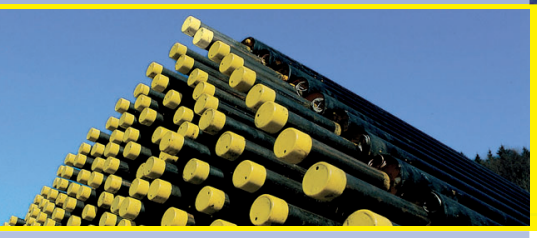
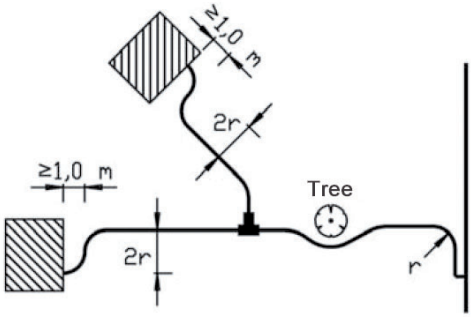
isoplus®

Transporting energy.



ISOCLIMA



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isoclima

The flexible pipe system **isoclima** is especially suitable as cold water pipe in residential building areas or as sewage pipe for industry and households.

Due to the continuous production of **isoclima** flex pipes a longitudinal compound pipe system comes into being, that means all three components (carrier pipe + insulation + jacket pipe) are connected nonpositive with each other.

Advantages

⇒ more economic production of the preinsulated pipe system, short delivery times, due to central stock
⇒ delivery in coils up to 150 m single lengths
⇒ no anchors required for wall penetrations
⇒ lower pipe-covering-heights are possible, respectively shallow pipe laying
⇒ minimum bending radius starting from 800 mm
⇒ requires no pipe-statical calculation (self-compensating)
⇒ nearly no assembling work for joint connections (trench can be filled immediately)
⇒ more easy trench-buildings in intensively constructed areas, reduction of total time for construction, less traffic-interference etc.

Heat-Insulation

isoclima-pipes are insulated with Polyurethane-hard-foam (PUR) in especially therefore designed prescription.
Foamed continuously in the production street around the service pipe, a high quality insulation will be reached, with excellent thermal conductivity, λ_{50} **= 0,0218** W/(m•K) at low specific weight, due to an exothermical chemical reaction.

isoplus is using generally PUR-foam which is 100% free of chlorofluorocarbon (CFC). Cyclopentan (C_5H_{10}) is exclusively used as foaming agent. That means lowest possible ODP- and GWP-value at extremest heat insulation quality.
ODP (ozone-reducing potential) = 0, GWP (greenhouse potential) = < 0,001 !

Jacket Pipe

As jacket pipe for **isoclima** the proved PE-LLD with even surface will be used. **P**oly**e**thylene **L**inear **L**ow **D**ensity is a seamless viscoplastic thermoplastical material. Thermal conductivity λ_{PE} = 0,33 W/(m•K).

PE-LLD is resistant against nearly all weather conditions and UV-rays, as well as against nearly all chemical reactions in the soil. Therefore PE is recommended in all national and international standards as sole suitable material for direct underground laying.

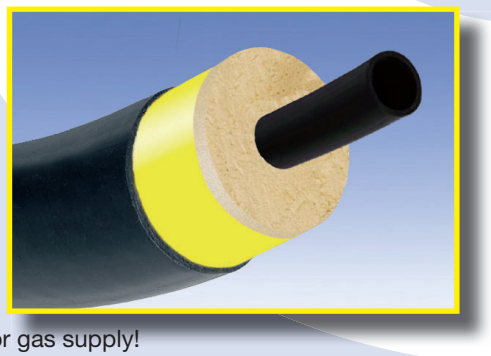
isoclima contains a polyethylene-foil between insulation and jacket pipe. This foil will avoid the exchange of PUR-cell-gas as a barrier. That means the energy loss will remain on a constant low level during operation.
Generally **isoclima** pipes are produced and delivered **without leak deceting**.

Carrier Pipe

The **isoclima** pipe consists of a seamlessly extruded, impact- and shatter-resistant, ductile and stable high-density polyurethane known as polyethylene 100. General quality requirements, pipe series, and measurements are in accordance to DIN 8075, DIN 8074 and DIN EN 12201-2.

