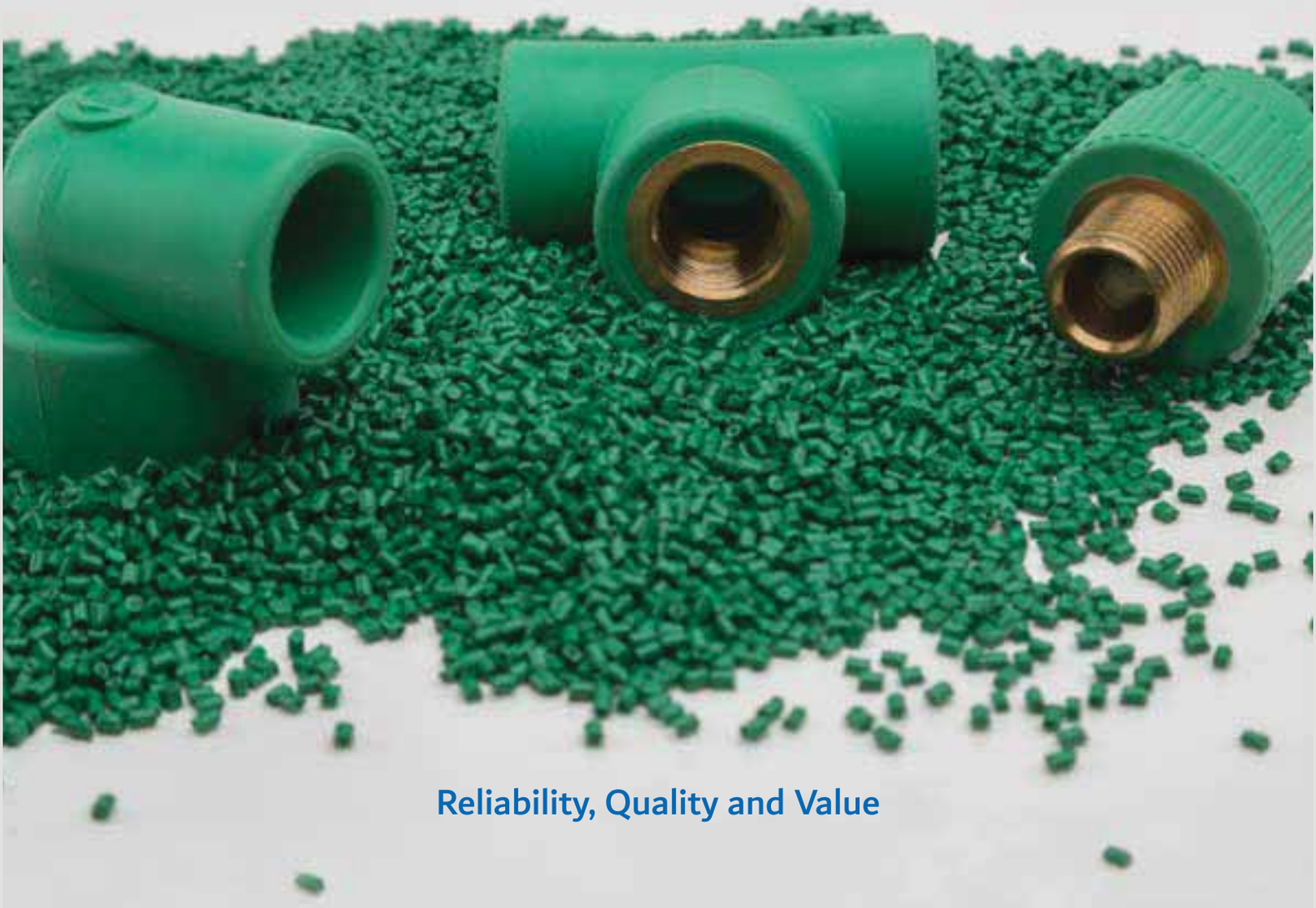
MODERN PLASTIC INDUSTRY L.L.C.

Over 30 years of Excellence



Reliability, Quality and Value

INTRODUCTION

Modern Plastic Industry is part of Oasis Investment company, holding company of Al Shirawi Group of companies which is one of the largest and most diversified business conglomerates in the Arabian gulf.

Since its establishment in 1971, as a trading and contracting company, the group has broadened its scope to encompass a cross section of products, services and industries ranging from printing & packaging, heavy fabrication, oil & gas, engineering, electromechanical and logistics.

Established in 1987, Modern Plastic Industry LLC pioneered the manufacturing of the UPVC pipes & fittings in the United Arab Emirates. With over 30 years of experience, MPI is manufacturing a wide range of Drainage Pipes & Fittings, High Pressure Pipes & Fittings, CPVC Pipes & Fittings and PP Compression Fittings.

MPI products have been used extensively in the irrigation, construction, plumbing and landscaping industry and are playing a significant role in the development of the Gulf region and Middle East.

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OVERVIEW

What is Water Supply Systems?

Pipe system typically used for domestic hot & cold water supply systems such as:

- **Drinking water-** Fresh water up to a temperature 25^{O}C for drinking and cooking.
- **Hot tap water**- Heated drinking water up to a temperature 60^{O}C.
- **Sanitary application-** Drinking water quality is not needed, like flush systems, washing & irrigation.

EN ISO 15874 standard classifies the service condition for hot and cold water applications as Class 1 (60^{O}C) & Class 2 (70^{O}C).
EN ISO 15874 standard classifies the temperatures above 70^{O}C as heating applications and comes under.
Class 4 (low temperature heating system) and Class 5 (High temperature heating system).

Rusting, corrosion, and scale formation are familiar problems of traditional metal piping system.

One of the important factor in the life and performance of a piping system is the material from which it is made.

An ideal material should not alter the water it is carrying.

Wrong choice of piping material may cause the failure of the installation and have a quantitative influence on the quality of water which we consume.

MPI PPR Pipe and Fittings are made from Polypropylene Random Co-Polymer (PP-R).
Polypropylene is a thermoplastic material and belongs to the polyolefin groups.
PP is a semicrystaline material.

PP's mechanical properties, chemical resistance and specially relatively high heat deflection temperature have made PP, one of the most important material used in piping industry.

Benefits

The Main Characteristics of MPI PPR pipe system are:

- Long service Life.
- Resistance to corrosion.
- Higher resistance to internal pressure.
- Taste and odor neutral.
- Hygienic and meets health requirements for water contact application.
- Good chemical resistance.
- Low thermal conductivity.
- Non toxic.
- Lower weight Excellent Weld-ability & Easy installation.
- Vibration and noise reduction.
- Low flow resistance.
- Higher impact strength.

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The MPI PPR pipe system is developed and manufactured within an ISO 9001.
Quality assurance system and complies with the DIN 8077/8078 and EN ISO 15874 standards.

Specification of raw material used in production:

- PP-R Standard Pipe, PP-R Fiber Pipe & PP-R Fittings are manufactured from Polypropylene Random Copolymer (**PPR-80**).

- **PP-RCT** Standard Pipe & Fittings are manufactured from **P**olypropylene **R**andom Copolymer with enhanced **C**rystalline structure and improved **T**emperature resistance.

  Brass inserts used in transition fittings is classified as CW617N (CuZn40Pb2) and suitable for drinking water installations.

MPI PP-R Pipe System

Standard Pipe

Standard Pipe is the conventional mono layer pipe as mentioned in the standards DIN 8077/8078 and EN ISO 15874.
PP-R pipe from 20 mm to 160 mm in SDR 6 & SDR 7.4
PP-RCT pipe from 20 mm to 160 mm in SDR 7.4, 20 mm to 110 mm in SDR 9 & 160 mm in SDR 11
Thermal expansion factor 0.15 mm / m.K

Fiber Pipe

Fiber pipe is a three layer pipe of which the middle layer is reinforced with glass fiber filled PP-R material. The outer & inner layer of the pipe is of normal PP-R material.
PP-R / PP-R GF / PP-R pipe from 20 mm to 160 mm inSDR 6 & SDR 7.4

Multilayer structure gives

- Lower thermal expansion coefficient
- Higher dimensional stability
- Higher stiffness and requires less bracketing
- Thermal expansion factor 0.036 mm / m.K

PP-R Fittings
PP-RCT Fittings

- Socket Welding type
- Brass transition type
- Flanged type

Transition fittings and unions are available to connect the pipe systems of different materials together.

The male and female threaded parts are manufactured according to the well accepted standard ISO 7.

Brass inserts used in transition fittings is classified as CW617N (CuZn40Pb2) and suitable for drinking water installations.

Installation Tools




MPI PP-R Pipe Product Range

Material	PP-R	PP-R	PP-R	PP-R	PP-RCT	PP-RCT	PP-RCT	PP-RCT
Pipe type	Standard	Standard	Fiber	Fiber	Standard	Standard	Fiber	Fiber
SDR	6	7.4	6	7.4	9	11	9	11
Pressure range	(PN20)	(PN16)	(PN20)	(PN16)	(PN16)	(PN10)	(PN16)	(PN10)
20	*	*	*	*	*		*	
25	*	*	*	*	*		*	
32	*	*	*	*	*		*	
40	*	*	*	*	*		*	
50	*	*	*	*	*		*	
63	*	*	*	*	*		*	
75	*	*	*	*	*		*	
90	*	*	*	*	*		*	
110	*	*	*	*	*		*	
160	*	*	*	*		*		*

ISO 15874, Maximum Operating Pressure MOP									
Class	1	10	8	10	8	8	6	8	6
Class	2	8	6	8	6	8	6	8	6
Class	4	10	10	10	10	8	6	8	6
Class	5	6	6	6	6	6	4	6	4

Class 1 hot water supply 60 °C
Class 2 hot water supply 70 °C
Class 4 low temperature heating 60 °C
Class 5 High temperature heating 80 °C

DIN 8077 , Maximum Operating Pressure MOP								
SF 1.5 – 20 °C	25.7	20.4	25.7	20.4	19.3	15.3	19.3	15.3
SF 1.5 – 60 °C	12.7	10.1	12.7	10.1	10.2		10.2	
SF 1.5 – 70 °C	8.5	6.7	8.5	6.7	8.5	6.8	8.5	6.8
SF 1.25 – 20 °C	30.9	24.5	30.9	24.5				
SF 1.25 – 60 °C	15.3	12.1	15.3	12.1				
SF 1.25 – 70 °C	10.2	8.1	10.2	8.1				
PN*	20	16	20	16	16	10	16	10

SF = Safety (Design) Factor – Permanent temperature for 50 years Design Life Span
* PN = Pressure Nominal based on DIN 8077 – 50 years at 20 °C.

MATERIALS

MPI (PP-R).

Polypropylene Random Copolymer (PP-R) exibits excellent combination of mechanical, thermal and chemical properties.

PPR is ideal choice for the potable water application.

MPI PPR pipe systems are designed to withstand constant temperatures up to 70 o C with a minimum service life of 50 years.

Temperature rise up to 100 $^{\circ}$ C for short time duration is acceptable.

Pipes of PP-R material shows pressure resistance, according to ISO/TR 9080 with a proven Minimum Required Strength (MRS) of 8 M Pa and Categorized Required Strength (CRS) of 3.2 M Pa.

Table A: Physical Properties of PP R Material

Property		Test Method	Unit	Value
Density		ASTM D 792 / ISO 1183	g/cm^3	0.905
Melt Flow Rate	230° C, 2.16 kg	ASTM D 1238 / ISO 1133	G/10 min	0.3
	190° C, 5.0 kg			0.45
Tensile Strength	Yeild point	ASTM D 638 / ISO 527	Mpa	25
	Break Point			23
Elongation at yeild		ASTM D 638 / ISO 527	%	13.5
Flexural Modulus		ASTM D 790 / ISO 178	Mpa	850
Charpy Impact Strength (notched)	23° C	ISO 179	KJ/m^2	50
	0° C			5
Vicat Softening Point		ASTM D 1525	°C	130
Coefficient of thermal expansion (0° C / 70° C)		DIN 53752	k^{-1}	1.5x10^4

The data of table are relative and represents empirical values obtained in various tests

MPI (PP-RCT).

PP-RCT - Polyproylene Random Crystallinity Temperature.
Polypropylene random coploymer with special crystallinity by special "β nucleation" process providing an improved pressure resistance, especially at elevated temperatures.

- Special crystallinity structre – high degree of the hexagonal for (β form).
- Improvement in long term strength 50 % than regular PP-R.
- Improved impact strength.
- Improved resistance to crack propagation.
- Lower wall thickness and higher hydraulic capacity.

Pipes of PP-RCT material shows pressure resistance, according to ISO/TR 9080 with a proven Minimum Required Strength (MRS) of 11.5 M Pa and Categorized Required Strength (CRS) of 5 M Pa.

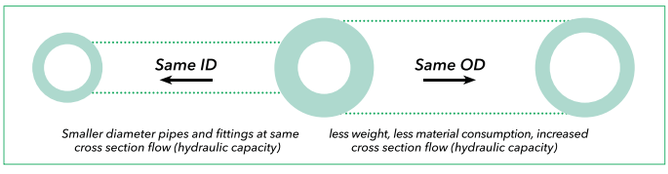
Table B: Physical Properties of PP-RCT Material

Property		Test Method	Unit	Value
Density		ISO 1183	g/cm^3	0.905
Melt Flow Rate	230° C, 2.16 kg	ISO 1133	G/10 min	0.25
	190° C, 5.0 kg			0.45
Tensile Strength	Yeild point	ISO 527	Mpa	25
Elongation at yeild		ISO 527	%	10
Flexural Modulus		ISO 527	Mpa	900
Charpy Impact Strength (notched)	23° C	ISO 179	KJ/m^2	40
	0° C			4
Coefficient of thermal expansion (0° C / 70° C)		DIN 53752	K^{-1}	1.5×10^{-4}

The data of table are relative and represents empirical values obtained in various tests

PP-RCT Advantages

- The improved long-term strength of PP-RCT material leads to a more economic set of dimensions of the pipe system.
- It enables designers to select thinner wall pipes and in some sitiuations also smaller diameter pipe can be used.
- This results in higher hydraulic pipe capacity or the possibility to apply higher pressure than with standard PP-R.



MPI QUALITY ASSURANCE

Quality is at the root of all good business, it reinforces a strong brand in the marketplace, encourages customer loyalty, and ensures the viability of a business.
Continuous improvement is essential to maintain the quality of business processes and practices.
At Modern Plastic Industry, we understand quality management from planning, control and assurance through to quality improvement. We believe that quality management is much more than product or service quality, but about how to achieve quality, maintain and improve it. Quality management systems are important for all businesses, whatever their size or complexity.

State of Art of Machinery

European state of art machinery with latest modern technologies ensures the demanded quality.

Incoming Material Inspection

Approved quality raw material is used for the manufacturing the PP-RCT pipe system.
The incoming raw material quality is ensured by the inspection and testing.

Production Monitoring

The process control set up will ensure the dimensional correctness of the items produced.
Consistent product quality is maintained by standard data of the injection molding machines, extrusion and compared with the specification.
Regular online checking of production runs are carried out.

Quality Control & Final Inspection

Continuous in-process inspection are carried out to monitor the process in regular intervals.
The following tests are conducted and the goods are released to the warehouse after final inspection.

- Visual appearance and surface finish.
- Dimensional accuracy.
- Internal Pressure test.
- Impact test.
- Heat Reversion test.

Standards & Certifcates

DIN 8076	Standard for testing metal threaded joints.
DIN 8077	Polypropylene (PP) pipe dimensions.
DIN 8078	Polypropylene (PP) pipes – PP-H, PP-B, PP-R, PP-RCT – General quality requirements.
EN ISO 15874	Plastics Piping Systems for hot and cold water installations – Polypropylene (PP).
DIN 16962	Pipe joint assemblies and fittings Polypropylene (PP).
DIN 2999	Standards for fittings with threaded metallic inserts.
DIN 4109	Noise control in buildings.
DIN 4140	Insulation of service installations.
DVS 2207	Welding of thermoplastic pipes and fittings.
DVGW W544	General Requirements and Testing of Plastics Pipes.
SKZ HR 3.10	Specification for test & inspection Pressure Piping Systems (PP).
ISO 9001- 2015	Quality Management System.

DESIGN OF PP-R PIPE SYSTEM

Polypropylene Material

Polypropylene is a thermoplastic material and belongs to the polyolefin groups.
PP is a semi-crystaline material.PP's mechanical properties, chemical resistance and specially relatively high heat deflection temperature have made PP, one of the most important material used in piping industry.

