Thermopipe®

(PPRC) Pipes & Fittings

The best choice
for pure water

Pioneer In Plastic Piping Network Since 1984

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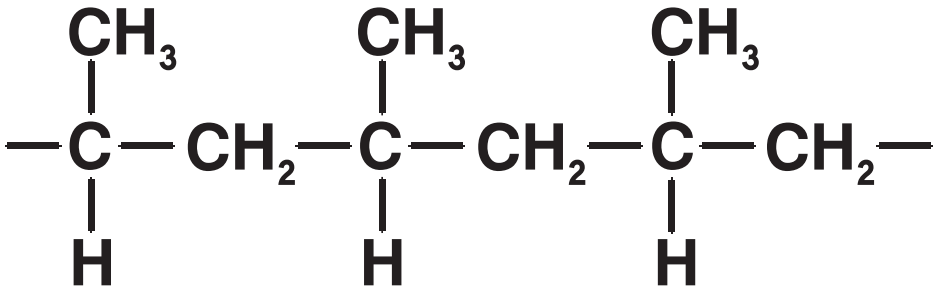
Introduction

World Plastics is a leading company in the development and manufacturing of advanced plastic piping systems. Our uniquely extensive range of large and small bore piping systems are capable of handling a wide variety of materials in industrial and domestic applications including water, fluid waste, gas and chemicals, World Plastics also produces piping system for electrical installation work. Pipes and fittings are made from high quality raw materials and manufactured on some of the most advanced plastic machinery in the world to the most developed standards. Our commitment to quality also extends to customer service. You will find us more than willing to help with the design of installation and can advise on the development of piping systems to meet particular needs .

What Is PP ?



Polypropylene or polypropene (PP) is a thermoplastic polymer, used in a wide variety of applications, including food packaging, textiles, plastic parts and reusable containers of various types, laboratory equipment, loudspeakers, automotive components, and polymer banknotes. An addition polymer made from the monomer propylene, it is rugged and unusually resistant to many chemical solvents, bases and acids.

Chemical & Physical Properties

Most commercial polypropylene has an intermediate level of crystallinity between that of low density polyethylene (LDPE) and high density polyethylene (HDPE); its Young's modulus is also intermediate. Although it is less tough then HDPE and flexible than LDPE, it is much more brittle than HDPE. This allows polypropylene to be used as a replacement for engineering plastics, such as ABS. Polypropylene is rugged, often somewhat stiffer than some other plastics, reasonably economical, and can be made translucent when uncolored but not completely transparent as polystyrene, acrylic or certain other plastics can be made. It can also be made opaque and/or have many kinds of colors. Polypropylene has very good resistance to fatigue, so that most plastic living hinges, such as those on flip-top bottles, are made from this material. Very thin sheets of polypropylene are used as a dielectric within certain high performance pulse and low loss RF capacitors.

Polypropylene has a melting point of (160 degrees Celsius). Many plastic items for medical or laboratory use can be made from polypropylene which is autoclavable so that it can withstand the heat in an autoclave. Food containers made from it will not melt in the dishwasher, and do not melt during industrial hot filling processes. For this reason, most plastic tubs for dairy products are polypropylene sealed with aluminium foil (both heat-resistant materials). After the product has cooled, the tubs are often given lids of a cheaper (and less heat-resistant) material, such as LDPE or polystyrene. Such containers provide a good hands-on example of the difference in modulus, since the rubbery (softer, more flexible) feeling of LDPE with respect to PP of

the same thickness is readily apparent. Rugged, translucent, reusable plastic containers made in a wide variety of shapes and sizes for consumers from various companies such as Rubbermaid and Sterilite are commonly made of polypropylene, although the lids are often made of somewhat more flexible LDPE so they can snap on to the container to close it. When liquid, powdered, or similar consumer products come in disposable plastic bottles which do not need the improved properties of polypropylene, the containers are often made of slightly more economical polyethylene, although transparent plastics such as polyethylene terephthalate are also used for appearance. Plastic pails, car batteries, wastebaskets, cooler containers, dishes and pitchers are often made of polypropylene or HDPE, both of which commonly have rather similar appearance, feel, and properties at ambient temperature.

MFI (Melt Flow Index) identifies the flow speed of the raw material in the process. It helps to fill the plastic mold during the production process. The higher MFI increases, the weaker the raw material gets.

It also has Copolymer and Random Copolymer. Copolymer helps stiffness of the PP (Polypropylene). Random Copolymer helps transparent look.

Copolymer is more expensive than Homopolypropylene. Random Copolymer is even higher than copolymer PP.

A rubbery PP can also be made by a specialized synthesis process, as discussed below. Unlike traditional rubber, it can be melted and recycled, making it a thermoplastic elastomer.

. For the two **monomer** units A and B we can have :

block	...AAAAAABBBBBB...
alternating	...ABABABABAB...
statistical (or random)	...ABAAABBABBAABBB...

The Best Solution

Thermopipe has earned a good reputation throughout the Middle East as a more flexible and efficient alternative to traditional materials such as copper and steel.

Thermopipe : Polypropylene Random Copolymer. (PPRC) piping has been approved to be ideal for plumbing, heating, air conditioning systems and for a wide range of industrial and medical uses.

Now, the system has been further improved with the addition of a full range of PPRC fittings that can be "Polywelded" to Thermopipe to create fully watertight systems, even under the most severe conditions of use.

Thermopipe has been approved from the Ministry of Public Works & Housing in Jordan in the Central heating Code: item number 5/2/1 & item 8/3/5 d, year 1990.

Mechanical and Thermal Properties

Property	Test method	Unit	Value
Viscosity number J Molecular weight average	ISO 1191 Solution viscosity c=0.001 g/cm'	Cm^3/g -	400 470.000
Melt flow index MFI 190/5 MFI 230/5	ISO 1133 Condition 18 Condition 20	 g/10 min g/10 min	 0.6 1.8
Density	ISO/R 1183	g/cm^3	0.89-0.92
Melting range	Polarisation microscope	°C	140- 150
Tensile stress at yield Tensile strength at break Elongation at break	ISO/R 527 Speed D	N/mm^2 N/mm^2 %	21 40 800
Ball indentation hardness	1S0 2039 (H 358/30)	N/mm^2	40
Flexural stress at 3.5% outer fibre strain	ISO 178	N/mm^2	20
Modulus of elasticity	ISO 178	N/mm^2	800
Shear modulus -10°C 0°C 10°C 20°C 30°C 40°C 50°C 60°C	ISO 53' Method A	 N/mm^2 N/mm^2 N/mm^2 N/mm^2 N/mm^2 N/mm^2 N/mm^2 N/mm^2	 1100 770 500 370 300 240 180 140
Mechanicalstrength propertiesdeter mined by impact strengthat 0°C	DIN 8078		no failure
Impact strength (Charpy) RT 0°C -10°C	ISO 179	kJ/m^2 kJ/m^2 kJ/m^2	no failure no failure no failure
Notched impact strength (Charpy) RT 0°C -20 °C	ISO 179	kJ/m^2 kJ/m^2 kJ/m^2	15 4.2 2.5
Coefficient of linear thermal expansion	VDE 0304 Part 1,§4	K^{-1}	1.5×10^{-4}
Thermal conductivity at 20°C	DIN 56612	W/m g	0.24
Specific heat at 20°C	Adiabatic calorimeter	kJ/kg K	2.0

Technical Data

Series: PN10/SDR11/S5
Color: Blue

Pipe		Diameter	Wall Thickness	Internal Diameter	Water Content
Dimension	Packing unit	d (mm)	s (mm)	d1 (mm)	1/M
20 mm	100 m	20	1.9	16.2	0.206
25 mm	100 m	25	2.3	20.4	0.327
32 mm	40 m	32	2.9	26.0	0.531
40 mm	40 m	40	3.7	32.6	0.834
50 mm	20 m	50	4.6	40.8	1.307
63 mm	20 m	63	5.8	51.4	2.075
75 mm	20 m	75	6.8	61.2	2.941
90 mm	12 m	90	8.2	73.6	4.254
110 mm	8 m	110	10.0	90.0	6.362
160 mm	4 m	160	14.6	130.8	-