Connection Technology

A wide range of connection components is available. The connection of the **isoclima** pipe occurs in underground sections, preferably using weldable HD-PE joints; butt welds, mirror-welds and screw-type connections as well as clamp connections are also options.



Application Range

Maximum operating temperature* T_{max}:	+40 °C*
Minimum operating temperature T_{min}:	-40 °C
Maximum operating pressure* p_B:	11,6 bar*
Leak detecting:	without
Possible liquids:	Cold water, sewage - **NOT** allowed for gas supply!

*Design example: A service life of 50 years is achieved at a temperature of 40 °C and a pressure of 11,6 bar. With increasing pressure and increasing temperature decreases the lifetime - context see next page.

Technical data HD-PE 100					
Property	**Unit**	**Value**	**Property**	**Unit**	**Value**
Volume weight *p* (at 23 °C)	kg/dm³	0,96	Elastic modulus *E*	N/mm²	≥ 1000
Tensile stress R_m	N/mm²	32	Thermal conductivity λ (at 20 °C)	W/(m•K)	0,40
Yield stress R_e	N/mm²	≥ 23	Specific heat capacity *c*	kJ/(kg•K)	2,35
Wall roughness *k*	mm	0,015	Thermal expansion coefficient α	K^{-1}	$1,8 \cdot 10^{-4}$

Dimensions resp. Types

Dimension HD-PE 100 pipe			Jacket-pipe Outside-Ø **Da** in mm	Max. delivery length in 1,00 m steps **L** in m	Max. coil-outside-Ø d_R in mm	Minimum bending-radius **r** in m	Weight without water **G** in kg/m
Type	Outside-Ø **da** in mm	Wall-thickness **s** in mm					
Pressure class SDR 11; ISO-S 5; PN 16, safety factor c = 1,25							
isoclima - 20	20,0	2,0	65	95	2500	0,8	0,65
isoclima - 25	25,0	2,3	75	95	2500	0,8	0,81
isoclima - 32	32,0	2,9	75	95	2500	0,9	0,89
isoclima - 40	40,0	3,7	90	95	2500	0,9	1,21
isoclima - 50	50,0	4,6	110	95	2500	1,0	1,75
isoclima - 63	63,0	5,8	125	150	2500	1,1	2,31
isoclima - 75	75,0	6,8	140	140	2700	1,2	3,04
isoclima - 90	90,0	8,2	160	120	2700	1,4	3,97
isoclima - 110 u	110,0	10,0	160	85	2700	1,4	4,80
isoclima - 110	110,0	10,0	180	85	2700	1,4	5,24

Context Temperature / Operating time / Operating pressure HD-PE 100

Temperature in °C	Operating time in years	Operating pressure (water) SDR 11; ISO-S 5; PN 16 in bar
10	5	20,2
	10	19,8
	25	19,3
	50	19,0
20	5	16,9
	10	16,6
	25	16,2
	50	16,0
30	5	14,4
	10	14,1
	25	13,8
	50	13,5
40	5	12,3
	10	12,1
	25	11,8
	50	11,6
50	5	10,7
	10	10,4
	15	9,5
60	5	7,7

The values in the table correspond to EN 12201-1. For the calculation of the operating pressure in freely installed pipeline systems, it is recommended to multiply them by a system reduction factor fS = 0,8 in order to take account of installation influences such as welded joints, flange connections or bending stresses.

