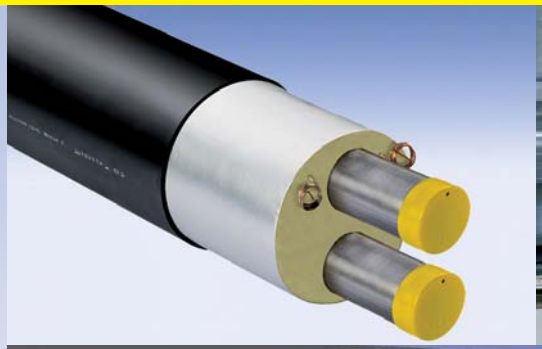
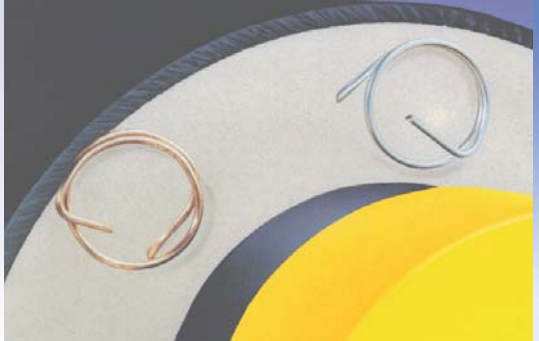
isoplus®

Transporting energy.

CONTI-PIPE-TECHNOLOGY





www.isoplus-pipes.com

isoplus

The **isoplus** group of companies with totally nearly 1200 employees is one of the leading manufacturer of preinsulated pipe systems.
The main applications are for district and local heating respectively cooling and for various industrial pipe systems. Whenever hot or chilled water, oil or other liquids have to be transported, **isoplus** will offer a technological practicable, **eco**nomical and **eco**logical optimized solution for every purpose.

isoplus as group is producing approximately 3.000 kilometres of pipes and the corresponding accessories per year like i.e. approximately 125.000 fittings and approximately 350.000 couplers (cross-linked and non-cross-linked), in seven manufacturing plants with high technology equipment and in discontinuous and continuous production procedure. The range of dimension reaches from DN 20 to DN 1000.

Within the **isoplus** group a various number of engineers are developing customer and project specific solutions concerning pipeline course, static and assembling.
With the **isoplus** philosophy „all from one hand“, that means from project design, material supply, qualified post-insulation by our own post-insulation specialists, approved by AGFW/ BFW, up to a competent convincing site-service, we offer our customer a high degree of safety for the project realization.
Furthermore **isoplus** disposes a own leak-detection system with digital fault detection.

The well known and appreciated **isoplus** delivery-reliability as well as the competent post-insulation carried out by isoplus assembling specialists, approved by AGFW/BFW have led essentially to the actual strong market position of **isoplus** in many countries.

In the beginning mainly focussed to Europe, the production and sales-activities include meanwhile also Near and Middle East as well as Asia and Africa. Our production plants and all our sales offices own all relevant quality certificates like DIN EN ISO 9001, EHP/001 as well as AGFW FW 603. During the production procedure all product standards like DIN EN 253, 448, 488, 489,13941 and 14419 will be considered. **isoplus** is a member of the Association for District Heating e.V. (AGFW) and also of the Federal Union for District Heating Lines e.V. (BFW).

CERTIFIED IQNet MANAGEMENT SYSTEM

EUROHEAT & POWER
GUIDELINES: EHP/001 • CERIFIED BY: XX/YY

AGFW

BFW

Application range

isoplus Conti-Pipes are guiding concerning their mechanical and thermal properties.
The innovative production procedure guarantees a constant foam density and thickness of the PEHD-jacket pipe over the total pipe length.

This will result in optimal opportunities to keep the energy efficiency of a district heating network high, respectively the heat-loss and CO_2 emission low.
The positive effects for the environment as well as for the expenses for network losses during the total lifetime are considerable.

isoplus Conti-Pipe is the actual best preinsulated pipe system, with lowest heat losses, due to its special construction, mainly because of an installed aluminum foil.

The pipe meets all requirements of EN 253 as well as AGFW - paper FW 401 - certified by EuHP.

The welding of the service pipe should especially considered during the pipe laying procedure (only approved and experienced welder).

