MICROFLEX®

Pre-insulated piping system

Technical Data Sheet

Wattswater.eu

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1. System description

1.1 Description

Microflex's pre-insulated piping system is composed of a thermal insulation around a carrier pipe and covered by a "closed chamber" protective UV-resistant outer casing.

Microflex piping is suitable for use in heating, cooling and sanitary applications and provides significant advantages such as, low-weight, hyper flexibility, robustness, and easy and rapid laying even over obstacles and around corners. System accessories can be mounted without any special tools.

Our PE-Xa central heating carrier pipe (made from cross-linked polyethylene) is oxygen diffusion proof in accordance with DIN 4726. It can transport a largenumber of different liquids and is fully corrosion free.

Microflex is made available as an UNO, DUO or QUADRO piping system. It is manufactured free of CFCs.

1.2 Fields of application

Heating
- Hot Water Distribution
- Supply to Individual Buildings
- Distribution Inside Buildings

Local or Remote Heating Networks

Sanitary Water
- Distribution of Potable and Non-Potable Water

Renewable Energy
- Heat Pumps
- Biogas and Biomass Installations
- Combined Heat and Power
- Pellet Fuels
- Geothermal Applications

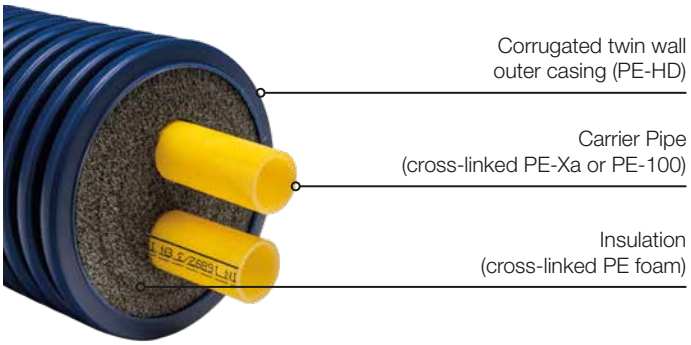
Special Applications
- Transport of Chemicals
- Food Industry
- Cooling Systems
- Swimming Pools
- Leisure Centres

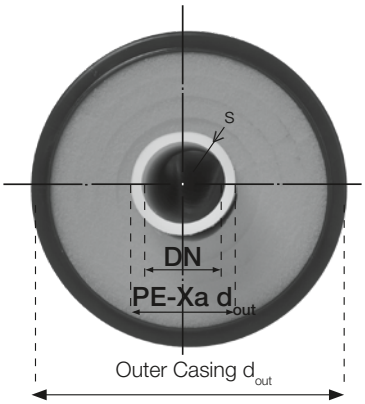
1.3 Properties

- Versatility
- Oxygen Diffusion Barrier to DIN 4726
- Low Weight
- Completely Corrosion Resistant
- Environmentally Friendly Manufactured
- Maintenance Free
- Long Life Expectancy
- Superior Quality

1.4 Structure of the Microflex system

The Microflex piping system consists of three integrated components and it is manufactured according to the EN 15632: 1-3 norm.





Piping system with one pipe: UNO

Microflex UNO
PN 6 - PN 10 - PN 16

Piping system with two pipes: DUO

Microflex DUO
PN 6 - PN 10 - PN 16

Piping system with four pipes: QUADRO

Microflex QUADRO
2x PN 6 - 2x PN 10

The Hyper Flexibility of the Microflex Piping System

- Placement of the pipe over obstacles and around corners is possible.
- The inside bending radii of the different pipes are specified in the Product Range Tables (see section 2.1). Measurements are taken from the inside of the pipe. A reserve factor is taken into account.
- For example: two PE-Xa pipes of Ø40mm can form a curve with an inside radius of 0.6m (see picture).

1.5 PE-Xa carrier pipe

The carrier or media transport pipe, as it is often called, used by Microflex for heating and sanitary applications is a PE-Xa pipe. PE-Xa stands for cross-linked PE, whereby cross-connections between the PE molecules are formed. The resulting molecule is more resistant to extremes of temperatures and/or pressures and chemical attacks.
The pipe is manufactured according to DIN 16892/16893 and ISO 15875 standards.

The PE-Xa pipe offers a few important benefits:

- **Excellent thermal properties**
  The pipes are, in normal operation, able to withstand operating temperatures and pressures of 85°C/6 bar for heating and 85°C/10 bar for sanitary installations. For short term, the pipe can withstand temperatures up to 95°C. Please check the life expectancy table for the appropriate conditions for a specific application.

- **Chemical resistance**
  Most chemicals have no influence on the pipe, even at elevated temperatures. Typically, plastics that are exposed to chemical substances are prone to physical changes in their properties, such as, swelling or dissolution of the polymers. Due to the chemical bonding of the polymer chains, PE-Xa pipes (cross-linked PE) are more resilient in that respect than pipes of non-cross-linked PE. In order to assess the resistance to different materials changes in the tensile and elongation characteristics were monitored. In a pressurized piping system, the resistance to unknown chemicals cannot generally be extrapolated from experience of known chemicals. For this, durability tests with the unknown chemicals in test piping are required.

- **High abrasion resistance**
  PE-Xa pipes provide an enhanced abrasion resistance and durability. Pipes conveying aggressive sludge at fairly high velocities do not suffer internal erosion.

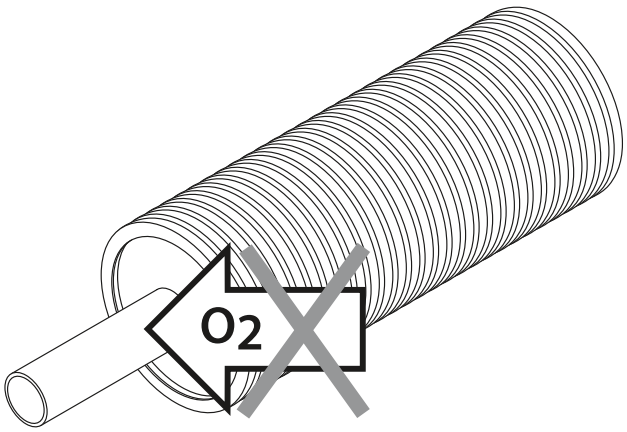
- **Pipe roughness**
  The smooth bore offers less resistance to flow than conventional pipes resulting in excellent flow characteristics with minimal flow loss without formation of any sedimentary deposits.

- **Environmentally friendly**
  PE-Xa pipes are certified to comply with international potable water quality requirements such as DVGW, WRAS and ACS (copies of the certificates are available on request). The pipe imparts neither taste nor odor and is non-toxic. Consequently, it is ideally suited for different branches of the food industry.

Oxygen diffusion barrier

The PE-Xa carrier pipe for central heating applications also features an oxygen diffusion barrier (EVOH) that prevents oxygen permeating into the piping system (according DIN 4726). The oxygen barrier layer enhances the life of any ferrous components of the system (pumps, valves, etc.)

The oxygen permeability is 0,02 mg/l per day at 80°C.



Material Properties PE-Xa Pipes

Mechanical properties	Standard	Value	Unit
Density	-	938	kg/m^3
Cross linking degree	-	80	%
Elasticity modulus (20°C)	DIN 53457	600 - 900	N/mm^2
Tensile strength (20°C)	DIN 53455	19	N/mm^2
Elongation at break (20°C)	DIN 53455	> 400	%
Moisture absorption	-	< 0,01	
Oxygen permeability (80°C)	DIN 4726	0,02	mg/lday

Thermal properties	Standard	Value	Unit
Linear expansion coefficient 20°C 100°C	-	 1,4 X 10^{-4} 2,0 X 10^{-4}	 1/K 1/K
Thermal conductivity coefficient (20°C)	-	0,35	W/mK
Softening Temperature	-	133	°C

Life expectancy: pressures and temperatures

The PE-Xa carrier pipe has a life expectancy of 50 years. The following table serves as a general guideline for temperatures and pressures. The permitted operating pressures are based on the medium water and are marked with a Safety factor of 1.25.

Average temperature (°C)	Life expectancy (years)	Operating pressure (bar)	
		Heating pipes SDR 11	Sanitary pipes SDR 7,4
40	50	11,9	18,9
50	50	10,6	16,8
60	50	9,5	15,0
70	50	8,5	13,4
80	25	7,5	12,0
90	15	6,8	10,9

The life expectancy of the pipe, however, is highly dependent on a combination of pressures and temperatures according to EN ISO 15875. This standard covers a range of service conditions (or application classes), design pressures and pipe dimensions. There are four application classes, based on different service conditions. Each class is related to a typical field of application and for a design period of 50 years. Each application class is be combined with a design pressure. The design pressure is the highest pressure related to the circumstances for which the system has been designed.

For each class, the temperature, lifetime and pressure are specified below:

*Class 1: hot water supply (60°C)** | Design pressure 6 bar

Type	Temperature	Lifetime
Design temperature	60°C	49 years
Maximum temperature	80°C	1 year
Accidental temperature	95°C	100h

*Class 2: hot water supply (70°C)** | Design pressure 6 bar

Type	Temperature	Lifetime
Design temperature	70°C	49 years
Maximum temperature	80°C	1 year
Accidental temperature	95°C	100h

Class 4: Underfloor heating and low temperature radiators | Design pressure 8 bar

Type	Temperature	Lifetime
Design temperature	20°C Followed by 40°C Followed by 60°C	2,5 years 20 years 25 years
Maximum temperature	70°C	2,5 years
Accidental temperature	100°C	100h

Class 5: High temperature radiators | Design pressure 8 bar

Type	Temperature	Lifetime
Design temperature	20°C Followed by 60°C Followed by 80°C	14 years 25 years 10 years
Maximum temperature	90°C	1 years
Accidental temperature	100°C	100h

** A country may select either class 1 or class 2 to conform to its national regulations.*

1.6 PE100 carrier pipe

The carrier pipe for cold and cooling applications (COOL) is PE 100 (MRS 10) in black color with blue identification stripes. The pipe is intended for the supply of drinking water and raw water prior to treatment, compliant with the requirements of the international standards EN 12201, ISO 4427 and EN 1622 and the national regulations for drinking water.

Chemical resistance

In the event it is necessary to evaluate the chemical resistance of PE 100 for specific installations, the pipes shall be classified in accordance with international guidelines (i.e. standard ISO/TR 10358). For a few chemical substances used at 20 °C the resistance is classified as in the below table:

Chemical	Resistance
Ethylene glycol	satisfactory resistance
Ethyl alcohol (40%)	satisfactory resistance
Chlorine (sol.)	limited resistance
Sodium chloride (2%)	satisfactory resistance
Chlorine dioxide	not satisfactory resistance

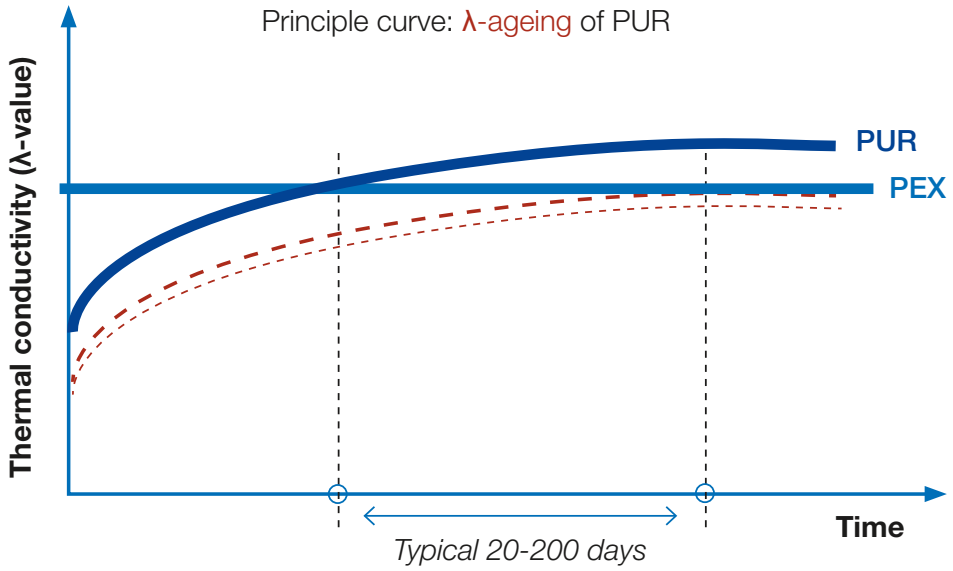
1.7 Insulating material

The insulating material used consists of microcellular, cross-linked polyethylene foam. In addition to the excellent insulating properties, the closed-cell structure of the material ensures that there is only minimal water absorption. The material is CFC free.

