	Weight EKO
s_D	=	Insulation thickness at EKO	u_t	=	actual expansion compensation
M	=	Minimum length connecting coupler	V_m	=	mechanical pre-stressing meas.
L_L	=	Delivery length EKO	E_L	=	Installation length EKO

DIMENSIONS - TYPE TC - PN 25

DN	Type	d_a [mm]	s [mm]	d_a' [mm]	D_a [mm]	s_D [mm]	M [mm]	L_L [mm]	u_m [mm]	F [N/mm]	A [cm^2]	G [kg]
20	EKO-25/25/50 (*)	26,9	3,2	56,0	125	34,5	1000	275	50	176	9,7	1,3
25	EKO-25/25/50	33,7	3,2	56,0	125	34,5	1000	275	50	176	9,7	1,3
32	EKO-25/32/50	42,4	2,6	73,0	140	33,5	1000	275	50	204	15,1	1,7
40	EKO-25/40/50	48,3	2,6	73,0	140	33,5	1000	275	50	177	16,3	1,8
50	EKO-25/50/50	60,3	2,9	86,0	160	37,0	1000	275	50	224	25,9	2,4
65	EKO-25/65/70	76,1	2,9	106,0	180	37,0	1000	335	70	219	42,1	3,8
80	EKO-25/80/70	88,9	3,2	122,0	180	29,0	1000	345	70	180	67,8	5,5
100	EKO-25/100/80	114,3	3,6	139,7	225	42,6	1200	390	80	212	109,9	9,8
125	EKO-25/125/80	139,7	3,6	168,3	250	40,8	1200	400	80	226	159,9	12,5
150	EKO-25/150/100	168,3	4,0	193,7	280	43,1	1200	475	100	261	230,5	14,5
200	EKO-25/200/120	219,1	4,5	268,0	355	43,5	1200	515	120	361	383,9	27,5
250	EKO-25/250/120	273,0	5,0	323,9	400	38,0	1200	515	120	362	594,0	35,0
300	EKO-25/300/140	323,9	5,6	355,6	450	47,2	1400	660	140	353	834,2	57,5
350	EKO-25/350/140	355,6	5,6	406,4	500	46,8	1400	650	140	617	1004,3	60,0
400	EKO-25/400/140	406,4	6,3	457,2	560	51,4	1400	650	140	505	1310,0	75,5
450	EKO-25/450/150	457,2	6,3	508,0	630	61,0	1400	660	150	528	1656,1	86,0
500	EKO-25/500/150	508,0	6,3	560,0	670	55,0	1400	660	150	537	2042,8	93,0
600	EKO-25/600/150	610,0	7,1	675,0	800	62,5	1500	690	150	864	2937,8	162,0

(*) = pipe reducing from DN 25 to DN 20 has to be carried out at site.
Other dimensions and types on request.

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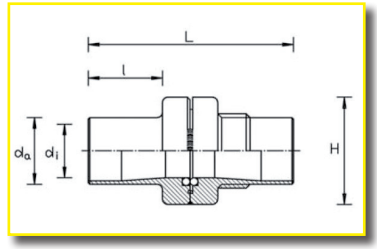
7.1.2 Tapping-Branch

A tapping-branch will be used to produce a pipe-branch at a **isoplus**-pipeline which is in operation. Preparation as well as execution of the tapping according to AGFW-guideline FW 432. Between nominal main- and branch size at least two dimension differences have to be kept, according to AGFW FW 401.

Due to the tapping procedure considerable expenses will be saved by simple, economical working steps, as well as by fast and safe assembling without operating interruptions. Temperature and pressure should be reduced before assembling.