Series: PN20 / SDR6 / S2.5
Color: Blue

Pipe		Diameter	Wall Thickness	Internal Diameter	Water Content
Dimension	Packing unit	d (mm)	s (mm)	d1 (mm)	1/M
20 mm	100m	20	3.4	13.2	0.137
25 mm	100m	25	4.2	16.6	0.216
32 mm	40m	32	5.4	21.2	0.353
40 mm	40m	40	6.7	26.6	0.556
50 mm	20m	50	8.3	33.2	0.866
63 mm	20m	63	10.5	42.0	1.385
75 mm	20m	75	12.5	50.0	1.963
90 mm	12m	90	15.0	60.0	2.827
110 mm	8m	110	18.3	73.2	4.208

Application Fields

Thermopipe system can be used for:

- Hot and cold potable water piping networks in residential and commercial building. i.e. hospitals, hotels, offices, school buildings etc.
- Chilled water networks in air conditioning systems, as an effective light weight and corrosion free substitute for steel pipes.
- Transportation of wide range of chemicals in the industry.
- Irrigation systems for gardens.
- Piping networks for rainwater utilization systems.
- Piping networks for swimming pools facilities.
- Compressed air installations.
- Piping networks for solar plants.

Characteristics

NO CORROSION

Thermopipe withstands all types of water hardness and withstands acids and alkaline substances cross a wide concentration and temperature range. (See table of Chemical Resistance page 24).

LESS PRESSURE LOSS

The smooth internal finish of Thermopipe creates no disturbance to flow and does not allow sediment to build up and reduces pressure. The pressure changes caused by opening and closing the cocks is sufficient to wash off any sediments. (Pressure loss data is given on page: 10)

LESS NOISE

The elasticity of polypropylene is 257 times higher than steel. A Thermopipe system will absorb water hammers which cause annoying vibration and noise in the buildings.

LONG-LIFE

The molecular structure of copolymers and special additives ensure a high mechanical resistance and a long life, depending on operating temperature and pressure. A Thermopipe system can be expected to last up to 50 years.

FROST RESISTANCE

Thermopipe will not burst in a cold weather the elasticity of the material allows the pipe to increase its section according to the volume of the frozen liquid inside it.

ABRASION RESISTANCE

Thermopipe has four times the abrasion resistance of metal piping, allowing higher water velocities, (up to 7m/sec) without corrosion problems.

DAMAGE RESISTANCE

Being made from a non-rigid material, a Thermopipe system does not suffer major damage as a result of building movement. Thermopipe is recognized by the Commission of International Engineering as being fit for use in seismic areas..

HYGINEIC AND NONTOXIC:

Thermopipe system is non toxic in accordance with current international standards.

Low Thermal Conductivity

The material's high level of thermal insulation guarantees low heat loss on the part of the fluid transported. This means minimal drop in temperature between the hot water source and delivery points, with consequent energy saving.

Thermal conductivity (at 20°C) of THERMOPIPE and the metals normally used in heating and water supply systems.

Thermopipe (deter, according to DIN 52612)	λ = 0.24	W/mK
Steel	λ = 45 ÷ 60	W/mK
Iron	λ = 45 ÷ 60	W/mK
Copper	λ = 300 ÷ 400	W/mK

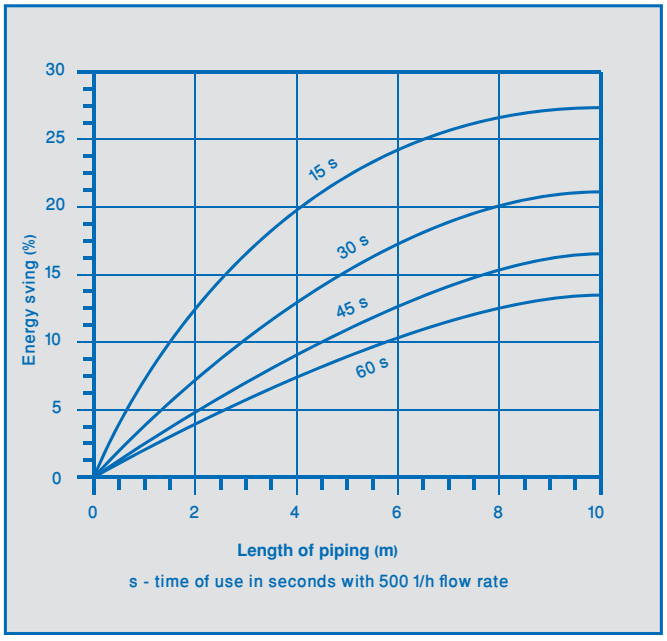
The low thermal conductivity value also causes a drastic reduction in the formation of condensation on the outside of the pipe, a frequent problem on metal pipes in some temperature and humidity conditions.
Thermopipe also a very poor electrical conductor, so no punctures will occur due to any stray currents.

Easy Workability

Due to the density of just 0.898 g/cm3, pipes and fittings are very light. Combined with the wide range of fittings available, this enables complete installations to be made easily and safely, with considerable time savings compared to conventional products.

Energy Saving

Thermopipe systems reach their operating temperature much faster than metal piping systems. Less energy is wasted Heating the pipe and less insulation is needed.

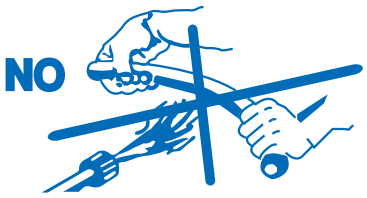


Percentage Energy Saving Under Transient Conditions

Fitting Instructions

In order not to prejudice the reliability of Thermopipe systems we recommend that you adhere strictly to the following directions :

1. Do not use a blow torch flame to bend or shape the pipes or fittings. The temperature cannot be controlled accurately and the molecular structure of the Polypropylene could be damaged.

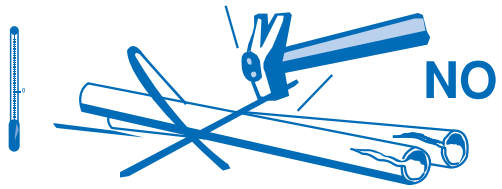


2. Pipes and fittings should not be directly exposed to UV radition. Over time, this can crystalize its material. Pipes and fittings should be stored out of direct sunlight and exposed installations should be protected by a suitable sheathing.

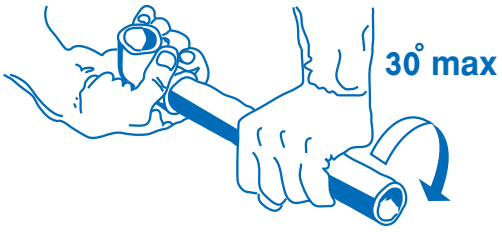
3. Do not try to fit any cast iron conical threads to the brass female end unions. Any high driving torque will destroy the brass threads. Besides Teflon, liquid sealants and hemp, can also be used as a seal if in suitable quantity.

4. When Welding Plate in site, hold the welder perpendicular to the pipe and the fitting in order to avoid partial weldings.

5. Any re-aligning between the pipe and the fitting should be made just after the welding and without exceeding 30 rotation.



6. Extra care should be taken when working conditions are below 0°c to avoid Impact damage to the Thermopipe. Avoid heavy loads and sharp bends.



7. Avoid all draughts during welding operation of pipes from 40-75 mm diameter in order to prevent tensions in the weldings .