Durable insulation performance

The durable insulation performance of the Microflex pipe is extremely resistant to aging. The phenomenon that similar pipe systems insulated with PUR foam partially lose their original insulating effect due to the diffusion of volatile blowing agents is better known as lambda aging. Thanks to the closed cell structure of the Microflex polyethylene foam, an optimal quality preservation with constant insulation performance throughout its long service life is ensured.

In addition, the coiling and bending of PUR foam pipe systems causes breaks in the insulation, which consequently have a major impact on the thermal performance of the system. The shape memory of the cross-linked polyethylene foam from Microflex, on the other hand, makes the insulation permanently elastic and ensures the continuance of the initial insulation performance, even after repeated rolling, unrolling and bending of the system.



Insulation properties		Standard	Value
Density	-	ISO 845	30 kg/m^3
Tensile strength	longitudinal	ISO 1798	0,30 MPa
	transversal		0,25 MPa
Elongation at fracture	longitudinal	ISO 1798	140%
	transversal		145%
Crush strength	10%	ISO 3386-1	16,6 KPa
	25%		35,7 KPa
	50%		94 KPa
Thermal stability		ISO 2796	95° C
Compression Set 22h, 25%, 23°	0,5h	ISO 1856	16,6%
	24h		8,1%
Service temperature		-	-80÷110°C
Water absorption after 28 days		DIN ISO 2896	< 3 % Vol.
Hardness	Shore A	ISO R.868	12
Thermal conductivity at 40°C		ASTM C-177	0,0372 W/m K

1.8 Corrugated PE-HD double-walled casing

The UV-resistant outer casing in dark blue color is made from PE-HD according to the “closed chamber” principle, protects the inner pipe as well as the insulating material from external impacts. The ribs of the corrugated outer cover are completely closed; water ingress due to superficial damage to the outer cover is therefore impossible. Due to the corrugated structure, the piping has longitudinal flexibility and resistance to impacts.

Microflex piping is very robust and resistant to aggressive substances.

1.9 Dimensions of coils

The standard length of a coil is 100m. Tailored lengths can be cut. The coils are designed to fit standard HGV trailers and containers. For transport and storage specifications see installation manual.

Casing Ø (mm)	Coil Inner Ø (mm)	Coil Outer Ø (mm)	Coil Width (mm)
Microflex UNO			
75	1200	1900	300
90	1200	1850	500
125	1200	2100	700
160	1200	2350	850
200	1200	2300	1400
Microflex DUO for Central Heating–Cooling Systems			
125	1200	2100	700
160	1200	2350	850
200	1200	2300	1400
Microflex QUADRO			
160	1200	2350	850
200	1200	2300	1400

2. Product range

2.1 Pre-Insulated pipes

Heating pipes

UNO

Art. No.	PE-Xa d_out x s (mm)	DN	Outer Casing d_out (mm)	Weight (kg/m)	Inner Bending Radius (1) (m)	Average Thickness of Insulation (mm)
Microflex UNO PN 6/95° - SDR 11						
M7525C	25x2,3	20	75	0,68	0,20	20
M9032C	32x2,9	25	90	1,00	0,25	22
M12525C	25x2,3	20	125	1,32	0,30	42
M12532C	32 x 2,9	25	125	1,48	0,30	40
M16032C	32 x 2,9	25	160	1,96	0,35	55
M9040C	40x3,7	32	90	1,11	0,30	20
M12540C	40x3,7	32	125	1,72	0,30	35
M16040C	40x3,7	32	160	2,32	0,35	53
M12550C	50x4,6	40	125	1,92	0,40	30
M16050C	50x4,6	40	160	2,48	0,45	48
M12563C	63x5,8	50	125	2,16	0,50	24
M16063C	63x5,8	50	160	2,78	0,55	40
M16075C	75x6,8	65	160	2,98	0,75	33
M20075C	75x6,8	65	200	4,16	0,80	51
M16090C	90x8,2	75	160	3,35	1,00	27
M20090C	90x8,2	75	200	4,73	1,10	45
M200110C	110x10	90	200	5,64	1,20	33
M200125C	125x11,4	100	200	6,50	1,40	28

DUO

Art. No.	PE-Xa d_out x s (mm)	DN	Outer Casing d_out (mm)	Weight (kg/m)	Inner Bending Radius (1) (m)	Average Thickness of Insulation (mm)
Microflex DUO PN 6/95° - SDR 11						
MD12525C	2x25x2,3	20	125	1,57	0,30	24
MD16025C	2x25x2,3	20	160	2,21	0,50	40
MD12532C	2x32x2,9	25	125	1,77	0,30	22
MD16032C	2x32x2,9	25	160	2,41	0,50	37
MD20032C	2x32x2,9	25	200	3,90	0,75	53
MD16050C	2x50x4,6	40	160	2,98	0,60	20
MD16040C	2x40x3,7	32	160	2,63	0,60	30
MD20040C	2x40x3,7	32	200	4,00	0,8	45
MD20050C	2x50x4,6	40	200	4,03	0,80	36
MD20063C	2x63x5,8	50	200	4,64	1,20	22

(1) Applicable practical values without risk of pipe distortion or damage.

Sanitary pipes

UNO

Art. No.	PE-Xa d_out x s (mm)	DN	Outer Casing d_out (mm)	Weight (kg/m)	Inner Bending Radius (1) (m)	Average Thickness of Insulation (mm)
Microflex UNO PN 10/95° - SDR 7,4						
M7522S	22x3,0	15	75	0,65	0,20	22
M7525S	25x3,5	20	75	0,75	0,20	20
M7528S	28x4,0	20	75	1,00	0,25	20
M7532S	32x4,4	25	75	1,08	0,25	15
M9018S	18x2,5	15	90	0,92	0,25	30
M9032S	32x3,5	25	90	1,20	0,25	22
M9040S	40x5,5	32	90	1,32	0,30	20
M12525S	25x3,5	20	125	1,43	0,30	42
M12528S	28x4,0	20	125	1,51	0,30	42
M12532S	32x4,4	25	125	1,60	0,40	40
M12540S	40x5,5	32	125	1,89	0,40	35
M12550S	50x6,9	40	125	2,19	0,50	30
M12563S	63x8,7	50	125	2,59	0,60	24
M16032S	32x4,4	25	160	2,55	0,60	55
M16040S	40x5,5	32	160	2,84	0,60	53
M16050S	50x6,9	40	160	3,09	0,70	48
M16063S	63x8,7	50	160	3,18	0,80	40
M20075S	75x10,3	65	200	4,29	1,20	51
M20090S	90x12,3	75	200	5,10	1,40	45
M200110S	110x15,1	90	200	6,15	1,50	33

DUO

Art. No.	PE-Xa d_out x s (mm)	DN	Outer Casing d_out (mm)	Weight (kg/m)	Inner Bending Radius (1) (m)	Average Thickness of Insulation (mm)
Microflex DUO - SANITARY Microflex DUO PN 10/95° - SDR 7,4						
MD1252818S	1x28x4 1x18x2,5	20-15	125	1,67	0,30	24
MD1253222S	1x32x4,4 1x22x3	25-15	125	1,86	0,30	22
MD1252520S	1x25x3,5 1x20x2,8	20-15	125	1,65	0,30	24
MD1253225S	1x32x4,4 1x25x3,5	25-20	125	1,94	0,30	22
MD16025S	2x25x3,5	20	160	2,35	0,50	40
MD1603218S	1x32x4,4 1x18x2,5	25-15	160	2,42	0,50	37
MD1603225S	1x32x4,4 1x25x3,5	25-20	160	2,50	0,50	37
MD1603228S	1x32x4,4 1x28x4	25-20	160	2,60	0,60	37
MD1604025S	1x40x5,5 1x25x3,5	32-20	160	2,71	0,60	30
MD1604028S	1x40x5,5 1x28x4	32-20	160	2,78	0,60	30
MD1604032S	1x40x5,5 1x32x4,4	32-25	160	2,88	0,60	30
MD1605025S	1x50x6,9 1x25x3,5	40-20	160	2,89	0,60	27
MD1605032S	1x50x6,9 1x32x4,4	40-25	160	3,04	0,60	27
MD1605040S	1x50x6,9 1x40x5,5	40-32	160	3,18	0,70	20
MD20063S	2 x 63x8,7	50	200	4,96	1,20	22

(1) Applicable practical values without risk of pipe distortion or damage.

Heating and sanitary

Art. No.	PE-Xa d_out x s (mm)	DN	Outer Casing d_out (mm)	Weight (kg/m)	Inner Bending Radius (1) (m)	Average Thickness of Insulation (mm)
Microflex QUADRO Heating /cooling: PN6/SDR11 - Sanitary: PN10/SDR7.4						
MQ16025C2520S	2x25x2,3 1x25x3,5 1x20x2,8	20-20-20-15	160	2,40	0,60	33
MQ16025C2818S	2x25x2.3 1x28x4 1x18x2,5	20-20-20-15	160	2,58	0,60	33
MQ16032C2520S	2x32x2,9 1x25x3,5 1x20x2,8	25-25-20-15	160	2,60	0,60	30
MQ16032C2818S	2x32x2.9 1x28x4 1x18x2,5	25-25-20-15	160	2,64	0,60	30
MQ16032C3218S	2x32x2,9 1x32x4,4 1x18x2,5	25-25-25-15	160	2,67	0,60	30
MQ16032C3225S	2x32x2,9 1x32x4,4 1x25x3,5	25-25-25-20	160	2,70	0,60	30
MQ20040C4028S	2x40x3,7 1x40x5,5 1x28x4	32-32-32-20	200	4,12	1,30	33
MQ20040C4032S	2x40x3,7 1x40x5,5 1x32x4,4	32-32-32-25	200	4,14	1,30	33

Cool without Self-Regulating Heating Cable

Art. No.	PE-Xa d_out x s (mm)	DN	Outer Casing d_out (mm)	Weight (kg/m)	Inner Bending Radius (1) (m)	Average Thickness of Insulation (mm)
Microflex COOL UNO without Self-Regulating Heating Cable PN 16/25°C - SDR 11						
M9032PE	32x2,9	25	90	1,00	0,25	22
M9040PE	40x3,7	32	90	1,11	0,30	20
M12550PE	50x4,6	40	125	1,92	0,40	30
M12563PE	63x5,7	50	125	2,16	0,50	24
M16075PE	75x6,8	65	160	3,20	0,75	33
M16090PE	90x8,2	75	160	3,85	1,00	27
M200110PE	110x10	90	200	5,74	1,20	33
M200125PE	125x11,4	100	200	6,10	1,40	28

Art. No.	PE-Xa d_out x s (mm)	DN	Outer Casing d_out (mm)	Weight (kg/m)	Inner Bending Radius (1) (m)	Average Thickness of Insulation (mm)
Microflex COOL DUO PN 16/25°C - SDR 11						
MD12532PE	2x32x2,9	25	90	1,00	0,30	22
MD16040PE	2x40x3,7	32	90	1,11	0,60	30
MD16050PE	2x50x4,6	40	125	1,92	0,60	20
MD20063PE	2x63x5,7	50	125	2,16	1,20	22

(1) Applicable practical values without risk of pipe distortion or damage.

