POWER : "THE FIRST NAME OF BEST QUALITY"

POWER is a trading manufacturing and distribution group, providing quality products and services in various fields of import, export, trading, real estate and manufacturing sector etc.

POWER have a history of 25 years experience in United Arab Emirates with two trading outlets and a large warehouse with huge stock of building materials in Abu Dhabi.

Over two decades we have witnessed spectacular developments in the United Arab Emirates, quick to recognize the potential and eager to participate in the U.A.E's growth, POWER group set out to become a major entrepreneurial and business force.

Water is a gift of God. Save and enjoy the most valuable resource of earth. PVC pipes are the first answer for the easy and efficient way of conservation and distribution of water. We extended our expertise and advanced technological knowledge for the production of PVC, u PVC pipes by **Power Plastic Factory.**

As a result of successful team work Power Plastic Factory became a market leader in manufacturing and supply of all kinds of PVC Pipes and fittings.

Through constant growth and product diversification Power has now developed a complete range of poly propylene (PP-R) pipes & fittings for cold & hot water distribution system. Branded as "Power therm" by New **Power Plastic Industry (NPPI).**

Another jewel in our group is **Power plastic Industry** for manufacturing of poly propylene cover and carry bags.

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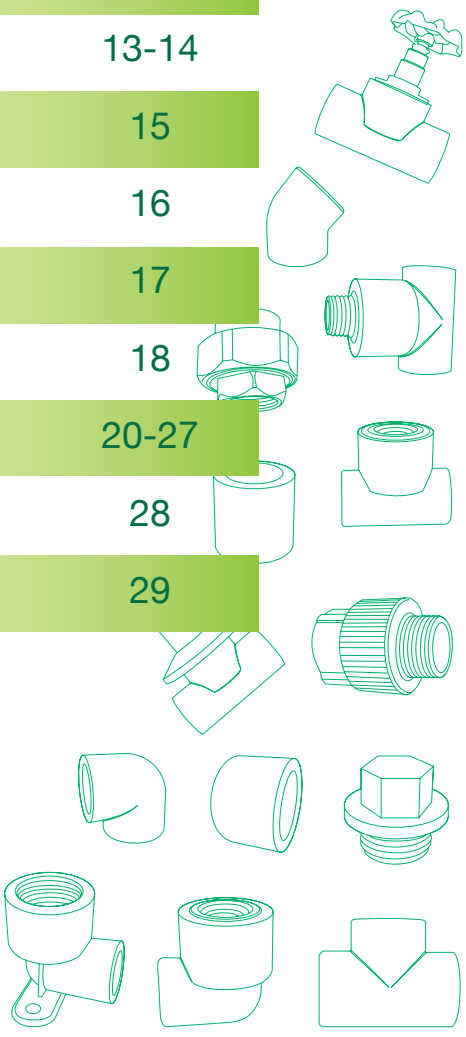
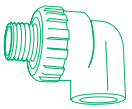
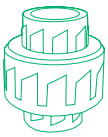




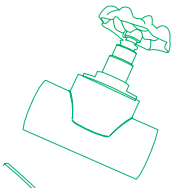
Power therm PP-R PIPES & FITTINGS

Polypropylene Random (PP-R) Offers basic properties which suit its use in many application. The main advantage of this is we can avoid copper, galvanized and the other metallic pipe for hot water. This can use for both hot water & cold water. So it is easy for plumbing work and getting multiple advantages. Power therm pipes & fitting are suitable for potable water distribution systems in additions of a wide range of hydro-sanitary applications. It can use for oil, gas and most of the chemicals. PP-R 80 pipes and fittings are quick and easy to joint with socket welding that provides homogeneous leak free joints. Polypropylene Random copolymer type 3 raw materials having low melt flow rate, high molecular weight and good flexibility. Power therm keeping German and international standards and quality. Raw material of PP-R used in Power therm pipes & fittings are procured from the world's proven highest quality raw materials producers.

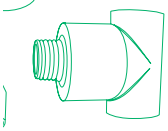


FIELDS OF APPLICATION:-

THE POLYPROPYLENE SYSTEM from **Power therm** can be used for:

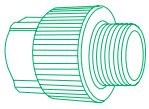


- Hot and cold potable water piping networks in residential and commercial buildings. i.e. hospitals, hotels, offices, school buildings, shopping malls etc.
- Chilled water networks in air conditioning system, as an effective light weight and corrosion free substitute for steel pipes.

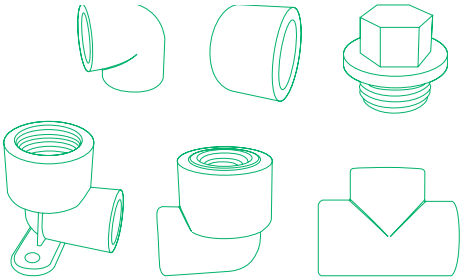


- Piping networks for all types of industrial applications for the delivery of aggressive chemicals including many acidic, alkaline and corrosive chemicals.
- Irrigation systems for gardens and agriculture.

- Piping networks for rainwater utilization systems.
- Piping networks for swimming pool facilities.

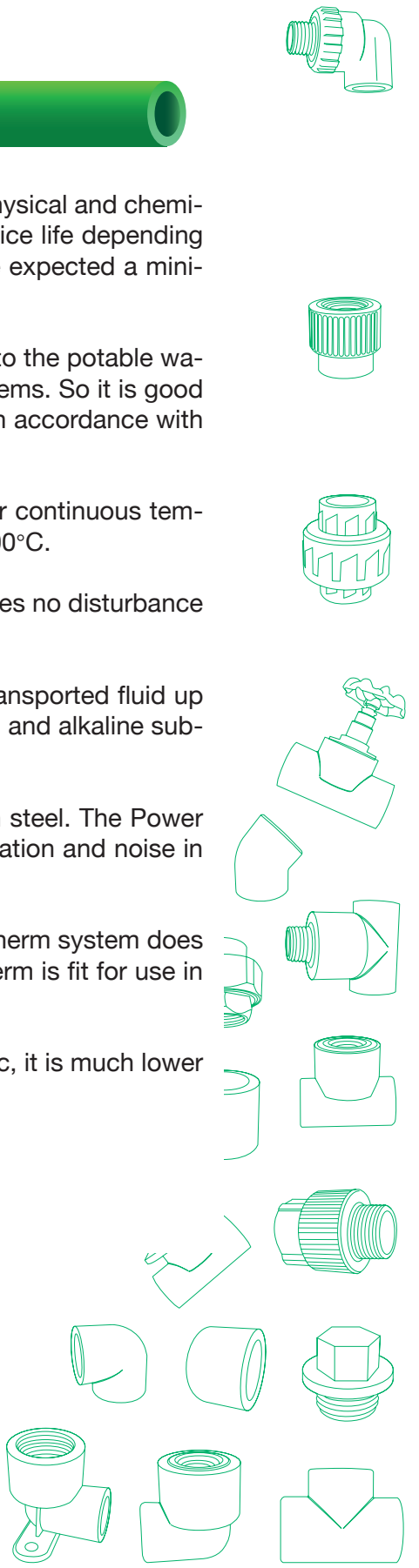


- Factories with high-pressure water and compressed air circuits.
- Hot pipe networks such as small and centralized water heater, central heating system and radiator connections etc.



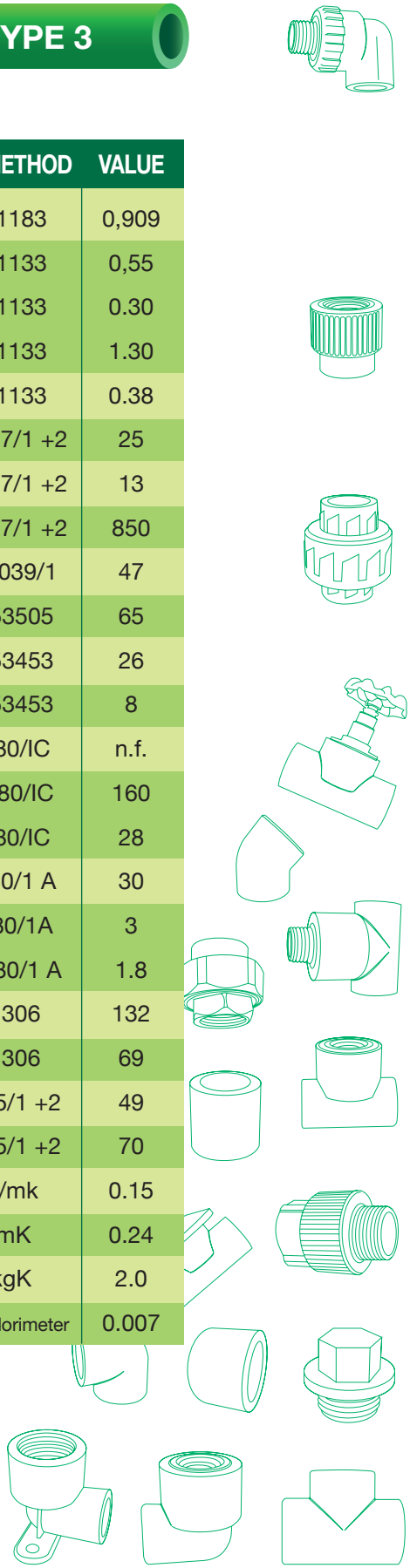
CHARACTERISTICS OF Power therm PP-R PIPE

- **Long-life:** The molecular structure of copolymers and its excellent physical and chemical properties ensure a high mechanical resistance and a longer service life depending on operating temperature and pressure. Power therm system can be expected a minimum of 50 years life.
- **Hygienic and non toxic:** Power therm pipe does not react or effect to the potable water, as compared with other material used in conventional piping systems. So it is good for drinking water and safe for health. PP-R is certified as non toxic in accordance with current international standard.
- **Strong heat resistance:** Power therm piping system is designed for continuous temperature of 0°C to 90°C, and short-term peak temperature of up to 100°C.
- **Less pressure loss:** The smooth internal finish of Power therm creates no disturbance to flow and does not allow sediment to build up and reduce pressure.
- **No corrosion:** This characteristic allow high flow velocities of the transported fluid up to 7 m/s without any problem of erosion, even in the presence of acid and alkaline substances with PH values between 1 and 14.
- **Less noise:** The elasticity of polypropylene is 257 times higher than steel. The Power therm system will absorb water hammers which cause annoying vibration and noise in the buildings.
- **Damage resistance:** Being made from a non-rigid material, Power therm system does not suffer major damage as a result of building movement. Power therm is fit for use in seismic areas.
- **Low thermal conductivity:** Heat conduction is 0.23-0.24 W/n at 20°c, it is much lower than the steel pipe (43-52mk) and red copper pipe (333W/mk).
- **Light weight, easy to install and low labour cost of installation.**
- **Cost effective pipeline network.**



