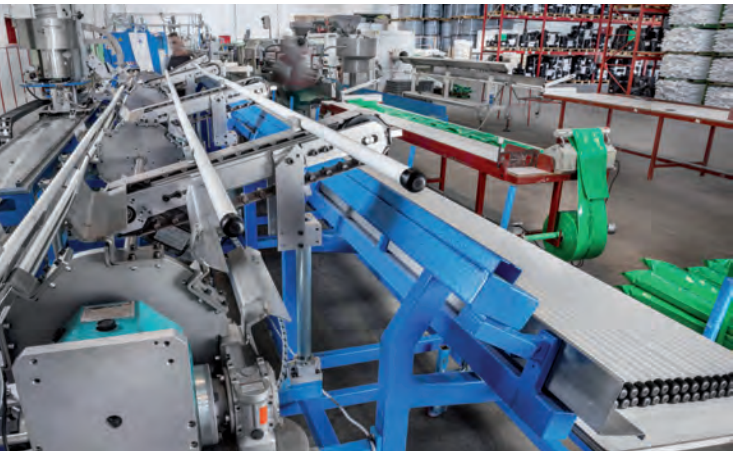
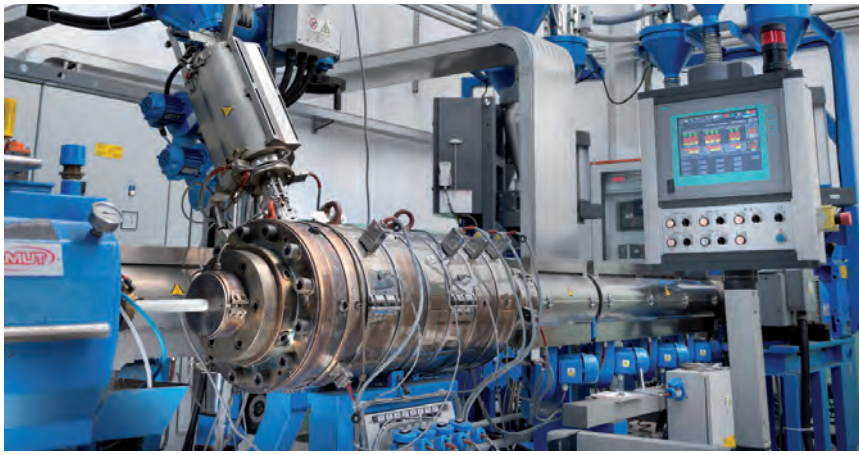
aquatechnik®

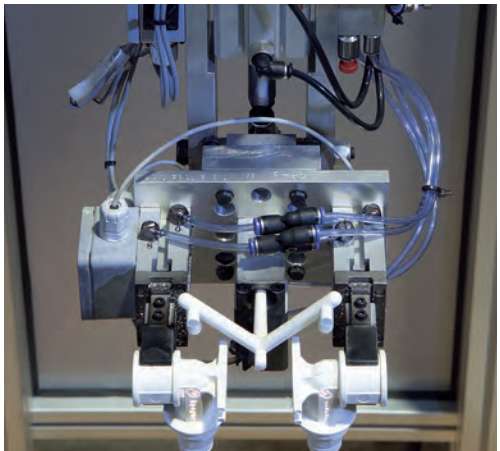
Solutions for plumbing and plant-engineering

iso-technik


aquatechnik







aquatechnik®

Who we are

Aquatechnik produces and distributes sanitary, heating, air conditioning and compressed air systems for civil and industrial installations.
The manufacturing facilities, located in Magnago (MI), boast a number of de-partments for a variety of processes: injection moulding, extrusion and pipe coating, PUR foam and assembly of special fittings (manifolds). Everything is supported by a mechanical workshop that allows equipment and tools, required to process the various systems, to be manufactured.

The company is completed by laboratories and a research centre which, along with a high level of automation, ensure high qualitative and productive stan-dards. The main warehouse, adjacent to the production department, allows the material, which is delivered by our own vehicles or by trusted couriers in Italy and abroad, to be rapidly and accurately sorted.
A sales network of specialist personnel and selected distributors creates an established presence that covers Italy and abroad, thereby providing inter-national sales and after-sales services.