Cool with Self-Regulating Heating Cable

Art. No.	PE-Xa d_out x s (mm)	DN	Outer Casing d_out (mm)	Weight (kg/m)	Inner Bending Radius (1) (m)	Average Thickness of Insulation (mm)
Microflex COOL UNO with Self-Regulating Heating Cable PN 16/25°C - SDR 11						
MV7532PE	32x2,9	25	75	0,81	0,25	15
MV9040PE	40x3,7	32	90	1,26	0,30	20
MV12550PE	50X4,6	40	125	2,00	0,40	30
MV12563PE	63x5,7	50	125	2,25	0,50	24
MV16075PE	75x6,8	65	160	3,30	0,75	33
MV16090PE	90x8,2	75	160	3,95	1,00	27
MV200110PE	110x10	90	200	5,84	1,20	33
MV200125PE	125x11,4	100	200	6,10	1,40	28

2.2 Couplings

All PE-X-couplings are made of brass (EN 12165). All clamping rings are made of brass that is resistant to dezincification (DZR–ISO 6509). The material of the pipe sections meets the latest potable water directives.

2.2.1 PE-X couplings for heating and cool pipes PN 6 (PN 16)–SDR 11

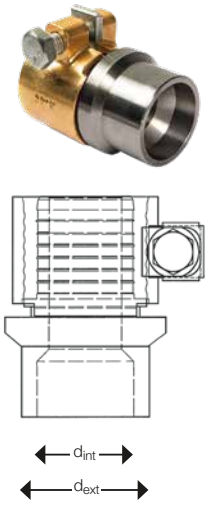
Art. No.	PE-X d_out/s (mm)	Thread (inch)	Ø Outer Diameter of Pipe (mm)
PE-X Coupling heating - 6/16 Bar - M			
MJ3413425/23	25/2.3	3/4"M	25
MJ3414432/29	32/2.9	1"M	32
MJ3415440/37	40/3.7	1 1/4"M	40
MJ341263/58	50/4.6	1 1/2"M	50
MJ3416450/46	63/5.8	2"M	63
MJ34121275/68	75/6.8	2 1/2"M	75
MJ341390/82	90/8.2	3"M	90
MJ3414110/10	110/10.0	4"M	110
MJ3414125/114	125/11.4	4"M	125

Art. No.	PE-X d_out/s (mm)	Thread (inch)	Ø Outer Diameter of Pipe (mm)
PE-X PE-X- coupling heating - 6/16 Bar			
MJ27025/23	25/2.3	2 x 3/4"	25x25
MJ27032/29	32/2.9	2 x 1"	32x32
MJ27040/37	40/3.7	2 x 1 1/4"	40x40
MJ27050/46	50/4.6	2 x 1 1/2"	50x50
MJ27063/58	63/5.8	2 x 2"	63x63
MJ27075/68	75/6.8	2 x 2 1/2"	75x75
MJ27090/82	90/8.2	2 x 3"	90x90
MJ270110/10	110/10.0	2 x 4"	110x110
MJ270125/114	125/11.4	2 x 4"	125x125

Art. No.	PE-X d_out/s (mm)	Thread (inch)	Ø Outer Diameter of Pipe (mm)
PE-X PE-X elbow coupling heating - 6/16 Bar			
MJ9025/23	25/2.3	2x3/4"	25x25
MJ9032/29	32/2.9	2x1"	32x32
MJ9040/37	40/3.7	2x1 1/4"	40x40
MJ9050/46	50/4.6	2x1 1/2"	50x50
MJ9063/58	63/5.8	2x2"	63x63
MJ9075/68	75/6.8	2x2 1/2"	75x75
MJ9090/82	90/8.2	2x3"	90x90
MJ90110/10	110/10.0	2x4"	110x110
MJ90125/114	125/11.4	2x4"	125x125

(1) Applicable practical values without risk of pipe distortion or damage.

Art. No.	PE-X d_out/s (mm)	Thread (inch)	Ø Outer Diameter of Pipe (mm)
3 x PE-X T-coupling heating - 6/16 Bar			
MJ13025/23	25/2.3	3x3/4”	25x25x25
MJ13032/29	32/2.9	3x1”	32x32x32
MJ1304032/37	40/3.7+32/2.9	2x11/4”+1x1”	40x32x40
MJ13040/37	40/3.7	3x11/4”	40x40x40
MJ13050/46	50/4.6+40/3.7	2x11/2”+1x11/4”	50x40x50
MJ1305040/46	50/4.6	3x11/2”	50x50x50
MJ13063/58	63/5.8+50/4.6	2x2”+1x11/2”	63x50x63
MJ1306350/58	63/5.8	3x2”	63x63x63
MJ13075/68	75/6.8	3x21/2”	75x75x75
MJ13090/82	90/8.2	3x3”	90x90x90
MJ130110/10	110/10.0	3x4”	110x110x110
MJ130125/114	125/11.4	3x4”	125x125x125



Art. No.	PE-X d_ext/s (mm)	Weld-end dext (mm)	Weld-end dint (mm)
Weld end coupling heating - 6/16 Bar			
MJ3412725/23L	25/2.3	26.90	21.50
MJ3413332/29L	32/2.9	33.70	27.00
MJ3414240/37L	40/3.7	42.40	36.00
MJ3414550/46L	50/4.6	48.30	42.00
MJ3415763/58L	63/5.8	60.30	53.00
MJ3417675/68L	75/6.8	76.10	68.00
MJ3418990/82L	90/8.2	88.90	80.00
MJ341110110/10L	110/10.0	114.30	105.00
MJ341114125/114L	125/11.4	114.30	105.00

2.2.2 PE-X couplings for sanitary pipes - PN 10 - SDR 7,4

Art. No.	PE-X d_out/s (mm)	Thread (inch)	Ø Outer Diameter of Pipe (mm)
PE-X coupling sanitary - 10 Bar			
MJ3413420/28	20/2.8	3/4”M	20
MJ3413425/35	25/3.5	3/4”M	25
MJ3414432/44	32/4.4	1”M	32
MJ3415440/55	40/5.5	11/4”M	40
MJ3416450/69	50/6.9	11/2”M	50
MJ341263/87	63/8.7	2”M	63
MJ34121275/103	75/10.3	21/2”M	75
MJ341390/123	90/12.3	3”M	90
MJ3414110/151	110/15.1	4”M	110

Art. No.	PE-X d_out/s (mm)	Thread (inch)	Ø Outer Diameter of Pipe (mm)
PE-X PE-X-coupling sanitary - 10 Bar			
MJ27025/35	25/3.5	2x3/4”	25x25
MJ27032/44	32/4.4	2x1”	32x32
MJ27040/55	40/5.5	2x1 1/4”	40x40
MJ27050/69	50/6.9	2x1	50x50
MJ27063/87	63/8.7	2x2” 1/2”	63x63
MJ27075/103	75/10.3	2x1 1/2”	75x75
MJ27090/123	90/12.3	2x3”	90x90
MJ270110/151	110/15.1	2x4”	110x110

Art. No.	PE-X d_out/s (mm)	Thread (inch)	Ø Outer Diameter of Pipe (mm)
PE-X PE-X elbow coupling sanitary - 10 Bar			
MJ9025/35	25/3.5	2x3/4”	25x25
MJ9032/44	32/4.4	2x1”	32x32
MJ9040/55	40/5.5	2x1 1/4”	40x40
MJ9050/69	50/6.9	2x1 1/2”	50x50
MJ9063/87	63/8.7	2x2”	63x63
MJ9075/103	75/10.3	2x2 1/2”	75x75
MJ9090/123	90/12.3	2x3”	90x90
MJ90110/151	110/15.1	2x4”	110x110

Art. No.	PE-X d_out/s (mm)	Thread (inch)	Ø Outer Diameter of Pipe (mm)
3 x PE-X T coupling sanitary			
MJ13025/35	25/3.5	3x3/4”	25x25x25
MJ13032/44	32/4.4	3x1”	32x32x32
MJ13040/55	40/5.5+32/4.4	2x11/4”+ 1x1”	40x32x40
MJ1304032/55	40/5.5	3x11/4”	40x40x40
MJ13050/69	50/6.9+40/5.5	2x11/2“+1x11/4”	50x40x50
MJ13063/87	50/6.9	3x11/2”	50x50x50
MJ1306350/87	63/8.7+50/6.9	2x2”+1x11/2”	63x50x63
MJ1305040/69	63/8.7	3x2”	63x63x63
MJ13075/103	75/10.3	3x21/2”	75x75x75
MJ13090/123	90/12.3	3x3”	90x90x90
MJ130110/151	110/15.1	3x4”	110x110x110

2.2.3 Accessories for PE-X couplings

Suitable for applications where the ends of pipes need to be anchored. Fix points must be installed to absorb the possible effects of thermal expansion/shrinkage of the PEX-a transport pipes. The non-application of fix points may result in serious damage.

Art. No.	Thread (inch)
Fix point	
MFP34	3/4”MF
MFP44	1”MF
MFP54	1 1/4”MF
MFP64	1 1/2”MF
MFP2	2”MF
MFP212	2 1/2”MF
MFP3	3”MF
MFP4	4”MF

Sleeve in bronze with parallel female thread according to ISO 228.

Art. No.	Thread (inch)
Sleeve - FF	
VW27034	3/4”FF
VW27044	1”FF
VW27054	1 1/4”FF
VW27064	1 1/2”FF
VW2702	2”FF
VW270212	2 1/2”FF
VW2703	3”FF
VW2704	4”FF

Elbow in bronze with parallel female thread according to ISO 228.

Art. No.	Thread (inch)
Elbow piece 90° - FF	
VW9034	3/4”FF
VW9044	1”FF
VW9054	1 1/4”FF
VW9064	1 1/2”FF
VW902	2”FF
VW90212	2 1/2”FF
VW903	3”FF
VW904	4”FF

Tee in bronze with parallel female thread according to ISO 228.

Art. No.	Thread (inch)
T-piece - FFF	
VW13034	3/4”FFF
VW13044	1”FFF
VW13054	1 1/4”FFF
VW13064	1 1/2”FFF
VW1302	2”FFF
VW130212	2 1/2”FFF
VW1303	3”FFF
VW1304	4”FFF

Reducing bush in brass with parallel male and female thread according to ISO 228.

Art. No.	Thread (inch)
Reduction bush - M/F	
VW2414434	1”Mx3/4”F
VW2415434	1 1/4”Mx3/4”F
VW2415444	1 1/4”Mx1”F
VW2416434	1 1/2”Mx3/4”F
VW2416444	1 1/2”Mx1”F
VW2416454	1 1/2”Mx11/4”F
VW241234	2”Mx3/4”F
VW241244	2”Mx1”F
VW241254	2”Mx11/4”F
VW241264	2”Mx11/2”F
VW24121254	2 1/2”Mx11/4”F
VW24121264	2 1/2”Mx11/2”F
VW2412122	2 1/2”Mx2”F
VW241344	3”Mx1”F
VW241354	3”Mx11/4”F
VW241364	3”Mx11/2”F
VW24132	3”Mx2”F
VW2413212	3”Mx21/2”F
VW24142	4”Mx2”F
VW2414212	4”Mx21/2”F
VW24143	4”Mx3”F

Threaded flange of galvanized steel.

Art. No.	Thread (inch)
Flange	
MDF34	3/4”F
MDF44	1”F
MDF54	1 1/4”F
MDF64	1 1/2”F
MDF2	2”F
MDF212	2 1/2”F
MDF3	3”F
MDF4	4”F

Nipple made of nickel-plated brass with conical thread according to ISO 7.

Art. No.	Thread (inch)
Nipple - M	
VW28034	3/4”M
VW28044	1”M
VW28054	1 1/4”M
VW28064	1 1/2”M
VW2802	2”M
VW280212	2 1/2”M
VW2803	3”M
VW2804	4”M

Plug made of nickel-plated brass with parallel thread according to ISO 228.

