

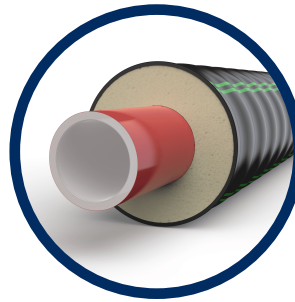


**TECHNICAL DATASHEETS**  
PRE-INSULATED, FLEXIBLE PLASTIC PIPES

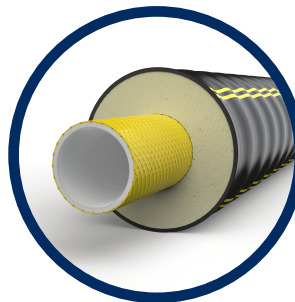


**TECHNICAL DATASHEETS**  
**PRE-INSULATED, FLEXIBLE PLASTIC PIPES**

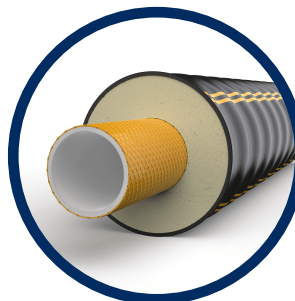
**HeatFlex**  
Page 1



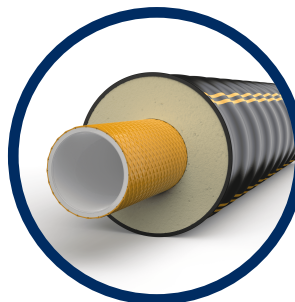
**FibreFlex**  
Page 6



**FibreFlex Pro**  
Page 11



**FibreFlex Pro 16**  
Page 16



# HeatFlex®

## TECHNICAL DATA SHEET Pre-insulated, flexible HeatFlex PN6 plastic pipe system

Pre-insulated flexible PE-Xa pipe, thermal insulation of CFC-free polyurethane foam with blowing agent cyclo-pentane (Lambda50: 0.021 W/mK) and corrugated casing of black LLD-PE, manufactured in accordance with EN15632-1, 2 and technical specification OFI ZG 200-1, bonded pipe system with no axial expansion in the supply line, for a service life of min. 30 years, for design pressures up to 6 bar at maximum operating temperature, for time/temperature profiles according to ISO 13760, with peak operating temperatures up to 95°C, with a connection system with axial compression fittings and sliding sleeves.

Service Pipe	HeatFlex PN6 cross-linked polyethylene PE-Xa SDR11, EN ISO 15875-1, 2 with oxygen barrier (EVOH) according to EN 15632-2
Casing	Polyurethane insulation with Corrugated LLD-PE extruded seamlessly
Pipe connection system	Axial press system with compression sleeves according to EN ISO 15875-3, 5 or clamp fittings
Casing connection system	Joint casing assembling according to EN 489-1 or half-shell system
Delivery of the pipeline	Max. Coil length according to manufacturer information or on customer request
Lambda-insulation at 50 ° C	0,021 W / m.K
Temperature range	-20°C bis +95°C
Max. continuous operating temperature at max. operating pressure	+ 80 ° C at 6 bar or + 95 ° C (variable)
Maximum operating temperature	+95°C (variable)
Other properties	self-compensating elongation through the bonded system
Relevant standards:	<ul style="list-style-type: none"> <li>- Service pipe corresponds to ofi ZG200-1 and EN15632-1, 2</li> <li>- Insulation and casing according to EN 15632-1, 2</li> <li>- Service pipe connection system according to EN ISO 15875-3, 5</li> </ul>
Certificates:	<ul style="list-style-type: none"> <li>- ISO 9001:2015 (TÜV AUSTRIA, Cert.-No.: 20100193005997)</li> <li>- ISO 14001:2015 (TÜV AUSTRIA, Cert.-No.: 20104193005998)</li> <li>- ZG 200-1 (ofi, Cert.No.: 0457)</li> <li>- CSTB TD 08-02 (CSTB Cert.No.: 4163-254-2252)</li> </ul>



Long-term load HeatFlex PN6 without load changes based on EN15632-2: 2022 for pre-insulated district heating and district cooling applications:

temperature in °C	Safety factor C		Pressure (bar)				
			Lifespan (years)				
			HeatFlex PN6 (6bar)				
			1	5	10	25	50
10	TD	1,50	14,9	14,6	14,5	14,4	14,2
20		1,50	13,2	12,9	12,8	12,7	12,6
30		1,50	11,7	11,5	11,4	11,3	11,2
40		1,50	10,4	10,2	10,1	10,0	9,9
50		1,50	9,3	9,1	9,0	8,9	8,8
60		1,50	8,3	8,1	8,0	7,9	7,9
70		1,50	7,4	7,3	7,2	7,1	7,0
80		1,50	6,6	6,5	6,4	6,4	-
90	Tmax.	1,30	7,0	6,8	6,7	-	-
95	Tmal.	1,00	7,2	7,0	7,0	-	-

According to EN15632-1, 2 and according to the technical specification OFI ZG200-1, the operating coefficient for the design of the pipeline is C = 1.5; Use C = 1.3 for the maximum temperature and C = 1 for the disorder. Other temperature / time profiles can be used in accordance with ISO 13760 (Miner's rule). See examples on page 3



Application of Miner's rule - calculation of the service life of HeatFlex PN6 systems.

Pipe systems according to this document are designed for a service life of at least 30 years when operated with the temperature / time profile specified in Table E.1.

This appendix contains four examples of the expected service life when a piping system that meets the requirements of this document is operated at a temperature profile other than that specified in Table E.1.

The examples are calculated based on the reference lines and the given safety factors.

Furthermore, Miner's rule (EN ISO 13760) is used to calculate the expected service life of polymeric piping systems (PB-H and PE-Xa) as a function of temperatures and operating times.

The service life calculation applies under the condition that the maximum pressure for the pipeline system is not exceeded -> HeatFlex PN6.

The following selection of typical examples of temperature profiles should help to understand the influence of different temperatures on the calculated service life of HeatFlex PN6 systems.

The calculated service life as a calculation result depending on the design temperature and the corresponding annual operating times are given in Table E.1.

The pipe manufacturer should be contacted if more detailed information or support for specific temperature profiles is required.

