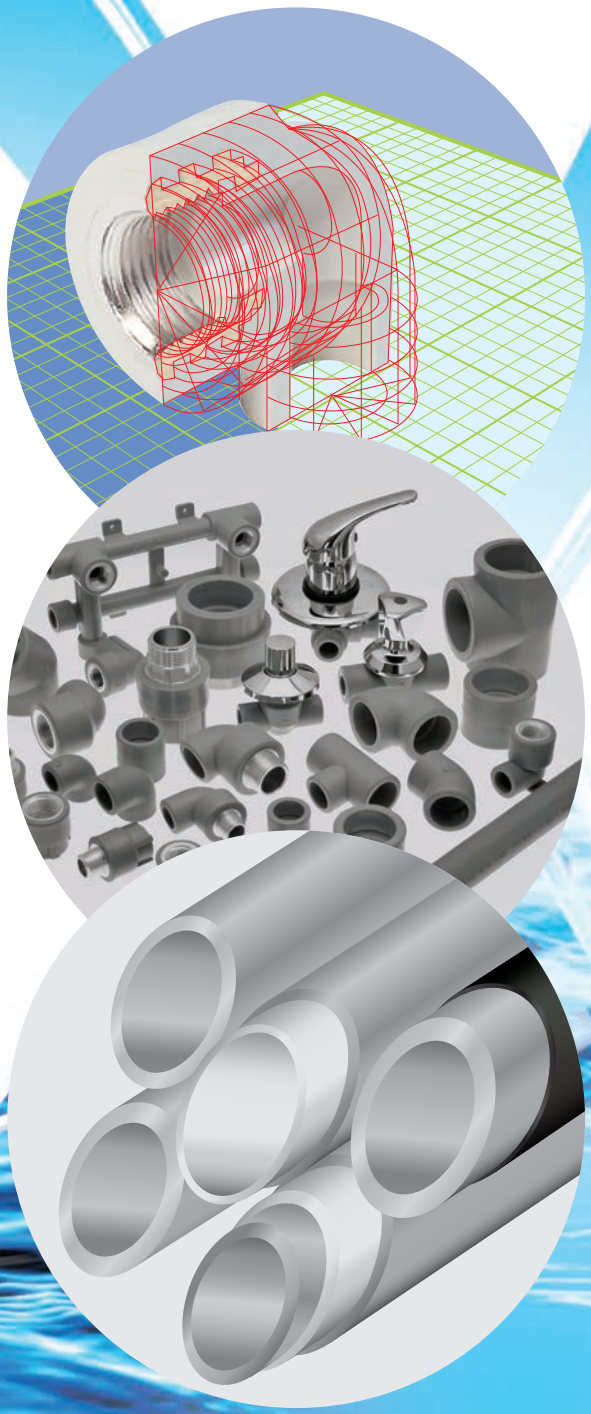
Plastofer System

PP-R pipes and fittings

Made in Italy

TECHNICAL CATALOGUE



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Mission

Plastofer is one of the first manufacturer of plastic sanitary installations. It has been operating in the market since 1958.

Plastofer products are made from polypropylene PP-R, the material designed for the needs of internal water installations and central heating. Plastofer has a complete system of pipes, stabi pipes, fiberglass pipes and fittings with diameters ranging from ø20 to 160 ø mm as well as complementary products.

The highest quality of Plastofer products is certified by an external institute of research.

Plastofer has all indispensable technical approvals, Hygienic Certificate and we are under constant control of external engineering institutes including all which ensures a consistent high quality of our products.

Service life of Plastofer products is up to 50 years. The wide range of available diameters (20-160mm) allows to construct hydro-sanitary system in big and small buildings, water-main system on boats, Residential apartments, condominiums, public housing, Hospital, schools, laboratories, Hotel and resorts, Office buildings and commercial shopping centres.

Our systems show an excellent performance conveying drinking water as well as other kind of fluids.

Plastofer product is the perfect mix between a cared craft production and a vision of global market.

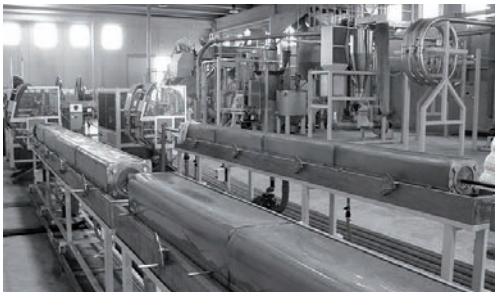
A philosophy of *craft* production

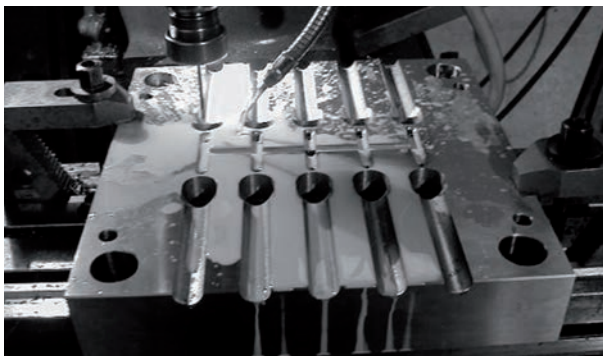
Plastofer conceive, design and produces each product in-house, a mean of safety that gives our company a great value.

Always attentive to technological innovation , the goods are under control at every stage: from the raw material and his first process, from the design and production of a single product to packaging made by hand. The ability of skilled technicians, and their knowledge of the entire production cycle distinguishes our company for quality and reliability.

This production structure allows us to satisfy any single request. We can offer series of customized items according to specific needs , having a high production flexibility.

While maintaining the philosophy of craftsmanship, we are attentive to the use of the most advanced skills and technologies in the plastic sector, without neglecting productivity, according to the demands of the domestic and international markets.





The value of Plastofer Made in Italy

Italy is the cradle of creativity. The artisan tradition and Italian style are known and admired all over the world, so that the Made in Italy brand has always been an added value, scope and refined. An Italian product is immediately recognizable by the attention to details and aesthetic values that it expresses.

In the collective imagination, in our country and abroad, buying Italian products means style, creativity, innovation, class and quality. Boating in this great tradition, Plastofer Srl creates products entirely Made in Italy.

The rigorous selection of materials and processing guided by the criteria of total quality, enable us to manufacture and offer customers a wide range of products Made in Italy.

Plastofer Made in Italy

Businesses require
Customers search for him
Consumers would like to thank

ITALY	EUROPE	AFRICA	ASIA	CARIBBEAN AREA
ROMA	ALBANIA	GHANA	LEBANON	DOMINICAN REPUBLIC
	GREECE	LYBIA	SAUDI ARABIA	
		MOROCCO		
		SYRIA		
		EGYPT		
		ETHIOPIA		

Company Quality Policy

The sector of the water-sanitary system has been suffering the world general business trend as well as the manufacturing sector. Behind those negative scenes, made of pessimism and uncertainty, PLASTOFER has managed to maintain and also strengthen its presence on the export markets. This great achievement has been reached thank to the skills and engagements of all the people involved in the company development who caught the message of the management in terms of customer service and production quality.

Moreover the company policy towards Quality has lead to a stronger image among customers, suppliers and competitors, besides the image growth during these difficult moments.

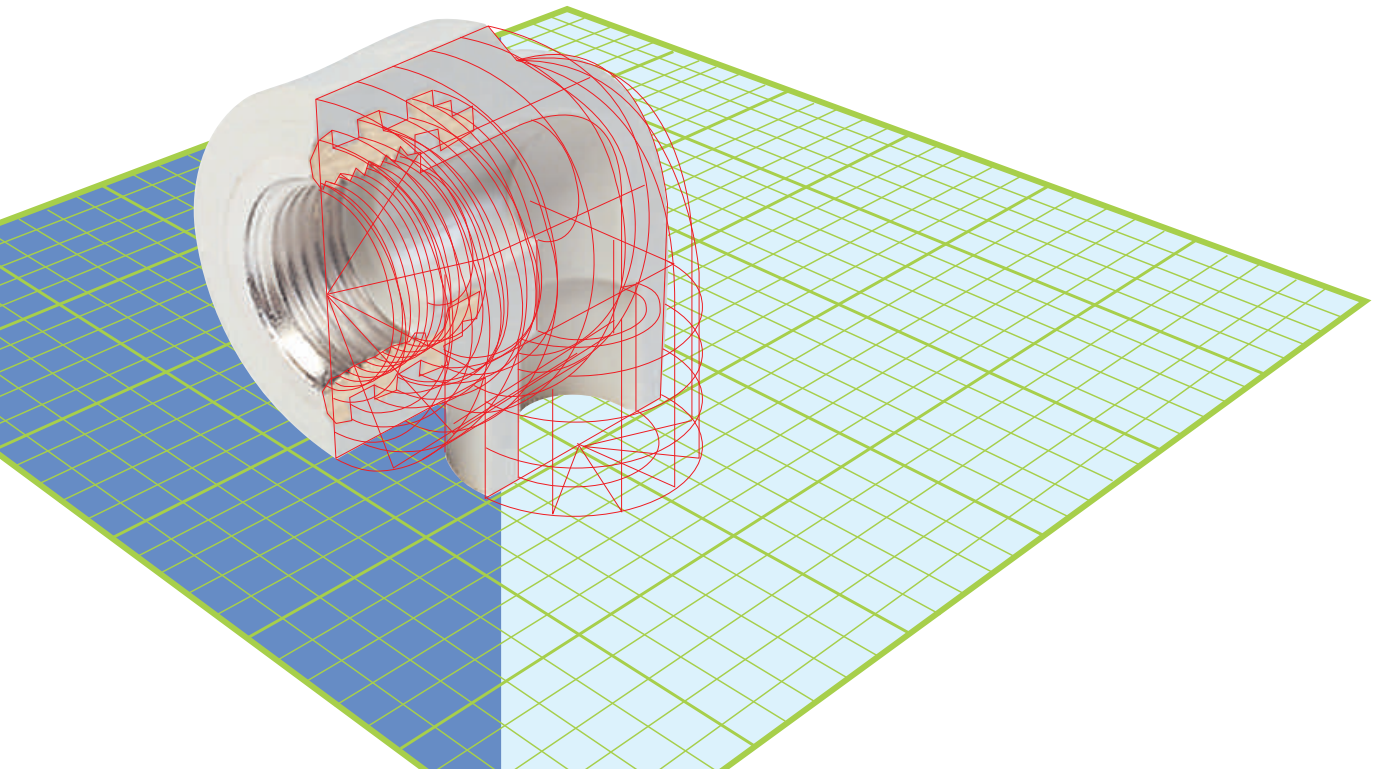
According to the company positive results, the direction wants to stress again the importance of the customer and his needs.

Therefore the Managerial activity will be based once again on the following goals:

- Strong focus on customers needs;
- Improvement of the capacity of production cycles;
- Maintenance of Company certification according to the norm UNI EN ISO 9001:2008.

Managers have the duty to give the right instruments in order to pursue the objectives given.

PLASTOFER wishes a prosperous work and a peaceful business future.



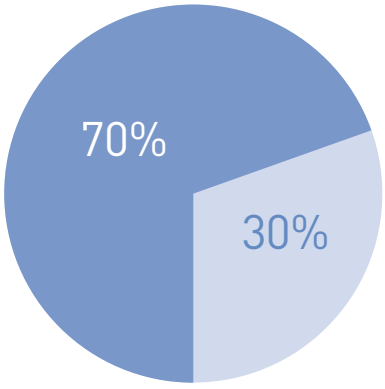
Plastofer production

Plastofer production is the main core of our activity. We have always been using latest generation machineries and high tech Instruments for the best quality of our product.

Plastofer is deeply focused on accuracy and care during the whole production process.

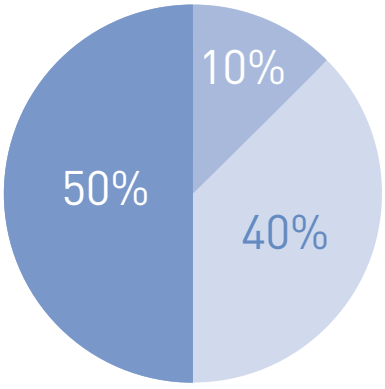
Our manufacturing plant can count 3 extrusion lines, 12 injection moulding, and 70 moulds. Plastofer takes advantage of his technical ability to better exploit the efficiency of his machineries reaching a high level of output to guarantee an important production volume.

Total Production



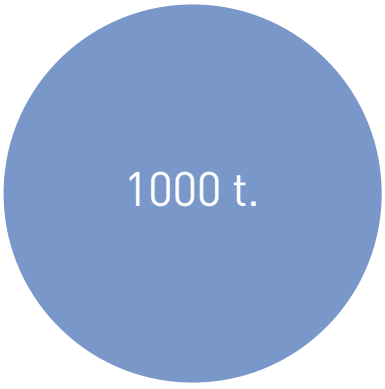
70% export
30% home market

Export Production



50% Africa
40% Middle East
10% other

Annual Production



1. Raw material

1.1 Specification of raw material used in production

Pipes and fittings of Plastofer system are made of polypropylene random copolymer, type 3 (PP-R).

This material is known for its strength, stability and resistance to high temperatures. Physical and chemical properties of the material meet the special requirements of drinking water supply and heating systems.

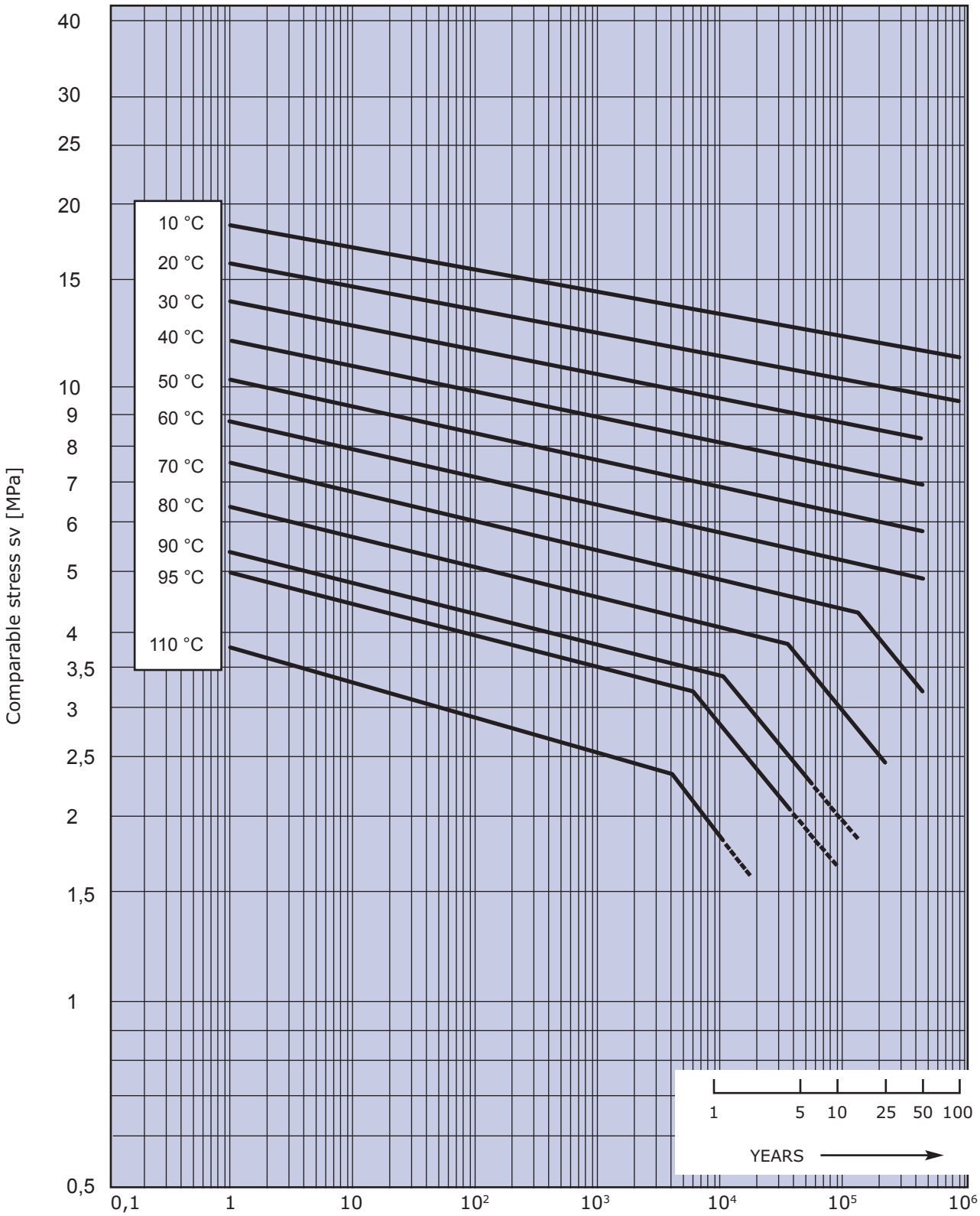
1.2 PP-R selected technical features

Properties of Unit PP-R value		Unit	PP-R value	Test method
Density		g/cm³	0.90	ISO 1183
Met Flow Rate (230°C/2,16kg)		g/10min	0.30	ISO 1133 Condition 12
Coefficient of Linear Thermal Expansion		1/K	1.5x10-4	DIN 53752
Thermal Conductivity		W/m K	0.24	DIN 52612
Modulus of Elasticity in tension (1mm/min)		MPa	900	ISO 527
Charpy's Impact Strenght, notched	+23°C	kJ/m2	20	ISO 179
	0°C	kJ/m2	4	
	-23°C	kJ/m2	2	

1.2 PP-R selected technical features

1. Long life service – even 50 years
2. Corrosion resistance
3. Low thermal conductivity – 0,22 W/m°K
4. High resistance to inner pressure
5. Low pipe friction- low roughness rate – low flow resistance
6. High surface smoothness – lack of lime scale formation as in other systems
7. Quick, easy and clean assembly
8. Total reliability and leak tightness of joints
9. Low price when compared to other materials
10. Resistance to many chemical agents
11. Weight low
12. Esthetic appearance
13. Vibration and noise suppression
14. Good electric current insulator
15. Sterility
16. Environmental friendliness (recycling)
17. No harmful gas emission from burning
18. Light impermeability – no risk of algae development
19. One type of pipe connectors to all pipes
20. Non-toxic
21. Smell and taste neutral.
22. Very good welding applications
23. Resistance to abrasion
24. No change in organoleptic properties of water
25. High cracking resistance under stress

1.4 Service life of Plastofer's system



Service life in hours
Termination of an isotherm indicates maximum service life also at lower tension.
The isotherms in the chart do not extended.

2. Product range

Pipes and fittings of Plastofer PP-R system are produced in the following sizes: 20, 25, 32, 40, 50, 63, 75, 90, 110, 125, 160 mm.

The pipe types are produced in various combinations of operating pressures and temperatures in separate pressure lines various wall thicknesses: SDR 11 (PN 10) - generally for cold water and floor heating; SDR 7,4 (PN 16) - generally for hot water and floor heating; SDR 6 (PN 20) - generally for hot water and central heating.

The STABI pipes are characterized by three pipe's layers: the polypropylene pipe is covered with an aluminum foil during production and subsequently coated with an external tin polypropylene layer. The pipe shows not only better pressure and temperature resistance due to the aluminum foil but also possesses characteristics typical for steel pipes like higher rigidity and lower thermal expansion. For mechanical protection of the aluminum foil the pipe is furnished with an external polypropylene layer. This external polypropylene layer does not affect the mechanical properties of the pipe, it is only an esthetical matter.

PPR fiber glass reinforced pipe is a higher performance pipe, which uses multilayer co-extruded, special techniques and equipment. It also has characteristics as low expansion coefficient, high pressure resistance.

Plastofer PPR piping system is designed for cold and hot water installations as well as in floor and central heating systems. Plastofer piping systems can also be used for distribution owing to their chemical resistance and other properties.

Fittings (adapting pipes) are manufactured jointly for all piping types in the highest PN 20 pressure range and in various design types:

- All-plastic fittings (sockets, elbows, T-pieces reduced and full-sized, reductions, crosspieces).
- Combined fittings with brass threads for threaded joints (reducing sleeves with metal thread,
- T-pieces, elbows for wall mounting.
- Special elements (crossovers, compensation pipes, clips)

2.1 Marking

Plastofer produces in compliance with European UNI-EN ISO 15874 and German standards DIN 8077, DIN 8078.

Pipes and fittings are marked during the manufacturing process.

All elements are marked: Pipes: PLASTOFER PPR T3 DIN 8077 / 8078 * UNI EN ISO 15874 * Ø20 x 3,4 * SDR 6 * - 1/10 bar - class 2/8 bar Date..... Made in Italy Line n.

Fittings: Plastofer logo PPR type, size, PN and made in Italy.

Packaging: carton box with plastic bags inside containing the fittings.

The possibility to identify each element in a system is an important vehicle of quality control management as well as an evidence for potential settlements of guarantee claims.

On the basis of UNI EN ISO 15874 requirements applied for piping system manufacture, we are going to change the class marking from PN to S (series) coding.