MECHANICAL & THERMAL PROPERTIES OF PPR TYPE 3

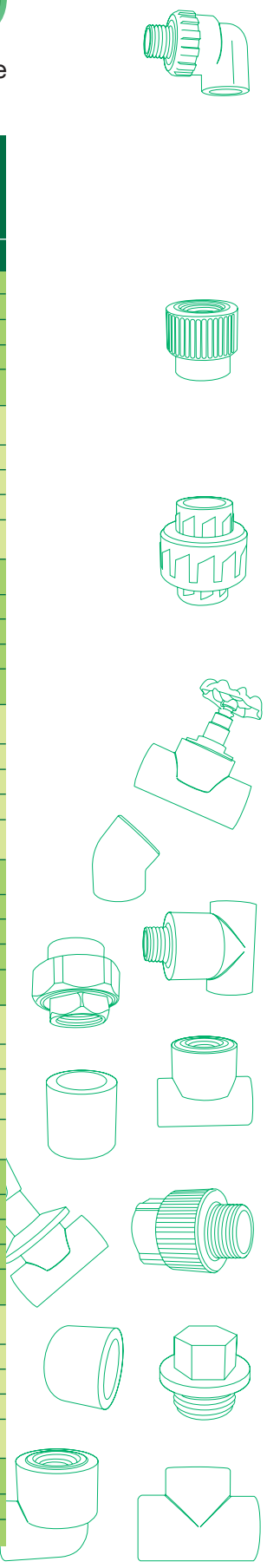
PROPERTIES		UNIT	TEST METHOD	VALUE
Density at	+23°C	g/cm³	ISO 1183	0,909
Melt-flow Index	MFR190/5	g/IOmin	ISO 1133	0,55
	MFR 130/2,16	g/IOmin	ISO 1133	0.30
	MFR 230/5	g/IOmin	ISO 1133	1.30
Volume	MVR 230/2,16	cm3/10min	ISO 1133	0.38
Yield Stress	(50mm/min)	MPa	ISO 527/1 +2	25
Yield Extension	(50mm/min)	%	ISO 527/1 +2	13
Tensile E. Modulus	(secant)	MPa	ISO 527/1 +2	850
Indentation Hardness		(132N/30s) N/mm2	ISO 2039/1	47
Shore Hardness D	(3 sec. value)		DIN 53505	65
Notched Bar Test	+23°C	Kl/m²	DIN 53453	26
Toughness at	0°C	Kl/m²	DIN 53453	8
Izod Impact	+23°C	Kl/m²	IS0180/IC	n.f.
Toughness at	0°C	Kl/m²	1S0180/IC	160
	-30°C	Kl/m²	IS0180/IC	28
Izod Impact	+23°C	Kl/m²	IS0180/1 A	30
Toughness at	0°C	Kl/m²	IS0180/1A	3
	-30°C	Kl/m²	ISO 180/1 A	1.8
Vicat Softening	VST/A/50	°C	ISO 306	132
Temperature	VST/B/50	°C	ISO 306	69
Thermal Dimentional	HDT A	°C	ISO 75/1 +2	49
Stablity	HDT B	°C	ISO 75/1 +2	70
Longitudinal coefficient of extension		VDE 0304	mm/mk	0.15
Thermal conductivity at 20°C		part 1 § 4	W/mK	0.24
Specific at 20°C		DIN 52612	kl/kgK	2.0
Pipe coefficient of friction			adiab calorimeter	0.007



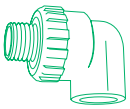
PRESSURE AND TEMPERATURE

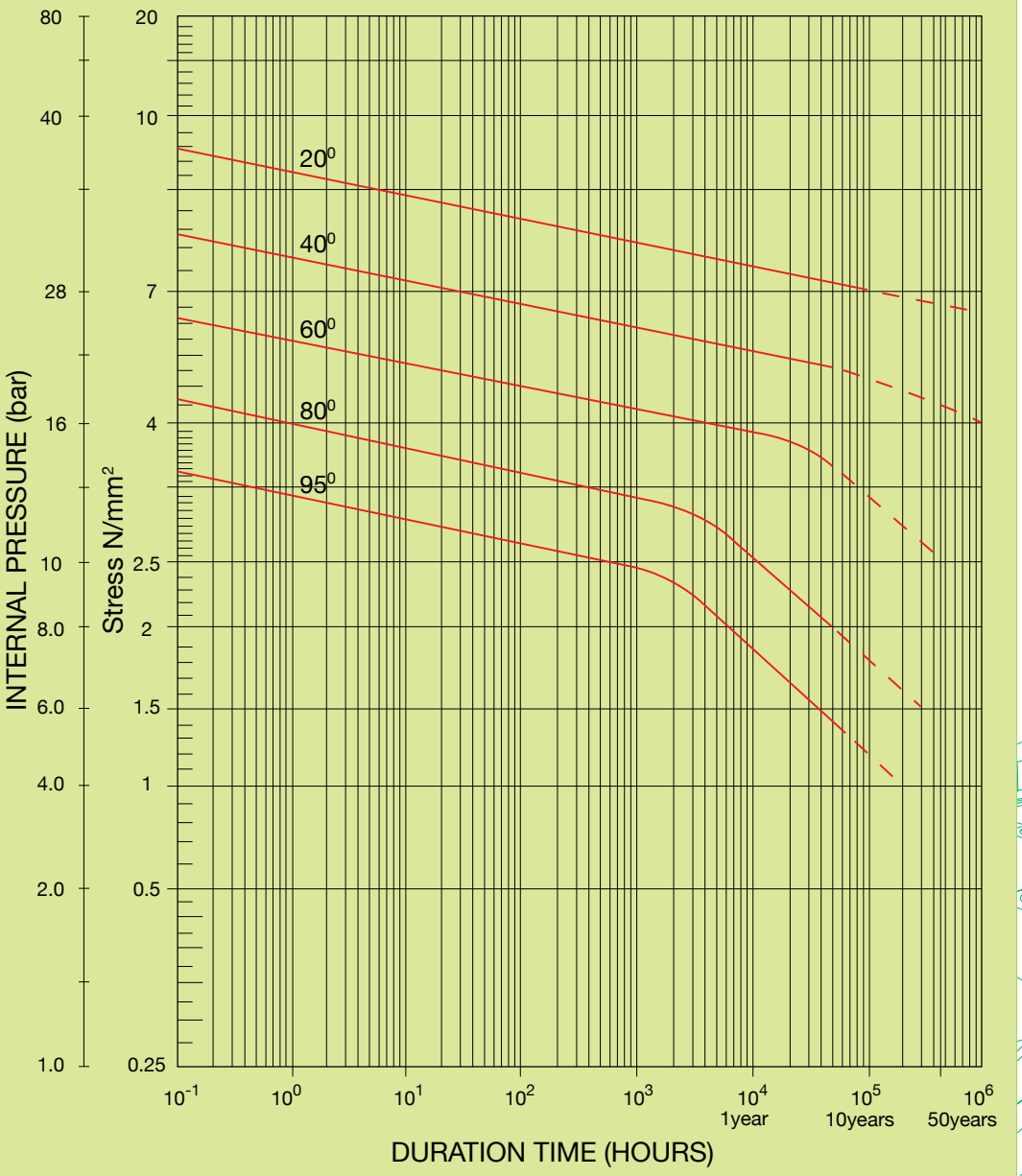
The following table shows the expected life span of Power therm polypropylene pipes and fittings at various selected pressure and temperature.

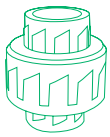
Temperature	Year of Service	Series 5 SDR 7.4 PN 16	Series 6 SDR 6 PN 20	Series 7 SDR 5 PN 25
		Permissible working pressure (bar) at 1.58 Safety factor		
	1	28.2	35.2	44.0
	5	26.5	33.1	41.3
10°C	10	25.8	32.3	40.3
	25	25.0	31.2	39.0
	50	24.3	30.4	38.0
	1	23.9	29.9	37.3
	5	22.6	28.3	35.3
20°C	10	22.0	27.5	34.3
	25	21.3	26.7	33.3
	50	20.7	25.9	32.3
	1	20.5	25.6	32.0
	5	19.2	24.0	30.0
30°C	10	18.6	23.2	29.0
	25	17.9	22.4	28.0
	50	17.5	21.9	27.3
	1	17.3	21.6	27.0
	5	16.2	20.3	25.3
40°C	10	15.8	19.7	24.7
	25	15.2	18.9	23.7
	50	14.7	18.4	23.0
	1	14.6	18.3	22.8
	5	13.7	17.1	21.3
50°C	10	13.2	16.5	20.7
	25	12.8	16.0	20.0
	50	12.4	15.5	19.3
	1	12.4	15.5	19.3
	5	11.5	14.4	18.0
60°C	10	11.1	13.9	17.3
	25	10.7	13.3	16.7
	50	10.4	12.9	16.2
	1	10.5	13.1	16.3
	5	9.6	12.0	15.0
70°C	10	9.3	11.6	14.5
	25	7.9	9.9	12.3
	50	6.8	8.5	10.7
	1	8.8	10.9	13.7
	5	7.7	9.6	12.0
80°C	10	6.4	8.0	10.0
	25	5.1	6.4	8.0
	50	4.7	5.9	7.2
	1	6.2	7.7	9.7
95	5	4.1	5.2	6.5
	10	3.5	4.3	5.4

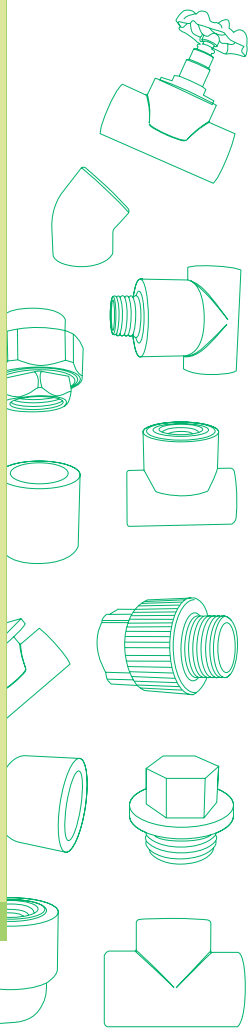


REGRESSION CURVE OF PP-R TYPE 3:









RESISTANCE TO CHEMICAL AGENTS OF THE Power therm SYSTEM

The Power therm system guarantees the resistance to a great number of chemical products at a high temperature. The surface stiffness of the pipes and fittings prevents the system from deterioration in contact with boiling detergents and cannot be corroded by acid and basic substances (lime and cement).

In the table here below, the capacity of resistance to chemical agents of PP-R pipes and fittings in according to ISO 7471 is stated.

Substances	Concentration %	Temperature (°C) 20	60	100
Aspirin®	-	+	+	+
		+	+	
Barium, chloride	-		+	+
Battery, acid	-	+	+	+
Beer	-	+	+	+
Benzaldheyde	100	+	+	+
Benzaldheyde, liquid	sol.sat.(0.3)	+	+	+
Benzoil, acid	100	+	+	+
Benzol	100	0	+	+
Borax	sol.sat.	+	+	+
Boric, acid	100	+	+	+
Bromine, liquid	100	-	+	+
Bromine, dry steam	high cone.	-		
Bromine, dry steam	low cone.	0	+	+
Butane, liquid	100	+		
Butane gas	100	+	+	+
Gutter	100	+	+	+
Butyl, alcohol	-	+	+	+
Butyl, alcohol	100	+	+	+
Butyl, gas	100	0	+	+
Calcium, chloride	sol.sat.	+	+	+
Calcium, nitrate	sol.sat	+	+	+
Carbon, tetrachloride	100	0	+	+
Chlorine, liquid	100	-	+	+
Chlorione, dry gas	100	-	+	+
Chlorine, wet gas	100	0	+	+
Chloroform	10	0	+	+
Chlorosulfomc» acid	100	-	+	+
Chromic, acid	-	+	+	+
Chromium platin bath	-	+	+	+
Chromium trioxide	sol.sat.	+		
Coca Cola®	-	+	+	+
Cocao	-		+	+
Coffee	-	+	+	+
Copper, salt	sol.sat	+	+	+
Copper, nitrate	-	30%	+	+
Cream	-	+	+	+
Cresot	100	+	+	+
Cuclohexan	100	+	+	+
Cucloheanol	100	+	+	+
Diesel oil	-	+	0	+
Diethyl either	100	0		
Dimenlhyl formamide	100	+		+
Diossano	100	+		+
Dizan liquid	-	+	+	+
Dry salt	-	+	+	+