PP is the polymer of propylene (C3H6), which is produced by Ziegler-Natta catalysts.
The main four types of Polypropylene are:

- 1. Polypropylene Homo Polymer (PP-H) (Type 1)
- 2. Poypropylene Block Co-Polymer (PP-B) (Type 2)
- 3. Polypropylene Random Co-Polymer (PP-R) (Type 3)
- 4. Polypropylene Random Crystalline Elevated Temperature (PP-RCT)

PP-H – High Internal Pressure Resistance – Preferred in Industrial application.
PP-B – High impact strength especially at low temperatures & low thermal endurance – Sewage Pipe System.
PP-R – High Internal Pressure Resistance at high temperature & low e-modulus – Plumbing and Sanitary application.
PP-RCT – High Internal Pressure Resistance at Elevated temperature – Hot water & Heating System.

Relationship between older PN pressure class marking, Series S & SDR

Pipe Series – S

Dimensionless number related to the nominal outside diameter of a pipe and its wall thickness.
On the basis of this number, the wall thickness (s) is to be calculated as follows:

$$s = \frac{d}{2s + 1}$$

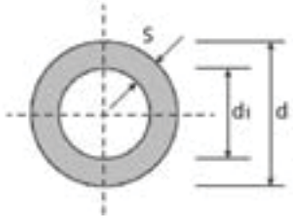
PN Nominal Pressure
S Pipe Series
SDR Standard Dimension Ratio
d External diameter of pipe
S Wall thickness of pipe

$$SDR = 2S + 1 = d/s$$

Pipe Series (S)							
20	26	12.5	8.3	5	3.2	2.5	2

PN	S	SDR
10	5	11
12.5	4	9
16	3.2	7.4
20	2.5	6
25	2	5

For standard PP-R Raw Material Only.



Long Term Material Strength

One of the most important properties of a polymer material used for hot and cold water pressure pipe is its resistance to internal pressure at different temperatures.
Also creep behavior is an important factor to take consideration for plastic pipe systems.

Design stress details for PP-R and PP-RCT

Application class	Design Stress for PP-R		Design Stress for PP-RCT	
	M Pa	Bar	M Pa	Bar
1	3.09	30.9	3.63	36.3
2	2.13	21.3	3.40	34.0
4	3.30	33.0	3.67	36.7
5	1.90	19.0	2.92	29.2
20°C / 50 years	6.93	69.3	8.24	82.4

Safety factor & Design Stress

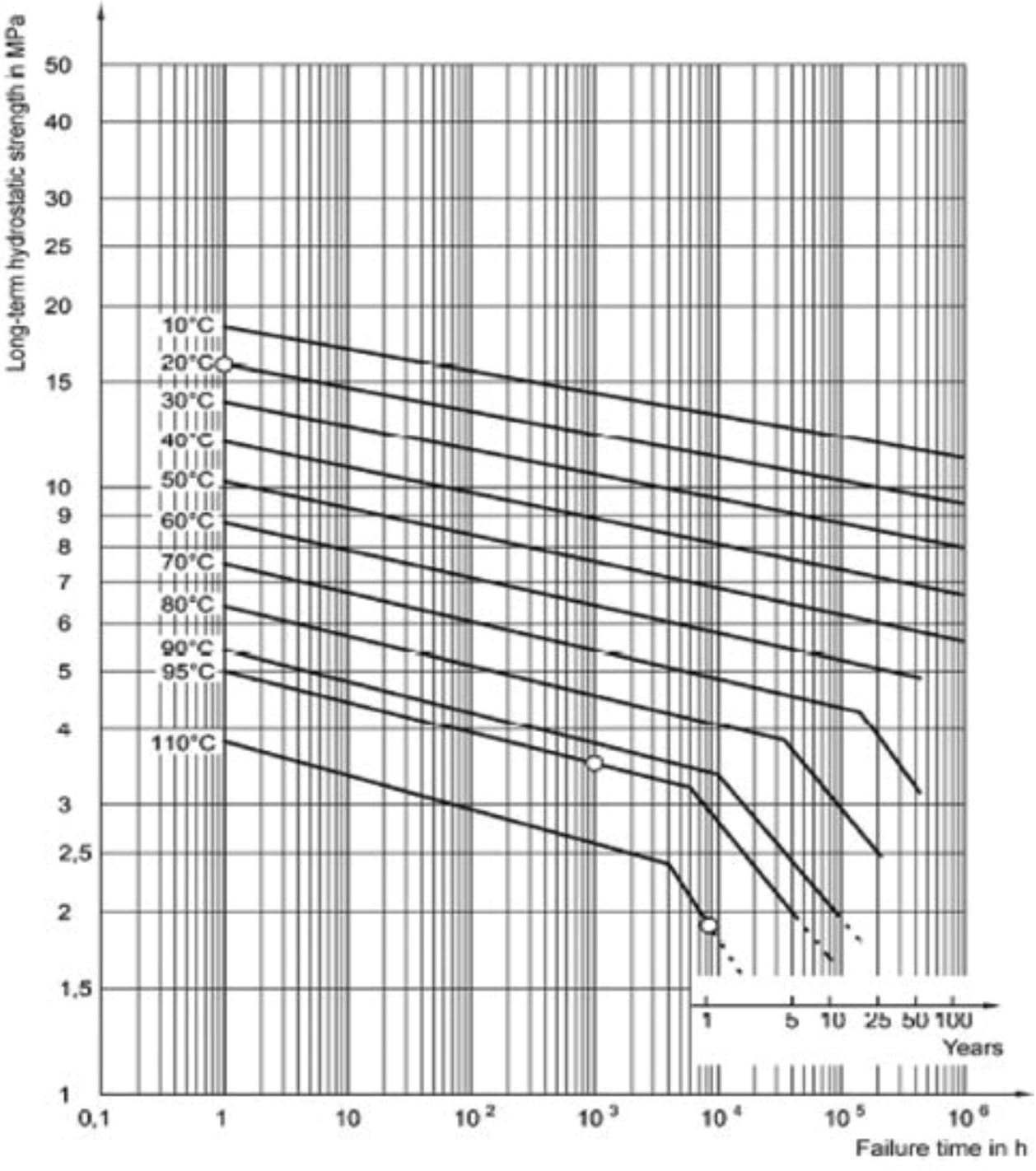
Temperature	SF	
°C	PP-R	PP-RCT
T_d	1.5	1.5
T_{max}	1.3	1.3
T_{mal}	1.0	1.0
T_{Cold}	1.4	1.4

T_D = Design Temperature
T_{max} =Maximum Temperature
T_{mal} =Failure Temperature
T_{Cold} =Cold water

Safety factor & Design Stress

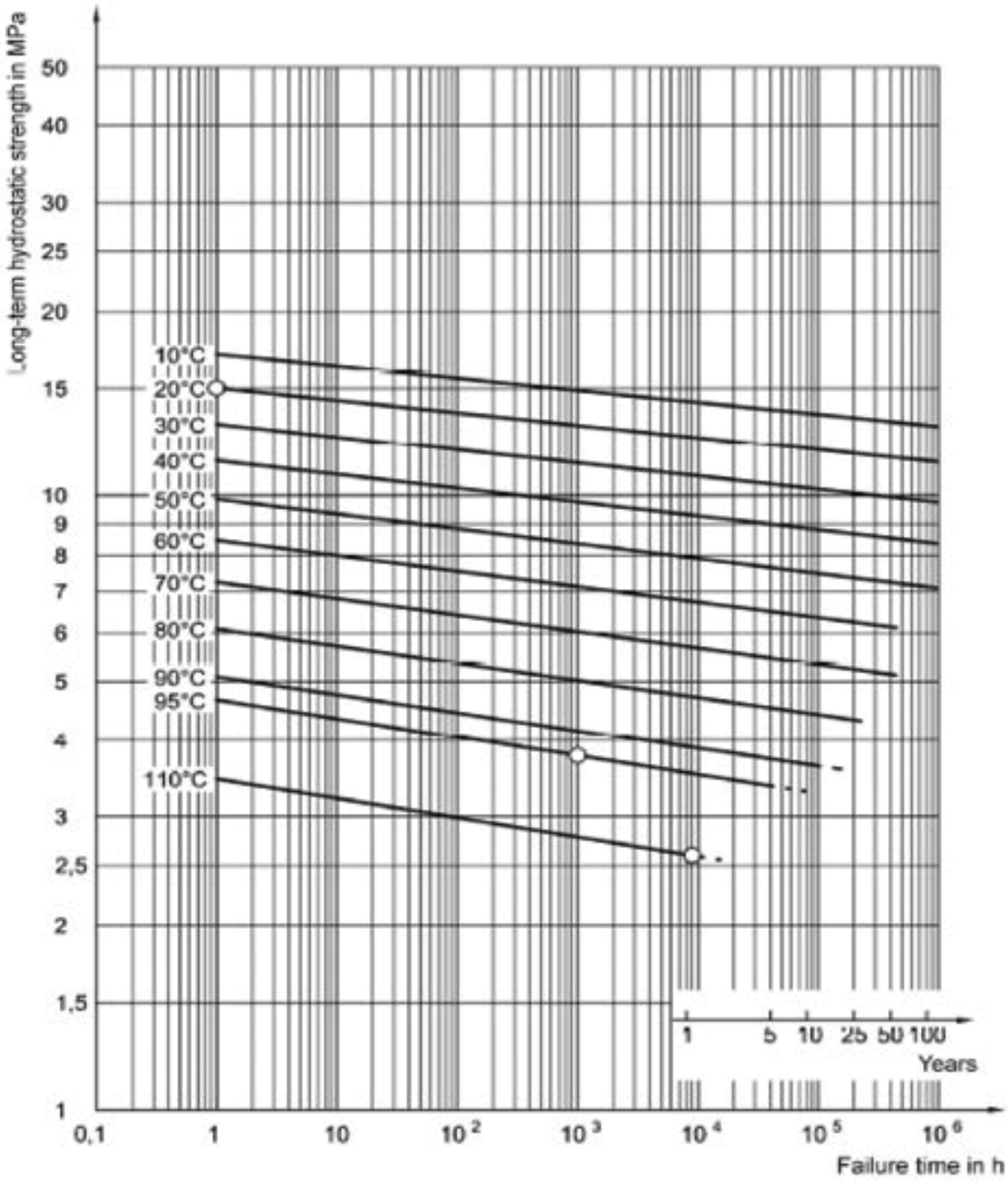
Temperature		Time (years)	Required Long term strength PP-R		Required Long term strength PP-RCT	
			M Pa	Bar	M Pa	Bar
20°C	68°F	50	9.7	97	11.5	115
60°C	140°F	50	4.9	49	6.1	61
70°C	158°F	50	3.2	32	5.1	51
95°C	203°F	5	1.9	19	3.3	33
110°C	230°F	1	1.9	19	2.6	26

Reference Characteristic curves of the long-term hydrostatic strength for **PP-R** Pipe



Pipes of PP-R material shows pressure resistance, according to ISO/TR 9080 with a proven Minimum Required Strength (MRS) of **8 MPa** and Categorized Required Strength (CRS) of **3.2 MPa**.

Reference Characteristic curves of the long-term hydrostatic strength for **PP-RCT** Pipe



Pipes of PP-RCT material shows pressure resistance, according to ISO/TR 9080 with a proven Minimum Required Strength (MRS) of **11.5 MPa** and Categorized Required Strength (CRS) of **5 MPa.**

Design of PP-R Pipe System

Recommended Pipe SDR for PP-R and PP-RCT for application Class 1 (hot water supply 60°C) & Class 2 (hot water supply 70°C)

Operating Pressure	Class 1 (60°C)		Class 2 (70°C)	
	PP-R	PP-RCT	PP-R	PP-RCT
4 bar	SDR 11	SDR 13.6	SDR 11	SDR 13.6
6 bar	SDR 11	SDR 11	SDR 7.4	SDR 11
8 bar	SDR 7.4	SDR 9	SDR 6	SDR 9
10 bar	SDR 6	SDR 7.4	SDR 5	SDR 7.4

Recommended Pipe SDR for PP-R and PP-RCT for application Class 4 (under floor heating & low temperature radiators) & Class 5 (high temperature radiators)

Operating Pressure	Class 4		Class 5	
	PP-R	PP-RCT	PP-R	PP-RCT
4 bar	SDR 11	SDR 13.6	SDR 7.4	SDR 13.6
6 bar	SDR 11	SDR 11	SDR 7.4	SDR 9
8 bar	SDR 7.4	SDR 9	SDR 5	SDR 7.4
10 bar	SDR 6	SDR 7.4	-	SDR 6

Table C – Classification of Service Conditions (EN ISO 15874-1: 2003)

Application Class	Design Temperature T_D	Operation Time $T_{ope.}$ at TD	T_{max}	Time at T_{max}	T_{mal}	Time at T_{mal}	Typical field of application
	°C	Years	°C	Years	°C	h	
1	60	49	80	1	95	100	Hot Water Supply (60° C)
2	70	49	80	1	95	100	Hot Water Supply (70° C)
4	20	2.5	70	2.5	100	100	Underfloor heating and low temperature radiators
	40	20					
	60	25					
5	20	14	90	1	100	100	High temperature rediators
	60	25					
	80	10					
	20	50	-	-	-	-	Cold Water Supply

T_D = Design Temperature
T_{max} =Maximum Temperature
T_{mal} =Failure Temperature

For application class with more than one operating temperature, the corresponding time of operation needs to be added.

For example:
the collective temperatures of the 50 years service life time of application class 4 is calculated as,
20°C over 2.5 years followed by
40°C over 20 years followed by
60°C over 25 years followed by
70°C over 2.5 years followed by
100°C over 100 hours

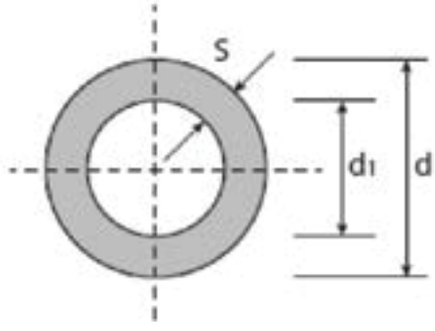
Table D: Allowable Working Pressure with Safety Factor 1.25 (for potable water)

Temperature in ° C	Years of Service	MPI PP-R Standard Pipe MPI PPR Fiber Pipe SDR 6	MPI PP-R Standard Pipe MPI PPR Fiber Pipe SDR 7.4	Application
10	1	42	33.4	Cold Water
	5	39.8	31.6	
	10	38.5	30.6	
	25	37.3	29.6	
	50	36.3	28.8	
	100	35.4	28.1	
20	1	36	28.6	
	5	33.8	26.8	
	10	32.8	26.1	
	25	31.8	25.3	
	50	30.9	24.5	
	100	29.9	23.8	
30	1	30.6	24.3	Cold & Warm Water
	5	28.7	22.8	
	10	27	.7 22	
	25	26.8	21.3	
	50	26.1	20.7	
	100	25.5	20.2	
40	1	25.8	20.5	
	5	24.2	19.2	
	10	23.6	18.7	
	25	22.6	18	
	50	22	17.5	
	100	21.3	16.9	
50	1	22	17.5	
	5	20.4	16.2	
	10	19.7	15.7	
	25	19.1	15.2	
	50	18.5	14.7	
	100	17.8	14.2	
60	1	18.5	14.7	
	5	17.2	13.7	
	10	16.6	13.2	
	25	15.9	12.6	
	50	15.3	12.1	
70	1	15.6	12.4	Hot Water
	5	14.3	11.4	
	10	14	11.1	
	25	12.1	9.6	
	50	10.2	8.1	
80	1	13.1	10.4	
	5	11.5	9.1	
	10	9.6	7.6	
	25	7.6	61	
90	1	9.2	7.3	
	5	6.1	4.8	
	10	5.1	4	

PRODUCTS RANGE - PIPES

PP-R Standard Pipe

Standard dimension ratio	SDR:6
Pipe Structure	Single
Pipe Series	2.5 (PN 20)
Standard	DIN 8077/8078 / EN ISO 15874-2
Standard Color	Green
Standard Pipe Length	4 meters



Application

Potable water
Plumbing
Heating and cooling
Swimming pool
Chemical transport
Under floor heating and low temperature radiators