PN	S	SDR
10	5	11
16	3,2	7,4
20	2,5	6
25	2	5

PN = Nominal Pressure
S = Series

SDR – Standard Dimension Ratio
SDR = 2xS+1 = d/s
d - external diameter of pipe,
s - wall thickness

3. Application areas

Operating conditions according to UNI EN ISO 15874

In terms of pressure and temperature for pipes and fittings, the operating conditions set forth in ISO 15874 are taken as the basic conditions. Water supply and heating systems are classified according to ISO 15874 in the following way:

Appl. class	Design temp. T_D	Time at T_D	Max.design temp.	Time at T_{max}	Emerg. temp.	Time at $T_{emerg.}$	Scope of application
	°C	years	°C	years	°C	hours	
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 40 60	2,5 20 25	70	2,5	100	100	Floor heating Low temp. radiators
5	20 60 80	14 25 10	90	1	100	100	High-temperature heating

T^D. - design temperature defined by the application.
T^{max}. - maximum design temperature, with its time-limited exposure.
T^{emerg}. - emergency temperature arising under emergencies due to troubles in control systems.

Maximum service life of pipelines for every class of application is determined by total performance time of pipeline under temperatures of TD, Tmax. and Temerg. and it amounts to 50 years. Other classes of application may be established; however the value of temperatures shall not exceed those provided for Class 5. ISO 15874 determines admissible maximum operating pressure for every type of pipeline made of PP-R material. Proper and correct determination of the required pipeline type during engineering work is required. It shall be, based on operational data, i.e. application class and operating pressure. Calculated series Smax shall be → series S, indicated on pipes and in technical documents of Plastofer.

Example

Pressure lines PN 20 = s 2.5 series:

according to the table, S ≤ Scalc max must apply

With use for hot water (max. temp, of hot water of 60 °C - scald protection) - Class 1 : can be operated at the pressure of 10 bar (2.5≤ 3.1), 49 years durability at a temp, of 60 °C, one year at a temperature of 80 °C (sudden temp, increase) and 100 hours at a temperature of 95 °C (emergency conditions). The same applies to other classes. This information is indicated on pipes as class 1/10 bars, 2/8 bars, 4/10 bars, 5/6 bars.

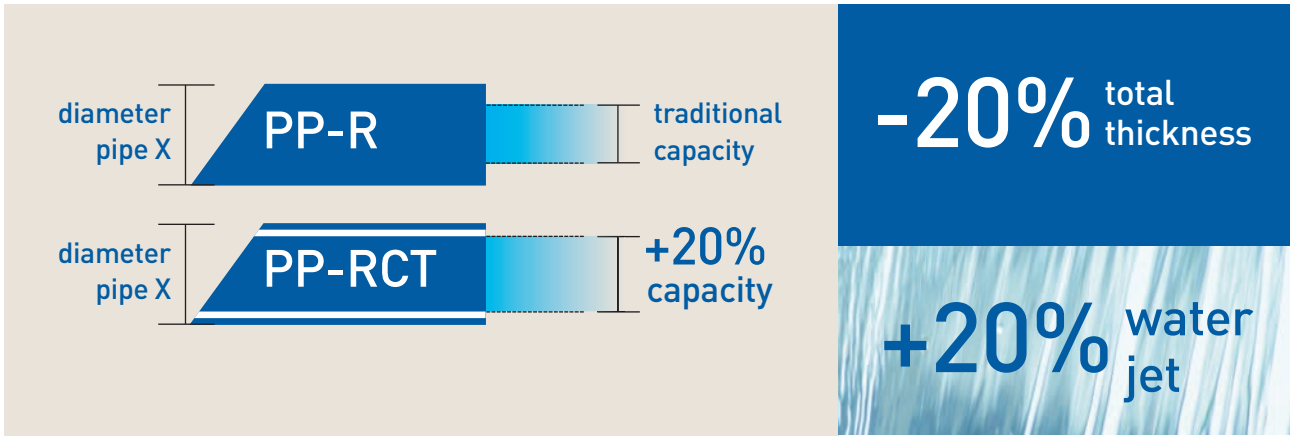
Design pressure P_D	Application			
Bar	calculated series S_{max}			
	Class 1	Class 2	Class 4	Class 5
4	6,9	5,3	6,9	4,8
6	5,2	3,6	5,5	3,2
8	3,9	2,7	4,1	2,4
10	3,1	2,1	3,3	1,9

The evolution of traditional PP-RCT pipe

The POWER system characterizes Plastofer's response to the evolution of the PP-RCT market. The pipe interior is white and contains additives that increase its strength and purity, allowing a thinner pipe wall and, increasing the water flowrate. Thanks to its greater size stability, these pipes are better suited for heating and cooling systems, compressed-air systems, and various industrial applications.

Plastofer PP-RCT

The special Plastofer PP-RCT β-nucleation process improves the material's crystalline structure, with a consequent improvement in resistance to specific chemical substances. Plastofer PP-RCT's new formulation and production process allows the pipes produced with this material to withstand high levels of pressure, especially at high temperatures.



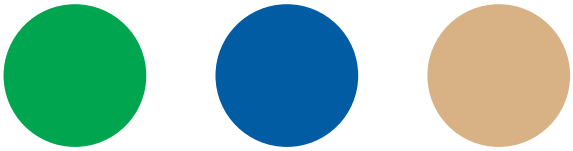
FIBERREINFORCED and PP-R

Plastofer FIBERGLASS is a three-layer random fiberglass pipe.

This type of pipe immediately exhibits a low thermal dilation, greater resistance to mechanical damage, low-gas permeability, particularly vital in the installation of closed-cycle heating.

The traditional pipe sealing method is sufficient for pipe welding.

Colors

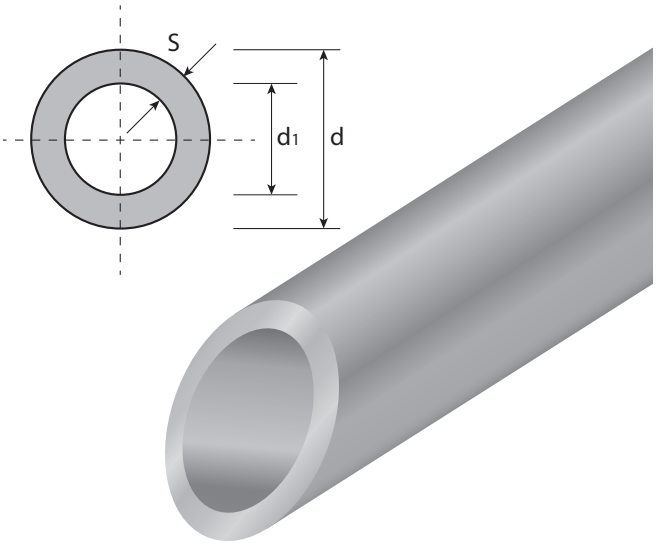


series
CLASSIC

SDR 6

Applications

Material: PPR
Type: S 2,5
Color: green
Supply: bars of 3-4 meters
Standards: UNI EN ISO 15874-2
DIN 8077
DIN 8078

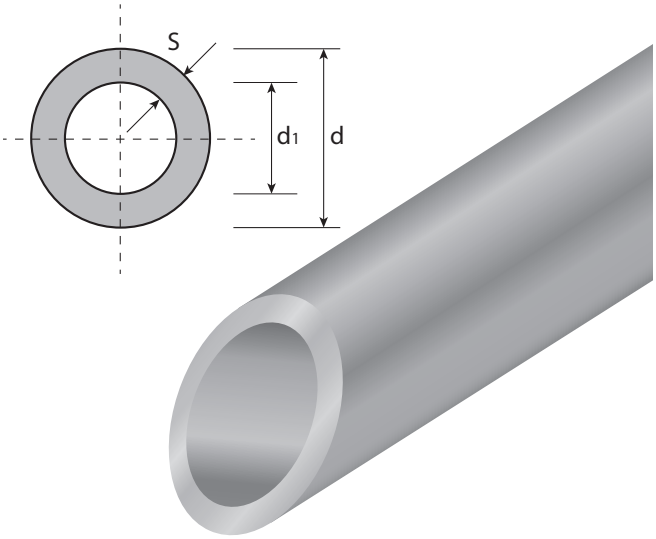


Cod	d	d_1	S	Kg/m	PN	SDR
532020	20	13,2	3,4	0,172	20	6
532025	25	16,6	4,2	0,266	20	6
532032	32	21,2	5,4	0,434	20	6
542020	20	13,2	3,4	0,172	20	6
542025	25	16,6	4,2	0,266	20	6
542032	32	21,2	5,4	0,434	20	6
542040	40	26,6	6,7	0,671	20	6
542050	50	33,4	8,3	1,040	20	6
542063	63	42,0	10,5	1,650	20	6
542075	75	50,0	12,5	2,340	20	6
542090	90	60,0	15,0	3,360	20	6

SDR 7,4

Applications

Material: PPR
Type: S 3,2
Color: green
Supply: bars of 4 meters
Standards: UNI EN ISO 15874-2
DIN 8077
DIN 8078



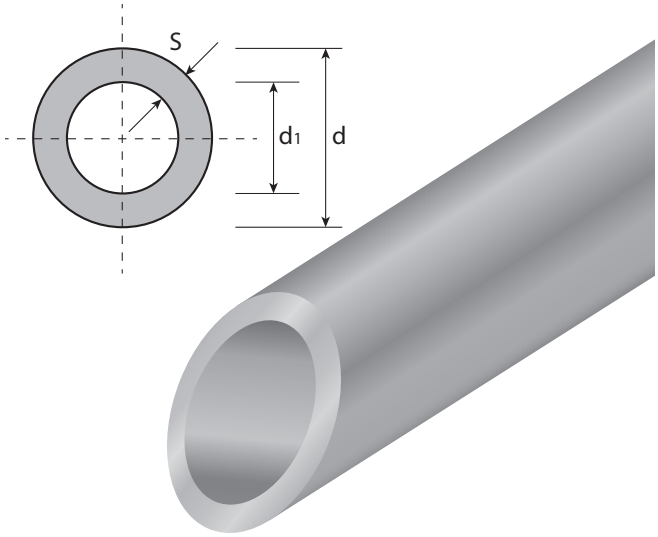
Cod	d	d_1	S	Kg/m	PN	SDR
541620	20	14,4	2,8	0,148	16	7,4
541625	25	18,0	3,5	0,230	16	7,4
541632	32	23,2	4,4	0,370	16	7,4
541640	40	29,0	5,5	0,575	16	7,4
541650	50	36,2	6,9	0,896	16	7,4
541663	63	45,8	8,6	1,410	16	7,4
541675	75	54,4	10,3	2,010	16	7,4
541690	90	65,4	12,3	2,870	16	7,4
5416110	110	79,8	15,1	4,300	16	7,4
5416125	125	90,8	17,1	5,530	16	7,4
5416160	160	116,2	21,9	9,040	16	7,4

SDR 11

Applications

Material: PPR
Type: S 5
Color: green
Supply: bars of 4 meters
Standards: UNI EN ISO 15874-2
DIN 8077
DIN 8078

Cod	d	d_1	s	Kg/m	PN	SDR
541032	32	26,2	2,9	0,261	10	11
541040	40	32,6	3,7	0,412	10	11
541050	50	40,8	4,6	0,638	10	11
541063	63	51,4	5,8	1,010	10	11
541075	75	61,4	6,8	1,410	10	11
541090	90	73,6	8,2	2,030	10	11
5410110	110	90,0	10,0	3,010	10	11
5410125	125	102,2	11,4	3,910	10	11
5410160	160	130,8	14,6	6,380	10	11



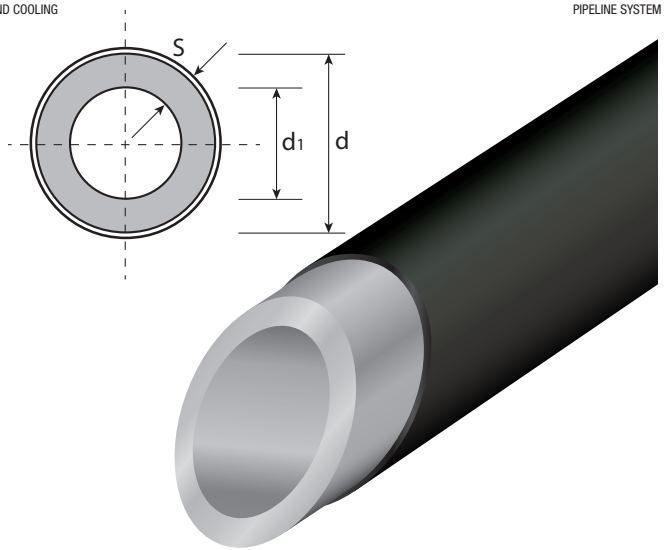
series
CLASSICUV

SDR 6

Applications

Material: PPR-PE-UV
Type: S 2,5
Color: green
Supply: bars of 4 meters
Standards: UNI EN ISO 15874-2
DIN 8077
DIN 8078

Cod	d	d_1	s	Kg/m	PN	SDR
TUBN2020	20	13,2	3,4	0,201	20	6
TUBN2025	25	16,6	4,2	0,302	20	6
TUBN2032	32	21,2	5,4	0,479	20	6
TUBN2040	40	26,6	6,7	0,728	20	6
TUBN2050	50	33,4	8,3	1,112	20	6
TUBN2063	63	42,0	10,5	1,775	20	6
TUBN2075	75	50,0	12,5	2,490	20	6
TUBN2090	90	60,0	15,0	3,516	20	6

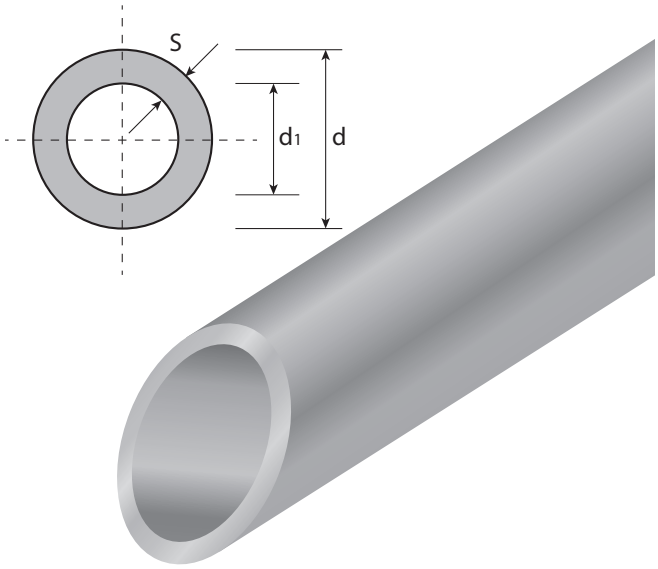


series
POWER

SDR 7,4

Applications

Material: PPR-CT
Type: S 3,2
Color: green
Supply: bars of 4 meters
Standards: UNI EN ISO 15874-2
DIN 8077
DIN 8078



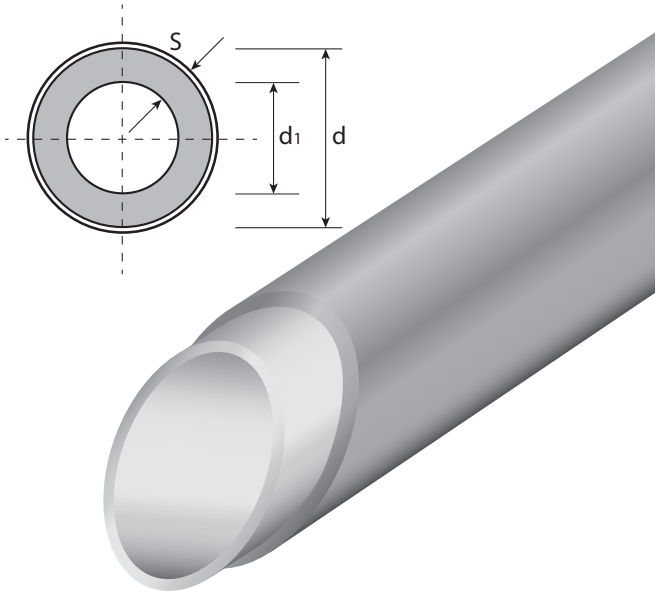
Cod	d	d_1	S	Kg/m	SDR
TRCT2025	25	18,0	3,5	0,230	7,4
TRCT2032	32	23,2	4,4	0,370	7,4
TRCT2040	40	29,0	5,5	0,575	7,4
TRCT2050	50	36,2	6,9	0,896	7,4
TRCT2063	63	45,8	8,6	1,410	7,4
TRCT2075	75	54,4	10,3	2,010	7,4
TRCT2090	90	65,4	12,3	2,870	7,4
TRCT20110	110	79,8	15,1	4,355	7,4
TRCT20125	125	90,8	17,1	5,555	7,4
TRCT20160	160	116,2	21,9	9,290	7,4

series
POWERPLUS

SDR 7,4

Applications

Material: PP-RCT
PP-RCT PLUS
Type: S 3,2
Color: green
Supply: bars of 4 meters
Standards: UNI EN ISO 15874-2
DIN 8077
DIN 8078



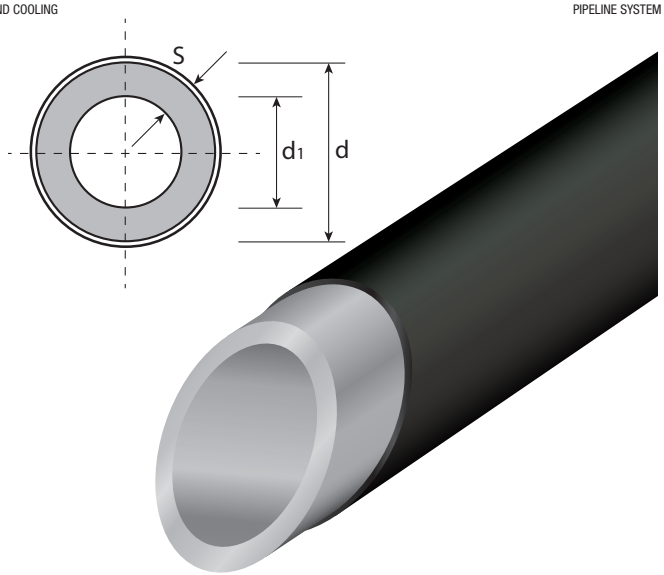
Cod	d	d_1	S	Kg/m	SDR
DBC2020	20	18,0	2,8	0,148	7,4
DBC2025	25	23,2	3,5	0,230	7,4
DBC2032	32	29,0	4,4	0,370	7,4
DBC2040	40	36,2	5,5	0,575	7,4
DBC2050	50	45,8	6,9	0,896	7,4
DBC2063	63	54,4	8,6	1,410	7,4

series
POWERUV

SDR 7,4

Applications

Material: PP-RCT
PE UV
Type: S 3,2
Color: green
Supply: bars of 4 meters
Standards: UNI EN ISO 15874-2
DIN 8077
DIN 8078



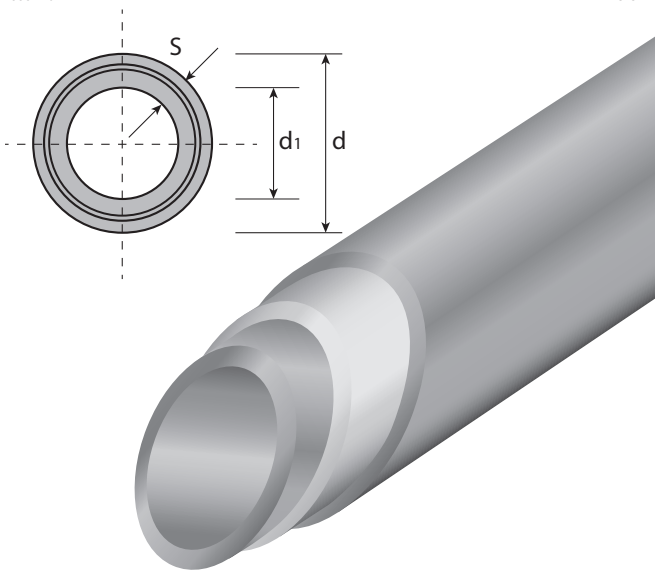
Cod	d	d_1	S	Kg/m	SDR
TRCN2025	25	18,0	3,5	0,280	7,4
TRCN2032	32	23,2	4,4	0,435	7,4
TRCN2040	40	29,0	5,5	0,656	7,4
TRCN2050	50	36,2	6,9	1,012	7,4
TRCN2063	63	45,8	8,6	1,556	7,4

series
FIBERREINFORCED

SDR 7,4

Applications

Material: PP-RCT
FIBER
PP-RCT
Type: S 3,2
Color: green
Supply: bars of 4 meters
Standards: UNI EN ISO 15874-2
DIN 8077
DIN 8078