Table E.1 - Examples for the calculated service life PE-Xa EN15632 - 1, 2 PN6 (SDR11) and OFI ZG200-1

Examples of temperature profiles	Service life with max. operating pressure of 6 bar	T <sub>D</sub>		Annual operation	T <sub>max</sub>		T <sub>mal</sub>	
		°C	Years		°C	hours	°C	hours
Example 1	30 years	80	29	365 days a year	90	7760	100	100
					95	1000		

Examples of temperature profiles	Service life with max. operating pressure of 6 bar	°C	days/year	Annual operation
70	155			
75	35			
80	146			
85	7			
Example 3	40 years	50	11	229 days a year
		60	10	
		65	5	
		70	5	
		75	5	
		85	188	
Example 4	more than 100 years	55	182,5	365 days a year
		65	182,5	

The system heat losses are determined under the following conditions:

$t_v$ [°C] Flow temperature	80 °C
$t_R$ [°C] Return temperature	60 °C
$t_E$ [°C] Soil temperature	10 °C
$t_B$ [°C] middle operating temperature	$t_B = (t_v + t_R)/2$
$l_E$ Coefficient of thermal conductivity soil	1,0 W/m.K
$h$ [mm] Overlap amount	800 mm
$d$ [mm]	Outer diameter of the service pipe
$D$ [mm]	outer diameter of the casing
$U$ [W/mK]	Heat transfer coefficient [W / m <sup>2</sup> K] based on 1m pipe
$Q$ [W/m]	Heat loss (this is the total loss of 1 m of pipe) $Q = U (t_B - t_E)$ [W / m]
$l_U$ [m]	Length of each section <sup>1</sup>
Total heat loss of the system [W]	calculated as $Q \times l_U$ [W]

<sup>1</sup> Meters of pipeline for calculation ie. with 2xd25 100 m are counted, with 1xd75 200 m per 100 m distance are counted.



Heat loss table for HeatFlex PN6

Service pipe		Casing	Bending radius	Heat transfer coefficient	Heat loss trench at an average operating temperature of 70°C
d[mm]	Wall thickness s [mm]	OD [mm]	r [m]	[W/m K]	[W]
2x d25	2,3	91	0,9	0,1821	10,93
	2,3	111	0,9	0,1394	8,36
2x d32	2,9	111	0,9	0,1936	11,62
	2,9	126	1,0	0,1599	9,59
2x d40	3,7	126	1,0	0,2203	13,22
	3,7	142	1,1	0,1786	10,72
2x d50	4,6	162	1,2	0,2010	12,06
	4,6	182	1,3	0,1677	10,06
2x d63	5,8	182	1,3	0,2431	14,59
	5,8	202	1,4	0,1975	11,85
2x d75	6,8	202	1,4	0,2784	16,70
	6,8	225	1,6	0,2185	13,11

d[mm]	Wall thckn. s [mm]	OD [mm]	r [m]	[W/m K]	[W]
d25	2,3	76	0,7	0,1129	6,77
	2,3	91	0,9	0,0972	5,83
d32	2,9	76	0,7	0,1431	8,59
	2,9	91	0,9	0,1189	7,13
d40	3,7	91	0,9	0,1487	8,92
	3,7	111	0,9	0,1209	7,25
d50	4,6	111	0,9	0,1521	9,13
	4,6	126	1,0	0,1324	7,94
d63	5,8	126	1,0	0,1723	10,34
	5,8	142	1,1	0,1487	8,92
d75	6,8	142	1,1	0,1851	11,12
	6,8	162	1,2	0,1564	9,38
d90	8,2	162	1,2	0,1995	11,97
	8,2	182	1,3	0,1695	10,17
d110	10,0	162	1,2	0,2864	17,18
	10,0	182	1,3	0,2284	13,70
	10,0	202	1,4	0,2014	12,08
d125	11,4	182	1,3	0,2933	17,60
	11,4	202	1,4	0,2369	14,21

The specified values are based on an average specific heat capacity [cm] of the water of 4,187 J / (kg · K).  
 All values are based on an overburden [ÜH] of 0.80 m, a conductivity of the soil [IE] of 1.0 W / (m · K), a soil temperature [TE] of 10 ° C and, for individual pipes, a pipe spacing of 100 mm.  
 Average temperature TM = (TVL + TRL): 2

## TECHNICAL DATA SHEET Pre-insulated, flexible FibreFlex PN10 plastic pipe system

Pre-insulated flexible PE-Xa pipe reinforced with fiber mesh of aramid, thermal insulation of CFC-free polyurethane foam with blowing agent cyclo-pentane ( $\lambda_{50}$ : 0.021 W/mK) and corrugated casing of black LLD-PE, manufactured in accordance with technical specification OFI ZG 200-2 Class A, bonded pipe system without axial expansion in the supply line, for a service life of min. 30 years, for design pressures up to 10bar at maximum operating temperature, for time/temperature profiles according to ISO 13760, with peak operating temperatures up to 95°C, with a connection system with axial compression fittings and polymer sleeves.