Service condition classification – Application class 2 (70°C) - see table C

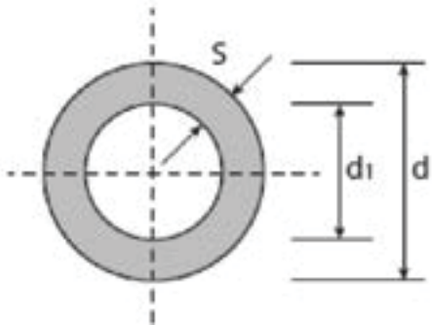
Life expectancy depends on the operation temperature.
Permissible operating pressures in bar- See table D

Product Code	Size	Packing unit	Outer Diameter (d)	Wall Thickness (s)	Inner Diameter (d1)	Water Content l/m
	mm	Nos.	mm	mm	mm	l/m
A20X3.4 SD6	20 x 3.4	25	20	3.4	13.2	0.137
A25X4.2 SD6	25 x 4.2	25	25	4.2	16.6	0.216
A32X5.4 SD6	32 x 5.4	10	32	5.4	21.2	0.353
A40X6.7 SD6	40 x 6.7	10	40	6.7	26.6	0.555
A50X8.3 SD6	50 x 8.3	5	50	8.3	33.4	0.876
A63X10.5 SD6	63 x 10.5	5	63	10.5	42.0	1.385
A75X12.5 SD6	75 x 12.5	5	75	12.5	50.0	1.963
A90X15.0 SD6	90 x 15.0	3	90	15	60.0	2.826
A110X18.3 SD6	110 x 18.3	2	110	18.3	73.4	4.229
A160X26.6 SD6	160 x 26.6	1	160	26.6	106.8	8.954

- 20°C / 20 Bar & 70°C / 10 Bar

PP-R Standard Pipe

Standard dimension ratio	SDR:7.4
Pipe Structure	Single
Pipe Series	3.2 (PN 16)
Standard	DIN 8077/8078 / EN ISO 15874-2
Standard Color	Green
Standard Pipe Length	4 meters



Application

Potable water
Plumbing
Heating and cooling
Swimming pool
Chemical transport
Under floor heating and low temperature radiators

Service condition classification – Application class 1 (60°C) - see table C

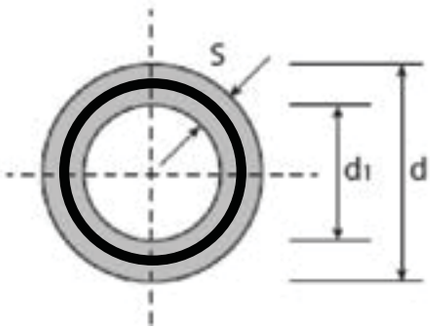
Life expectancy depends on the operation temperature.
Permissible operating pressures in bar- See table D

Product Code	Size	Packing unit	Outer Diameter (d)	Wall Thickness (s)	Inner Diameter (d1)	Water Content l/m
	mm	Nos.	mm	mm	mm	l/m
A20X2.8 SD7.4	20 x 2.8	25	20	2.8	14.4	0.163
A25X3.5 SD7.4	25 x 3.5	25	25	3.5	18.0	0.254
A32X4.4 SD7.4	32 x 4.4	10	32	4.4	23.2	0.423
A40X5.5 SD7.4	40 x 5.5	10	40	5.5	29.0	0.660
A50X6.9 SD7.4	50 x 6.9	5	50	6.9	36.2	1.029
A63X8.6 SD7.4	63 x 8.6	5	63	8.6	45.8	1.647
A75X10.3 SD7.4	75 x 10.3	5	75	10.3	54.4	2.323
A90X12.3 SD7.4	90 x 12.3	3	90	12.3	65.4	3.358
A110X15.1 SD7.4	110 x 15.1	2	110	15.1	79.8	4.999
A160X21.9 SD7.4	160 x 21.9	1	160	21.9	116.2	10.599

- 20°C / 16 Bar & 70°C / 8 Bar

PP-R Fiber Pipe – Glass Fiber Reinforced Pipes

Standard dimension ratio	SDR:6
Pipe Structure	3 layer
Pipe Series	2.5 (PN 20)
Standard	DIN 8077/8078 / EN ISO 15874-2
Standard Color	Green
Standard Pipe Length	4 meters



Application

Potable water
Plumbing
Heating and cooling
Swimming pool
Chemical transport
Under floor heating and low temperature radiators

Service condition classification – Application class 2 (70°C) - see table C

Life expectancy depends on the operation temperature.
Permissible operating pressures in bar- See table D

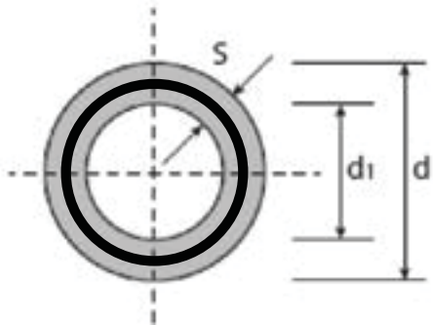
Multilayer pipe with glass fiber reinforced mid layer for indoor and outdoor cold, hot water supply and central heating systems.

Product Code	Size	Packing unit	Outer Diameter (d)	Wall Thickness (s)	Inner Diameter (d1)	Water Content l/m
	mm	Nos.	mm	mm	mm	l/m
AGF20X3.4 SD6	20 x 3.4	25	20	3.4	13.2	0.137
AGF25X4.2 SD6	25 x 4.2	25	25	4.2	16.6	0.216
AGF32X5.4 SD6	32 x 5.4	10	32	5.4	21.2	0.353
AGF40X6.7 SD6	40 x 6.7	10	40	6.7	26.6	0.555
AGF50X8.3 SD6	50 x 8.3	5	50	8.3	33.4	0.876
AGF63X10.5 SD6	63 x 10.5	5	63	10.5	42.0	1.385
AGF75X12.5 SD6	75 x 12.5	5	75	12.5	50.0	1.963
AGF90X15.0 SD6	90 x 15.0	3	90	15	60.0	2.826
AGF110X18.3 SD6	110 x 18.3	2	110	18.3	73.4	4.229
AGF160X26.6 SD6	160 x 26.6	1	160	26.6	106.8	8.954

- 20°C / 20 Bar & 70°C / 10 Bar

PP-R Fiber Pipe – Glass Fiber Reinforced Pipes

Standard dimension ratio	SDR:7.4
Pipe Structure	3 layer
Pipe Series	3.2 (PN 16)
Standard	DIN 8077/8078 / EN ISO 15874-2
Standard Color	Green
Standard Pipe Length	4 meters



Application

Potable water
Plumbing
Heating and cooling
Swimming pool
Chemical transport
Under floor heating and low temperature radiators

Service condition classification – Application class 1 (60°C) - see table C

Life expectancy depends on the operation temperature.
Permissible operating pressures in bar- See table D

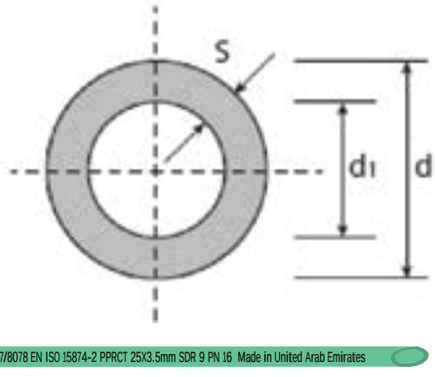
Multilayer pipe with glass fiber reinforced mid layer for indoor and outdoor cold, hot water supply and central heating systems.

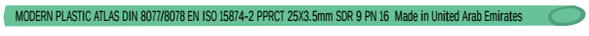
Product Code	Size	Packing unit	Outer Diameter (d)	Wall Thickness (s)	Inner Diameter (d1)	Water Content l/m
	mm	Nos.	mm	mm	mm	l/m
AGF20X2.8 SD7.4	20 x 2.8	25	20	2.8	14.4	0.163
AGF25X3.5 SD7.4	25 x 3.5	25	25	3.5	18.0	0.254
AGF32X4.4 SD7.4	32 x 4.4	10	32	4.4	23.2	0.423
AGF40X5.5 SD7.4	40 x 5.5	10	40	5.5	29.0	0.660
AGF50X6.9 SD7.4	50 x 6.9	5	50	6.9	36.2	1.029
AGF63X8.6 SD7.4	63 x 8.6	5	63	8.6	45.8	1.647
AGF75X10.3 SD7.4	75 x 10.3	5	75	10.3	54.4	2.323
AGF90X12.3 SD7.4	90 x 12.3	3	90	12.3	65.4	3.358
AGF110X15.1 SD7.4	110 x 15.1	2	110	15.1	79.8	4.999
AGF160X21.9 SD7.4	160 x 21.9	1	160	21.9	116.2	10.599

- 20°C / 20 Bar & 70°C / 8 Bar

PP-RCT Standard Pipe

Standard dimension ratio	SDR:9
Pipe Structure	Single
Pipe Series	4 (PN 16)
Standard	DIN 8077/8078 / EN ISO 15874-2
Standard Color	Green
Standard Pipe Length	4 meters





Cold & Hot water supply, Central heating systems.

Application

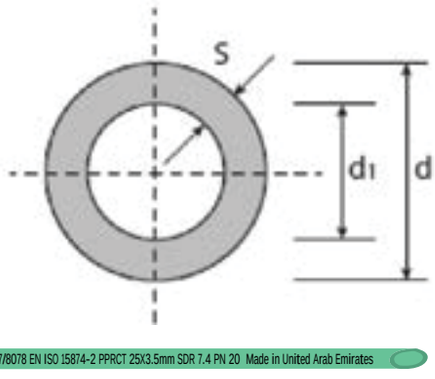
Potable water
Plumbing
Heating and cooling
Swimming pool
Chemical transport
Under floor heating and low temperature radiators

Service condition classification – Application class 1 (60°C),
Class 2 (70°C) & Class 3 - see table C

Product Code	Size	Packing unit	Outer Diameter (d)	Wall Thickness (s)	Inner Diameter (d1)	Water Content l/m
	mm	Nos.	mm	mm	mm	l/m
ACT20X2.3 SD9	20 x 2.3	25	20	2.3	15.4	0.186
ACT25X2.8 SD9	25 x 2.8	25	25	2.8	19.4	0.295
ACT32X3.6 SD9	32 x 3.6	10	32	3.6	24.8	0.483
ACT40X4.5 SD9	40 x 4.5	10	40	4.5	31.0	0.754
ACT50X5.6 SD9	50 x 5.6	5	50	5.6	38.8	1.182
ACT63X7.1 SD9	63 x 7.1	5	63	7.1	48.8	1.869
ACT75X8.4 SD9	75 x 8.4	5	75	8.4	58.2	2.659
ACT90X10.1 SD9	90 x 10.1	3	90	10.1	69.8	3.825
ACT110X12.3 SD9	110 x 12.3	2	110	12.3	85.4	5.725

PP-RCT Standard Pipe

Standard dimension ratio	SDR:7.4
Pipe Structure	Single
Pipe Series	3.2 (PN 20)
Standard	DIN 8077/8078 / EN ISO 15874-2
Standard Color	Green
Standard Pipe Length	4 meters



Cold & Hot water supply, Central heating systems.

Application

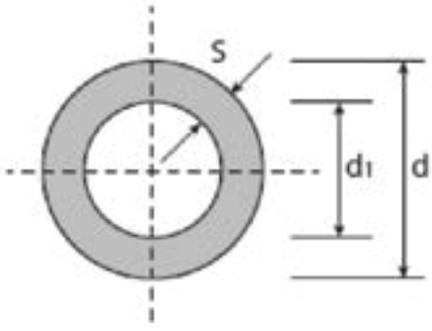
Potable water
Plumbing
Heating and cooling
Swimming pool
Chemical transport
Under floor heating and low temperature radiators

Service condition classification – Application class 4
(Under floor heating & lowtemperature radiator)

Product Code	Size	Packing unit	Outer Diameter (d)	Wall Thickness (s)	Inner Diameter (d1)	Water Content l/m
	mm	Nos.	mm	mm	mm	l/m
ACT20X2.8 SD7.4	20 x 2.8	25	20	2.8	14.4	0.163
ACT25X3.5 SD7.4	25 x 3.5	25	25	3.5	18.0	0.254
ACT32X4.4 SD7.4	32 x 4.4	10	32	4.4	23.2	0.423
ACT40X5.5 SD7.4	40 x 5.5	10	40	5.5	29.0	0.660
ACT50X6.9 SD7.4	50 x 6.9	5	50	6.9	36.2	1.029
ACT63X8.6 SD7.4	63 x 8.6	5	63	8.6	45.8	1.647
ACT75X10.3 SD7.4	75 x 10.3	5	75	10.3	54.4	2.323
ACT90X12.3 SD7.4	90 x 12.3	3	90	12.3	65.4	3.358
ACT110X15.1 SD7.4	110 x 15.1	2	110	15.1	79.8	4.999
ACT160X21.9 SD7.4	160 x 21.9	1	160	21.9	116.2	10.599

PP-RCT Standard Pipe

Standard dimension ratio	SDR:11
Pipe Structure	Single
Pipe Series	5 (PN 12.5)
Standard	DIN 8077/8078 / EN ISO 15874-2
Standard Color	Green
Standard Pipe Length	6 meters



Cold & Hot water supply, Central heating systems.

Application

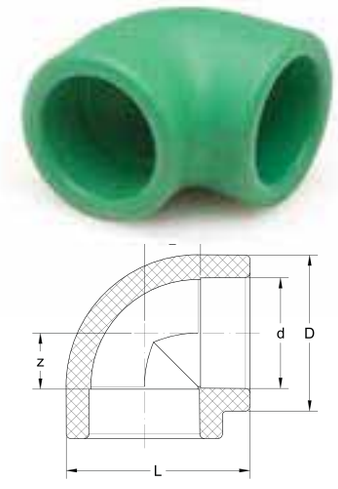
Potable water
Plumbing
Heating and cooling
Swimming pool
Chemical transport
Under floor heating and low temperature radiators

Service condition classification – Application class 4
(Under floor heating & lowtemperature radiator)

Product Code	Size	Packing unit	Outer Diameter (d)	Wall Thickness (s)	Inner Diameter (d1)	Water Content l/m
	mm	No.	mm	mm	mm	l/m
ACT160X14.6 SD11	160 x 14.6	1	160	14.6	130.8	13.43

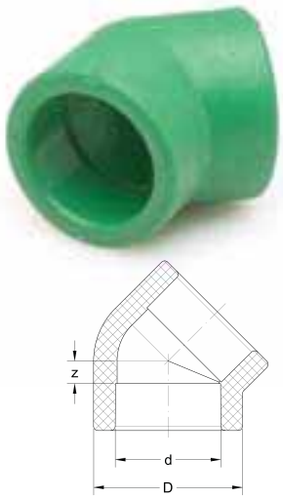
PRODUCTS RANGE - FITTNGS

Elbow 90°



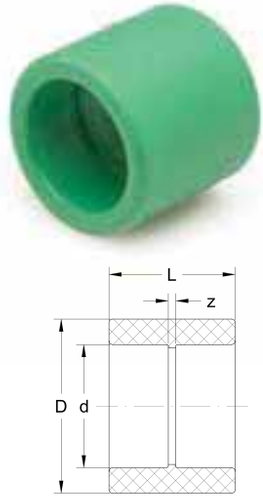
CODE	d	D	L	Z	Pack	Weight (gms)
APE9020	20	28.05	39.03	10.3	10 pcs	16
APE9025	25	35.05	46.28	12.55	10 pcs	25
APE9032	32	44.3	56.15	15.8	5 pcs	45
APE9040	40	55.45	68.23	19.8	5 pcs	83
APE9050	50	69.8	83.8	25	5 pcs	160
APE9063	63	87.6	103	31.5	1 pc	294
APE9075	75	100	119.5	38.3	1 pc	447
APE9090	90	119.6	140.8	45.3	1 pc	715
APE90110	110	147.3	170.65	55.3	1 pc	1285

Elbow 45°

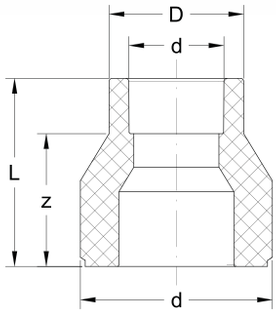


CODE	d	D	L	Z	Pack	Weight (gms)
APE4520	20	28.05	19.2	4.5	10 pcs	13
APE4525	25	35.05	21.5	5.3	10 pcs	20
APE4532	32	44.3	25	6.8	5 pcs	35
APE4540	40	55.45	29.5	8.8	5 pcs	65
APE4550	50	69.5	34.5	10.8	5 pcs	120
APE4563	63	87.7	41	13.5	1 pc	225
APE4575	75	100	47.5	16.3	1 pc	327
APE4590	90	119.6	55	19.3	1 pc	517
APE45110	110	147.3	65	23.3	1 pc	975

