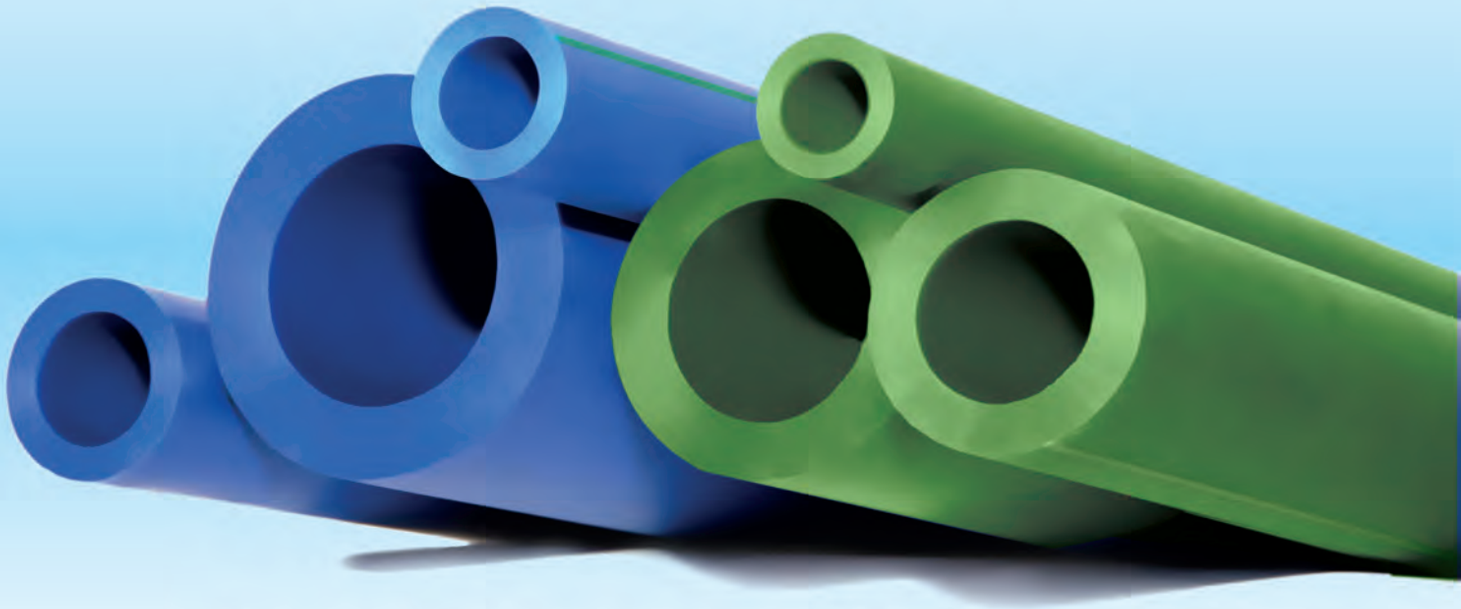
Thermopipe®

(PPR & PPR-CT) Pipes & Fittings

The Best Choice
For Pure Water



Thermopipe®

(PPR & PPR-CT) Pipes & Fittings

The First Manufacturer Of Advanced Plastic Piping Systems In Middle East Region

Solar Photovoltaic System

As one of the leading companies in the Jordanian industrial sector, we believe in being part of the solution for its most irritating challenges , the prices of energy have been rapidly increasing in the past few years . We, ***at World plastics***, have taken a major step towards facing this challenge and turning it into an opportunity; we have recently operated a 712 kW on grid solar photovoltaic system that covers 60% of our energy needs, the system consists of 2262 photovoltaic panels distributed on our warehouses rooftops, and will provide the factory with 1145 MWh of electricity annually, thus reducing our factory's environmental impact with up to 550 tons of CO_2 emissions per year.

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(PPR & PPR-CT) Pipes & Fittings

Introduction

World Plastics is the leading company in the development and manufacture of advanced piping systems since 1984. Our uniquely wide-range of large and small bore piping systems are capable of handling a wide variety of materials in both industrial and domestic applications including water, waste fluid, gas, and chemicals in addition to manufacturing piping systems for electrical installations. Pipes are manufactured from high quality raw material using some of the most advanced production techniques in the world, according to the existing standards.
Our commitment to quality extends to customer support and service. You will find us more than willing to help in the design of the system, and offer engineering counseling in developing a piping network that meets 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 with stand 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.

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

Polypropylene Random Copolymer

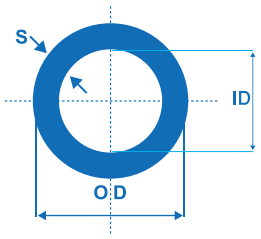
Property	Test method	Unit	Value
Viscosity number J Molecular weight average	ISO 1191 Solution viscosity c=0.001 g/cm'	Cm^3/g -	400 470.000
Melt flow index MFI 190/5 MFI 230/5	ISO 1133 Condition 18 Condition 20	 g/10 min g/10 min	 0.6 1.8
Density	ISO/R 1183	g/cm^3	0.89-0.92
Melting range	Polarisation 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

PPR-C (Type 3)
According to DIN 8077/8078
Color: Blue, Green, or special orders

Series: PN16 / SDR 7.4 / S3.2

Pipe		Wall Thickness	Outer Diameter	Internal Diameter	Water Content
Dimension	Packing unit	s (mm)	OD (mm)	ID (mm)	L/M
20 mm	100 m	2.8	20	14.4	0.165
25 mm	100 m	3.5	25	18.0	0.257
32 mm	50 m	4.4	32	23.2	0.427
40 mm	50 m	5.5	40	29.0	0.667
50 mm	25 m	6.9	50	36.2	1.04
63 mm	15 m	8.6	63	45.8	1.664
75 mm	15 m	10.3	75	54.4	2.348
90 mm	10 m	12.3	90	56.4	3.394
110 mm	5m	15.1	110	79.8	5.053
: 160 mm	5m	21.9	160	116.2	10.710
: 250 mm	5m	34.2	250	181.6	26.171



Series: PN20 / SDR6 / S2.5

Pipe		Wall Thickness	Outer Diameter	Internal Diameter	Water Content
Dimension	Packing unit	s (mm)	OD (mm)	ID (mm)	L/M
20 mm	100m	3.4	20	13.2	0.137
25 mm	100m	4.2	25	16.6	0.216
32 mm	50 m	5.4	32	21.2	0.353
40 mm	50 m	6.7	40	26.6	0.556
50 mm	15 m	8.3	50	33.2	0.866
63 mm	15 m	10.5	63	42.0	1.385
75 mm	10 m	12.5	75	50.0	1.963
90 mm	5m	15.0	90	60.0	2.827
110 mm	5m	18.3	110	73.2	4.208
125 mm	5m	20.8	125	83.4	5.465
160 mm	5m	26.6	160	106.8	8.962

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- TIME
  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.

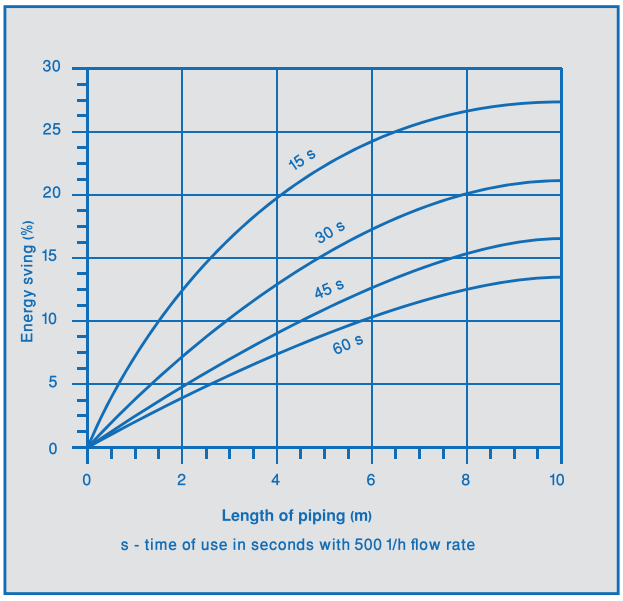
- DAMAGE RESISTANCE
  Being made from a non-rigid material, A Thermopipe system does not suffer major damage as a result of building movement. Thermopipe is recognized by the Commission of International Engineering as being fit for use in seismic areas..

- HYGIENIC AND NONTOXIC
  Thermopipe system is non toxic in accordance with current international standards.

- 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

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)	$\lambda = 0.24$	W/mK
Steel	$\lambda = 45 \div 60$	W/mK
Iron	$\lambda = 45 \div 60$	W/mK
Copper	$\lambda = 300 \div 400$	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.

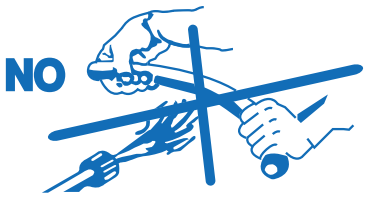
Weathering of PPR pipe

Pigmented polypropylene pipe has a limited life when stored outdoors.The outdoor stornge life of polypropylene should be limited to a total of three months unless the pipe is covered or otherwise protect from sunlight.

Fittings Instructions

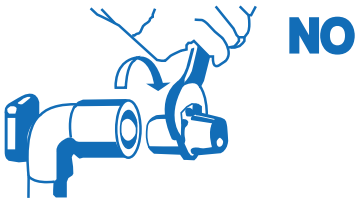
In order not to prejudice the reliability of Thermopipe systems we recommend that you adhere strictly to the following directions :

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.

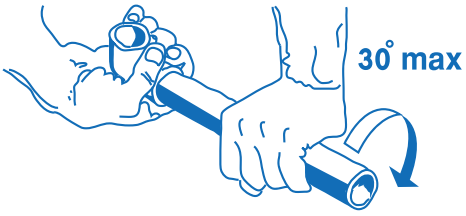
3. Do not try to fit any cast iron conical threads to the brass female end unions. Any high driving torque will destroy the brass threads. Besides Teflon, liquid sealants and hemp, can also be used as a seal if in suitable quantity.