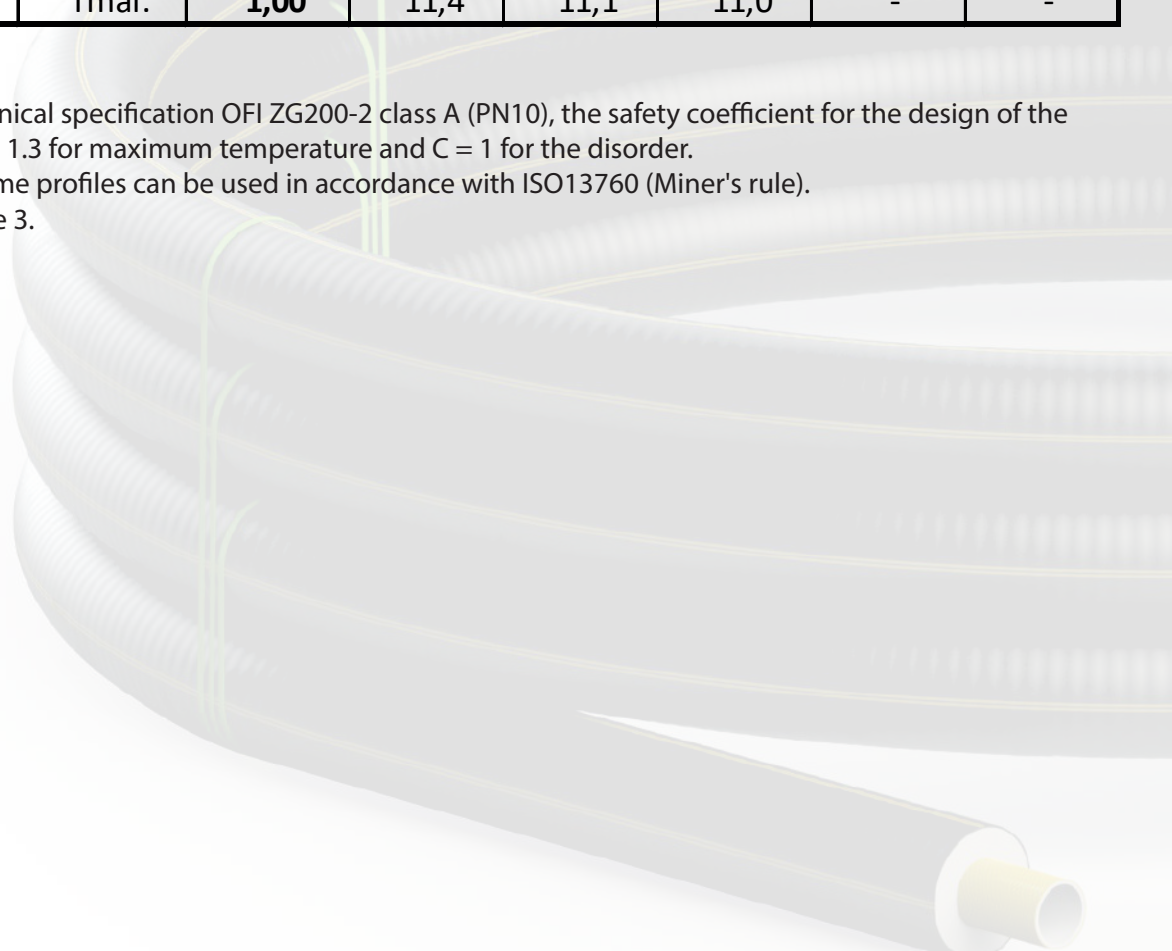
Service Pipe	FibreFlex PN10 cross-linked polyethylene PE-Xa reinforced with fiber mesh of aramid with oxygen barrier (EVOH) according to ZG 200-2
Casing	Polyurethane insulation with corrugated LLD-PE extruded seamlessly
Pipe connection system	Axial compression fittings with polymer sleeves, tested according to ZG200-2 based on EN ISO 15878-3, 5 or clamp fittings
Casing connection system	Joint casing assembling according to EN 489-1 or half-shell system
Delivery of the pipeline	Max. Coil length according to manufacturer information or on customer request
Lambda-insulation at 50 °C	0,021 W / m.K
Temperature range	-20 °C to +95 °C
Max. continuous operating temperature at max. operating pressure	+80°C at 10bar or +95°C (variable)
Maximum operating temperature	+95 °C (variable)
Other properties	self-compensating elongation through the bonded system
Relevant standards:	<ul style="list-style-type: none"><li>- Service Pipe corresponds to ZG200-2 Class A (based on EN15632-1, 2)</li><li>- Insulation and casing according to EN 15632-1, 2</li><li>- Service pipe connection system according to ZG200-2 based on EN ISO 15875-3, 5</li></ul>
Certificates:	<ul style="list-style-type: none"><li>- ISO 9001:2015 (TÜV AUSTRIA, Cert.-No.: 20100193005997)</li><li>- ISO 14001:2015 (TÜV AUSTRIA, Cert.-No.: 20104193005998)</li><li>- ZG 200-2 (ofi, Zert.-No.: 0458)</li></ul>



Long-term load FibreFlex PN10 Pipe without load changes based on ofi ZG200-2 Class A (based on EN15632-2:2022) for pre-insulated district heating and district cooling applications:

temperature in °C	Safety factor C		Pressure (bar)				
			Lifespan (years)				
			FibreFlex PN10 (10bar)				
			1	5	10	25	50
10	TD	1,50	23,6	23,2	23,0	22,8	22,6
20		1,50	20,9	20,5	20,4	20,1	20,0
30		1,50	18,5	18,2	18,1	17,9	17,7
40		1,50	16,5	16,2	16,1	15,9	15,7
50		1,50	14,7	14,4	14,3	14,1	14,0
60		1,50	13,1	12,9	12,8	12,6	12,5
70		1,50	11,8	11,5	11,4	11,3	11,2
80		1,50	10,5	10,3	10,2	10,1	-
90	Tmax.	1,30	11,2	10,9	10,8	-	-
95	Tmal.	1,00	11,4	11,1	11,0	-	-

According to the technical specification OFI ZG200-2 class A (PN10), the safety coefficient for the design of the pipeline is C = 1.5; C = 1.3 for maximum temperature and C = 1 for the disorder. Other temperature/time profiles can be used in accordance with ISO13760 (Miner's rule). See examples on page 3.





Application of Miner's rule - calculation of the service life of FibreFlex PN10 systems.

Pipe systems according to this document are designed for a service life of at least 30 years when operated with the temperature / time profile specified in Table E.1.

This appendix contains five examples of the expected service life when a piping system that meets the requirements of this document is operated at a temperature profile other than that specified in Table E.1.

The examples are calculated based on the reference lines and the given safety factors.

Furthermore, Miner's rule (EN ISO 13760) is used to calculate the expected service life of polymeric piping systems (PB-H and PE-Xa) as a function of temperatures and operating times.

The service life calculation applies under the condition that the maximum pressure for the pipeline system is not exceeded -> FibreFlex PN10.

The following selection of typical examples of temperature profiles should help to understand the influence of different temperatures on the calculated service life of FibreFlex PN10 systems.

The calculated service life as a calculation result depending on the design temperature and the corresponding annual operating times are given in Table E.1.

The pipe manufacturer should be contacted if more detailed information or support for specific temperature profiles is required.