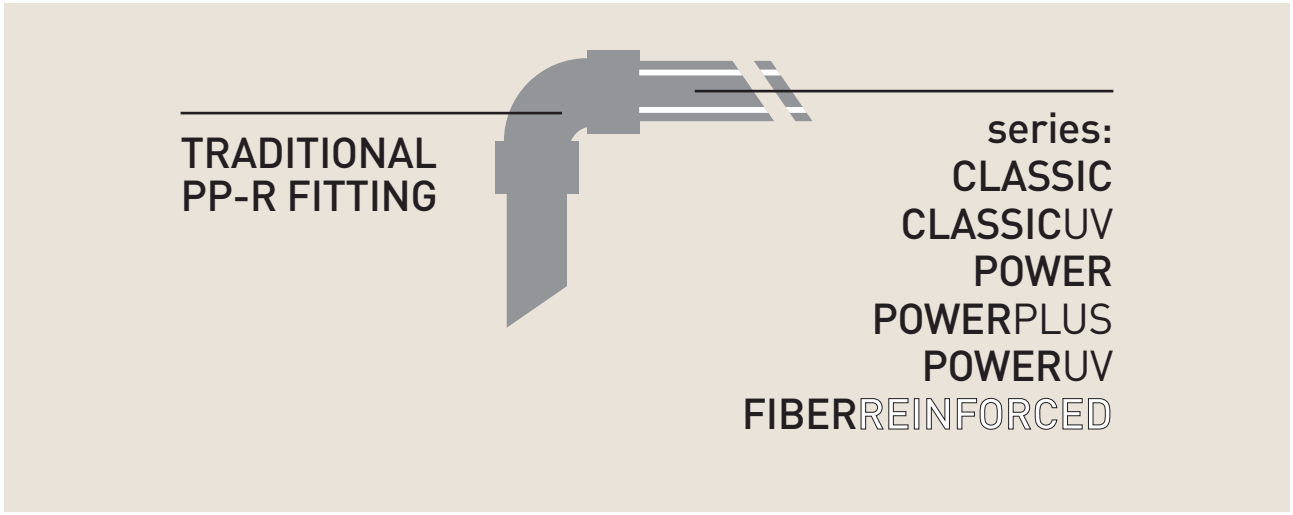
Cod	d	d_1	S	Kg/m	SDR
TFG2020	20	14,4	2,8	0,154	7,4
TFG2025	25	18,0	3,5	0,238	7,4
TFG2032	32	23,2	4,4	0,382	7,4
TFG2040	40	29,0	5,5	0,597	7,4
TFG2050	50	36,2	6,9	0,935	7,4
TFG2063	63	45,8	8,6	1,450	7,4

Fittings

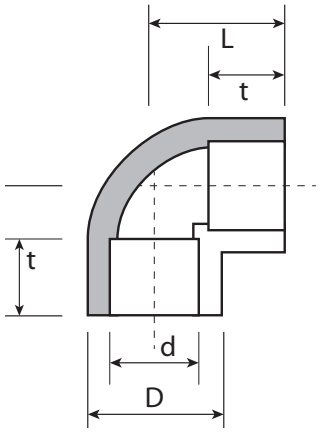
Applications

POTABLE WATER APPLICATION | HEATING SYSTEM CONSTRUCTION | CONNECTION HEATING AND COOLING | CHILLED WATER TECHNOLOGY | AGRICOLTURE | SWIMMING-POOL TECHNOLOGY | CHEMICAL TRANSPORT | RRAINWATER APPLICATION | DISTRICT HEATING PIPELINE SYSTEM

Assembly Compatibility

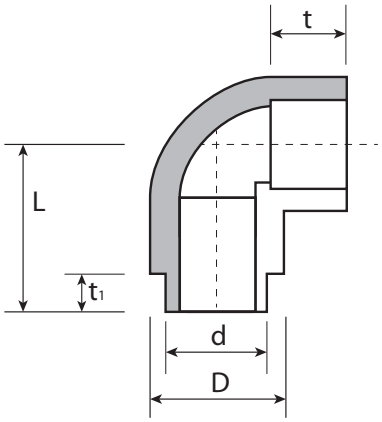


90° plain elbow



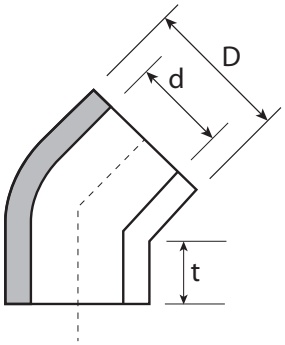
Code	Φ	d	D	L	t
601020	20	19,3	30	27	14,5
601025	25	24,3	34	31	16,0
601032	32	31,3	41	36	18,0
601040	40	39,2	54	42	20,5
601050	50	49,2	66	50	23,5
601063	63	62,1	83	60	27,5
601075	75	74,1	99	69	30
601090	90	89,2	120	80	33
6010110	110	109,2	146	95	37

M/F 90° plain elbow



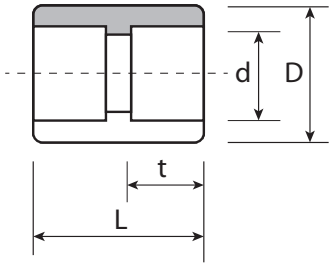
Code	Φ	d	D	L	t	t1
602020	20	20,1	29	30	14,5	14
602025	25	25,1	36	35	16	15
602032	32	32,1	44	41	18	18

45° plain elbow



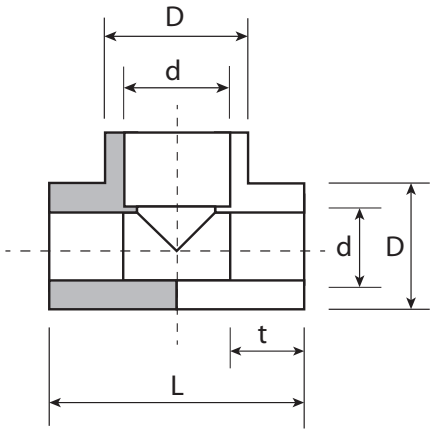
Code	Φ	d	D	t
603020	20	19,3	29,0	14,5
603025	25	24,3	33,5	18,0
603032	32	31,3	41,5	22,0
603040	40	39,2	55,0	20,5
603050	50	49,2	69,0	22,0
603063	63	62,1	87,0	26,0
603075	75	74,1	100	30
603090	90	89,2	120	35
6030110	110	109,2	146	37

Sleeve



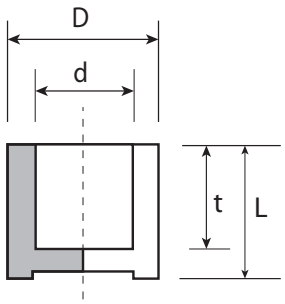
Code	Φ	d	D	L	t
604020	20	19,3	29	35	14,5
604025	25	24,3	34	35	16,0
604032	32	31,3	42	43	18,0
604040	40	39,2	54	48	20,5
604050	50	49,2	64	51	23,5
604063	63	62,1	84	59	41,0
604075	75	74,1	100	68	30
604090	90	89,2	120	80	33
6040110	110	109,2	146	86	37

90° plain Tee



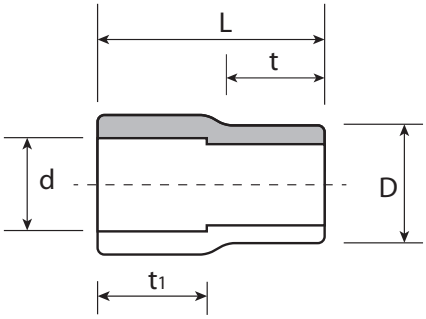
Code	Φ	d	D	L	t
605020	20	19,3	30	54	14,5
605025	25	24,3	34	64	16,0
605032	32	31,3	41	75	18,0
605040	40	39,2	54	86	20,5
605050	50	49,2	65	98	23,5
605063	63	62,1	83	117	27,5
605075	75	74,1	100	139	30
605090	90	89,2	120	170	33
6050110	110	109,2	146	188	37

Plain cap



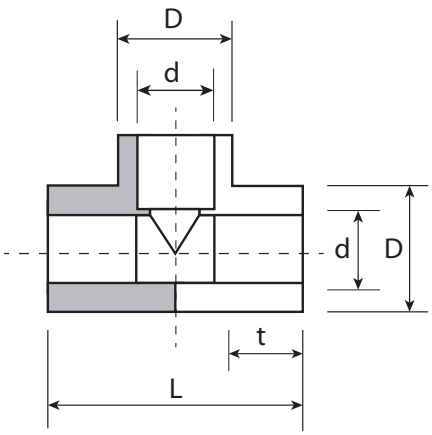
Code	Φ	d	D	L	t
606020	20	19,1	30	22	14,5
606025	25	24,1	34	23	16
606032	32	31,1	41	35	16
606040	40	39,2	54	35	18
606050	50	49,2	63	34	18
606063	63	62,1	84	40	18
606075	75	74,1	100	57	30
606090	90	89,2	120	63	33
6060110	110	109,2	146	85	37

M/F Plain reduction



Code	Φ	d	D	t	t_1	L
607015	25x20	19,3	25	14,5	15	31,5
607020	32x20	19,3	32	20,0	21,6	42
607025	32x25	24,2	32	20,0	21,6	42
607030	40x20	19,3	40	23,5	25,2	19
607035	40x25	24,2	40	23,5	25,5	49
607040	40x32	31,2	40	25,5	26	51,3
607043	50x20	19,3	50	15,0	21,7	38,5
607044	50x25	24,2	50	16,5	21,7	38,5
607045	50x32	31,2	50	12,6	21,7	35
607050	50x40	39,2	50	19,6	25	44,5
607052	63x20	19,3	63	15,2	25	40
607053	63x25	24,2	63	15,2	25	40
607054	63x32	31,2	63	15,2	25	41
607055	63x40	39,2	63	18,7	25	43,7
607060	63x50	49,1	63	24,7	27	49,7
607065	75x40	39,2	75	30,0	23,5	58
607070	75x50	49,1	75	30,0	23,5	58
607075	75x63	62,2	75	30,0	27,5	58
607085	90x50	49,1	90	33,0	23,5	60
607087	90x63	62,2	90	33,0	27,5	60
607090	90x75	74,2	90	33,0	30,0	60
607095	110x63	62,2	110	37,0	27,5	66
607096	110x75	74,2	110	37,0	30,0	66
607098	110x90	89,1	110	37,0	30,0	66

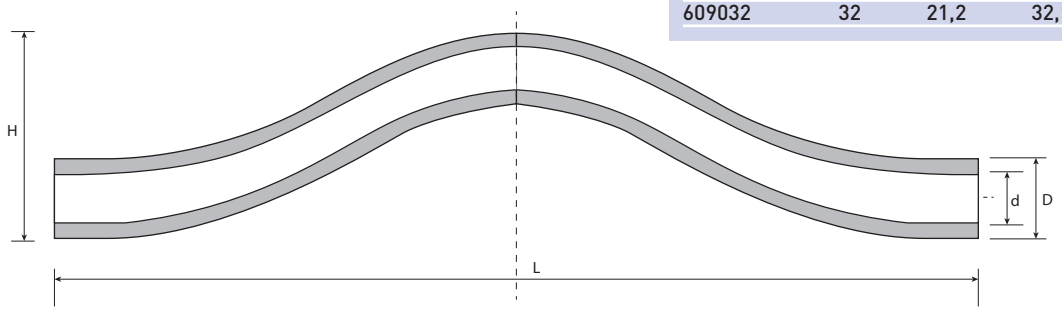
90° plain reduced tee



Code	Φ	d	D	d1	D1	t	L
608005	25x20x25	19,3	34	24.1	34	16,0	64
608010	32x20x32	19,3	41	31,2	41	18,0	75
608015	32x25x32	24,2	41	31,2	41	18,0	75
608018	40x20x40	19,3	54	39,2	54	20,5	86
608019	40x25x40	24,2	54	39,2	54	20,5	86
608020	40x32x40	31,2	54	39,2	54	20,5	86
608023	50x25x50	24,2	65	49,1	65	23,5	98
608024	50x32x50	31,2	65	49,1	65	23,5	98
608025	50x40x50	39,2	65	49,1	65	23,5	98
608029	63x25x63	24,2	44	62,1	88	27,5	84
608030	63x32x63	31,2	44	62,1	88	27,5	84
608035	63x40x63	39,2	83	62,1	83	27,5	117
608040	63x50x63	49,1	83	62,1	83	27,5	117
608055	75x40x75	39,2	51	74,1	100	30,0	139
608057	75x50x75	49,1	70	74,1	100	30,0	139
608063	75x63x75	62,2	85	74,1	100	30,0	139
608091	90x50x90	49,1	70	89,2	122	33,0	170
608093	90x63x90	62,2	85	89,2	122	33,0	170
608094	90x75x90	74,1	100	89,2	122	33,0	170
608095	110x63x110	62,2	85	109,2	147	37,0	188
608096	110x75x110	74,2	100	109,2	147	37,0	188
608098	110x90x110	89,2	120	109,2	147	37,0	188

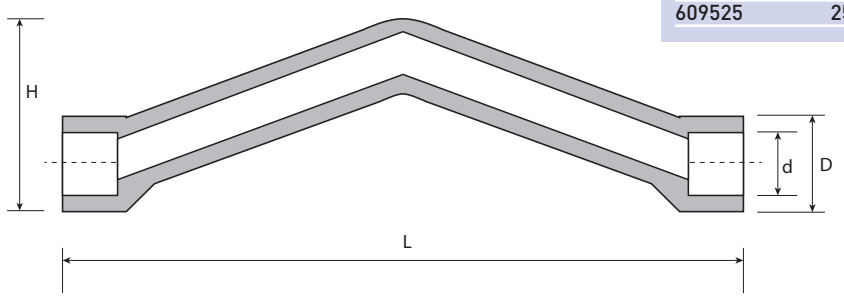
By-pass

Code	Φ	d	D	H	L
609020	20	13,2	20,1	50	33
609525	25	16,6	25,1	56	33
609032	32	21,2	32,1	63	33

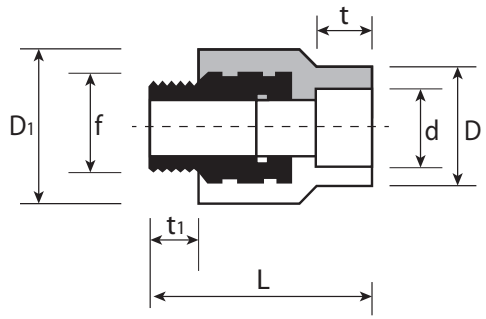


By-pass with coupling

Code	Φ	d	D	H	L
609525	20	19,1	28	51	180
609525	25	24,1	35	57	205

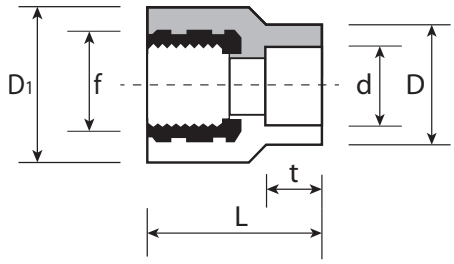


Male threaded joint



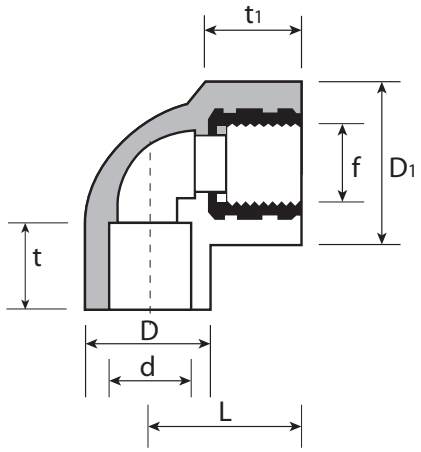
Code	Φ	d	f	D	D1	t	L	t1
701020	20x½	19,1	1/2"	34	37	14	55	15
701024	25x½	24,1	1/2"	38	40	14	55	15
701025	25x¾	24,1	3/4"	38	40	14	56	16
701031	32x¾	31,1	1/2"	47	49,6	17	63,6	16
701032	32x1	31,1	1"	47	49,6	17	63,6	18,5
701040	40x1 ¼	39,3	1 ¼	58	65	25,5	95,6	33
701050	50x1 ½	49,3	1 ½	64	73,7	25,5	96	38,7
701063	63x2	62,2	2"	84	97,7	28,6	99	34,5
701075	75x2 ½	74,1	2 ½	100	120	30	105	38
701090	90x3	89,2	3	120	134	33	133	48
7010110	110x4	109,2	4	144	160	37	152	55

Female threaded joint



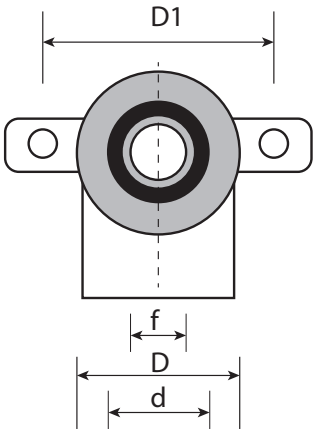
Code	Φ	d	f	D	D1	t	L
702020	20x½	19,1	1/2"	34	37	14	40
702024	25x½	24,1	1/2"	38	40	14	40
702025	25x¾	24,1	3/4"	38	40	14	40
702031	32x¾	31,1	1/2"	47	49,6	17	45
702032	32x1	31,1	1"	47	49,6	17	45
702040	40x1 ¼	39,3	1 ¼	58	65	25,5	78
702050	50x1 ½	49,3	1 ½	64	73,7	25,5	75
702063	63x2	62,2	2"	84	97,7	28,6	85.7
702075	75x2 ½	74,1	2 ½	100	120	30	81
702090	90x3	89,2	3	120	134	33	107
7020110	110x4	109,2	4	146	160	37	133

Female threaded elbow



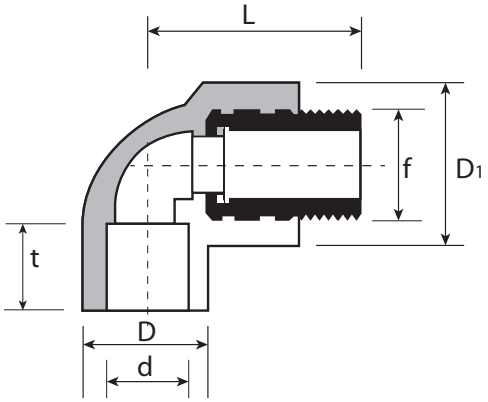
Code	Φ	d	f	D	D1	t	L	t1
703020	20x½	19,1	1/2"	30	39	14,5	35	22
703024	25x½	24,1	1/2"	36	41	16,0	38	27
703025	25x¾	24,1	3/4"	36	41	16,0	38	27
703031	32x¾	32,1	1"	42,5	51	18,0	42,5	29
703032	32x1	32,1	1"	42,5	51	18,0	42,5	29

Female threaded elbow with brackets



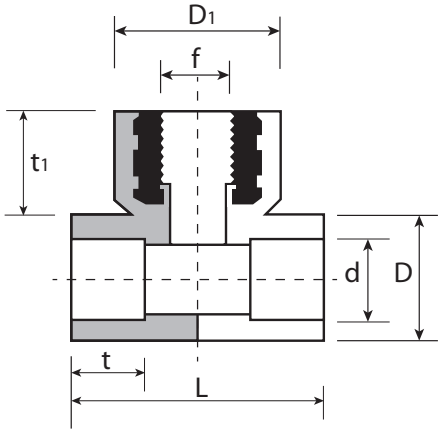
Code	Φ	d	f	D	D1
705020	20	19,3	1/2"	29	40

Male threaded elbow



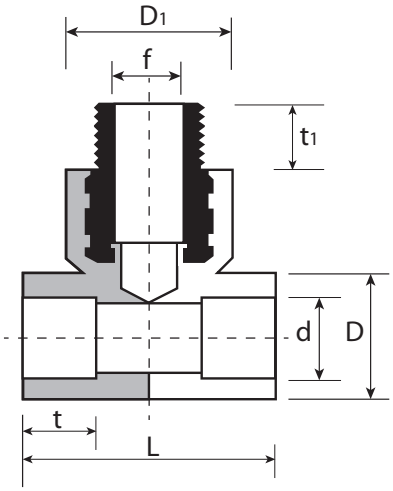
Code	Φ	d	f	D	D1	t	L
707020	20x½	19,1	1/2"	30	39	14,5	50
707024	25x½	24,1	1/2"	36	41	16,0	53
707025	25x¾	24,1	3/4"	36	41	16,0	54
707032	32x1	32,1	1"	42,5	51	18,0	61

Female threaded tee



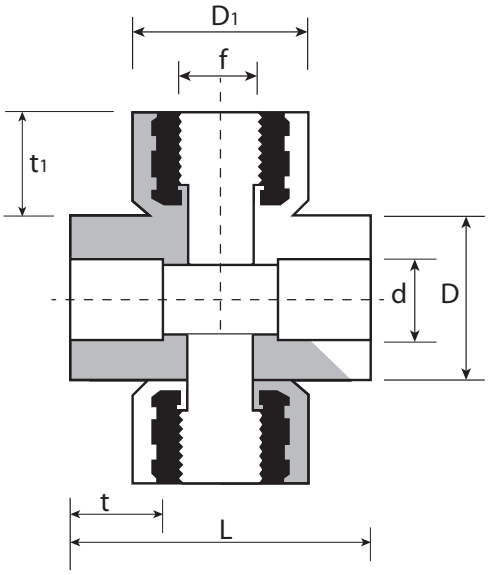
Code	Φ	d	f	D	D1	t	L	t1
708020	20x½	19,1	1/2"	29	38	14,5	54,2	26,7
708024	25x½	24,1	1/2"	33,7	43	16,0	62,6	21,7
708025	25x¾	24,1	3/4"	33,7	43	16,0	62,6	21,7
708031	32x¾	32,1	3/4"	42,4	51	18,0	74	22
708032	32x1	32,1	1"	42,4	51	18,0	74	22
708047	50x¾	49,1	3/4"	70	43	27	80	18
708060	63x¾	62,1	3/4"	88	44	29	84	16