Tapping-Branch - ASP - Type T

DN	d_a [mm]	H [mm]	d_i [mm]	l [mm]	L [mm]	D_a [mm]
20/25	26,9/33,7	68	27,3	47	130	125
32	42,4	76	36,0	47	130	125
40	48,3	78	39,0	47	130	140
50	60,3	88	46,0	52	135	140
65	76,1	105	60,0	55	145	160
80	88,9	117	71,0	63	155	200
100	114,3	148	100,0	73	175	250
125	139,7	260	121,0	90	204	315
150	168,3	292	140,0	105	243	355
200	219,1	386	182,0	120	287	450



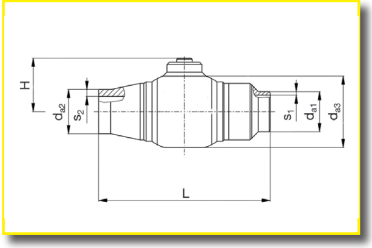
Material: S355J2G4 (tai AISI 316), sealing made of EPDM, delivery incl. lock-disc. For assembling of tapping locks DN 125 to DN 200 a 24 h tapping service will be available on request. They will carry out even tappings at bigger pipes up to DN 400, after corresponding inspection.

For branches up to maximum DN 100 a safety-tapping-lock-unit will be available as accessory.

The complete delivery includes all adapters of the tapping branches DN 25 to DN 100, hole saws made of thin-walled Bi-metal of these nominal sizes, a 475 mm long tapping-spindle, centralization-drill made of hard-metal with catch device, all required keys, handle for lock-discs and gear-unit.

Assembling information see **chapter 6.11.1** and **10.2.10**

Tapping-Branches - AKH - Type J



DN	d_{a1} [mm]	s_1 [mm]	d_{a2} [mm]	s_2 [mm]	H [mm]	d_{a3} [mm]	L [mm]	D_a [mm]
20	24,0	2,6	24,0	3,9	34	42,4	125	125
25	33,7	2,9	37,0	5,8	46	60,3	145	140
32	42,4	2,9	37,0	5,8	46	60,3	145	140
40	48,3	2,9	54,0	6,7	57	88,9	200	160
50	60,3	3,2	54,0	6,7	57	88,9	200	160
65	76,1	3,2	63,0	7,0	70	114,3	260	180
80	88,9	3,2	82,0	8,0	80	133,0	265	225
100	114,3	3,6	100,0	9,0	90	159,0	275	280

Material: Casing and welding ends made of P235, adjusted ring and sealing made of PTFE, ball and gear-shaft made of high grade steel. The operation of DN 20 is carried out with a screwdriver, DN 25 to DN 50 with a hexagon socket wrench 10 mm and 14 mm beyond.

The tapping procedure occurs in this system by a user supplied device.

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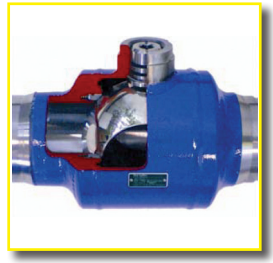
7.1.3 One-Time-Ball-Valve



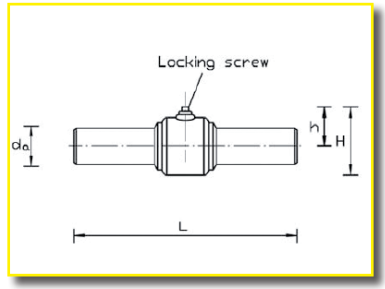
One-time- respectively connection ball valves will be used for the end of a construction-section, which will be continued later on. As the end-piece will be welded at the pipe end, the existing **isoplus**-pipeline may be continued at any time, without draining the pipes and without interruption of pipeline operation.

One-time-ball-valves will be welded in closed position into the pipeline, like a piece of pipe. In case of double pipes it has to be considered that the assembling of the ball valves should be made clockwise and longitudinal transposed.

For protection reasons and in order to avoid that PUR-foam will enter into the open end of the ball valve, the assembling of a torospherical head respectively a pipe cap acc. to DIN EN 10253-2 will be prescribed. Post insulation will be carried out by use of an end-coupler.