Socket

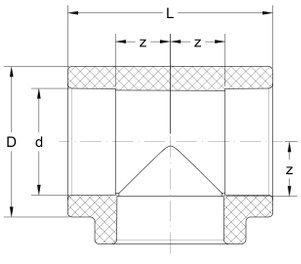


CODE	d	D	L	Z	Pack	Weight (gms)
APS20	20	28.05	32	2.6	10 pcs	10
APS25	25	34.5	35.5	3.1	10 pcs	15
APS32	32	44.3	39.4	3	5 pcs	28
APS40	40	55.5	46	4.6	5 pcs	52
APS50	50	69.5	50.4	3	5 pcs	86
APS63	63	88	60	4.6	1 pc	160
APS75	75	100	66.4	4	1 pc	215
APS90	90	119.6	76.4	5	1 pc	350
APS110	110	147.3	88.4	5	1 pc	615



Reducer

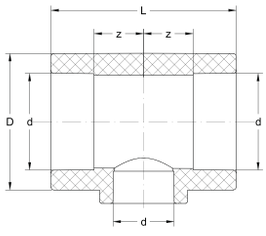
CODE	d	D	L	Z	Pack	Weight (gms)
APR25X20	25x20	25.2	38	4.8	10 pcs	11
APR32X20	32x20	32.15	41.2	8	5 pcs	16
APR32X25	32x25	32.15	42.7	8	5 pcs	20
APR40X20	40x20	40.15	45.7	10	5 pcs	25
APR40X25	40x25	40.15	47.2	10	5 pcs	29
APR40X32	40x32	40.15	49.2	10	5 pcs	36
APR50X20	50x20	50.2	51.2	12.5	5 pcs	42
APR50X25	50x25	50.2	52.7	12.5	5 pcs	46
APR50X32	50x32	50.2	54.7	12.5	5 pcs	52
APR50X40	50x40	50.2	57.2	12.5	5 pcs	66
APR63X20	63x20	63.2	58.4	15.5	1 pc	77
APR63X25	63x25	63.2	59.9	15.5	1 pc	80
APR63X32	63x32	63.2	61.9	15.5	1 pc	86
APR63X40	63x40	63.2	64.4	15.5	1 pc	97
APR63X50	63x50	63.2	67.4	15.5	1 pc	121
APR75X40	75x40	75.25	71.2	18.5	1 pc	129
APR75X50	75x50	75.25	74.2	18.5	1 pc	150
APR75X63	75x63	75.25	78.2	18.5	1 pc	194
APR90X50	90x50	90.3	82.7	22.5	1 pc	221
APR90X63	90x63	90.3	86.7	22.5	1 pc	260
APR90X75	90x75	90.3	90.2	22.5	1 pc	288
APR110X63	110x63	110.3	97.7	27.5	1 pc	394
APR110X75	110x75	110.3	101.2	27.5	1 pc	420
APR110X90	110x90	110.3	105.7	27.5	1 pc	500



Equal Tee

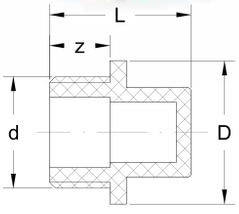
CODE	d	D	L	Z	Pack	Weight (gms)
APT20	20	28.05	51	10.8	10 pcs	20
APT25	25	35.05	60	10.8	10 pcs	32
APT32	32	44.3	69	16.3	5 pcs	57
APT40	40	55.5	82	20.3	5 pcs	107
APT50	50	69.3	98	25.3	1 pc	189
APT63	63	87.7	119	31.8	1 pc	365
APT75	75	99.6	138	37.8	1 pc	515
APT90	90	119.6	162	45.3	1 pc	862
APT110	110	146.7	184	54.8	1 pc	1496

Reducing Tee

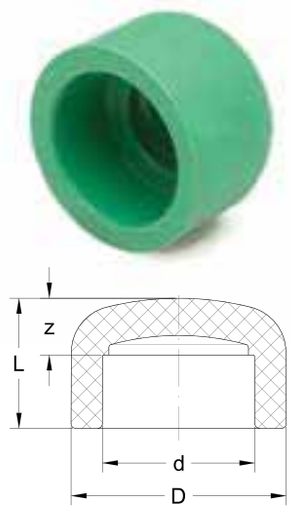


CODE	d	D	L	Z	Pack	Weight (gms)
APRT20X25X20	20 X 25 X 20	35.05	58	12.8	10 pcs	40
APRT25X20X20	25 X 20 X 20	35.05	58	12.8	10 pcs	40
APRT25X20	25 X 20 X 25	35.05	58	12.8	10 pcs	35
APRT32X20	32 X 20 X 32	44.3	69	16.3	5 pcs	52
APRT25X32	32 X 25 X 25	44.3	69	16.3	5 pcs	70
APRT32X25	32 X 25 X 32	44.3	69	16.3	5 pcs	64
APRT40X20	40 X 20 X 40	55.5	82	20.3	1 pc	97
APRT40X25	40 X 25 X 40	55.5	82	20.3	1 pc	97
APRT40X32	40 X 32 X 40	55.5	82	20.3	1 pc	100
APRT50X20	50 X 20 X 50	69.5	98	25.3	1 pc	172
APRT50X25	50 X 25 X 50	69.5	98	25.3	1 pc	174
APRT50X32	50 X 32 X 50	69.5	98	25.3	1 pc	175
APRT50X40	50 X 40 X 50	69.5	98	25.3	1 pc	180
APRT63X20	63 X 20 X 63	87.7	119	31.8	1 pc	332
APRT63X25	63 X 25 X 63	87.7	119	31.8	1 pc	332
APRT63X32	63 X 32 X 63	87.7	119	31.8	1 pc	330
APRT63X40	63 X 40 X 63	87.7	119	31.8	1 pc	332
APRT63X50	63 X 50 X 63	87.7	119	31.8	1 pc	340
APRT75X32	75 X 32 X 75	100	138	37.8	1 pc	480
APRT75X40	75 X 40 X 75	100	138	37.8	1 pc	479
APRT75X50	75 X 50 X 75	100	138	37.8	1 pc	484
APRT75X63	75 X 63 X 75	100	138	37.8	1 pc	503
APRT90X40	90 X 40 X 90	119.6	162	45.3	1 pc	800
APRT90X50	90 X 50 X 90	119.6	162	45.3	1 pc	805
APRT90X63	90 X 63 X 90	119.6	162	45.3	1 pc	808
APRT90X75	90 X 75 X 90	119.6	162	45.3	1 pc	820
APRT110X63	110 X 63 X 110	147.3	184	54.8	1 pc	1345
APRT110X75	110 X 75 X 110	147.3	184	54.8	1 pc	1350
APRT110X90	110 X 90 X 110	147.3	184	54.8	1 pc	1391

End Plug

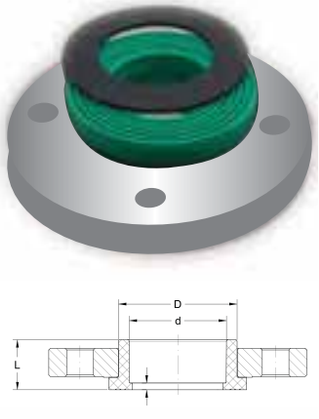


CODE	d	D	L	Z	Pack	Weight (gms)
APEP0.5	1/2"	28	28.7	13.2	10 pcs	8
APEP0.75	3/4"	34.5	29	14.5	10 pcs	11
APEP1	1"	38.5	31.5	17	10 pcs	17



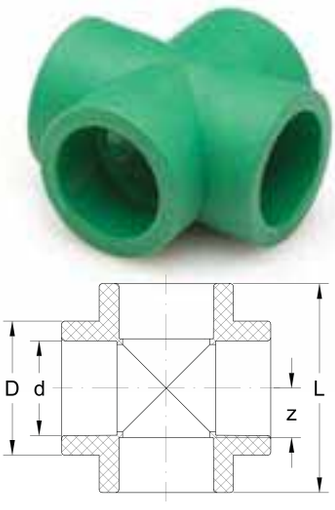
End Cap

CODE	d	D	L	Z	Pack	Weight (gms)
APEC20	20	28.05	22.8	8.1	10 pcs	10
APEC25	25	35.05	25	8.8	10 pcs	13
APEC32	32	44.3	29.2	11	5 pcs	24
APEC40	40	55.45	32.5	11.8	5 pcs	40
APEC50	50	69.5	38.2	14.5	5 pcs	76
APEC63	63	88	44	16.3	1 pc	140
APEC75	75	100	50	18.8	1 pc	200
APEC90	90	119	55	19.3	1 pc	300
APEC110	110	147.3	67	25.3	1 pc	568



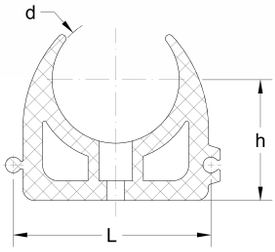
Flange Adapter

CODE	d	D	L	Z	Pack	Weight (gms)
APFA63	63	75.8	32	4.3	1 pc	56
APFA75	75	89.4	35.5	4.3	1 pc	87
APFA90	90	109	40.5	4.8	1 pc	148
APFA110	110	130	47	5.3	1 pc	223



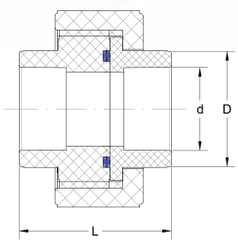
Cross Tee

CODE	d	D	L	Z	Pack	Weight (gms)
APCT20	20	28.05	51	10.8	10 pcs	25
APCT25	25	35.05	58	12.8	10 pcs	37
APCT32	32	44.3	69	16.36	5 pcs	65



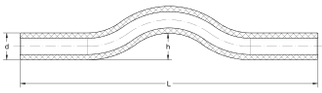
Pipe Bracket

CODE	d	L	h	Pack	Weight (gms)
APPB20	20	35.5	24.9	20 pcs	10
APPB25	25	41	27.4	20 pcs	12
APPB32	32	50	30.6	20 pcs	15



Plastic Union

CODE	d	D	L	Pack	Weight (gms)
APU20	20	28.05	42	10 pcs	28
APU25	25	34.5	49	10 pcs	70
APU32	32	44.3	59	5 pcs	127

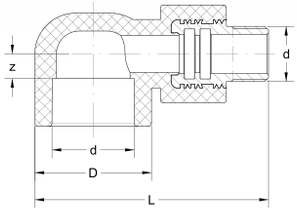


Cross Over

CODE	d	L	h	Pack	Weight (gms)
APCO20	20	352	22	10 pcs	60
APCO25	25	352	25	10 pcs	91
APCO32	32	352	32	5 pcs	154

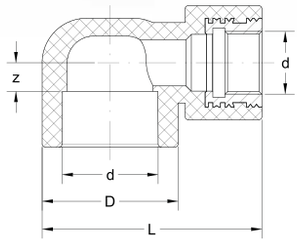
PRODUCTS RANGE - TRANSITION FITTNGS

Male Elbow -Transition



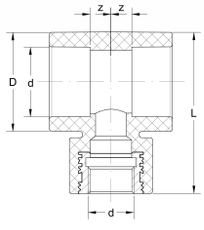
CODE	d	D	L	Z	Pack	Weight (gms)
APME20X0.5	20x1/2	37.2	66.83	16.8	10 pcs	84
APME20X0.75	20x3/4	38	67.78	17.75	10 pcs	92
APME25X0.5	25x1/2	37.2	70.03	17.55	10 pcs	94
APME25X0.75	25x3/4	38	71.03	20.15	10 pcs	101
APME32X0.5	32x1/2	44.3	88.75	9.3	5 pcs	104
APME32X0.75	32x3/4	44.3	90.55	9.3	5 pcs	109
APME32X1	32X1	52	92.15	13.8	5 pcs	239

Female Elbow -Transition

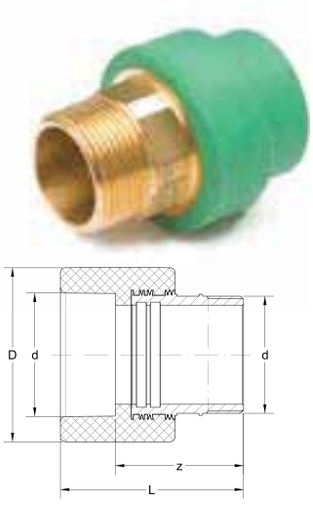


CODE	d	D	L	Z	Pack	Weight (gms)
APFE20X0.5	20x1/2	37.2	48.95	15.65	10 pcs	63
APFE20X0.75	20x3/4	44.3	54.6	17.75	10 pcs	83
APFE25X0.5	25x1/2	37.2	52.35	17.55	10 pcs	73
APFE25X0.75	25x3/4	44.3	58.5	20.15	10 pcs	94
APFE32X0.5	32x1/2	44.3	71.6	9.3	5 pcs	83
APFE32X0.75	32x3/4	43.3	72.3	9.3	5 pcs	99
APFE32X1	32X1	52	75.35	15.2	5 pcs	208

Female Tee -Transition

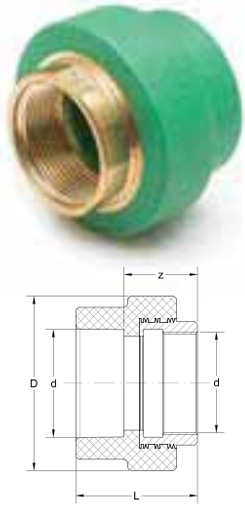


CODE	d	D	L	Z	Pack	Weight (gms)
APFT20X0.5	20x1/2x20	37.2	62.5	16.55	10 pcs	74
APFT20X0.75	20x3/4x20	48.3	62.5	16.55	10 pcs	87
APFT25X0.5	25x1/2x25	37.2	62.5	15.05	10 pcs	79
APFT25X0.75	25x3/4x25	44.3	73	20.3	10 pcs	99
APFT32X0.5	32x1/2x32	44.3	72.15	16.8	5 pcs	93
APFT32X0.75	32x3/4x32	44.3	71.8	10.8	5 pcs	107
APFT32X1	32x1x32	52	76.05	14.8	5 pcs	211



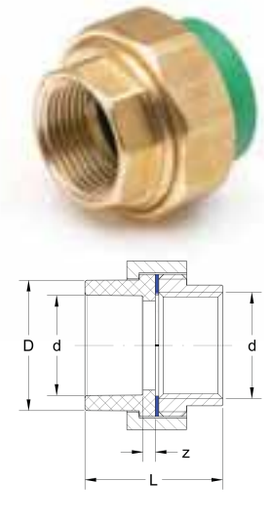
Male Hex Socket - Transition

CODE	d	D	L	Z	Pack	Weight (gms)
APMHS32X1	32X1	53	74.2	59	5 pcs	217
APMHS40X1	40X1	55.46	77.2	59.5	5 pcs	233
APMHS40X1.25	40X11/4	64	79	58.3	1 pc	335
APMHS50X1.5	50X11/2	73.2	85.7	62	1 pc	398
APMHS63X2	63X2	87.6	92.3	64.6	1 pc	604
APMHS75X2.5	75X21/2	100	98.2	67	1 pc	782
APMHS90X3	90X3	119.6	115.3	84.6	1 pc	1516
APMHS110X4	110X4	174.5	165.5	122	1 pc	4655



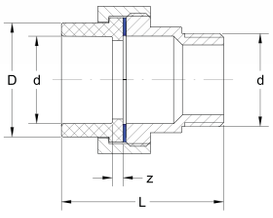
Female Hex Socket - Transition

CODE	d	D	L	Z	Pack	Weight (gms)
APFHS32X1	32X1	59.5	55.4	37.2	5 pcs	190
APFHS40X1	40X1	60	58	37.3	5 pcs	203
APFHS40X1.25	40X11/4	74	57.6	36.9	1 pc	293
APFHS50X1.5	50X11/2	85.6	64	40.3	1 pc	401
APFHS63X2	63X2	100.5	70	42.3	1 pc	603
APFHS75X2.5	75X21/2	126	76.8	45.6	1 pc	779
APFHS90X3	90X3	145	89	53.3	1 pc	1264
APFHS110X4	110X4	174.5	132	90	1 pc	3415