Male threaded tee



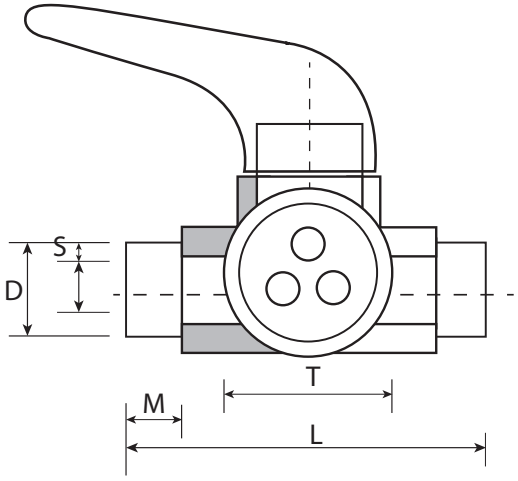
Code	Φ	d	f	D	D1	t	L	t1
709020	20x½	19,1	1/2"	29	38	14,5	54,2	41,7
709024	25x½	24,1	1/2"	33,7	43	16,0	62,6	36,7
709025	25x¾	24,1	3/4"	33,7	43	16,0	62,6	38,7
709032	32x1	31,1	1"	42,4	51	18,0	74	40,6

Double female threaded tee



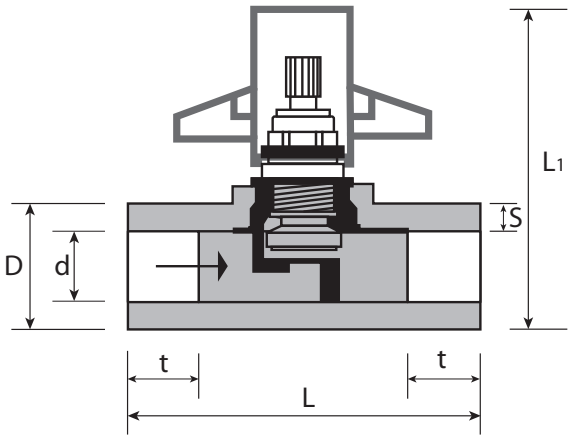
Code	Φ	d	f	D	D1	t	L	t1
708547	¾x50x¾	49,1	3/4"	70	43	27	80	18
708560	¾x63x¾	62,1	3/4"	88	44	29	84	16

Monocontrol mix shower



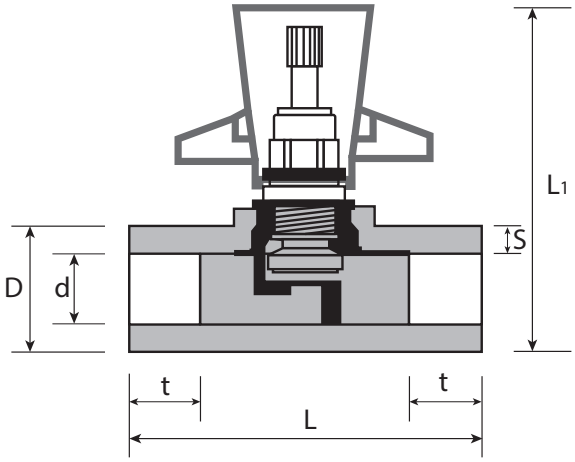
Code	Φ	d	D	L	M	S	T
852020	20	19	29	100	15,7	5	50

Tap with chrome cap PP/SEAT



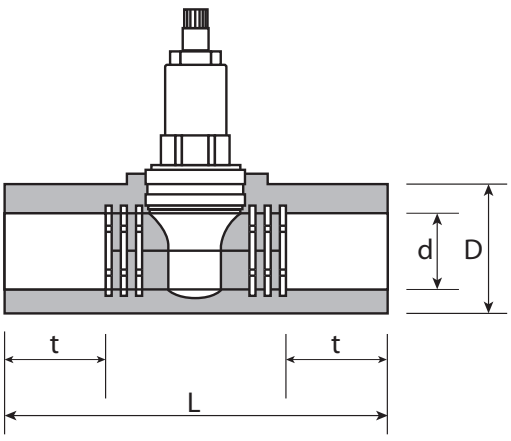
Code	Φ	d	D	L	S	t	V	L1
VD803020	20	19	29	75	4,5	16	1/2"	90
VD803025	25	24,2	34	87	5,0	17	3/4"	98
VD803032	32	31,1	44	98	6,8	22	3/4"	109

Tap with chrome handle PP/SEAT



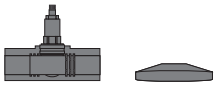
Code	Φ	d	D	L	S	t	V	L1
VD803520	20	19	29	75	4,5	16	1/2"	115
VD803525	25	24,2	34	87	5,0	17	3/4"	124
VD803532	32	31,1	44	98	6,8	22	3/4"	133

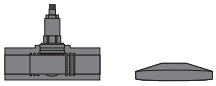
Valve with extractable ball

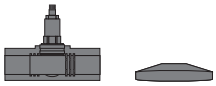


Φ	d	D	L	S	t
20	19	36	99	8,5	16
25	24	36	99	6	18
32	31.6	45	116	6.4	23

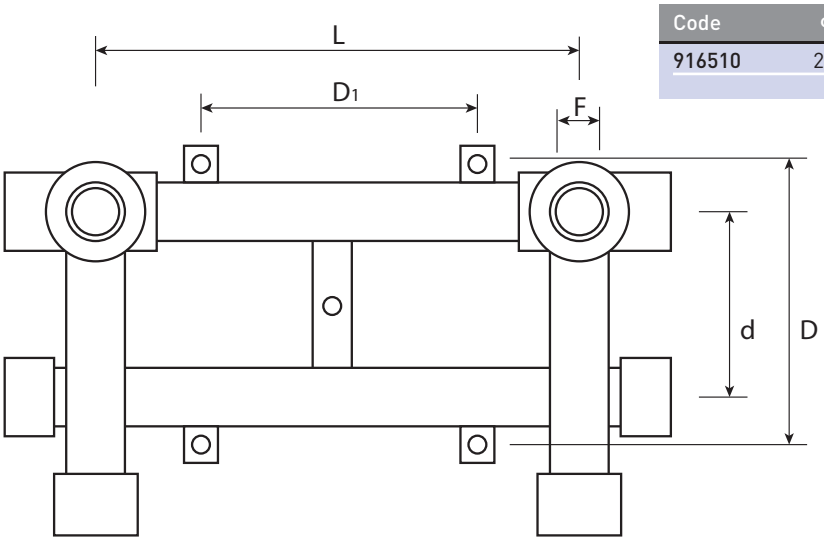
COMPLETE KIT

Code VD8040  CHROM CAP

Code VD8050  CHROM LEVER

Code VD8060  CHROM HANDLE

Modul aligning



Code	Φ	d	D	L	D1	F
916510	20	59	93	15,5	78	**1/2"**

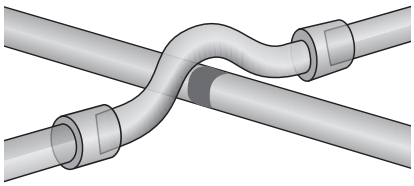
4. Mounting guidelines

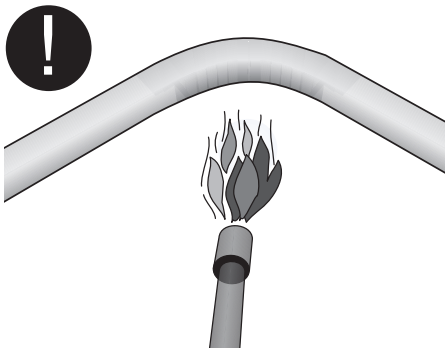
4.1 Basic principles of routing and fixing polypropylene pipes

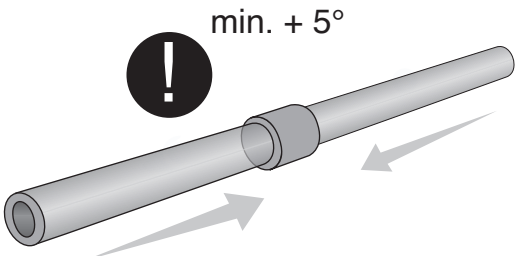
1. Pipe installation should be carried out by licensed and qualified people.
2. PP pipes in water supply installations inside buildings should not be laid above gas and electric supply systems.
3. Minimum distance between PP pipes and heat pipes shall be 10 cm counting from the pipes' surface. Otherwise an insulation should be applied.
4. In case of warm domestic water installations it is recommended to insulate a riser and horizontal piping whereas in central heating installations to insulate a riser piping in wall channels and a horizontal piping running through unheated spaces.
5. Pipes in water supply installations inside buildings should be laid in such a way that they are protected against mechanical damage.
6. All elements of the installation directly adjoining plastics shall be equipped with an elastic separator.
7. Where the pipes are laid through a building wall, protective sleeves, at least 2 cm longer than wall thickness, should be applied. The space between a pipe and a sleeve should be filled with an elastic material.
8. Clamps used to fix PP pipes should allow the pipe a free sliding movement.
9. Thermal elongation of a pipe should be taken into account and a self-compensation should be applied.
10. PP pipes should be joined by welding and by means of connectors.
11. During welding adequate welding parameters determined for a certain material should be observed.
12. The system components must be protected against radiation UV. Long-term exposure to sunlight can degrade the operating properties of the system. When the elements are installed unprotected on outdoor wall surface they must be covered with suitable insulation.

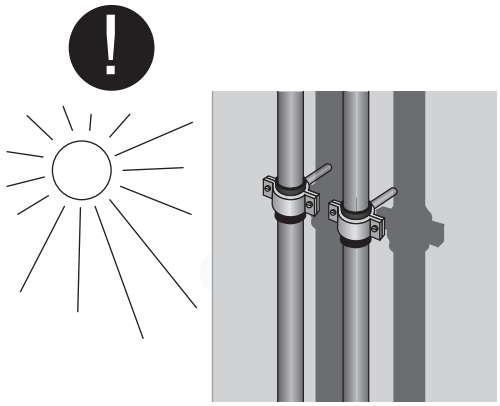
Components of plastic piping systems must be protected against impact, falling, blow or any other mechanical damage during their transport and installation.

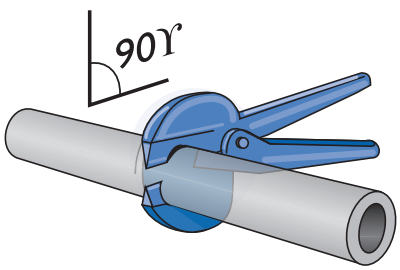
- Only the components that are not damaged or contaminated, during storage or transportation, may be used for installation works.
- A minimum temperature for plastic piping installation, as regards welding, is +5 °C. At lowers temperatures it is difficult to provide working conditions for high quality pipe joints.
- Pipeline crossings are made by means of the components specially designed for this purpose.
- Joining of plastic parts is done by polyfusion welding which results in a high-quality homogeneous joint.
- Joining must be performed under specified working conditions with the use of appropriate tools. It is not recommended to weld Plastofer components together with other brand products (no warranty).
- Components must not be exposed to open fire.
- Sharp and professional tools can only be used to cut the pipes.

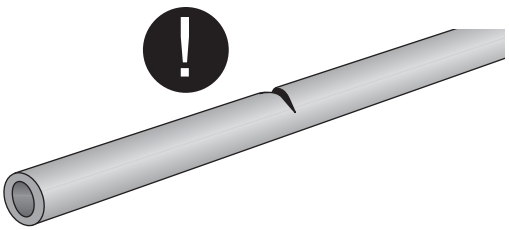












4.2 Pipe fixing

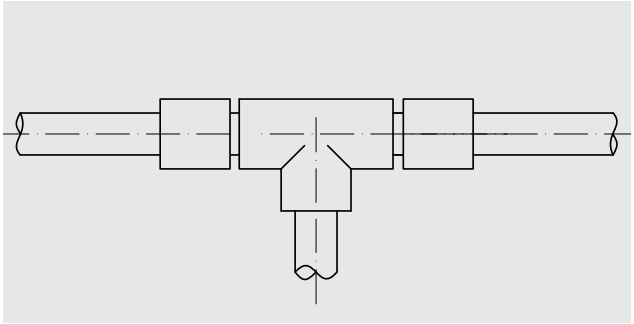
The design of a pipeline route must consider the material of the distribution system (thermal expansion coefficient), the necessity to allow for expansion, given operating conditions (a combination of pressure and temperature levels) and a type of pipe joints. Fixing of distribution systems shall be performed so that fixed and sliding points are planned with respect to expected linear changes of the pipes.

Types of pipe fixing techniques

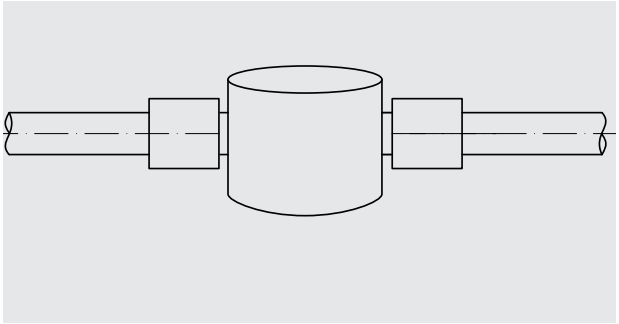
There are two kinds of supports in terms of pipe fixing.

Fixed point – closely fit set of two connectors blocking a fastening clamps, restraining axis movements of a pipe. It is designed for an adequate division of an installation into sections subject to separate elongations (thermal elongation is not transmitted beyond a fixed point). The distance between fixed points arises from the need to allow an adequate pipe compensation. Besides fixed points fastening is obligatory in the following cases:

- At draw-off points
- Before and after the fittings installed on a pipe or additional utilities (filters, water meters, settling tanks).

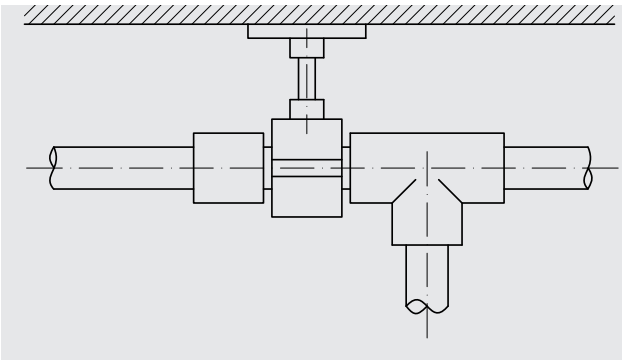


At pipe branch

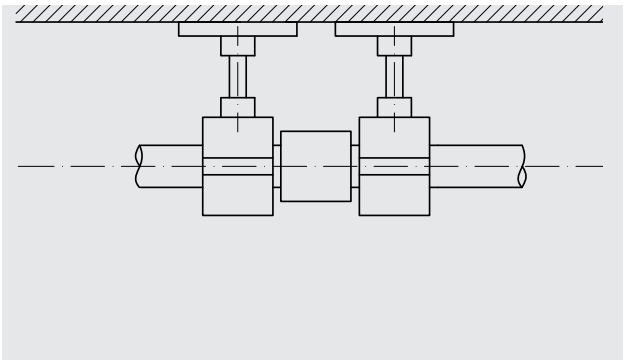


At the place of pipe fitting

Sliding point – a fastening clamp designed for anchoring the installation to the structural component of a building and preventing the pipes against excessive buckling. The distance between sliding points depends on the temperature of a medium and the outer diameter of a pipe. The list of maximum permissible distances for the pipes laid horizontally is set forth in Table. The distances between sliding points in case of stabi pipes (with an aluminum insert) are bigger.



By loose pipe-straps



By pipe-straps suspended on hooks

4.3 Maximum distances between supports

Temperature of medium in °C at density g/cm³
Standard pipe

Ø pipe (mm)	20	30	40	50	60	80
16	70	50	50	50	50	45
20	80	75	70	70	65	60
25	85	85	85	80	75	70
32	100	95	95	90	85	75
40	110	110	105	100	95	85
50	125	120	115	110	105	90
63	140	135	130	125	120	105
75	155	150	145	135	130	115
90	170	170	160	160	145	135
110	190	185	180	175	160	155

Maximum spacing of between supports enabling the pipe expansion for of vertical conduits is the same as for in case of horizontal conduits but it may be increased by 30%. If medium density is higher than 1g/cm³, then the reducing coefficient should be applied.

Fiber Reinforced

Ø pipe (mm)	20	30	40	50	60	80
16	120	110	100	100	100	80
20	150	125	115	115	105	105
25	160	135	120	120	115	110
32	170	160	140	140	135	130
40	185	190	160	160	155	150
50	210	195	185	180	170	165
63	235	230	200	190	185	175
75	250	245	210	200	195	185
90	265	255	220	210	205	190
110	270	265	255	245	235	215

4.4 Linear expansion

Polypropylene has a considerable coefficient of linear expansion α = 0.13-0.18 mm/m°K (depending on the temperature of the material). Consequently, during the mounting the system, pipe linear expansion, resulting from the change of temperature should be taken into account. The expansion of a pipe section is calculated with the following formula:

$\Delta L = \alpha \times L \times \Delta t$

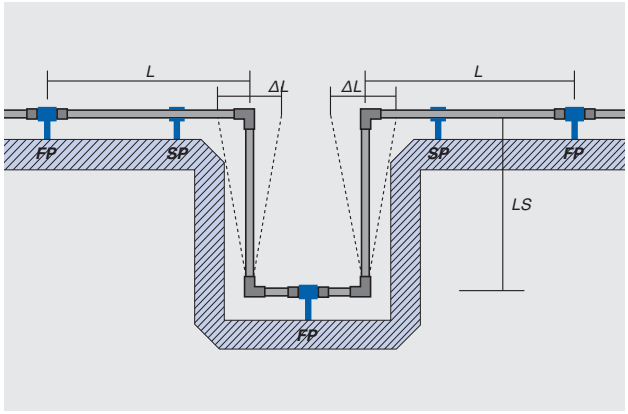
Where:
- ΔL - linear expansion (mm)
- α - is coefficient of linear expansion (mm/m°K)
- L - is initial length of a pipe (m)
- Δt - is temperature difference (°K)

The compensation of elongation is done by means of a flexible arm, an expansion loop and U-shape compensator.

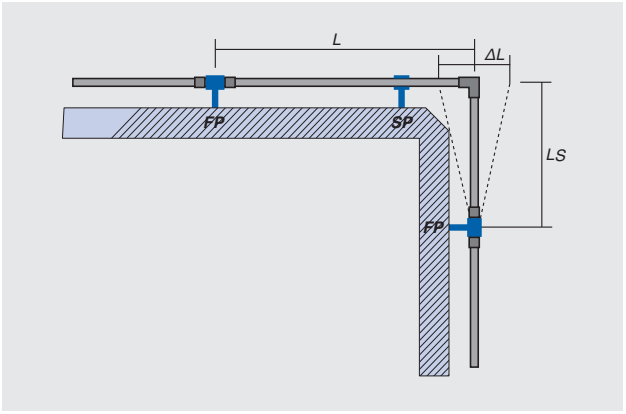
The length of a flexible arm may be calculated with the following formula:

$$L_s = K x \sqrt{D x \Delta L}$$

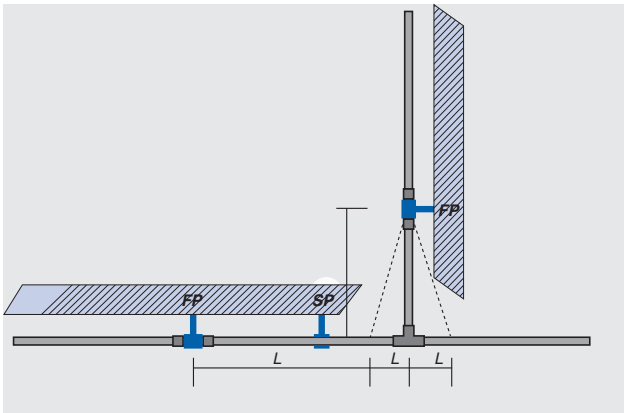
Where:
- Ls - the length of flexible arm (mm)
- K - material constant for polypropylene PP-R is 20
- ΔL - expansion of a pipe (mm)
- D - outer diameter (mm)



Example of U-expander compensator



Example of expansion in A pipeline section near a curve



Legend :
Δl - length variation
SP - sliding point
L - pipeline length
FP - fixed point
LS - U-expansion joint length

Example of expansion in A pipeline section near an inner branch.