Table E.1. Examples for the calculated service life TRSP, class of use A PN10

Examples of temperature profiles	Service life with max. operating pressure of 10 bar	T <sub>D</sub>		Annual operation	T <sub>max</sub>		T <sub>mal</sub>	
		°C	Years		°C	hours	°C	hours
Example 1	30 years	80	29	365 days a year	90	7760	100	100
					95	1000		

Examples of temperature profiles	Service life with max. operating pressure of 10 bar	°C	days/year	Annual operation
		Example 2	49 years	
70	155			
75	35			
80	146			
85	7			
Example 3	41 years	50	11	229 days a year
		60	10	
		65	5	
		70	5	
		75	5	
		80	5	
Example 4	more than 100 years	55	182,5	365 days a year
		65	182,5	
		65	182,5	

Examples for the calculated service life TRSP, class of use A PN10 but max. operation with PN6

Examples of temperature profiles	Service life with max. operating pressure of 6 bar	T <sub>D</sub>		Annual operation	T <sub>max</sub>		T <sub>mal</sub>	
		°C	years		°C	hours	°C	hours
Example 5	50 years	80	29	365 days a year	90	7760	100	100
					95	1000		

The system heat losses are determined under the following conditions:

$t_v$ [°C] Flow temperature	80 °C
$t_R$ [°C] Return temperature	60 °C
$t_E$ [°C] Soil temperature	10 °C
$t_B$ [°C] middle operating temperature	$t_B = (t_v + t_R)/2$
$l_E$ Coefficient of thermal conductivity soil	1,0 W/m.K
$h$ [mm] Overlap amount	800 mm
$d$ [mm]	Outer diameter of the service pipe
$D$ [mm]	Outer diameter of the casing
$U$ [W/mK]	Heat transfer coefficient [W / m <sup>2</sup> K] based on 1m pipe
$Q$ [W/m]	Heat loss (this is the total loss of 1m of pipe) $Q = U (t_B - t_E)$ [W / m]
$l_U$ [m]	Length of each section <sup>1</sup>
Total heat loss of the system [W]	calculated as $Q \times l_U$ [W]

<sup>1</sup> Meters of pipeline for calculation ie. with 2xd25 100 m are counted, with 1xd75 200 m per 100 m distance are counted.





Heat loss table for FibreFlex PN10

Service pipe			Casing	Bending radius	Heat transfer coefficient	Heat loss trench at an average operating temperature 70°C
d[mm]	Nominal size da [mm]	Wall thickness s [mm]	OD [mm]	r [m]	[W/m K]	[W]
2x d25	25,0	2,2	91	0,9	0,1821	10,93
	25,0	2,2	111	0,9	0,1395	8,37
2x d32	32,0	2,5	111	0,9	0,1937	11,62
	32,0	2,5	126	1,0	0,1599	9,59
2x d40	40,0	2,8	126	1,0	0,2206	13,24
	40,0	2,8	142	1,1	0,1788	10,73
2x d50	47,6	3,6	162	1,2	0,1866	11,20
	47,6	3,6	182	1,3	0,1580	9,48
2x d63	58,5	4,0	182	1,3	0,2116	12,66
	58,5	4,0	202	1,4	0,1773	10,64
2x d75	69,5	4,6	202	1,4	0,2353	14,12
	69,5	4,6	225	1,6	0,1928	11,57
2x d90	84,0	6,0	225	1,6	0,2781	16,69

d[mm]	Nominal s. da [mm]	Wall thckn. s [mm]	OD [mm]	r [m]	[W/m K]	[W]
d25	25,0	2,2	76	0,7	0,1129	6,77
	25,0	2,2	91	0,9	0,0973	5,84
d32	32,0	2,5	76	0,7	0,1434	8,60
	32,0	2,5	91	0,9	0,1190	7,14
d40	40,0	2,8	91	0,9	0,1492	8,95
	40,0	2,8	111	0,9	0,1213	7,28
d50	47,6	3,6	111	0,9	0,1442	8,65
	47,6	3,6	126	1,0	0,1264	7,58
d63	58,5	4,0	126	1,0	0,1577	9,46
	58,5	4,0	142	1,1	0,1377	8,26
d75	69,5	4,6	142	1,1	0,1680	10,08
	69,5	4,6	162	1,2	0,1440	8,64
d90	84,0	6,0	162	1,2	0,1813	10,88
	84,0	6,0	182	1,3	0,1562	9,37
d110	101,0	6,5	162	1,2	0,2432	14,59
	101,0	6,5	182	1,3	0,2001	12,01
	101,0	6,5	202	1,3	0,1722	10,33
d125	116,0	6,8	182	1,3	0,2536	15,22
	116,0	6,8	202	1,4	0,2103	12,62
d140	127,0	7,1	202	1,6	0,2460	14,76
	127,0	7,1	225	1,6	0,2050	12,30
d160	144,0	7,5	225	1,6	0,2550	15,30

The specified values are based on an average specific heat capacity [cm] of the water of 4,187 J / (kg · K).  
 All values are based on an overburden [ÜH] of 0.80 m, a conductivity of the soil [IE] of 1.0 W / (m · K), a soil temperature [TE] of 10 ° C and for individual pipes, a pipe spacing of 100 mm.  
 Average temperature TM = (TVL + TRL): 2

# FibreFlex® Pro

## TECHNICAL DATA SHEET

### Pre-insulated, flexible FibreFlex Pro PN10 plastic pipe system

Pre-insulated flexible PE-Xa pipe reinforced with high temperature fiber mesh of aramid, thermal insulation of CFC-free polyurethane foam with blowing agent cyclo-pentane ( $\lambda_{50}$ : 0.021 W/mK) and corrugated casing of black LLD-PE, manufactured in accordance with OFI ZG 200-2 Class B technical specification, bonded pipe system without axial expansion in the supply line, for a service life of min. 30 years, for design pressures up to 10 bar at maximum operating temperature, for time/temperature profiles according to ISO 13760, with peak operating temperatures up to 115°C, with a connection system with axial compression fittings and polymer sleeves, optionally equipped with a network monitoring system consisting of two flat ribbon cables with two copper wires each.