Art. No.	Thread (inch)
Plug - M	
VW29034	3/4”M
VW29044	1”M
VW29054	1 1/4”M
VW29064	1 1/2”M
VW2902	2”M
VW290212	2 1/2”M
VW2903	3”M
VW2904	4”M

Stop valve made of nickel-plated brass with male thread.

Art. No.	Thread (inch)
Ball valve	
VW35034	3/4”M
VW35044	1”M
VW35054	1 1/4”M
VW35064	1 1/2”M
VW3502	2”M
VW350212	2 1/2”M
VW3503	3”M
VW3504	4”M

An anti-seize copper based lubrican. Provides a shield against seizing and galling.

Art. No.	Content
Micro-lubri	0.04 Kg

2.2.4 Plastic couplings for PE pipes

The PE couplings are made from Polypropylene and are for use in cold and cooling water systems. These are ideal for use in chlorine environments, e.g. swimming pool. Suitable for connecting PE carrier transport pipes.

Maximum working pressure at 20°C: 16 bar for 32–63mm

Maximum working pressure at 20°C: 10 bar for 75–110mm

Art. No.	PE d_out /S (mm)	Thread (inch)
	Male-threaded coupling	
MPP3414432/29	32/2.9	1”M
MPP3415440/37	40/3.7	1 1/4”M
MPP3416450/46	50/4.6	1 1/2”M
MPP341263/58	63/5.8	2”M
MPP34121275/68	75/6.8	2 1/2”M
MPP341390/82	90/8.2	3”M
MPP3414110/10	110/10.0	4”M

Art. No.	PE d_out /S (mm)	PE-X d_out x dout (mm)
	PE x PE coupling	
MPP27032/29	32/2.9	32x32
MPP27040/37	40/3.7	40x40
MPP27050/46	50/4.6	50x50
MPP27063/58	63/5.8	63x63
MPP27075/68	75/6.8	75x75
MPP27090/82	90/8.2	90x90
MPP270110/10	110/10.0	110x110

Art. No.	PE d_out /S (mm)	PE-X d_out x dout (mm)
	PE x PE elbow piece	
MPP9032/29	32/2.9	32x32
MPP9040/37	40/3.7	40x40
MPP9050/46	50/4.6	50x50
MPP9063/58	63/5.8	63x63
MPP9075/68	75/6.8	75x75
MPP9090/82	90/8.2	90x90
MPP90110/10	110/10.0	110x110

Art. No.	PE d_out /S (mm)	PE-X d_out x d_out x d_out (mm)
	3 x PE T-piece	
MPP13032/29	32/2.9	32x32x32
MPP13040/37	40/3.7	40x32x40
MPP13050/46	50/4.6	50x40x50
MPP13063/58	63/5.8	63x63x63
MPP13075/68	75/6.8	75x75x75
MPP13090/82	90/8.2	90x90x90
MPP130110/10	110/10.0	110x110x110

2.3 Accessories

2.3.1 End caps

Dust caps

Dust caps at the ends of the pipe provides for a dust tight closure.

Art. No.	Ø Outer Casing	Ø Pipe
	Dust cap for microflex UNO	
MS7522	75	1x22
MS7525	75	1x25
MS7528	75	1x28
MS7532	75	1x32
MS9032	90	1x32
MS9040	90	1x40
MS12525	125	1x25
MS12528	125	1x28
MS12532	125	1x32
MS12540	125	1x40
MS12550	125	1x50
MS12563	125	1x63
MS16032	160	1x32
MS16040	160	1x40
MS16050	160	1x50
MS16063	160	1x63
MS16075	160	1x75
MS16090	160	1x90
MS20075	200	1x75
MS20090	200	1x90
MS200110	200	1x110
MS200125	200	1x125

Art. No.	Ø Outer Casing	Ø Pipe
	Dust cap for microflex DUO	
MSD12525	125	2x25
MSD1252520	125	1x25/1x20
MSD12532	125	2x32
MSD1253225	125	1x32/1x25
MSD16025	160	2x25
MSD16032	160	2x32
MSD1603225	160	1x32/1x25
MSD16040	160	2x40
MSD1604025	160	1x40/1x25
MSD16050	160	2x50
MSD1605025	160	1x50/1x25
MSD1605032	160	1x50/1x32
MSD20032	200	2x32
MSD20040	200	2x40
MSD20050	200	2x50
MSD20063	200	2x63

Art. No.	Ø Outer Casing	Ø Pipe
	Dust cap for microflex QUADRO	
MSQ160252520	160	3x25/1x20
MSQ160322520	160	2x32/1x25/1x20
MSQ160323225	160	3x32/1x25
MSQ200404032	200	3x40/1x32

Microflex heat shrinkable caps

Shrink caps are used for preventing the ingress of water between the outer casing and the insulated carrier pipe. Pressure resistant up to 0,3 bar.

Art. No.	Ø Outer Casing	Ø Pipe
	Heat shrink caps for UNO	
MK2000	75	25
MK2100	75/90	32 or 40
MK2200	125	40 or 50
MK2340	125	63
MK2400	160	40 or 50
MK2500	160	63 ÷ 90
MK2600	200	75 ÷ 125

Art. No.	Ø Outer Casing	Ø Pipe
	Heat shrink caps for DUO	
MK3250-P604	125	1x25/1x20
MK3250-P604	125	2x25
MK3250-P604	125	1x32/1x25
MK3280	125	2 x 32
MK3350-01	160	2x25 of 2x32
MK3350-02	160/200	2 x 40
MK3350-01	160	1x32/1x25
MK3350-02	160	1x40/1x25
MK3360-01	160	1x50/1x25
MK3350-03	160	1x50/1x32
MK3350-03	160	2x50
MK3350-03	200	2x 5
MK3350-05	200	2x63

Microflex EPDM rubber end caps

EPDM end caps are used for preventing the ingress of water between the outer casing and the insulated carrier pipe. Pressure resistant up to 0,3 bar.

Art. No.	Ø Outer Casing	Ø Pipe
	EPDM Rubber End-Cap for UNO	
MG751832	75	1 x 18, 25, 28, 32
MG901840	90	1 x 18, 25, 32, 40
MG1251832	125	1 x 18, 25, 28, 32
MG1252532	125	1 x 25, 28, 32
MG1254063	125	1 x 40, 50, 63
MG1603250	160	1 x 32, 40, 50
MG1606390	160	1 x 63, 75, 90
MG20075125	200	1 x 75, 90, 110, 125

Art. No.	Ø Outer Casing	Ø Pipe
	EPDM Rubber End-Cap for DUO	
MGD1251832	125	2 x 18, 20, 25, 28, 32
MGD1601840	160	2 x 18, 28, 32, 40
MGD1602550	160	2 x 25, 32, 40, 50
MGD2004063	200	2 x 40, 50, 63

Art. No.	Ø Outer Casing	Ø Pipe
	EPDM Rubber End-Cap for QUADRO	
MGQ1601832	160	2x25/32-1x18/20/25-1x25/28/32

2.3.2 Wall feed throughs

MICRO SEAL wall feed through (subterranean use)

This mechanically expanded water-resistant wall seal can be applied directly in drilled holes and built-in plastic and fibre-cement wall feedthroughs. It is designed for use under ground where the piping seals are exposed to ground water. The Micro Seal chain comprises a number of links that expand when tightened to produce a very tight seal. Pressure resistant up to 3 bar.

Art. No.	Outside Casing d_out (mm)	Wall opening (mm)	Torque Nm Max
9LS200	75	100-102	2
7LS300	75	110 - 115	6
8LS300	90	128- 132	6
9LS315	90	134-136	6
7LS475	125	200 - 202	20
6LS325	125	180 - 182	6
7LS325	160	209-212	6
7LS400	160	240-245	20
13LS300	160	200-202	6
9LS325	200	250-255	6
8LS400	200	275-282	20
10LS575	200	301-320	50

Other combinations are available on request.

MICRO PRESS Wall Penetration Seal - WATERPROOF

Wall penetration MICRO PRESS seals for pre-insulated pipe system with casing in PE. Versions for all Microflex pipe sizes and diameters: 2x40 and 1x40 mm. Extra soft rubber for low tightening torque with low danger of pipe deformations. MFPA approval up to 5 bar. Easy installation letting the pipe moving.

Standard version 1x40mm

Stainless steel pressure plates Bolts S304 Rubber size 1 x 40 mm Rubber: EPDM

Stainless steel pressure plates Bolts S304 Rubber size 1 x 40 mm Rubber: EPDM Art. No.	Core hole/ wallsleeve mm	Outer casing d_out (mm) min.	max.
M10527	125	70	78
M10532	150	69	78
M10534	150	85	94
M10540	200	88	103
M10543	200	119	128
M10553	250	156	165
M10557	250	197	202
M10567	300	198	207

Split version

Stainless steel pressure plates. SPLIT version Bolts S304 Rubber size 1 x 40 mm Rubber: EPDM
Suitable for applications where the pipe is already installed.

Stainless steel pressure plates. SPLIT version Bolts S304 Rubber size 1 x 40 mm Rubber: EPDM Art. No.	Core hole/ wallsleeve mm	Outer casing d_out (mm) min.	max.
M10627	125	70	78
M10632	150	69	78
M10634	150	85	94
M10641	200	88	103
M10643	200	119	128
M10653	250	156	165
M10657	250	197	202
M10667	300	198	207

Standard version 2x40mm

Stainless steel pressure plates Bolts S304 Rubber size 2 x 40 mm Rubber: EPDM

Stainless steel pressure plates Bolts S304 Rubber size 2 x 40 mm Rubber: EPDM	Core hole/ wallsleeve	Outer casing d_out (mm)	
Art. No.	mm	min.	max.
M10701	125	70	78
M10705	150	69	78
M10706	150	85	94
M10709	200	88	103
M10711	200	119	128
M10718	250	156	165
M10722	250	197	202
M10727	300	198	207

MMDV wall feedthrough (above ground / surface use)

The MMDV wall feedthrough comprises a corrugated PE-HD pipe and shrink sleeve. The feedthrough seals are designed to withstand typical weather conditions and are resistant to water splashing. After the pipe is bricked in (protruding 10cm out of the wall), the Microflex pipe is fed through and sealed with the shrink sleeve. The maximum wall thickness is 40cm.

Art. No.	Microflex Pipe with Casing d_out (mm)	Wall Feedthrough Pipe d_out (mm)	Wall hole (mm)
MMDV75	75	110	210
MMDV90	90	110	210
MMDV125	125	160	260
MMDV160	160	200	300
MMDV200	200	235	350

2.3.3 Insulation sets

Microflex insulated T-Piece Kit

Guarantees complete insulation and sealing of branch connections between UNO, DUO and QUADRO pipes. The kit comprises 2 halves in PE-HD, Rockwool insulation, bitumen rubber sealer kit, stainless steel bolts and assembly instructions. Heat shrinkable caps MK or rubber end caps MG to be ordered separately.

Art. No.	Microflex Pipe with Casing d_out (mm)	L (mm)	W (mm)	h (mm)	Weight (Kg)
MT129075	125/90/75	970	580	190	7,7
MT201612	200/160/125	1210	795	270	11,1

Microflex insulated double T-Piece Kit

Guarantees complete insulation and sealing of branch connections between UNO, DUO and QUADRO pipes. The kit comprises 2 halves in PE-HD, Rockwool insulation, bitumen rubber sealer kit, stainless steel bolts and assembly instructions. Heat shrinkable caps MK or rubber end caps MG to be ordered separately.

Art. No.	Microflex Pipe with Casing d_out (mm)	L (mm)	W (mm)	h (mm)	Weight (Kg)
MDT201612	200/160/125	1180	1180	270	20,4

Microflex reducers for insulated T-Piece Kit MT201612 and MDT201612

Used where a transition from a 160mm outer casing to 90mm or 75mm is necessary. Reducers comprise an outside casing with interior insulation and a shrink sleeve. The reducer is pressed into the insulated T-piece kit. Heat shrinkable caps MK or rubber end caps MG to be ordered separately.