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:

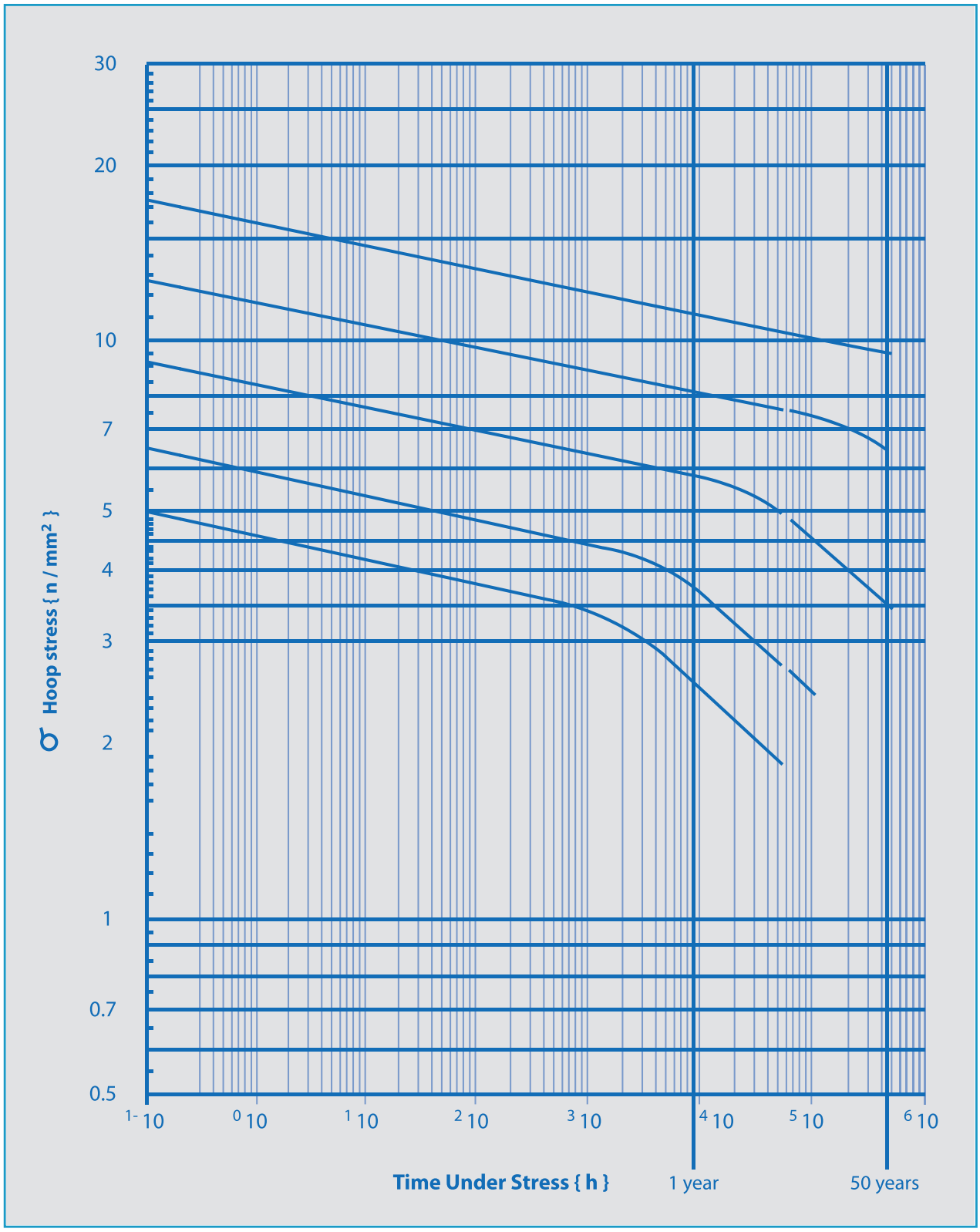
$$P=\left[\frac{20.S.\sigma}{OD\text{-}s}\right]$$

Where,
P = internal pressure (bar)
S = hoop stress (N/mm²)
OD = 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 :

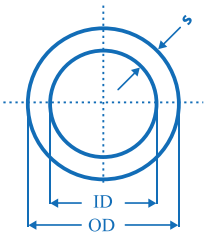
Temperature (C)	Duration in years contin. Operation *	Max pressure (bar)
20	50	20
40	50	20
60	50	12.6
80	50	7.8
95	50	5.2

* 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
ID = inner diameter
OD= outer diameter

Φ =OD mm	Φ =OD inch	S = mm*	ID - mm
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
90	3	15.0	60.0
110	4	18.3	73.4
125	5	20.8	83.4
160	6	26.6	106.8

* Nominal Working Pressure 20 bar. PN 20

Calculation of Pipe Inside Diameter Required

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

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

Where,
ID = 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:

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

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/m^3 specific weight of water

G = 9.81 m/s^2 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:

$$\Delta P = 1 \,.\, R + z \,.\, 10$$

where:

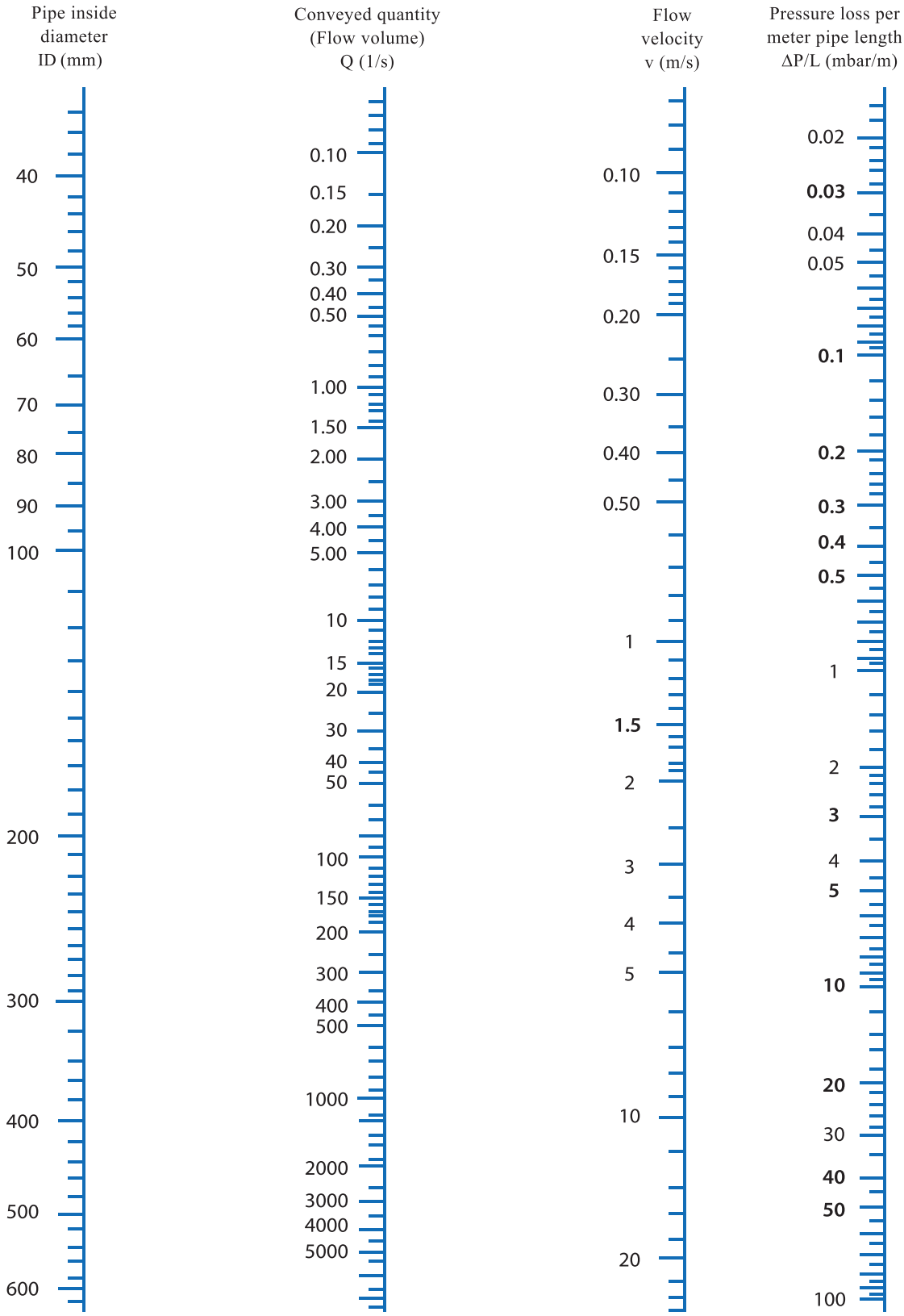
ΔP = total loss of pressure (mm c.a.)

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 =ID and about 5m of pipe length for each bend r = 1.5xID.



Thermal Expansion

The expansion L is calculated according to the following formula.

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

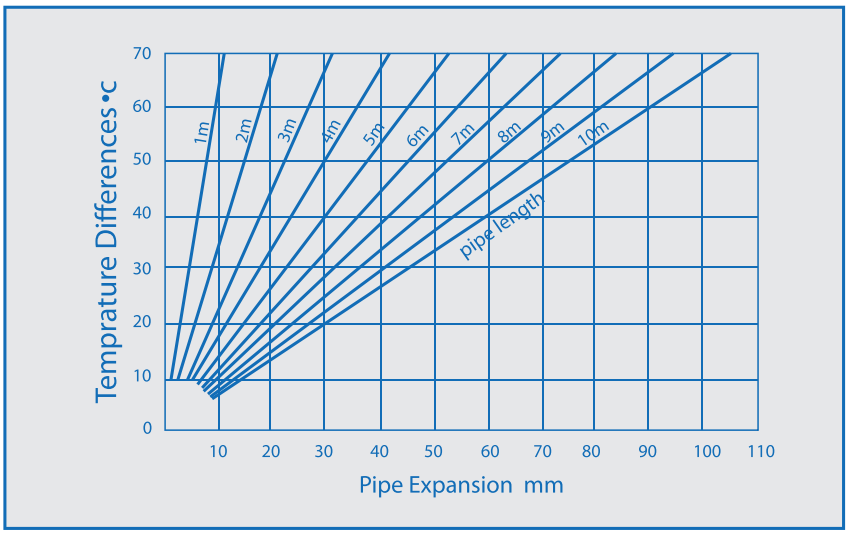
Where,

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.