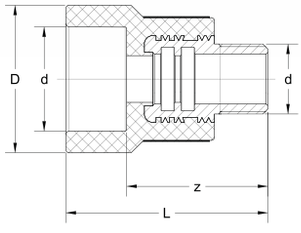
Female Brass Union - Transition

CODE	d	D	L	Z	Pack	Weight (gms)
APFBU20X0.5	20x1/2	27	17.2	2.5	10 pcs	6
APFBU25X0.75	25x3/4	34.3	19.5	3.3	10 pcs	11
APFBU32X1	32X1	40.6	22	3.8	5 pcs	14
APFBU40X1.25	40X11/4	51	25	4.8	1 pc	25
APFBU50X1.5	50X11/2	65.6	28	4.3	1 pc	45
APFBU63X2	63X2	81.8	34.5	6.9	1 pc	90



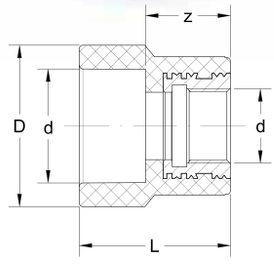
Male Brass Union - Transition

CODE	d	D	L	Z	Pack	Weight (gms)
APMBU20X0.5	20x1/2	27	17.2	2.5	10 pcs	6
APMBU25X0.75	25x3/4	34.3	19.5	3.3	10 pcs	11
APMBU32X1	32X1	40.6	22	3.8	5 pcs	14
APMBU40X1.25	40X11/4	51	25	4.8	1 pc	25
APMBU50X1.5	50X11/2	65.6	28	4.3	1 pc	45
APMBU63X2	63X2	81.8	34.5	6.9	1 pc	90



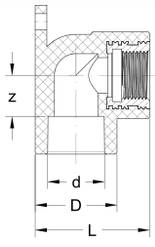
Male Socket - Transition

CODE	d	D	L	Z	Pack	Weight (gms)
APMS20X0.5	20x1/2	37.8	56	41.3	10 pcs	75
APMS20X0.75	20x3/4	37.8	57	42.3	10 pcs	81
APMS25X0.5	25x1/2	38.8	56	39.8	10 pcs	77
APMS25X0.75	25x3/4	36.8	57	40.8	10 pcs	82
APMS32X0.5	32x1/2	44.3	60.5	42.3	5 pcs	85
APMS32X0.75	32x3/4	44.3	59.8	41.6	5 pcs	89



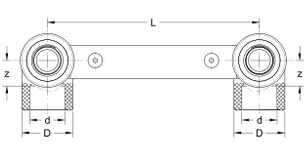
Female Socket - Transition

CODE	d	D	L	Z	Pack	Weight (gms)
APFS20X0.5	20x1/2	37.5	40	23	10 pcs	57
APFS20X0.75	20x3/4	43.5	40	23.35	10 pcs	72
APFS25X0.5	25x1/2	38	39.8	23.6	10 pcs	58
APFS25X0.75	25x3/4	43.5	40	23.8	10 pcs	73
APFS32X0.5	32x1/2	44.3	41.5	23.3	10 pcs	64
APFS32X0.75	32x3/4	44.8	41.5	23.3	5 pcs	76



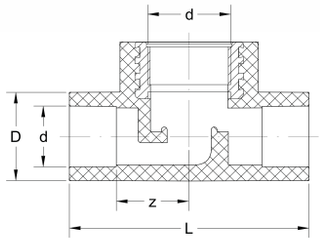
Wall Mount Elbow

CODE	d	D	L	Z	Pack	Weight (gms)
APWME20X0.5	20x1/2	37.2	48.95	15.65	10 pcs	73
APWME25X0.5	25x1/2	37.2	52.35	17.55	10 pcs	83
APWME25X0.75	25x3/4	38.8	56	39.8	10 pcs	104



Double Female Elbow With Tape Connector

CODE	d	D	L	Z	Pack	Weight (gms)
APWMG25X0.5	25x1/2	37.2	146	17.55	1 SET	180



Valve Body

CODE	d	D	L	Z	Pack	Weight (gms)
APVB20X0.75	20	28.05	75	21.65	1 pc	90
APVB25X0.75	25	35.05	75	21.65	1 pc	98
APVB32X1	32	44.3	98	26	1 pc	234

Stop Valve

CODE	d	D	L	Z	Pack	Weight (gms)
APSGV20X0.75	20	28.05	75	21.65	1 pcs	198
APSGV25X0.75	25	35.05	75	21.65	1 pcs	207
APSGV32X1	32	44.3	98	26	1 pcs	549

Concealed Valve

CODE	d	D	L	Z	Pack	Weight (gms)
APCV20X0.75	20	28.05	75	21.65	10 pcs	410
APCV25X0.75	25	35.05	75	21.65	10 pcs	419
APCV32X1	32	44.3	98	26	10 pcs	433

Ball Valve

CODE	d	Pack	Weight (gms)
APBV20	20	1	350
APBV25	25	1	500
APBV32	32	1	655
APBV40	40	1	900
APBV50	50	1	1313
APBV63	63	1	2530
APBV75	75	1	3200

PRODUCTS RANGE - ACCESSORIES

CODE	DESCRIPTION	CAPACITY
	PPRC WELDING MACHINE SET (20-40MM SOCKET)	750+750 watt
	50 - 160 MM SOCKET WELDING	Manual
	ONLY BIG WELDING MACHINE	1200+1200 watt

CODE	DESCRIPTION	CAPACITY
	ONLY WELDING MACHINE	650+850 watt
	ONLY WELDING MACHINE	850 watt

CODE	DESCRIPTION	CAPACITY
	ONLY BIG WELDING MACHINE	1000+1000 watt

CODE	DESCRIPTION	CAPACITY
	RATCHETING PIPE CUTTER (NEW MODEL)	16-42 MM

CODE	DESCRIPTION	CAPACITY
	PLASTIC PIPE CUTTER	UP to 75 MM

CODE	DESCRIPTION	SIZE
WS-16	WELDING SOCKET	16 MM
WS-20	WELDING SOCKET	20 MM
WS-25	WELDING SOCKET	25 MM
WS-32	WELDING SOCKET	32MM
WS-40	WELDING SOCKET	40 MM
WS-50	WELDING SOCKET	50 MM
WS-63	WELDING SOCKET	63 MM
WS-75	WELDING SOCKET	75 MM
WS-90	WELDING SOCKET	90 MM
WS-110	WELDING SOCKET	110 MM
WS-125	WELDING SOCKET	125 MM
WS-160	WELDING SOCKET	160 MM

CODE	DESCRIPTION	SIZE
PPS-16	PLASTIC PIPE SHARPENER	20-16 MM
PPS-20	PLASTIC PIPE SHARPENER	25-20 MM
PPS-25	PLASTIC PIPE SHARPENER	32-25 MM
PPS-32	PLASTIC PIPE SHARPENER	40-32 MM
PPS-50	PLASTIC PIPE SHARPENER	63-50 MM
PPS-75	PLASTIC PIPE SHARPENER	75-75 MM
PPS-90	PLASTIC PIPE SHARPENER	90-75 MM
PPS-110	PLASTIC PIPE SHARPENER	110 MM

CODE	DESCRIPTION	CAPACITY
	PLASTIC PIPE CUTTER	50 TO125MM

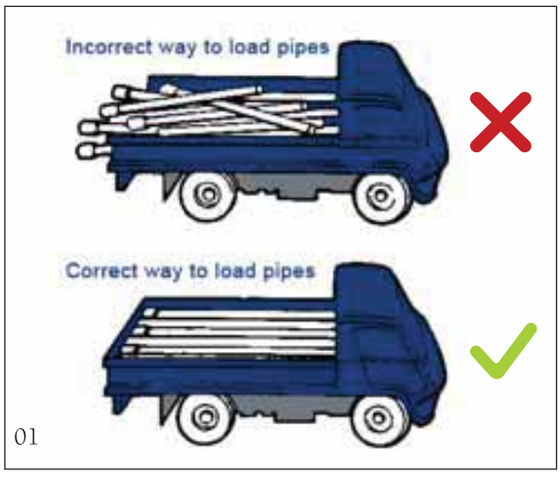
CODE	DESCRIPTION	CAPACITY
	MANUEL TEST PRESSURE PUMP	0-60 Bar

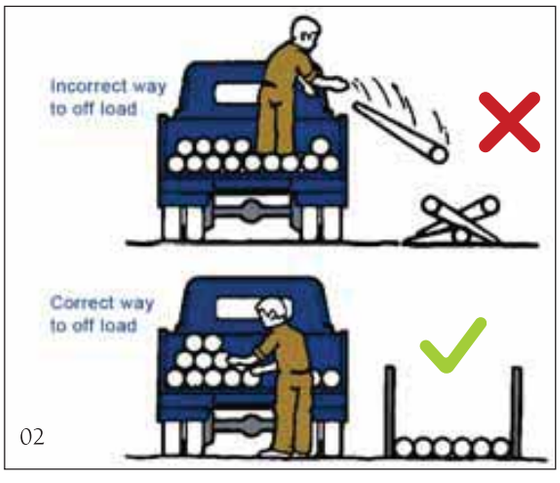
Handling Tips

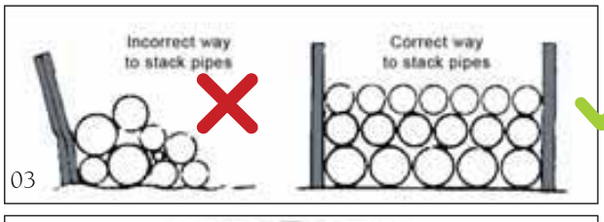
Thanks to the material properties of polypropylene, the pipes and fittings can be stored for a long time under temperatures. The storage of pipes and fittings must be in accordance with the following conditions:

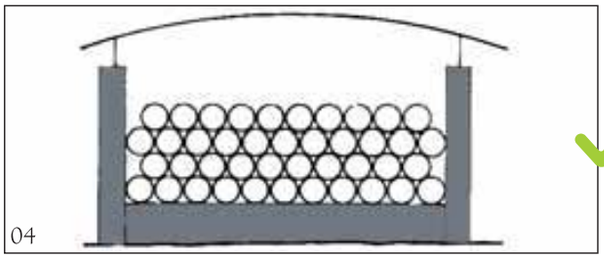
- The pipes should be supported along their full length.
- Bending of the pipes is to be avoided.
- The material becomes sensitive to impact at low temperatures and in particular at temperatures below 0°C. For this reason knocks and similar impacts are to be avoided under these conditions.
- High-polymer materials are sensitive to UV radiation. For this reason the M.P.I material should also be protected against the effects of UV radiation.

ON SITE STORAGE AND HANDLING





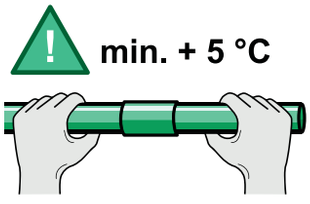




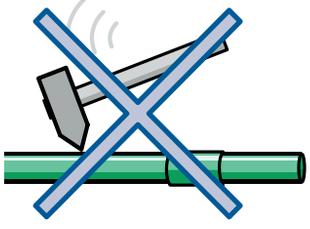
Assembly Instructions

General

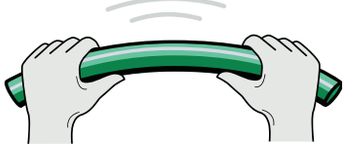
Only components not damaged or contaminated, either during storage or transport, may be used for installation works.



A minimum temperature level for plastic piping installation is, with regard to welding, +5 °C. At lower temperatures it is difficult to provide working conditions for high quality pipe joints.



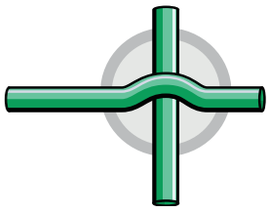
Components of plastic piping systems must be protected against damage during transport and installation.



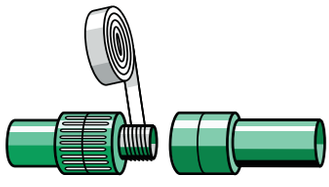
Pipe bending should be done at +15 °C. For pipes of diameter range 16 – 32 mm a minimum bending radius equals to eight diameters (D).

Components must not be exposed to naked flames.

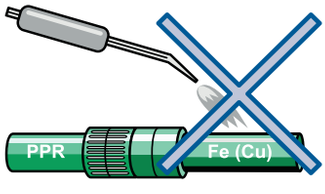
Pipeline cross overs should be made with the use of components specially designed for this purpose.



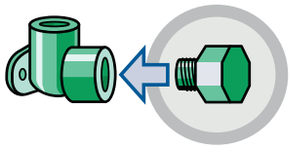
Threaded fittings must be used for screw-type joints. Threads should never be cut directly into plastic components. Threads are sealed with a special PTFE tape or sealing compounds.



Brazing or soldering of metal fittings should not take place close to a joint between metal and plastic systems because of potential hazard of heat transfer to the fitting.

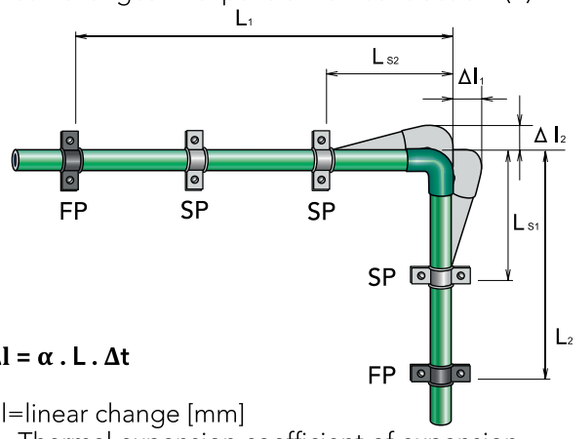


It is recommended to use plastic plugs for blanking elbows or wall mounting groups (plastic plugs are designated only for temporary use). For long term blanking has to be used plugs with metal thread.



Linear expansion and contraction

The difference of temperature during installation and under service conditions, i.e. a medium flows through the system at a different temperature to that prevailing during the installation period, results in linear changes – expansion or contraction (Δ).



ΔI = α . L . Δt

ΔI=linear change [mm]
α=Thermal expansion coefficient of expansion [mm/m°C] for PPR design purposes α = 0,15 for MPI FIBER α = 0,05
L=Design distance of fixed points in the line) [m]
Δt=installation and service temperature difference[°C]

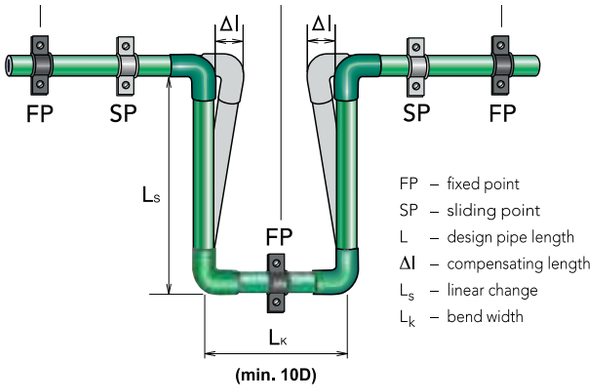
$Ls = k \cdot \sqrt{(D \cdot \Delta l)}$ [mm]

Ls = Compensating length [mm]
k = Material constant, for PPR k = 20
D = Pipe outside diameter [mm]
ΔI = linear change [mm]

If pipeline linear changes are not compensated in a suitable way, i.e. if the pipes can not contract and expand, additional thrust and tensile forces are concentrated in the pipes shortening their service life.