In case of leakages at the welding seams, the hot medium will spread out rapidly. In consequence extensive excavation work will be necessary (depending from time and extension of the damage).

Special considered should be also a pressure test according to the standard, tightness of the pipeline, as well as a perfect installation and a rapid put into operation of the monitoring system.

EUROHEAT & POWER

CERTIFICATE NUMBER 01/23

PRODUCT	"Isoplus" continuous pre-insulated district heating pipes and fittings, single pipe system, with service pipes DN 25 – 200 and casing pipes 110 – 355 mm
LICENSEE	Isoplus Fernwärmetechnik GmbH
PRODUCTION PLANT	Isoplus Fernwärmetechnik GmbH Furthoferstrasse 1a, AT-3192 Hohenberg, Austria

EUROHEAT & POWER

GUIDELINES: EHP/001
CERTIFICATE: 01/23

VALID UNTIL 27.08.2015

This certificate is granted in accordance with the Euroheat & Power Certification Guidelines for Quality Assessment of District Heating Pipes [001]

Name, Signature	Date, Place
Lennart Månsson	27.08.2012, Borås

SP Technical Research Institute of Sweden
Box 857
SE-501 15 Borås
Sweden
www.sp.se

The production complies with EN 253, EN 448 and EHP Certification Guidelines [001].

The licensee may use the Euroheat & Power Certification Board quality mark.

The certificate is valid only for the production plant mentioned in the certificate.

The materials used are contained in the confidential Annex to this certificate.

The certificate is valid for 3 years subject to periodic surveillance. Re-issue is automatic.

Refer to the Euroheat & Power Certification Guidelines [001] for full requirements and conditions

certificate

System

Conti-Pipe - Single

isoplus-single pipes are mainly used as energy pipe for effective lasting transportation of district heating and district cooling. Furthermore it will be used for various industrial applications. High quality PUR-hard foam insulation - 100% free of freon, with Cyclopentan as foaming agent, processed on modern machinery equipment - guarantees a permanent excellent insulation characteristic during the duration of application.

- DN 25 (1“) up to DN 200 (8“)
- Thermal conductivity λ_{50} = **0,0240 W**/(m•K) at a density of 60 kg/m^3
- Thermal conductivity λ_{50} = **0,0225 W**/(m•K) at a density of 48 kg/m^3
- **Diffusion barrier layer**
- Standard insulation, 1 x or 2 x reinforced
- Operating temperature at least according to EN 253 and 25 bar pressure
- Service pipe up to DN 80 P235TR1/TR2/GH, from DN 100 P235GH acc. to EN 253, EN 10217-1 / -2
- Depending from dimension as 12 m or 16 m pipe-bar
- **IPS-Cu** as leak detecting

Conti-Pipe - Double

isoplus-double pipe is an effective supplement to the single pipe and a perfect solution for the transportation of district heating and district cooling with optimized **eco**logical and **eco**nomical customer efficiency.

- DN 25 (1“) up to DN 100 (4“)
- Thermal conductivity λ_{50} = **0,0240 W**/(m•K) at a density of 60 kg/m^3
- Thermal conductivity λ_{50} = **0,0225 W**/(m•K) at a density of 48 kg/m^3
- **Diffusion barrier layer**
- 1 x reinforced insulation or 2 x reinforced
- Operating temperature at least according to EN 253 and 25 bar pressure
- Up to 90 K spread between flow- and return-line
- Service pipe up to DN 80 P235TR1/TR2/GH, from DN 100 P235GH acc. to EN 253, EN 10217-1 / -2
- Available as 12 m pipe-bar
- **IPS-Cu** as leak detecting

Data

Continuous-Pipe-Technology

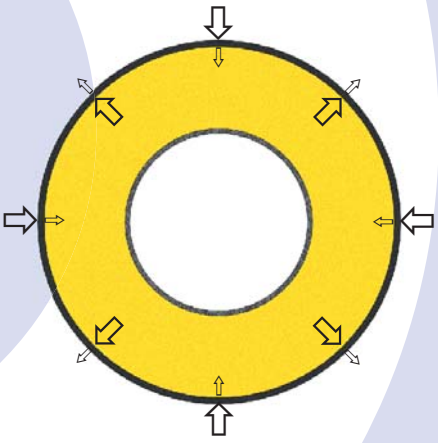
Production Procedure

During the first step of the production line, the steel pipe rods will be mechanically coupled together. This string of pipes will then receive the leak detection wires, the polyurethane insulation layer, the diffusion barrier layer, and the extruded polyethylene casing pipe in a continuous and CNC-controlled process.