Art. No.	
MR24116075	Reducer for insulation kit

Microflex insulated straight coupling Kit

Guarantees complete insulation and sealing of straight connections between UNO, DUO and QUADRO pipes. The kit comprises 2 halves in PE-HD, Rockwool insulation, bitumen rubber sealer kit, stainless steel bolts and assembly instructions. Heat shrinkable caps MK or rubber end caps MG to be ordered separately.

Art. No.	Microflex Pipe with Casing d_out (mm)	L (mm)	W (mm)	h (mm)	Weight (Kg)
MM129075	125/90/75	970	250	200	5,5
MM201612	200/160/125	1210	380	270	7,7

Microflex insulation straight coupling Kit - Alternative

Guarantees complete insulation and sealing of straight extensions between UNO, DUO and QUADRO pipes. The kit comprises a connection piece, 2 shrink sleeves, Rockwool insulation, adhesive tape and assembly instructions. Heat shrinkable caps MK or rubber end caps MG to be ordered separately.

Art. No.	Microflex Pipe with Casing d_out (mm)	L (mm)
MM75/90	75/90	700
MM125	125	850
MM160	160	1000
MM200	200	1000

Microflex insulated 90° elbow Kit

Guarantees complete insulation and sealing of perpendicular connections between UNO, DUO and QUADRO pipes. The kit comprises 2 halves in PE-HD, Rockwool insulation, bitumen rubber sealer kit, stainless steel bolts and assembly instructions. Heat shrinkable caps MK or rubber end caps MG to be ordered separately.

Art. No.	Microflex Pipe with Casing d_out (mm)	L (mm)	W (mm)	h (mm)	Weight (kg)
MH201612	200/160/125	740	740	270	7,5

Microflex insulated Y-Piece Kit

Guarantees complete insulation and sealing of straight connections between 1 Quadro and 2 Duo or 1 Duo to 2 Uno pipes. The kit comprises 2 halves in PE-HD, Rockwool insulation, bitumen rubber sealer kit, stainless steel bolts and assembly instructions. Heat shrinkable caps MK or rubber end caps MG to be ordered separately.

Art. No.	Microflex Pipe with Casing d_out (mm)	L (mm)	W (mm)	h (mm)	Weight (kg)
MBR201612	200/160/125	1170	460	230	7,0
IN	200/160/125				
OUT	160/125				

Inspection chamber

Can be used as an alternative for MM, MT, MDT or MBR insulation kits. The PE-HD inspection chamber has 6 connection points, enabling connections of different pipes and integration of shut off valves. The kit comprises inspection chamber, lid, stainless steel bolts, bitumen rubber sealer kit and assembly instructions. Heat shrinkable caps MK or rubber end caps MG and shrink sleeves to be ordered separately.

Art. No.	Microflex Pipe with Casing d_out (mm)	Diameter MIS (mm)	H	Weight (kg)
MIS	200/160/125	810	770	35

	Outside Casing d_out(mm)
	Shrink sleeve
MHM125	125
MHM160	160
MHM235	200

2.3.4 Accessories outer casing

Repair tape

Used to repair incidental local damage to the outside casing.
MHB200: Heat-shrinkable wrapping tape
MHK150: Cold-applied wrapping tape

Art. No.	Repair Tape	L x W (m)
MHB200	Heat-shrinkable tape	10 m x 0,20 m
MHK150	Cold-applied tape	10 m x 0,15 m

Shrink sleeve

Used to seal connections made to an Inspection Chamber and to repair incidental local damage to the casing. Slide the sleeve over the damaged area, heat with hot air (be sure not to burn the outside casing) and apply gentle pressure whilst wearing protective gloves.

Art. No.	Outside Casing d_out (mm)	Width (mm)
MHM75/90	75-90	220
MHM125	125	220
MHM160	160	220
MHM200	200	220

Warning tape

Used to show the location of underground pipes during excavation work. The tape is placed in the trenches above the pre-insulated pipe.

Art. No.	Warning tipe	Length (m)
MTRB	ATTENTION: water pipe with heating cable (blue)	250
MTRW	ATTENTION: water pipe (red)	250

2.3.5 Accessories for connection heating cable

Ambient thermostat MVTH

The thermostat switches power to the heating cable depending on the changing ambient temperature. The use of this thermostat is strongly recommended because it prevents the heating cable from being powered on at all times and so cuts energy consumption and prevents possible over-heating.

- Operation: Automatic/EN 60730-1
- Protection Level: IP 54/EN 60529
- Regulating Range: -10÷40°C
- Differential: ΔT=2°C at 16A
- Maximum Current: 16A/230VAC
- Voltage: 230VAC

MVBOX

This PVC distribution box connects the heating cable to the current feed.

- Protection level: IP55

MVKITGR10W/MVKITGR18W

One kit comprising:

- 3 shrink sleeves to insulate the feed wire and the earthing of the heating cable
- 1 shrink sleeve to insulate the heating cable at the connection
- 1 bulkhead feedthrough for the MVBOX

MVKITM10W/MVKITM18W

Used for the connection of one or more straight extensions, with a maximum length of 100m.

One kit comprising:

- 1 x MVBOX
- 2 x MVKITGR10W/MVKITGR18W10W/MVKITGR10W/MVKITGR18W18W

MVKITT10W/MVKITT18W

Used for the connection of one or more T-piece extensions, with a maximum length of 100m.

One kit comprising:

- 1 x MVBOX
- 3 x MVKITGR10W/MVKITGR18W

Art. No.	
MVTH	Microflex thermostat
MVBOX	Microflex connection box
MVKITGR10W	Microflex connection kit for cable
MVKITGR18W	Microflex connection kit for cable
MVKITM10W	1 x MVBOX + 2 x MVKITGR10W
MVKITM18W	1 x MVBOX + 2 x MVKITGR18W
MVKITT10W	1 x MVBOX + 3 x MVKITGR10W
MVKITT18W	1 x MVBOX + 3 x MVKITGR18W

ATTENTION!

At 0°C heating cable must not be longer than 100m; if length is over 100m, more than one power source point should be foreseen; in anycase at least 1 each 100m length.

3. Installation data

3.1 Equivalent Pipe Length for a Bending Angle of 45° and 90°

	Pipe Model	Bending Radius (m)	Equivalent Pipe Length (m) for a Bending Angle of:	
			90°	45°
Standard	M7525C	0,20	0,37	0,19
	M9032C	0,25	0,46	0,23
	M16040C	0,35	0,68	0,34
	M16050C	0,45	0,83	0,42
	M16063C	0,55	0,99	0,49
	M20075C	0,80	1,41	0,71
	M20090C	1,10	1,88	0,94
	M200110C	1,20	2,04	1,02
	M200125C	1,40	2,36	1,18
	MD16025C	0,50	0,91	0,46
	MD16032C	0,50	0,91	0,46
	MD16040C	0,60	1,07	0,53
	MD20050C	0,80	1,41	0,71
	MD20063C	1,20	2,04	1,02
Primo	M9040C	0,30	0,54	0,27
	M12540C	0,30	0,57	0,28
	M12550C	0,40	0,73	0,36
	M12563C	0,50	0,88	0,44
	M16075C	0,75	1,30	0,65
	M16090C	1,00	1,70	0,85
	MD12525C	0,30	0,57	0,28
	MD12532C	0,30	0,57	0,28
	MD16050C	0,60	1,07	0,53

3.2 Pipe capacity

Microflex PEX-a for Central Heating PN 6-SDR 11

Ø Pipe/Pipe Thickness mm	Ø Outer Pipe Diameter mm	Pipe Capacity l/sec.
25/2,3	25	0,327
32/2,9	32	0,539
40/3,7	40	0,835
50/4,6	50	1,307
63/5,8	63	2,075
75/6,8	75	2,961
90/8,2	90	4,254
110/10,0	110	6,362
125/11,4	125	8,203

Microflex PEX-a for Sanitary PN 10-SDR 7,4

Ø Pipe/Pipe Thickness mm	Ø Outer Pipe Diameter mm	Pipe Capacity l/sec.
20/2,8	20	0,163
25/3,5	25	0,254
32/4,4	32	0,423
40/5,5	40	0,660
50/6,9	50	1,029
63/8,7	63	1,633
75/10,3	75	2,309
90/2,3	90	3,318
110/15,1	110	4,962

3.3 Determine the necessary power of the heat source

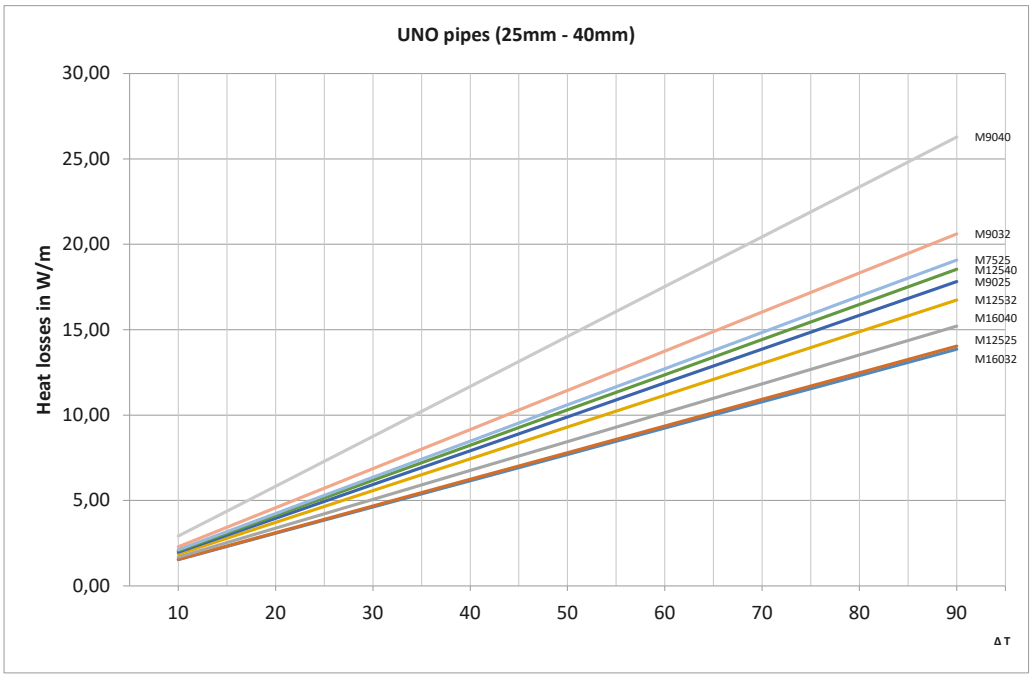
The necessary power of the heat source is calculated as a function of the required capacity and the heat loss of the network.
To calculate the heat loss one has to take into account the following factors:

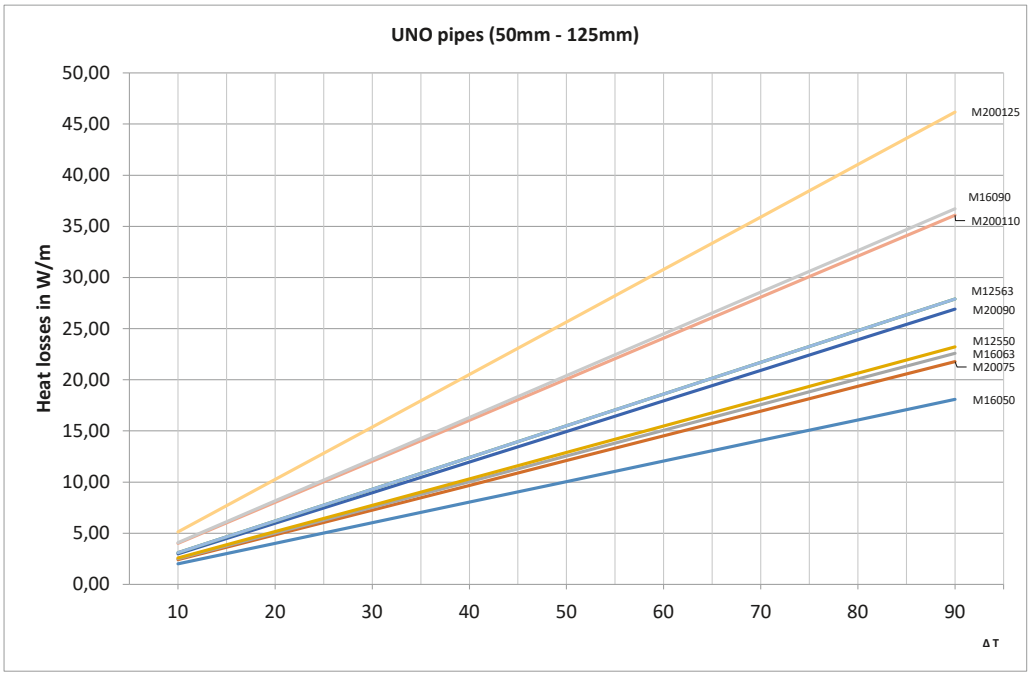
- λ insulation: 0.0335 W/m.K at 10°C
  0.0372 W/m.K at 40°C
- λ ground: 1 W/mK
- λ PEX-a pipe: 0,35 W/mK
- Depth of cover over top of pipe: 80cm

3.4 Heat loss graphs

MICROFLEX® UNO range

Heat losses in W/m



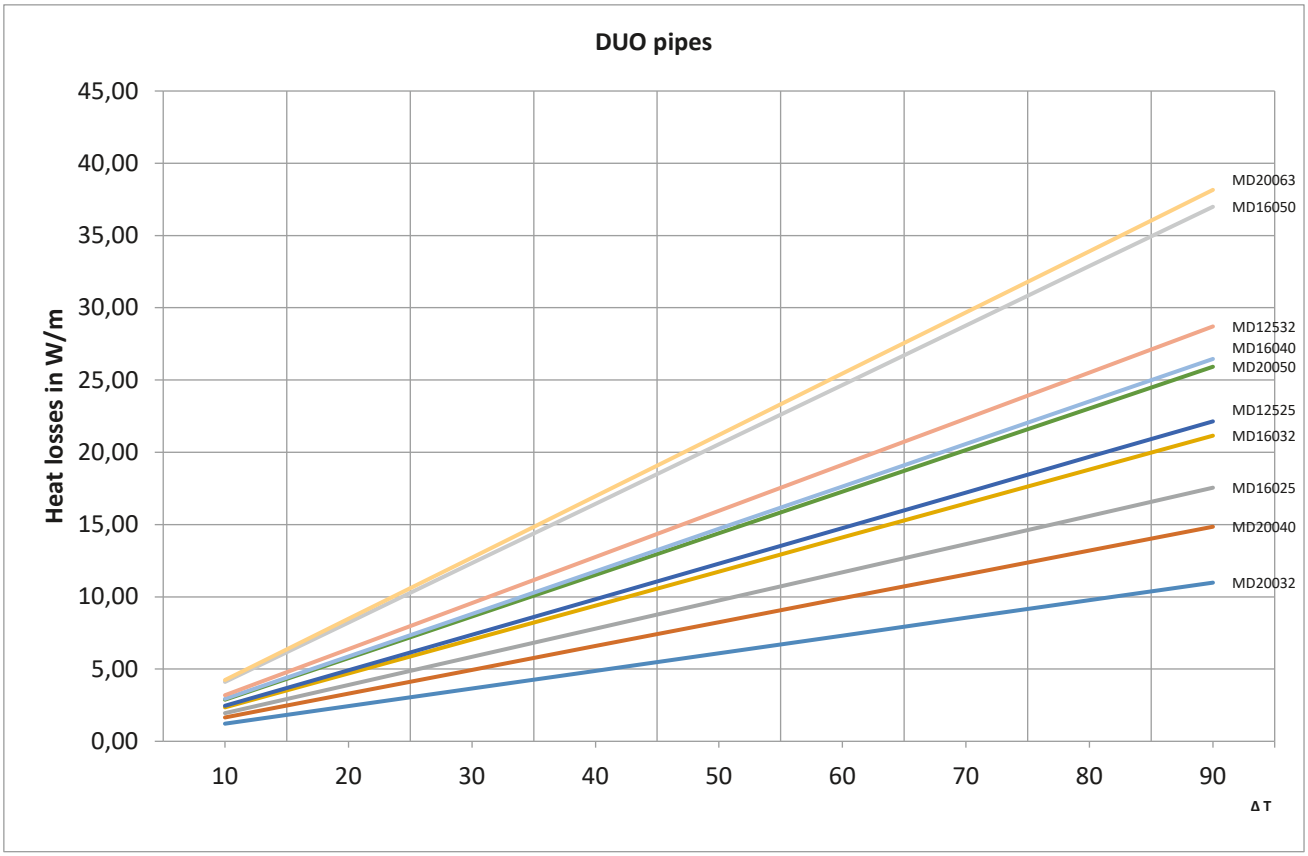


For UNO $\Delta T = T_v - T_o$	T_v : Flow temperature T_o : Ground temperature

Using the above graphs the heat loss per meter can be calculated for a temperature differential (ΔT) between the pipe media and the ground temperature.

MICROFLEX® DUO Range

Heat losses in W/m



For Duo

$$\Delta T = \frac{(T_v + T_r)}{2} - T_o$$

T_v : Flow temperature
T_r : Return temperature
T_o : Ground temperature

Using the above graphs the heat loss per meter can be calculated for a temperature differential (ΔT) between the pipe media and the ground temperature.

3.5 U-values UNO & DUO pipes

Tables-UNO pipes

NB: The temperature value displayed above the different columns gives the temperature differential (ΔT) between the ground temperature and the pipe temperature.

		ΔT [°C]								
U-value	**Type**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
0,154	M16032	1,54	3,08	4,62	6,16	7,70	9,24	10,78	12,32	13,86
0,156	M12525	1,56	3,12	4,68	6,24	7,80	9,36	10,92	12,48	14,04
0,169	M16040	1,69	3,38	5,07	6,76	8,45	10,14	11,83	13,52	15,21
0,186	M12532	1,86	3,72	5,58	7,44	9,30	11,16	13,02	14,88	16,74
0,198	M9025	1,98	3,96	5,94	7,92	9,90	11,88	13,86	15,84	17,82
0,201	M16050	2,01	4,02	6,03	8,04	10,05	12,06	14,07	16,08	18,09
0,206	M12540	2,06	4,12	6,18	8,24	10,30	12,36	14,42	16,48	18,54
0,212	M7525	2,12	4,24	6,36	8,48	10,60	12,72	14,84	16,96	19,08
0,229	M9032	2,29	4,58	6,87	9,16	11,45	13,74	16,03	18,32	20,61
0,242	M20075	2,42	4,84	7,26	9,68	12,10	14,52	16,94	19,36	21,78
0,251	M16063	2,51	5,02	7,53	10,04	12,55	15,06	17,57	20,08	22,59
0,258	M12550	2,58	5,16	7,74	10,32	12,90	15,48	18,06	20,64	23,22
0,292	M9040	2,92	5,84	8,76	11,68	14,60	17,52	20,44	23,36	26,28
0,299	M20090	2,99	5,98	8,97	11,96	14,95	17,94	20,93	23,92	26,91
0,31	M16075	3,10	6,20	9,30	12,40	15,50	18,60	21,70	24,80	27,90
0,345	M12563	3,45	6,90	10,35	13,80	17,25	20,70	24,15	27,60	31,05
0,401	M200110	4,01	8,02	12,03	16,04	20,05	24,06	28,07	32,08	36,09
0,408	M16090	4,08	8,16	12,24	16,32	20,40	24,48	28,56	32,64	36,72
0,513	M200125	5,13	10,26	15,39	20,52	25,65	30,78	35,91	41,04	46,17

Tables-DUO pipes

NB: The temperature value displayed above the different columns gives the temperature differential between the ground temperature and the pipe temperature (average temperature between the flow and the return).

		ΔT [°C]								
U-value	**Type**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
0,122	MD20032	1,22	2,44	3,66	4,88	6,10	7,32	8,54	9,76	10,98
0,165	MD20040	1,65	3,30	4,95	6,60	8,25	9,90	11,55	13,20	14,85
0,195	MD16025	1,95	3,90	5,85	7,80	9,75	11,70	13,65	15,60	17,55
0,235	MD16032	2,35	4,70	7,05	9,40	11,75	14,10	16,45	18,80	21,15
0,246	MD12525	2,46	4,92	7,38	9,84	12,30	14,76	17,22	19,68	22,14
0,288	MD20050	2,88	5,76	8,64	11,52	14,40	17,28	20,16	23,04	25,92
0,294	MD16040	2,94	5,88	8,82	11,76	14,70	17,64	20,58	23,52	26,46
0,319	MD12532	3,19	6,38	9,57	12,76	15,95	19,14	22,33	25,52	28,71
0,411	MD16050	4,11	8,22	12,33	16,44	20,55	24,66	28,77	32,88	36,99
0,424	MD20063	4,24	8,48	12,72	16,96	21,20	25,44	29,68	33,92	38,16

3.6 Pressure loss tables heating pipes

Pipe Rugosity: 0.007 mm, Water density: 0,971.90 g/cm³, Water temperature: 80°C.