One-Time-Ball-Valves - Maximum dimensions of available types

DN	d_a [mm]	H [mm]	h [mm]	L [mm]	D_a Single pipe [mm]	D_a Double Pipe [mm]
20	26,9	57,2	36,0	230	110	140
25	33,7	75,2	45,0	235	125	180
32	42,4	91,5	56,5	260	140	200
40	48,3	100,1	62,0	260	160	225
50	60,3	121,0	76,5	300	180	280
65	76,1	144,7	87,5	360	200	315
80	88,9	171,4	101,5	370	225	355
100	114,3	210,9	122,0	390	280	450
125	139,7	236,9	140,0	325	315	500
150	168,3	269,6	160,0	350	355	560
200	219,1	321,5	185,0	390	400	670



Material: Casing and welding ends made of P235, adjusted ring and sealing made of PTFE, ball and gear-shaft made of high grade steel.
If the continuing section will be installed, assembled and welded on to the one-time-ball-valve, the line will be put in operation. For that the locking-screw of the one-time-ball-valve will be moved by use of a screw driver respectively an inside-hexagon-key and will be welded afterwards. The post insulation ensues with a double reducing joint.

7.1.4 End Cap

Simplex-End Cap

Duplex-End Cap

Zipper-End Cap

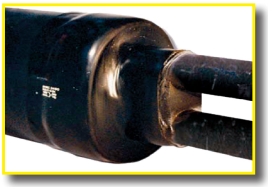
End caps are suitable for gable-end protection against water in order to avoid moisture penetration into the PUR-foam at the pipe ends, in buildings or constructions. Inside of manholes the end caps have to be secured against flooding with heating water.

Additionally end caps will protect against diffusion of PUR-foam-cell-gas which will occur at the open pipe ends. According to the result of long term investigations, cell-gas diffusions at not protected pipe ends respectively gable-ends, will influence the life time of PEHD jacket-pipes in a negative way. Therefore installation of pipe ends without end cap will be generally not permitted.

The pipe-layer will be responsible for putting on the end caps before connection to the continuing conventional pipe lines, inside of the building. End caps may be not cut open and have to be protected against heat and burnings in case of welding works. In order to guarantee a correct shrinking of the end caps, a minimum overlapping distance of the PEHD-jacket-pipe has to be considered inside of the building.

In case of medium temperatures > 120 °C end caps have to be fixed additionally at carrier pipe and jacket pipe by use of anti corrosion gripping tapes. End caps are available in all carrier-/jacket-pipe combinations. For double pipes so called Duplex-end caps are available and zipper-end caps for already welded pipes. If Simplex end caps are used for **isoplus** double pipes, an aging-resistant EDPM fill block to bridge the clear distance between the carrier pipes is included in delivery. This will be pressed into the gap before assembly.

All end caps consist of a heat shrinking, molecular cross linked, modified and therefore nonweldable Polyolefin, and are coated by a special temperature resistant sealing adhesive at both ends. Resistant against weather conditions- and chemical influence as well as UV-radiation and alkaline soil.



Assembling steps see **chapter 10.2.12**
Carrier-/Jacket-pipe combinations see **chapter 2.2.2, 2.2.3, 2.3.2, 2.3.3, 3.2, 3.3, 3.4, 3.5**

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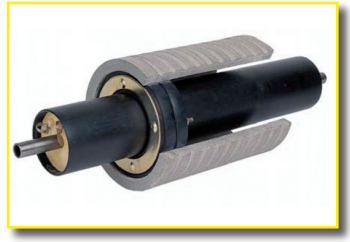
7.1.5 Wall duct

Sealing Ring Standard

Sealing Insert with Pipe Liner



Sealing rings resp. -inserts are used in order to avoid water entry at wall ducts inside of buildings or manholes. The pipe-layer will be responsible for putting on the sealing rings and for centering the inserts at the wall ducts before the connection to the pipeline of the building.

The wall ducts have to be installed rectangular to the wall. Radial loads due to subsidences at building- or manhole entry as well as lateral dislocations will cause leakages. This can be avoided by careful compression of the soil at the area of the entry. Installation of **isoplus**-pipes without sealing rings is not permitted. Inside of the building a minimum overlapping of the PE-jacket-pipe has to be considered.