In order to make U-shape compensator outside flexible arm, the width of compensator should be known i.e. the distance between the arms S = 2 x ΔL + Amin (Amin. – Safety Width – assigned as 150mm).

In order to minimize the dimensions of compensators during assembly the initial wire tension is used. The assembly along with initial tension ensures aesthetic appearance of a system.

Length of initial tension = ΔL/2.

Symbol	Name	Value	Unit
α	Coefficient of linear expansion	0,15	mm/ m°C
L	Length of pipe	10	m
t_p	Operating Temperature	60	°C
t_m	Temperature during mounting	20	°C
Δt	Temperature diffe-rence Δt=tp-tm	40	°C

Symbol	Name	Value	Unit
K	PP-R material constant	20	-
D	Outside pipe diameter	40	mm
ΔL	Linear expansion	60	mm

Linear expansion ΔL = αxLxΔt

$$\Delta L = 0{,}15x10x40 = 60mm$$

Compensating length:

$$L_s = Kx\sqrt{Dx\Delta L}$$

$$L_s = 20x\sqrt{40x60} = 980\,mm$$

Compensation length with initial tension:

$$L_s = Kx\sqrt{Dx\frac{\Delta L}{2}}$$

$$L_s = 20x\sqrt{40x\frac{60}{2}} = 693\,mm$$

Pipe Lenght (m)	Temperature Δt (°C)							
	10	20	30	40	50	60	70	80
	Linear elongation Δl (mm)							
1	0,35	0,70	1,05	1,40	1,75	2,10	2,45	2,80
2	0,70	1,40	2,10	2,80	3,50	4,20	4,90	5,60
3	1,50	2,10	3,15	4,20	5,25	6,30	7,35	8,40
4	1,60	2,80	4,20	5,60	7,00	8,40	9,80	11,2
5	1,75	3,50	5,25	7,00	8,75	10,5	12,3	14,0
6	2,10	4,20	6,30	8,40	10,5	12,6	14,7	16,8
7	2,45	4,90	7,35	9,80	12,3	14,7	17,2	19,6
8	2,80	5,60	8,40	11,2	14,0	16,8	19,6	22,4
9	3,15	6,30	9,45	12,6	15,8	18,9	22,1	25,2
10	3,50	7,00	10,5	14,0	17,5	21,0	24,5	28,0

Fiber composite piping has 75% less elongaition

Elongaition coefficient: 0,035 mm/mk

Δl - 0,035 x m x Δt

Δl - lengthwise change

Δt - temperature change

Length of flexible arm with initial tension may be calculated in the following way:

Length of pipeline L(m)	Difference in temperatures Δt (°C)						
	10	20	30	40	50	60	70
1	1,5	3,0	4,5	6,0	7,5	9,0	10,5
2	3,0	6,0	9.0	12,0	15,0	18.0	21,0
3	4,5	9,0	13,5	18,0	22,5	27,0	31,5
4	6,0	12,0	18,0	24,0	30,0	36,0	42,0
5	7,5	15,0	22,5	30,0	37,5	45,0	52,5
6	9,0	18,0	27,0	36,0	45,0	54,0	63,0
7	10,5	21,0	31,5	42,0	52,5	63,0	73,5
8	12,0	24,0	36,0	48,0	60,0	72,0	84,0
9	13,5	27,0	40,5	54.0	67,5	81,0	94,5
10	15,0	30,0	45,0	60.0	75,0	90,0	105.0
15	22,5	45,0	67,5	90,0	112,5	135,0	157,5
20	30,0	60,0	90,0	120,0	150,0	180,0	210,0

Length of pipeline L(m)	Difference in temperatures Δt (°C)						
	10	20	30	40	50	60	70
1	0,3	0,6	0,9	1,2	1,5	1,8	2,1
2	0.6	1,2	1.8	2.4	3,0	3,6	4,2
3	0,9	1,8	2,7	3,6	4,5	5,4	6,3
4	1.2	2,4	3.6	4.8	6,0	7,2	8,4
5	1,5	3,0	4,5	6,0	7,5	9,0	10,5
6	1.8	3,6	5,4	7.2	9,0	10,8	12,6
7	2,1	4,2	6,3	8,4	10,5	12,6	14,7
8	2,4	4,8	7,2	9,6	12,0	14,4	16,8
9	2.7	5,4	8,1	10,8	13,5	16,2	18,9
10	3.0	6,0	9,0	12,0	15,0	18,0	21,0
15	4,5	9,0	13,5	18,0	22,5	27,0	31,5
20	6.0	12,0	18,0	24,0	30,0	36.0	42,0

4.5 Pipeline routing

Pipes should be installed with a minimum gradient of 0.5 % towards the lowest system points where system emptying by drain faucet or shut off valves with outlet is made possible.

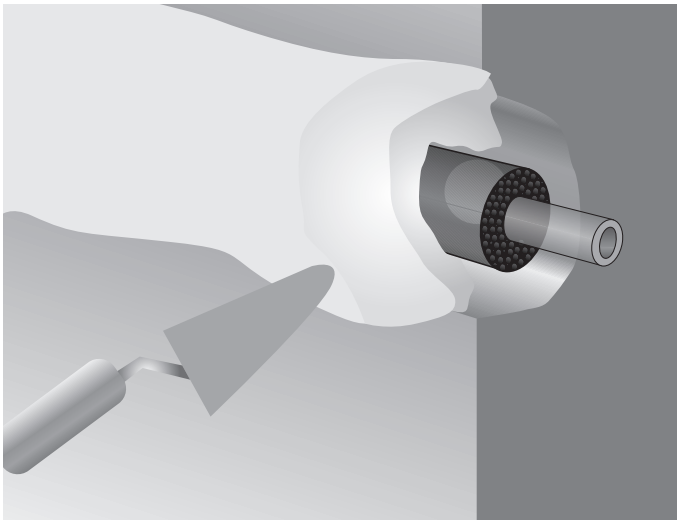
The piping system must be divided into separate parts that can be closed, if necessary. Straight valves and plastic ball taps are used for this purpose. For build in installation the shut off valves or ball taps are used. It is recommended to test fitting functions (closing/opening) before they are installed. A wall mounting group with tap connectors is recommended to be used in a termination place where valve mixers are installed.

Routing of Plastofer inlet piping

Inlet piping systems are made mainly of 20 mm diameters that are usually laid in wall channels. The channel of insulated pipe routing must be free of obstacles and allow for expansion. Beside its thermal properties the insulation system also protects the pipe against mechanic damage as well as a layer making piping expansion more easy. An insulation system of expanded polystyrene or polyurethane (foam) is recommended. Before the piping system is bricked in the pipes must be thoroughly fixed to the channel (using plastic or metal pipe-straps or by plastering at some places, etc.).

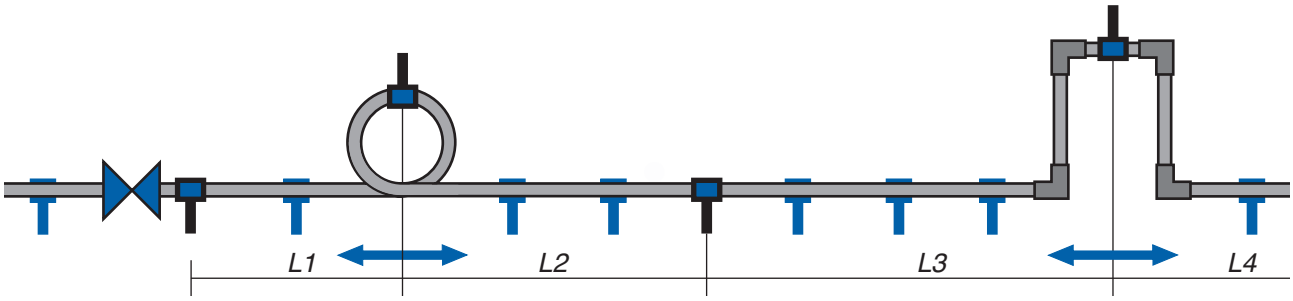
If water supply piping systems are installed inside stack partitions then they must be fixed in a suitable way - such as with a system of metal clamps and supporting elements. The systems must be insulated and positioned allowing for expansion. If water supply /distribution piping systems are installed inside floor/ ceiling structures then flexible plastic protective sleeves (made of polyethylene) are used for protection against mechanic damage while the air layer between the sleeve and pipe works as a thermal insulation. Piping systems freely laid are rarely used for short distances in areas where visual appearance is not a priority (laundry, building service areas, etc.). Supporting elements must be positioned with a necessary care to fix the piping and consider a compensation of pipe expansion in connecting sections where the pipes are covered as well as to apply a good insulation system to the piping,

(if, for instance, a cold water pipe is led freely on-wall in a heated area then a risk of surface condensation will be considerable). Piping systems may be led freely on-wall where there is no risk of mechanic damage while in normal operation.

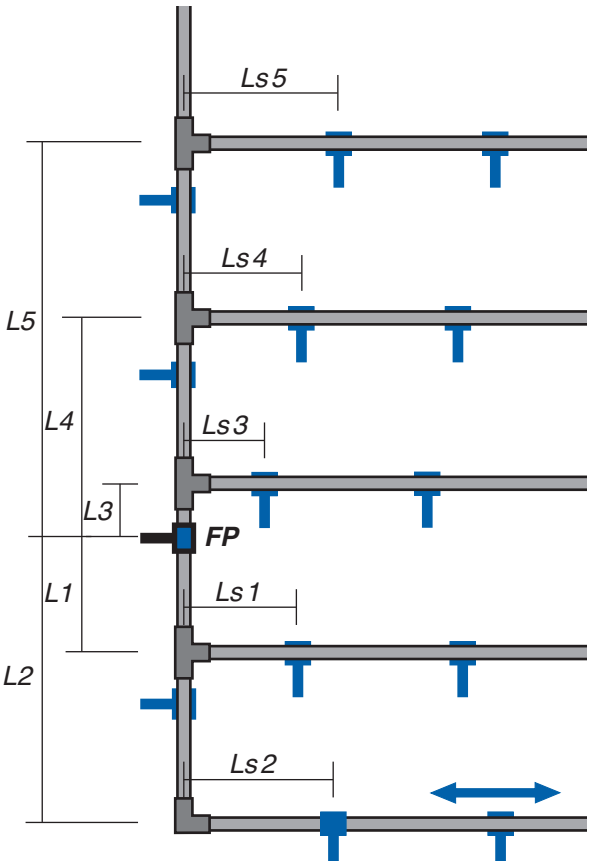


Routing of Plastofer riser piping

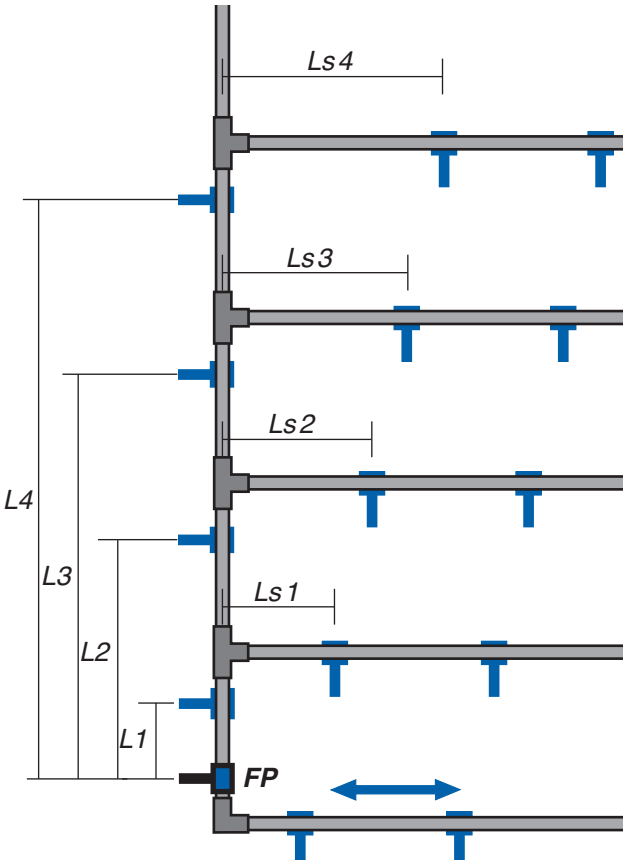
In the case of riser piping it is necessary to consider precisely the layout of fixed points and sliding mounts as well as creation of a suitable expansion compensation system. The adjustments for expansion in riser piping systems are provided as follows:



Example of horizontal pipeline section with fixed points according to choice.
Expansion is counterbalanced by a circular compensator and by an expansio curve.



Example of placing a fixed point at the first floor.

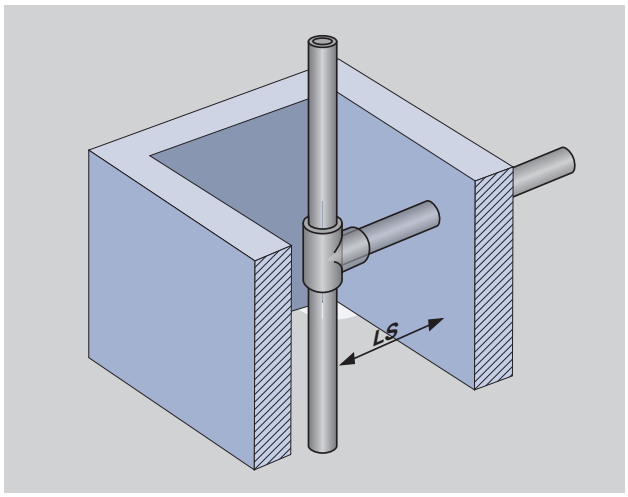


Example of placing a fixed point at the ground floor.

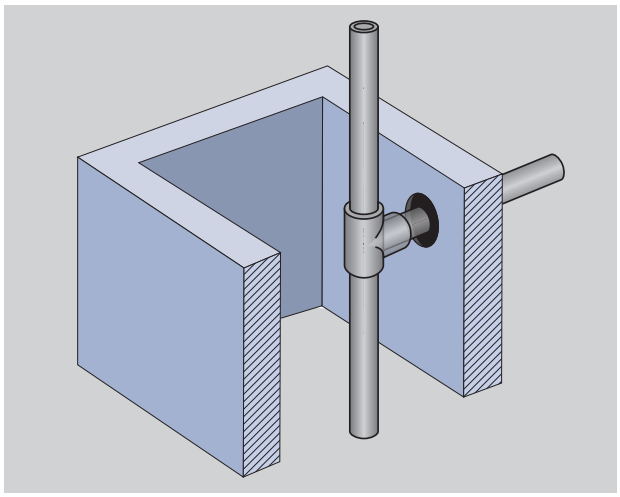
4.6 Installation in ducts

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:

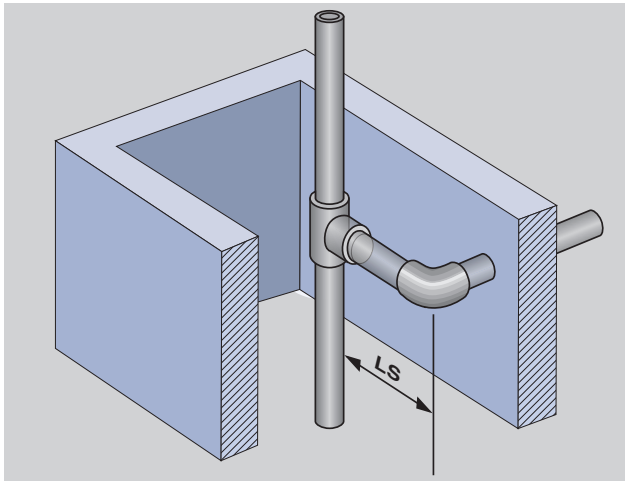
In branching off feeder piping it is necessary to allow for the riser expansion by:



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 expansion at the riser normal line.

5. Welding

5.1 Welding process

1. **Cutting pipes to proper length.**

   Cut pipes perpendicularly to its axis with a pipe cutter or a rotary pipe cutter.

2. **Cleaning and marking.**

   Before fusion clean up the end of a pipe and a fitting and mark the depth of the insertion of a pipe into a fitting in accordance with the table.

3. **Removing aluminium from stabi pipes.**

   In case of stabi pipes, prior to the fusion, remove the outside layer of polypropylene and aluminium with a stabi cutter. The depth of conditioning up to the stop position determines depth of fusion during the welding. After completing grinding check if a foil has been fully removed.

4. **Welding of elements.**

   When the heating temperature has reached the required 260°C, push the fitter and the end of the pipe on the welding ends by means of a sliding non-rotary motion to the depth previously marked and heat them according to the time specified in the table.

5. **Joining.**

   Take a pipe and a fitting off the welding ends and join them by pushing without turning, up to the previously marked welding depth. During pushing determine the mutual position of a pipe and a fitting. Leave a joint still until it reaches the required stability.

Times of working

Pipe outside diameter (mm)	Fitting depth (mm)	Heating time (s)	Working time (s)	Cooling time (min)
20	14	5	4	2
25	15	7	4	2
32	16,5	8	4	2
40	18	12	6	4
50	20	18	6	4
63	24	24	8	6
75	26	30	8	6
90	29	40	8	8
110	32,5	50	10	8

5.2 General requirements for welding

Only the same kind of material can be welded together.

Pipes and fittings should be heated simultaneously and not more than once.

All operations during a welding process shall be performed without turning a pipe against a fitting and welding ends.

It should be taken into account that welding time differs depending on elements' diameters.

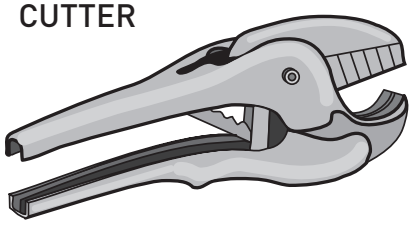
Welding time for PN 10 pipes is shortened by about half.

The recommended surrounding temperature during welding shall be above 5ºC. In lower temperature the welding time should be increased by 50% and the level of heating of the welding ends should be constantly checked. Welding below 0ºC should be avoided.

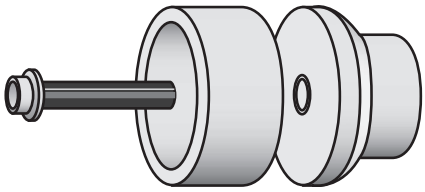
Double, even flash on the whole weld surface indicates a good quality of a joint.

In case of stabi pipes it is essential to make sure that an aluminum foil has been removed.

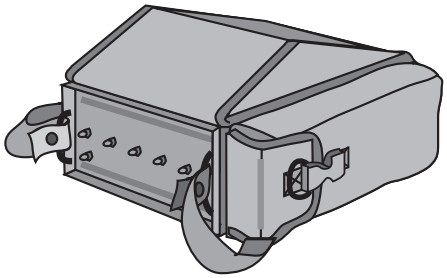
CUTTER



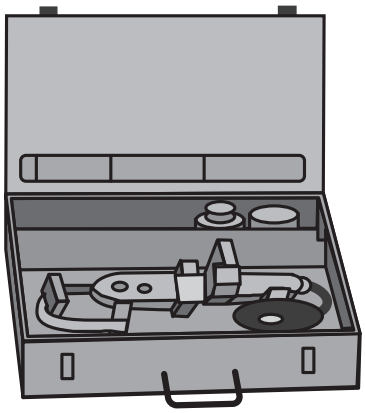
MOULD



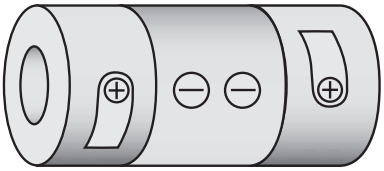
ELECTRICAL WELDING MACHINE



FUSION MACHINE



PEELER



6. Insulation

While hot water piping systems and heating systems are insulated against heat losses, the cold water ones are conversely insulated against heat gains and pipe sweating. From the point of view of drinking water health requirements, the insulation of a cold water system is important to keep the temperature level under 20 °C as well as keeping hot water at the upper limit (given by the standard of protection against scalding) - both cases are concerned with bacteria effect reduction. Keeping hot water at the required temperature level together with properly functioning circulation are important parts of protection against bacteria (such as: Legionella pneumophila) beside some other technical solutions (such as thermal sterilisation).

The thickness and kind of insulation layers are determined on the basis of thermal resistance of the insulation system to be used, air humidity in the area of the piping system and a difference between the room temperature (air) and that one of flowing water. The whole piping system, along its whole route including fittings and valves, must be insulated,

It is necessary to maintain a minimum insulation layer thickness along both pipe diameter and pipeline route (this means that insulation types that are wrapped over the pipes as cut lengthwise must be, after the installation, bonded again into a uniform profile (e.g. using an adhesive, clamps or a sealing tape).

Minimum thermal insulation layer for cold water system – example.

If hot water is transferred then it should be taken into consideration that plastic pipes posses better thermal insulation properties than metal ones. An application of plastic pipes in such systems may therefore mean a significant cost-saving solution! In systems of high demand (such as: bathrooms, bathtubs, washing machines, etc.) heat losses in plastic pipes with flowing water are 20 % compared to metal ones. Another 15 % can be saved by a thorough insulation. In systems of small and/or short-time demand where pipes are not heated to operating temperatures regularly, only 10 % of savings can be expected, however, 20 % can be expected at peak demand.