Substances	Concentration %	Temperature (°C) 20	60	100
Ethyl, Acetate	100	+	+	+
Etihyl, Alcohol	100	+	+	+
Ethyl, Benzol	100	+	+	+
Ethyl, Chloride	100	+	+	+
Ethyl, Heanol	100	+	+	+
Flour	-	+	+	+
Formaldehyde	40	+	+	+
Formic, Acid	-	+	+	+
Fruit Juice	-	+	+	+
Gelatine	-	+	+	+
Gin	40			
Glycerine	100	+	+	+
Glycerine, Liquid	low conc.	+	+	+
Glycolic, Acid	100	+	+	+
Glucose	-	+	+	+
Heplance	100	+	+	+
Hezanc	100	+	+	+
Hydrocloric, Acid	high conc.	+	+	+
Hydrocloric,Acid	Low cone.	+	+	+
Hydrocloric, Ammonium	T	+	+	+
Hydrogendiozide	3	+	+	+
Lodmc, Tinctrue	-	+	+	+
Iron. Salt	sol.sat	+	+	+
Iso Octane	100	+	+	+
Iso Propylie Alcohol	100	+	+	+
Jam	-	+	+	+
Lactic, Acid	-	+	+	+
Lanolin	-	+	+	+
Lemonades	-	+	+	+
Lemon Juice	-	+	+	+
Limestone	t	+	+	+
Liquors				
Magnesium, Salt	sol.sat			
Margarine	-	+	+	+
Mayonnaise	-			
Menthol	-	+	+	+
Mercury	100	+	+	+
Methanol	100	+	+	+

RESISTANCE TO CHEMICAL AGENTS OF THE Power therm SYSTEM

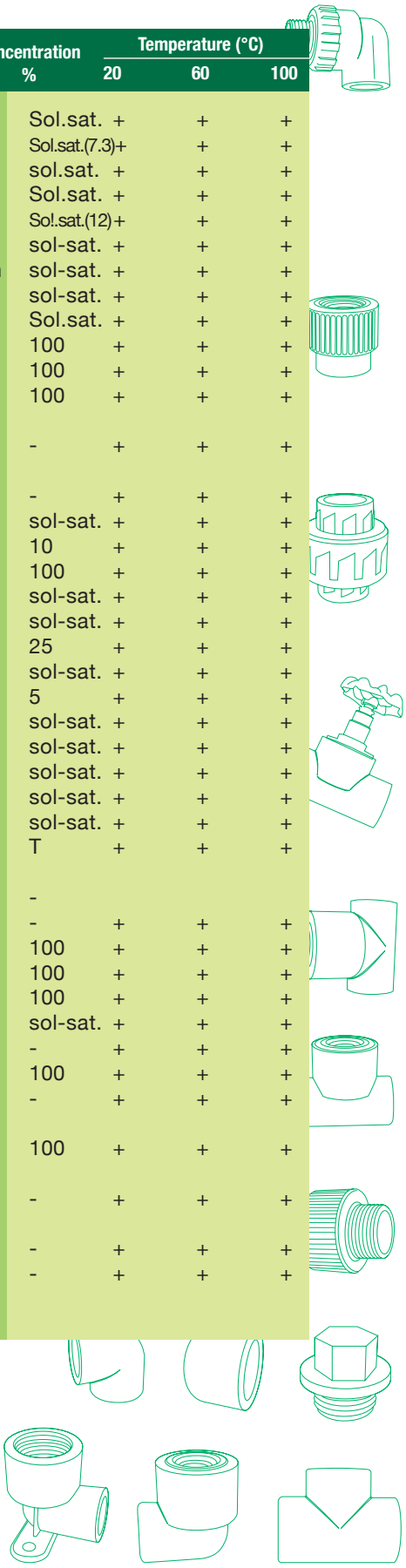
Substances	Concentration %	Temperature (°C) 20	60	100
Methyl choloride	100	+	+	+
Me thy! -ethy -ketone	100	+	+	+
Milch	-	+	+	+
Muriatic acid	10	+	+	+
Mustard	-	+	+	+
Naphtalene decahydro	100	+	+	+
Naphtene	100	+	+	+
Naphtalene trachloride	100	+	+	+
Nitric acid	10	+	+	+
Nickel salt	sol.sat.	+	+	+
Nitrobenzene				
Octane	-	+	+	+
Oil	100			
Oii ether	100	+	+	+
Oil of tupenthine	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	-	+	+	+
Rasin oil	-	+	+	+
Silicone oil	-	+	+	+
Paraffin	100	+	+	+
Petroleum	100	+	+	+
Pepper	-	+	+	+
Perborax	sol.sat. (1.4)			
Perfume	-	+	+	+
Phenol	sol.sat.			
Phosphurus acid	sol.sat.	+	+	+
Phosphurus oxichloride	100	+	+	+
Phtographic acid	-	+	+	+
Examined substances				

Substances	Concentration %	Temperature (°C) 20	60	100
Potassium crbonate	Sol.sat.	+	+	+
Potassium chlorate	Sol.sat.(7.3)	+	+	+
Potassium chlorite	sol.sat.	+	+	+
Potassium chromate	Sol.sat.	+	+	+
Potassium iodide	So!.sat.(12)	+	+	+
Potassium nitrate	sol-sat.	+	+	+
Pot assium pemiangan	sol-sat.	+	+	+
potassium pemlfate	sol-sat.	+	+	+
Potassium sulfate	Sol.sat.	+	+	+
Propane gas	100	+	+	+
Propane liquid	100	+	+	+
Pyridiae	100	+	+	+
Quinine	-	+	+	+
Salt dry	-	+	+	+
SUve salt	sol-sat.	+	+	+
Soap lipuid	10	+	+	+
Soda caustic	100	+	+	+
Sodium bicarbonat e	sol-sat.	+	+	+
Sodiun carbnate	sol-sat.	+	+	+
Sodiun chlorate	25	+	+	+
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.	+	+	+
Suiphure carbon	T	+	+	+
Tea	-			
Tertra chlorine ehtylen	-	+	+	+
Tetraidrophurano	100	+	+	+
Thiophene	100	+	+	+
Tin 11 chloride	100	+	+	+
Toothpaste	sol-sat.	+	+	+
Trichlorethylene	-	+	+	+
Tricresyphosphate	100	+	+	+
Turpentine	-	+	+	+
Urea	100	+	+	+
Vanilla	-	+	+	+
Vaseline	-	+	+	+
Vineger	-	+	+	+

SYMBOLS

+ = highly resistant
⊕ = resistant
O = fairly resistant
Θ = scarcely resistant
- = non resistant

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



STANDARDS AND REGULATIONS

PP-R Pipes and fittings are produced with the following standards and regulations	
DIN 1988	DVGW code of practice (Drinking water supply systems, Materials, Components, Appliances, Design and Installation).
DIN 8076	Standard for testing metal threaded joints.
DIN 8077	Polypropylene (PP) pipe dimensions.
DIN 8078	Poly propylene (PP) pipes, general quality requirements testing and chemical resistance of pipes and fittings.
DIN 2999	Standards for fittings with threaded metallic inserts.
DIN 16962/PH	Pipe joint assemblies and fittings for type 1 and 2 Polypropylene (PP) pressure pipes, bends produced by segment inserts for butt welding dimensions.
DIN 16928	Installation, Pipe and Fitting connections.
DIN 4109	Noise control in buildings.
DIN 4140	Insulation of service installations.
DVS 2207	Welding of thermoplastic pipes and fittings.
DVS 2208	Welding machines and devices for thermoplastic pipes and fittings.
OHSAS 18001	British standard for health and safety management system.
ISO 9001-2000	Quality Management System.

OUR QUALITY CONTROL MEASURES

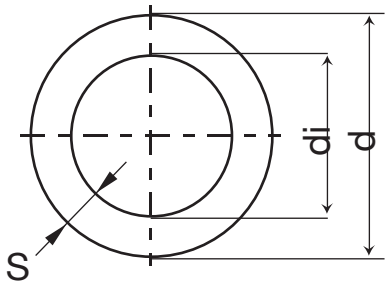
- Daily Round the clock Inspection
- Well Trained Staff
- Well Equipped Laboratory
- Most Modern Machineries
- High Quality Raw Materials
- Timely Production
- Checking of Finished goods, to ensure the quality

PRODUCT RANGE WITH STANDARD SPECIFICATIONS

NPPI manufactured PP-R Pipes Power therm in accordance with German standards.

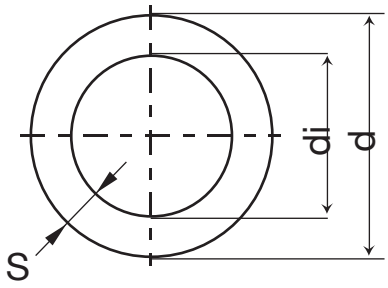
Power therm Pipe SDR 7.4 PP-R 80 PN 16 Pipe Series 5 acc. To DIN 8077/78

Art. No	Dimension	Packing Unit	Diameter	Wall Thickness	Internal Diameter	Water Content
PT16-20	20 mm	100	20	2.8	14.4	0.163
PT16-25	25 mm	100	25	3.5	18	0.254
PT16-32	32 mm	40	32	4.4	23.2	0.415
PT16-40	40 mm	40	40	5.5	29	0.651
PT16-50	50 mm	20	50	6.9	36.2	1.029
PT16-63	63 mm	20	63	8.6	45.8	1.633
PT16-75	75 mm	20	75	10.3	54.4	2.307
PT16-90	90 mm	12	90	12.3	65.4	3.318
PT16-110	110 mm	8	110	15.1	79.8	5.674



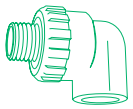
Power therm Pipe SDR 6 PP-R 80 PN 20 Pipe Series 6 acc. To DIN 8077/78

Art. No	Dimension	Packing Unit	Diameter	Wall Thickness	Internal Diameter	Water Content
PT20-20	20 mm	100	20	3.4	13.2	0.137
PT20-25	25 mm	100	25	4.2	16.6	0.216
PT20-32	32 mm	40	32	5.4	21.2	0.353
PT20-40	40 mm	40	40	6.7	26.6	0.556
PT20-50	50 mm	20	50	8.4	33.2	0.866
PT20-63	63 mm	20	63	10.5	42	1.385
PT20-75	75 mm	20	75	12.5	50	1.963
PT20-90	90 mm	12	90	15	60	2.827
PT20-110	110 mm	8	110	18.4	73.2	4.208



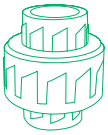
PRODUCT RANGE WITH STANDARD SPECIFICATIONS

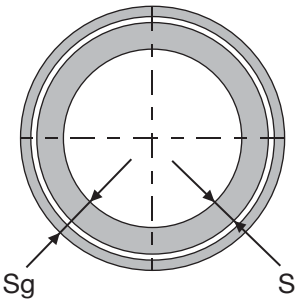
NPPI manufactured PP-R Pipes Power therm in accordance with German standards.

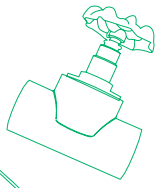


Power therm Stabi Composite Pipe PP-R 80 with Aluminum PN 20 acc. To DIN 8077/78

Art. No	Dimension	Packing Unit	Diameter	Wall Thickness	Internal Diameter	Water Content
20A-20	20 mm	100	20	2.8	14.4	0.163
20A-25	25 mm	100	25	3.5	18	0.254
20A-32	32 mm	40	32	4.4	23.2	0.415
20A-40	40 mm	40	40	5.6	29	0.651
20A-50	50 mm	20	50	6.9	36.2	1.029
20A-63	63 mm	20	63	8.6	45.8	1.633
20A-75	75 mm	20	75	10.3	54.4	2.307
20A-90	90 mm	12	90	12.3	65.4	3.318
20A-110	110 mm	8	110	15.1	79.8	5.674

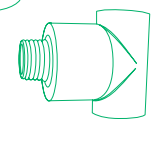


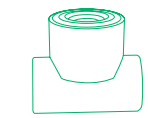


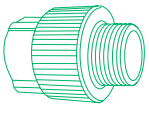


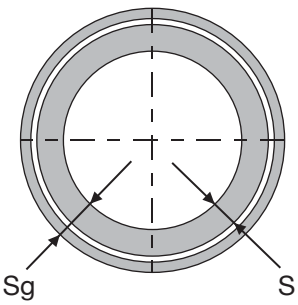
Power therm Stabi Composite Pipe PP-R 80 with Aluminum PN 25 acc. To DIN 8077/78

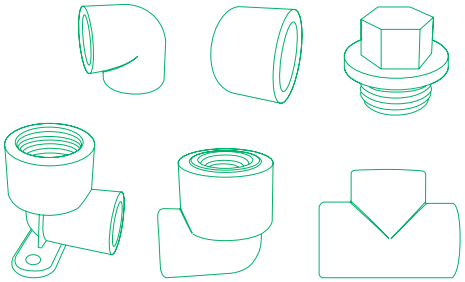
Art. No	Dimension	Packing Unit	Diameter	Wall Thickness	Internal Diameter	Water Content
25A-20	20 mm	100	20	3.4	13.2	0.111
25A-25	25 mm	100	25	4.2	16.6	0.178
25A-32	32 mm	40	32	5.4	21.2	0.291
25A-40	40 mm	40	40	6.7	26.6	0.461
25A-50	50 mm	20	50	8.4	33.2	0.703
25A-63	63 mm	20	63	10.5	42	1.137
25A-75	75 mm	20	75	12.5	50	1.619
25A-90	90 mm	12	90	15	60	2.336
25A-110	110 mm	8	110	18.4	73.2	2.742











THERMAL EXPANSION

Thermal Expansion Calculation

During the design and installation of plastic pipes, it is very important to calculate the duct expansion caused by a possible difference between operating temperature and starting temperature.