Sealing Ring - Standard

Standard sealing ring consists of special profiled, non ageing neoprene rubber ring and is suitable for sealing against non pressing and none damming up water acc. to DIN 18195-4. The ring-breadth is 50 mm independing from nominal diameter, the strength resp. thickness of the conical ring is 12 mm up to 22 mm. The ring will be pushed to the middle of the wall duct and will be imbedded in concrete afterwards by a constructing company. At standard sealing rings axial expansions up to 10 mm are permissible.

Sealing Insert - C 40

In case of pressing and damming up water acc. to DIN 18195-6 gas- and compressed water a tight sealing insert, which can be restreched from inside has to be used. This consists of a double-sealing insert with two steel-pressure-disks, as well as each of two 40 mm, black EPDM-solid-rubber sealings (Ethylen-Propylen-Rubber), shore-hardness = 35 ShA. All metal parts are electrogalvanized, yellow-chromated and sealed. The special for KMR constructed sealing areas will guarantee a constant distribution of compression on the PEHD-jacket-pipe and will avoid any imprints or necks.

It will be installed into a pipe liner or core drilling. Drilling resp. imbedding in concrete of the pipe liner will be carried out by a construction company. The length of the pipe liner is depending from the wall thickness. The retention moments of the screws have to be considered strictly, in order to avoid any damages of the jacket-pipe during assembling. At sealing inserts axial expansions up to 20 mm are permissible in case of creeping expansion, that means no temperature-impacts which will occur i. e. at steam.

Assembling steps see **chapter 10.2.13** and **chapter 10.2.14**
Carrier- /Jacket-pipe combinations see **chapter 2.2.2, 2.2.3, 2.3.2, 2.3.3, 3.2, 3.3, 3.4, 3.5**

7.1.6 Expansion Pads

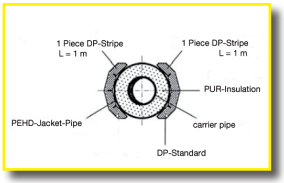
Expansion pads (DP) are compensating movements of **isoplus**-pipelines at L-, Z- and U-elbows, at branches, at reduction- and end-couplers, at shut-off-valves as well as at high- and lowest points. The pipe-layer is responsible to keep the increased minimum distances between the jacket-pipes and the trench side-walls at the expansion pad areas, see **chapter 9.2.4**.

Only because of that a regular DP-assembling according to the pipe-static requirements will be guaranteed. As standard DP with a thickness of 40 mm and a length of 1000 mm will be produced. If a thickness of > 40 mm will be required, two or more pads should be glued upon another by flaming up. Assembling will be made exclusively by approved and **isoplus**-educated installers.

Kind of execution

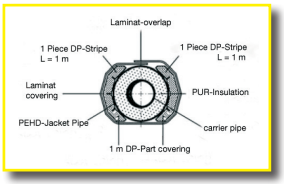
DP - Standard

One meter of DP-standard includes two pieces of stripes for lateral assembling at 3.00 o'clock and 9.00 o'clock-position. Hereby a heat accumulation will arise at the pipe-peak.



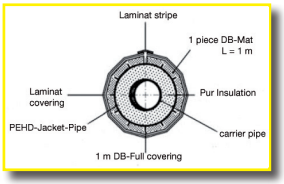
DP - Part-Covering

Like DP-standard, but with an additional factory backed outside, solid edge-area of laminate for complete covering of the PEHD-jacket-pipe in closed horizontal-oval execution. Hereby no heat accumulation will arise and penetration of sand between jacket-pipe and pad will be avoided.



DP - Full-Covering

Like DP-part-covering, but not in stripe-execution, however as DP-mats, which will cover the circumference of the PE-jacket-pipes totally. Longitudinal and lateral abutting ends will be glued by flaming up of laminate. One meter DP-full covering consists of a piece of mat of 1000 mm length and a breadth depending from dimension. This alternative can be used only conditionally, resp. the DP-thickness has to be reduced to max. 80 mm, due to the high heat accumulation, especially at the pipe-peak.