Creep Rupture Strength Curves

The following diagram indicates according to the temperature the equivalent stress over time. To obtain the maximum operating pressure the following formula shall be applided:

$$P=\left[\frac{20.S.\sigma}{D-S}\right]$$

Where,

P = internal pressure (bar)

S = hoop stress (N/mm^2)

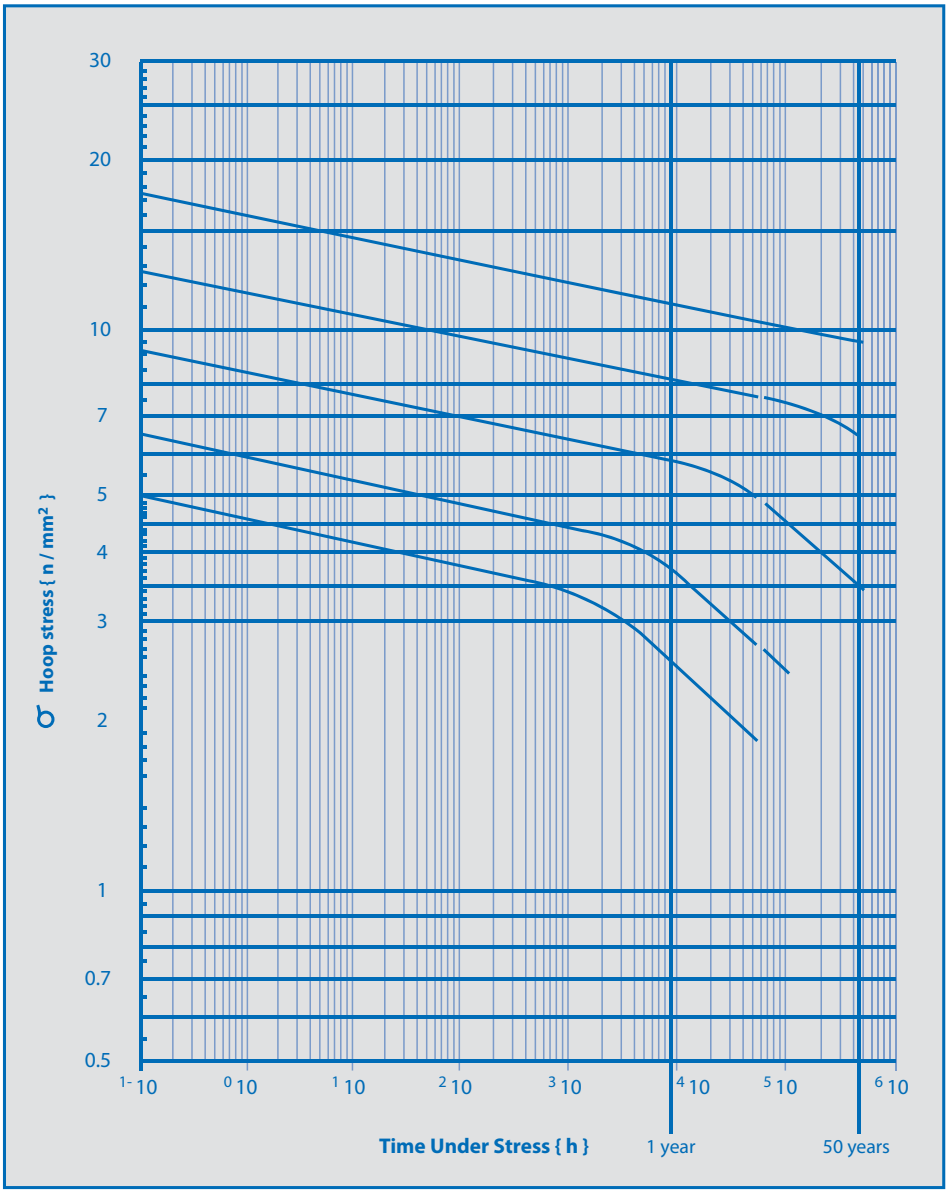
D = outside diameter of pipe (mm)

S = wall thickness (mm)

By extrapolating from the following diagram, the hoop stress (6) corresponding to the different temperatures, the maximum operating conditions will be as follow :

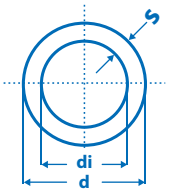
Temperature (C)	Duration in years contin. Operation *	Max pressure (bar)
20	50	20
40	50	20
60	50	12.6
80	50	7.8
95	50	5.2

* By continuous operation we mean 24 h/day for 365 days / year.



Dimensions

Thermopipe is manufactured in compliance with the DIN 8077 / 78 Standards.



S = Wall thickness
di = inner diameter
d = outer diameter

Φ = d mm	inch	S = mm*	di - mm
16	3/8	2.7	10.6
20	1/2	3.4	13.2
25	3/4	4.2	16.6
32	1	5.4	21.2
40	1 1/2	6.7	26.6
50	1 1/2	8.4	33.2
63	2	10.5	42
75	2 1/2	12.5	50

* Nominal Working Pressure 10 bar. PN10

Φ = d mm	inch	S = mm*	di - mm
90	3	8.2	73.6
110	4	10	90
125	5	11.4	102.2
140	5 1/2	12.7	114.6
160	6	14.6	130.8

Calculation of Pipe Inside Diameter Required

The required inside pipe diameter can be calculated according to the water pressure and flow.

$$Di=35.7\sqrt{\frac{Q}{V}}$$

Where,
Di = inside diameter of the pipe (mm)
Q = fluid volume flow rate (1 /s)
V = fluid flow speed (m/s)

Reference values for V is
1.0 ~ 3.0 m/s for liquids
10 ~ 30 m/s for gases
For Heating Systems:

$$Di=0.60\sqrt{\frac{H}{V.\Delta t}}$$

Where,
H = heating capacity (Kca/h)
Δt = temperature difference (°C)

Pressure loss

Once the coefficients "r" are known, the system's localized loss of pressure are calculated using the following formula:

$$Z = \Sigma r.v^2.\gamma / 2g = f.\Sigma r.v^2 \quad \textbf{(mbar)}$$ where :

γ = 999.7 kg/m3 specific weight of water
G = 9.81 m/s2 gravity acceleration
V = speed of water in m/s
$\sum$ = summation
Z = pressure loss

Loss of pressure z in relation to r = 1 with water at 10°C for various speeds v

Flowing speed v (m/s)	Loss of pressure for r = 1(mbar)	Flowing speed v (m/s)	Loss of pressure z for r =1 (mbar)
0.1	0.1	2.6	33.8
0.2	0.2	2.7	36.5
0.3	0.5	2.8	39.2
0.4	0.8	2.9	42.1
0.5	1.3	3.0	45
0.6	1.8	3.1	48
0.7	2.5	3.2	51
0.8	3.2	3.3	55
0.9	4.1	3.4	58
1.0	5.0	3.5	61
1.1	6.1	3.6	645
1.2	7.2	3.7	68
1.3	8.5	3.8	72
1.4	9.8	3.9	76
1.5	11.3	4.0	80
1.6	12.8	4.1	84
1.7	14.5	4.2	88
1.8	16.2	4.3	92
1.9	18.1	4.4	97
2.0	20.0	4.5	101
2.1	22.1	4.6	106
2.2	24.2	4.7	110
2.3	26.5	4.8	115
2.4	28.8	4.9	120
2.5	31.3	5.0	125