Medium thermal expansion coefficient

A give the elongation of a bar of 1 meter of pipe for the temperature increasing of 1K.

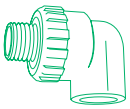
Medium thermal expansion coefficient

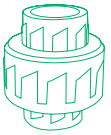
PP-R Pipe

a = 0.15 mm/mK

PP-R ALU Pipe

a = 0.03 mm/mK





Example

The length variation is calculated with the following formila.

$$\Delta L\ (mm) = L\ (m) \times \Delta T\ (°C) \times a\ (mm/m°C)$$

L = Initial pipe length (m)
ΔL = length variation (mm)
ΔT = temperature difference (°C)
a = expansion coefficient (mm/m°C)

Length variation

For **PP-R** pipe
L = 5 m
L = 50°K
= 0.15 mm/mk

L = 5x50x0.015 L = 37.5 mm

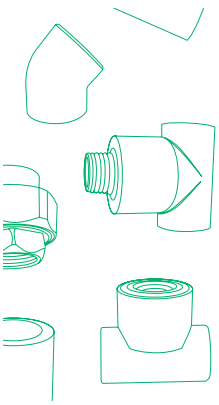
Graphical example at page 16 & 17

Length variation

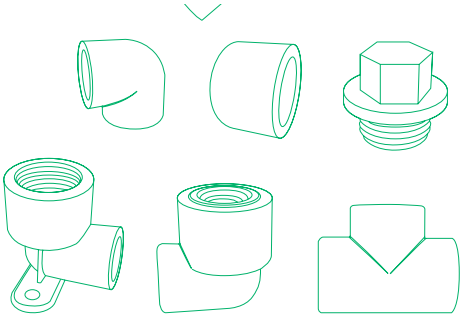
for **PP-R – ALU** pipe
L = 5 m
L = 50°K
= 0.03 mm/mk

5x50x0.03 L = 7.5 mm

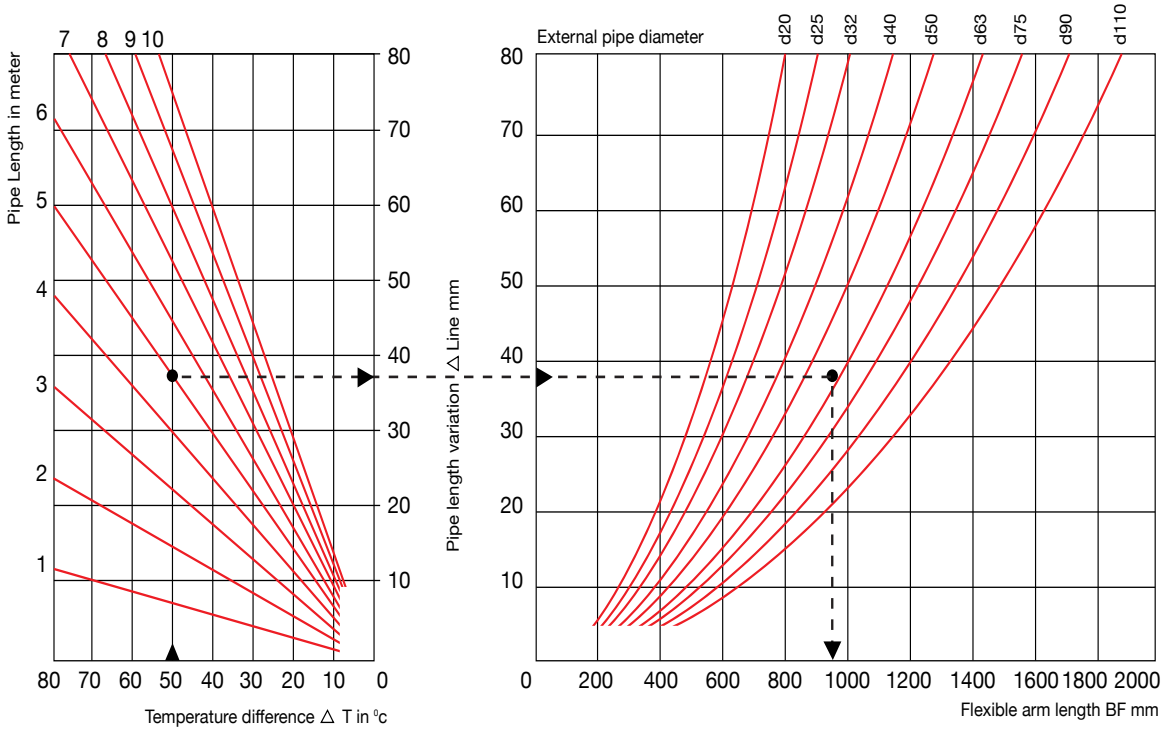
$$L_{BF} = C \times \sqrt{L \times d_e}$$



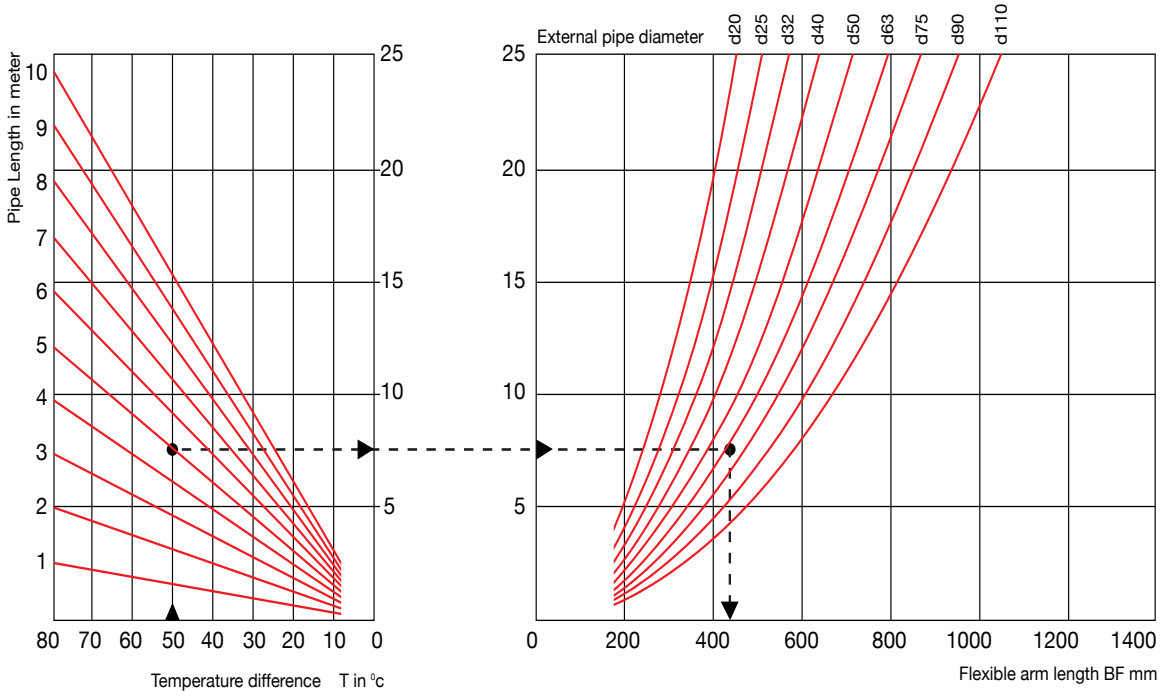
L_{BF} = flexible arms length
C = 20 coeff. PP-R
ΔL = length variation (mm)
d_e = external pipe diameter

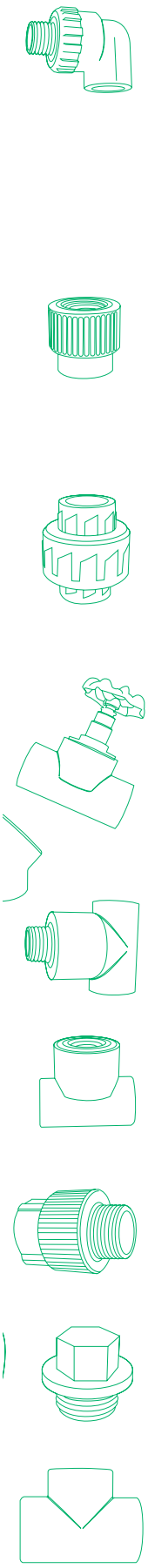


ASSESSMENT OF THE FLEXIBLE ARM FOR PP-R PIPE

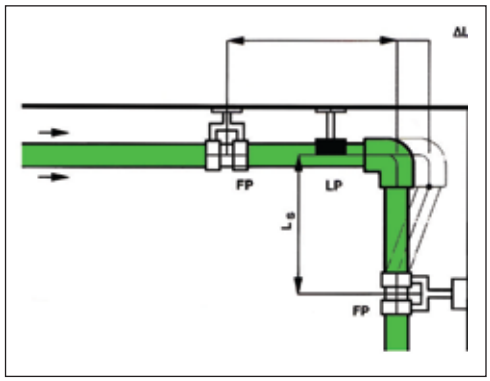


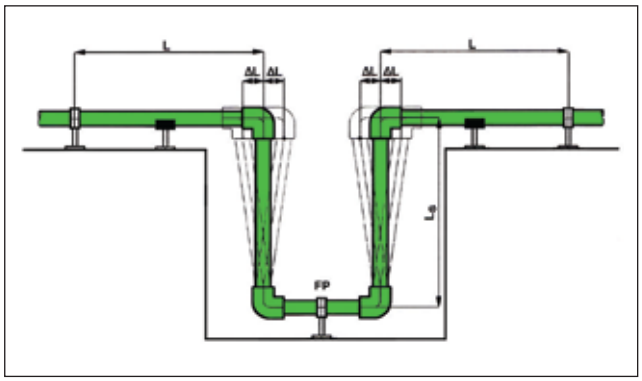
ASSESSMENT OF THE FLEXIBLE ARM FOR PP-R ALU PIPE





COMPENSATION OF EXPANSION





Important: If the operating temperature is higher than the starting temperature, the pipe is lengthened. In the reverse case, the pipe is shortened.

The length difference must also be limited by fixed and movable points suitably placed. The example has shown here help to understand how to place fix and movable points.