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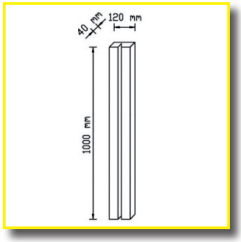
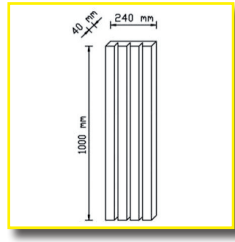
Technical Parameter 20° C		Standard	Unit	Value - DP	Value - Laminate
Raw Density ρ		DIN EN ISO 845	kg/m³	32 ± 4	45 ± 4
Tensile Strength σ_R		DIN EN ISO 1798	N/mm²	0,16	0,59
Breaking Elongation ε_R		DIN EN ISO 1798	%	55	109
Rebound Resilience R		DIN 53 512	%	45	---
Compressive Strain σ_D at deformation (spring characteristic)	25 % 50 %	DIN EN ISO 3386	N/mm²	0,045 0,110	0,023 0,050
Deformation by compression after 24 h relief DVR	25% 50%	DIN EN ISO 1856	%	6 22	18 ---
Thermal Conductivity λ		DIN 52 612	W/(m•K)	0,042	0,039
Water Absorption after 24 h		DIN 53 428	vol.%	2	3
Water-Steam Absorption after 24 h (d = thickness)		DIN EN ISO 12572	g/m² • d	d = 60 mm 0,15	d = 10 mm 0,65
Material Class		DIN 4102	---	B 2	B 3
Material		Closed celled, cross linked, not corroded, rodent-protected and chemical resistant white Polyethylene-foam-laminate			

Measures DP-Stripes

Size I
(1 nick)



Size II
(3 nicks)



Size III
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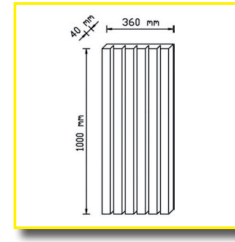
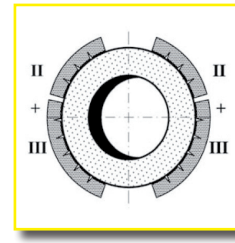


Application

Jacket-Pipe- Ø in mm	Size	Combination
65 - 160	I	---
180 - 280	II	---
315 - 355	III	---
400 - 500	IV	II + II
560	V	II + III
630 - 670	VI	III + III
710	VII	III + II + II
800	VIII	III + III + II
900	IX	III + III + III
1000	X	III + III + II + II
1100	XI	III + III + III + II
1200	XII	III + III + III + III
1300	XIII	III + III + III + II+ II

Example of Combination
Size V



7.1.7 PUR-Foam

Polyurethane-hard foam consists of two components Polyol (component A, bright) and Isocyanat (component B, dark). As blowing agent environmental friendly C-Pentane will be used, whose characteristics will neither impair the ozonosphere nor will increase the greenhouse effect. In the factory Polyurethane-hard foam (PUR) will be manufactured by use of high sophisticated high pressure equipment.

At site **isoplus** installers are using manual mixed can-foam which will be mixed by use of a turbo-mixer, or machined foam, which will be portioned acc. to corresponding requirements in pre-heated containers from a mobile foaming equipment.

Because of an exothermal chemical reaction a high-quality insulation material comes into being with excellent insulation characteristics and a low specific gravity. PUR-foam is reaching a high pressure resistance at thermal load as well as a long life-time. The temperature-dependent field of application of the current stage of development extends far beyond the required values according to EN 253.

Studies from officially approved material-test-authorities (AMPA) certify a lifetime of at least 30 years as well as a thermal conductivity [λ] of maximum **0,027 W/(m•K)** at **discontinuous** production. In the **continuous** production of pipe bars the thermal conductivity is maximum **0,024 W/(m•K)**, at flexible pipes max. **0,023 W/(m•K)**.