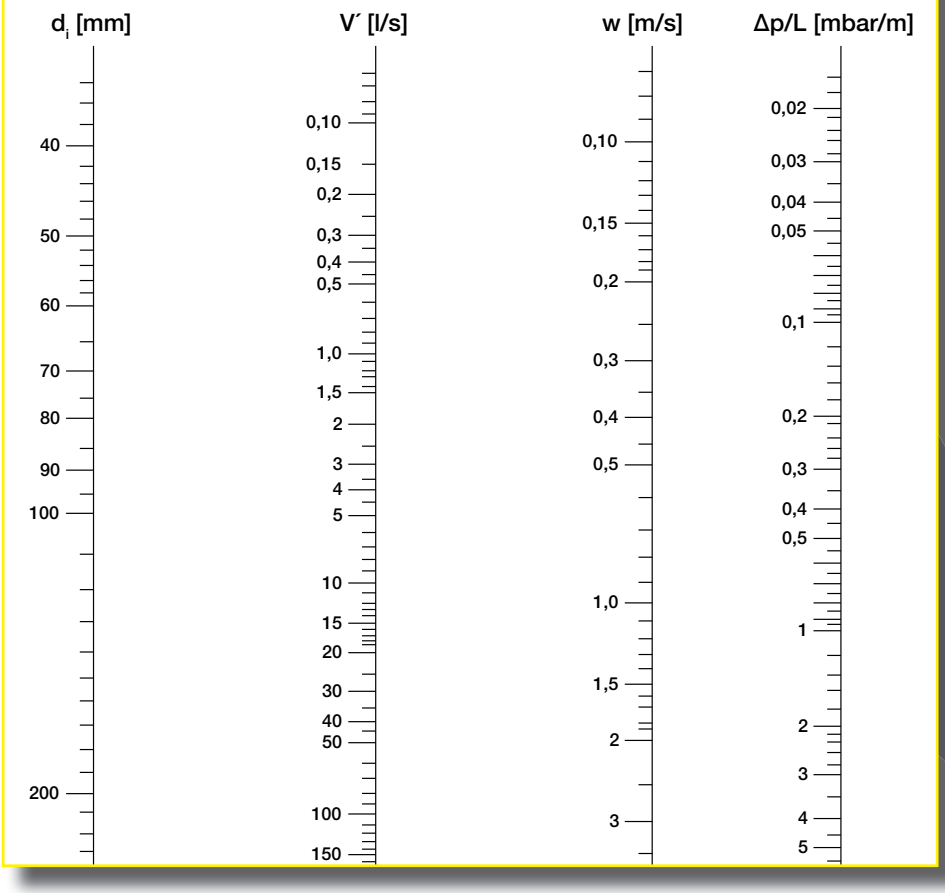
Capacity [P] and Heat loss [q]

Type	Dimensioning				Heat loss
	Water-content **v** in Liter/m	Volume-flow **V´** in m^3/h and (l/s)	Flow-speed **w** in m/s	Transmittable capacity **P** in KW at spread*	Koeffizient **u** in W/(m•K)
				6 K	
isoclima - 20	0,201	0,87 - 1,01 (0,24 - 0,28)	1,2 - 1,4	6 - 7	0,1051
isoclima - 25	0,327	1,41 - 1,65 (0,39 - 0,46)	1,2 - 1,4	10 - 11	0,1121
isoclima - 32	0,539	2,33 - 2,72 (0,65 - 0,76)	1,2 - 1,4	16 - 19	0,1406
isoclima - 40	0,835	3,61 - 4,21 (1,00 - 1,17)	1,2 - 1,4	25 - 29	0,1469
isoclima - 50	1,307	5,65 - 6,59 (1,57 - 1,83)	1,2 - 1,4	39 - 46	0,1515
isoclima - 63	2,075	8,96 - 10,46 (2,49 - 2,91)	1,2 - 1,4	63 - 73	0,1714
isoclima - 75	2,961	15,99 - 18,12 (4,44 - 5,03)	1,5 - 1,7	112 - 126	0,1852
isoclima - 90	4,254	22,97 - 26,04 (6,38 - 7,23)	1,5 - 1,7	160 - 182	0,1990
isoclima - 110 u	6,362	38,93 - 43,51 (10,81 - 12,09)	1,7 - 1,9	272 - 304	0,2810
isoclima - 110	6,362	38,93 - 43,51 (10,81 - 12,09)	1,7 - 1,9	272 - 304	0,2272

*The mentioned values are based on a medium specific heat capacity [cm] of the water of 4.187 J/(kg•K)

Pressure loss

HD-PE 100 Flow nomogram (water)



d_i	Pipe inner diameter [mm]
V´	Volume flow [l/s]
w	Flow speed [m/s]
Δp/L	Pressure loss per meter pipe length [mbar/m]