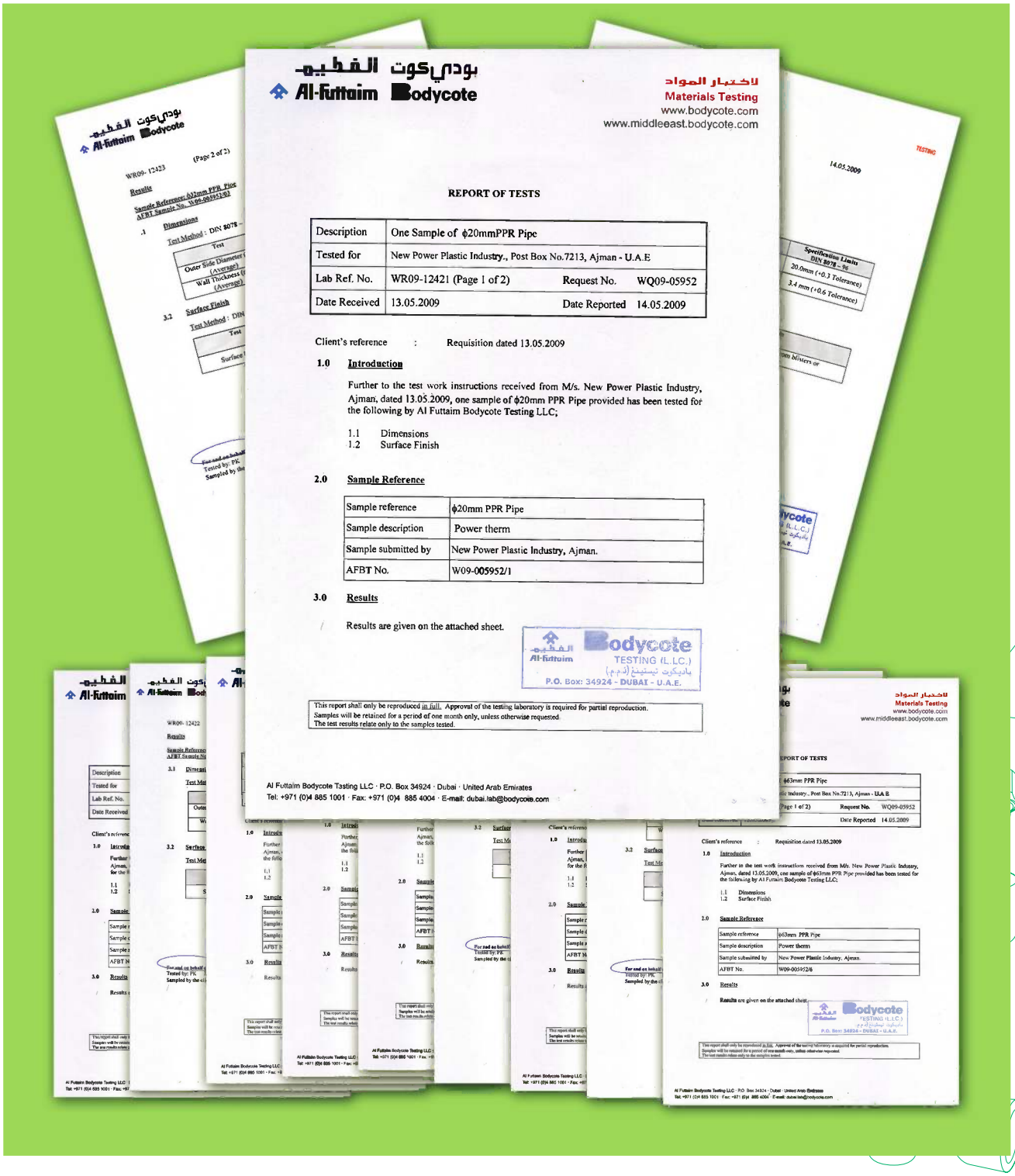
When it is not possible to obtain the length of inflection by changing the direction, use the method illustrated on the right.

Example for the assessment of the flexible arm data:

L = 10 m
d = 50 mm
T installation = 15°c
T max operation = 80°c
AL – 0,15.10.65 = 97,5 mm

SP- Sliding point
FP- Fixed point
LBF-Flexible arm length

TEST CERTIFICATES



الفطيم بودي كوت
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لاختبار المواد
Materials Testing
www.bodycote.com
www.middleeast.bodycote.com

REPORT OF TESTS

Description	One Sample of ϕ20mmPPR Pipe		
Tested for	New Power Plastic Industry., Post Box No.7213, Ajman - U.A.E		
Lab Ref. No.	WR09-12421 (Page 1 of 2)	Request No.	WQ09-05952
Date Received	13.05.2009	Date Reported	14.05.2009

Client's reference : Requisition dated 13.05.2009

1.0 Introduction

Further to the test work instructions received from M/s. New Power Plastic Industry, Ajman, dated 13.05.2009, one sample of ϕ20mm PPR Pipe provided has been tested for the following by Al Futtaim Bodycote Testing LLC;

1.1 Dimensions
1.2 Surface Finish

2.0 Sample Reference

Sample reference	ϕ20mm PPR Pipe
Sample description	Power therm
Sample submitted by	New Power Plastic Industry, Ajman.
AFBT No.	W09-005952/1

3.0 Results

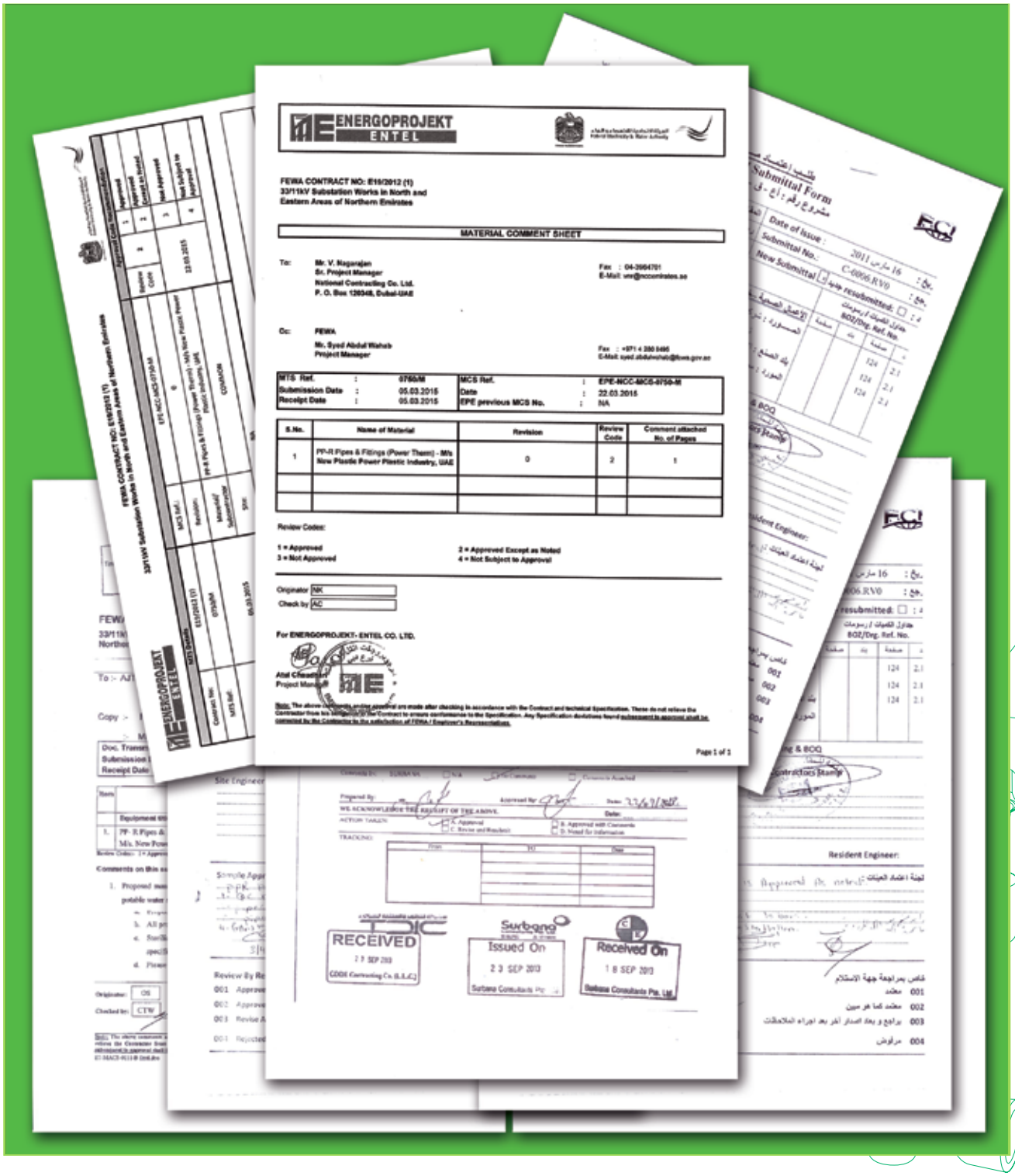
Results are given on the attached sheet.

Al-Futtaim Bodycote TESTING (L.L.C.) P.O. Box: 34924 - DUBAI - U.A.E.

This report shall only be reproduced in full. Approval of the testing laboratory is required for partial reproduction.
Samples will be retained for a period of one month only, unless otherwise requested.
The test results relate only to the samples tested.

Al Futtaim Bodycote Testing LLC · P.O. Box 34924 · Dubai · United Arab Emirates
Tel: +971 (0)4 885 1001 · Fax: +971 (0)4 885 4004 · E-mail: dubai.lab@bodycote.com

APPROVAL COPIES



ENERGOPROJEKT ENTEL

FEWA CONTRACT NO: E15/2012 (1)
33/11kV Substation Works in North and
Eastern Areas of Northern Emirates

MATERIAL COMMENT SHEET

To: Mr. V. Nagarajan
Sr. Project Manager
National Contracting Co. Ltd.
P. O. Box 126548, Dubai-UAE

Fax : 04-3564701
E-Mail: vnr@nccemirates.ae

Cc: FEWA
Mr. Syed Abdul Wahab
Project Manager

Fax : +971 4 200 8486
E-Mail: syed.abdulwahab@fewa.gov.ae

MTS Ref.	: 0750/M	MCS Ref.	: EPE-NCC-MCS-0750-M
Submission Date	: 05.03.2015	Date	: 22.03.2015
Receipt Date	: 05.03.2015	EPE previous MCS No.	: NA

S.No.	Name of Material	Revision	Review Code	Comment attached No. of Pages
1	PP-R Pipes & Fittings (Power Therm) - M/s New Plastic Power Plastic Industry, UAE	0	2	1

Review Codes:

1 = Approved
2 = Approved Except as Noted
3 = Not Approved
4 = Not Subject to Approval

Originator NK
Check by AC

For ENERGOPROJEKT- ENTEL CO. LTD.

Atul Chauhan
Project Manager

Note: The above comments and remarks are made after checking in accordance with the Contract and technical Specification. These do not relieve the Contractor from his obligations of the Contract to ensure conformance to the Specification. Any Specification deviations found subsequent to approval shall be corrected by the Contractor to the satisfaction of FEWA / Employer's Representatives.

Page 1 of 1

RECEIVED 29 SEP 2013 CDDE Contracting Co. (L.L.C.)

Issued On 23 SEP 2013 Surbana Consultants Pte. Ltd.

Received On 18 SEP 2013 Surbana Consultants Pte. Ltd.