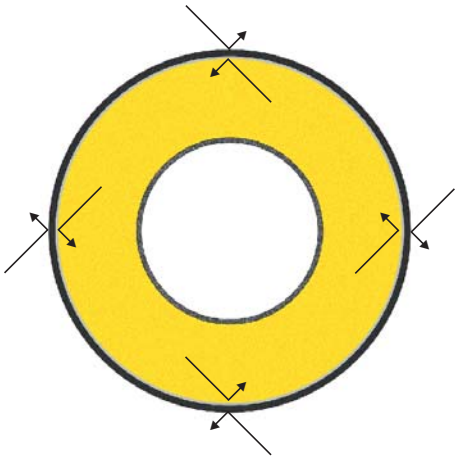
isoplus Conti-Pipe with diffusion barrier layer

The optimal quality of the PUR-foam will result in the best possible heat insulation of non-aged pipes. The part of cellular gases at λ-total value is approx. 60% and is therefore the determinant factor. A partial exchange of cellular gases by air will occur during the operation of traditional produced preinsulated pipes, especially at permanent operating temperatures of ≥130°C. Cyclopentan will mainly remain in the foam cells, due to it´s molecular structure. However the λ-value will get more worse because of the exchange of the CO_2. The so called aging procedure. In order to avoid this, a diffusion barrier-foil will be installed between PUR-foam and PEHD jacket pipe. Because of this the favorable insulation properties of the pipes will remain nearly constant during the total lifetime.
This is very important in order to keep the energy efficiency of a pipe network on the highest possible level, especially in case of smaller and medium pipe dimensions.

Without Foil

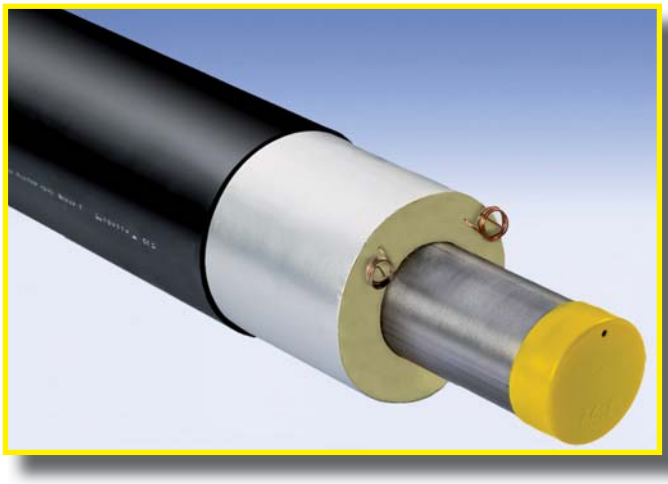


With Foil



PUR-foam density

After request by the Scandinavian countries, the EN 253 standard has been modified concerning the foam-density of preinsulated pipes. Now the density of 60 kg/m^3 is no longer strictly required. The **isoplus** Conti-Pipe-Technology offers the possibility to adjust the foam density exact and constant over the total pipe length. By reducing the foam density below 60 kg/m^3 the lambda-value (λ) can be improved.
However it has to be exactly considered, that the required shearing and pressure resistance values, as well as the expected lifetime will be kept, in case of preinsulated pipes with a PUR-foam density below 60 kg/m^3.