Total loss of pressure

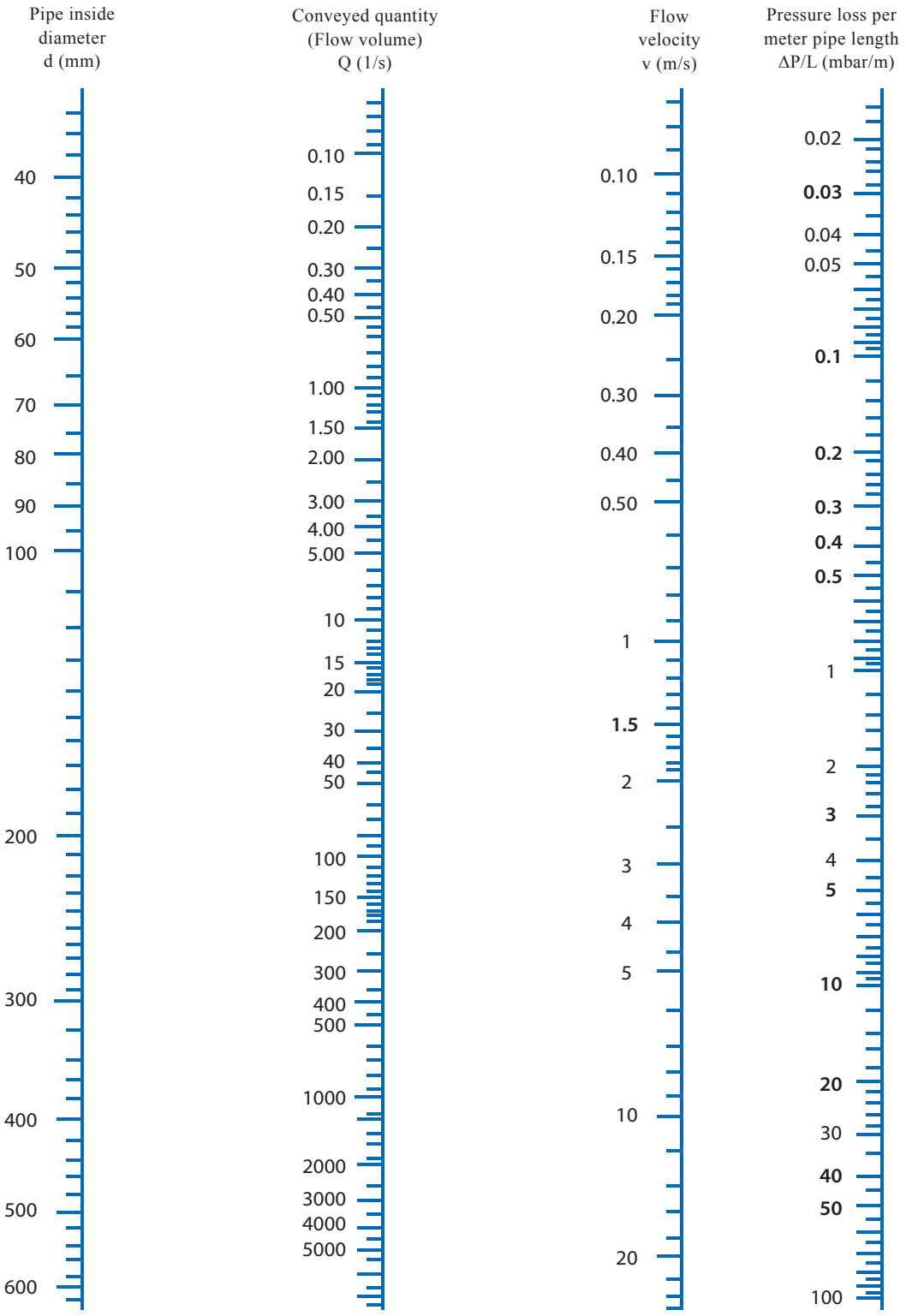
As already mentioned, the total system headloss is obtained adding together the continuous and localized loss of pressure:

$$\Delta P = 1 \cdot R + z \cdot 10$$

where:

ΔP = total loss of pressure (mm c.a.)
I = pipeline length (m)
R = continuous loss of pressure (mm c.a./m)
Z = localized loss of pressure (mbar)

For rough determination of flow velocity, pressure loss and conveying quantity serves the following flow nomogram. At an average flow velocity up to 20 m of pipe length are added for each tee, reducer and 90° elbow, about 10m of pipe for each bend = d and about 5m of pipe length for each bend r =1.5xd.



Thermal Expansion

The expansion L is calculated according to the following formula.

$\Delta L = \alpha \times L \times Dt$

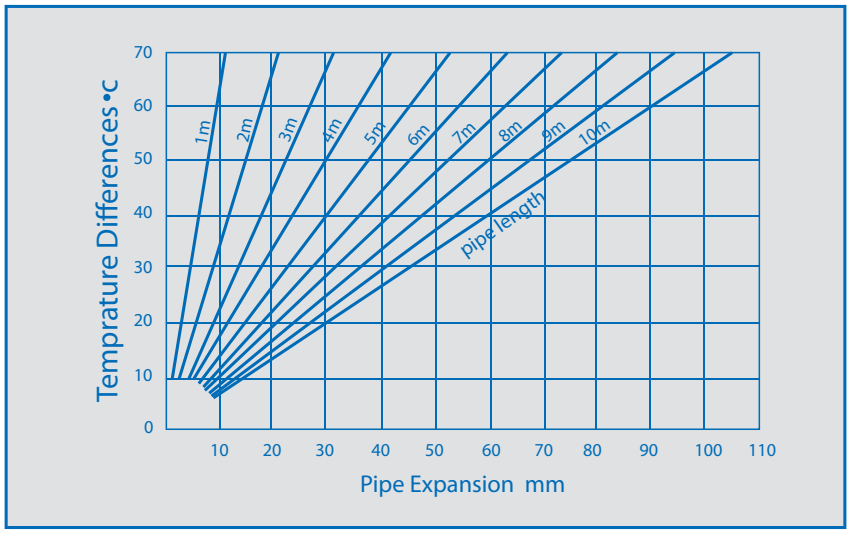
Where,

DL = pipe expansion (mm)

α = Thermal expansion coefficient of, Thermopipe (average value) = 0.15°C

L = pipe length (m)

Δt = temperature difference between warm water and ambient temperature (°C)



The previous diagram reports the pipe expansion depending on temperature difference e.g with water passing from

20°C to 60°C, Dt = 40°C

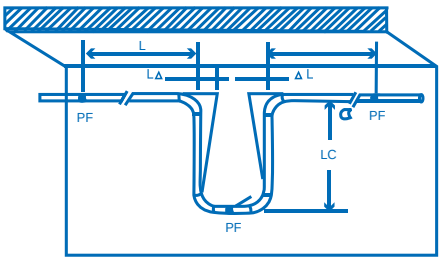
The above mentioned values are only apply to surface mounted systems. Values are lower when pipes are installed in a wall or under floor.

NOTE : Thermopipe can be laid directly in the wall, in touch with lime, gypsum or cement.

Catering For Thermal Expansion

Thermal expansion at double offset sections are obtained by the following formula:

$$Lc = 30\sqrt{d.\Delta L}$$



Where,

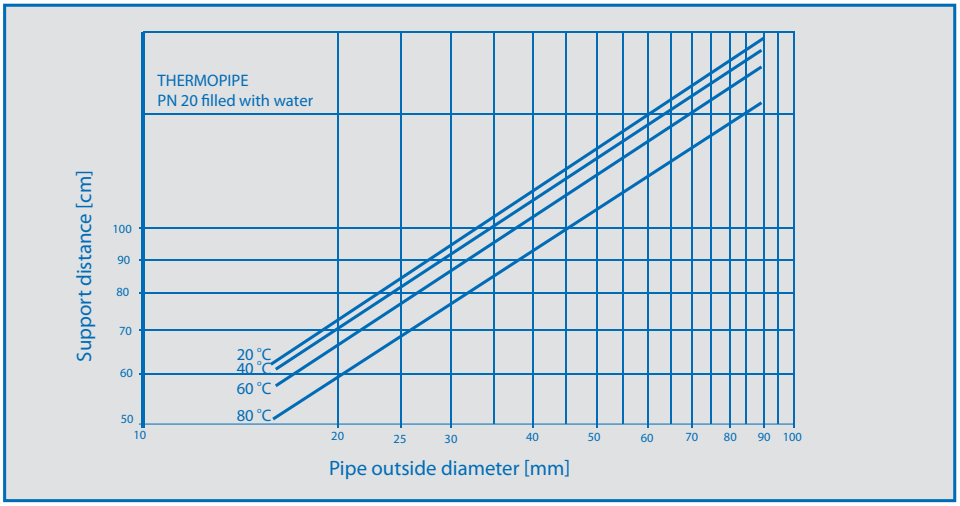
Lc = length of double offset expansion bend

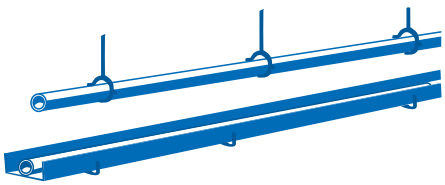
d = outer diameter of pipe (mm)

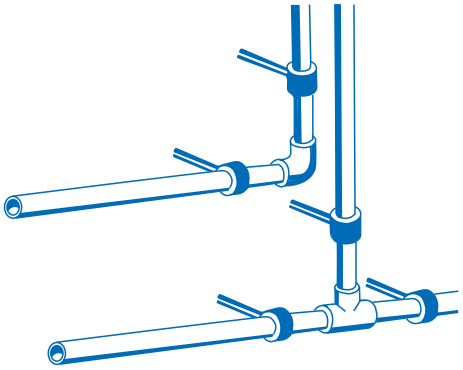
ΔL = expansion of pipe (mm)

Calculating Support Distances

Diagram for the determination of support distances with regard to free-layed pipelines in relation to temperature and pipe outside diameter.