Expansion U-bend

Lk = 2 . ΔI + 150 [mm] and also Lk ≥10.D

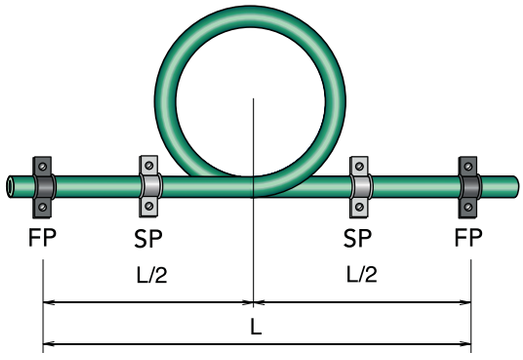


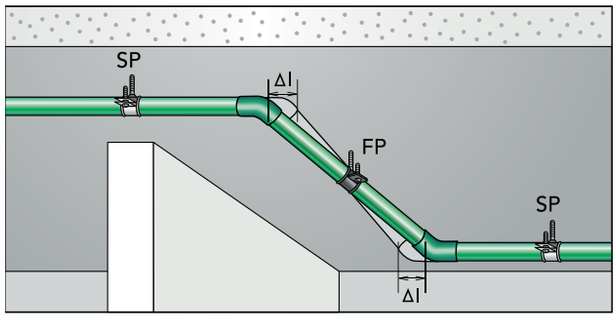
In polypropylene applications material flexibility is used for linear compensations. Pipe bends are also used for these purposes. A suitable compensation technique is the one where the pipeline is deflected perpendicularly to the original route and a free compensating length (marked as Ls) is left at the normal line.The value of Ls compensating length will depend on calculated route extension (shortening), pipe material and diameter.

Table of compensation pipe

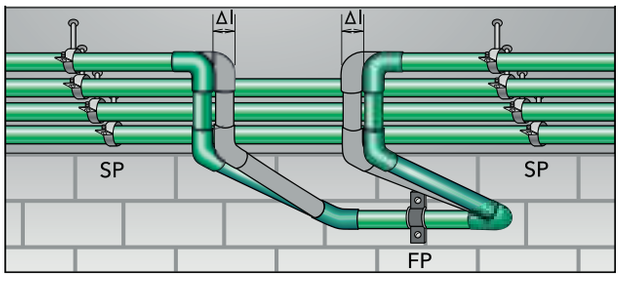
pipe diametr (mm)	distances of all fixed L-points (m)	
	Fiber & Fiber CT	PP-R
16	24	8
20	27	9
25	30	10
32	36	12
40	42	14

Compensation pipe

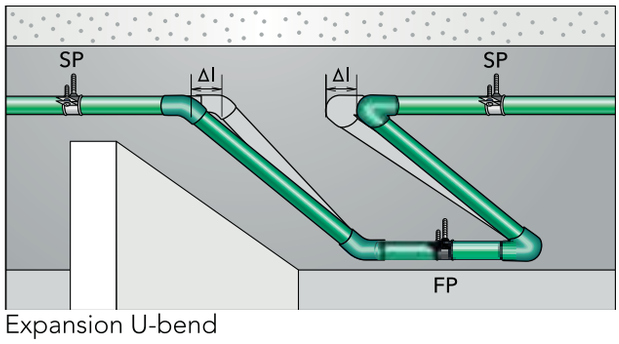




Example of compensations by change of path



By changing the height of the pipeline.



Expansion U-bend

Examples given for M.P.I. PPR piping

1) Data input:

parameter	symbol	value	unit
linear change	ΔI	?	mm
thermal expansion coefficient	α	0,15	mm/m °C
pipe lenght	L	10	m
operating temperature inside the pipe	t_p	60	°C
temperature at installation	t_m	20	°C
difference between operating and installation temperature levels ($\Delta t = t_p - t_m$)	Δt	40	°C

Solution: $\Delta I = \alpha \cdot L \cdot \Delta t$ [mm]

$\Delta I = 0{,}15 \cdot 10 \cdot 40 =$ **60 mm**

2) Data input:

parameter	symbol	value	unit
compensating lenght	ΔI	?	mm
PPR material constant	k	20	-
external pipe diametr	D	40	mm
linear change as calculated above	ΔI	60	mm

Solution: $L_s = k \cdot \sqrt{(D \cdot \Delta I)}$ [mm]

$L_s = 20 \cdot \sqrt{(40 \cdot 60)} = 980$ mm

3) Data input:

parameter	symbol	value	unit
expansion U-bend width			
external pipe diametr	D	40	mm
linear change as calculated above	ΔI	60	mm

Solution: $L_k = 2 \cdot \Delta I + 150$ [mm]

$L_k = 2 \cdot 60 + 150 = 270$ mm

$L_k > 10\ D$

270 mm < 10 . 40 = Lk = 400 mm

Pipe pre-stressing can be also used for the purposes of linear expansion compensation; the compensating length may be made shorter in this way. The pre-stressing orientation is opposite to the expected linear change and its value equals to about one half.

4) Data input:

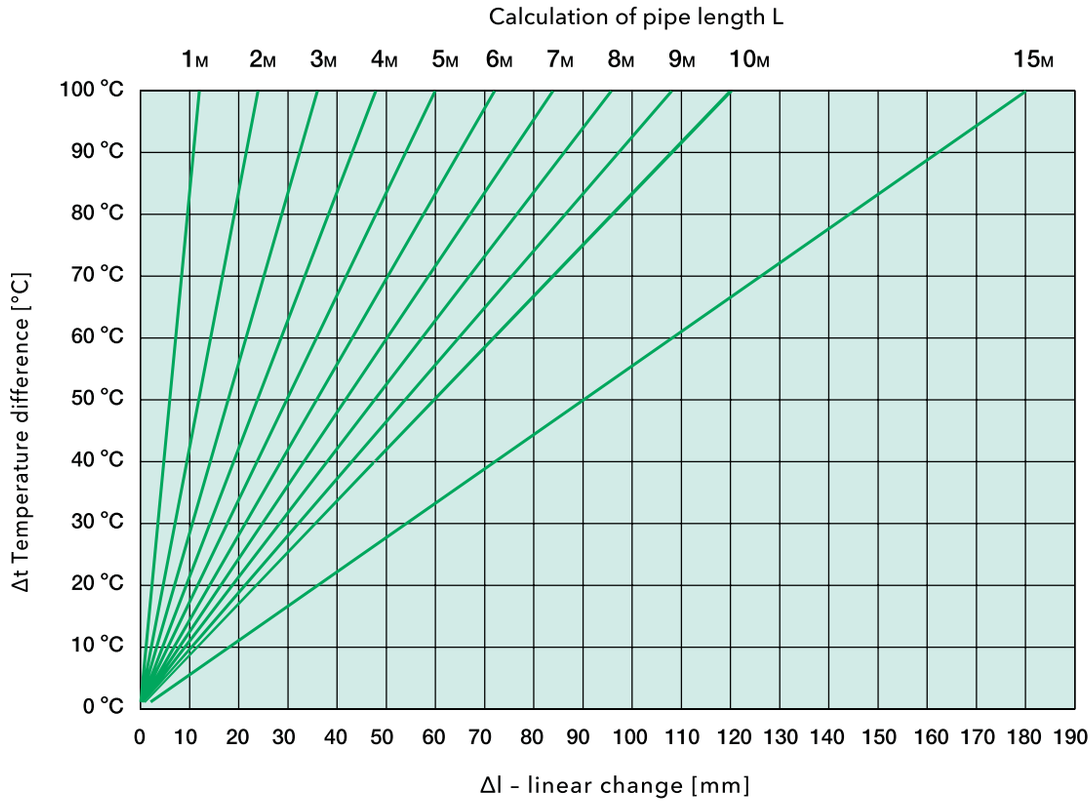
parameter	symbol	value	unit
compensating lenght at pre-stressing	L_{sp}	?	mm
PPR material constant	k	20	-
external pipe diametr	D	40	mm
linear change as calculated above	ΔI	60	mm

Solution: $L_{sp} = k \cdot \sqrt{(D \cdot I/2)}$ [mm]

$L_{sp} = 20 \cdot \sqrt{(40 \cdot 30)} = 693$ mm

The calculated free length (Lsp) is assumed lenght without any sustaining or suspending elements (within this length).
obstructing the expansion. The free length (Lsp) should not exceed max. spacing distance between supporting elements corresponding to the pipe diameter and media temperature.

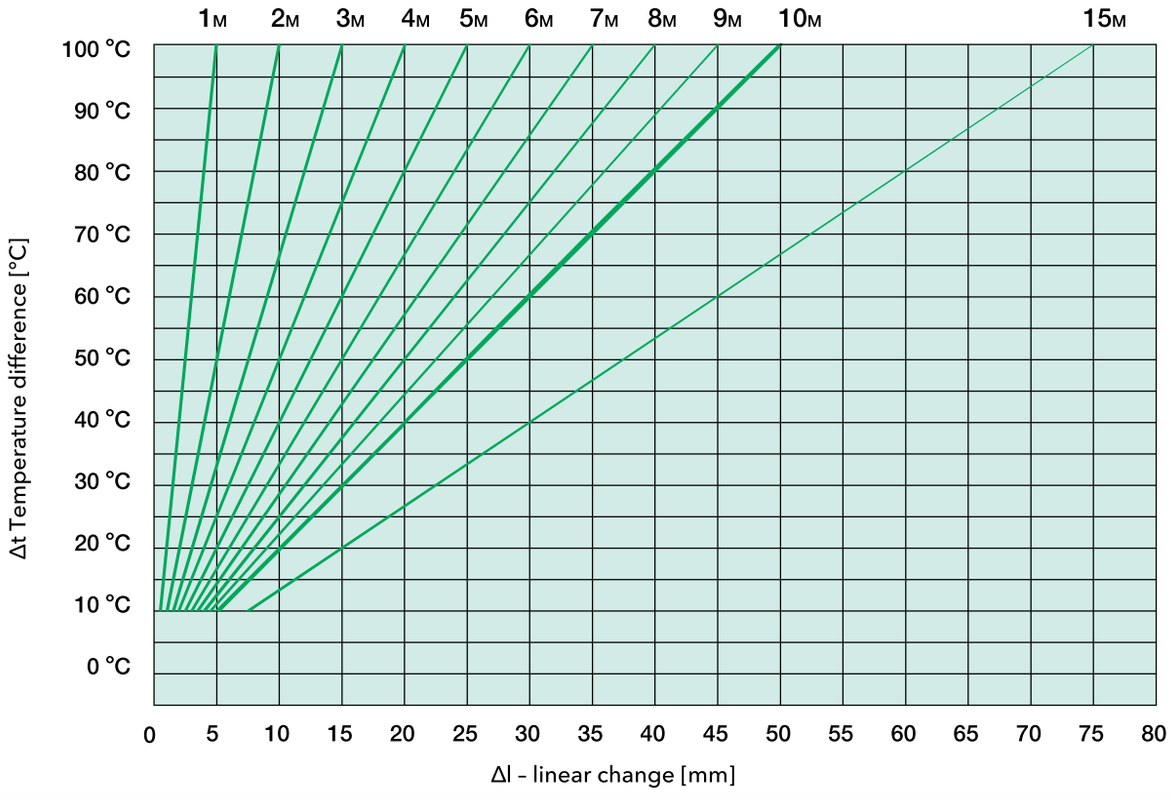
Diagram & Chart to Establish the Temp-dependant Liner Expansion of (STD) PP-R & PP-RCT Pipes



pipe length	temperature difference Δt							
	10 °C	20 °C	30 °C	40 °C	50 °C	60 °C	70 °C	80 °C
	linear change Δl [mm]							
1 m	1	2	4	5	6	7	8	10
2 m	2	5	7	10	12	14	17	19
3 m	4	7	11	14	18	22	25	29
4 m	5	10	14	19	24	29	34	38
5 m	6	12	18	24	30	36	42	48
6 m	7	14	22	29	36	43	50	58
7 m	8	17	25	34	42	50	59	67
8 m	10	19	29	38	48	58	67	77
9 m	11	22	32	43	54	65	76	86
10 m	12	24	36	48	60	72	84	96
15 m	18	36	54	72	90	108	126	144

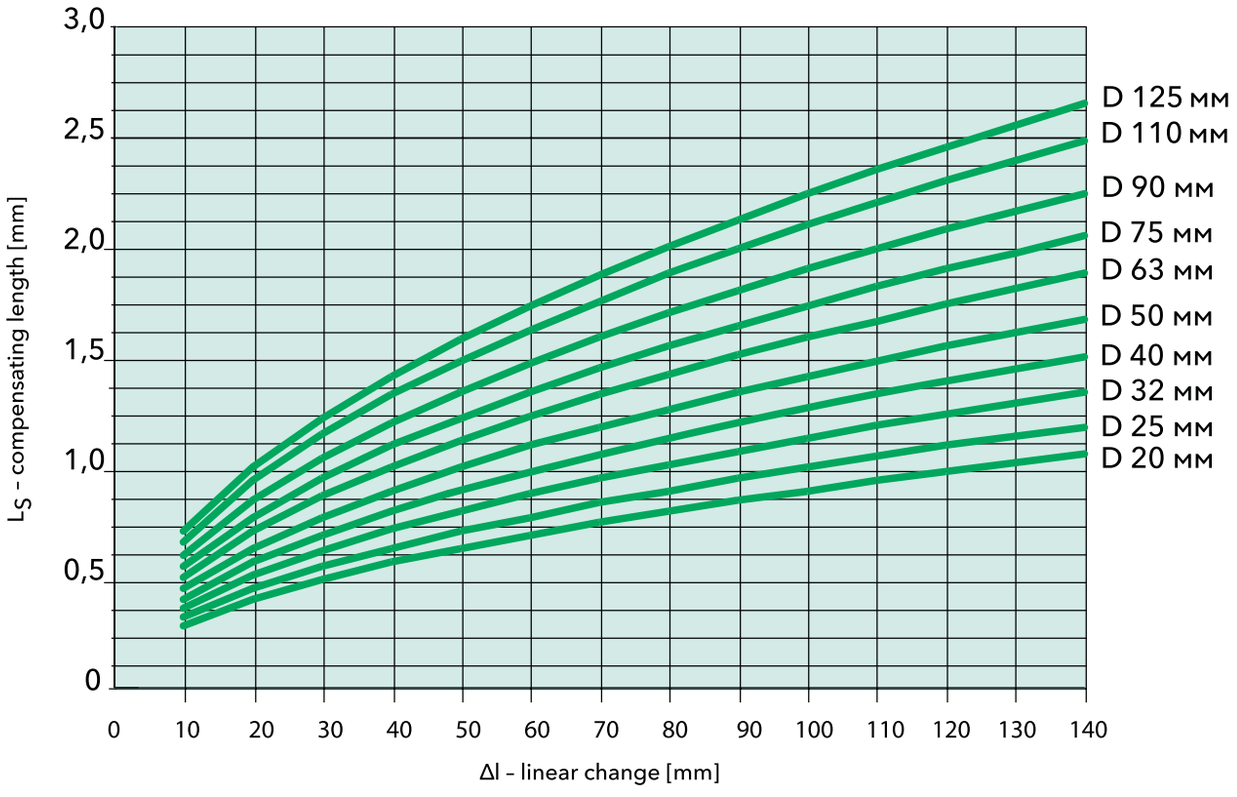
Rounded to whole numbers.