Service Pipe	FibreFlex Pro PN10 cross-linked polyethylene PE-Xa reinforced with fiber mesh of aramid with oxygen barrier (EVOH) according to ZG 200-2
Casing	Polyurethane insulation with corrugated LLD-PE extruded seamlessly
Pipe connection system	Axial compression fittings with polymer sleeves, tested according to ZG200-2 based on EN ISO 15878-3, 5 or clamp fittings
Casing connection system	Joint casing assembling according to EN 489-1 or half-shell system
Delivery of the pipeline	Max. Coil length according to manufacturer information or on customer request
Lambda-insulation at 50 °C	0,021 W / m.K
Temperature range	-20 °C to +115 °C (variable)
Max. continuous operating temperature at max. operating pressure	+95°C at 10 bar or +115°C (variable)
Maximum operating temperature	+115 °C (variable)
Other properties	self-compensating elongation through the bonded system If required with alarm wire for network monitoring
Relevant standards:	- Service Pipe corresponds to ZG200-2 Class B (based on EN15632-1, 2) - Insulation and casing according to EN 15632-1, 2 - Service pipe connection system according to ZG200-2 based on EN ISO 15875-3, 5
Certificates:	- ISO 9001:2015 (TÜV AUSTRIA, Cert.-No.: 20100193005997) - ISO 14001:2015 (TÜV AUSTRIA, Cert.-No.: 20104193005998) - ZG 200-2 (of, Zert.-No.: 0555)

Long-term load FibreFlex Pro PN10 Pipe without load changes based on ofi ZG200-2 Class B (based on EN15632-2:2022) for pre-insulated district heating and district cooling applications:

temperature in °C	Safety factor C		Pressure (bar)					
			Lifespan (years)					
			FibreFlex Pro PN10 (10bar)					
			1	5	10	20	30	50
40	TD	1,50	25,0	22,3	21,2	20,2	19,6	18,9
45		1,50	24,1	21,4	20,3	19,3	18,7	18,0
50		1,50	23,1	20,4	19,3	18,3	17,8	17,1
55		1,50	22,2	19,5	18,4	17,4	16,8	16,1
60		1,50	21,2	18,5	17,4	16,4	15,9	15,2
65		1,50	20,2	17,5	16,5	15,5	14,9	14,3
70		1,50	19,2	16,6	15,5	14,5	14,0	13,4
75		1,50	18,2	15,6	14,5	13,6	13,1	12,4
80		1,50	17,2	14,6	13,6	12,6	12,1	11,5
85		1,50	16,2	13,6	12,6	11,7	11,2	10,6
90	Tmax.	1,30	17,4	14,5	13,4	12,4	11,8	-
95		1,30	16,2	13,4	12,3	11,3	-	-
100		1,30	15,0	12,2	11,2	-	-	-
105		1,30	13,8	11,1	-	-	-	-
110		1,30	12,6	-	-	-	-	-
115		1,30	11,4	-	-	-	-	-
120	T mal.	1,00	13,2	-	-	-	-	-

According to the technical specification OFI ZG200-2 class A (PN10), the safety coefficient for the design of the pipeline is C = 1.5; C = 1.3 for maximum temperature and C = 1 for the disorder. Other temperature/time profiles can be used in accordance with ISO13760 (Miner's rule). See examples on page 3.



Application of Miner's rule - calculation of the service life of FibreFlex Pro PN10 systems.

Pipe systems according to this document are designed for a service life of at least 30 years when operated with the temperature / time profile specified in Table E.1.

This appendix contains four examples of the expected service life when a piping system that meets the requirements of this document is operated at a temperature profile other than that specified in Table E.1.

The examples are calculated based on the reference lines and the given safety factors.

Furthermore, Miner's rule (EN ISO 13760) is used to calculate the expected service life of polymeric piping systems (PB-H and PE-Xa) as a function of temperatures and operating times.

The service life calculation applies under the condition that the maximum pressure for the pipeline system is not exceeded -> FibreFlex Pro PN10.

The following selection of typical examples of temperature profiles should help to understand the influence of different temperatures on the calculated service life of FibreFlex Pro PN10 systems.

The calculated service life as a calculation result depending on the design temperature and the corresponding annual operating times are given in Table E.1.

The pipe manufacturer should be contacted if more detailed information or support for specific temperature profiles is required.

Lifespan at 30y (50y) Examples of temp. profiles	T <sub>D</sub>		T <sub>max</sub>		T <sub>mal</sub>	
	°C	years	°C	hours	°C	hours
Example1	90	29	100	8760	115	100
Example2	70	23	115	1000	120	100
	80	3,5				
	90	2				
	100	1				
Example3	110	0,4	115	4380	120	100
	70	19				
	80	3,5				
	90	3				
Example4	100	2,5	115	1000	120	100
	110	1,5				
Example5	80	19,8	115	1000	120	100
	95	10				
	70	25				
	80	15				
	90	4,8				
	95	5				

In addition, Miner's rule (EN ISO 13760) should be applied to calculate the expected service life as a function of temperatures and operating times.

The system heat losses are determined under the following conditions:

$t_v$ [°C] Flow temperature	80 °C
$t_R$ [°C] Return temperature	60 °C
$t_E$ [°C] Soil temperature	10 °C
$t_B$ [°C] middle operating temperature	$t_B = (t_v + t_R)/2$
$l_E$ Coefficient of thermal conductivity soil	1,0 W/m.K
$h$ [mm] Overlap amount	800 mm
$d$ [mm]	Outer diameter of the service pipe
$D$ [mm]	Outer diameter of the casing
$U$ [W/mK]	Heat transfer coefficient [W / m <sup>2</sup> K] based on 1m pipe
$Q$ [W/m]	Heat loss (this is the total loss of 1m of pipe) $Q = U (t_B - t_E)$ [W / m]
$l_U$ [m]	Length of each section <sup>1</sup>
Total heat loss of the system [W]	calculated as $Q \times l_U$ [W]

<sup>1</sup> Meters of pipeline for calculation ie. with 2xd25 100 m are counted, with 1xd75 200 m per 100 m distance are counted.

