PINOPLAST

ITALIAN TECHNOLOGY

PPR-C PIPES AND FITTINGS







TECHNICAL CATALOUGE

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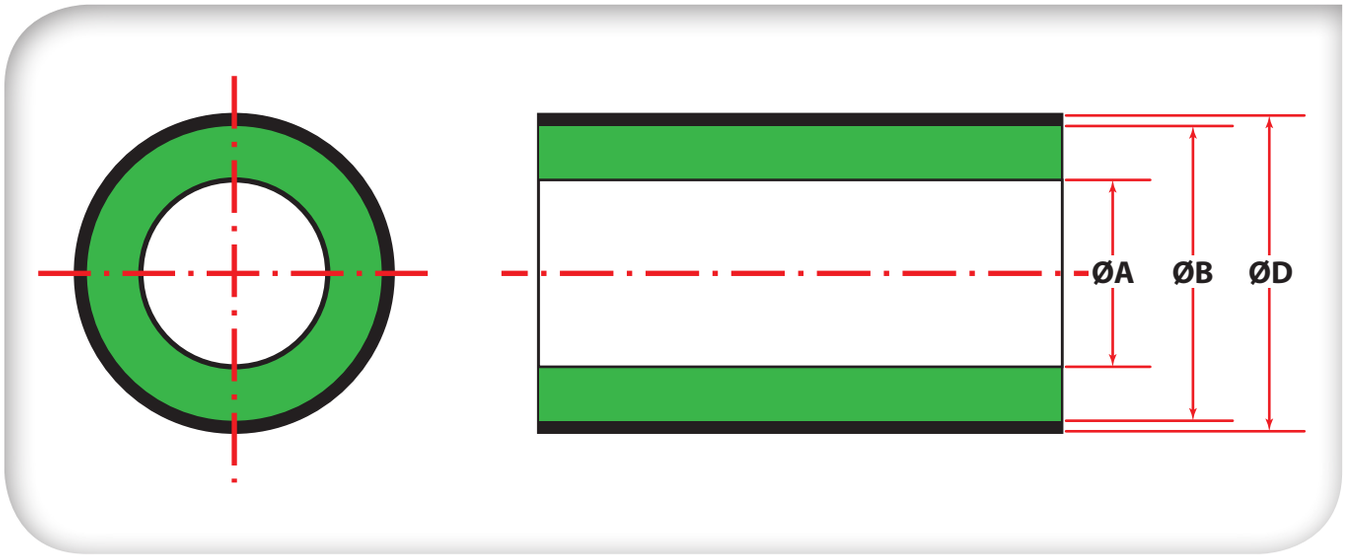
UV STABILIZED PIPES



PINOPLAST PPR-C

UV STABILIZED PIPES

PINO PLAST UV STABILIZED PIPE consists of two layers where the inner layer is produced of PPR-C and the outer layer is produced of the special mixture of PPR-C and UV stabilizer raw material of the properties shown on the below table.



The main advantages of PINOPLAST UV stabilized pipe are the following:

- The outer layer which is UV stabilized prevents cracks when the pipe exposed to high temperature and sun rays.
- The outer layer ensures an effective UV light protection, so there will be no sun effect on the pipe.

PHYSICAL PROPERTIES

Property	Test method	Units	Mean value
Density at 23^{0}C	ISO 1183	g/cm^3	0.9
Melt mass flow rate MFR at 190^{0}C/ 5Kg	ISO 1133	g/10min.	0.5
Melt mass flow rate MFR at 230^{0}C/ 2.16Kg	ISO 1133	g/10min.	0.3
Melting point	DSC	^{0}C	149

THERMAL PROPERTIES

Property	Test method	Units	Mean value
Thermal conductivity at 20^{0}C	DIN 52612	W/MK	0.23
Specific heat at 20^{0}C	Adiabatic calorimeter	KJ/Kg.K	1.68
Heat deflection temperature at 0.45Mpa (HDT/B)	ISO 75-1,-2	^{0}C	70
Heat deflection temperature at 1.8Mpa (HDT/A)	ISO 75-1,-2	^{0}C	45
Vicat softening point, A120	ISO 306	^{0}C	130
Vicat softening point, B120	ISO 306	^{0}C	70
Coefficient of linear expansion, at20^{0}C	VDE 0304	m/mk (k^{-1})	1.1x10^{-4}

MECHANICAL PROPERTIES

Property	Test method	Units	Mean value
Tensile modulus (1 mm/min.)	ISO 527-1,-2	MPa	800
Tensile stress at Yield (50 mm/min.)	ISO 527-1,-2	MPa	22
Tensile strain at yield (50 mm/min.)	ISO 527-1,-2	%	13
Tensile stress at break (50 mm/min.)	ISO 527-1,-2	MPa	18
Tensile strain at break (50 mm/min.)	ISO 527-1,-2	%	350
Charpy impact strength at 23^{0}C	ISO 179/1eU	KJ/m^2	NB
Charpy impact strength at -20^{0}C	ISO 179/1eU	KJ/m^2	70
Charpy impact strength notched at 20^{0}C	ISO 179/1eA	KJ/m^2	20
Charpy impact strength notched at -20^{0}C	ISO 179/1eA	KJ/m^2	2,5
Flexural modulus (2mm/min.)	ISO 178	MPa	780
Hardness	ISO 2039-2	R scale	75

APPLICATION AREAS

- Outside installations in coastal places.
- All kind of installations in places where the soil is acidic or basicity or any way aggressive.
- Outside installations for hot and cold water.