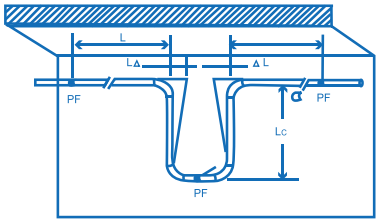
NOTE :

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,

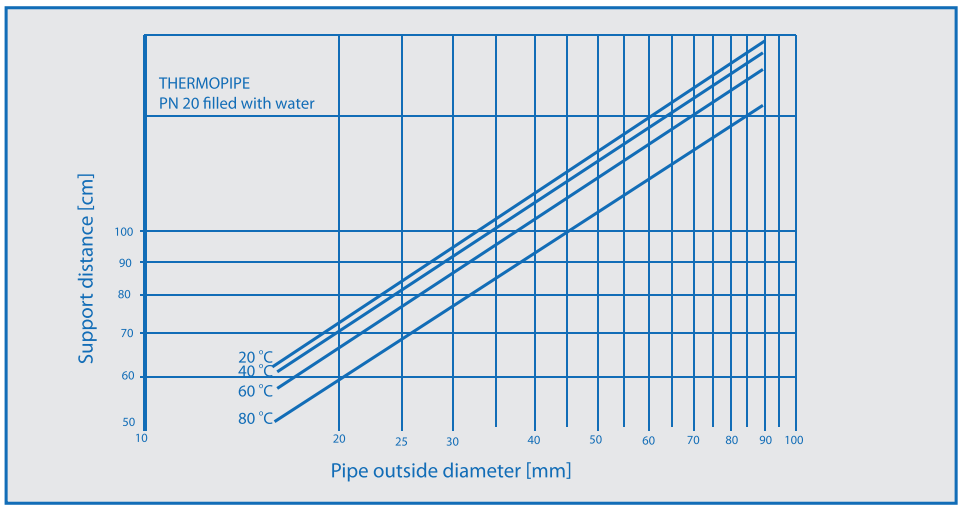
Lc = length of double offset expansion bend

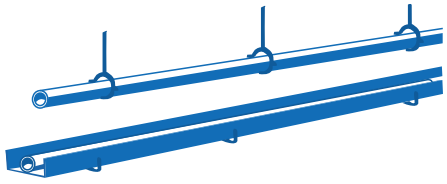
OD = outer diameter of pipe (mm)

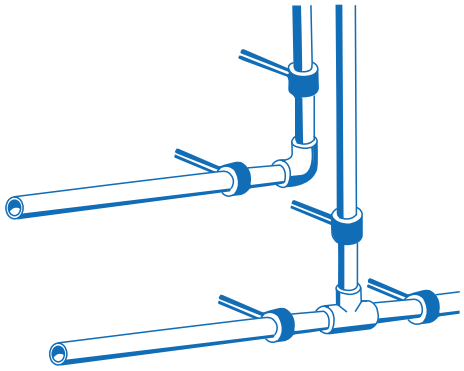
ΔL = expansion of pipe (mm)

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 & Welding

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.

The ambient temperature during the mounting is very important. you should increase the welding time in cold conditions (up to 50% when the temperature is about 5°C) and decrease the time when it is hot. Consider also the cooldown of the surface of the welding machine. It is the best to use heat signal light to make sure that the welding surface temp. has reached (260 ±5°C).

PPR-C Type 3 Pipes Welding 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

Chemical Resistance

Examined substances	Concentration %	Temperature (°C)		
		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

Symbol

+ = highly resistant	Sol.sat =saturated solution
= resistant	t = all %
O = fairly resistant	s = it loses colour
Θ = scarcely resistant	
– = non resistant	

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	-	+	+	+
	-	+	+	+

Thermopipe®

PPR-CT Pipes

What is PPR-CT?

Based on the success of PP-R , the next generation of Polypropylene- Random Copolymer was developed with a special crystalline structure that exhibits an improved pressure rating at elevated temperatures. It is called Polypropylene Random Crystalline Temperature (PP-RCT). Its enhanced crystalline structure is created through a special nucleation process that enables the pipe to operate at Higher Pressures at Elevated Temperatures. This advanced resin is used in World Plastics Mechanical Pipes and Fittings according to German Standards (DIN 8077 / 8078) and to Standard (DIN EN ISO 15874) .

In long-term pressure tests, the outstanding performance characteristics of PP-RCT vs. standard PP-R is apparent :

- **PPR-CT :** 50 year strength at 70° C (158° F) = 5.00 MPa (725 psi).
- **PPR :** 50 year strength at 70° C (158° F) = 3.21 MPa (464 psi) Offering more than 50% improved long-term strength, PP-RCT enables designers to achieve higher pressure ratings than with traditional PP-R pipes of the same wall thickness, or they can utilize PP-RCT's higher pressure rating and down-gauge to a thinner wall pipe offering higher hydraulic capacities and cost savings.

Advantages of PPR-CT Pipes

- Material Stability

  Integrity of the PP-R (CT) raw material is not affected during processing and fabrication. More importantly, the material is engineered to withstand long-term service life even at high temperatures.

- Corrosion Resistance

  Unlike metal piping systems that have to be upsized due to corrosion, PP-R (CT) systems do not corrode, rust or scale. No corrosion means long-term consistent flow, no decrease in pipe inside diameter, lower pumping costs and a better quality of water Chemical Resistance and Special Applications PP-R (CT) is safe for the transport of drinking water and any food-grade fluids. Because of the non-polar characteristics of polypropylene and a specially designed additive package, PP-R (CT) systems are also suitable for the distribution of most chemicals . Although PPR (CT) is resistant to a wide variety of chemicals, it is very important to select appropriate "transition" fittings (fittings with metal inserts) .

- **Hydrolysis**
  World Plastics PP-R (CT) pipes are completely resistant to hydrolysis , meaning they will not react with water . The pipe will not break down and no chemicals will leach into the water throughout its lifecycle Additionally , these pipes do not impart any taste or odor into the fluids they convey. This makes them ideal for the transport of water and food grade liquids .

- **UV Protection Indoor vs. Outdoor**
  PP-R (CT) pipe and fittings are designed for indoor use. They are not stabilized for direct Ultraviolet (UV) exposure. Over Time, UV exposure causes degradation, resulting in decreases in the pipe's physical and chemical properties and long term performance. If the pipes are to be used outdoors, they should be buried or encased in a protective wrap or coating.
  Note: Coating of the system can be achieved by using PP-R (CT) safe paint, which must be properly applied and maintained .

- **Fiber Composite Pipes Integrated Expansion and Contraction Control**
  Temperature changes cause thermoplastic pipes to expand and contract in the linear direction. With PP-R (CT) Fiber Composite pipes, expansion and contraction is controlled in the linear direction. This is achieved by the addition of a fiber layer co- extruded into the mid-wall of the pipe. The middle layer is comprised of oriented fibers encapsulated in PP-RCT, which does not expand when exposed to temperature changes. Therefore, overall expansion of the pipe is minimized. Not only does it reduce the need for additional expansion control, it also provides rigidity and stability. Pipes with the Fiber Composite layer are joined via heat fusion .

- **Heat Fusion Connections**
  Piping systems use the Heat Fusion process to create the homogeneous connections between the pipe and the fittings. The connections use no added solders, solvents, glues or similar products. When heat fusing PP-R (CT) components, extra material is collected at the joint which makes fusion joints the strongest points of the system. Properties of the material do not change when heat fused, so connections between pipes and fittings are strong and safe.

- **Premium Quality**
  World Plastics strict policy on quality control requires the use of premium PP-R (CT) resins produced by the world's premier resin manufacturers. Material formulations are continuously monitored for compliance and consistency insuring the long term performance of your piping system.

- **(50 +) Year Lifetime**
  World Plastics has developed long-lasting , low maintenance piping systems. Our products are produced from proprietary resin formulations insuring long term performance. The pipes are resistant to scaling and corrosion; the walls of the pipes are extremely smooth and therefore have a low friction coefficient eliminating abrasion. Furthermore, mechanical joints, the weakest point of a traditional piping system, are eliminated by using heat fusion as the joining method. With heat fused joints, physical stresses will not damage the integrity of the joints.

- **Insulation and Energy Savings**
  A (50%) improvement in heat loss or heat gain can be realized when comparing non insulated metal pipe to non insulated PP-R (CT) pipe . Before starting installation, always check code requirements to make sure that your installation complies.

- **Low Thermal Conductivity**
  The value of Thermal conductivity of PP-R (CT) material is (1.67) BTU (in / hr x 2 °F) . This low conductivity value, combined with the thickness of the pipe and fitting wall, acts as a natural insulator. Traditional metal piping systems have much higher Thermal Conductivity values. Under normal operating conditions, non-insulated PP-R (CT) pipes have less heat loss or gain and greater resistance to condensation as compared with metal and other types of plastic piping systems. One of the objectives of Energy and Building codes is to improve operating efficiencies. They make recommendations for the required amount of insulation for piping systems. Because piping systems have much lower heat losses and heat gains than traditional metal systems, our piping system is capable of operating at an equal or in most cases a more efficient level than other metal systems under the same code. If there is a need for insulation, both space and material can be saved using PP-R (CT) systems . PP-R (CT) pipes will burn, but are not classified as flammable.

- **Fittings Insulation Advantage**
  The socket fusion fittings vary from (1/2") to (4") , (20 mm – 125 mm) . When pipes are inserted into the socket of the fittings , thickness of the PP-R (CT) material is increased at the joint. When thickness of the over-engineered fittings and pipe are added in conjunction with natural thermal resistance of the material, need for fitting insulation is eliminated in certain applications.

- **Prevention of Biological Growth**
  Light transmission through PP-R (CT) pipe is less than (0.2%) . Therefore, algae and other bio film attachment is not supported. This benefit makes it an ideal piping system for health care facilities and food grade applications.

- **Natural Sound Insulation**
  Because of the integrated natural sound insulation, pressure bellow and water flow noise are lessened by PP-R (CT) pipes, enhancing the quality of living for the occupants of the buildings.

- **Safe Handling and Installations**
  Installation of PP-R (CT) piping system is preferred over other piping systems because they weigh less and are joined using heat fusion, instead of solders or glues . Installers should follow all safety recommendations .

Application Fields of PPR & PPR-CT

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.
- Food Processing.