Submittal Form

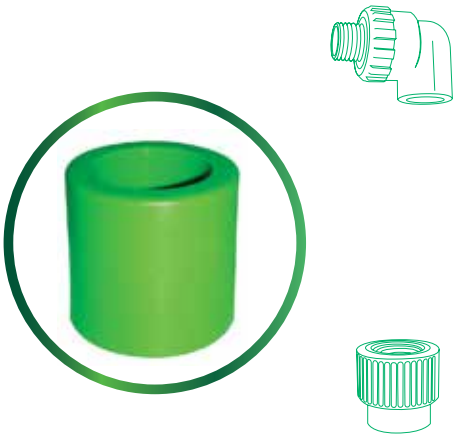
Power therm

PP-R Products

Power therm PP-R FITTINGS & ACCESSORIES

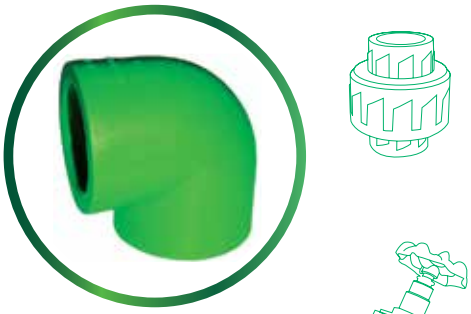
Socket

Art No.	Dimension	Packing Unit
S-20	20 mm	10pc
S-25	25 mm	10pc
S-32	32 mm	5pc
S-40	40 mm	5pc
S-50	50 mm	5pc
S-63	63 mm	1pc
S-75	75 mm	1pc
S-90	90 mm	1pc
S-110	110 mm	1pc



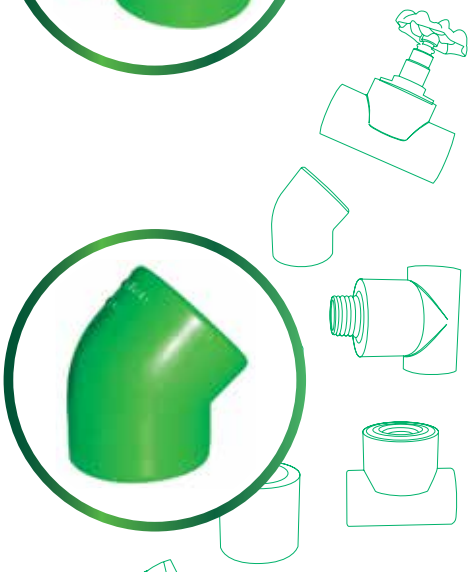
Elbow 90

Art No.	Dimension	Packing Unit
E90-20	20 mm	10pc
E90-25	25 mm	10pc
E90-32	32 mm	5pc
E90-40	40 mm	5pc
E90-50	50 mm	5pc
E90-63	63 mm	1pc
E90-75	75 mm	1pc
E90-90	90 mm	1pc
E90-110	110 mm	1pc



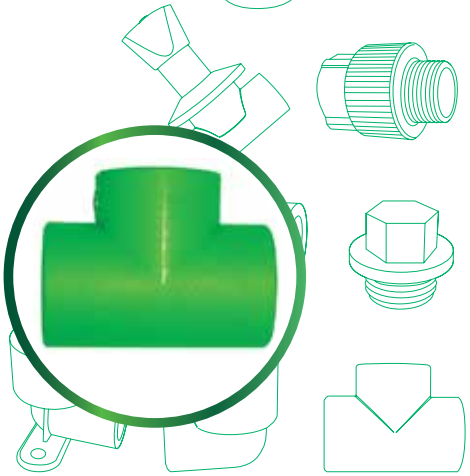
Elbow 45

Art No.	Dimension	Packing Unit
E45-20	20 mm	10pc
E45-25	25 mm	10pc
E45-32	32 mm	5pc
E45-40	40 mm	5pc
E45-50	50 mm	5pc
E45-63	63 mm	1pc
E45-75	75 mm	1pc
E45-90	90 mm	1pc
E45-110	110 mm	1pc



Tee

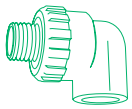
Art No.	Dimension	Packing Unit
T-20	20 mm	10pc
T-25	25 mm	10pc
T-32	32 mm	5pc
T-40	40 mm	5pc
T-50	50 mm	5pc
T-63	63 mm	1pc
T-75	75 mm	1pc
T-90	90 mm	1pc
T-110	110 mm	1pc

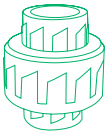


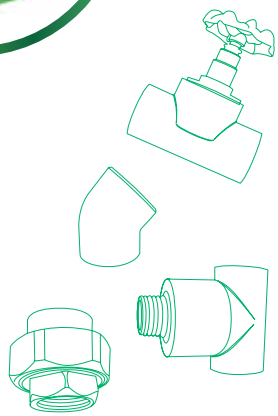
Power therm PP-R FITTINGS & ACCESSORIES

Reducing Tee

Art No.	Dimension	Packing Unit
RT-202520	20 X 25 X 20 mm	10pc
RT-252020	25 X 20 X 20 mm	10pc
RT-252025	25 X 20 X 25 mm	10pc
RT-253225	25 X 32 X 25 mm	10pc
RT-322032	32 X 20 X 32 mm	5pc
RT-322525	32 X 25 X 25 mm	5pc
RT-323225	32 X 32 X 25 mm	5pc
RT-322532	32 X 25 X 32 mm	5pc
RT-402040	40 X 20 X 40 mm	5pc
RT-402540	40 X 25 X 40 mm	5pc
RT-403240	40 X 32 X 40 mm	5pc
RT-502050	50 X 20 X 50 mm	5pc
RT-502550	50 X 25 X 50 mm	5pc
RT-503250	50 X 32 X 50 mm	5pc
RT-504050	50 X 40 X 50 mm	5pc
RT-632063	63 X 20 X 63 mm	1pc
RT-632563	63 X 25 X 63 mm	1pc
RT-633263	63 X 32 X 63 mm	1pc
RT-634063	63 X 40 X 63 mm	1pc
RT-635063	63 X 50 X 63 mm	1pc
RT-753275	75 X 32 X 75 mm	1pc
RT-754075	75 X 40 X 75 mm	1pc
RT-755075	75 X 50 X 75 mm	1pc
RT-756375	75 X 63 X 75 mm	1pc
RT-905090	90 X 50 X 90 mm	1pc
RT-906390	90 X 63 X 90 mm	1pc
RT-907590	90 X 75 X 90 mm	1pc
RT-11063110	110 X 63 X 110 mm	1pc
RT-11075110	110 X 75 X 110 mm	1pc
RT-11090110	110 X 90 X 110 mm	1pc

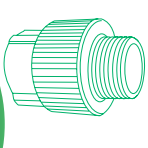


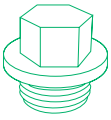


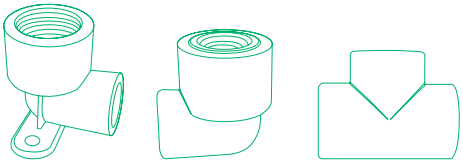


Cross Tee

Art No.	Dimension	Packing Unit
CT-20	20 mm	10pc
CT-25	25 mm	10pc
CT-32	32 mm	5pc



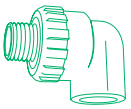


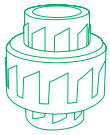


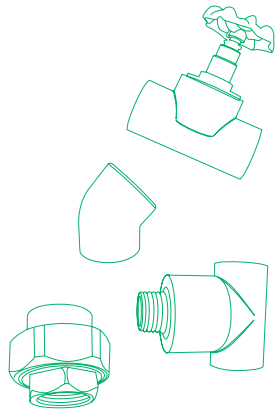
Power therm PP-R FITTINGS & ACCESSORIES

Reducer

Art No.	Dimension	Packing Unit
R-2520	25/20 mm	10pc
R-3220	32/20 mm	5pc
R-3225	32/25 mm	5pc
R-4020	40/20 mm	5pc
R-4025	40/25 mm	5pc
R-4032	40/32 mm	5pc
R-5020	50/20 mm	5pc
R-5025	50/25 mm	5pc
R-5032	50/32 mm	5pc
R-5040	50/40 mm	5pc
R-6320	63/20 mm	1pc
R-6325	63/25 mm	1pc
R-6332	63/32 mm	1pc
R-6340	63/40 mm	1pc
R-6350	63/50 mm	1pc
R-7540	75/40 mm	1pc
R-7550	75/50 mm	1pc
R-7563	75/63 mm	1pc
R-9050	90/50 mm	1pc
R-9063	90/63 mm	1pc
R-9075	90/75 mm	1pc
R-11063	110/63 mm	1pc
R-11075	110/75 mm	1pc
R-11090	110/90 mm	1pc

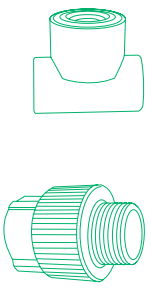


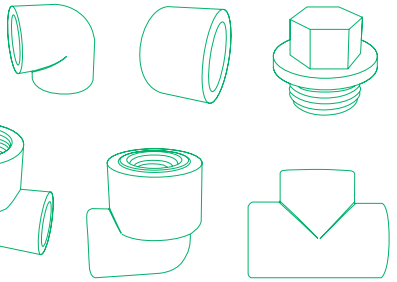




End Cap

Art No.	Dimension	Packing Unit
EC-20	20 mm	10pc
EC-25	25 mm	10pc
EC-32	32 mm	5pc
EC-40	40 mm	5pc
EC-50	50 mm	5pc
EC-63	63 mm	1pc
EC-75	75 mm	1pc
EC-90	90 mm	1pc
EC-110	110 mm	1pc





Power therm PP-R FITTINGS & ACCESSORIES

Union (Both Ends Welding)

Art No.	Dimension	Packing Unit
U-20	20 mm	10pc
U-25	25 mm	10pc
U-32	32 mm	10pc
U-40	40 mm	10pc
U-50	50 mm	5pc
U-63	63 mm	5pc
U-75	75 mm	1pc
U-90	90 mm	1pc
U-110	110 mm	1pc

End Plug

Art No.	Dimension	Packing Unit
EP-1/2	½	100pc
EP-3/4	3/4	100pc

Cross Over Pipe

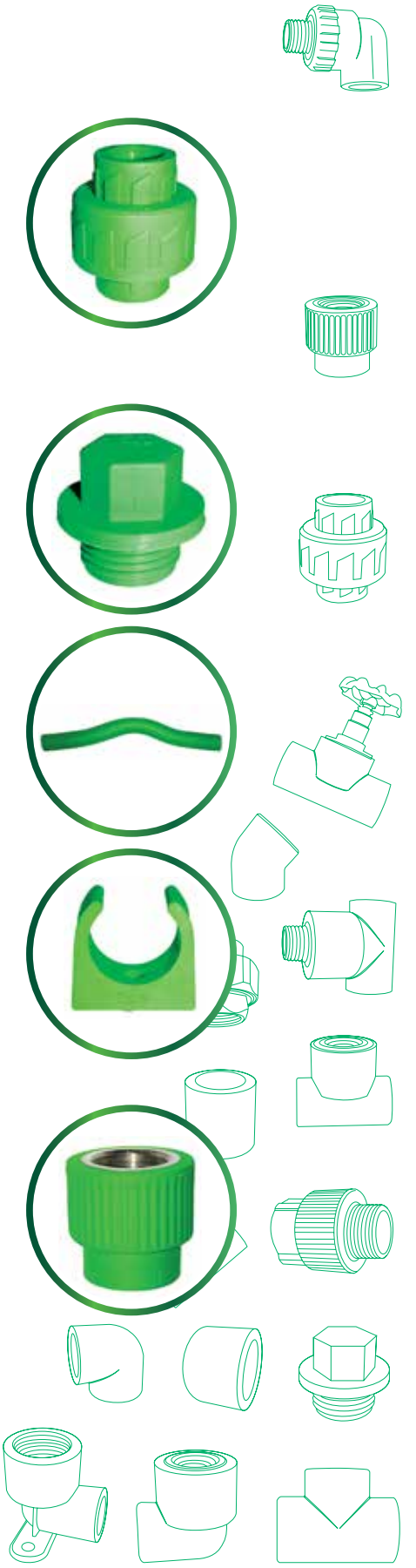
Art No.	Dimension	Packing Unit
COP-20	20 mm	10pc
COP-25	25 mm	10pc
COP-32	32 mm	5pc

Bracket Clip PP-R

Art No.	Dimension	Packing Unit
BC-20	20 mm	200pc
BC-25	25 mm	200pc
BC-32	32 mm	200pc
BC-40	40 mm	200pc

Female Threaded Socket

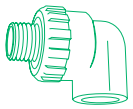
Art No.	Dimension	Packing Unit
FS-20½	20 X ½”	10pc
FS-20¾	20 X ¾”	10pc
FS-25½	25 X ½”	10pc
FS-25¾	25 X ¾”	10pc
FS-32¾	32 X ¾”	5pc