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LINEAR EXPANSION CALCULATION OF PINOPLAST PPR-C UV STABILIZED PIPES

PINOPLAST ***UV STABILIZED PIPES have coefficient of linear expansion same as that of*** **PINOPLAST** ***standard pipes, and the amount of linear expansion is calculated using same calculations:***

$$\Delta l = L_0 \times \Delta t \times \alpha$$

Where:

Δl : linear expansion (elongation) in mm

L_0 : pipe length in m

Δt : Temperature difference in °C between the operating temperature and the installation temperature,

α : coefficient of linear expansion which is: 0.11MM/MK

Example:

For a pipe have **Ø**32mm, L_0=4m, **Δt** =50°C so

Δl = 4 x 50 x 0.11

Δl = 22mm

LINEAR EXPANSION TABLE FOR PINOPLAST UV STABILIZED PIPES

Pipe Length	Temprature Difference (°C)									
L(m)	10	20	30	40	50	60	70	80	90	100
1.0	1.10	2.20	3.30	4.40	5.50	6.60	7.70	8.80	9.90	11.00
2.0	2.20	4.40	6.60	8.80	11.00	13.20	15.40	17.60	19.80	22.00
3.0	3.30	6.60	9.90	13.20	16.50	19.80	23.10	26.40	29.70	33.00
4.0	4.40	8.80	13.20	17.60	22.00	26.40	30.80	35.20	39.60	44.00
5.0	5.50	11.00	16.50	22.00	27.50	33.00	38.50	44.00	49.50	55.00
6.0	6.60	13.20	19.80	26.40	33.00	39.60	46.20	52.80	59.40	66.00
7.0	7.70	15.40	23.10	30.80	38.50	46.20	53.90	61.60	69.30	77.00
8.0	8.80	17.60	26.40	35.20	44.00	52.80	61.60	70.40	79.20	88.00
9.0	9.90	19.80	29.70	39.60	49.50	59.40	69.30	79.20	89.10	99.00
10.0	11.00	22.00	33.00	44.00	55.00	66.00	77.00	88.00	99.00	110.00
11.0	12.10	24.20	36.30	48.40	60.50	72.60	84.70	96.80	108.90	121.00
12.0	13.20	26.40	39.60	52.80	66.00	79.20	92.40	105.60	118.80	132.00
13.0	14.30	28.60	42.90	57.20	71.50	85.80	100.10	114.40	128.70	143.00
14.0	15.40	30.80	46.20	61.60	77.00	92.40	107.80	123.20	138.60	154.00

linear expansion (Δl) in mm

FREE EXPANSION CALCULATION IN PINOPLAST UV STABILIZED PIPES

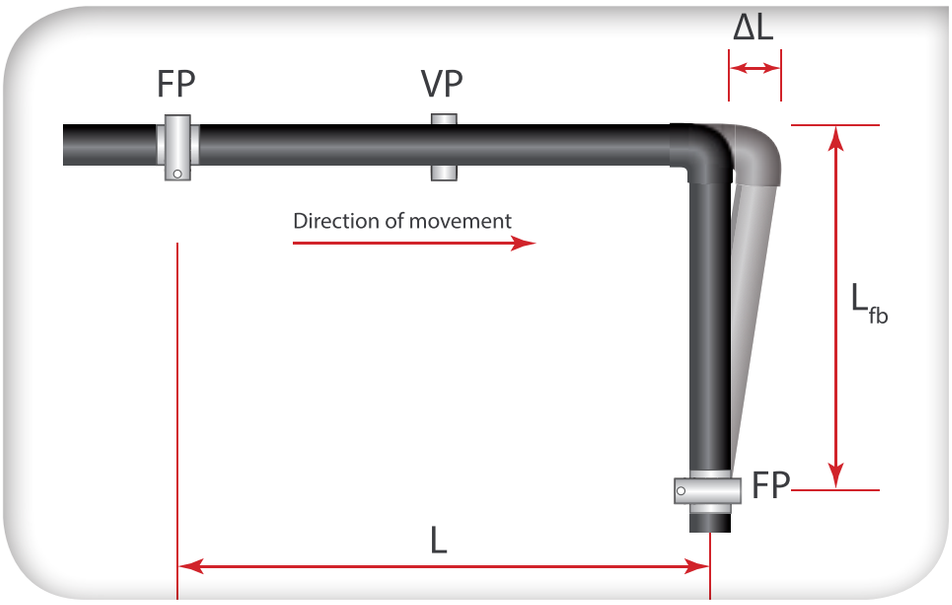
The concept which followed in calculation of the length of free bending part when using PINOPLAST PPR-C standard pipes and PINOPLAST reinforced pipes can be applied for this kind of pipes also.