Technical Table

Outer Diameter	Pipe Wall Thickness (mm)			
	PN 16		PN 20	
(mm)	PPR	PPR - CT	PPR	PPR - CT
20	2.8	1.9	3.4	2.8
25	3.5	2.3	4.2	3.5
32	4.4	2.9	5.4	4.4
40	5.5	3.7	6.7	5.5
50	6.9	4.6	8.4	6.9
63	8.6	5.8	10.5	8.6
75	10.3	6.8	12.5	10.3
90	12.3	8.2	15.0	12.3
110	15.1	10.0	18.4	15.1
125	17.1	11.4	20.8	17.1
160	21.9	14.6	26.6	21.9

PPR-CT Vs. PPR

Temperature	Operating Time	Allowable Working Pressure (Bar)							
		S 4 (SDR 9)		S 3.2 (SDR 7.4)		S 2.5 (SDR 6)		S 2 (SDR 5)	
(°C)	(Years)	PP - RC	PP - RCT	PP - RC	PP - RCT	PP - RC	PP - RCT	PP - RC	PP - RCT
20	10	17.2	19.9	21.7	25.1	27.4	31.6	34.5	39.8
	25	16.6	19.6	21.0	24.6	26.4	31.0	33.3	39.1
	50	16.2	19.3	20.4	24.3	25.7	30.6	32.4	38.5
40	10	12.3	14.7	15.5	18.6	19.6	23.4	24.7	29.5
	25	11.9	14.4	15.0	18.2	18.8	22.9	23.7	28.9
	50	11.5	14.2	14.5	17.9	18.3	22.6	23.1	28.4
60	10	8.7	10.6	11.0	13.4	13.9	16.8	17.5	21.2
	25	8.4	10.4	10.5	13.1	13.3	16.5	16.7	20.7
	50	8.1	10.2	10.2	12.8	12.9	16.2	16.2	20.4
70	10	7.3	8.9	9.2	11.2	11.6	14.1	14.6	17.8
	25	6.3	8.7	8.0	10.9	10.0	13.8	12.7	17.4
	50	5.3	8.5	6.7	10.7	8.5	13.5	10.7	17.0
80	10	5.1	7.4	6.4	9.3	8.1	11.7	10.2	14.8
	25	4.1	7.2	5.1	9.1	6.5	11.4	8.1	14.4
95	5	3.2	5.6	4.1	7.1	5.2	8.9	6.5	11.3

** S = (SDR - 1) / 2
** Safety Factor = 1.5

Thermopipe , Fittings & Accessories

According to DIN 8077 & Available in ASTM F2389

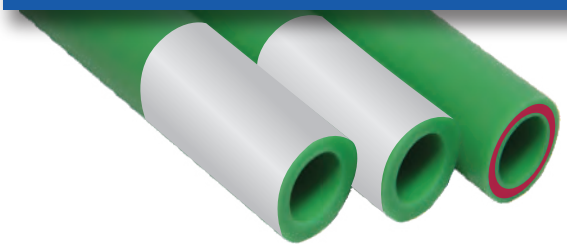
Available Colors

PPR Pipes — Size mm

Size	
20 mm	75 mm
25 mm	90 mm
32 mm	110 mm
40 mm	125 mm
50 mm	160 mm
63 mm	

Available Colors

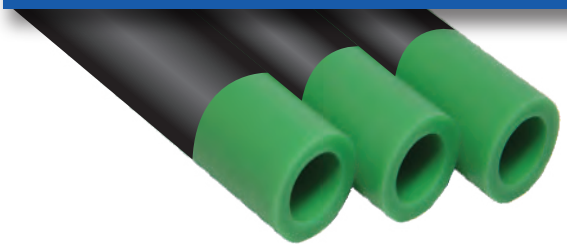
PPR Composite Pipes — Size mm



Size
20 mm
25 mm
32 mm
40 mm
50 mm
63 mm

Available Colors

PPR Pipes with UV Protection — Size mm



Size
20 mm
25 mm
32 mm
40 mm
50 mm
63 mm

Available Colors

PPR- CT Pipes — Size mm

Size	
20 mm	75 mm
25 mm	90 mm
32 mm	110 mm
40 mm	125 mm
50 mm	160 mm
63 mm	

Available Colors

Coupling

Size mm

Size	
20 mm	75 mm
25 mm	90 mm
32 mm	110 mm
40 mm	125 mm
50 mm	160 mm
63 mm	

Available Colors

Reducer

Size mm

Size	
20 x 25 mm	75 x 63 mm
32 x 25 mm	90 x 75 mm
40 x 25 mm	110 x 90 mm
50 x 25 mm	160 x 125 mm
50 x 40 mm	
63 x 50 mm	

Available Colors

End Cap

Size mm

Size	
20 mm	75 mm
25 mm	90 mm
32 mm	110 mm
40 mm	125 mm
50 mm	160 mm
63 mm	

Available Colors

Elbow 90°

Size mm

Size	
20 mm	75 mm
25 mm	90 mm
32 mm	110 mm
40 mm	125 mm
50 mm	160 mm
63 mm	

Available Colors

Elbow 45° Size mm

Size	
20 mm	75 mm
25 mm	90 mm
32 mm	110 mm
40 mm	125 mm
50 mm	160 mm
63 mm	

Available Colors

Equal Tee Size mm

Size	
20 mm	75 mm
25 mm	90 mm
32 mm	110 mm
40 mm	125 mm
50 mm	160 mm
63 mm	

Available Colors

Reduced Tee Size mm

Size	
20 x 25 mm	75 x 63 mm
32 x 25 mm	90 x 75 mm
40 x 25 mm	110 x 90 mm
50 x 25 mm	160 x 125 mm
50 x 40 mm	
63 x 50 mm	

Available Colors

Bridge Size mm

Size
20 mm
25 mm
32 mm

Available Colors

Socketed bridge

Size mm

Size
25 mm

Available Colors

Flash Wall Disk

Size mm

Size
20 x 1/2"
25 x 1/2"

Available Colors

Double wall disk

Size mm

Size
25 x 1/2"

Available Colors

Male Threaded Elbow 90°

Size mm

Size
20 x 1/2"
25 x 1/2"
25 x 3/4"
32 x 3/4"
32 x 1"

Available Colors

Test Plug — Size mm

Size
1/2"

Available Colors

Female Threaded Elbow 90° — Size mm

Size
20 x 1/2"
25 x 1/2"
25 x 3/4"
32 x 3/4"
32 x 1"

Available Colors

Male Threaded Coupling — Size mm

Size
20 x 1/2 "
25 x 1/2"
25 x 3/4"
32 x 1"
40 x 1.1/4"
50 x 1.1/2"
63 x 2"
75 x 2.1/2"

Available Colors

Female Threaded Coupling — Size mm

Size
20 x 1/2 "
25 x 1/2"
25 x 3/4"
32 x 1"
40 x 1.1/4"
50 x 1.1/2"
63 x 2"
75 x 2.1/2"

Available Colors

Female Threaded Tee

Size mm

Size
20 x 1/2"
25 x 1/2"
25 x 3/4"
32 x 3/4"
32 x 1"

Available Colors

Male Threaded Tee

Size mm

Size
20 x 1/2"
25 x 1/2"
25 x 3/4"
32 x 3/4"
32 x 1"

Available Colors

Female & Male Threaded Union

Size mm

Size
20 x 1/2"
25 x 1/2"
25 x 3/4"
32 x 1"

Available Colors

Metal Threaded Union

Size mm

Size
20 x 1/2"
25 x 1/2"
25 x 3/4"
32 x 1"

Available Colors

Stop Valve

Size mm

Size

20 x 1/2"
25 x 3/4"
32 x 1"
40 x 1.1/4"
50 x 1.1/2"

Available Colors

New Stop Valve

Size mm

Size

20 x 1/2"
25 x 3/4"
32 x 1"

Available Colors

Concealed Stop Valve

Size mm

Size

20 x 1/2"
25 x 3/4"
32 x 1"