Lay the pipes into suitable ducts.

We also recommend the use of rigid hangers or anchoring to absorb hydraulic thrusts in the braces (tees or elbows) and in reducing sockets.

Cutting And Polywelding

1. Cut the pipe at right angles using suitable cutter.

2. Mount the dies corresponding to the diameter of the pipe to be welded and connect the welder to the 220V AC power supply.

3.Wait until the welder attains the working temperature of 260°C (the green light goes off).Make sure that the pipe is perfectly clean before welding. Insert the pipe and the coupling simultaneously into the die, exerting a slight pressure. Heat both parts according to the time indicated in the table below. Then, quickly insert the pipe into the coupling, exerting a light pressure.

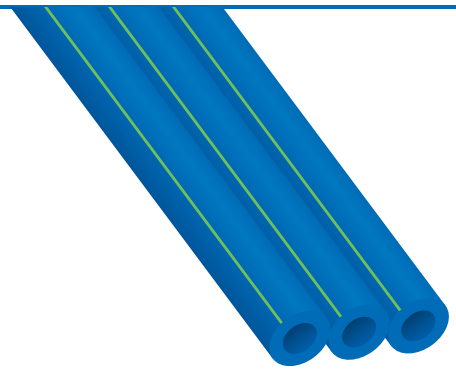
Any misalignment should be corrected immediately after the insertion, in order to avoid tensions in the welding.

Pipe outer diameter(mm)	Heating duration(sec)	Assembling duration(sec)	Testing after (min)	Pipe insertion(mm)
20	5	4	2	14
25	7	4	3	16
32	8	6	4	18
40	12	6	4	20
50	18	6	4	23
63	25	8	6	26
75	30	10	8	28
90	35	12	9	38
110	40	14	10	42

This type of junction ensures a perfect sealing that withstands the most severe conditions.

● Production range: PN 10, PN 16, PN 20 and PN 25 of the same size of below table, upon request. (According to DIN 8077, 8078)

THERMOPIPE , PARTS AND ACCESSORIES

Thermopipe 20 Bar	Unit: Meter	Item No.	Size
		WPPOl16	16 mm
		WPP0120	20 mm
		WPP0125	25 mm
		WPP0132	32 mm
		WPP0140	40 mm
		WPPO150	50 mm
		WPP0163	63 mm
		WPP0175	75 mm
		WPP0190	90 mm
		WPPO1110	110 mm
		WPP01125	125 mm
		WPP01140	140 mm
		WPP01160	160 mm

Socket	Unit: Piece	Item No.	Size
		WPP0316	16 mm
		WPP0320	20 mm
		WPP0325	25 mm
		WPP0332	32 mm
		WPP0340	40 mm
		WPP0350	50 mm
		WPP0363	63 mm
		WPP0375	75 mm
		WPP0390	90 mm
		WPP03110	110 mm

Elbow 90°	Unit: Piece	Item No.	Size
		WPP0416	16 mm
		WPP0420	20 mm
		WPP0425	25 mm
		WPP0432	32 mm
		WPP0440	40 mm
		WPP0450	50 mm
		WPP0463	63 mm
		WPP0475	75 mm
		WPP0490	90 mm
		WPP04110	110 mm

Elbow 45°	Unit: Piece	Item No.	Size
		WPP 0516	16 mm
		WPP 0520	20 mm
		WPP 0525	25 mm
		WPP 0532	32 mm
		WPP 0540	40 mm
		WPP 0550	50 mm
		WPP 0563	63 mm
		WPP 0575	75 mm

Tee	Unit: Piece	Item No.	Size
		WPP 0616	16 mm
		WPP 0620	20 mm
		WPP 0625	25 mm
		WPP 0632	32 mm
		WPP 0640	40 mm
		WPP 0650	50 mm
		WPP 0663	63 mm
		WPP 0675	75 mm
		WPP 0690	90 mm
		WPP 06110	110 mm

Reduced Tee	Unit : Piece	Item No.	Size
		WPP 0701	20x16x20 mm
		WPP 0702	25x16x25 mm
		WPP 0703	25x20x25 mm
		WPP 0704	32x20x32 mm
		WPP 0705	32x25x32 mm
		WPP 0706	40x20x40 mm
		WPP 0707	40x25x40 mm
		WPP 0708	40x32x40 mm
		WPP 0709	50x20x50 mm
		WPP 0710	50x25x50 mm
		WPP 0711	50x32x50 mm
		WPP 0712	50x40x50 mm
		WPP 0713	63x20x63 mm
		WPP 0714	63x25x63 mm
		WPP 0715	63x32x63 mm
		WPP 0716	63x40x63 mm
		WPP 0717	75x50x75 mm
		WPP 0718	75x25x75 mm
		WPP 0719	75x32x75 mm
		WPP 0720	75x40x75 mm

Reducer	Unit : Piece	Item No.	Size
		WPP 0801	20x16 mm
		WPP 0802	25x16 mm
		WPP 0803	25x20 mm
		WPP 0804	32x20 mm
		WPP 0805	32x25 mm
		WPP 0806	40x20 mm
		WPP 0807	40x25 mm
		WPP 0808	40x32 mm
		WPP 0809	50x20 mm
		WPP 0810	50x25 mm
		WPP 0811	50x32 mm
		WPP 0812	50x40 mm
		WPP 0813	63x20 mm
		WPP 0814	63x25 mm
		WPP 0815	63x32 mm
		WPP 0816	63x40 mm
		WPP 0817	63x50 mm
		WPP 0818	75x25 mm
		WPP 0819	75x32 mm
		WPP 0820	75x40 mm
		WPP 0821	75x50 mm
		WPP 0822	75x63 mm
		WPP 0823	90x40 mm
		WPP 0824	90x50 mm
		WPP 0825	90x63 mm
		WPP 0826	90x75 mm
		WPP 0827	110x40 mm
		WPP 0828	110x50 mm
		WPP 0829	110x63 mm
		WPP 0830	110x75 mm
		WPP 0831	110x90 mm

Bridge	Unit : Piece	Item No.	Size
		WPP 0916	16 mm
		WPP 0920	20 mm
		WPP 0925	25 mm
		WPP 0932	32 mm

Plug	Unit: Piece	Item No.	Size
		WPP 1016	16 mm
		WPP 1020	20 mm
		WPP 1025	25 mm
		WPP 1032	32 mm
		WPP 1040	40 mm
		WPP 1050	50 mm
		WPP 1063	63 mm
		WPP 1075	75 mm
		WPP 1090	90 mm
		WPP 10110	110 mm

Flush Wall Disc	Unit: Piece	Item No.	Size
		WPP 1116	16 X 1/2`
		WPP 1120	20 X 1/2`
		WPP 1125	25 X 1/2`

Male Adaptor	Unit: Piece	Item No.	Size
		WPP 1216	16 X 1/2`
		WPP 1220	20 X 1/2`
		WPP 1225	25 X 3/4`
		WPP 1232	32 X 1`
		WPP 1240	40 X 1` 1/4`
		WPP 1250	50 X 1 1/2`
		WPP 1263	63 X 2`
		WPP 1275	75 X 2 1/2`

Female Adaptor	Unit : Piece	Item No.	Size
		WPP 1316	16 X 2/1`
		WPP 1320	20 X 2/1`
		WPP 1325	25 X 3/4`
		WPP 1332	32 X 1`
		WPP 1340	40 X 1 1/4`
		WPP 1350	50 X 1 1/2`
		WPP 1363	63 X 2`
		WPP 1375	75 X 2 1/2`