The length of free bending part is calculated from the following formula:

$$L_{fb} = A \times \sqrt{\Delta l \times d}$$

Where:

L_{fb}: length of free bending part in mm
A = specific constant of PPR-C material A=20
Δl : longitudinal elongation in mm
L : pipe length in m
d : pipe outer diameter in mm
FP : fixed point
VP : varying point



FREE EXPANSION CALCULATION IN PINOPLAST PPR-C UV STABILIZED PIPES

Example:

Consider a corner installation consists of a **PINO**PLAST UV stabilized pipe and have the following specifications:

Pipe diameter =Ø32mm

Pipe length L_0=4m

Max. working temperature=60^{0}C

ambient temperature=20^{0}C

then **Δt** =60-20=40^{0}C

First step:

we need to calculate the linear expansion amount that going to be happened in the main pipe by using the following formula:

$$\Delta l = L_o \times \Delta t \times \alpha$$

As for PINOPLAST UV stabilized pipe **α**= 0.11MM/MK

Δl = 4 x 40 x 0.11 = 17.6 mm

Second step:

we use the following formula to calculate the length of free bending part:

$$L_{fb} = A \times \sqrt{\Delta l \times d}$$

So,

$$L_{fb} = 20 \times \sqrt{17.6 \times 32}$$

L_{fb}= 474.64mm

EXPANSION CHAMBERS IN PINOPLAST UV STABILIZED PIPES

If the linear expansion can not be removed by changing the direction, an expansion chamber must be designed as the below shape

MINIMUM WIDTH OF EXPANSION CHAMBER CALCULATION:

$$W_{min.} = (2 \times \Delta L) + SM$$

Where:

Wmin : minimum width of expansion chamber in mm

SM : safety margin 150mm

L_{fb} : length of free bending part in mm

Δl : longitudinal elongation in mm

l : pipe length in m

FP : fixed point

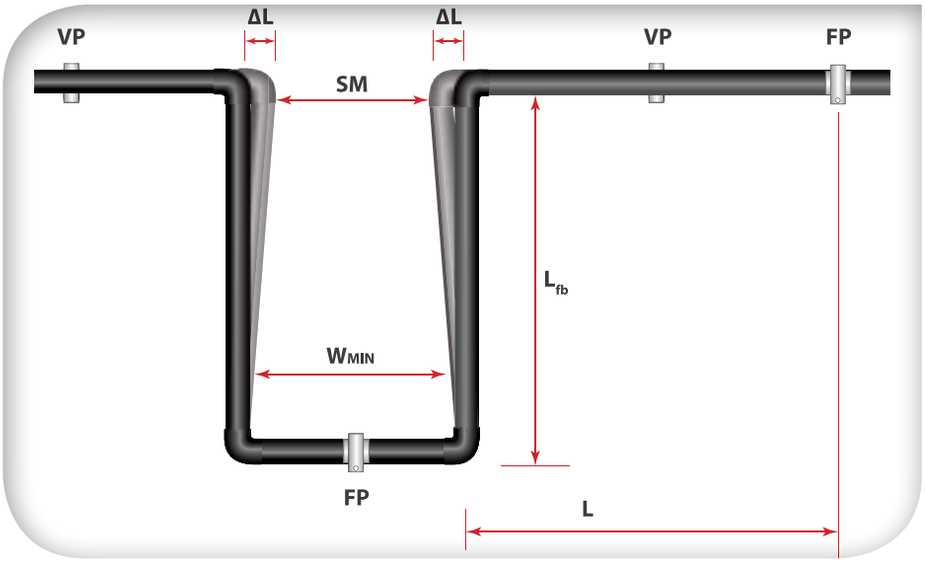
VP : varying point

Example:

Consider we have an expansion chamber have Δl= 44mm, then the minimum width of expansion chamber will be calculated as follows:

Wmin.= (2 x 44) + 150

Wmin.= 238mm



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CLAMP SPACING IN PINOPLAST UV STABILIZED PIPES

Temperature Difference (°C)	Pipe Diameter (mm)									
	16	20	25	32	40	50	63	75	90	110
0	85	90	110	130	145	170	195	210	225	255
20	80	65	80	95	105	125	145	155	165	185
30	75	65	80	95	105	125	145	155	165	185
40	75	65	75	85	95	115	135	145	155	175
50	70	65	75	85	95	115	135	145	155	175
60	70	60	70	80	90	105	120	130	145	165
70	65	55	65	75	85	100	110	110	130	145

Clamp Spacing (cm)

NOTES:

- The values of clamp spacing listed in the previous table are for PN16, PN20 & PN25.

- For cold water applications @PN10: when the temperature of medium is 20°C, you are supposed to use the following spacing:

Pipe Diameter in mm									
16	20	25	32	40	50	63	75	90	110
Clamp spacing in cm									
80	65	80	95	105	125	145	155	165	185

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