The company is always attentive to innovation and new features and has, over time, developed a comprehensive and complete system of pipes, com-ponents, special fittings and adjustment equipment that can meet the most varied manufacturing requirements for traditional plumbing and heating sy-stems and radiant panel systems. Today, Aquatechnik can boast thousands of systems built thanks to the approvals obtained by the most important certification institutes world-wide, which rank it among the leading companies in Europe and the world.

Our history

Aquatechnik was founded in the early 80s after current president and founder Lino Petenà's extensive experience in the hydro-thermal-sanitary sector, with the purpose of introducing a new system of pipes and fittings on the market for plants in plastic material as an alternative to conventional galvanised pipes. The fusio-technik welded system was successful from the start and already in 1984, the company had to expand its facilities to adapt to the sales levels it had reached. The first headquarters was a warehouse of about 1000 m^2 located in Busto Arsizio.

At the beginning of the 90s, learning centres were built to spread knowle-dge about their systems through meetings for installers and technicians in the sector and the company moved to Magnago (MI), where it remains to date, stretching over an area of 60.000 m^2, of which 15.000 are covered. The company, which was created with the single purpose of selling and di-stributing the product, took its first steps towards production and began sales activities abroad. In the new millennium, Aquatechnik established it-self with a completely original patented connection system between mul-tilayer pipes and PPSU fittings: the safety system. Presented initially in a brass-plastic version (safety-metal) and later with a fitting made entirely in plastic (PPSU), it was received enthusiastically both at a national and international level. The productive capacity today is about 6.000 tonnes/year of PP-R for pipe production and the production potential is greater than 20.000.000 metres/year of multilayer pipe. The injection moulding depart-ment produces up to 80.000.000 parts/year.

The production site has worked according to excellent quality standards in compliance with the ISO 9001 standards starting from the early 90s and in full respect of the environment, according to ISO 14001 Standards.
The company today includes over 150 people.

Our principles

Aquatechnik is founded on a great goal: "distributing, building and develo-ping innovative products that can simplify applications, ensure maximum safety in the installations and contribute to energy savings respecting envi-ronmental sustainability."
Passion is what drives the soul of our company, leading us to pursue the goals we set and pushing us to reach increasingly higher levels.
Quality is the heart of our business philosophy as it unites the concepts of style and design with product excellence, which have always been the di-stinguishing features of made in Italy products: the union of these elements is the key to opening foreign markets.
Listening to and taking care of our customers stimulates the creation of new ideas and forges our entrepreneurial culture, facilitating a collaborative atmosphere, reciprocally satisfying needs.
Aquatechnik means "water technology", a concept that we have expanded and integrated into different systems, becoming, to date, one of the most influential players in the hydro-thermal-sanitary market.

Marco Petenà (CEO): "Our company is a family business, every person that works with us is an important resource and a part of this family."

iso-technik index

Introduction

The iso-technik system, which is designed and manu-factured by Aquatechnik, includes a complete range of pre-insulated fittings and single pipes made with PUR (stiff polyurethane) foam protected by a casing pipe made with PE-HD. The iso-technik system is used to remotely distri-bute energy, both directly and indirectly, by means of the carrying fluid water.
The range of iso-technik products includes pipes and fit-tings with diameters ranging from Ø 32 up to Ø 315 mm, which are available in the following versions:

- ***iso FIBER-T SDR 7,4***
  for sanitary systems at high temperature
- ***iso FIBER-COND SDR 11** for saniraty systems at medium temperature and*
  heating systems at high temperature
- ***iso FIBER-COND SDR 17,6** for saniraty systems at low temperature and heating systems at medium temperature and pressure*

The products are guaranteed with integrated cycle and with references to the standards that regulate the industry: EN 253, EN 448, EN 489, DIN 8075, UNI EN ISO 15874.

The internal service pipes and fittings, which form the iso-technik system, are made using the most advanced materials, exclusively of European production: PP-R 80 Super and PP-RCT WOR (White Oxidation Resistance), developed by Aquatechnik with special blends of additi-ves, which ensure greater resistance to the action of oxi-dants and ions of metallic origin.
Their action also ensures high stability at high tempera-tures; the intermediate layer of the pipes, made of fibre-reinforced polypropylene (PP-RF), reduces linear thermal expansion up to 70% compared to single-layer PP-R pipes.
In addition, the "bonded" type system binds the high-quality polyurethane PUR heat insulator to obtain a com-pact system between the PE-HD (corona treatment) casing pipe and service pipes.