Female Threaded Te	Unit: Piece	Item No.	Size
		WPP 1420	20 X 2/1 X 20 mm
		WPP 1425	25 X 2/1 X 25 mm
		WPP 1426	25 X 3/4 X 25 mm
		WPP 1427	32 X 3/4 X 32 mm
		WPP 1428	32 X 1 X 32 mm

Male Threaded Tee	Unit: Piece	Item No.	Size
		WPP 1520	20 X 2/1 X 20 mm
		WPP 1525	25 X 2/1 X 25 mm
		WPP 1526	25 X 4/3 X 25 mm
		WPP 1527	32 X 4/3 X 32 mm
		WPP 1528	32 X 1 X 32 mm

Flange Collar	Unit: Piece	Item No.	Size
		WPP 1740	40 mm
		WPP 1750	50 mm
		WPP 1763	63 mm
		WPP 1775	75 mm
		WPP 1790	90 mm
		WPP 17110	110 mm

Flange Caller	Unit: Piece	Item No.	Size
		WPP 1840	40 mm
		WPP 1850	30 mm
		WPP 1863	63 mm
		WPP 1875	75 mm
		WPP 1890	90 mm
		WPP 18110	110 mm

MALE BRASS RECCORD	UNIT: PIECE	Item No.	Size
		WPP 2016	16 X ½'
		WPP 2020	20 X ½'
		WPP 2025	25 X ¾'
		WPP 2032	32 X 1'
		WPP 2040	40 X 1 ¼'
		WPP 2050	50 X 1 ½'

PIPE CUTTER	UNIT: PIECE	Item No.	Size
		WL 2116	16-75mm

Chemical Resistance

Examined substances	Concentration %	Temperature (C^o)		
		20	60	100
Water :				
Boric water	Sol.sat.		+	
Brackish water	-	+	+	+
chlorinated water	12.5% cholorine	O	O	
Distilled water	100	+	+	+
Drinking water	-	+	+	+
Lake water	-	+	+	+
Soda water	-	+		+
Wax	+	-	O	
Xylene	100	O	-	

Polypropylene has high resistance to a large number of aggressive substances, and is therefore particularly suitable for special applications.

The table below provides the resistance of Thermopipe to various chemicals.

Take care when the installation is to carry water with chlorine content over the limits permitted by law and/or contains elements which induce oxidation in general.

TABLE OF CHEMICAL AGENTS RESISTANCE OF POLYPROPYLENE

SYMBOLS

+ = highly resistant
= resistant
O = fairly resistant
Θ = scarcely resistant
– = non resistant

Sol.sat =saturated solution
t = all %
s = it loses colour

Examined substances	Concentration %	Temperature (°C)		
		20	60	100
Acetone	100	+	O	
Acid (see acid name)	-			
Acetic, acid	100	+	+	
Acetic, anhydride	100	+	+	
Alum	sol.sat	+	+	
Aluminum, salt	t	+	+	+
Amber, acid	sol.sat	+	+	
Ammonia, gas	100	+	+	
Ammonia, liquid	conc.	+	+	
Ammonium, acetate	t	+	+	+
Ammonium, nitrate	t	+	+	+
Ammonium, phosphate	t	+	+	+
Ammonium, sulphate	t	+	+	+
Aniline	100	+	⊕	+
Antifreeze	-	+	+	
Apple juice	-	+	+	
Aspirin ®	-	+	+	+
			+	+
Barium, chloride	t	+	+	+
Battery, acid	-	+	+	+
Beer	-	+	+	+
Benzaldhyde	100	+	+	+
Benzaldheyde, liquid	sol. sat. (0.3)	+	+	+
Benzoic, acid	100	+	+	+
Benzol	100	O	+	+
Borax	sol. sat.	+	+	+
Boric, acid	100	+	+	+
Bromine, liquid	100	-	+	+
Bromine, dry steam	high conc.	-		
Bromine, dry stam	low conc.	O	+	+
Butane, liquid	100	+		
Butane gas	100	+	+	+
Gutter	100	+	+	+
Butyl, alcohol	-	+	+	+
Butyl, alcohol	100	+	+	+
Butyl, gas	100	©	+	+
			+	+
Calcium, chloride	sol. sat.	+	+	+
Calcium, nitrate	sol. sat	+	+	+
Carbon, tetrachloride	100	O	+	+
Chlorine, liquid	100	-	+	+
Chlorine, dry gas	100	-	+	+
Chlorine, wet gas	100	O	+	+
Chloroform	10	O	+	+
Chlorosulfonic, acid	100	-	+	+
Chromic, acid	-	+	+	+
Chromium platinum bath	-	+	+	+
Chromium trioxide	sol.sat.	+		
Coca Cola ©	-	+	+	+
Cocoa	-		+	+
Coffee	-	+	+	+
Copper, salt	sol.sat.	+	+	+
Copper, nitrate	30%	+	+	+
Cream	-	+	+	+
Cresol	100	+	+	+
Cyclohexan	100	+	+	+
Cycloheanol	100	+	+	+

Examined substances	Concentration %	Temperature (°C)		
		20	60	100
Diesel oil	-	+	O	+
Diethyl either	100	O		
Dimethyl formamide	100	+		+
Diossano	100	+	O	+
Dizan liquid	-	+	+	+
Dry Salt	-	+	+	+
		+	+	+
Ethyl, Acetate	100	+	+	+
Ethyl, Alcohol	100	+	+	+
Ethyl, Benzol	100	+	+	+
Ethyl, Chloride	100	+	+	+
Ethyl, Heanol	100	+	+	+
		+	+	+
Flour	-	+	+	+
Formaldehyde	40	+	+	+
Formic, Acid	-	+	+	+
Fruit Juice	-	+	+	+
Gelatin	-	+	+	+
Gin	40			
Glycerin	100	+	+	+
Glycerin, Liquid	low conc.	+	+	+
Glycolic, Acid	100	+	+	+
Glucose	-	+	+	+
		+	+	+
Heptanes	100	+	+	+
Hexane	100	+	+	+
Hydrochloric, Acid	high conc.	+	+	+
Hydrochloric, Acid	low conc.	+	+	+
Hydrochloric, Ammonium	T	+	+	+
Hydrogendiozide	3	+	+	+
		+	+	+
Iodine, Tincture	-	+	+	+
Iron, Salt	sol.sat	+	+	+
Iso Octane	100	+	+	+
Iso Propylic Alcohol	100	+	+	+
Jam	-	+	+	+
		+	+	+
Lactic, Acid	-	+	+	+
Lanolin	-	+	+	+
Lemonades	-	+	+	+
Lemon Juice	-	+	+	+
Limestone	-	+	+	+
Liquors	t	+	+	+
		+	+	+
Magnesium, Salt	sol.sat			
Margarine	-	+	+	+
Mayonnaise	-			
Menthol	-	+	+	+
Mercury	100	+	+	+
Methanol	100	+	+	+
Methyl chloride	100	+	+	+
Methylethylketone	100	+	+	+
Mulch	-	+	+	+
Muriatic acid	10	+	+	+
Mustard	-	+	+	+
		+	+	+