Available Colors

Flange Core

Size mm

Size

63 mm
75 mm
90 mm
110 mm
125 mm
160 mm

Flange Union

Size mm

Size
63 mm
75 mm
90 mm
110 mm
125 mm
160 mm

Available Colors

Low Foot Pipe Clamp

Size mm

Size
20 mm
25 mm
32 mm
40 mm
50 mm
63 mm

Pipe Cutter

Size mm

Size
20 - 40 mm
20 - 63 mm
50 - 110 mm

Welding Device

Size mm

Size
20 - 32 mm
20 - 63 mm
75 - 110 mm

Thermopipe®

(PPR & PPR-CT) Pipes & Fittings

LIST OF REFERENCES


Al Buhaira Tower


Etihad-Towers


Sheraton Abu-Dhabi


ADTradeCenter


Abu Dhabi Central Bank


Abu Dhabi Central Market


Abu-Dhabi-Airport


Hilton

Thermopipe®

(PPR & PPR-CT) Pipes & Fittings


Inter National-Rotana-Inn Abu-Dhabi


Rotana Hotel


Marina Villas


Belghailam


Bustan Complex


Al-Raha-Beach-Hotel


Abu Dhabi Trade Centre


Al- Fardan Towers

Etihad Towers Abu Dhabi

Thermopipe®

(PPR & PPR-CT) Pipes & Fittings

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

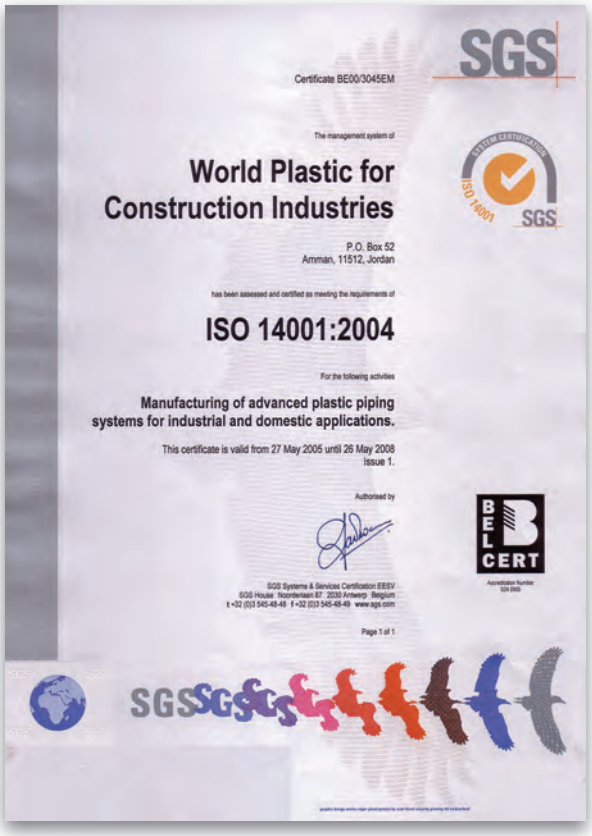
Selected Projects List in U.A.E

S.NO.	DESCRIPTION	CONSULTANT	CONTRACTOR
1	Etihad Towers	Cansult	ACC
2	Abu Dhabi Trade Center Phase I	Cansult	Six Construct
3	Abu Dhabi Trade Center Phase II	Cansult	ACC
4	Abu Dhabi Trade Center Phase III	Cansult	ACC
5	Abu Dhabi Trade Center Phase IV	Cansult	ACC
6	Abu Dhabi Trade Center Rotana	Cansult	ACC
7	Abu Dhabi Trade Center Beach Residence	Cansult	ACC
8	Central Market (Abu Dhabi)	Atkens Conslt	ACC
9	Al Bustan Complex	Cox	Al Habtoor
10	Villa Compound plot Z17/1	Ewan Conslt	Pivot Engg.
11	Al Rawdah Place	Al Salam	ACC
12	Al Yassat Island	Al Salam	ACC
13	Al sadiyat Island (345- Villas)	WhiteYoung Emirates	Al Jaber
14	Bel Ghialam Residential Tower	ACG	ACC
15	8 Building in Al Ain	APG	ACC
16	Al Raha Beach (Trade Center)	DMGM	Al Habtoor
17	Al Raha Beach Hotel	DMGM	Al Habtoor
18	Sheraton Hotel (Renovation)	Khateeb&Alami	Airmech
19	Hilton Hotel Abu Dhabi	Hilton	Hilton
20	Sands Hotel (Renovation)	Sands Hotel	Bani Marban
21	Abu Dhabi Int' Hotel (Renovation)	S.D. Partnership	Bani Marban
22	Vegibal & Fish Market	ACG	Al Farra'a Cont.
23	Rotana Beach Hotel-Fujairah	ACG	Verger & Delporte
24	Rotana Beach Hotel-ADH	ACG	Al Muraikhy
25	Regency Hotel	Al Salam	Unco
26	Al Kheily Tower	Syrconsult	ETA
27	Al Kheily Tower -2	Syrconsult	Remco
28	Al Qubaisy Tower	Syrconsult	ETA
29	Al Mansouri Tower Sharjah	Syrconsult	Nivitrex
30	Abu Dhabi Commercial Bank	Turner & APG	ETA
31	Al Murrour Tower (Social Affairs)	Ian Bin Ham	Lootah
32	Al Jazeera Hospital (Renovation)	PWD	Bani Marban
33	Delma Project	Heberger Engg.	Itinad Contg.
34	Commercial Building	Heberger Engg.	Asqalan

S.NO.	DESCRIPTION	CONSULTANT	CONTRACTOR
35	Mosque Project	Heberger Engg.	Bin Aylan
36	H.H. Sheikha Fatima Tower	Golden Planer	Square Gen. Cont.
37	Abu Dulah Al Fahim Tower	Golden Planer	Square Gen. Cont.
38	H.H. Sheikha Moza Tower	Golden Planer	Bel Badi Cont.
39	Mr. Mohammed Al Zabee	Golden Planer	Sheperds
40	Al Fardan Tower (ADH)	Golden Planer	Al Muraikhy
41	Sheikha Maryam Tower	Golden Planer	Target Eng. Cont.
42	Al Fardan Centre (Sharjah)	Golden Planer	Square Gen. Cont.
43	H.H. Sheikha Hamda Bin Mohamed Building	Golden Planer	Unco
44	Al Saheal Tower	Golden Planer	Square Gen. Cont.
45	Mr. Saif Al Marar	Golden Planer	Commodore Cont.
46	Ahmed Mohd ali Al Mansouri	Golden Planer	Shaya Al Mazroui
47	Al Suwaidi Tower	Suwaidi Consult	Commodore Cont.
48	120 Villa	Syrconsult	Commodore Cont.
49	106 Villa	Ghazi Awad	Commodore Cont.
50	Shk. Hamdan Bin Zayed Palace	Ghazi Awad	Commodore Cont.
51	Jannah Tower	Syrconsult	Commodore Cont.
52	Residential Tower	Syrconsult	Commodore Cont.
53	Dubi Atomobile and Tour Club	Conin Consult	Commodore Cont.
54	Residential Complex Development	Bainona Consult	Ali & sons
55	Costruction Completion	Intregrated Design	thinet Emirates
56	Mr. Nasser Belhool	Suwaidi Consult	Dalta
57	Al Suwaidi Building	Suwaidi Consult	Al Ghafly Gen. Cont.
58	Mr. Abdulah Naser Al Swaidi	Suwaidi Consult	Al Ghafly Gen. Cont.
59	150 Villa (Khalidia)	Ewan Conslt	Pivot Engg.
60	76 Villa	Ewan Conslt	Pivot Engg.
61	Shk. Abdulah Bin Zayed Palace	Ewan Conslt	Teamco
62	Al Ain Mall Project	Ewan Conslt	Pivot Engg.
63	Fish & Vigitable Market	ACG	Al Farra'a Cont.
64	Dr. Mana'a Sayed Al Otaiba	Syrconsult	C.G.C (House)
65	Al Buhaira Tower	Khateeb & Alami	Al Fahed Cont.
66	H.H. Shk. Hazza Bin Zayed Palace	ACG	Target Eng. Cont.
67	H.H. Sheikha Maryam Palace (Al Raha)	Amiral A	Al Farra'a Cont.
68	Shk. Affra Bint Zayeed Tower	Arab Consult	Emirates Link

S.NO.	DESCRIPTION	CONSULTANT	CONTRACTOR
69	Al Ghazlam Island	Ewan Conslt	Target Eng. Cont.
70	Corniche Hospital (Renovation)	PWD	Bin Ham Cont.
71	Mafraq Hospital	PWD	Bani Marban
72	H.E.Sheikh Mohmeed Bin Butti Al Hamid	Suwaidi Consult	Code Cont.
73	Dubai British School	Omar Moujais Consult	Fibrex
74	Liwa Tower	KEO Consult	Al Dhafer
75	National Bank of Abu Dhabi	Arab Consult	Shaya Al Mazroui
76	Shk. Abdulah Bin Zayed Palace	National Eng. Bureau	Target Eng. Cont.
77	Abu Dhabi Airport	Ardent	Verger & Delporte
78	Shk. Sultan Bin Khalifa Tower	Dewan	Civilco
79	Shk. Shamsa Bin Zayed Tower	Dewan	Group 3
80	Shk. Mohd. Bin Khalifa Tower	Syrconsult	Group 3
81	Dr. Abdullah Al Nowais Tower	Dr. Moklouf	Al Sabah
82	Power House	W.E.P.	Bin Ham Cont.
83	Fatima Al Otaiba Building	Ardent	Solid
84	Shk. Ahmed Bin Zayed Building	Arab Consult	Dhabi Cont.
85	Shk. Ahmed Bin Zayed Building	Arab Consult	Dhabi Cont.
86	Afra Al Ghazali Building	Al Meedan	Al Qantra
87	Al Bateen Airport	Defence	Al Geco Contr.
88	Al Zafra Air Base	Defence	Al Geco Contr.
89	Al Zafra Air Base	Defence	Trust Gen. Cont
90	Defence Project (Maintenance)	Defence	Al Shams Cont
91	Mosque Project (Defence)	Defence	Bin Dharwish
92	Defence Project (Maintenance)	Defence	Unit Cont.
93	Contrct MW 184	Defence	Al Ghafly Gen. Cont.
94	Contrct MW 054	Defence	Al Ghafly Gen. Cont.
95	Medical Centre (Al Bateen)	Defence	Al Geco Contr.
96	Officer Accommodation	Defence	AlGeco Contr.
97	Sas Al Nakheel	Ewan Conslt	Pivot Engg.
98	Shk. Sultan Bin Hamdan Al Nahyan	Arkan	Al Muraikhy
99	Marina Village	National Eng. Bureau	Nael Gen. Contr.
100	Shk. Zayed Tower	Eng. Adnan Saffarini	Civilco
101	Latifa Shames Al wiheibi Building	AlMarkazia lilfnon	Shaya Al Mazroui
102	Hilal omir Ali Miran Al mansouri Building	Dec Consltant	Shaya Al Mazroui

S.NO.	DESCRIPTION	CONSULTANT	CONTRACTOR
103	Omer Ali Miran Al mansouri Building	Dec Consltant	Shaya Al Mazroui
104	National Bank of Abu Dhabi (Al Yaher)	Arab Consult	Shaya Al Mazroui
105	N ational Bank of ADH (Swehan)	Arab Consult	Shaya Al Mazroui
106	Hazaa Mohd Bighit Sayed Al Mansouri	Dec Consltant	Shaya Al Mazroui
107	National Bank of Abu Dhabi	--	Shaya Al Mazroui
108	Commercial Bldg.	Integrated Design Bureau	Pivot Engg.
109	Office Building (Sayed Hilal)	ADD	Gulf Irragtion
110	BARGEHLS 2000	NPCC	Bani Marban
111	BARGEHLS 150	NPCC	Bani Marba



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.

Authorised by

SGS Systems & Services Certification EESV
SGS House Noordersteen 87 2030 Antwerp Belgium
t +32 (0)3 540-48-48 f +32 (0)3 540-48-49 www.sgs.com

Page 1 of 1

Certificate CH18/0808

The management system of

World Plastics for Construction Industries

Al-Qastal Industrial Area, Cargo Road, East of railway
P.O Box 53 Amman 11512 Jordan n

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities

Manufacturing of advanced plastic piping systems for industrial and domestic applications

This certificate is valid from 09 July 2018 until 23 June 2021
and remains valid subject to satisfactory surveillance audits
Recertification audit due before 11 June 2021
Issue 1. Certified since June 2012

Authorised by

SGS Societe Generale de Surveillance SA Systems & Services Certification
Technoparkstrasse 1 8005 Zurich Switzerland
t +41 (0)44 445-16-80 f +41 (0)44 445-16-88 www.sgs.com

Page 1 of 1

Jordan Standards and Metrology Organization (JSMO)
www.jsmo.gov.jo
Certification Department
A Product Certification Body operating according to
ISO/IEC 17065:2012
has granted this

Jordan Quality Mark Certificate

No.: JQM 161001
for the product
"Polypropylene Pipes" for the trade mark "Thermopipe"
which is produced by
World Plastic For Construction Industries
P.O Box: 53- Amman-11512 - Jordan
After the organization has fulfilled all the requirements of granting Jordan Quality Mark for its product according to Jordan Quality Mark instructions no.: 4/2007 including the conformity of product to the technical requirements JQM TR 57:2014
"Pipes – Polypropylene (PP) (PP-H,PP-B,PP-R,PP-RCT) - General requirements and testing"
Hence, this organization is entitled to label its product with Jordan Quality Mark logo

Quality Mark
JQM161001

Issue Date : 8th June 2016
Expiry Date : 7th June 2019
Provided that the preconditions for the certification still exist

Certification Department Director
Eng. Tamara Qatarneh

Director General
Dr. Hayder Al Zaben

مؤسسة المواصفات والمقاييس الأردنية
www.jsmo.gov.jo
مديرية شهادات المطابقة
هيئة مانحة لشهادات المطابقة للمنتجات تعمل وفق
ISO/IEC 17065:2012
قد منحت