These characteristics make the iso-technik system ideal for the remote transfer of energy between thermal power stations for the production of heat, chillers, heat pumps, geothermal systems, thermal-bath systems, etc. and the utilities involving networks of pre-insulated underground pipes, ensuring maximum safety and design/application reliability.

The advantages of iso-technik system

Easy installation

The iso-technik system also has several advantages in terms of installation:

- ***Easy installation, quick application and safe*** *joints by means of hot-melt sealing, from Ø 32 to 125 mm, butt welding from Ø 160 to 315 mm and electro-welding.*
- ***Dedicated welding equipment,*** *with welding machines that mechanically self-align the pipes (from Ø 50 to 315 mm).*
- ***Reduced linear mass ridotto*** *with respect to metal pipes, so it is easier to manoeuvre the materials on site. It is not necessary to perform transverse welding trenches. No crane hoists and/or similar devices are needed to handle the items during the welding operaion.*
- ***Selection of single and/or double-seal repairing joints*** *to be carried out by means of on-site foaming using a PUR (two component) system.*
- ***Facilitated pipe casing removal*** *(service pipe cutting, removal of the heat insulator and casing), for customised installation.*
- ***Possibility to assemble the line outside the trench*** *and re-position in the trench at a later stage; it is very useful in the event of very bad weather conditions that make the trench unusable.*
- *In case there are no direction changes by means of*

"cold" installation, the iso-technik system offers excellent ***self-compensation features*** *(only in case of underground installations).*
Therefore it is not necessary to provide for loops, omegas, mechanical compensators, thrust bearings and all the solutions that increase work costs.

- ***Possible installation in "pre-tension" conditions with open trench,*** *which consists in preheating the lines with temperatures that reach at least 50% of the max. design temperature, before being buried to close the excavation.*

This is possible also thanks to the reduced mechanical stresses that the pipe develops due to thermal expansion. These are proportional to E modulus, which for fibro-reinforced PP is about 1,5 GPa, 100 times lower than steel.

Self - compensation features

The stresses produced by residual thermal expansions will be absorbed and compensated (self-compensation) in a natural manner by the material, and the viscoelasticity characteristics of the material provide a new configuration of the pipeline.

Table comparing PP-RF and Steel

	Modulus of elasticity	Coefficient of linear thermal expansion
PP-RF	≃1450 N/mm²	α 0,035 mm/m°C
Acciaio	210.000 N/mm²	α 0,017 mm/m°C

As for the above-mentioned values, we can infer a higher stress in steel compared with fibre-reinforced PP-R, where it is remarkably lower.
For further details, please contact our Technical Depart-ment (ufficio.tecnico@aquatechnik.it)

Energy saving

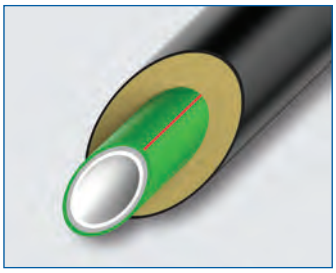
The iso-technik system also ensures several energy saving advantages.
These advantages are all the more significant when compared to metal pre-insulated pipes:

- ***Minimum heat loss*** *thanks to the low thermal tran- smittance U (W/m²°K) values, also in the presence of high heat gradients (ΔT).*
  This factor is mainly characterised by the very low thermal conductivity λ of the service pipe (0,19 W/mK, against 52 W/mk for steel).
  Together with an excellent and uniform insulation by means of rigid polyurethane foam (PUR) injected into the interspace between the service pipe and the external casing pipe (made with PE-HD), it makes the pipes highly efficient from the energy saving point of view.

- ***"Energy saving"*** *thanks to its low thermal conductivity value. The iso-technik system is considered "energy saving".*
- ***Reduced pressure drops:*** *the inner surface of the service pipes, with a roughness value of 0,007 mm (against 0,020 mm of steel pipes) generates low friction inside the pipes, promoting fluid flow and significantly reducing distributed pressure drops.*
  This factor is reflected, for example, in considerable energy savings when using pumps: due to their design capacity, they can operate more slowly, decreasing the flow rate of the convoyed fluid and therefore consuming less energy, while still ensuring the required flow rate.
  In addition, this feature significantly reduces the noise of the plant.
- ***Increased system cleanliness:*** *the polymeric material used for the production of the service pipes of the iso-technik range prevents the formation of sludge and the presence of rust, as well as drastically reducing limestone deposits.*
  This prevents poor equipment performance, possible clogging problems in exchangers, filters, shut-off valves and other devices that are part of the system, resulting in reduced operation and maintenance.
- ***Excellent chemical resistance:*** *the iso-technik system does not require anti-corrosion film-forming treatments, it is compatible with antifreeze products (MEG, DEG, MPG and PPG) and is resistant to many chemicals.*
- ***No corrosive phenomena*** *such as:*
  - *galvanic corrosion due to metal couplings between different metal alloys;*
  - *stray currents: it is not necessary to provide any cathodic-anodic protection since the fibre-reinforced PP-R pipe features high "electrical volume resistivity" of approximately $10^{14}\Omega \cdot m$;*
  - *electrochemical or chemical corrosion due to the effect of water or chemicals dissolved in it.*