Due to an optimal adhesive force of the PUR-foam, a very high shearing strength will be reached between jacket-pipe and foam as well as between foam and carrier pipe. Because of that the reached compound can compensate the frictional force which will occur due to the thermal stress between sand-bed and jacket-pipe, as well as the occurring shearing- and pressure tension.

Technical Characteristics PUR-Hard-Foam	Unit	Minimum value acc. to EN 253
Raw density free foamed ρ	kg/m^3	50
Radial compression strength σ_{Druck} at 10% deformation	N/mm^2	0,40
Closed cells	%	90
Size of cells in radial direction	mm	< 0,5
Water absorption after 90 minutes boiling-test	vol.%	5
Maximum continuous operating temperature T_{max}	°C	161
Lifetime L	a	≥ 30
Thermal Conductivity λ at 50 °C average temperature	W/(m•K)	≤ 0,027
Specific Heat Capacity c_m	kJ/(kg•K)	1,4
Material Class (highly flammable)	DIN 4102	B 3
Fire Resistance Class (fire-retardant)	DIN 4102	< F 30
Ozone Depletion Potenzial ODP	---	0
Global Warming Potential GWP	---	< 0,001

Foam used at site has to be stored acc. to EN 489 at +15° up to +25° C, and can be used at surface temperatures between min. 15° and max. 45° C. Maximum storing period is 3 months. Depending from quantity delivery will be in 1 ltr., 5 ltr. or in 10 ltr. units, incl. the corresponding required multiple mixing-cans.

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7.1.8 Joining Pipe / Assembling Supports / Warning Tape

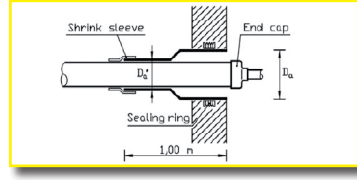
isoplus-pipes often have to be connected to existing channel net-works. In case of lateral duct through the channel wall a lateral movement will normally occur. By use of a joining pipe this movement can be compensated.

Delivery length of the PEHD-fitting will be 1,00 m. It consists of a central placed PEHD-jacket-pipe- and socket pipe. Delivery includes a shrink seal for the socket pipe-end for sealing of the joining pipe to the PEHD-jacket of the corresponding PEHD-jacket pipe.

Sealing of the joining pipe will be made with the technically required wall-duct, see **chapter 7.1.5**, this will be not included in the delivery.

Technical caracteristics PEHD see **chapter 2.1.4**

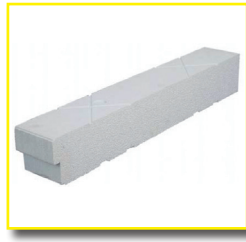
D_a' = Joint-pipe diameter
D_a = Jacket-pipe diameter
Δl_{Lat} = Maximum permissible expansion compensation, lateral resp. transverse



D_a' [mm]	D_a [mm]	Δl_{Lat} [mm]	D_a' [mm]	D_a [mm]	Δl_{Lat} [mm]
65	110	19	315	450	60
75	125	22	355	500	64
90	140	22	400	560	71
110	160	22	450	630	80
125	180	24	500	710	93
140	200	26	560	800	107
160	225	28	630	900	122
180	250	30	670	900	102
200	280	35	710	1000	131
225	315	40	800	1100	136
250	355	46	900	1200	135
280	400	53	1000	1300	135

Assembling Supports

Pipe supports are used as auxiliary bearing support for **isoplus**-pipelines up to a jacket-pipe diameter of max. 315 mm. Contrary to squared timber, they have not to be removed and should therefore preferably used. Pipe supports consist of extruded hard-foam free of fluorine hydrogen. Three point of support, resp. pieces of supports are required per 6,00 m pipeline.



Warning Tape

Warning tapes are used for marking **isoplus**-pipelines above the finished sand-bed and the first filling layer of 200 mm in 12.00 o'clock position of primary and secondary pipeline. The warning tapes will be delivered in coils of 250 m length and a breadth of 40 mm, with black inscription on yellow background "Attention District Heating Pipeline".