The insulation layer thickness for hot water systems usually fluctuates in the range of 9 through 15 mm at the value of thermal resistance: A. = 0.040 W/mK.

Placement / routing of pipes	Insulation layer thickness X = 0,040 W/mK
Freely laid pipes in unheated areas (such as: basement areas)	4 mm
Freely laid pipes in heated areas	9 mm
Pipes in crawlways without a hot water line running in parallelel	4 mm
Pipes in crawlways with a hot water line running in parallelel	13 mm
Independently running underplaster pipes (in channels)	4 mm
Underplaster pipes (in channels) running in parallel with a hot water line	13 mm
Pipes cast over with concrete	4 mm

7. Service life of plastic sanitary installations

Service life depends on the intensity of plastic material aging process under temperature. Permissible temperature is the one which does not cause polymer degradation or destruction of a particular structure.

In the case of low-temperature installations where the temperature of heating water does not exceed 65°C, plastic aging process goes so slowly that a 50-year service life of an installation may easily be expected. It is tantamount to a service life of a building before a complete refurbishment. Temperature used in central heating has been recently reduced from 95°/70° to 80°/60°.

New central heating installations and also those modernized should be designed, if possiblein such a way to allow operating temperature of heating water, not higher than 70°C. Keeping the temperature at a certain level may be achieved by increasing the surface of heaters in the premises. Life service is determined experimentally by defining its survivability in the function of temperature and water pressure. Such testing is conducted in water bathtubs in closed chambers or bathtubs allowing to control pressure and temperature. The samples used in tests are having closed outlets. Standard tests take 1000 or 8000 hours, that is approximately 40 to 320 days. As a result of aging plastic is losing its flexibility and becomes brittle and is also losing its original mechanical properties. First visible sign of aging may be:

- change of color – turning yellow, white or dull
- possible occurrence of excessive conduit sagging
- likely appearance of pores and micro-cracks on the surface of the pipe resulting in stress corrosion

In extreme cases the pipe may suddenly break (burst). When the aging symptoms appear the installation should be instantly evaluated and the samples tested.

7.1 Guarantee

Plastofer pipes and fittings are guaranteed by an insurance policy against possible damages due to manifest defects in the manufacturing process. Plastofer guarantees a compensation for damages coming from the use of Plastofer pipes and fittings exceptionally faulty; the guarantee is valid for a period of 10 years from the date of the installation of the system. The insurance policy does not cover any possible damage caused by:

- Installations carried out without respect towards the technical instruction;
- Wrongly done welding operations or carried out by not suitable tools;
- Welding of Plastofer pipes or fittings with similar products not manufactured by Plastofer;
- Installation of pipes and fittings with manifest signs of deteroration due to bad storage and handling.
- Use for the conveyance of corrosive liquids at rash conditions and concentrations or not included in the table.

In case of damage, the user has to send a notice in writing to Plastofer immediately. In order to benefit by the guarantee conditions, ask the distributor for the certificate of guarantee that shall be forwarded to the producer duly filled in with the following data:

- The installing company's name;
- Place and date of installations;
- User's and distributor's stamp and signature.

Any claim and contest will not be accepted if the certificate of guarantee has not previously filled in.

8. Pressure test

Test procedure A

To use Procedure A to apply the hydrostatic test pressure conduct the procedure as follows:

A) Open the venting system;

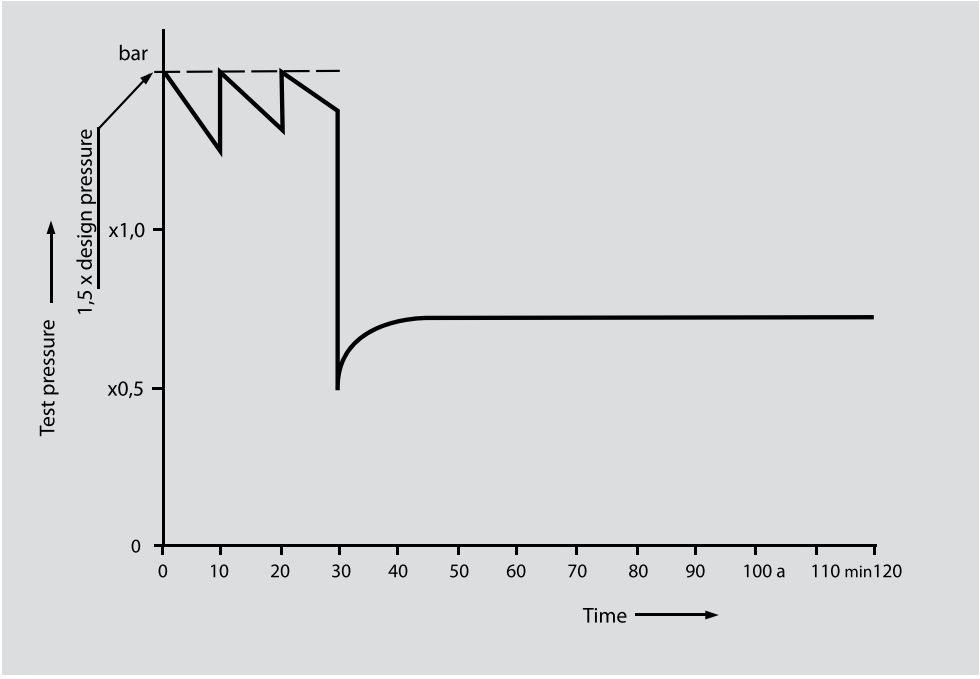
B) Purge the system with water to expel all air that can be removed thereby. Stop the flow and close the venting system;

C) Apply the selected hydrostatic test pressure equal to 1,5 times the design pressure by pumping according to Figure 12 during the first 30 min, during which time an inspection should be carried out to identify any obvious leaks with the system under test;

D) Reduce the pressure by rapidly bleeding water from the system to 0,5 times design pressure according to Figure 12;

E) Close the valve. The recovery of a constant pressure, which is higher than 0,5 times the design pressure, is indicative of a sound system. Monitor the situation for 90 min. Visually check for leaks. If during that period there is a drop in pressure, this indicates a leak within the system;

F) The test result should be recorded.



Test procedure B

To use Procedure B to apply the hydrostatic test pressure, conduct the procedure as follows:

A) Open the venting system;

B) Purge the system with water to expel all air that can be removed thereby. Stop the flow and close the venting system;

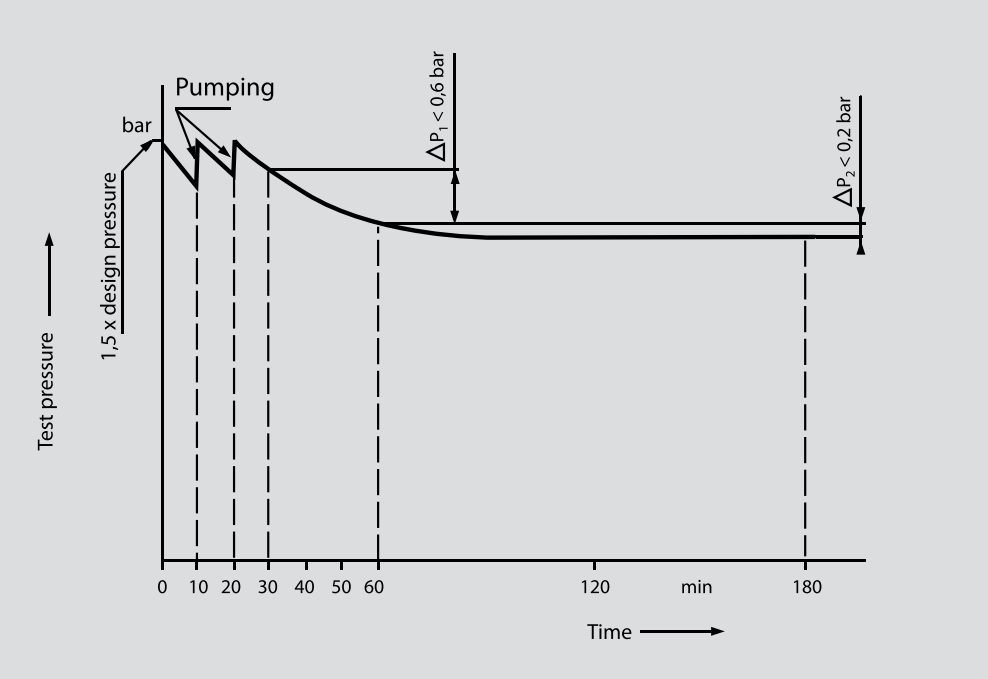
C) Apply the selected test pressure equal to 1,5 times the design pressure by pumping according to Figure 13 during the first 30 min;

D) Read the pressure when the first 30 min have elapsed;

E) Read the pressure after another 30 min and visually check for leaks. If the pressure has dropped by less than 0,6 bar conclude the system has no obvious leakage and continue the test without further pumping;

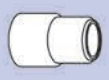
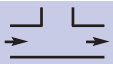
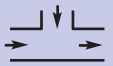
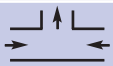
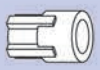
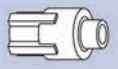
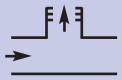
F) Visually check for leaks and if during the next 2 h, the pressure drops by more than 0,2 bar this

G) Indicates a leak within the system.



The test result should be recorded. For smaller sections of an installation the test Procedure B may be reduced to only stages a) to e) and g).

9. Pressure loss tables

Fitting	Picture	Symbol	Comment	Coefficient of loss ζ
Socket				0.25
Reducer MF			by 1 dimension by 2 dimension by 3 dimension	0.40 0.50 0.60
Elbow 90°				1.50
Elbow 45°				0.60
Equal Tee				0.25
			Separation of flow	1.20
			Conjunction of flow	0.80
			Counter current in case of separation of flow	1.80
			Counter current in case of conjunction of flow	3.00
Reducer tee	Sum of ζ Equal Tee and ζ Reducer			
Four Way Fitting			Separation of flow	2.10
			Conjunction of flow	3.70
Socket Female Thread				0.50
Socket Male Thread				0.70
Elbow Female Thread				1.40
Elbow Male Thread				1.60
Tee Female Thread			Separation of flow	1.40
Tee Male Thread			Separation of flow	1.80
Ball Valve			20	0.50

Continous pressure drop SDR 6 20° / 70°

Rugosity	0,007 mm	0,007 mm
Specific weight	998,00 kg/m3	977,20 kg/m3
Temperature	20° C	70° C
Viscosity	1,02E-06 m²/s	4,30E-07 m2/s

Legend symbols

Q= flow (l/s) De= Ø ext. (mm) Di= Ø int. (mm)
R= continous pressure drop (mbar/m)
V= speed (m/s)

Q = l/s	De Di	20 mm 13,2 mm		25 mm 16,6 mm		32 mm 21,2 mm		40 mm 26,6 mm		50 mm 33,4 mm		63 mm 42,0 mm		75 mm 50,0 mm		90 mm 60,0 mm		110 mm 73,4 mm	
0,01	R	0,14	0,09	0,05	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00				
	V	0,07	0,07	0,05	0,05	0,03	0,03	0,02	0,02	0,01	0,01	0,01	0,01	0,01	0,01				
0,02	R	0,27	0,29	0,11	0,10	0,04	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00			
	V	0,15	0,15	0,09	0,09	0,06	0,06	0,04	0,04	0,02	0,02	0,01	0,01	0,01	0,01	0,01			
0,03	R	0,81	0,60	0,16	0,20	0,06	0,06	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00		
	V	0,22	0,22	0,14	0,14	0,08	0,08	0,05	0,05	0,03	0,03	0,02	0,02	0,02	0,02	0,01	0,01		
0,04	R	1,33	0,99	0,45	0,33	0,14	0,10	0,03	0,04	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00		
	V	0,29	0,29	0,18	0,18	0,11	0,11	0,07	0,07	0,05	0,05	0,03	0,03	0,02	0,02	0,01	0,01		
0,05	R	1,94	1,46	0,66	0,49	0,21	0,15	0,07	0,05	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00		
	V	0,37	0,37	0,23	0,23	0,14	0,14	0,09	0,09	0,06	0,06	0,04	0,04	0,03	0,03	0,02	0,02		
0,06	R	2,66	2,02	0,90	0,67	0,28	0,21	0,10	0,07	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00		
	V	0,44	0,44	0,28	0,28	0,17	0,17	0,11	0,11	0,07	0,07	0,04	0,04	0,03	0,03	0,02	0,02		
0,07	R	3,48	2,65	1,17	0,88	0,37	0,27	0,13	0,09	0,04	0,03	0,01	0,01	0,00	0,00	0,00	0,00		
	V	0,51	0,51	0,32	0,32	0,20	0,20	0,13	0,13	0,08	0,08	0,05	0,05	0,04	0,04	0,02	0,02		
0,08	R	4,39	3,36	1,48	1,12	0,46	0,35	0,16	0,12	0,06	0,04	0,02	0,01	0,01	0,01	0,00	0,00		
	V	0,58	0,58	0,37	0,37	0,23	0,23	0,14	0,14	0,09	0,09	0,06	0,06	0,04	0,04	0,03	0,03		
0,09	R	5,39	4,15	1,81	1,38	0,57	0,43	0,19	0,14	0,07	0,05	0,02	0,02	0,01	0,01	0,00	0,00		
	V	0,66	0,66	0,42	0,42	0,25	0,25	0,16	0,16	0,10	0,10	0,06	0,06	0,05	0,05	0,03	0,03		
0,10	R	6,48	5,02	2,17	1,66	0,68	0,51	0,23	0,17	0,08	0,06	0,03	0,02	0,01	0,01	0,00	0,00		
	V	0,73	0,73	0,46	0,46	0,28	0,28	0,18	0,18	0,12	0,12	0,07	0,07	0,05	0,05	0,04	0,04		
0,12	R	8,92	6,97	2,99	2,30	0,93	0,71	0,32	0,24	0,11	0,08	0,04	0,03	0,02	0,01	0,01	0,00		
	V	0,88	0,88	0,55	0,55	0,34	0,34	0,22	0,22	0,14	0,14	0,09	0,09	0,06	0,06	0,04	0,04		
0,14	R	11,7	9,22	3,91	3,03	1,22	0,93	0,42	0,31	0,15	0,11	0,05	0,04	0,02	0,02	0,01	0,01		
	V	1,02	1,02	0,65	0,65	0,40	0,40	0,25	0,25	0,16	0,16	0,10	0,10	0,07	0,07	0,06	0,05		
0,16	R	14,8	11,8	4,94	3,85	1,54	1,18	0,52	0,40	0,18	0,14	0,06	0,04	0,03	0,02	0,01	0,01		
	V	1,17	1,17	0,74	0,74	0,45	0,45	0,29	0,29	0,18	0,18	0,12	0,12	0,08	0,08	0,06	0,06		
0,18	R	18,3	14,6	6,08	4,77	1,89	1,46	0,64	0,49	0,22	0,17	0,07	0,06	0,03	0,02	0,01	0,01	0,01	0,00
	V	1,32	1,32	0,83	0,83	0,51	0,51	0,32	0,32	0,21	0,21	0,13	0,13	0,09	0,09	0,06	0,06	0,04	0,00
0,20	R	22,0	17,6	7,32	5,77	2,27	1,76	0,77	0,59	0,27	0,20	0,09	0,07	0,04	0,03	0,02	0,01	0,01	0,01
	V	1,46	1,46	0,92	0,92	0,57	0,57	0,36	0,36	0,23	0,23	0,14	0,14	0,10	0,10	0,07	0,07	0,05	0,05
0,30	R	45,6	37,4	15,1	12,1	4,64	3,66	1,57	1,22	0,55	0,42	0,18	0,14	0,08	0,06	0,03	0,02	0,01	0,01
	V	2,19	2,19	1,39	1,39	0,85	0,85	0,54	0,54	0,35	0,35	0,22	0,22	0,15	0,15	0,11	0,11	0,07	0,07
0,40	R	76,8	63,9	25,2	20,5	7,74	6,18	2,61	2,05	0,90	0,70	0,29	0,23	0,13	0,10	0,05	0,04	0,02	0,07
	V	2,92	2,92	1,85	1,85	1,13	1,13	0,72	0,72	0,46	0,46	0,29	0,29	0,20	0,20	0,14	0,14	0,10	0,10
0,50	R	115	97,6	37,7	31,1	11,5	9,31	3,87	3,07	1,34	1,05	0,44	0,34	0,19	0,15	0,08	0,06	0,03	0,03
	V	3,65	3,65	2,31	2,31	1,42	1,42	0,90	0,90	0,58	0,58	0,36	0,36	0,25	0,25	0,18	0,18	0,12	0,12
0,60	R	161		52,5	43,7	16,0	13,1	5,35	4,28	1,85	1,46	0,60	0,47	0,26	0,20	0,11	0,08	0,04	0,03
	V	4,38		2,77	2,77	1,70	1,70	1,08	1,08	0,69	0,69	0,43	0,43	0,31	0,31	0,21	0,21	0,14	0,14
0,70	R	214		69,5	58,4	21,2	17,3	7,05	5,68	2,43	1,93	0,79	0,62	0,34	0,27	0,14	0,11	0,06	0,05
	V	5,12		3,23	3,23	1,98	1,98	1,26	1,26	0,81	0,81	0,51	0,51	0,36	0,36	0,25	0,25	0,17	0,17
0,80	R			88,7		26,9	22,2	8,96	7,26	3,08	2,46	1,00	0,78	0,43	0,34	0,18	0,14	0,07	0,06
	V			3,70		2,27	2,27	1,44	1,44	0,92	0,92	0,58	0,58	0,41	0,41	0,28	0,28	0,19	0,19
0,90	R			110		33,3	27,7	11,1	9,03	3,80	3,05	1,23	0,97	0,53	0,42	0,22	0,17	0,09	0,07
	V			4,16		2,55	2,55	1,62	1,62	1,04	1,04	0,65	0,65	0,46	0,46	0,32	0,32	0,21	0,21
1,00	R			133		40,4	33,8	13,4	10,9	4,59	3,70	1,48	1,18	0,64	0,51	0,27	0,21	0,10	0,08
	V			4,62		2,83	2,83	1,80	1,80	1,16	1,16	0,72	0,72	0,51	0,51	0,35	0,35	0,24	0,24
1,20	R					56,3	47,7	18,7	15,4	6,37	5,17	2,05	1,64	0,89	0,70	0,37	0,29	0,14	0,10
	V					3,40	3,40	2,16	2,16	1,39	1,39	0,87	0,87	0,61	0,61	0,42	0,42	0,29	0,29
1,40	R					74,8		24,6	20,5	8,41	6,87	2,70	2,17	1,17	0,93	0,49	0,38	0,19	0,13
	V					3,97		2,52	2,52	1,62	1,62	1,01	1,01	0,71	0,71	0,50	0,50	0,33	0,33
1,60	R					95,6		31,5	26,4	10,7	8,80	3,43	2,78	1,48	1,19	0,62	0,49	0,24	0,17
	V					4,53		2,88	2,88	1,85	1,86	1,15	1,15	0,81	0,81	0,57	0,57	0,38	0,38
1,80	R							39,1	32,9	13,2	10,9	4,24	3,45	1,83	1,47	0,76	0,61	0,29	0,22
	V							3,24	3,24	2,08	2,08	1,30	1,30	0,92	0,92	0,64	0,64	0,43	0,43
2,00	R							47,4		16,1	13,4	5,13	4,19	2,21	1,78	0,92	0,73	0,35	0,25
	V							3,60		2,31	2,31	1,44	1,44	1,02	1,02	0,71	0,71	0,48	0,48
2,20	R							56,4		19,1	15,9	6,10	5,00	2,63	2,13	1,09	0,87	0,42	0,30
	V							3,96		2,54	2,54	1,59	1,59	1,12	1,12	0,78	0,78	0,52	0,52
2,40	R							66,2		22,4	18,7	7,14	5,87	3,07	2,49	1,28	1,02	0,49	0,39
	V							4,32		2,77	2,77	1,73	1,73	1,22	1,22	0,85	0,85	0,57	0,57
2,60	R							76,8		25,9	21,8	8,25	6,81	3,55	2,89	1,47	1,19	0,57	0,42
	V							4,68		3,00	3,00	1,88	1,88	1,32	1,32	0,92	0,92	0,62	0,62
2,80	R							88,1		29,7	25,2	9,44	7,82	4,06	3,32	1,68	1,36	0,65	0,48
	V							5,04		3,23	3,23	2,02	2,02	1,43	1,43	0,99	0,99	0,67	0,67
3,00	R									33,7		10,7	8,89	4,59	3,77	1,90	1,54	0,73	0,54
	V									3,47		2,17	2,17	1,53	1,53	1,06	1,06	0,71	0,71

Continous pressure drop SDR 6 20° / 70°

Rugosity	0,007 mm	0,007 mm
Specific weight	998,00 kg/m3	977,20 kg/m3
Temperature	20° C	70° C
Viscosity	1,02E-06 m²/s	4,30E-07 m2/s

Legend symbols

Q= flow (l/s) De= Ø ext. (mm) Di= Ø int. (mm)
R= continous pressure drop (mbar/m)
V= speed (m/s)