Power therm PP-R FITTINGS & ACCESSORIES

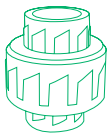
Male Threaded Socket

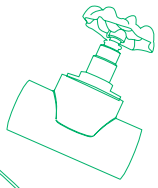
Art No.	Dimension	Packing Unit
MS20½	20 X ½”	10pc
MS20¾	20 X ¾”	10pc
MS25½	25 X ½”	10pc
MS25¾	25 X ¾”	10pc
MS321	32 X 1”	5pc
MS401¼	40 X 1 ¼ ”	5pc
MS501½	50 X 1 ½ ”	5pc
MS632	63 X 2”	1pc
MS752½	75 X 2 ½ ”	1pc
MS903	90 X 3”	1pc
MS1104	110 X 4”	1pc



Male Threaded Union

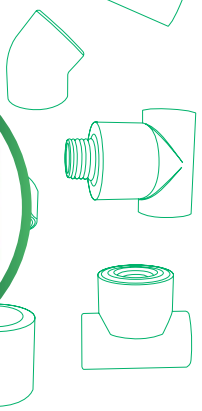
Art No.	Dimension	Packing Unit
MU20½	20 X ½”	10pc
MU25¾	25 X ¾”	10pc
MU321	32 X 1”	5pc
MU401¼	40 X 1¼”	5pc
MU501½	50 X 1½”	5pc
MU632	63 X 2”	5pc





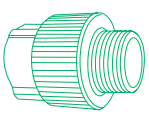
Female Threaded Union

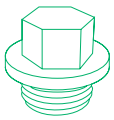
Art No.	Dimension	Packing Unit
FU20½	20 X ½”	10pc
FU25¾	25 X ¾”	10pc
FU321	32 X 1”	5pc
FU401¼	40 X 1¼”	5pc
FU501½	50 X 1½”	5pc
FU632	63 X 2”	5pc

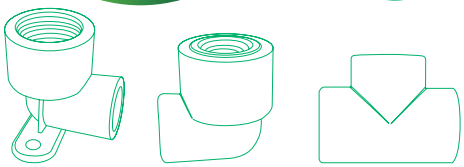


Female Threaded Elbow

Art No.	Dimension	Packing Unit
FE20½	20 X ½”	10pc
FE20¾	20 X ¾”	10pc
FE25½	25 X ½”	10pc
FE25¾	25 X ¾”	10pc
FE32¾	32 X ¾”	5pc
FE321	32 X 1”	5pc







Power therm PP-R FITTINGS & ACCESSORIES

Male Threaded Elbow

Art No.	Dimension	Packing Unit
ME20½	20 X ½”	10pc
ME20¾	20 X ¾”	10pc
ME25½	25 X ½”	10pc
ME25¾	25 X ¾”	10pc
ME32¾	32 X ¾”	10pc
ME321	32 X 1”	5pc

Female Threaded Wall Mount Elbow

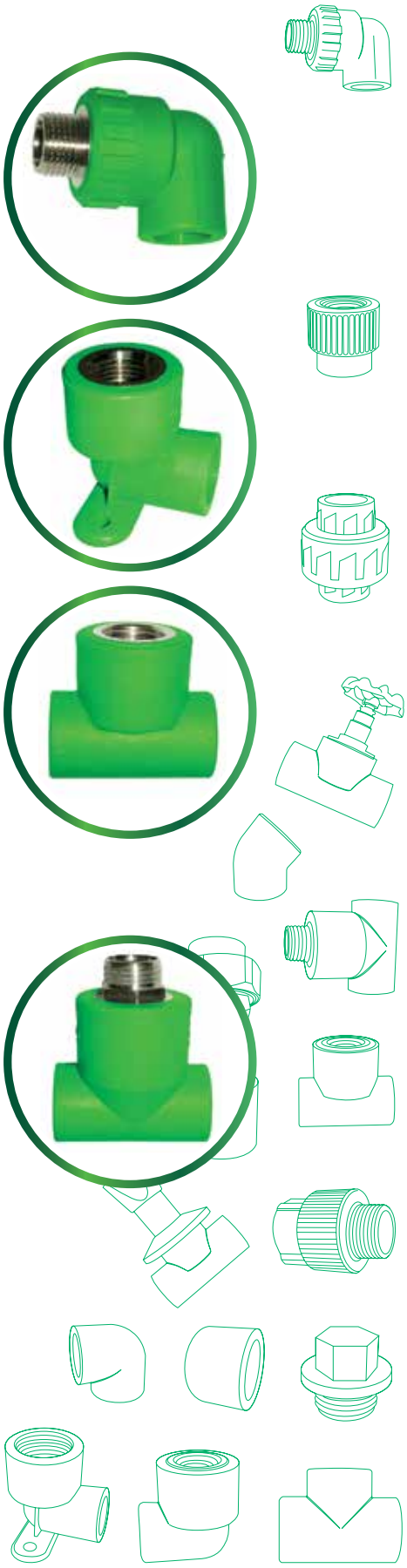
Art No.	Dimension	Packing Unit
FEW20½	20 X ½”	10pc
FEW25½	25 X ½”	10pc
FEW25¾	25 X ¾ ”	10pc

Female Threaded Tee

Art No.	Dimension	Packing Unit
FT20½	20 X ½” X 20	10pc
FT20¾	20 X ¾” X 20	10pc
FT25½	25 X ½” X 25	10pc
FT25¾	25 X ¾” X 25	10pc
FT32½	32 X ½” X 32	5pc
FT32¾	32 X ¾” X 32	5pc
FT321	32 X 1” X 32	5pc

Male Threaded Tee

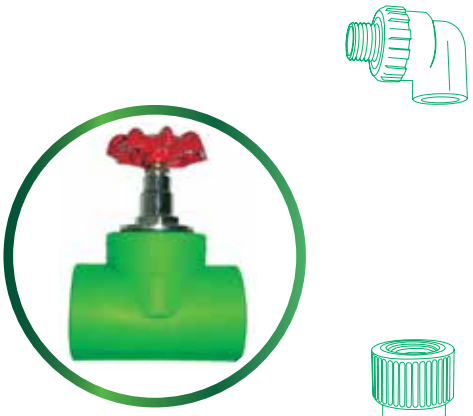
Art No.	Dimension	Packing Unit
MT20½	20 X ½” X 20	10pc
MT20¾	20 X ¾” X 20	10pc
MT25½	25 X ½” X 25	10pc
MT25¾	25 X ¾” X 25	10pc
MT32½	32 X ½” X 32	5pc
MT32¾	32 X ¾” X 32	5pc
MT321	32 X 1” X 32	5pc



Power therm PP-R FITTINGS & ACCESSORIES

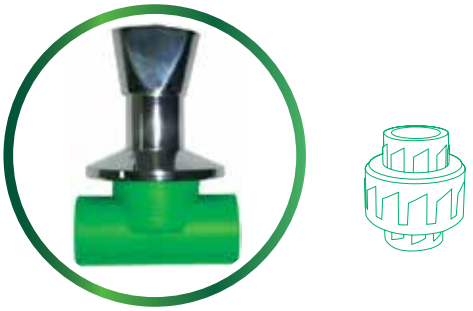
Stop Valve With Round Wheel Handle

Art No.	Dimension	Packing Unit
SR20	20 mm	1pc
SR25	25 mm	1pc
SR32	32 mm	1pc
SR40	40 mm	1pc
SR50	50 mm	1pc
SR63	63 mm	1pc
SR75	75 mm	1pc
SR90	90 mm	1pc
SR110	110 mm	1pc



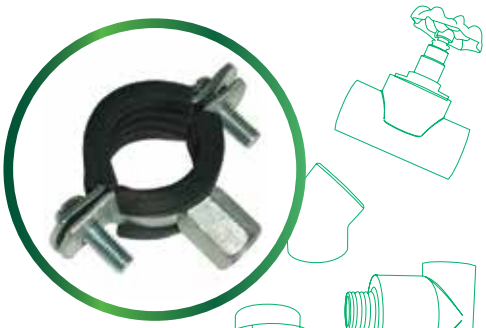
Concealed Valve (Chrome Plated)

Art No.	Dimension	Packing Unit
CV20	20 mm	1pc
CV25	25 mm	1pc
CV32	32 mm	1pc



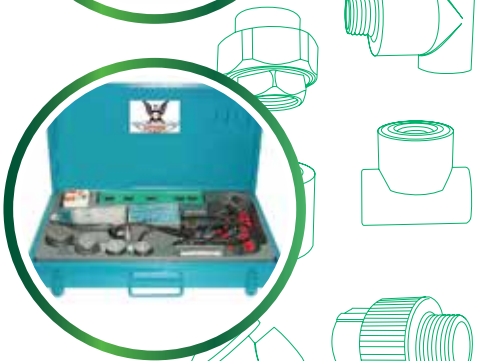
Pipe Supporting Rubber Clamps

Art No.	Dimension	Packing Unit
HC20	20 mm	400pc
HC25	25 mm	350pc
HC32	32 mm	300pc
HC40	40 mm	250pc
HC50	50 mm	200pc
HC63	63 mm	150pc
HC75	75 mm	100pc
HC90	90 mm	100pc
HC110	110 mm	60pc



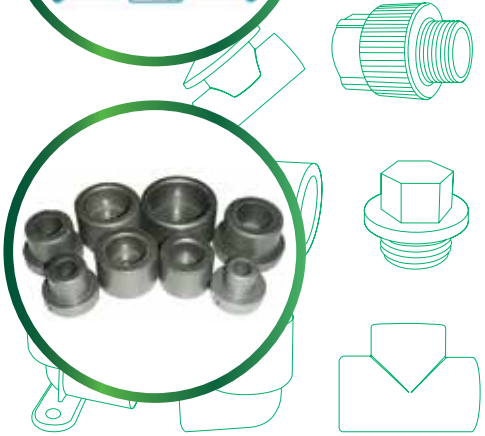
Welding Machine With Tools

Art No.	Dimension	Packing Unit
WM2040	20 – 40 mm	1pc
WM50110	50 – 110 mm	1pc



Welding Tool

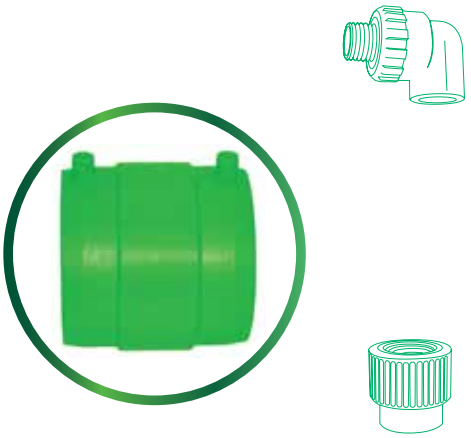
Art No.	Dimension	Packing Unit
WT20	20 mm	1pc
WT25	25 mm	1pc
WT32	32 mm	1pc
WT40	40 mm	1pc
WT50	50 mm	1pc
WT63	63 mm	1pc
WT75	75 mm	1pc
WT90	90 mm	1pc
WT110	110 mm	1pc



Power therm PP-R FITTINGS & ACCESSORIES

Electro Fusion Welding Sockets

Art No.	Dimension	Packing Unit
EWA20	20 mm	1pc
EWA 25	25 mm	1pc
EWA 32	32 mm	1pc
EWA 40	40 mm	1pc
EWA 50	50 mm	1pc
EWA 63	63 mm	1pc
EWA 75	75 mm	1pc
EWA 90	90 mm	1pc
EWA 110	110 mm	1pc



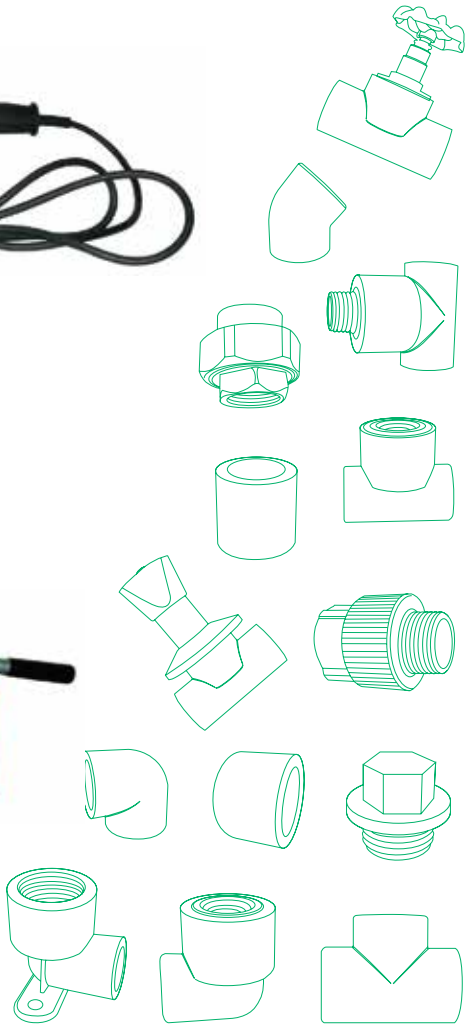
Professional Pipe Cutter

Art No.	Dimension	Packing Unit
PC2040	20 – 40 mm	1pc
PC4075	40 – 75 mm	1pc
PC63110	63 – 110 mm	1pc

Manual Welding Machine

Electro Fusion Welding Machine

Pressure Testing Pump



CUTTING AND POLYFUSION WELDING INSTRUCTIONS

The jointing process PP-R pipes and fittings are very simple and stronger than any other system. It is carried out using a simple welding machine that melts the internal surface of the fitting and the external surface of the pipe, so that the material of the pipe and the fitting will be fused together.