Dimensions respectively Types

Single

Dimensions Steel Pipe P235TR1 / TR2 / GH					Delivery length	Jacket-Pipe Outisde-Ø · Wall Thickness $D_a \cdot s$ in mm			Weight without water G in kg/m		
Type	Nominal Diameter / Dimension in		Outside-Ø d_a	Wall-thickness s	L	Insulation Class			Insulation Class		
	DN	Zoll	in mm	in mm	in mm	Standard	1x reinforced	2x reinforced	Standard	1x reinforced	2x reinforced
KRE - 25	25	1“	33,7	3,2	12	-	110 • 3,0	125 • 3,0	-	3,98	4,32
KRE - 32	32	11/4“	42,4	3,2	12	110 • 3,0	125 • 3,0	140 • 3,0	4,62	4,97	5,34
KRE - 40	40	11/2“	48,3	3,2	12	110 • 3,0	125 • 3,0	140 • 3,0	5,06	5,40	5,78
KRE - 50	50	2“	60,3	3,2	12	125 • 3,0	140 • 3,0	160 • 3,0	6,27	6,64	7,18
KRE - 65	65	21/2“	76,1	3,2	12	140 • 3,0	160 • 3,0	180 • 3,0	7,76	8,30	8,89
KRE - 80	80	3“	88,9	3,2	12	160 • 3,0	180 • 3,0	200 • 3,2	9,18	9,77	10,94
KRE - 100	100	4“	114,3	3,6	12/16	200 • 3,2	225 • 3,4	250 • 3,6	13,69	14,63	15,78
KRE - 125	125	5“	139,7	3,6	12/16	225 • 3,4	250 • 3,6	280 • 3,9	16,48	17,64	19,13
KRE - 150	150	6“	168,3	4,0	12/16	250 • 3,6	280 • 3,9	315 • 4,1	21,22	22,71	24,86
KRE - 200	200	8“	219,1	4,5	12/16	315 • 4,1	355 • 4,5	-	31,25	34,13	-

Double

Dimensions Steel Pipe P235TR1 / TR2 / GH					Delivery length	Jacket-Pipe Outside-Ø · Wall Thickness $D_a \cdot s$ in mm		Ridge height (Pipe Clearance)	Weight without water G in kg/m	
Type	Nominal Diameter / Dimension in		Outside-Ø d_a	Wall-thickness s	L	Insulation Class		h_S	Insulation Class	
	DN	Zoll	in mm	in mm	in mm	1x reinforced	2x reinforced	in mm	1x reinforced	2x reinforced
KRD - 25	2 • 25	1“	33,7	3,2	12	160 • 3,0	180 • 3,0	19	7,58	8,27
KRD - 32	2 • 32	11/4“	42,4	3,2	12	180 • 3,0	200 • 3,2	19	9,46	10,33
KRD - 40	2 • 40	11/2“	48,3	3,2	12	180 • 3,0	200 • 3,2	19	10,33	11,19
KRD - 50	2 • 50	2“	60,3	3,2	12	225 • 3,4	250 • 3,6	20	14,18	15,31
KRD - 65	2 • 65	21/2“	76,1	3,2	12	250 • 3,6	280 • 3,9	20	17,56	19,26
KRD - 80	2 • 80	3“	88,9	3,2	12	280 • 3,9	315 • 4,1	25	20,81	23,22
KRD - 100	2 • 100	4“	114,3	3,6	12	355 • 4,5	-	25	31,33	-

Transmittable Capacity [P]

Type	Volume Flow V´ in m³/h		Flow Speed w in m/s		Transmittable Capacity P in kW at spread					
					20 K		30 K		40 K	
	from	to	from	to	from	to	from	to	from	to
KRE - 25	1,148	2,526	0,50	1,10	27	59	40	88	53	118
KRE - 32	2,348	4,695	0,60	1,20	55	109	82	164	109	218
KRE - 40	3,151	6,303	0,60	1,20	73	147	110	220	147	293
KRE - 50	5,879	11,757	0,70	1,40	137	273	205	410	273	547
KRE - 65	9,781	19,563	0,70	1,40	228	455	341	683	455	910
KRE - 80	15,395	30,791	0,80	1,60	358	716	537	1.074	716	1.432
KRE - 100	25,945	51,891	0,80	1,60	604	1.207	905	1.811	1.207	2.414
KRE - 125	49,639	89,350	1,00	1,80	1.155	2.078	1.732	3.118	2.309	4.157
KRE - 150	87,185	152,573	1,20	2,10	2.028	3.549	3.042	5.324	4.056	7.098
KRE - 200	174,732	299,541	1,40	2,40	4.064	6.968	6.097	10.451	8.129	13.935
KRD - 25	1,148	2,526	0,50	1,10	27	59	40	88	53	118
KRD - 32	2,348	4,695	0,60	1,20	55	109	82	164	109	218
KRD - 40	3,151	6,303	0,60	1,20	73	147	110	220	147	293
KRD - 50	5,879	11,757	0,70	1,40	137	273	205	410	273	547
KRD - 65	9,781	19,563	0,70	1,40	228	455	341	683	455	910
KRD - 80	15,395	30,791	0,80	1,60	358	716	537	1.074	716	1.432
KRD - 100	25,945	51,891	0,80	1,60	604	1.207	905	1.811	1.207	2.414

All data are based on an average specific thermal capacity [c_m] of the water of 4.187 J/(kg•K). The flow speed [w] has generally to be determined on dependence of application.