Diagram & Chart to Establish the Temp-dependant Liner Expansion of (MULTI LAYER) PP-R & PP-RCT Pipes



pipe length	temperature difference Δt							
	10 °C	20 °C	30 °C	40 °C	50 °C	60 °C	70 °C	80 °C
	linear change Δl [mm]							
1 m	1.5	3.00	4.50	6.00	7.50	9.00	10.50	12.00
2 m	3.00	6.00	9.00	12.00	15.00	18.00	21.00	24.00
3 m	4.50	9.00	13.50	18.00	22.50	27.00	31.50	36.00
4 m	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00
5 m	7.50	15.00	22.50	30.00	37.50	45.00	52.50	60.00
6 m	7.00	18.00	27.00	37.50	45.00	54.00	63.00	72.00
7 m	10.50	21.00	31.50	42.00	52.50	63.00	73.50	84.00
8 m	12.00	24.00	36.00	48.00	60.00	72.00	84.00	96.00
9 m	13.50	27.00	40.50	54.00	67.50	81.00	94.50	108.00
10 m	15.00	30.00	45.00	60.00	75.00	90.00	105.00	120.00
15 m	22.50	45.00	67.50	90.00	112.50	135.00	157.50	180.00

Determination of L_S – compensating length



pipe diameter [mm]	Δl – linear change [mm]													
	10	20	30	40	50	60	70	80	90	100	110	120	130	140
	Ls – compensating length [mm]													
16	0,25	0,36	0,44	0,51	0,57	0,62	0,67	0,72	0,76	0,80	0,84	0,88	0,91	0,95
20	0,28	0,40	0,49	0,57	0,63	0,69	0,75	0,80	0,85	0,89	0,94	0,98	1,02	1,06
25	0,32	0,45	0,55	0,63	0,71	0,77	0,84	0,89	0,95	1,00	1,05	1,10	1,14	1,18
32	0,36	0,51	0,62	0,72	0,80	0,88	0,95	1,01	1,07	1,13	1,17	1,24	1,29	1,34
40	0,40	0,57	0,69	0,80	0,89	0,98	1,06	1,13	1,20	1,26	1,33	1,39	1,44	1,5
50	0,45	0,63	0,77	0,89	1,00	1,10	1,18	1,26	1,34	1,41	1,48	1,55	1,61	1,67
63	0,50	0,71	0,87	1,00	1,12	1,23	1,33	1,42	1,50	1,59	1,66	1,74	1,81	1,88
75	0,55	0,77	0,95	1,10	1,22	1,34	1,45	1,55	1,64	1,73	1,82	1,90	1,97	2,05
90	0,60	0,85	1,04	1,20	1,34	1,47	1,59	1,70	1,80	1,90	1,99	2,08	2,16	2,24
110	0,66	0,94	1,15	1,33	1,48	1,62	1,75	1,88	1,99	2,10	2,20	2,30	2,39	2,48
125	0,71	1,00	1,22	1,41	1,58	1,73	1,87	2,00	2,12	2,24	2,35	2,45	2,55	2,65

Maximum distances of supports of pipeline MPI PPR (PN 10) pipe (horizontal pipeline)

Ø pipe [mm]	spacing distances in [cm] at temperature of					
	20 °C	30 °C	40 °C	50 °C	60 °C	80 °C
16	90	85	85	80	80	65
20	95	90	85	85	80	70
25	100	100	100	95	90	85
32	120	115	115	110	100	90
40	130	130	125	120	115	100
50	150	150	140	130	125	110
63	170	160	155	150	145	125
75	185	180	175	160	155	140
90	200	200	185	180	175	150
110	220	215	210	195	190	165
125	235	230	225	210	200	170

Maximum spacing distances MULTI LAYER pipes (independently of water temperature)

Ø pipe [mm]	spacing distances in [cm] at temperature of
	PPR FIBER MULTI LAYER
16	
20	80
25	100
32	110
40	120
50	130
63	150
75	145
90	155
110	160
125	165

Maximum distances of supports of pipeline MPI PPR (PN 16) pipe (horizontal pipeline)

Ø pipe [mm]	spacing distances in [cm] at temperature of					
	20 °C	30 °C	40 °C	50 °C	60 °C	80 °C
16	80	75	75	70	70	60
20	90	80	80	80	70	65
25	95	95	95	90	80	75
32	110	105	105	100	95	80
40	120	120	115	105	100	95
50	135	130	125	120	115	100
63	155	150	145	135	130	115
75	170	165	160	150	145	125
90	180	180	170	165	160	135
110	200	195	190	180	175	155
125	220	215	200	195	190	165

Pipe fixing

The pipeline route design must respect distribution system material – i.e. its thermal coefficient of expansion in the first place, necessity to allow for expansion, given operating conditions (a combination of pressure and temperature levels) and a type of pipe joints. The fixing of distribution systems is performed so that fixed and slidably mounted points are recognised when expected linear changes of pipes are considered.

Pipe fixing techniques

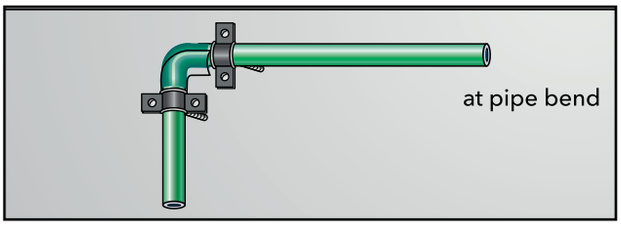
Two kinds of supports are being recognised from the point of view of pipe fixing

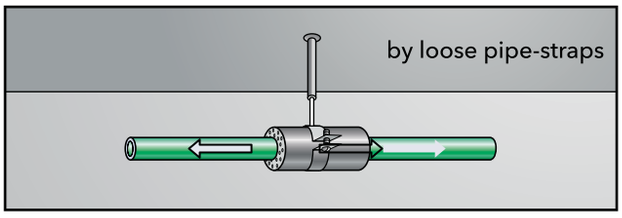
Fixed points (FP):

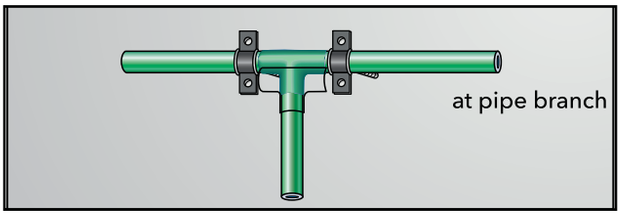
This is a type of fixing where no allowance for pipe expansion is made, i.e. the pipe can not move along its axis in the place of support (it can not slide).

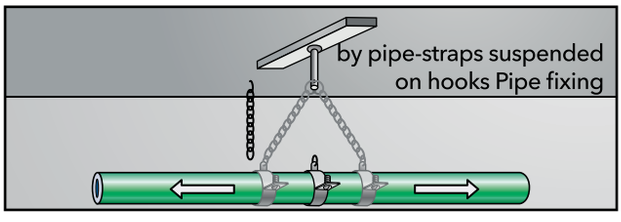
Sliding point (SP):

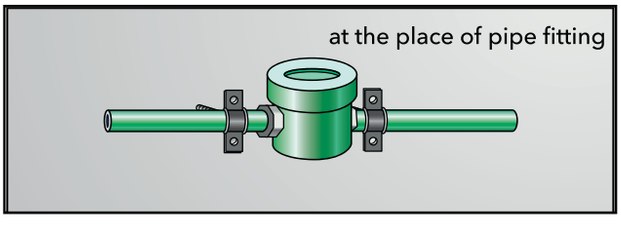
This is a type of fixing where the pipe is not allowed to move sideways but expansion movements are not restricted (elongation, shrinkage). Slidable mounting can be designed as follows.





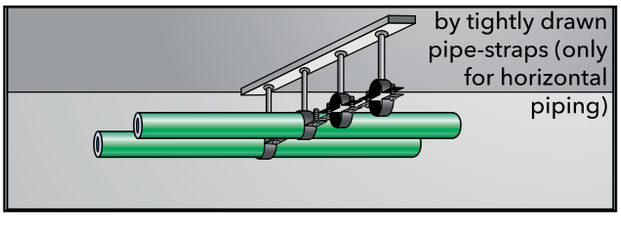


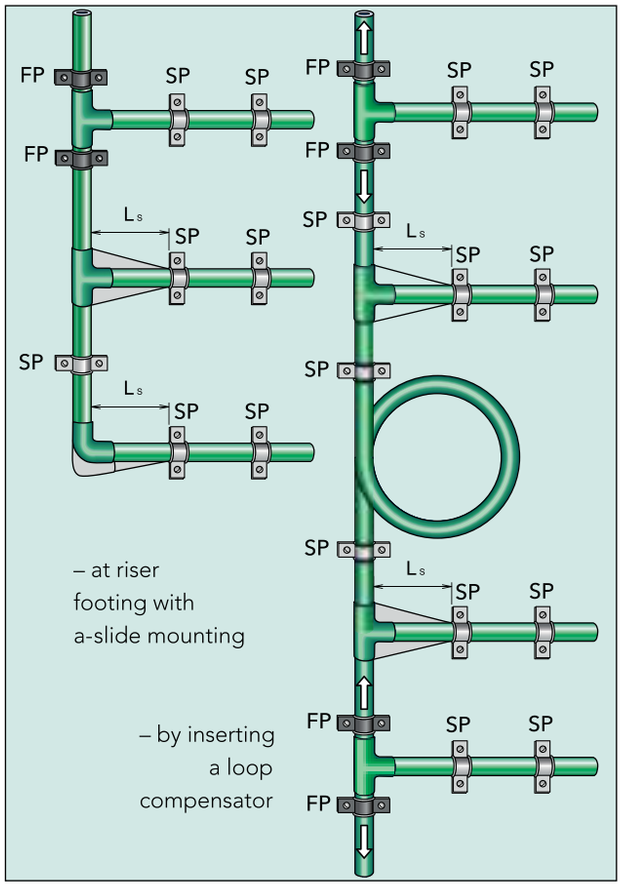


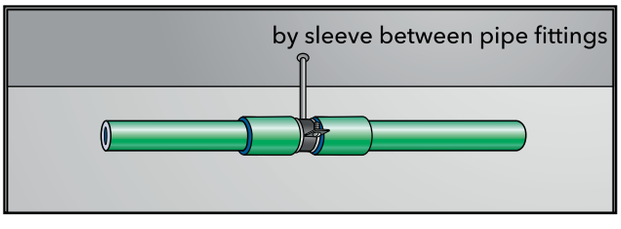


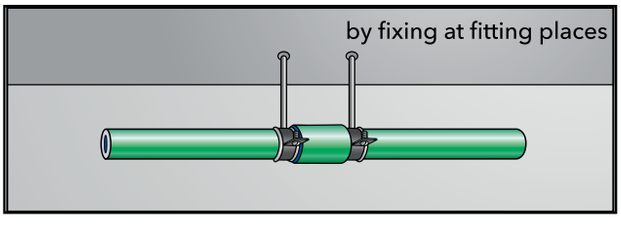
Routing of M.P.I. PPR riser piping

In the case of riser piping it is necessary to consider precisely the layout of fixed points and sliding mounts



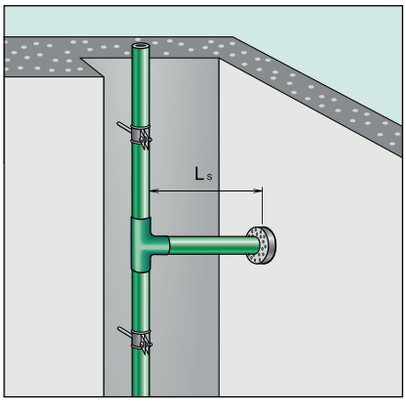




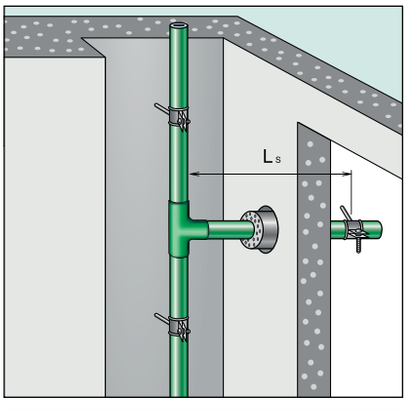


as well as creation of a suitable expansion compensation system. The adjustments for expansion in riser piping systems are provided as follows:
If it is necessary to divide the riser into several expansion sections then it can be achieved by placing fixed points.
The riser fixed points are always fixed under and over T-pieces at a branch pipe or socket which, at the same time, prevents the riser to fall. The pipe expansion must accounted for between these fixed points as follows:

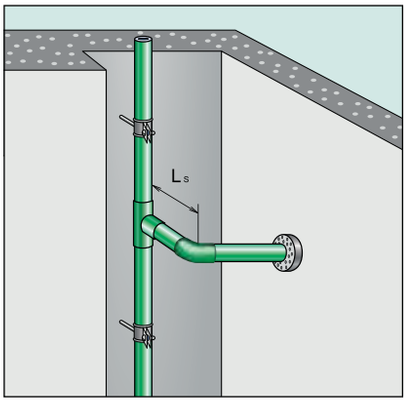
In branching off feeder piping it is necessary to allow for the riser expansion by:



- Keeping a sufficient distance from the wall pass-through point.



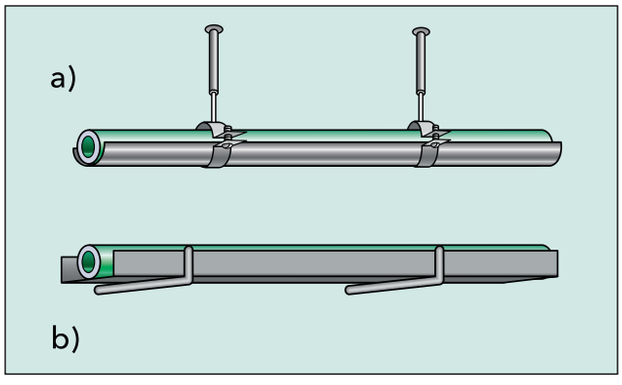
- Creating a possibility of branch pipe movement in the wall pass-through point.



- Creating a compensating length allowing for an expansion at the riser normal line

Routing of horizontal MPI PP-R piping

It is necessary, in horizontal piping systems, to respect precisely expansion conditions and solve how allow for them and lay the piping correctly.
The most common routing is in galvanised metal or plastic troughs, in clamps or in-wall channels (this one must be kept free).
The compensation for expansion is performed, most commonly, by a change in the routing or by the use of expansion U-bends but a use of a pipe compensation is also possible.



The expansion adjustment may be designed both in perpendicular and parallel plane to the ceiling structures. In option a) a pipe is insulated .
including the through on-the-spot, while in option b) an insulated pipe is laid into the trough.

WELDING

MPI welding is performed according to the below guidelines. In this process, pipes and fittings are welded overlapping. The end of the pipes and fittings are heated using a welding device and subsequently connected.

MPI Welding devices and tools

- Make sure that the welding tools lie flat against the heating element.
- Do not use pliers or other unsuitable tools so as not to damage the coating of the welding tools.
- The required welding temperature for processing the MPI-PPR system is 260°C.
- Warning: The first welding should not be done until five minutes after welding temperature has been reached.
- MPI welding devices and tools are to be protected from impurities.
- Burned-on particles can lead to incorrect welding connections.
- Tools may be cleaned with non-fibrous, coarse paper towels.
- The welding tools must always be kept dry. If necessary, dry them with a clean, non-fibrous cloth.
- Damaged and soiled welding tools must be replaced, since only clean, properly functioning tools can produce clean and proper connections.

Guidelines

Processing Information

Minimum times for socket welding of PP pipeline segments at an outdoor temperature of °20C and moderate air movement				
In the case of outdoor temperatures of under °5C, heat-up times must be doubled.				
1	2	3	4	5
Outside pipe diameter mm	Insertion depths mm	Heating period s	Processing period s	Cooling period min
16 20 25	13 14 15	6 6 9	4	2
32 40 50	16,5 18 20	10 15 23	6	4
63	24	28	8	6
75 90	26 32	35 46	10 10	8 8

WELDING TIPS

The following points should be observed:

- The welding device should be equipped with the appropriate welding tools. (Welding bushes and core rods have a high-quality Teflon coating. In order to avoid damaging the Teflon coating, never use pliers or similar tools for assembly. Please use a screwdriver or hexagon socket wrench.
- Switch on the welding device.
- Check welding temperature before starting to weld. Check the temperature once again before welding.
- The ends of the pipes must be cut clean and even. Pipe, fittings and welding tools must be clean and checked before welding for impurities. If necessary, clean them with a non-fibrous paper towel or a clean cloth.
- Fitting and pipe must be inserted quickly and axially, without twisting, into the corresponding welding tools The parts to be welded are then heated.
- After the required heating time, fitting and pipe are to be removed quickly from the heating element and connected immediately by pushing together without twisting until insertion depth or markings have been reached.
- The setting time of the joint corresponds to the heating period. Only after the cooling period may pressure be put on the welded connection.
- If necessary, clean the welding bushes

Chemical Resistances

Definitions, symbols and abbreviations
The criteria of classification, definitions, symbols and abbreviations adopted in this document are as follows:

S = Satisfactory
The chemical resistance of polypropylene exposed to the action of a fluid is classified as 'satisfactory' when the results of test are acknowledged to be 'satisfactory' by the majority of the countries participating in the evaluation.

L = Limited
The chemical resistance of polypropylene exposed to the action of a fluid is classified as 'limited' when the results of tests are acknowledged to be 'limited' by the majority of the countries participating in the evaluation.
Also classified as 'limited' is the resistance to the action of chemical fluids for which judgements 'S' and 'NS' or 'L' are pronounced to an equal extent.

NS = Not satisfactory
The chemical resistance of polypropylene exposed to the action of a fluid is classified as 'not satisfactory' when the results of tests are acknowledged to be 'not satisfactory' by the majority of the countries participating in the evaluation.

Also classified as 'not satisfactory' are materials for which judgements 'L' and 'NS' are pronounced to an equal extent.