Examined substances	Concentration %	Temperature (°C)		
		20	60	100
Naphthalene decahydro	100	+	+	+
Naphtene	100	+	+	+
Naphthalene trachloride	100	+	+	+
Nitric acid	10	+	+	+
Nickel salt	sol. sat.	+	+	+
Nitrobenzene	100	+	+	+
Octane	-	+	+	+
Oil	100			
Oil ether	100	+	+	+
Oil of turpentine	100	+	+	+
Oleic salt	100	+	+	+
Oleum	t	+	+	+
Orange juice	<0.5 ppm.	+	+	+
Ozone		+	+	+
Oil	-	+	+	+
Almond oil	-	+	+	+
Animal oil	-	+	+	+
Camphor oil	-	+	+	+
Coconut oil	-	+	+	+
Cod oil	-	+	+	+
Cloves oil	-	+	+	+
Corn oil	-	+	+	+
Linseed oil	-	+	+	+
Motor oil	-	+	+	+
Olive oil	-			
Oxalic oil	-	+	+	+
Paraffin oil	-	+	+	+
Peppermint oil	-	+	+	+
Resin oil	-	+	+	+
Silicone oil	-	+	+	+
		+	+	+
Paraffin	100	+	+	+
Petroleum	100	+	+	+
Pepper	-	+	+	+
Perborax	sol. sat. (1.4)			
Perfume	-	+	+	+
Phenol	sol. sat.			
Phosphorus acid	Sol. sat.	+	+	+
Phosphorus oxichloride	100	+	+	+
Photographic acid	-	+	+	+
Potassium carbonate	sol. sat.	+	+	+
Potassium chlorate	sol. sat.(7.3)	+	+	+
Potassium chlorite	sol. sat.	+	+	+
Potassium chromate	sol. sat.(12)	+	+	+
Potassium iodide	sol. sat.	+	+	+
Potassium nitrate	sol. sat.	+	+	+
Potassium permanganate	sol. sat.	+	+	+
Potassium perulfate	sol. sat.	+	+	+
Potassium sulfate	sol. sat.	+	+	+
Propane gas	100	+	+	+
Propane liquid	100	+	+	+
Pyridine	100	+	+	+
Quinine	-	+	+	+
Salt dry	-	+	+	+
Silver salt	sol. sat.	+	+	+
Soap liquid	10	+	+	+
Soda caustic	100	+	+	+
Sodium bicarbonate	sol. sat.	+	+	+
Sodium carbonate	sol. sat.	+	+	+
Sodium chlorate	25	+	+	+

Examined substances	Concentration %	Temperature (°C)		
		20	60	100
Sodium hypochlorite	sol. sat.	+	+	+
Sodium nitrate	5	+	+	+
Sodium phosphate	Sol. sat.	+	+	+
Sodium sulphate	Sol. sat.	+	+	+
Sodium sulphite	Sol. sat.	+	+	+
Sodium thiosulphate	Sol. sat.	+	+	+
Starch	Sol. sat.	+	+	+
Sulphure carbon	T	+	+	+
	-	+	+	+
Tea				
Tetra chlorine ethylene	-	+	+	+
tetraidrophurano	100	+	+	+
Thiophene	100	+	+	+
Tin 11 chloride	100	+	+	+
Toothpaste	sol. sat.	+	+	+
Trichloroethylene	-	+	+	+
Tricresyphosphate	100	+	+	+
Turpentine	-	+	+	+
	100	+	+	+
Urea				
	sol. sat.	+	+	+
Vanilla				
Vaseline	-	+	+	+
Vinegar	-	+	+	+
	-	+	+	+

ppr-c Type 3
Pipsenn Mounting Techniques

Ppr-c Type 3 Pipes Welding Techniques

Cut the pipe with special pipe scissor perpendicularly top ipe axis. Control if welding machine is warmed to 260°C. Be sure that tools are clean.

Connect the pipe and the additional part that you got out of the tool, without turning. Don't make operation on the welded parts that didn't finish their cooling time.

Push the pipe and the additional part together through welding tool without turning. For welding and cooling times, look at welding informations table.

Foiled Ppr-c Type 3 Pipes Welding Techniques

Cut the pipe with special pipe scissor perpendicularly top ipe axis. Control if welding machine is warmed to 260°C. Be sure that tools are clean.

Push the pipe into foil peeling apparatus in comformity with pipe diameter.

Peel the aluminium foil by turning the apparatus until it comes to resisting point

If any foil piece left on the pipe surface, it must be cleaned.

Push the pipe and the additional part together through welding tool without turning. For welding and cooling times, look at welding informations table.

Connect the pipe and the additional part that you got out of the tool, without turning. Don't make operation on the welded parts that didn't finish their cooling time.

In welded installations, it has to be tested that if any water leakage exists. All pipe ends are closed and 10 At. Water pressure is applied from a point with a pump. Installation is kept wait with 10 at. Pressure for 24 hours in order to control if any leakage exists.

Out Diameter	Welding Depth (mm)	Heating	Duration (s) DVS 2207	Welding Duration (s)	Cooling Duration(m)
20	14.0	5	8	4	2
25	15.0	7	11	4	2
32	16.5	8	12	6	4
40	18.0	12	18	6	4
50	20.0	18	27	6	4
63	24.0	24	36	8	6

LIST OF REFERENCES

No.	Approved By	Country.
1	Ministry Of Public Works & Housing	Jordan
2	Saudi Arabian Standards Organization	Saudi Arabia
3	Directorate General For Specifications & Measurements	Oman
4	Egyptian Organization For Standardizations & Quality Control	Egypt
5	Public Works Dept. (Abu Dhabi)	U.A.E
6	Architectural Engineering Dept.	Qatar
7	Ministry Of Electricity And Water	Qatar
8	Ministry Of Public Health	Qatar

No.	Official Buildings	Country.
1	Irbid Municipal Building	Jordan
2	Royal Diving Club Aqaba	Jordan
3	Royal Jordanian Air Force	Jordan
4	Jordan Phosphate & Fertilizer Units	Jordan
5	Marine Biological Science In Aqaba	Jordan
6	Arab Animal Resources Development Co.	Jordan
7	Arab Potash Company Dead Sea	Jordan
8	Cooling Network For Nuclear Accelerator University Of Jordan	Jordan
9	Raja Hotel	Egypt
10	Al-Oroba & Al-Ettehad Schools	Jordan
11	Justice Court Zarqa City	Jordan
12	Cous Breeding Association (Al-dolail) Tolido Hotel	Jordan

No.	Commercial Centers	Country.
1	Abu Irshead Commercial Center	Jordan
2	Al-Mohtaseb Commercial Center	Jordan
3	Kana'n Commercial Center	Jordan
4	Al.-Nabeeh Commercial Center	Jordan
5	Al-Akkad Commercial Center	Jordan
6	Shokri E'lyan Commercial Center	Jordan
7	Al-Buhatra Tower (Sharjah)	U.A.E

No.	Universities	Country.
1	University Of Jordan	Jordan
2	Yarmouk University	Jordan
3	Amman National University	Jordan
4	Philadelphia University	Jordan
5	Jordan University For Women	Jordan
6	Mo'ta University	Jordan
7	Al-Zaitoneh University	Jordan
8	Sultan Qaboos University	Oman

No.	Housing Projects	Country.
1	Marwan Al-Abdullat Housing Projects	Jordan
2	Nidal Al-Khuza'i Housing Projects	Jordan
3	Talal Seder Housing Projects	Jordan
4	Mosely & Saiead Housing Projects	Jordan
5	Al-Sheedia Phosphate	Jordan
6	Nayrookh Hotel Project	Jordan
7	Zreak Housing Projects	Jordan
8	Tayel Sad Al-Deen Housing Projects	Jordan
9	Akram Ramadan Housing Projects	Jordan
10	Al-Ama'ry Housing Projects	Jordan
11	Jordan Development & Investment Co. Housing Projects	Jordan
12	Mahmoud Al-Qaisi Housing Projects	Jordan
13	Kahena Hotel	Tunis
14	Sibiria Hotel Russia (Cis)	
15	Rass Leffan Villas Project	Qatar

No.	Mosques & Churches	Country.
1	Al-Taba'a Mosque	Jordan
2	Al-Shaheed Hamza al-Shoobaki Mosque	Jordan
3	Swaifeyeh Church Hall	Jordan
4	Al-Zohoor Mosque	Jordan
5	Al-Shaheed Abdullah Azzam Mosque	Jordan
6	Al-Redwan Mosque	Jordan
7	Amro Ben Salem Al-Khoza'y Mosque	Jordan

No.	Medical Institutions	Country.
1	Hospitals:	
a	• University Of Jordan Hospital	Jordan
b	• Al-Basheer Hospital	Jordan
c	• Prince Basma Hospital	Jordan
d	• Zarqa Governmental Hospital	Jordan
e	• Prince Haya Hospital	Jordan
f	• Al-Jaziera Hospital	U.A.E
g	• Mafraq Hospital	U.A.E
h	• Mafraq Specialized Hospital	Jordan
i	• Corniche Hospital	U.A.E
2	Arab Cevyer For Pharmaceuticals & Chemicals	Jordan
3	Arab Medical Containers Co.	Jordan
4	Animal Health Institute	Jordan
5	Jordan Medical Corporation Co. Ltd.	Jordan
6	Dar Al-Dawa Co.	Jordan
7	Al-Shiefa' Medical Factory	Sudan
8	Cyprus Mineral Health Resort	Tunis
9	Manufacturing Of Drug And Medical Appliances Samera'	Iraq
10	Med-Farma Industries	Jordan