Heat loss table for FibreFlex Pro PN10

Service pipe			Casing	Bending radius	Heat transfer coefficient	Heat loss trench at an average operating temperature 70°C
d[mm]	Nominal size da [mm]	Wall thickness s [mm]	OD [mm]	r [m]	[W/m K]	[W]
2x d32	32,0	2,9	111	0,9	0,1936	11,62
	32,0	2,9	126	1,0	0,1599	9,59
2x d40	40,0	3,7	126	1,0	0,2203	13,22
	40,0	3,7	142	1,1	0,1786	10,72
2x d50	47,6	3,6	162	1,2	0,1866	11,20
	47,6	3,6	182	1,3	0,1580	9,48
2x d63	58,5	4,0	182	1,3	0,2116	12,70
	58,5	4,0	202	1,4	0,1773	10,67
2x d75	69,5	4,6	202	1,4	0,2353	14,12
	69,5	4,6	225	1,6	0,1928	11,57
2x d90	84,0	6,0	225	1,6	0,2781	16,69

d[mm]	Nominal s. da [mm]	Wall thickn s [mm]	OD [mm]	r [m]	[W/m K]	[W]
d32	32,0	2,9	76	0,7	0,1431	8,59
	32,0	2,9	91	0,9	0,1189	7,13
d40	40,0	3,7	91	0,9	0,1487	8,92
	40,0	3,7	111	0,9	0,1209	7,25
d50	47,6	3,6	111	0,9	0,1442	8,65
	47,6	3,6	126	1,0	0,1264	7,58
d63	58,5	4,0	126	1,0	0,1577	9,46
	58,5	4,0	142	1,1	0,1377	8,26
d75	69,5	4,6	142	1,1	0,1680	10,08
	69,5	4,6	162	1,2	0,1440	8,64
d90	84,0	6,0	162	1,2	0,1813	10,88
	84,0	6,0	182	1,3	0,1562	9,37
d110	101,0	6,5	162	1,2	0,2432	14,59
	101,0	6,5	182	1,3	0,2001	12,01
	101,0	6,5	202	1,3	0,1722	10,33
d125	116,0	6,8	182	1,3	0,2536	15,22
	116,0	6,8	202	1,4	0,2103	12,62
d140	127,0	7,1	202	1,4	0,2460	14,76
	127,0	7,1	225	1,6	0,2050	12,30
d160	144,0	7,5	225	1,6	0,2550	15,30

The specified values are based on an average specific heat capacity [cm] of the water of 4,187 J / (kg • K).  
 All values are based on an overburden [ÜH] of 0.80 m, a conductivity of the soil [IE] of 1.0 W / (m • K), a soil temperature [TE] of 10 ° C and, for individual pipes, a pipe spacing of 100 mm.  
 Average temperature TM = (TVL + TRL): 2



## TECHNICAL DATASHEET

### Pre-insulated, flexible FibreFlex Pro PN16 plastic pipe system

Pre-insulated flexible PE-Xa pipe reinforced with high temperature fiber mesh of aramid, thermal insulation of CFC-free polyurethane foam with blowing agent cyclo-pentane ( $\lambda_{50}$ : 0.021 W/mK) and corrugated casing of black LLD-PE, manufactured in accordance with technical specification OFI ZG 200-2 Class B, bonded pipe system without axial expansion in the supply line, for a service life of min. 30 years, for design pressures up to 16 bar at maximum operating temperature, for time/temperature profiles according to ISO 13760, with peak operating temperatures up to 115°C, with a connection system with axial compression fittings with polymer sleeves, optionally equipped with a network monitoring system consisting of two flat ribbon cables with two copper wires each.

Service Pipe	FibreFlex Pro PN16 cross-linked polyethylene PE-Xa reinforced with high temperature fiber mesh of aramid with oxygen barrier (EVOH) according to ZG 200-2
Casing	Polyurethane insulation with corrugated LLD-PE extruded seamlessly
Pipe connection system	Axial compression fittings with polymer sleeves, tested according to ZG200-2 based on EN ISO 15878-3, 5 or clamp fittings
Casing connection system	Joint casing assembling according to EN 489-1 or half-shell system
Delivery of the pipeline	Max. Coil length according to manufacturer information or on customer request
Lambda-insulation at 50 °C	0,021 W / m.K
Temperature range	-20°C to +115 °C (variable)
Max. continuous operating temperature at max. operating pressure	+95°C at 16 bar or +115°C (variable)
Maximum operating temperature	+115 °C
Other properties	self-compensating elongation through the bonded system If required with alarm wire for network monitoring
Relevant standards:	- Service Pipe corresponds to ZG200-2 Class B (based on EN15632-1, 2) - Insulation and casing according to EN 15632-1, 2 - Service pipe connection system according to ZG200-2 based on EN ISO 15875-3, 5
Certificates:	- ISO 9001:2015 (TÜV AUSTRIA, Cert.-No.: 20100193005997) - ISO 14001:2015 (TÜV AUSTRIA, Cert.-No.: 20104193005998) - ZG 200-2 (ofi, Zert.-No.: 0555)



Long-term load FibreFlex Pro PN16 Pipe without load changes based on ofi ZG200-2 Class B (based on EN15632-2:2022) for pre-insulated district heating and district cooling applications:

temperature in °C	Safety factor C		Pressure (bar)					
			Lifespan (years)					
			FibreFlex Pro - PN16 (16bar)					
			1	5	10	20	30	50
40	TD	1,50	40,0	35,6	33,9	32,3	31,4	30,3
45		1,50	38,5	34,2	32,5	30,8	29,9	28,8
50		1,50	37,0	32,7	31,0	29,3	28,4	27,3
55		1,50	35,5	31,1	29,4	27,8	26,9	25,8
60		1,50	33,9	29,6	27,9	26,3	25,4	24,3
65		1,50	32,4	28,1	26,4	24,8	23,9	22,9
70		1,50	30,8	26,5	24,8	23,3	22,4	21,4
75		1,50	29,2	24,9	23,3	21,7	20,9	19,9
80		1,50	27,5	23,3	21,7	20,2	19,4	18,4
85		1,50	25,9	21,7	20,2	18,7	17,9	16,9
90	Tmax.	1,30	27,9	23,2	21,5	19,8	18,9	-
95		1,30	26,0	21,4	19,7	18,1	-	-
100		1,30	24,0	19,6	17,9	-	-	-
105		1,30	22,1	17,8	-	-	-	-
110		1,30	20,1	-	-	-	-	-
115		1,30	18,2	-	-	-	-	-
120	Tmal.	1,00	21,1	-	-	-	-	-

According to the technical specification OFI ZG200-2 class A (PN16), the safety coefficient for the design of the pipeline is C = 1.5; C = 1.3 for maximum temperature and C = 1 for the disorder. Other temperature/time profiles can be used in accordance with ISO13760 (Miner's rule). See examples on page 3.



Application of Miner's rule - calculation of the service life of FibreFlex Pro PN16 systems.

Pipe systems according to this document are designed for a service life of at least 30 years when operated with the temperature / time profile specified in Table E.1.

This appendix contains five examples of the expected service life when a piping system that meets the requirements of this document is operated at a temperature profile other than that specified in Table E.1.