Q = l/s	De Di	20 mm 13,2 mm	25 mm 16,6 mm	32 mm 21,2 mm	40 mm 26,6 mm	50 mm 33,4 mm	63 mm 42,0 mm		75 mm 50,0 mm		90 mm 60,0 mm		110 mm 73,4 mm	
3,20	R					37,9	12,1	10,1	5,16	4,25	2,14	1,74	0,87	0,61
	V					3,70	2,31	2,31	1,63	1,63	1,13	1,13	0,76	0,76
3,40	R					42,4	13,4	11,2	5,76	4,75	2,39	1,94	0,91	0,68
	V					3,93	2,45	2,45	1,73	1,73	1,20	1,20	0,81	0,81
3,60	R					47,1	14,9	12,5	6,39	5,28	2,65	2,16	1,01	0,75
	V					4,16	2,60	2,60	1,83	1,83	1,27	1,27	0,86	0,86
3,80	R					52,1	16,5	13,8	7,06	5,84	2,92	2,38	1,17	0,82
	V					4,39	2,74	2,74	1,94	1,94	1,34	1,34	0,90	0,90
4,00	R					57,3	18,1	15,3	7,75	6,43	3,20	2,62	1,23	0,91
	V					4,62	2,89	2,89	2,04	2,04	1,41	1,41	0,95	0,95
4,20	R					62,7	18,8	16,8	8,47	7,04	3,50	2,87	1,34	1,00
	V					4,85	3,03	3,03	2,14	2,14	1,49	1,49	1,00	1,00
4,40	R					68,4	21,6	18,3	9,22	7,68	3,80	3,13	1,45	1,09
	V					5,08	3,18	3,18	2,24	2,24	1,56	1,56	1,05	1,06
4,60	R						23,5		9,99	8,35	4,12	3,40	1,58	1,19
	V						3,32		2,34	2,34	1,63	1,63	1,03	1,09
4,80	R						25,3		10,8	9,05	4,45	3,68	1,70	1,29
	V						3,46		2,44	2,44	1,70	1,70	1,09	1,14
5,00	R						27,3		11,6	9,76	4,80	3,97	1,83	1,39
	V						3,61		2,55	2,55	1,77	1,77	1,19	1,19
5,20	R						29,3		12,5	10,5	5,15	4,27	1,97	1,67
	V						3,75		2,65	2,65	1,84	1,84	1,24	1,24
5,40	R						31,4		13,4	11,2	5,52	4,58	2,11	1,60
	V						3,90		2,75	2,75	1,91	1,91	1,28	1,28
5,60	R						33,6		14,3	12,1	5,90	4,90	2,25	1,71
	V						4,04		2,85	2,85	1,98	1,98	1,33	1,33
5,80	R						35,9		15,3	12,9	6,29	5,23	2,40	1,82
	V						4,19		2,95	2,95	2,05	2,05	1,38	1,38
6,00	R						38,2		16,2	13,8	6,69	5,57	2,55	1,94
	V						4,33		3,06	3,06	2,12	2,12	1,43	1,43
6,20	R						40,6		17,3	14,7	7,10	5,93	2,70	2,07
	V						4,48		3,16	3,16	2,19	2,19	1,47	1,47
6,40	R						43,1		18,3	15,6	7,52	6,29	2,87	2,19
	V						4,62		3,26	3,26	2,26	2,26	1,52	1,52
6,60	R						45,6		19,4	16,5	7,96	6,66	3,03	2,32
	V						4,76		3,36	3,36	2,33	2,33	1,57	1,57
6,80	R						48,2		20,5	17,4	8,41	7,05	3,20	2,47
	V						4,91		3,46	3,46	2,41	2,41	1,62	1,62
7,00	R						50,8		21,6		8,86	7,44	3,27	2,60
	V						5,05		3,57		2,48	2,48	1,66	1,66
7,50	R								24,5		10,1	8,47	3,82	2,96
	V								3,82		2,65	2,65	1,78	1,78
8,00	R								27,6		11,3	9,61	4,30	3,39
	V								4,07		2,83	2,83	1,90	1,90
9,00	R								34,4		14,1	11,9	5,33	4,23
	V								4,58		3,18	3,18	2,14	2,14
10,0	R								41,8		17,1	14,6	6,47	5,08
	V								5,09		3,54	3,54	2,38	2,38

Continous pressure drop SDR 7,4 20° / 67°

Rugosity	0,007 mm	0,007 mm
Specific weight	998,00 kg/m3	977,20 kg/m3
Temperature	20° C	67° C
Viscosity	1,02E-06 m²/s	4,30E-07 m2/s

Legend symbols

Q= flow (l/s) De= Ø ext. (mm) Di= Ø int. (mm)

R= continous pressure drop (mbar/m)

V= speed (m/s)

Q = l/s	De Di	20 mm 14,4 mm		25 mm 18,0 mm		32 mm 23,2 mm		40 mm 29,0 mm		50 mm 36,2 mm		63 mm 45,8 mm		75 mm 54,4 mm		90 mm 65,4 mm		110 mm 79,8 mm		125 mm 90,8 mm	
0,01	R	0,10	0,04	0,04	0,02	0,01	0,01	0,01	0,00	0,00	0,00										
	V	0,06	0,06	0,04	0,04	0,02	0,02	0,02	0,02	0,01	0,01										
0,02	R	0,19	0,21	0,08	0,07	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00								
	V	0,12	0,12	0,08	0,08	0,06	0,06	0,03	0,03	0,02	0,02	0,01	0,01								
0,03	R	0,54	0,42	0,12	0,15	0,04	0,05	0,02	0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00				
	V	0,18	0,18	0,12	0,12	0,07	0,07	0,05	0,05	0,03	0,03	0,02	0,02	0,01	0,01	0,01	0,01				
0,04	R	0,88	0,70	0,31	0,24	0,06	0,08	0,02	0,03	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00				
	V	0,25	0,25	0,16	0,16	0,10	0,10	0,06	0,06	0,04	0,04	0,02	0,02	0,02	0,02	0,01	0,01				
0,05	R	1,29	1,03	0,45	0,36	0,14	0,11	0,03	0,04	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00				
	V	0,31	0,31	0,20	0,20	0,12	0,12	0,08	0,08	0,05	0,05	0,03	0,03	0,02	0,02	0,02	0,02				
0,06	R	1,76	1,42	0,61	0,49	0,19	0,15	0,07	0,05	0,01	0,02	0,01	0,01	0,00	0,00	0,00	0,00				
	V	0,37	0,37	0,24	0,24	0,14	0,14	0,09	0,09	0,06	0,06	0,04	0,04	0,03	0,03	0,02	0,02				
0,07	R	2,30	1,86	0,80	0,64	0,25	0,20	0,09	0,07	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00				
	V	0,43	0,43	0,28	0,28	0,17	0,17	0,11	0,11	0,07	0,07	0,04	0,04	0,03	0,03	0,02	0,02				
0,08	R	2,90	2,36	1,10	0,81	0,12	0,25	0,11	0,09	0,04	0,03	0,01	0,01	0,00	0,00	0,00	0,00				
	V	0,40	0,49	0,31	0,31	0,19	0,19	0,12	0,12	0,08	0,08	0,05	0,05	0,03	0,05	0,02	0,03				
0,09	R	3,56	2,91	1,23	1,00	0,39	0,31	0,13	0,11	0,05	0,04	0,02	0,01	0,00	0,00	0,00	0,00				
	V	0,55	0,56	0,35	0,35	0,22	0,22	0,14	0,14	0,09	0,09	0,06	0,06	0,04	0,04	0,03	0,03				
0,10	R	4,28	3,51	1,48	1,20	0,46	0,37	0,16	0,13	0,05	0,04	0,02	0,01	0,00	0,01	0,00	0,00				
	V	0,61	0,61	0,39	0,39	0,24	0,24	0,15	0,15	0,10	0,10	0,06	0,06	0,04	0,04	0,03	0,03				
0,12	R	0,58	4,86	2,03	1,66	0,63	0,51	0,22	0,18	0,07	0,06	0,03	0,02	0,01	0,01	0,00	0,00				
	V	0,74	0,74	0,47	0,47	0,29	0,29	0,18	0,18	0,12	0,12	0,07	0,07	0,05	0,05	0,04	0,04				
0,14	R	0,77	6,40	2,66	2,18	0,83	0,67	0,29	0,23	0,10	0,08	0,03	0,03	0,01	0,01	0,01	0,00				
	V	0,86	0,86	0,55	0,55	0,34	0,34	0,21	0,21	0,14	0,14	0,09	0,09	0,06	0,06	0,04	0,04				
0,16	R	9,76	8,14	3,36	2,77	1,04	0,85	0,36	0,29	0,12	0,10	0,04	0,03	0,02	0,01	0,01	0,01				
	V	0,98	0,98	0,63	0,63	0,39	0,39	0,25	0,25	0,16	0,16	0,10	0,10	0,07	0,07	0,05	0,05				
0,18	R	12,0	10,0	4,13	3,42	1,28	1,05	0,44	0,36	0,15	0,12	0,05	0,04	0,02	0,02	0,01	0,01				
	V	1,11	1,11	0,71	0,71	0,43	0,43	0,28	0,28	0,17	0,17	0,11	0,11	0,08	0,08	0,05	0,05				
0,20	R	14,5	12,1	4,97	4,13	1,54	1,27	0,53	0,43	0,18	0,14	0,06	0,05	0,03	0,02	0,01	0,01				
	V	1,23	1,23	0,79	0,79	0,48	0,48	0,31	0,31	0,19	0,19	0,12	0,12	0,09	0,09	0,06	0,06				
0,30	R	29,9	25,5	10,1	8,58	3,14	2,61	1,07	0,88	0,36	0,30	0,12	0,10	0,05	0,04	0,02	0,02	0,01	0,01	0,00	0,00
	V	1,84	1,84	1,18	1,18	0,72	0,72	0,46	0,46	0,29	0,29	0,18	0,18	0,13	0,13	0,09	0,09	0,06	0,06	0,05	0,05
0,40	R	50,2	43,4	17,4	14,5	5,23	4,39	1,78	1,48	0,60	0,49	0,20	0,16	0,09	0,07	0,04	0,03	0,01	0,01	0,01	0,01
	V	2,46	2,46	1,57	1,57	0,96	0,96	0,61	0,61	0,29	0,29	0,26	0,26	0,17	0,17	0,12	0,12	0,08	0,08	0,06	0,06
0,50	R	75,3	65,7	25,4	2,18	7,79	6,58	2,64	2,21	0,88	0,73	0,29	0,24	0,13	0,11	0,05	0,04	0,02	0,02	0,01	0,01
	V	3,07	3,07	1,96	1,96	1,20	1,20	0,77	0,77	0,49	0,49	0,31	0,31	0,22	0,22	0,15	0,15	0,10	0,10	0,08	0,08
0,60	R	105	92,4	35,3	30,5	10,7	9,18	3,65	3,07	1,22	1,02	0,41	0,33	0,18	0,15	0,08	0,06	0,03	0,02	0,02	0,01
	V	3,68	3,68	2,36	2,36	1,44	1,44	0,92	0,92	0,58	0,58	0,37	0,37	0,26	0,26	0,18	0,18	0,12	0,12	0,09	0,09
0,70	R	139		46,1	40,7	14,2	12,1	4,81	4,06	1,60	1,34	0,53	0,44	0,23	0,19	0,10	0,08	0,04	0,03	0,02	0,02
	V	4,30		2,75	2,75	1,68	1,68	1,07	1,07	0,68	0,68	0,43	0,43	0,30	0,30	0,21	0,21	0,14	0,14	0,11	0,11
0,80	R	178		59,7	52,2	18,1	15,5	6,11	5,18	2,03	1,71	0,67	0,56	0,29	0,24	0,12	0,10	0,05	0,04	0,03	0,02
	V	4,91		3,14	3,14	1,93	1,93	1,23	1,23	0,78	0,78	0,49	0,49	0,35	0,35	0,24	0,24	0,16	0,16	0,12	0,12
0,90	R			74,0	65,1	22,4	19,3	7,54	6,43	2,51	2,11	0,83	0,69	0,36	0,30	0,15	0,13	0,06	0,05	0,03	0,03
	V			3,54	3,54	2,17	2,17	1,39	1,39	0,87	0,87	0,55	0,55	0,39	0,39	0,27	0,27	0,18	0,18	0,14	0,14
1,00	R			89,8		27,1	23,5	9,12	7,80	3,03	2,56	1,01	0,84	0,44	0,36	0,18	0,15	0,07	0,06	0,04	0,03
	V			3,93		2,41	2,41	1,54	1,54	0,97	0,97	0,61	0,61	0,43	0,43	0,30	0,30	0,20	0,20	0,15	0,15
1,20	R			125		37,8	33,0	12,6	10,9	4,19	3,57	1,38	1,16	0,60	0,50	0,25	0,21	0,10	0,08	0,05	0,04
	V			4,72		2,89	2,89	1,84	1,84	1,17	1,17	0,73	0,73	0,52	0,52	0,36	0,36	0,24	0,24	0,19	0,19
1,40	R					50,1	44,0	16,7	14,5	5,63	4,73	1,82	1,54	0,79	0,67	0,33	0,28	0,13	0,10	0,07	0,06
	V					3,37	3,37	2,15	2,15	1,36	1,36	0,86	0,86	0,61	0,61	0,42	0,42	0,28	0,28	0,22	0,22
1,60	R					64,0	56,6	21,3	18,5	7,04	6,04	2,31	1,96	1,01	0,85	0,42	0,35	0,16	0,13	0,09	0,07
	V					3,85	3,85	2,48	2,48	1,88	1,88	0,98	0,98	0,69	0,69	0,48	0,48	0,32	0,32	0,25	0,25
1,80	R					79,5		26,4	23,1	8,71	7,50	2,85	2,43	1,24	1,05	0,52	0,44	0,20	0,16	0,11	0,09
	V					4,33		2,76	2,76	1,75	1,75	1,10	1,10	0,78	0,78	0,54	0,54	0,36	0,36	0,28	0,28
2,00	R					96,7		32,0	28,1	10,5	9,11	3,54	2,94	1,50	1,27	0,63	0,53	0,24	0,20	0,13	0,11
	V					4,81		3,07	3,07	1,94	1,94	1,22	1,22	0,87	0,87	0,60	0,60	0,40	0,40	0,31	0,31
2,20	R					115		38,2	33,6	12,5	10,8	4,11	3,61	1,78	1,51	0,74	0,63	0,28	0,24	0,15	0,12
	V					5,30		3,38	3,38	2,14	2,14	1,35	1,35	0,98	0,98	0,66	0,66	0,44	0,44	0,34	0,34
2,40	R							44,8	39,6	14,6	12,7	4,79	4,11	2,08	1,77	0,87	0,73	0,33	0,28	0,17	0,15
	V							3,68	3,68	2,33	2,33	1,47	1,47	1,04	1,04	0,72	0,72	0,48	0,48	0,37	0,37
2,60	R							57,9		16,9	14,8	5,64	4,77	2,40	2,05	1,01	0,85	0,38	0,32	0,20	0,17
	V							3,99		2,53	2,53	1,59	1,59	1,13	1,13	0,78	0,78	0,52	0,52	0,40	0,40
2,80	R							59,6		19,4	17,0	6,33	5,47	2,75	2,35	1,14	0,97	0,43	0,36	0,23	0,19
	V							4,30		2,72	2,72	1,71	1,71	1,21	1,21	0,84	0,84	0,56	0,56	0,43	0,43
3,00	R							67,7		22,0	19,3	7,18	6,21	3,11	2,67	1,29	1,10	0,49	0,41	0,26	0,22
	V							4,61		2,91	2,91	1,84	1,84	1,30	1,30	0,90	0,90	0,60	0,60	0,46	0,46

Continous pressure drop SDR 7,4 20° / 67°

Rugosity	0,007 mm	0,007 mm
Specific weight	998,00 kg/m3	977,20 kg/m3
Temperature	20° C	67° C
Viscosity	1,02E-06 m²/s	4,30E-07 m2/s

Legend symbols

Q= flow (l/s) De= Ø ext. (mm) Di= Ø int. (mm)
R= continous pressure drop (mbar/m)
V= speed (m/s)

Q = l/s	De Di	20 mm 14,4 mm	25 mm 18,0 mm	32 mm 23,2 mm	40 mm 29,0 mm	50 mm 36,2 mm		63 mm 45,8 mm		75 mm 54,4 mm		90 mm 65,4 mm		110 mm 79,8 mm		125 mm 90,8 mm	
3,20	R				76,3	24,8	21,8	8,07	7,00	3,50	3,00	1,45	1,24	0,55	0,46	0,29	0,25
	V				4,91	3,11	3,11	1,96	1,96	1,39	1,39	0,96	0,96	0,64	0,64	0,49	0,49
3,40	R				85,3	27,7	24,4	9,01	7,83	3,90	3,35	1,62	1,28	0,61	0,52	0,32	0,27
	V				5,22	3,30	3,30	2,08	2,08	1,47	1,47	1,02	1,02	0,68	0,68	0,53	0,53
3,60	R					30,8		10,1	8,70	4,33	3,73	1,80	1,54	0,68	0,57	0,36	0,30
	V					3,50		2,20	2,20	1,56	1,56	1,08	1,08	0,72	0,72	0,56	0,56
3,80	R					34,0		11,0	9,62	4,77	4,12	1,98	1,69	0,75	0,63	0,40	0,33
	V					3,69		2,33	2,33	1,68	1,68	1,15	1,15	0,76	0,76	0,59	0,59
4,00	R					37,4		12,1	10,5	5,24	4,53	2,17	1,86	0,82	0,69	0,43	0,37
	V					3,89		2,45	2,45	1,73	1,73	1,21	1,21	0,80	0,80	0,62	0,62
4,20	R					41,0		13,2	11,6	5,72	4,96	2,37	2,04	0,89	0,76	0,47	0,40
	V					4,08		2,57	2,57	1,82	1,82	1,27	1,27	0,84	0,84	0,65	0,65
4,40	R					44,6		14,4	12,6	6,23	5,40	2,58	2,22	0,97	0,83	0,52	0,44
	V					4,28		2,69	2,69	1,91	1,91	1,33	1,33	0,88	0,88	0,68	0,68
4,60	R					48,5		15,6	13,7	6,75	5,86	2,80	2,41	1,05	0,90	0,56	0,47
	V					4,47		2,82	2,82	1,99	1,99	1,39	1,39	0,92	0,92	0,71	0,71
4,80	R					52,4		16,9	14,8	7,30	6,35	3,02	2,60	1,14	0,97	0,60	0,51
	V					4,66		2,94	2,94	2,08	2,08	1,45	1,45	0,96	0,96	0,74	0,74
5,00	R					56,6		18,2	16,0	7,86	6,85	3,25	2,81	1,22	1,04	0,65	0,55
	V					4,86		3,06	3,06	2,17	2,17	1,51	1,51	1,00	1,00	0,77	0,77
5,20	R					60,8		19,6	17,2	8,44	7,36	3,49	3,02	1,31	1,12	0,70	0,59
	V					5,05		3,18	3,18	2,25	2,25	1,57	1,57	1,04	1,04	0,80	0,80
5,40	R							21,0		9,05	7,90	3,74	3,24	1,40	1,20	0,74	0,63
	V							3,31		2,34	2,34	1,63	1,63	1,09	1,09	0,83	0,83
5,60	R							22,4		9,67	8,45	4,00	3,46	1,50	1,29	0,79	0,68
	V							3,43		2,43	2,43	1,69	1,69	1,13	1,13	0,86	0,86
5,80	R							23,9		10,3	9,03	4,26	3,69	1,60	1,37	0,85	0,72
	V							3,55		2,51	2,51	1,75	1,75	1,17	1,17	0,90	0,90
6,00	R							25,5		10,9	9,61	4,53	3,93	1,70	1,46	0,90	0,77
	V							3,67		2,60	2,60	1,81	1,81	1,21	1,21	0,93	0,93
6,20	R							27,1		11,6	10,2	4,81	4,18	1,80	1,55	0,95	0,82
	V							3,80		2,69	2,69	1,87	1,87	1,25	1,25	0,96	0,96
6,40	R							28,7		12,3	10,8	5,10	4,43	1,91	1,64	1,01	0,86
	V							3,92		2,77	2,77	1,93	1,93	1,29	1,29	0,99	0,99
6,60	R							30,4		13,0	11,4	5,39	4,69	2,02	1,74	1,07	0,92
	V							4,04		2,86	2,86	1,99	1,99	1,33	1,33	1,02	1,02
6,80	R							32,1		13,8	12,1	5,69	4,96	2,13	1,84	1,13	0,97
	V							4,16		2,95	2,95	2,05	2,05	1,37	1,37	1,05	1,05
7,00	R							33,9		14,5	12,8	6,00	5,23	2,25	1,94	1,19	1,02
	V							4,29		3,03	3,03	2,11	2,11	1,41	1,41	1,08	1,08
7,50	R							38,5		16,5	14,6	6,81	5,95	2,55	2,20	1,27	1,16
	V							4,59		3,25	3,25	2,26	2,26	1,51	1,51	1,16	1,16
8,00	R							43,4		18,6		7,66	6,71	2,86	2,48	1,51	1,30
	V							4,90		3,47		2,41	2,41	1,61	1,61	1,24	1,24
9,00	R							54,1		23,1		9,51	8,36	3,55	3,08	1,87	1,62
	V							5,51		3,90		2,71	2,71	1,81	1,81	1,39	1,39
10,00	R									28,1		11,5	10,1	4,30	3,75	2,27	1,97
	V									4,33		3,01	3,01	2,01	2,01	1,54	1,54

10. Chemical compatibility

This chart shows the chemical resistance of polypropylene resin under static conditions and not under pressure.