شهادة علامة الجودة الأردنية

رقم: ج ع ١٦١٠٠١
لمنتج
"أنابيب متعدد البروبلين" للعلامة التجارية "ثيرموبايب"
والذي تنتجه
شركة عالم البلاستيك للصناعات الإنشائية
ص.ب ٥٣ عمان ١١٥١٢ الأردن
حيث أن المنشأة قد استكملت جميع متطلبات منح علامة الجودة الأردنية لمنتجها
وذلك حسب تعليمات علامة الجودة الأردنية مرقم: ٢٠٠٧/٤
وتشمل مطابقة المنتج للمتطلبات الفنية لعلامة الجودة الأردنية مرقم: ٢٠١٤/٥٧
"الأنابيب – أنابيب متعدد البروليين (PP-H,PP-B,PP-R,PP-RCT) - المتطلبات العامة وطرق الفحص"
وبناءً عليه فإن هذه المنشأة مخولة أن تضع على منتجها المذكور شعار علامة الجودة الأردنية

Quality Mark
ج ع ١٦١٠٠١

تاريخ الإصدار : ٠٥ - حزيران - ٢٠١٦
تاريخ الانتهاء : ٠٤ - حزيران - ٢٠١٩
مديرية شهادات المطابقة
م. غادا القطارنة

بشرط أن تبقى متطلبات منح هذه الشهادة مستوفاة
المدير العام
د. حيدر الزعبن


الجمعية العلمية الملكية
Royal Scientific Society

JAS
Accreditation Unit

Test 002

Test report is only valid with division-stamp and signature

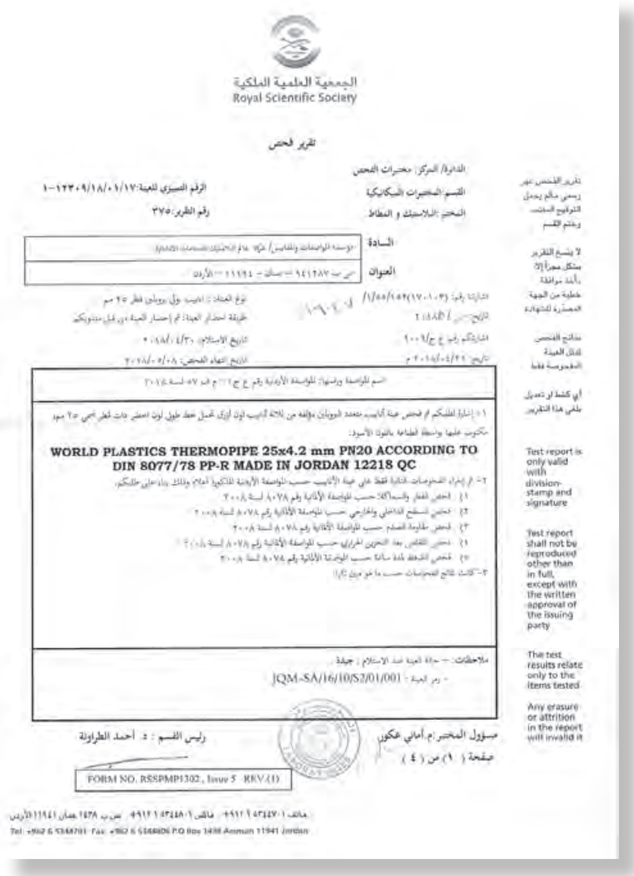
Test report shall not be reproduced other than in full, except with the written approval of the issuing party

The test results relate only to the items tested

Any erasure or attrition in the report will invalid it

FORM NO. RSSPMP1302, Issue 5 REV.(1)

Tel: +962 6 5344701 Fax: +962 6 5344806 P.O Box 1438 Amman 11941 Jordan


الجمعية العلمية الملكية
Royal Scientific Society

WORLD PLASTICS THERMOPIPE 25x4.2 mm PN20 ACCORDING TO DIN 8077/78 PP-R MADE IN JORDAN 12218 QC

JQM-SA/16/10/S2/01/001

Test report is only valid with division-stamp and signature

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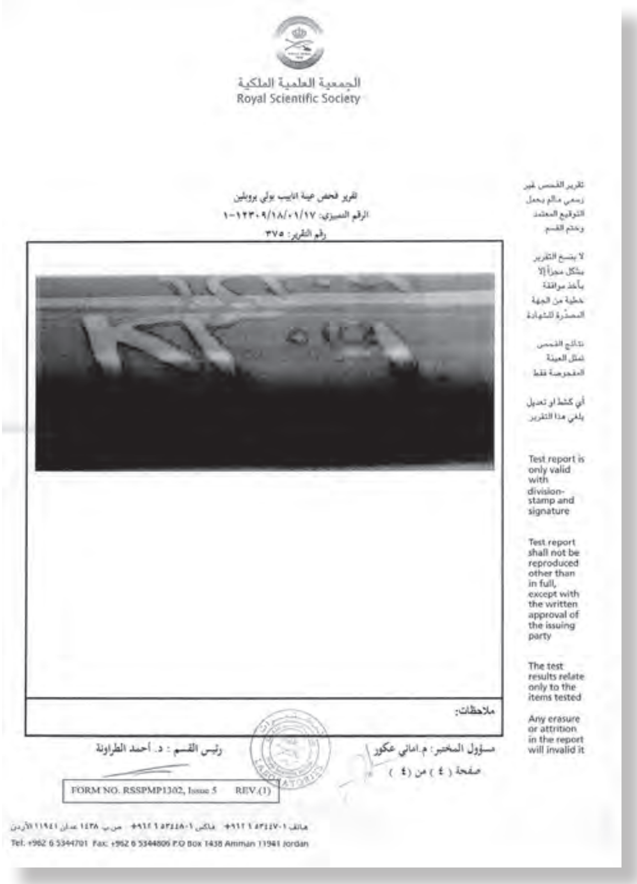
الجمعية العلمية الملكية
Royal Scientific Society

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الجمعية العلمية الملكية
Royal Scientific Society

JAS
Accreditation Unit

Test 003

FORCED CIRCULATED AIR

Test report is only valid with division-stamp and signature

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The test results relate only to the items tested

Any erasure or attrition in the report will invalid it

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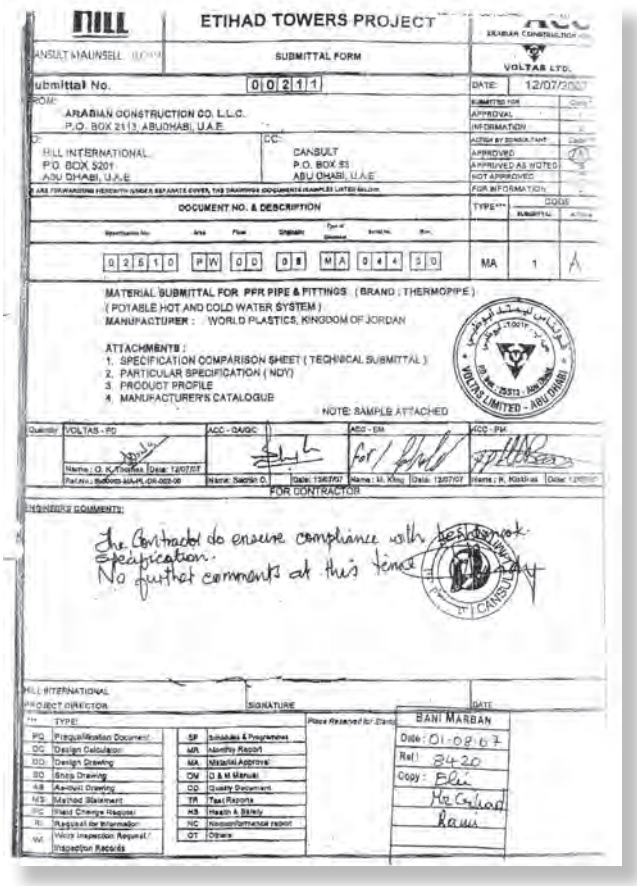


ETIHAD TOWERS PROJECT

SUBMITTAL FORM

Submittal No. 00211

FROM: ARABIAN CONSTRUCTION CO. L.L.C.
P.O. BOX 2113, ABUDHABI, U.A.E.

TO: HILL INTERNATIONAL
P.O. BOX 5201
ABU DHABI, U.A.E.

CC: CANSULT
P.O. BOX 83
ABU DHABI, U.A.E.

DATE: 12/07/2007

DOCUMENT NO. & DESCRIPTION

0 2 5 1 0 | PW | 0 0 | 0 8 | MA | 0 4 4 3 0 | MA | 1

MATERIAL SUBMITTAL FOR PPR PIPE & FITTINGS (BRAND : THERMOPIPE)
(POTABLE HOT AND COLD WATER SYSTEM)
MANUFACTURER : WORLD PLASTICS, KINGDOM OF JORDAN

ATTACHMENTS :
1. SPECIFICATION COMPARISON SHEET (TECHNICAL SUBMITTAL)
2. PARTICULAR SPECIFICATION (NOV)
3. PRODUCT PROFILE
4. MANUFACTURER'S CATALOGUE

NOTE: SAMPLE ATTACHED

VOLTAS - PD | ACC - QA/QC | ACC - EM | ACC - PM

FOR CONTRACTOR

ENGINEER'S COMMENTS:

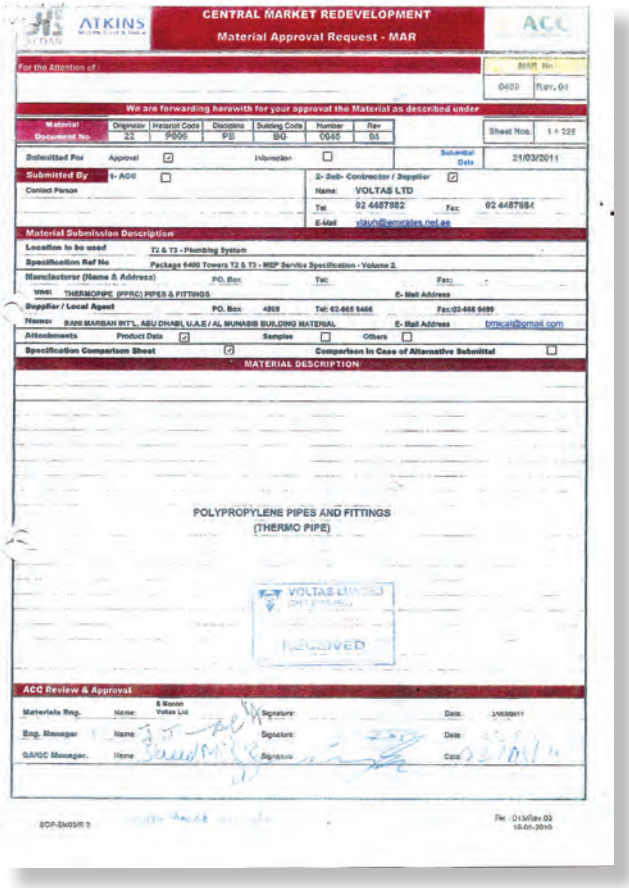
The Contractor do ensure compliance with the relevant Specification.
No further comments at this time