The following steps describe the welding process:

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

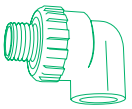
2. Mount the dies corresponding to the diameter of the pipe to be welded and connect the plug to the 220V AC power supply.

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 fitting 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 fitting.

4. Allow the joint to cool fully before using, do not rotate the pipe and fitting relative to each other during the cooling time.

Pipe Dimension	Welding Depth mm	Heating Time Sec.	Welding Time Sec.	Cooling Time Min.
20mm	14.0	5	4	2
25mm	15.0	7	4	2
32mm	16.5	8	6	4
40mm	18.0	12	6	4
50mm	20.0	18	6	4
63mm	24.0	24	8	6
75mm	26.0	30	8	8
90mm	29.0	40	8	8
110mm	32.5	50	10	8

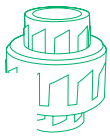
ELECTRO FUSION WELDING INSTRUCTIONS



The Electro Fusion welding process is used for emergency repairs or when welding has to be done in small places or in positions not accessible by a welding machine. The joints are achieved using Electro fusion welding sockets.

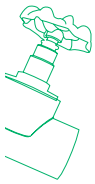
1. Cut the pipe with proper pipe cutter at a straight angle.

2. For Power therm stabi pipe fusion welding, remove the upper PP-R and aluminum layer by Power therm peeling tool up to the marked depth of the welding pipe.

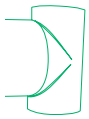


3. For stabi pipe, adjust peeling blade screw on the peeling tool for required peeling depth.

4. Clean outer surface of pipe ends with cloth and alcohol from grease, dust and other contamination around the perimeter.

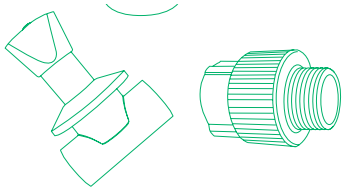


5. Mark the depth of insertion on the pipe.



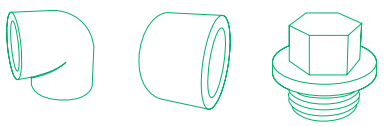
6. To keep Power therm electric welding sleeves free of dirt, dust and grease, remove them from their packing only before starting welding.

7. Insert pipe into the welding sleeve up to the stop and hold firm during welding process.

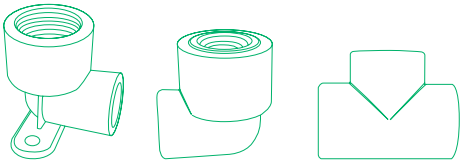


8. Connect the fusion control box to the power supply. Connect fusion cable to fitting terminal. Start fusion by pressing the START button. Fusion process runs automatically.

9. The two indicator pins will spring out once the heating time has ended.



10. Disconnect the cable from the electric welding sleeve.



11. Before going to the next process, make sure cooling-down times are maintained.

PE-X (CROSS LINKED POLYETHYLENE)

BRAND:- POWER PEX

POWER PEX pipe technology based on great products of polyethylene pipes, hot and cold-water installations, POWER PEX Plastic Pipes are suitable for different floors, floors and wall types of flexible structures; They can be easily used in the radiator systems, which are called as mobile installations, Cross Linked PEX Piping Systems are used in business centers, residences, sports halls, schools, laboratories, places of worship, cinemas, etc. It is the most accurate installation solution for heating different spaces. This piping system combines the advantage of both PP-R and manifold system. The manifold can select according to number of outlets equal to the number of hot & cold-water tops in each circuit respectively.

Dimensions of Power PEX Pipes:

POWER PEX Pipes are manufactured according to the German Standard DIN 16892 and DIN 16893 which list the general requirements for PEX pipes. The following table shows the dimensions of pipes.

Outside Diameter (mm)	Series 1 / PressureRating PN 12.5 / SDR 11.08	Series 2 / PressureRating PN 20 / SDR 7.4
	W.T. (mm)	W.T. (mm)
16	1.8	2.2
20	1.9	2.8
25	2.3	3.5
32	2.9	4.4

Main advantages :

- Simple installation
- High temperature resistance
- High flexibility
- Cost-effective
- High stability
- Corrosion Free

Application :

- Hot and cold water transportation
- Under- floor, wall and ceiling heating systems

POWER PEX

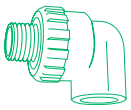
Working Conditions :

The Following table shows the maximum working conditions of PEX pipes at various sclected temperaturcs and pressures as listed in DIN 16893

Temperature	Service Life (years)	Permissible Working pressure (Bar)	
		PN20 Pipes	PN12.5 Pipes
10°C	1	24.0	15.1
	5	23.5	14.8
	10	23.3	14.7
	25	23.1	14.5
	50	22.8	14.4
20°C	1	21.7	13.7
	5	21.2	13.3
	10	21.0	13.2
	25	20.7	13.1
	50	20.0	12.5
30°C	1	19.6	12.3
	5	19.0	11.9
	10	18.8	11.7
	25	18.6	11.7
	50	18.4	11.6
40°C	1	17.5	11
	5	17.1	10.8
	10	16.9	10.7
	25	16.7	10.5
	50	16.5	10.4
50°C	1	15.4	9.7
	5	15.0	9.5
	10	14.8	9.3
	25	14.6	9.2
	50	14.4	9.1
60°C	1	13.8	8.7
	5	13.3	8.4
	10	13.1	8.3
	25	12.9	8.1
	50	12.8	8.1
70°C	1	12.2	7.7
	5	11.9	7.5
	10	11.6	7.3
	25	11.4	7.2
	50	11.2	7.1
80°C	1	10.4	6.5
	5	10.2	6.4
	10	10.1	6.3
	25	9.9	6.3
90°C	1	9.4	5.9
	5	9.2	5.8
	10	9.1	5.7
95 °C	1	9.0	5.7
	5	8.8	5.5
	10	8.6	5.4

Reference : DIN 16893

POWER PEX

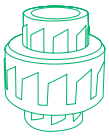


Pex Blue / Red Protective Sleeve

Blue		Red	
Art-.No.	Internal Diameter(mm)	Art-.No.	Internal Diameter(mm)
PBS - 25	25	PRS - 25	25
PBS - 32	32	PRS - 32	32
PBS - 40	40	PRS - 40	40

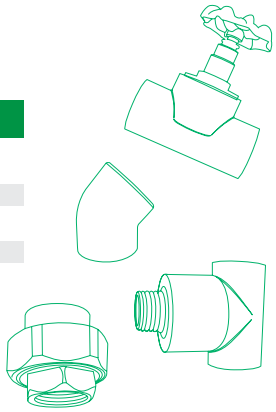
Male Adaptor

Art-.No.	Dimension
MA - 161/2	16mm x 1/2”
MA - 201/2	20mm x 1/2”
MA - 253/4	25mm x 3/4”
MA - 321	32mm x 1”
MA 25 1/2	25mm x1/2”



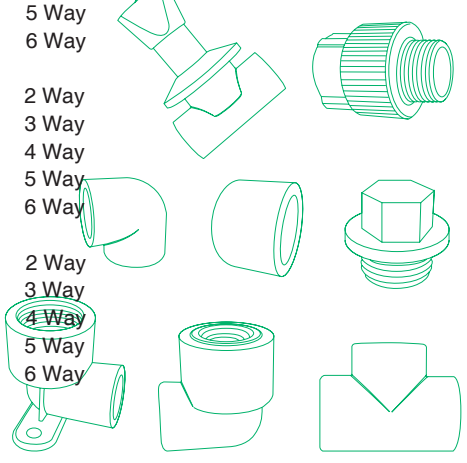
Female Adaptor

Art-.No.	Dimension
FA - 161/2	16mm x 1/2”
FA - 201/2	20mm x 1/2”
FA - 253/4	25mm x 3/4”
FA - 321	32mm x 1”



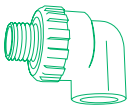
Manifold

Art-.No.	Dimension	Outlets
MF3/4x1/2 2	3/4” x 1/2”	2 Way
MF3/4x1/2 3	3/4” x 1/2”	3 Way
MF3/4x1/2 4	3/4” x 1/2”	4 Way
MF3/4x1/2 5	3/4” x 1/2”	5 Way
MF3/4x1/2 6	3/4” x 1/2”	6 Way
MF1x1/2 2	1” x 1/2”	2 Way
MF1x1/2 3	1” x 1/2”	3 Way
MF1x1/2 4	1” x 1/2”	4 Way
MF1x1/2 5	1” x 1/2”	5 Way
MF1x1/2 6	1” x 1/2”	6 Way
MF1x3/4 2	1” x 3/4”	2 Way
MF1x3/4 3	1” x 3/4”	3 Way
MF1x3/4 4	1” x 3/4”	4 Way
MF1x3/4 5	1” x 3/4”	5 Way
MF1x3/4 6	1” x 3/4”	6 Way



POWER PEX

Male Elbow

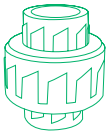


Art-.No.	Dimension
ME - 1/2	20mm x 1/2”
ME - 3/4	25mm x 3/4”
ME - 1	32mm x 1”

Male Coupling

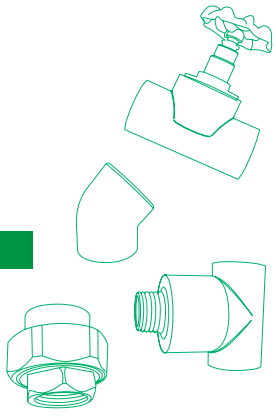
Art-.No.	Dimension
MS - 1/2	1/2”
MS - 3/4	3/4”
MS - 3/4 x1/2	3/4” x 1/2”
MS’ 1	1”
MS 11/4	11/4”

Pex Union



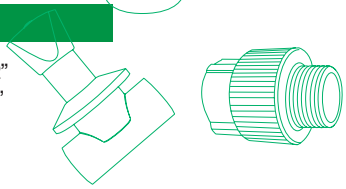
Art-.No.	Dimension
PU - 16	16mm x 16mm
PU - 20	20mm x 20mm
PU - 25	25mm x 25mm
PU - 32	32mm x 32mm

END Plug



Art-.No.	Dimension
EP1-1/2	1/2”
EP1-3/4	3/4”
EP1-1	1”
EP1-11/4	11/4”

Female Elbow with Box



Art-.No.	Dimension
FEB	16 mm x 1/2”
FEB	20 mm x 1/2”

PEX Protection Cap

Art-.No.	Dimension
PC 2516B	25-16 Blue
PC 2516R	25-16 Red