The examples are calculated based on the reference lines and the given safety factors.

Furthermore, Miner's rule (EN ISO 13760) is used to calculate the expected service life of polymeric piping systems (PB-H and PE-Xa) as a function of temperatures and operating times.

The service life calculation applies under the condition that the maximum pressure for the pipeline system is not exceeded -> FibreFlex Pro PN16.

The following selection of typical examples of temperature profiles should help to understand the influence of different temperatures on the calculated service life of FibreFlex Pro PN16 systems.

The calculated service life as a calculation result depending on the design temperature and the corresponding annual operating times are given in Table E.1.

The pipe manufacturer should be contacted if more detailed information or support for specific temperature profiles is required.

Table E.1 - Examples of calculated service life TRSP, service class B

Lifespan at 30y (50y) Examples of temp. profiles	T <sub>D</sub>		T <sub>max</sub>		T <sub>mal</sub>	
	°C	years	°C	hours	°C	hours
Example1	90	29	100	8760	115	100
Example2	70	23	115	1000	120	100
	80	3,5				
	90	2				
	100	1				
	110	0,4				
Example3	70	19	115	4380	120	100
	80	3,5				
	90	3				
	100	2,5				
	110	1,5				
Example4	80	19,8	115	1000	120	100
	95	10				
Example5	70	25	115	1000	120	100
	80	15				
	90	4,8				
	95	5				

In addition, Miner's rule (EN ISO 13760) should be applied to calculate the expected service life as a function of temperatures and operating times.



The system heat losses are determined under the following conditions:

$t_v$ [°C] Flow temperature	80 °C
$t_R$ [°C] Return temperature	60 °C
$t_E$ [°C] Soil temperature	10 °C
$t_B$ [°C] middle operating temperature	$t_B = (t_v + t_R)/2$
$l_E$ Coefficient of thermal conductivity soil	1,0 W/m.K
h [mm] Overlap amount	800 mm
d [mm]	Outer diameter of the service pipe
D [mm]	Outer diameter of the casing
U [W/mK]	Heat transfer coefficient [W / m <sup>2</sup> K] based on 1m pipe
Q [W/m]	Heat loss (this is the total loss of 1m of pipe) $Q = U (t_B - t_E)$ [W / m]
$l_U$ [m]	Length of each section <sup>1</sup>
Total heat loss of the system [W]	calculated as $Q \times l_U$ [W]

<sup>1</sup> Meters of pipeline for calculation ie. with 2xd25 100 m are counted, with 1xd75 200 m per 100 m distance are counted.