1 = negligible effect: the material should be suitable for all applications where these environmental conditions exist.

2 = limited absorption or attack: the material should be suitable for most applications but the user is advised to carry out his/her own tests to determine the suitability of polypropylene in a particular environment.

3 = extensive absorption and/or rapid permeation: the material should be suitable for applications where only intermittent service is involved, or where the swelling produced has no detrimental effect on the part. The user should carry out his/her own tests to determine the suitability of polypropylene in a particular environment.

4 = extensive attack: the specimen dissolves or disintegrates. Polypropylene is not recommended.

Environment	Conc. %	Temp. 20°C	60°C	100°C
Acetic acid (glacial)	97	1	2 (80°C)	-
Acetic acid	50	1	1 (80°C)	-
Acetic acid	40	1	-	-
Acetic acid	10	1	1	-
Acetone	100	1	1	-
Acetophenone	100	2	2	-
Acriflavine (2% solution in H_2O)	2	1	1	- (80°C)
Acrylic emulsions		1	1	-
Aluminum chloride		1	1	-
Aluminum fluoride		1	1	-
Aluminum sulfate		1	1	-
Alums (all types)		1	1	-
Ammonia (aqueous)	30	1	-	-
Ammonia gas (dry)		1	1	-
Ammonium carbonate	Satd.	1	1	-
Ammonium chloride	Satd.	1	1	-
Ammonium fluoride	20	1	1	-
Ammonium hydroxide	10	1	1	-
Ammonium metaphosphate	Satd.	1	1	-
Ammonium nitrate	Satd.	1	1	-
Ammonium persulfate	Satd.	1	1	-
Ammonium sulfate	Satd.	1	1	-
Ammonium sulfide	Satd.	1	1	-
Ammonium thiocyanate	Satd.	1	1	-
Amyl acetate	100	2	3	-
Amyl alcohol	100	1	2	-
Amyl chloride	100	3	3	-
Aniline	100	1	1	-
Anisole	100	2	2	-
Antimony chloride		1	1	-
Aviation fuel (115/145 octane)	100	2	3	-
Aviation turbine fuel	100	2	3	-

Environment	Conc. %	Temp. 20°C	60°C	100°C
Barium carbonate	Satd.	1	1	-
Barium chloride	Satd.	1	1	-
Barium hydroxide		1	1	-
Barium sulfate	Satd.	1	1	-
Barium sulfide	Satd.	1	1	-
Beer		1	1	-
Benzene	100	2	3	3
Benzoic acid	A	1	-	
Benzyl alcohol		1	1	-
Bismuth carbonate	Satd.	1	1	-
Borax		1	1	-
Boric acid		1	1	-
Brine	Satd.	1	1	-
Bromine liquid	100	4	-	-
Bromine water	(a)	3	-	-
Butyl acetate	100	3	3	-
Butyl alcohol	100	1	1	-
Calcium carbonate	Satd.	1	1	-
Calcium chlorate	Satd.	1	1	-
Calcium chloride	50	1	1	-
Calcium hydroxide		1	1	-
Calcium hypochlorite bleach	20(a)	1	2	-
Calcium nitrate		1	1	-
Calcium phosphate	50	1	-	-
Calcium sulfate		1	1	-
Calcium sulfite		1	1	-
Carbon dioxide (dry)		1	1	-
Carbon dioxide (wet)		1	1	-
Carbon disulfide	100	2	3	-
Carbon monoxide		1	1	-
Carbon tetrachloride	100	3	3	3
Carbonic acid		1	1	-
Castor oil		1	-	-

Environment	Conc. %	Temp. 20°C	60°C	100°C
Cetyl alcohol	100	1	-	-
Chlorine (gas)	100	4	4	-
Chlorobenzene	100	3	3	-
Chloroform	100	3	4	4
Chlorosulfonic acid	100	4	4	4
Chrome alum		1	1	-
Chromic acid	80(a)	1	-	-
Chromic acid	50(a)	1	1	-
Chromic acid	10(a)	1	1	-
Chromic/sulfuric acid		4	4	-
Cider		1	1	-
Citric acid	10	1	1	-
Copper chloride	Satd.	1	1	-
Copper cyanide	Satd.	1	1	-
Copper fluoride	Satd.	1	1	-
Copper nitrate	Satd.	1	1	-
Copper sulfate	Satd.	1	1	-
Cottonseed oil		1	1	-
Cuprous chloride	Satd.	1	1	-
Cyclohexanol	100	1	2	-
Cyclohexanone	100	2	3	-
Decalin	100	3	3	3
Detergents	2	1	1	1
Developers (photographic)		1	1	-
Dibutyl phthalate	100	1	2	4
Dichloroethylene	100	1	-	-
Diethanolamine	100	1	1	-
Diisooctyl phthalate	100	1	1	-
Emulsifiers		1	1	-
Ethanolamine	100	A	1	-
Ethyl acetate	100	2	2	-
Ethyl alcohol	96	1	1 (80°C)	-
Ethyl chloride	100	3	3	-
Ethylene dichloride	100	2	-	-
Ethylene glycol		1	1	-
Ethylene oxide	100	2 (10°C)	-	-
Ethyl ether	100	B	-	-
Fatty acids (C_6)	100	1	1	-
Ferric chloride	Satd.	1	1	-
Ferric nitrate	Satd.	1	1	-
Ferric sulfate	Satd.	1	1	-
Ferrous chloride	Satd.	1	1	-
Ferrous sulfate	Satd.	1	1	-
Fluorosilicic acid		1	1	-
Formaldehyde	40	1	1	-
Formic acid	100	1	-	-
Formic acid	10	1	1	-
Fructose		1	1	-
Fruit juices		1	1	-
Furfural	100	3	3	-
Gas liquor		3	-	-
Gasoline	100	2	3	3
Gearbox oil	100	1	2	-
Gelatin		1	1	-

Environment	Conc. %	Temp. 20°C	60°C	100°C
Glucose	20	1	1	-
Glycerin	100	1	1	1
Glycol		1	1	-
Hexane	100	1	2	-
Hydrobromic acid	50(a)	1	1	-
Hydrobromic acid	30(a)	1	2	4
Hydrobromic acid	20	1	1 (80°C)	-
Hydrobromic acid	10	1	1 (80°C)	2
Hydrobromic acid	2	1	1	1
50-50 HCl-HNO_3	(a)	2	4 (80°C)	-
Hydrofluoric acid	40	1	-	-
Hydrofluoric acid	60(a)	1	1 (40°C)	-
Hydrogen chloride gas (dry)	100	1	1	-
Hydrogen peroxide	30	1	-	4
Hydrogen peroxide	10	1	2	-
Hydrogen peroxide	3	1	-	-
Hydrogen sulfide		1	1	-
Hydroquinone		1	1	-
Inks		1	1	-
Iodine tincture		1	-	-
Isooctane	100	3	3	-
Isopropyl alcohol	100	1	1	-
Ketones		1	-	-
Lactic acid	20	1	1	-
Lanolin	100	1	1	-
Lead acetate	Satd.	1	1	-
Linseed oil	100	1	1	-
Lubricating oil	100	1	2	-
Magenta dye (aqueous solution)	2	1	1 Some staining	-
Magnesium carbonate	Satd.	1	1	-
Magnesium chloride	Satd.	1	1	-
Magnesium hydroxide	Satd.	1	1	-
Magnesium nitrate	Satd.	1	1	-
Magnesium sulfate	Satd.	1	1	-
Magnesium sulfite	Satd.	1	1	-
Meat juices		1	1	-
Mercuric chloride	40	1	1	-
Mercuric cyanide	Satd.	1	1	-
Mercurous nitrate	Satd.	1	1	-
Mercury	100	1	1	-
Methyl alcohol	100	1	1	-
Methylene chloride	100	1	-	-
Methyl ethyl ketone	100	1	2	-
Milk and its products		1	1	1
Mineral oil	100	1	2	-
Molasses		1	1	-
Motor oil	100	1	2	-
Naphthalene	100	1	1	1
Nickel chloride	Satd.	1	1	-

Environment	Conc. %	Temp. 20°C	60°C	100°C
Nickel nitrate	Satd.	1	1	-
Nickel sulfate	Satd.	1	1	-
Nitric acid	fuming	4	4	4
Nitric acid	70(a)	3	4	-
Nitric acid	60	1	4 (80°C)	-
Nitric acid	10	1	1	1
50-50 HNO_3-HCl	(a)	2	4 (80°C)	-
50-50 HNO_3-H_2SO_4	(a)	3	4 (80°C)	-
Nitrobenzene	100	1	1	-
Oleic acid		1	2	-
Oleum		-	-	4
Olive oil	100	1	1	-
Oxalic acid (aqueous)	50	1	2	-
Paraffin	100	1	2	-
Paraffin wax	100	1	1	-
Petrol	100	2	3	-
Petroleum ether (boiling point 100°-140°C)	100	3	3	-
Phenol	100	1	1	-
Phosphoric acid	95	1	1	-
Plating solutions, brass		1	1	-
Plating solutions, cadmium		1	1	-
Plating solutions, chromium		1	1	-
Plating solutions, copper		1	1	-
Plating solutions, gold		1	1	-
Plating solutions, indium		1	1	-
Plating solutions, lead		1	1	-
Plating solutions, nickel		1	1	-
Plating solutions, rhodium		1	1	-
Plating solutions, silver		1	1	-
Plating solutions, tin		1	1	-
Plating solutions, zinc		1	1	-
Potassium bicarbonate	Satd.	1	1	-
Potassium borate	1	1	1	-
Potassium bromate	10	1	1	-
Potassium bromide	Satd.	1	1	-
Potassium carbonate	Satd.	1	1	-
Potassium chlorate	Satd.	1	1	-
Potassium chloride	Satd.	1	1	-
Potassium chromate	40	1	1	-
Potassium cyanide	Satd.	1	1	-
Potassium dichromate	40	1	1	-
Potassium ferri-/ferrocyanide		1	1	-
Potassium fluoride		1	1	-
Potassium hydroxide	50	1	1	-
Potassium hydroxide	10	1	1	1
Potassium nitrate	Satd.	1	1	-
Potassium perborate	Satd.	1	1	-
Potassium perchlorate	10	1	1	-
Potassium permanganate	20	1	1	-
Potassium sulfate		1	1	-
Potassium sulfide		1	1	-
Potassium sulfite		1	1	-
Propyl alcohol	100	1	1	-
Pyridine	100	1	-	-

Environment	Conc. %	Temp. 20°C	60°C	100°C
Silicone oil	100	1	1	-
Soap solution (concentrated)		1	1	-
Sodium acetate		1	1	-
Sodium bicarbonate	Satd.	1	1	-
Sodium bisulfate	Satd.	1	1	-
Sodium bisulfite	Satd.	1	1	-
Sodium borate		1		-
Sodium bromide oil solution		1	1	-
Sodium carbonate	Satd.	1	1	-
Sodium chlorate	Satd.	1	1	-
Sodium chloride	Satd.	1	1	1
Sodium chlorite	2	1	1 (80°C)	-
Sodium chlorite	5	1 (80°C)	1	-
Sodium chlorite	10	1 (80°C)	1	-
Sodium chlorite	20	1 (80°C)	1	-
Sodium cyanide	Satd.	1	1	-
Sodium dichromate	Satd.	1	1	-
Sodium ferricyanide	Satd.	1	1	-
Sodium ferrocyanicle	Satd.	1	1	-
Sodium fluoride	Satd.	1	1	-
Sodium hydroxide	50	1	1	-
Sodium hydroxide	10	1	1	1
Sodium hypochlorite	20	1	2	2
Sodium nitrate		1	1	-
Sodium nitrite		1	1	-
Sodium silicate		1	1	-
Sodium sulfate	Satd.	1	1	-
Sodium sulfide	25	1	1	-
Sodium sulfite	Satd.	1	1	-
Stannic chloride	Satd.	1	1	-
Stannous chloride	Satd.	1	1	-
Starch		1	1	-
Sugars and syrups		1	1	-
Sulfamic acid		1	1 (80°C)	-
Sulfates of Calcium and magnesium		1	1	-
Sulfates of potassium and sodium	Satd.	1	1	-
Sulfur		1	1	-
Sulfuric acid	98(a)	3	-	4
Sulfuric acid	60	1	2 (80°C)	-
Sulfuric acid	50	1	2	-
Sulfuric acid	10	1	1	1
50-50 H_2SO_4/HNO_3	(a)	3	4 (80°C)	-
Tallow		1	1	-
Tannic acid	10	1	1	-
Tartaric acid		1	1	-
Tetrahydrofuran	100	3	3	3
Tetralin	100	3	3	3
Toluene	100	3	3	-
Transformer oil	100	1	3	-
Trichloroacetic acid	10	1	1	-
Trichloroethylene	100	1	1 (80°C)	-
Turpentine	100	3	3	3

Environment	Conc. %	Temp. 20°C	60°C	100°C
Urea		1	1	-
Urine		1	1	-
Water (distilled, soft, hard and vapor)		1	1	1
Wet chlorine gas		-	4 (70°C)	-
Whiskey		1	1	1
White Paraffin	100	1	2 (80°C)	-
White spirit	100	2	3	-
Wines		1	1	-
Xylene	100	3	3	3
Yeast		1	1	-
Zinc chloride	Satd.	1	1	-
Zinc oxide		1	1	-
Zinc sulfate	Satd.	1	1	-

11. Quality assurance

Plastofer is well-known for its high quality products. We produce in compliance with European EN ISO 15874 and German standards DIN 8077, DIN 8078.

The laboratory is well equipped with state-of-the-art devices to test raw materials, production process and end products.

- The control of basic raw material i.e. polypropylene through determination of mass flow rate (MFR) and density measure.
- Check of geometric parameters during the production process by means of inspection and electronic gauges.
- Optical microscope testing – structure of raw material in end products, welded joints after tests and the quality of plastic connection with threaded inserts.
- Laboratory tests of end products - a reflection of the extreme conditions of use, among others, determination of inner pressure resistance.

Standard applied in production:

- DIN 8077 Polypropylene (PP) Pipes, Dimensions.
- DIN 8078 Polypropylene (PP) Pipes, General Quality Requirements and Testing.
- DIN 16962 Pipe Joint Assemblies and Fittings for Polypropylene Pressure Pipes.
- EN ISO 15874 Plastic pipe systems for hot and cold water installation.
- Drinking water tested by authorized office.

12. Storage, handling and transportation

The system components must be protected against ultraviolet radiation, weather and contamination.

UV radiation is damaging to polypropylene. Long – term exposure to sunlight can degrade the operating properties of the system. When the elements are stored in outdoors area or installed unprotected on outdoor wall surface, they must be taken to indoor storage or be covered with a suitable insulation.

When stacked Plastic pipes must be supported along their whole length or protected against deflection in another suitable way.

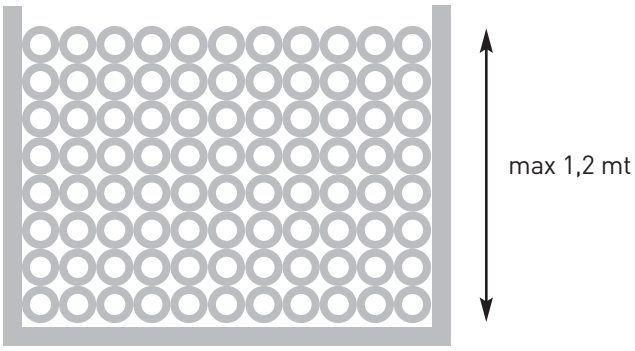
Plastic pipe and fittings are usually stored in sacks or on palettes or are freely loaded in boxes, containers, baskets, etc. Maximum storage height of 1,2 m must be respected if plastic pipes are kept in plastic sleeves and/or pipe fittings in plastic sacks. Different types of pipes and fittings are stored separately.

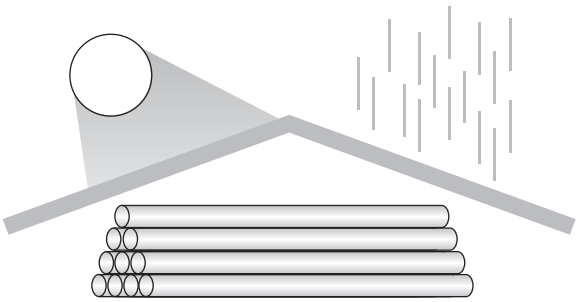
During handling it is not allowed to drag pipes over the ground or a lorry deck. The pipes must not be moved by throwing or letting them fall off the lorry to the ground.

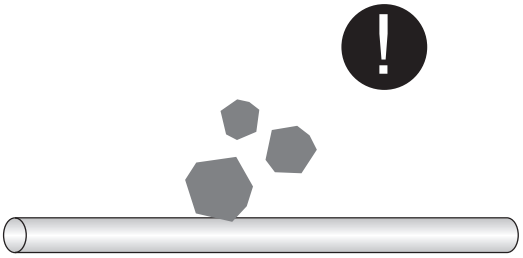
During transportation the pipes must be protected against mechanical damage and stored on a suitable underlay where protected against dirt, solvents, direct heat (contact with a radiator, etc.).

The pipes are put into protective covers (pipes in polyethylene bags, pipe fittings also in sacks or cardboard boxes) and it is recommended to let them stay in there as long as possible before the installation works start (as a protection against dirt).

Pipes and fittings should be treated with special caution at the temperature of 0°C or lower.



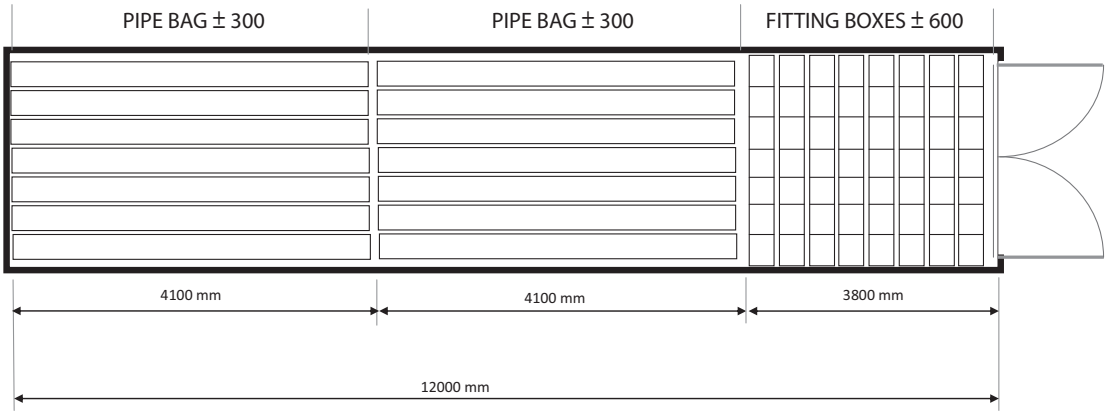




13. Boxing and shipping

Example of loading for international Standard Container

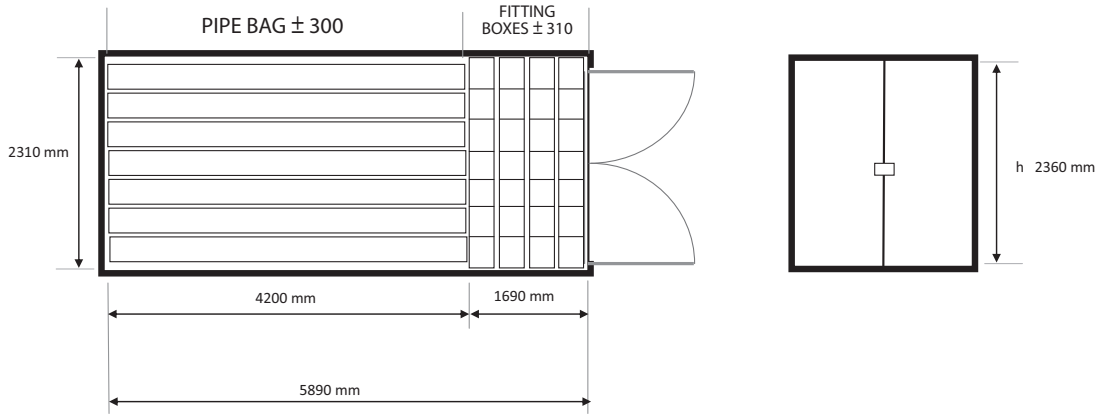
40'' feet Container



Max Bags n 600

Max Boxes n 600

20'' feet Container



Max Bags n 300

Max Boxes n 310

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All Plastofer products
are fully recyclable.

ISO 9001
BUREAU VERITAS
Certification

The Italian PRODUCT

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