Heating Capacity [kW] at a given ΔT [K]							Flow [l/sec]	25 x 2,3		32 x 2,9	
5	10	15	20	25	30	40		m/s	Pa/m	m/s	Pa/m
1,3	2,5	3,8	5,0	6,3	7,5	10,0	0,08	0,21	33	0,15	13
2,5	5,0	7,5	10,0	12,5	15,0	20,0	0,12	0,37	84,8	0,22	25,6
3,8	7,5	11,3	15,0	18,8	22,5	30,0	0,18	0,55	174,9	0,33	52,4
5,0	10,0	15,0	20,0	25,0	30,0	40,0	0,24	0,73	239,5	0,45	87,5
6,3	12,5	18,8	25,0	31,3	37,5	50,0	0,30	0,92	439,9	0,56	130,7
7,5	15,0	22,5	30,0	37,5	45,0	60,0	0,36	1,1	613,2	0,67	181,5
8,8	17,5	26,3	35,0	43,8	52,5	70,0	0,42	1,28	813,1	0,78	240
10,0	20,0	30,0	40,0	50,0	60,0	80,0	0,48	1,47	1039,3	0,89	305,8
11,3	22,5	33,8	45,0	56,3	67,5	90,0	0,55	1,68	1336	1,02	392
12,5	25,0	37,5	50,0	62,5	75,0	100,0	0,60	1,84	1569,5	1,11	459,6
13,8	27,5	41,3	55,0	68,8	82,5	110,0	0,65	1,99	1820,8	1,21	532,2
15,0	30,0	45,0	60,0	75,0	90,0	120,0	0,70	-	-	1,3	609,8
16,3	32,5	48,8	65,0	81,3	97,5	130,0	0,75	-	-	1,39	692,3
17,5	35,0	52,5	70,0	87,5	105,0	140,0	0,85	-	-	1,58	872,2
18,8	37,5	56,3	75,0	93,8	112,5	150,0	0,90	-	-	1,67	969,4
20,0	40,0	60,0	80,0	100,0	120,0	160,0	0,95	-	-	1,76	1071,5
21,3	42,5	63,8	85,0	106,3	127,5	170,0	1,00	-	-	1,85	1178,5
22,5	45,0	67,5	90,0	112,5	135,0	180,0	1,05	-	-	1,95	1290,3
23,8	47,5	71,3	95,0	118,8	142,5	190,0	1,10	-	-	2,04	1406,9
25,0	50,0	75,0	100,0	125,0	150,0	200,0	1,20	-	-	-	-
27,5	55,0	82,5	110,0	137,5	165,0	220,0	1,30	-	-	-	-
30,0	60,0	90,0	120,0	150,0	180,0	240,0	1,40	-	-	-	-
32,5	65,0	97,5	130,0	162,5	195,0	260,0	1,55	-	-	-	-
35,0	70,0	105,0	140,0	175,0	210,0	280,0	1,65	-	-	-	-
37,5	75,0	112,5	150,0	187,5	225,0	300,0	1,80	-	-	-	-
40,0	80,0	120,0	160,0	200,0	240,0	320,0	1,90	-	-	-	-
42,5	85,0	127,5	170,0	212,5	255,0	340,0	2,00	-	-	-	-
45,0	90,0	135,0	180,0	225,0	270,0	360,0	2,10	-	-	-	-
47,5	95,0	142,5	190,0	237,5	285,0	380,0	2,20	-	-	-	-
50,0	100,0	150,0	200,0	250,0	300,0	400,0	2,40	-	-	-	-
56,3	112,5	168,8	225,0	281,3	337,5	450,0	2,70	-	-	-	-
62,5	125,0	187,5	250,0	312,5	375,0	500,0	3,00	-	-	-	-
68,8	137,5	206,3	275,0	343,8	412,5	550,0	3,20	-	-	-	-
75,0	150,0	225,0	300,0	375,0	450,0	600,0	3,50	-	-	-	-
81,3	162,5	243,8	325,0	406,3	487,5	650,0	3,80	-	-	-	-
87,5	175,0	262,5	350,0	437,5	525,0	700,0	4,00	-	-	-	-
93,8	187,5	281,3	375,0	468,8	562,5	750,0	4,40	-	-	-	-
100,0	200,0	300,0	400,0	500,0	600,0	800,0	4,60	-	-	-	-
106,3	212,5	318,8	425,0	531,3	637,5	850,0	5,00	-	-	-	-
112,5	225,0	337,5	450,0	562,5	675,0	900,0	5,20	-	-	-	-
118,8	237,5	356,3	475,0	593,8	712,5	950,0	5,60	-	-	-	-
125,0	250,0	375,0	500,0	625,0	750,0	1000,0	5,80	-	-	-	-
131,3	262,5	393,8	525,0	656,3	787,5	1050,0	6,20	-	-	-	-
137,5	275,0	412,5	550,0	687,5	825,0	1100,0	6,40	-	-	-	-
143,8	287,5	431,3	575,0	718,8	862,5	1150,0	6,80	-	-	-	-
150,0	300,0	450,0	600,0	750,0	900,0	1200,0	7,00	-	-	-	-
156,3	312,5	468,8	625,0	781,3	937,5	1250,0	7,40	-	-	-	-
162,5	325,0	487,5	650,0	812,5	975,0	1300,0	7,50	-	-	-	-
168,8	337,5	506,3	675,0	843,8	1012,5	1350,0	8,00	-	-	-	-
175,0	350,0	525,0	700,0	875,0	1050,0	1400,0	8,50	-	-	-	-
181,3	362,5	543,8	725,0	906,3	1087,5	1450,0	8,75	-	-	-	-
187,5	375,0	562,5	750,0	937,5	1125,0	1500,0	8,90	-	-	-	-
193,8	387,5	581,3	775,0	968,8	1162,5	1550,0	9,40	-	-	-	-
200,0	400,0	600,0	800,0	1000,0	1200,0	1600,0	9,85	-	-	-	-
212,5	425,0	637,5	850,0	1062,5	1275,0	1700,0	10,20	-	-	-	-
225,0	450,0	675,0	900,0	1125,0	1350,0	1800,0	10,50	-	-	-	-
237,5	475,0	712,5	950,0	1187,5	1425,0	1900,0	11,00	-	-	-	-
250,0	500,0	750,0	1000,0	1250,0	1500,0	2000,0	11,50	-	-	-	-
262,5	525,0	787,5	1050,0	1312,5	1575,0	2100,0	12,00	-	-	-	-
275,0	550,0	825,0	1100,0	1375,0	1650,0	2200,0	12,35	-	-	-	-
287,5	575,0	862,5	1150,0	1437,5	1725,0	2300,0	13,50	-	-	-	-
300,0	600,0	900,0	1200,0	1500,0	1800,0	2400,0	14,00	-	-	-	-
312,5	625,0	937,5	1250,0	1562,5	1875,0	2500,0	14,50	-	-	-	-
325,0	650,0	975,0	1300,0	1625,0	1950,0	2600,0	15,50	-	-	-	-
337,5	675,0	1012,5	1350,0	1687,5	2025,0	2700,0	16,15	-	-	-	-
350,0	700,0	1050,0	1400,0	1750,0	2100,0	2800,0	16,40	-	-	-	-
362,5	725,0	1087,5	1450,0	1812,5	2175,0	2900,0	16,70	-	-	-	-
375,0	750,0	1125,0	1500,0	1875,0	2250,0	3000,0	17,20	-	-	-	-

Conversion: 1 watt = 0,860 kCal

40 x 3,7		50 x 4,6		63 x 5,8		75 x 6,8		90 x 8,2		110 x 10		125 x 11,4	
m/s	Pa/m	m/s	Pa/m	m/s	Pa/m	m/s	Pa/m	m/s	Pa/m	m/s	Pa/m	m/s	Pa/m
0,11	6	-	-	-	-	-	-	-	-	-	-	-	-
0,14	9	0,08	2,3	0,05	0,7	-	-	-	-	-	-	-	-
0,22	18,4	0,11	4,6	0,07	1,5	-	-	-	-	-	-	-	-
0,29	30,6	0,19	11,2	0,12	3,7	-	-	-	-	-	-	-	-
0,36	45,5	0,23	15,5	0,14	5	0,1	2,2	0,07	0,9	-	-	-	-
0,43	63,1	0,27	20,4	0,17	6,6	0,12	2,9	0,08	1,2	-	-	-	-
0,5	83,2	0,31	25,9	0,19	8,4	0,14	3,7	0,09	1,5	-	-	-	-
0,58	105,9	0,34	31,9	0,22	10,3	0,15	4,5	0,11	1,9	-	-	-	-
0,66	135,4	0,42	45,8	0,26	14,8	0,19	6,4	0,13	2,7	-	-	-	-
0,72	158,6	0,46	53,5	0,29	17,3	0,2	7,5	0,14	3,1	-	-	-	-
0,78	183,4	0,5	61,8	0,31	19,9	0,22	8,6	0,15	3,6	-	-	-	-
0,84	209,8	0,54	70,7	0,33	22,8	0,24	9,9	0,16	4,1	-	-	-	-
0,9	237,9	0,57	80,1	0,36	25,8	0,25	11,2	0,18	4,7	-	-	-	-
1,02	299	0,65	100,4	0,41	32,3	0,29	14	0,2	5,8	-	-	-	-
1,08	332	0,69	111,4	0,43	35,8	0,3	15,5	0,21	6,5	-	-	-	-
1,14	366,6	0,73	122,9	0,45	39,4	0,32	17	0,22	7,1	-	-	-	-
1,2	402,8	0,76	134,9	0,48	43,2	0,34	18,7	0,24	7,8	-	-	-	-
1,26	440,6	0,8	147,4	0,5	47,2	0,35	20,4	0,25	8,5	-	-	-	-
1,32	480	0,84	160,5	0,53	51,4	0,37	22,2	0,26	9,3	-	-	-	-
1,44	563,5	0,92	188,1	0,57	60,1	0,41	25,9	0,28	10,8	-	-	-	-
1,56	653,3	0,99	217,8	0,62	69,5	0,44	30	0,31	12,5	-	-	-	-
1,68	749,4	1,07	249,5	0,67	79,5	0,47	34,3	0,33	14,3	-	-	-	-
1,86	905,2	1,19	300,8	0,74	95,7	0,51	38,8	0,35	16,2	-	-	-	-
1,98	1016,9	1,26	337,4	0,79	107,3	0,54	43,6	0,38	18,2	-	-	-	-
-	-	1,38	396,2	0,86	125,8	0,61	54	0,42	22,5	-	-	-	-
-	-	1,45	437,8	0,91	138,8	0,64	59,6	0,45	24,8	-	-	-	-
-	-	1,53	481,3	0,96	152,5	0,68	65,4	0,47	27,2	-	-	-	-
-	-	1,61	526,9	1	166,8	0,71	71,5	0,49	29,7	-	-	-	-
-	-	1,68	574,3	1,05	181,6	0,74	77,9	0,52	32,3	-	-	-	-
-	-	1,84	675,1	1,15	213,1	0,81	91,3	0,56	37,9	0,38	11,0	0,15	5,0
-	-	-	-	1,29	264,8	0,91	113,2	0,63	46,9	0,44	15,0	0,22	7,0
-	-	-	-	1,43	321,8	1,01	137,4	0,71	56,8	0,44	18,9	0,26	9,0
-	-	-	-	1,53	362,6	1,08	154,7	0,75	63,9	0,5	22,0	0,32	12,0
-	-	-	-	1,67	428,2	1,15	172,9	0,8	71,4	0,5	27,0	0,36	14,0
-	-	-	-	1,82	498,9	1,28	212,3	0,89	87,6	0,57	29,8	0,40	18,0
-	-	-	-	1,96	574,8	1,35	233,4	0,94	96,2	0,65	32,0	0,48	21,0
-	-	-	-	-	-	1,49	278,5	1,03	114,7	0,69	39,0	0,55	25,0
-	-	-	-	-	-	1,55	302,4	1,08	124,4	0,69	43,0	0,55	28,0
-	-	-	-	-	-	1,69	353,1	1,18	145,1	0,75	48,0	0,58	30,0
-	-	-	-	-	-	1,76	379,8	1,22	156	0,81	56,0	0,62	33,0
-	-	-	-	-	-	1,89	436,1	1,32	178,9	0,85	66,9	0,69	39,0
-	-	-	-	-	-	1,96	465,6	1,36	190,9	0,88	75,0	0,69	39,0
-	-	-	-	-	-	2,09	527,4	1,46	216	0,94	80,0	0,72	42,0
-	-	-	-	-	-	2,16	559,6	1,5	229,1	1,01	85,6	0,75	46,0
-	-	-	-	-	-	2,3	626,9	1,6	256,5	1,07	92,0	0,84	53,0
-	-	-	-	-	-	2,36	661,9	1,65	270,7	1,1	98,0	0,84	55,0
-	-	-	-	-	-	2,5	734,7	1,74	300,2	1,13	106,3	0,88	58,0
-	-	-	-	-	-	-	-	-	-	1,18	112,0	0,91	62,0
-	-	-	-	-	-	-	-	-	-	1,26	118,0	0,98	71,0
-	-	-	-	-	-	-	-	-	-	1,34	122,0	1,00	75,8
-	-	-	-	-	-	-	-	-	-	1,38	136,1	1,08	89,1
-	-	-	-	-	-	-	-	-	-	1,4	142,0	1,10	94,0
-	-	-	-	-	-	-	-	-	-	1,48	147,9	1,16	110,0
-	-	-	-	-	-	-	-	-	-	1,55	170,0	1,18	121,1
-	-	-	-	-	-	-	-	-	-	1,60	190,0	1,21	124,0
-	-	-	-	-	-	-	-	-	-	1,65	214,1	1,29	126,0
-	-	-	-	-	-	-	-	-	-	1,73	225,0	1,34	127,0
-	-	-	-	-	-	-	-	-	-	1,81	270,0	1,40	132,0
-	-	-	-	-	-	-	-	-	-	1,89	296,3	1,50	154,0
-	-	-	-	-	-	-	-	-	-	1,94	308,3	1,60	166,0
-	-	-	-	-	-	-	-	-	-	-	321,1	1,65	177,0
-	-	-	-	-	-	-	-	-	-	-	325,7	1,71	184,0
-	-	-	-	-	-	-	-	-	-	-	328,5	1,77	197,0
-	-	-	-	-	-	-	-	-	-	-	354,5	1,89	223,0
-	-	-	-	-	-	-	-	-	-	-	370,3	1,97	238,0
-	-	-	-	-	-	-	-	-	-	-	385,4	2,00	251,0
-	-	-	-	-	-	-	-	-	-	-	395,5	2,04	264,0
-	-	-	-	-	-	-	-	-	-	-	401,0	2,10	275,0

3.7 Chemical resistance

Most chemicals have no influence on the pipe, even at elevated temperatures. Typically, plastics that are exposed to chemical substances are prone to physical changes in their properties, such as, swelling or dissolution of the polymers. Due to the chemical bonding of the polymer chains, PEX-a pipes (cross-linked PE) are more resilient in that respect than pipes of non-cross-linked PE. In order to assess the resistance to different materials changes in the tensile and elongation characteristics were monitored. In a pressurised piping system the resistance to unknown chemicals cannot generally be extrapolated from experience of known chemicals. For this, durability tests with the unknown chemicals in test piping are required.