No.	Food & Chemical Industries	Country.
No.	Yeast Industries Co.	Jordan
1	Adnan Khudari & Sons Trading Co.	Jordan
2	Arab Gas Industries Co.	Jordan
3	Modern Cosmetics & Detergents Co.	Jordan
4	Spartan Chemical Co.	Jordan
5	Al-Qasem & Tahboob Co. (food industries)	Jordan
6	Arge Hls 2000 And Barge Sep Iso (N.P.C.C)	Jordan
7	Hammoda Dairy Factory	Jordan
8	Hoppecke Battery Factory	Jordan

No.	G Selected Project List In U.A.E	Country.
1	Abu Dhabi Trade Center Phase I	U.A.E (Abu Dhabi)
2	Abu Dhabi Trade Center Rotana	U.A.E (Abu Dhabi)
3	Abu Dhabi Trade Center Residence (Hotel)	U.A.E (Abu Dhabi)
4	Al yasat Isand	U.A.E (Abu Dhabi)
5	Bel Ghalim Residential Tower	U.A.E
6	8 – Building in Al Ain	U.A.E (Al Ain)
7	Al Raha Beach (trade Center)	U.A.E (Abu Dhabi)
8	Al Raha Beach Hotel	U.A.E (Abu Dhabi)
9	Sheraton Hotel (Renovation)	U.A.E (Abu Dhabi)
10	Hilton Hotel (ABU DHABI)	U.A.E
11	Sands Hotel (Renovation)	U.A.E
12	Abu Dhabi Int. Hotel (Renovation)	U.A.E
13	Rotana Beach Hotel- Fujairah	(Fujairah)
14	Rotana Beach Hotel-ADH	U.A.E
15	Regency Hotel	U.A.E
16	Al Kheily Tower	U.A.E
17	Al Kheily – 2	U.A.E
18	Al Qubaisy Tower	U.A.E
19	AL Mansouri Tower Sharjah	U.A.E
20	Abu Dhabi Commercial bank	U.A.E
21	Al Murrour Tower (Social Affaires)	U.A.E
22	Al Jazeera Hospital (Renovation)	U.A.E
23	Cornice Hospital (Renovation)	U.A.E
24	Mafraq Hospital	U.A.E
25	BARGE HIS 2000	U.A.E
26	BARGE SEP 150	U.A.E
27	Purchase Department	U.A.E
28	H.H. Sheikha Fatima Tower	U.A.E
29	Abu Dulah Al Fatima Tower	U.A.E
30	H.H. Shieka Moza Tower	U.A.E
31	Mr Mohammed Al Zabee	U.A.E
32	Mr Saif Al Marar	U.A.E
33	Al Fardan Tower (ADH)	U.A.E
34	Sheikha Maryam Tower	U.A.E

35	Al Fardan Center (Sharjah)	U.A.E
36	H.H. Sheikha Hamda Bin Mohamed Building	U.A.E
37	Al Suwaidi Tower	U.A.E
38	Mr Nasser Balhool	U.A.E
39	Al Suwaidi Builing	U.A.E
40	Mr Abdulah Naser Al Swaidi	U.A.E
41	150 Villa (Khalidiya)	U.A.E
42	302 Villa	U.A.E
43	Shk Abdullah Bin Zayed place	U.A.E
44	D.mana'a Sayed Al Otaiba	U.A.E
45	Al Buhaira Tower	U.A.E
46	H.H. shk hazza Bin Zayed Place	
47	H.H. Shaika Maryam Pala (Al Raha)	
48	Shk affra Bint Zayeed Tower	
49	Al Ghazlan Island	U.A.E
50	Shk hamdan Bin Zayed Palace	U.A.E
51	Shk Abdulah Bin Zayed Place	U.A.E
52	Abu Dhabi Airport	U.A.E
53	Dr.mana'a Saeed Al Otaiba Place	U.A.E
54	Shk. Sultan Bin khalifa Tower	U.A.E
55	Shk Shamsa Bin Sayed Tower	U.A.E
56	Shk Mohd Bin Khalifa Tower	U.A.E
57	Dr. Abdulah Al Nowais Tower	U.A.E
58	Power House	U.A.E
59	2 Building – Abu Dhabi	U.A.E
60	Fatima Al Otaiba Building	U.A.E
61	Shk Ahmed Bin Zayed Building	U.A.E
62	Afra Al Ghazali Building	U.A.E
63	AL Bateen Air Port	U.A.E
64	Al zafra air base	U.A.E
65	Al Zafra air base	U.A.E
66	Deffence Project (Maintenance)	U.A.E
67	Mosque project (Deffence)	U.A.E
68	Deffence Project (Maintenance)	U.A.E
69	Contract MW 184	U.A.E
70	Contract MW 054	U.A.E
71	Medical center (al bateen)	U.A.E
72	Officer Accomndation	U.A.E

Certificate BE03/3262QA

The management system of

World Plastics for Construction Industries

PO Box 52
11512 Amman, Jordan

has been assessed and certified as meeting the requirements of

ISO 9001:2000

Exclusions: 7.3, 7.5.2, 7.5.4

For the following activities

Manufacturing of advanced plastic piping systems for industrial and domestic applications.

This certificate is valid from 21 August 2003 until 30 September 2006
Issue 1.
Authorised by

SGS International Certification Services EESV
SGS House Noorderlaan 87 2030 Antwerp Belgium
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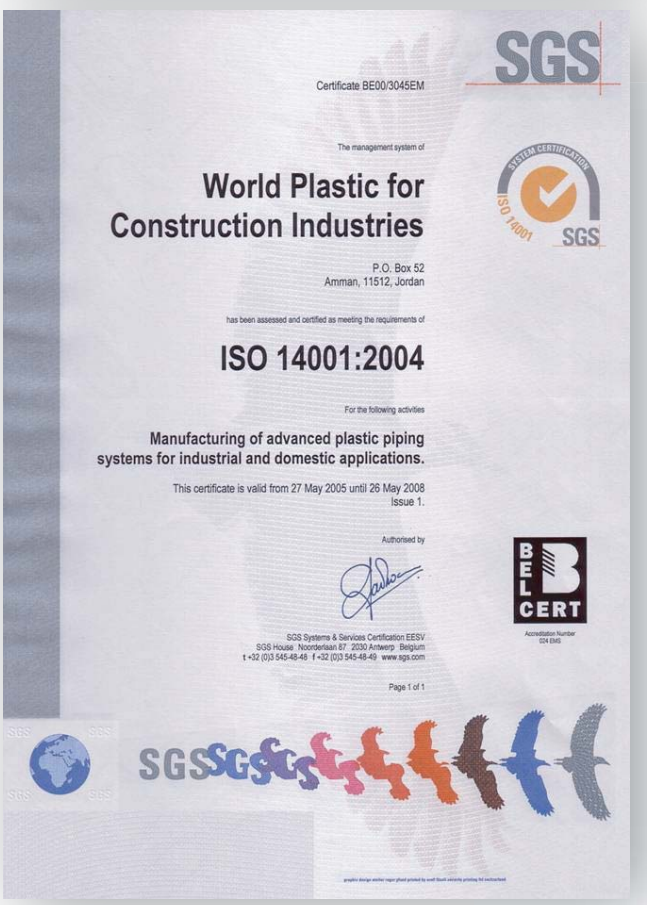
Page 1 of 2

MGMT. SYS
RvA C 055

Accreditation Number
007 QS



Certificate BE00/3045EM

The management system of

World Plastic for Construction Industries

P.O. Box 52
Amman, 11512, Jordan

has been assessed and certified as meeting the requirements of

ISO 14001:2004

For the following activities

Manufacturing of advanced plastic piping systems for industrial and domestic applications.

This certificate is valid from 27 May 2005 until 26 May 2008
Issue 1.

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All information are subjected to modification without prior notice
All the information are for general knowledge, for technical support please contact the company.

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