HILL INTERNATIONAL
PROJECT DIRECTOR

SIGNATURE

DATE

BANI MARBAN
Date: 01-08-07
Ref: B420
Copy: PD
Mr Gulzar
Rawis



ATKINS

CENTRAL MARKET REDEVELOPMENT
Material Approval Request - MAR

ACC

For the Attention of:

MAR No. 0409 Rev. 04

We are forwarding herewith for your approval the Material as described under

Material Document No. | Originator 22 | Material Code P006 | Discipline PB | Building Code BG | Number 0045 | Rev 04

Sheet Nos. 1 + 228

Submitted For: Approval ☑ Information ☐ Submittal Date 21/03/2011

Submitted By: 1- ACC ☐ 2- Sub- Contractor / Supplier ☑
Contact Person
Name: VOLTAS LTD
Tel: 02 4487882 Fax: 02 4487884
E-Mail: vlauh@emirates.net.ae

Material Submission Description
Location to be used: T2 & T3 - Plumbing System
Specification Ref No: Package 6400 Towers T2 & T3 - MEP Service Specification - Volume 2.
Manufacturer (Name & Address): PO. Box: Tel: Fax:
Brand: THERMOPIPE (PPRC) PIPES & FITTINGS E- Mail Address:
Supplier / Local Agent: PO. Box: 4808 Tel: 02-665 5466 Fax: 02-665 5490
Name: BANI MARBAN INT'L, ABU DHABI, U.A.E / AL MUNAHIE BUILDING MATERIAL E- Mail Address: bmcal@gmail.com
Attachments: Product Data ☑ Samples ☐ Others ☐
Specification Comparison Sheet ☑ Comparison In Case of Alternative Submittal ☐

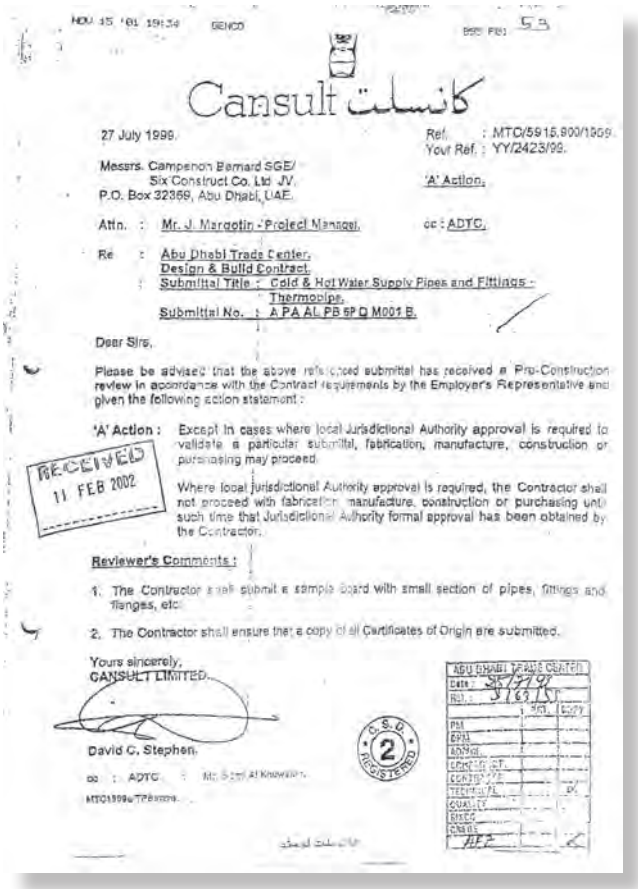
MATERIAL DESCRIPTION

POLYPROPYLENE PIPES AND FITTINGS
(THERMO PIPE)

VOLTAS LIMITED
RECEIVED

ACC Review & Approval

Materials Eng. Name: S Menon Voltas Ltd Signature: Date:
Eng. Manager Name: Signature: Date:
QA/QC Manager Name: Signature: Date:



NOV 15 '01 19:34 GENCO P.03

Cansult كانسلت

27 July 1999.

Ref. : MTC/5915.900/1809.
Your Ref. : YY/2423/99.

Messrs. Campenon Bernard SGE/
Six Construct Co. Ltd JV,
P.O. Box 32369, Abu Dhabi, U.A.E.

'A' Action.

Attn. : Mr. J. Margotin - Project Manager. cc : ADTC.

Re : Abu Dhabi Trade Center.
Design & Build Contract.
Submittal Title : Cold & Hot Water Supply Pipes and Fittings - Thermopipe.
Submittal No. : A PA AL PB 6P Q M001 B.

Dear Sirs,

Please be advised that the above referenced submittal has received a Pre-Construction review in accordance with the Contract requirements by the Employer's Representative and given the following action statement :

'A' Action : Except in cases where local Jurisdictional Authority approval is required to validate a particular submittal, fabrication, manufacture, construction or purchasing may proceed.

RECEIVED 11 FEB 2002

Where local jurisdictional Authority approval is required, the Contractor shall not proceed with fabrication, manufacture, construction or purchasing until such time that Jurisdictional Authority formal approval has been obtained by the Contractor.

Reviewer's Comments :

1. The Contractor shall submit a sample board with small section of pipes, fittings and flanges, etc.
2. The Contractor shall ensure that a copy of all Certificates of Origin are submitted.

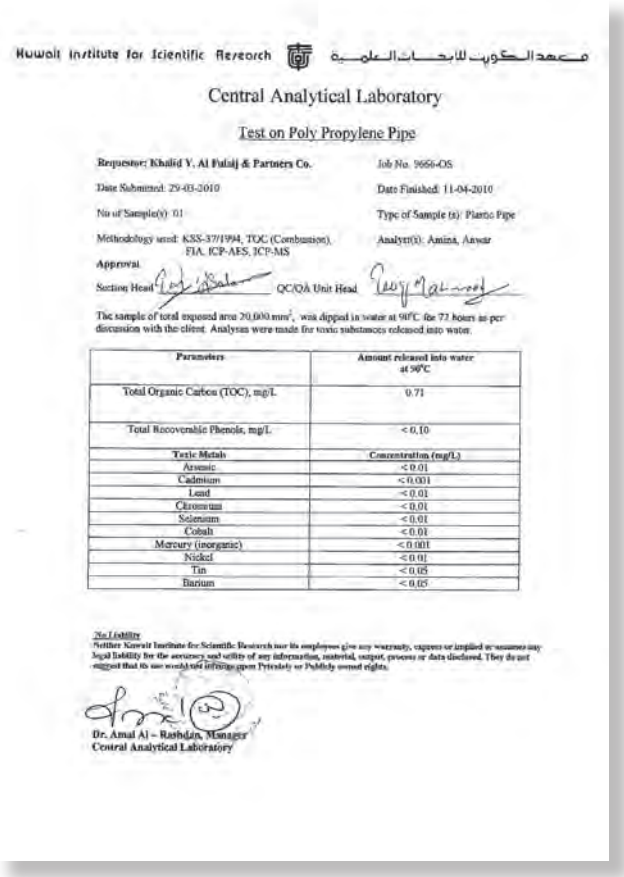
Yours sincerely,
CANSULT LIMITED.

David C. Stephen.

cc : ADTC. Mr. Saeed Al Khawaldeh.

C.S.D. 2 REGISTERED

ABU DHABI TRADE CENTER
Date: 5/7/99
Ref.: 5165
PM
EPM
ADMIN.
CONSTR. DIV.
CONTR. DIV.
TECHNICAL
QUALITY
DESIGN
CHAIR



Kuwait Institute for Scientific Research — معهد الكويت للابحاث العلمية

Central Analytical Laboratory

Test on Poly Propylene Pipe

Requestor: Khalid Y. Al Fulaij & Partners Co. — Job No. 9666-OS

Date Submitted: 29-03-2010 — Date Finished: 11-04-2010

No of Sample(s): 01 — Type of Sample (s): Plastic Pipe

Methodology used: KSS-37/1994, TOC (Combustion), FIA, ICP-AES, ICP-MS — Analyst(s): Amina, Anwar

Approval

Section Head — QC/QA Unit Head

The sample of total exposed area 20,000 mm², was dipped in water at 90°C for 72 hours as per discussion with the client. Analyses were made for toxic substances released into water.

Parameters	Amount released into water at 90°C
Total Organic Carbon (TOC), mg/L	0.71
Total Recoverable Phenols, mg/L	< 0.10
Toxic Metals	**Concentration (mg/L)**
Arsenic	< 0.01
Cadmium	< 0.001
Lead	< 0.01
Chromium	< 0.01
Selenium	< 0.01
Cobalt	< 0.01
Mercury (inorganic)	< 0.001
Nickel	< 0.01
Tin	< 0.05
Barium	< 0.05

No Liability

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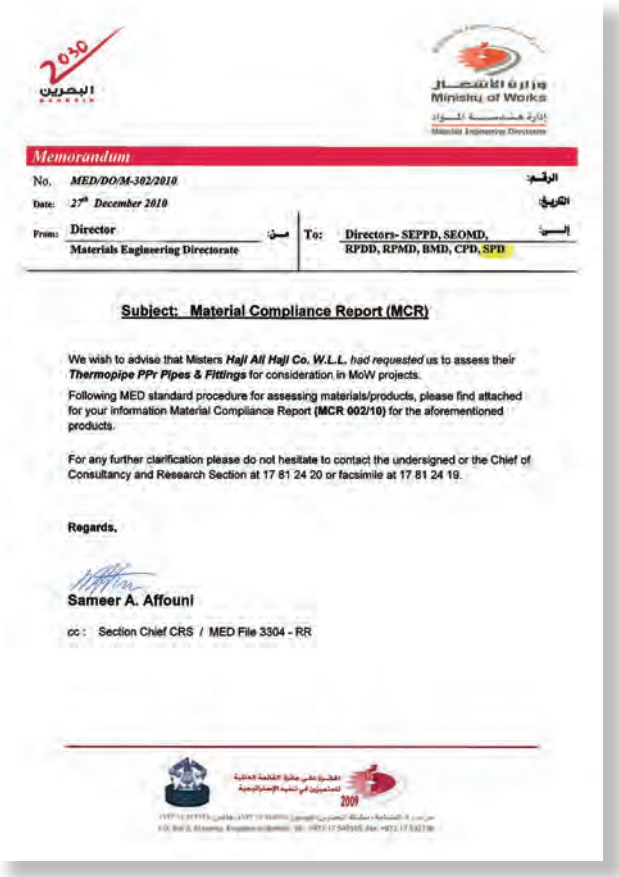
Dr. Amal Al – Rashdan, Manager
Central Analytical Laboratory



2010 البحرين

وزارة الأشغال
Ministry of Works
إدارة هندسة المواد
Material Engineering Directorate

Memorandum

No. MED/DO/M-302/2010 — الرقم:

Date: 27th December 2010 — التاريخ:

From: Director, Materials Engineering Directorate — من:

To: Directors- SEPPD, SEOMD, RPDD, RPMD, BMD, CPD, SPD — إلى:

Subject: Material Compliance Report (MCR)

We wish to advise that Misters ***Haji Ali Haji Co. W.L.L.*** *had requested* us to assess their ***Thermopipe PPr Pipes & Fittings*** for consideration in MoW projects.