Sat. sol Satured aqueous solution, prepared at 20°C
Sol Aqueous solution at a concentration higher than 10%, but not saturated
Dil.sol Dilute aqueous solution at a concentration equal to or lower than 10%
Work.sol Aqueous solution having the usual concentration for industrial use

Solution concentrations reported in the text are expressed as a percentage by mass. The aqueous solutions of sparingly soluble chemicals are considered, as far as chemical action towards polypropylene is concerned, as saturated solutions. In general, common chemical names are used in this document.

The evaluation of chemical resistance of polypropylene) is based on PP not subjected to mechanical stress. Polypropylene subjected to mechanical stress may behave different and show
different result.

Chemical or product	Concentration	Temperature °C 20	60	100
Acetic acid	Up to 40 %	S	S	-
Acetic acid	50 %	S	S	-
Acetic acid, glacial	Greater Than 96 %	S	L	NS
Acetic anhydride	100 %	S	-	-
Acetone	100 %	S	S	-
Aceptophenone	100 %	S	L	-
Acylonitrite	100 %	S	-	-
Air		S	S	S
Almind oil		S	-	-
Alum	Sol	S	-	-
Ammonia, aqueous	Up to 30 %	S	-	-
Ammonia, dry gas	100 %	S	-	-
Ammonia, liquid	100 %	S	-	-
Ammonium acetate	Satsol	S	S	-
Ammonium chloride	Satsol	S	-	-
Ammonium fluoride	Sol	S	S	-
Ammonium hydrogen carbonate	Satsol	S	S	-
Ammonium hydroxid	Satsol	S	-	-
Ammonium metaphosphate	Satsol	S	S	-
Ammonium nitrate	Satsol	S	S	S
Ammonium phosphate	Satsol	S	-	-
Ammonium sulphate	Satsol	S	S	S
Amyl acetate	100 %	L	-	-
Amyl alcohol	100 %	S	S	S
Aniline	100 %	S	S	-
Apple juice	-	S	-	-
Aqua regia	HCl/HNO_3=3/1	NS	NS	NS
Barium carbonate	Satsol	S	S	S
Barium chloride	Satsol	S	S	S
Barium hydroxide	Satsol	S	S	S
Barium sulphate	Satsol	S	S	S
Benzene	100 %	L	NS	NS
Benzoic acid	Satsol	S	-	-
Bemzyl alcohol	100 %	S	L	-
Borax	Sol	S	S	-
Boric acid	Satsol	S	-	-
Bromine, gas		L	NS	NS
Bromine, liquid	100 %	NS	NS	NS

Chemical or product	Concentration	Temperature °C 20	60	100
Butane	100 %	S	-	-
Butanol	100 %	S	L	L
Butyl acetate	100 %	S	L	L
Butyl glycol	100 %	S	-	-
Butyl phenol	Cold satsol	S	-	-
Butyl phthalate	100 %	S	L	L
Calcium carbonate	Satsol	S	S	S
Calcium chloride	Satsol	S	S	S
Calcium hydroxide	Satsol	S	S	-
Calcium hypochiorite	Sol	S	-	-
Calcium nitrate	Satsol	S	S	-
Camphor oil		NS	NS	NS
Carbon dioxide, dry gas	100 %	S	S	-
Carbon dioxide, wet		S	S	-
Carbon disulphide	100 %	S	NS	NS
Carbon tetrachioride	100 %	NS	NS	NS
Castor oil	100 %	S	S	-
Caustic soda	Up to 50 %	S	L	L
Chlorine, aqueous	Satsol	S	L	-
Chlorine, dry gas	100 %	NS	NS	NS
Chlorine, liquid	100 %	NS	NS	NS
Cloroacetic acid	Sol	S	-	-
Chloroethanol	100 %	S	-	-
Chloroform	100 %	L	NS	NS
Chlorosulphonic acid	100 %	NS	NS	NS
Chrome alum	Sol	S	S	-
Chromic acid	Up to 40 %	S	L	N
Citric acid	10 %	S	S	S
Coconut oil		S	-	-
Corn oil		S	L	-
Cottonseed oil		S	S	-
Cresol	Greater Than 90 %	S	-	-
Copper (II) Chloride	Satsol	S	S	-
Copper (II) nitrate	30 %	S	S	S
Copper (II) sulphate	Satsol	S	S	-
Cyclohexane	100 %	S	-	-
Cyclohexanol	100 %	S	L	-
Cyclohexanone	100 %	L	NS	NS

Chemical or product	Concentration	Temperature °C 20	60	100
Dakalin (decahydro-naphthalene)	100 %	NS	NS	NS
Dextrin	Sol	S	S	-
Dextrose	Sol	S	S	-
Dibutyl phthalate	100 %	S	L	NS
Dichloroacetic acid	100 %	L	-	-
Dichloroethylene (A und B)	100 %	L	-	-
Diethanolamine	100 %	S	-	-
Diethyl ether	100 %	S	L	-
Diethylone glycol	100 %	S	S	-
Diglycolic acid	Satsol	S	-	-
Disooctyl phthalate	100 %	S	L	-
Disooctyl amine	100 %	S	-	-
Disooctyl formamide	100 %	S	S	-
Dioctyl phthalate	100 %	L	L	-
Dioxane	100 %	L	L	-
Distilled water	100 %	S	S	S
Ethanolamine	100 %	S	-	-
Ethyl acetate	100 %	L	NS	NS
Ethyl alcohol	Up to 95 %	S	S	S
Ethyl chloride	100 %	NS	NS	NS
Ethylene chloride (mono and di)		L	L	-
Ethylene glycol	100 %	S	S	S
Formaldehyde	40 %	S	-	-
Formic acid	10 %	S	S	L
Formic acid	85 %	S	NS	NS
Formic acid, anhydrous	100 %	S	L	L
Fructose	Sol	S	S	S
Fruit juice		S	S	S
Gasoline, petrol (aliphatic hydrocarbons)		NS	NS	NS
Gelatine		S	S	-
Glucose	20 %	S	S	S
Glycerine	100 %	S	S	S
Glycolic acid	30 %	S	-	-
Heptane	100 %	L	NS	NS
Hexane	100 %	S	L	-
Hydrobromic acid	Up to 48 %	S	-	
Hydrochloric acid	From 2 to 7 %	S	S	S
Hydrochloric acid	From 10 to 20 %	S	S	-
Hydrochloric acid	30 %	S	L	L
Hydrochloric acid	From 35 to 36 %	S	-	-
Hydrofluoric acid	Dilsol	S	-	-
Hydrofluoric acid	40 %	S	-	-
Hydrogen	100 %	S	-	-
Hydrogen chloride, dry gas	100 %	S	S	-
Hydrogen peroxide	Up to 10 %	S	-	-
Hydrogen peroxide	Up to 30 %	S	L	-
Hydrogen sulphide, dry gas	100 %	S	S	-
Iodune in alcohol		S	-	-
Isopropyl alcohol	100 %	S	S	S
Isopropyl ether	100 %	L	-	-
Isoctane	100 %	L	NS	NS
Lactic acid	Up to 90 %	S	S	-
Lanoline		S	L	-
Linseed oil		S	S	S
Megnecium carbonate	Satsol	S	S	S
Megnecium chloride	Satsol	S	S	-
Megnesium sulphate	Satsol	S	S	-
Malic acid	Sol	S	S	-
Mercury (II) chloride	Satsol	S	S	-
Mercury (II) cyanide	Satsol	S	S	-
Mercury (II) nitrate	Sol	S	S	-
Mercury	100 %	S	S	-
Methyl acetate	100 %	S	S	-
Methyl alcohol	5 %	S	L	L
Methyl amine	Up to 32 %	S	-	-
Methyl bromide	100 %	NS	NS	NS
Methyl ether ketone	100 %	S	-	-
Methylene chloride	100 %	L	NS	NS
Milk		S	S	S
Monochloroacetic acid	Greater Than 85 %	S	S	-
Naphtha		S	NS	NS
Nickel chloride	Satsol	S	S	-
Nickel nitrate	Satsol	S	S	-
Nickel sulphate	Satsol	S	S	-
Nitric acid	10 %	S	NS	NS
Nitric acid	30 %	S	-	-
Nitric acid	From 40 to 50 %	L	NS	NS
Nitric acid, fujming (with nitrogen dioxide)		NS	NS	NS
Nitrobenzene	100 %	S	L	-
Oleic acid	100 %	S	L	-
Oleum (sulphuric acid with 60 % of SO_3)		NS	NS	NS
Olive oil		S	S	L
Oxalic acid	Satsol	S	L	NS
Oxygen	100 %	S	-	-

Chemical or product	Concentration	Temperature °C 20	60	100
Paraffin oil (FL 65)		S	L	NS
Peanut oil		S	S	-
Peppemint oil		S	-	-
Perchloric acid	2N	S	-	-
Petroleum ether (ligroinel)		L	L	-
Phenol	5 %	S	S	-
Phenol	90 %	S	-	-
Phosphoric acid	25 %	S	S	S
Phosphoric acid	From 25 to 85 %	S	S	S
Phosphoric oxychloride	100 %	L	-	-
Picric acid	Satsol	S	-	-
Potassium bicarbonate	Satsol	S	S	-
Potassium borate	Satsol	S	S	-
Potassium bromate	Up to 10 %	S	S	-
Potassium brominde	Satsol	S	S	-
Potassium carbonate	Satsol	S	-	-
Potassium chlorate	Satsol	S	S	-
Potassium chloride	Satsol	S	-	-
Potassium chromate	Satsol	S	S	-
Potassium syanide	Sol	S	-	-
Potassium fluoride	Satsol	S	S	
Potassium hydroxide	Up to 50 %	S	S	S
Potassium iodide	Satsol	S	-	-
Potassium nitrate	Satsol	S	S	-
Potassium perchlorate	10 %	S	S	-
Potassium pemanganate	2 %	S	-	-
Potassium persulphate	Satsol	S	-	-
Potassium sulphate	Satsol	S	-	-
Propane	100 %	S	-	-
Propionic acid	Greater Than 50 %	S	-	-
Pyridne	100 %	L	-	-
Sea water		S	S	S
Sillicone oil		S	S	S
Silver nitrate	Satsol	S	S	L
Sodium acetate	Satsol	S	S	S
Sodium benzoate	35 %	S	-	-
Sodium carbonate	Up to 50 %	S	S	L
Sodium chlorate	Satsol	S	-	-
Sodium chloride	Satsol	S	S	S
Sodium chlorite	2 %	S	L	NS
Sodium chlorite	20 %	S	L	NS
Sodium dichromate	Satsol	S	S	S
Sodium hydrogen carbonate	Satsol	S	S	S
Sodium hydrogen sulphate	Satsol	S	S	-
Sodium hydrogen sulphite	Sol	S	-	-
Sodium hydroxide	1 %	S	S	S
Sodium hydroxide	From 10 to 60 %	S	S	S
Sodium hypochlorite	5 %	S	-	-
Sodium hypochlorite	10 %	S	-	-
Sodium hypochlorite	20 %	S	-	-
Sodium metaphosphate	Sol	S	-	-
Sodium nitrate	Satsol	S	S	-
Sodium perborate	Satsol	S	-	-
Sodium phosphate (neutral)	Satsol	S	S	S
Sodium silicate	Sol	S	S	-
Sodium sulphate	Satsol	S	S	-
Sodium sulphide	Satsol	S	-	-
Sodium sulphite	40 %	S	S	S
Sodium thiosuphate (hypo)	Satsol	S	-	-
Soybean oil		S	L	-
Succinic acid	Satsol	S	S	-
Sulphur acid	Up to 10 %	S	S	S
Sulphur dioxide,dry or wet	100 %	S	S	-
Sulphur acid	From 10 to 30 %	S	S	-
Sulphuric acid	50 %	S	L	L
Sulphuric acid	96 %	S	L	NS
Sulphuric acid	98 %	L	NS	NS
Sulphurous acid	Sol	S	-	-
Tartaric acid	10 %	S	S	-
Tetrahydrofuran	100 %	L	NS	NS
Tetralin	100 %	NS	NS	NS
Thiophene	100 %	S	L	-
Tin (IV) chloride	Satsol	S	S	-
Tin (II) chloride	Satsol	S	S	-
Toluene	100 %	L	NS	NS
Trichloroacetic acid	Up to 50 %	S	S	-
Trichloroethylene	100 %	NS	NS	NS
Triethanolamine	Sol	S	-	-
Turpentine		NS	NS	NS
Urea	Satsol	S	-	-
Vinegar		S	S	-
Water brackish, mineral, potable		S	S	S
Whiskey		S	-	-
Wines		S	-	-
Xylene	100 %	NS	NS	NS
Yeast	Sol	S	S	S
Zinc chloride	Satsol	S	S	-
Zinc sulphate	Satsol	S	S	-

Table 3.1 Chemical resistance of polypropylene, not subjected to mechanical stress, to various fluids at 60 ,20 and °100C (source: ISO/TR 10358)

bsi.

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2008

This is to certify that: Modern Plastics Industry LLC
Dubai Investment Park 1
Jebel Ali
PO Box 31550
Dubai
United Arab Emirates

Holds Certificate No: **FM 51169**

and operates a Quality Management System which complies with the requirements of ISO 9001:2008 for the following scope:

The manufacture of PVC/CPVC Pipe and Fittings, PP Compression Fittings, Injection Moulded Products to company and customer required specifications.

For and on behalf of BSI:

Frank Lee, EMEA Compliance & Risk Director

Original Registration Date: 07/07/1999
Latest Revision Date: 11/08/2015

Effective Date: 30/10/2015
Expiry Date: 29/10/2018

Page: 1 of 1

..making excellence a habit.

Approval Number: 1810526
Test Report: M106618

1st November 2018

Modern Plastic Industry LLC
Dubai Investment Park,
PO Box No. 31550,
Dubai,
United Arab Emirates

Water Regulations Advisory Scheme Ltd.
Unit 13,
Willow Road,
Pen y Fan Industrial Estate,
Crumlin,
Gwent.
NP11 4EG

WATER REGULATIONS ADVISORY SCHEME LTD. (WRAS)
MATERIAL APPROVAL

The material referred to in this letter is suitable for contact with wholesome water for domestic purposes having met the requirements of BS6920+1:2000 and/or 2014 'Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water'.

The reference relates solely to its effect on the quality of the water with which it may come into contact and does not signify the approval of its mechanical or physical properties for any use.

POLYPROPYLENE - COMPONENTS. **5260**

'Flowtech & Atlas PP-R Pipe'. Green coloured, extruded PP-R pipes. For use with water up to 85°C.

APPROVAL NUMBER: 1810526
APPROVAL HOLDER: MODERN PLASTIC INDUSTRY LLC

The Scheme reserves the right to review approval.
Approval 1810526 is valid between October 2018 and October 2023

An entry, as above, will accordingly be included in the Water Fittings Directory on-line under the section headed, "Materials which have passed full tests of effect on water quality".

The Directory may be found at: www.wras.co.uk/directory

Yours faithfully

Jason Furnival
Approvals & Enquiries Manager
Water Regulations Advisory Scheme

Das Kunststoff Zentrum

SKZ

Urkunde

Modern Plastic Industry L.L.C.
UAE - Dubai

is a member
of the

Association for the promotion of the SKZ (FSKZ e.V.)

July 2018
Wuerzburg

Prof. Dr.-Ing. Martin Bastian
Chief Executive Officer

element

TEST CERTIFICATE

element

TEST CERTIFICATE

WHY MPI

Proven research capability and ability to provide products to suit customer application needs.

Value pipes & fittings at a competitive price.

Technical service and installation backup.

One stop facility - wide range of pipes & fittings in UPVC (SWR Drainage), UPVC high pressure, CPVC & PP Compression and PP-R / PP-RCT.

Prompt deliveries in-house manufacturing facilities for all the pipes and fittings in UAE.

Quality - according to international standards, Quality management system (ISO 9001, KITEMARK, WRAS).

Operational excellence - precision manufacturing according to the standards using state of the art machinery.

Duty exemption in GCC countries.

Reliability - 24 hours customer service.

صناعة البلاستيك الحديثة (ش.ذ.م.م.)

MODERN PLASTIC INDUSTRY (L.L.C.)

(A Member of Al Shirawi Group of Companies)

ص.ب: ٣١٥٥٠، دبي – ا.ع.م، تليفون: ٣٠٠ ٨٨٥ ٤ ٩٧١+، فاكس: ٣٠١ ٨٨٥ ٤ ٩٧١+

P.O. Box: 31550, Dubai - U.A.E., Tel.: +971-4-8851300, Fax: +971-4-8851301

E-mail: marketing@mpi.ae Web Location: http://www.mpi.ae