Edition: 16.01.2012

7.2.1 Press Tool / Bending Tool

Press Tool

For the pressing procedure three types of tools are available:

⇒ Mechanical press tool
for **isopex**-pipes up to dimension of 40 mm

⇒ Hydraulically press tool
for **isopex**-pipes up to dimension of 40 mm

⇒ Hydraulically press tool
for **isopex**-pipes starting from 50 mm

All tools incl. all required accessories like press-pincers, -blocks and -ridges, expansion pincer and -heads as well as the corresponding small accessories are completed in a stable metal suitcase.

Depending from requirements they can be used for some days or weeks against payment. During this time the user of the tools will be exclusively responsible for correct function, cleaning and complete return of the equipment.

Bending Tool

For the procedure of bending of **isoflex** or/and **isocu** the hydraulically **isoplus**-bending tool incl. pump and pressure hoses will be available. Bending will be made in three to four steps. Depending from kind of flexible pipe different minimum bending radius should be considered. See **chapter 3.2.2** and **chapter 3.3.2**

The use of a not suitable bending equipment is not allowed. In order to avoid damages of the flexible pipes bending around edges like foreign pipe-lines, squared timber, buildings- or wall-corners are not permitted.

Depending from requirement the equipment may be used for days or weeks. During this period the user will be exclusively responsible for correct function, cleaning and the complete return of all parts.

For bending of **isopex**-pipes the use of a tool will be not possible, due to the high self-elasticity of the carrier pipe.

Edition: 16.01.2012

7.2.2 Protection Cap / Distributing Manhole

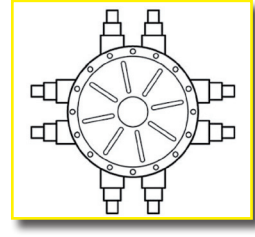
Protection Cap

In order to protect the PUR foam against moisture by means of condense, inside of buildings (drying-rooms) protection caps should be used. These are consisting of age-resistant neoprene-rubber and will be used as simplex- or duplex-cap, depending from kind of flexible pipe-type.

The pipe laying company will be responsible to put on the protection cap before connecting with the building line. These caps have to be protected from fire, may not be cutted and may not be used for post installation. The installation of the pipe ends without protection cap is not permitted.

Available PE-jacket-pipe dimensions see **chapter 3.2.2, 3.3.2, 3.4.2, 3.5.2**

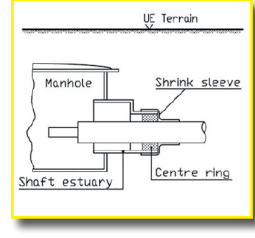
Distributing Manhole



A distributing manhole will be used for checking of installations like branches within a **isopex**-pipeline. This inspection manhole incl. cover-plate consists of polyethylene (PE) and will be delivered in dimension of 800 mm and an installation height respectively depth of approx. 700 mm.

The universal and water-tight construction allows the connection of up to eight pipes with jacket-pipe dimensions of 65 to 180 mm.

Before the flexible pipe will be installed, the pipe layer should install the corresponding sealing set. This consists of a closed heat shrinkable sleeve as well as of a centre ring in accordance with the jacket-pipe dimension. The sealing sets are not part of the delivery of the distributing manhole.



At a pipe covering height of 0,4 m the maximum admissible load of the cover will be 50 kN/m². In case that higher coverings will be reached, a well ring respectively a soak-hole concrete ring should be installed above the PE-manhole.

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7.2.3 Twin-Accoutrement

This fitting unit, consisting of two ball-valves, may be used for all **isoplus**-flexible pipes for heating installations. It should be installed at the wall in closed position with the included mounting-plate.

Casing and welding ends are made of P235GH , (Material-Number 1.0345), ball of stainless steel (Material-Number 1.4301) and gear-shaft of stainless steel (Material-Number 1.4404), ring and sealing of PTFE (Teflon), available for carrier pipe dimensions of ¾" to maximum 2".

For **isopex** type **H-25** to **H-63** additionally two connection couplings with welding ends are required, see **chapter 3.6.5.**

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