Following MED standard procedure for assessing materials/products, please find attached for your information Material Compliance Report **(MCR 002/10)** for the aforementioned products.

For any further clarification please do not hesitate to contact the undersigned or the Chief of Consultancy and Research Section at 17 81 24 20 or facsimile at 17 81 24 19.

Regards,

Sameer A. Affouni

cc: Section Chief CRS / MED File 3304 - RR

Aleppo University
Mechanical Engineering Faculty

جامعة حلب
كلية الهندسة الميكانيكية

السادة أعضاء اللجنة الفنية في قيادة شرطة محافظة حلب .

تحية طيبة وبعد :

بناء على طلبكم تبين لكم فيما يلي نتائج الاختبارات الميكانيكية والفيزيائية لعينات مأخوذة من القساطل والاكسسوارات المصنوعة من مادة البولي بروبلين والخاصة بتمديدات مياه الشرب والعائدة لمشاريعكم والمقدمة من قبلكم

الأنابيب المقدمة من البولي بروبلين صناعة شركة World Plastics Therno pipe الأردنية

32	25	20	القطر الاسمي (mm)
20	20	20	الضغط الاسمي (Bar)

التقاصات (Reducer) 32x25 ، 25x20
سدة (Plug) 32 مم ، وبداية (Male Adapter) 20 x 1/2

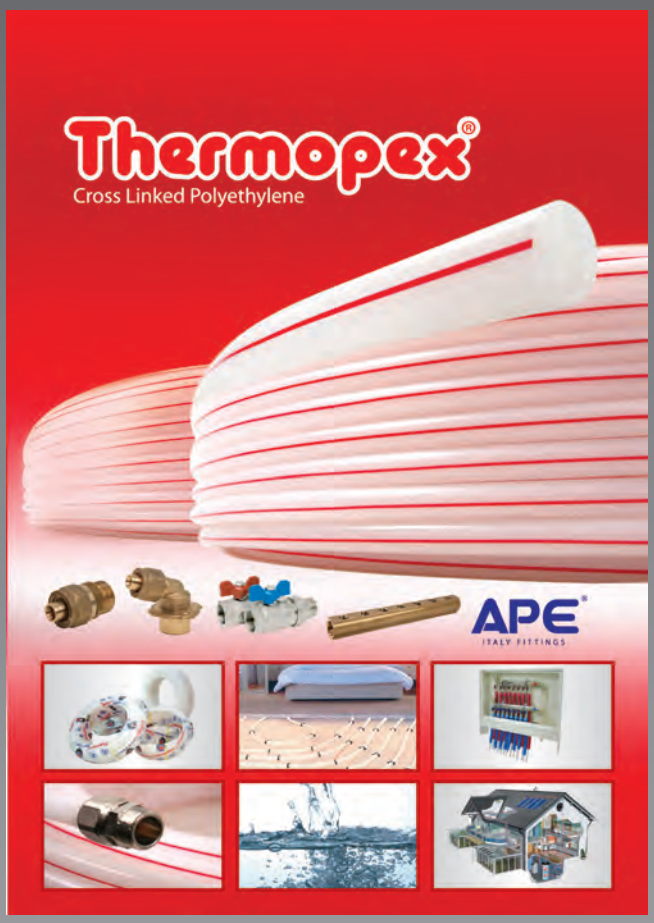
يرجى الإطلاع وشكرا للتعاون

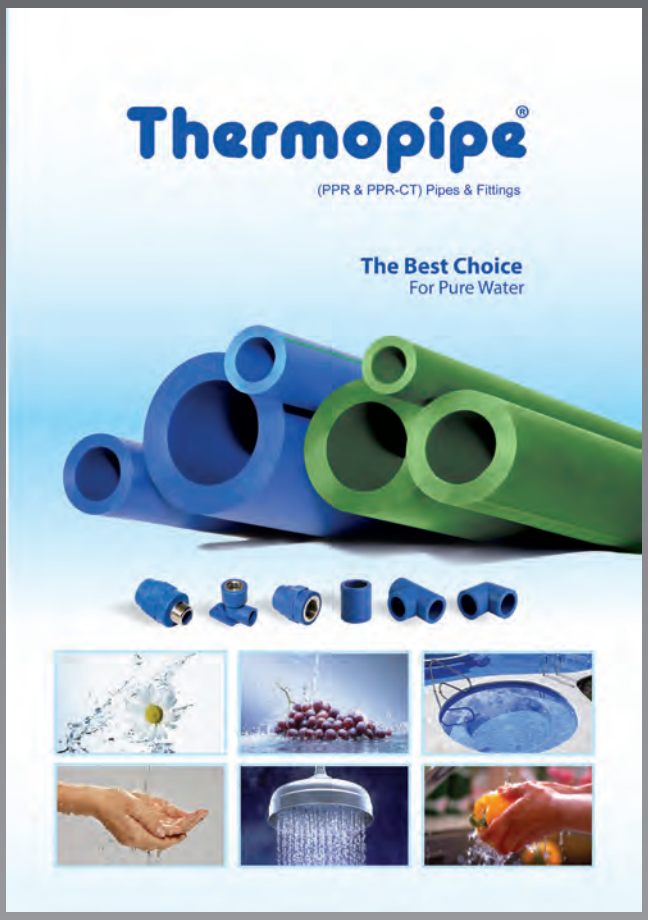
الدارس

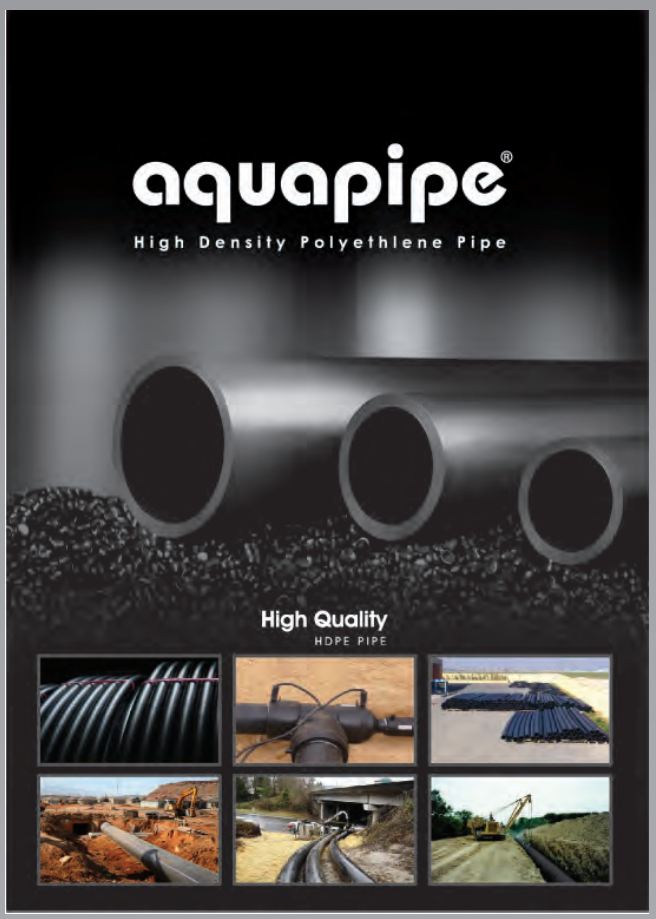
الدكتور المهندس عبد المنعم جمري

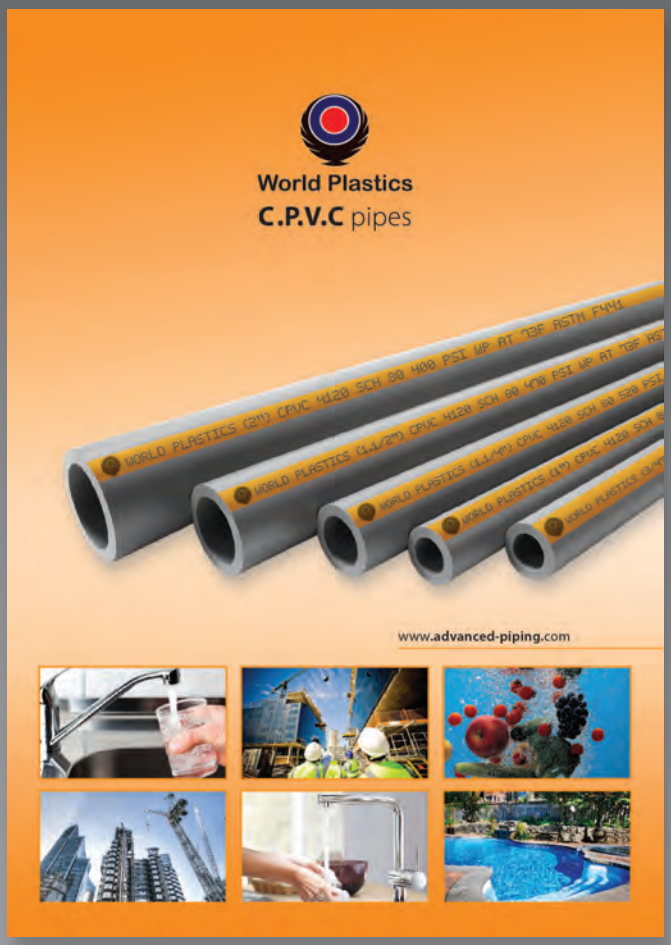
Under Process Certificates

SKZ DVGW


Thermopex®
Cross Linked Polyethylene
APE
ITALY FITTINGS


Thermopipe®
(PPR & PPR-CT) Pipes & Fittings
The Best Choice
For Pure Water


aquapipe®
High Density Polyethlene Pipe
High Quality
HDPE PIPE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PVC conduits
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