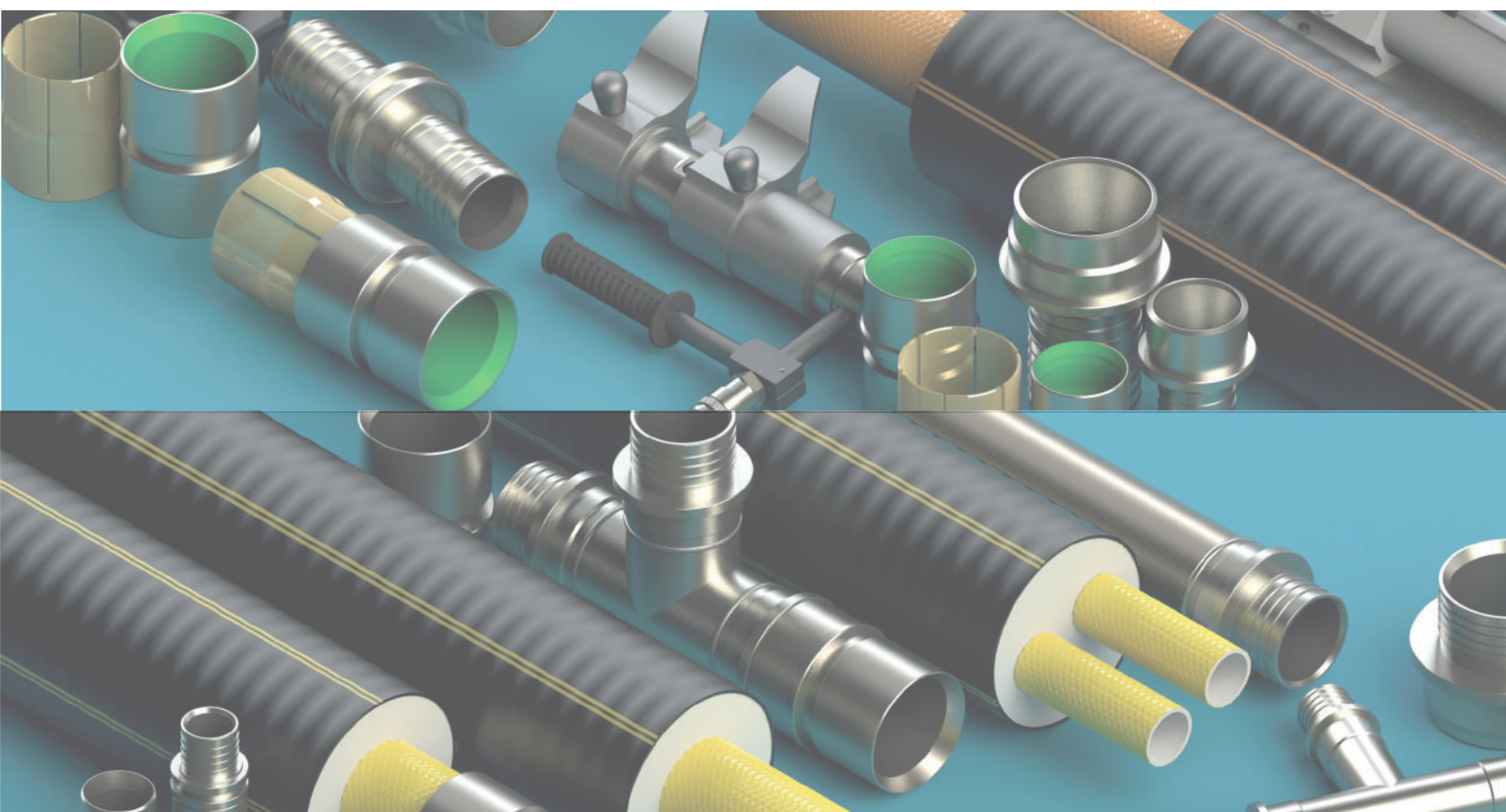
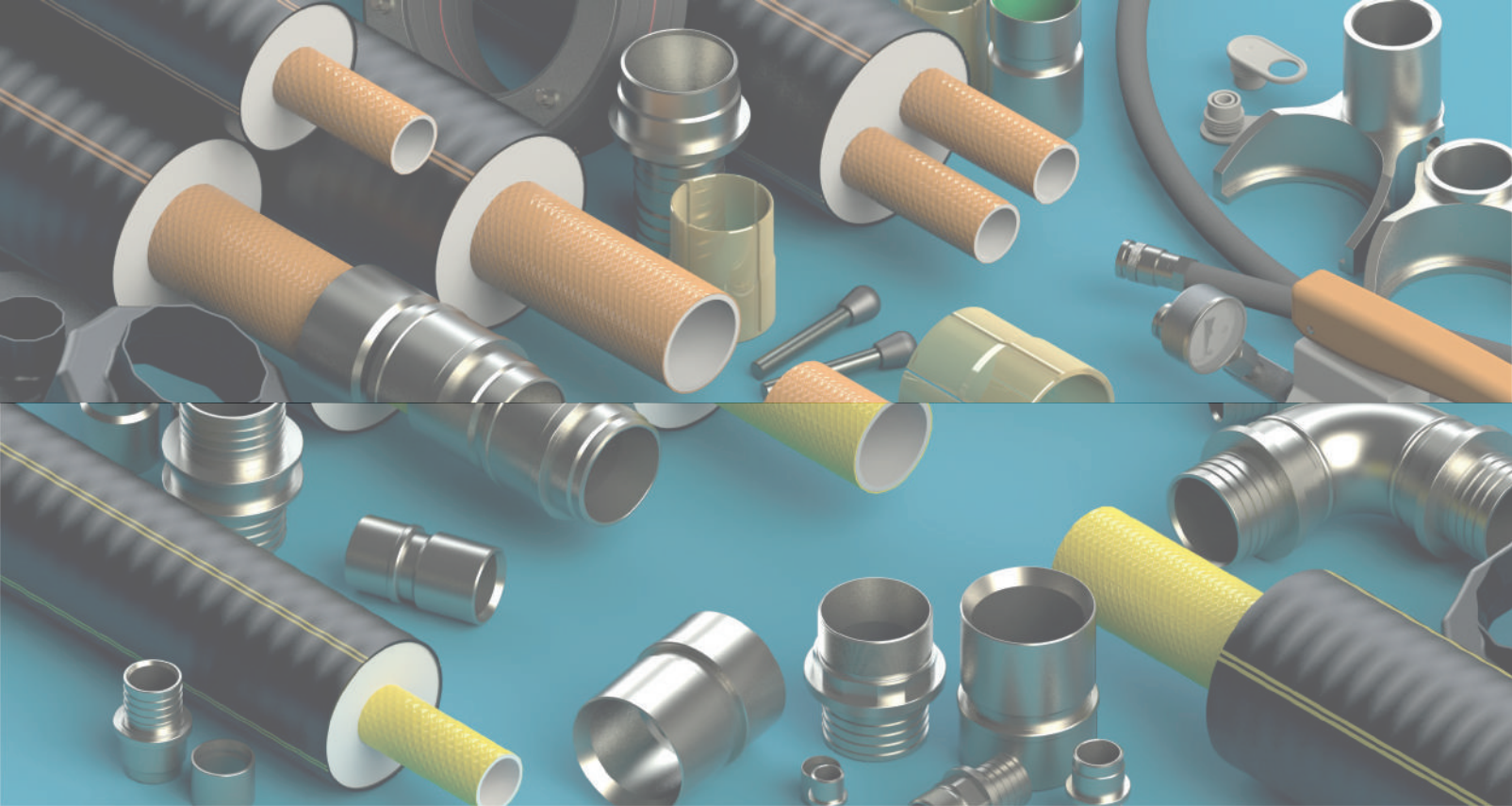
Heat loss table for FibreFlex Pro PN16

Service pipe			Casing	Bending radius	Heat transfer coefficient	Heat loss trench at an average operating temperature 70°C
d[mm]	Nominal size da [mm]	Wall thickness s [mm]	OD [mm]	r [m]	[W/m K]	[W]
2x d50	47,6	3,6	162	1,2	0,1866	11,20
	47,6	3,6	182	1,3	0,1580	9,48
2x d63	58,5	4,0	182	1,3	0,2116	12,70
	58,5	4,0	202	1,4	0,1773	10,64
2x d75	69,5	4,6	202	1,4	0,2353	14,12
	69,5	4,6	225	1,6	0,1928	11,57
2x d90	84,0	6,0	225	1,6	0,2781	16,69

Service pipe			Casing	Bending radius	Heat transfer coefficient	Heat loss trench at an average operating temperature 70°C
d[mm]	Nominal size da [mm]	Wall thickness s [mm]	DA [mm]	r [m]	[W/m K]	[W]
d50	47,6	3,6	111	0,9	0,1442	8,65
	47,6	3,6	126	1,0	0,1264	7,58
d63	58,5	4,0	126	1,0	0,1577	9,46
	58,5	4,0	142	1,1	0,1377	8,26
d75	69,5	4,6	142	1,1	0,1680	10,08
	69,5	4,6	162	1,2	0,1440	8,64
d90	84,0	6,0	162	1,2	0,1813	10,88
	84,0	6,0	182	1,3	0,1562	9,37
d110	101,0	6,5	162	1,2	0,2432	14,59
	101,0	6,5	182	1,3	0,2001	12,01
	101,0	6,5	202	1,3	0,1722	10,33

The specified values are based on an average specific heat capacity [cm] of the water of 4,187 J / (kg • K).  
 All values are based on an overburden [ÜH] of 0.80 m, a conductivity of the soil [IE] of 1.0 W / (m • K), a soil temperature [TE] of 10 ° C and, for individual pipes, a pipe spacing of 100 mm.  
 Average temperature TM = (TVL + TRL): 2







**RK Infra GesmbH**

**Adress:** Gollensdorf 24,  
A-4300 St. Valentin

**TEL.:** +43 (0) 7435/93080

**E-Mail:** [office@rkinfra.com](mailto:office@rkinfra.com)