Thermal Transmission Coefficient [U] and Heat Loss [q]

Type	Jacket-Pipe Outside-Ø D_a in mm			Coefficient U in W/(m•K)			q at Average Temperature T_M = 100 °C in W/m			q at Average Temperature T_M = 80 °C in W/m			q at Average Temperature T_M = 60 °C in W/m		
	Insulation Class			Insulation Class			Insulation Class			Insulation Class			Insulation Class		
	Standard	1 x reinf.	2 x reinf.	Standard	1 x reinf.	2 x reinf..	Standard	1 x reinf.	2 x verst.	Standard	1 x reinf.	2 x reinf.	Standard	1 x reinf.	2x reinf.
KRE - 25	-	110	125	-	0,1178	0,1071	-	10,600	9,636	-	8,244	7,495	-	5,889	5,353
KRE - 32	110	125	140	0,1435	0,1279	0,1161	12,916	11,514	10,449	10,046	8,955	8,127	7,176	6,396	5,805
KRE - 40	110	125	140	0,1638	0,1438	0,1290	14,745	12,944	11,614	11,468	10,068	9,033	8,192	7,191	6,452
KRE - 50	125	140	160	0,1824	0,1593	0,1403	16,420	14,337	12,625	12,771	11,151	9,820	9,122	7,965	7,014
KRE - 65	140	160	180	0,2112	0,1790	0,1574	19,010	16,114	14,162	14,786	12,533	11,015	10,561	8,952	7,868
KRE - 80	160	180	200	0,2196	0,1878	0,1667	19,762	16,904	15,002	15,371	13,147	11,668	10,979	9,391	8,335
KRE - 100	200	225	250	0,2308	0,1943	0,1718	20,773	17,483	15,465	16,157	13,598	12,028	11,541	9,713	8,592
KRE - 125	225	250	280	0,2620	0,2228	0,1930	23,579	20,050	17,370	18,339	15,595	13,510	13,099	11,139	9,650
KRE - 150	250	280	315	0,3074	0,2534	0,2117	27,662	22,807	19,050	21,515	17,739	14,817	15,368	12,671	10,583
KRE - 200	315	355	-	0,3361	0,2677	-	30,251	24,090	-	23,528	18,737	-	16,806	13,384	-
KRD - 25	-	160	180	-	0,1527	0,1359	-	13,742	12,234	-	10,688	9,515	-	7,634	6,797
KRD - 32	-	180	200	-	0,1668	0,1491	-	15,015	13,415	-	11,679	10,434	-	8,342	7,453
KRD - 40	-	180	200	-	0,1930	0,1691	-	17,372	15,216	-	13,511	11,835	-	9,651	8,453
KRD - 50	-	225	250	-	0,1867	0,1645	-	16,801	14,805	-	13,067	11,515	-	9,334	8,225
KRD - 65	-	250	280	-	0,2188	0,1863	-	19,693	16,769	-	15,317	13,043	-	10,941	9,316
KRD - 80	-	280	315	-	0,2391	0,1976	-	21,518	17,785	-	16,736	13,833	-	11,954	9,881
KRD - 100	-	355	-	-	0,2372	-	-	21,351	-	-	16,606	-	-	11,861	-

The mentioned data are based on a covering heigth [$Ü_H$] of 0,80 m, a thermal conductivity of soil [λ_E] of 1,0 W/(m•K), a soil temperature [T_E] of 10 °C as well as a pipe distance concerning to the minimum assembly distance [M] at single pipe;
M = 150 mm at D_a = 100 - 140 mm; M = 200 mm at D_a = 160 - 250 mm; M = 300 mm at D_a = 280 - 355 mm;

$T_M = (T_{VL} + T_{RL}) : 2$ => Example: (100 °C + 60 °C) : 2 = 80 °C

All data are based on a thermal conductivity of PUR-Foam λ_{50} = 0,0240 W/(m•K).

Conti-Pipe

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