Legend
A = resistant
B = resistant at operating pressure
C = resistant at 60% of the operating pressure
D = resistant at 20% of the operating pressure
U = unsuitable

Compound	40 °C	60 °C	80 °C
Acetic Acid	A	A	
Acetone	C		
Acrylonitritle	A	A	A
Allyl Alcohol	A		
Aluminium Chloride	A	A	A
Aluminium Sulphate	A	A	A
Ammoniak, Aqueous	A	A	A
Ammonium Chloride	A	A	A
Ammonium Sulphate	A	A	A
Aniline, pure	A	A	
Aqua Regia	U	A	A
Axalic Acid	A	B	
Beer	A		
Benzoic Acid	A	A	B
Benzole Sulphonic Acid	U	A	A
Bitumen	A	C	A
Bleach	D	U	A
Bromine	U	C	
Butanediol	B	A	A
Butanol	A	A	A
Butter	A		B
Butter Acid	C	D	
Butyl Acetate	A	B	C
Carbon Dioxide	A	A	
Chlorine water saturated	A		B
Chlorine, dry gas	B		U
Chlorine, liquid	U		
Chloroform	D	U	
Chromic Acid, 50%	A	A	A
Chromo Sulfuric Acid	A	U	
Citric Acid	A		
Cod Liver Oil	B	C	
Cresol	A	C	
Cyclohexane	C	D	
Cyclohexanol	A		
Cyclohexanone	D	U	
Decahydro Naphtalene	B	C	
Detergents	A	B	
Dibutyl Ether	B	D	
Dibutyl Phthalate	B	C	C

Compound	40 °C	60 °C	80 °C
Dichloorbenzene	C	U	
Dichloroethylene	U		
Diesel Oil	A	B	C
Diethyl Ether	C	D	U
Esteric Oils	B	B	B
Ethers	C	D	U
Ethyl Acetate	A	B	C
Ethyl Alcohol	A	A	A
Ethylene Glycol	A	A	A
Fluorbenzene	U		
Formaldehyde, 40%	A	A	
Formic Acid	A	A	B
Freon	U		
Fuel Oils	A	D	
Gasoline, pure	B	C	
Glycerine	A	A	A
Glycol, 10%	A	A	
Hexane	C	D	
Hydrochloric Acid, 30%	A		
Hydrochlorid Acid, 10%	A	A	A
Hydrogen Peroxide, 100%	A	U	
Hydrogen Peroxide, 30%	A	A	A
Hydrogen Sulphide	A		
Iodine Tincture of	A	C	
Linseed Oil	A	B	C
Magnesium Salts	A	A	
Maleic Acid	A	A	A
Mercury	A	A	A
Methyl Alcohol	A	A	A
Methyl Ethylketone	B	D	
Methylene Chloride	C	U	
Milk	A	A	A
Motor Oils			C
Nafta	B	U	
Naphthalene	A	C	
Nitric Acid, 30%	A	A	
Nitric Acid, 50%	B	C	
Nitrobenzene	C	U	
Oil	C	C	
Oil Acid			C

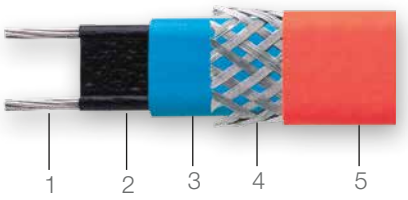
Compound	40 °C	60 °C	80 °C
Oleum	U		
Ozone	C		U
Paraffin	A	B	C
Paraffin Oil	A	A	A
Perchloro Ethylene	U		
Petroleum	A	B	C
Petroleum Ether	A	D	
Phenols 100% (Carbolic Acid)	D		
Phosphates	A	A	A
Phosphoric Acid, 95%	A	A	
Phthalic Acid, 50%	A	A	A
Polyglycols	A	A	
Potassium Chloride	A	A	A
Potassium Chromate, 40%	A	A	A
Potassium Hydroxide, 50%	A	A	A
Potassium Permanganate, 18%	A	A	A
Propanol	A	A	A
Propanol	A	A	A
Propionic Acid, 50%	A	A	A
Pyridine	A	B	C
Silicone Oils	A	A	A
Soap Solution	A	A	A
sodium Hydroxide Con.	A	A	
Sodium Hypochlotite Solution	B		
Styrene	C	U	
Sulphur Solution	A		
Sulphuric Acid, up to 50%	A	A	A
Sulphuric Acid, up to 98%	U		
Tetrachlore Ethane	D	U	
Tetrahydro Furane	U		
Tetraline	B	U	
Toluene	D	U	
Transformater Oils	A	C	D
Trichloro Ethylene	U		
Turpentine	D	U	
Vaseline	A	B	C
Water	A	A	A
Wine	A	A	A
Xylol	C		U

3.8 Heat loss table for COOL with self-regulating heating cable

This table features heat losses in the event of a negative ambient temperature around the pipe casing. If the heat loss exceeds 9 W/m there exists a danger that pipes could freeze.

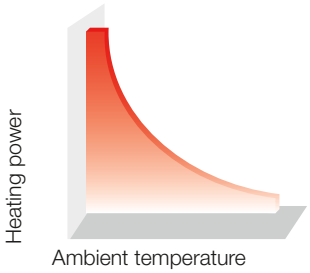
	Casing d_{out} / Pipe d_{out}	75/32	90/40	125/50	125/63	160/75	160/90	200/110	200/125
	Insulation thickness	**15,5 mm**	**17,5 mm**	**28 mm**	**21,5 mm**	**31,5 mm**	**24 mm**	**31 mm**	**23,5 mm**
temperature around the outside casing	-1	1	1	1	1	1	1	1	1
	-2	1	1	1	2	2	2	2	2
	-3	1	2	2	2	2	3	2	2
	-4	2	2	2	3	2	3	2	3
	-5	2	2	2	3	3	4	3	3
	-6	2	3	3	3	3	4	3	4
	-7	2	3	3	4	3	5	4	4
	-8	3	4	3	4	4	5	4	5
	-9	3	4	4	5	4	6	5	5
	-10	3	4	4	5	5	6	5	6
	-11	4	5	4	6	5	7	6	7
	-12	4	5	5	6	5	7	6	7
	-13	4	5	5	7	6	8	7	8
	-14	5	6	5	7	6	8	7	8
	-15	5	6	6	7	6	9	7	9
	-16	5	6	6	8	7	9	8	9
	-17	5	7	6	8	7	10	8	10
	-18	6	7	6	9	8	10	9	10
	-19	6	8	7	9	8	10	9	11
	-20	6	8	7	9	8	11	10	11
	-21	7	8	7	10	9	11	10	12
	-22	7	9	8	10	9	12	10	13
	-23	7	9	8	11	9	12	11	13
	-24	8	9	8	11	10	13	11	14
	-25	8	10	9	12	10	13	12	14
	-26	8	10	9	12	10	14	12	15
	-27	8	10	9	12	11	14	13	15
	-28	9	11	10	13	11	15	13	16
	-29	9	11	10	13	12	15	14	16
	-30	9	11	10	14	12	16	14	17
	-31	10	12	10	14	12	16	15	18
	-32	10	12	11	14	13	17	15	18
	-33	10	12	11	15	13	17	15	19
	-34	10	13	11	15	13	18	16	19
	-35	11	13	12	16	14	18	16	20
	-36	11	13	12	16	14	18	17	20
	-37	11	14	12	16	14	19	17	21
	-38	12	14	13	17	15	19	18	21
	-39	12	14	13	17	15	20	18	22
non-recommended temperatures	-40	12	15	13	18	15	20	18	22
	-41	13	15	13	18	16	21	19	23
	-42	13	15	14	18	16	21	19	24
	-43	13	16	14	19	16	22	20	24
	-44	13	16	14	19	17	22	20	25
	-45	14	16	15	19	17	23	21	25
	-46	14	17	15	20	17	23	21	26
	-47	14	17	15	20	18	23	22	26
	-48	15	17	15	21	18	24	22	27
	-49	15	17	16	21	18	24	23	27
	-50	15	18	16	21	19	25	23	28

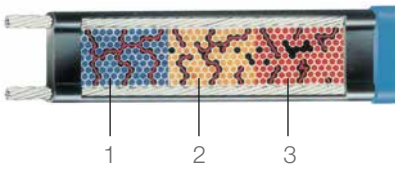
3.9 Self-regulating heating cable: structure and operation



1 Tin-coated copper conductor
2 Self-regulating heating element
3 Electric insulation mantle
4 Safety plait in tin-coated copper
5 External safety cover

Schematic diagram





1 In the cold sections of the heating cable, the structure of the plastic will draw together, generating a large number of electrical currents through the carbon particles. The current is converted into heat in the heating element.

2 In the warmer sections, the structure of the plastic expands and progressively interrupts the currents in the carbon particles. This increases the resistance and reduces the current draw and thus the heating capacity.

3 In the hot sections, the expansion of the plastic structure breaks the currents almost entirely. This creates a very high electrical resistance and the heating capacity falls to almost 0.

Robust construction

The heating cable is a self-regulating cable with two parallel, multiwire tin-coated copper conductors and an intermediate semiconducting heating element.

This heating element is electrically insulated by means of a synthetic polyolefine or fluoropolymer cover. It is also covered by a plaited, tin-coated copper cord. This plaiting provides the earthing (safety conductor) for the heating cable, complies with prevailing safety standards (VDE 0100) and is fitted with an additional mechanical protection.

Proven lifespan

These self-regulating heating cables have been intensively tested in our laboratories using international standard tests and recognised scientific methods and procedures. These tests found that the self-regulating heating cable has a lifespan of over 40 years. All self-regulating heating cables are manufactured in accordance with the strictest quality norms and are subjected to ongoing quality controls. They are VDE-certified as well as with a variety of production, control and other licenses from many countries.

Parallel circuits

The current flows between two parallel copper conductors, regardless of where the heating cable is and right through the semiconducting, molecularly refined heating element. The electrical circuit diagram is similar to a parallel circuit in many temperature-dependent resistances. The system's straightforward design and even simpler installation process will save you considerable expense. The heating cable is always connected to a 230 VAC output, regardless of its length.

Operation

The heating element consists of a specially formulated, molecularly refined plastic cover embedded with carbon particles which generate electrical currents between two parallel copper conductors. When the temperature rises, the plastic expands due to molecular expansion.

The carbon particles move further and further apart, resulting in the interruption of the electrical currents and a rise in the electrical resistance of the heating element. The current draw and the heating capacity fall proportionally.

When the element cools, the process is reversed and the heating capacity rises in response to low temperatures. The molecular refinement of the heating element gives it duroplastic properties, making the expansion behaviour at molecular level exactly reproducable, even under fluctuating temperatures. The self-regulating properties of the heating cable are thus incorporated into the material itself.

Thanks to this self-regulation, the heating cable responds to temperature fluctuations along the entire length of the system.

Energy conservation

Because the heating capacity adjusts to local temperatures, energy consumption is always adapting to prevailing requirements. The heating cables therefore save energy and costs through self-regulation.

Safe and reliable

Due to these self-regulating properties, the system cannot overheat or burn through, even if the heating cable overlaps.

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