Characteristics of the system

faser iso FIBER-T



Description

Pre-insulated pipe made of PUR (rigid polyurethanic foam) protected by casing sheath hose, made with faser FIBER-T service pipe (SDR 7,4), in PP-RCT WOR with high resi-stance against high temperature and oxidation process, particularly suitable for high temperature water systems, mechanical and compressed air systems, technological fluids transport. In the event of transporting chemicals, check suitability with our Technical Department.

Data sheet

Raw material: PP-RCT WOR/PP-RF/PP-R
Series: S 3.2
Thermal conductivity at 20°C: λ 0,190 W/mK Coefficient of linear thermal expansion (CLTE): α 0,035 mm/mK
Internal roughness: 0,007 mm
Colour: inner layer white, external layer green with red stripes, black outer casing
Size: from Ø 32 to 125 mm

Product specifications

Item	SDR	Internal pipe			External pipe		Insulation thickness	DN	Pipe	H_2O cont.	Pipe weight		
		Ø ext.	int. Ø	Thick.	ext. Ø	Thick.					naked	preinsulated	pipe
		mm	mm	mm	mm	mm	mm		m	l/m	Kg/m	Kg/m	Kg/m
61362PC	7,4	32,0	23,2	4,4	90,0	3,0	26,0	25	5,8	0,423	0,393	1,456	8,0
61364PC	7,4	40,0	29,0	5,5	110,0	3,0	32,0	32	5,8	0,661	0,606	1,998	11,1
61366PC	7,4	50,0	36,2	6,9	110,0	3,0	27,0	40	5,8	1,029	0,939	2,288	12,8
61368PC	7,4	63,0	45,8	8,6	125,0	3,0	28,0	50	5,8	1,647	1,478	3,050	17,1
61370PC	7,4	75,0	54,4	10,3	140,0	3,0	29,5	--	5,8	2,324	2,090	3,897	21,9
61372PC	7,4	90,0	65,4	12,3	160,0	3,0	32,0	65	5,8	3,359	2,995	5,136	29,0
61374PC	7,4	110,0	79,8	15,1	200,0	3,2	41,8	80	5,8	5,001	4,519	7,593	42,9
61376PC	7,4	125,0	90,8	17,1	225,0	3,4	46,6	--	5,8	6,475	5,572	9,326	52,7
61362PL	7,4	32,0	23,2	4,4	90,0	3,0	26,0	25	11,6	0,423	0,393	1,456	16,8
61364PL	7,4	40,0	29,0	5,5	110,0	3,0	32,0	32	11,6	0,661	0,606	1,998	23,0
61366PL	7,4	50,0	36,2	6,9	110,0	3,0	27,0	40	11,6	1,029	0,939	2,288	26,5
61368PL	7,4	63,0	45,8	8,6	125,0	3,0	28,0	50	11,6	1,647	1,478	3,050	35,4
61370PL	7,4	75,0	54,4	10,3	140,0	3,0	29,5	--	11,6	2,324	2,090	3,897	45,3
61372PL	7,4	90,0	65,4	12,3	160,0	3,0	32,0	65	11,6	3,359	2,995	5,136	59,8
61374PL	7,4	110,0	79,8	15,1	200,0	3,2	41,8	80	11,6	5,001	4,519	7,593	88,4
61376PL	7,4	125,0	90,8	17,1	225,0	3,4	46,6	--	11,6	6,475	5,572	9,326	108,6

* *Pre-insulated pipe weight refers to 1 meter pipe totally insulated and coated.*

** *Rod weight refers to the insulated and coated rod except the two terminal parts (cut back), measuring 19 cm each.*

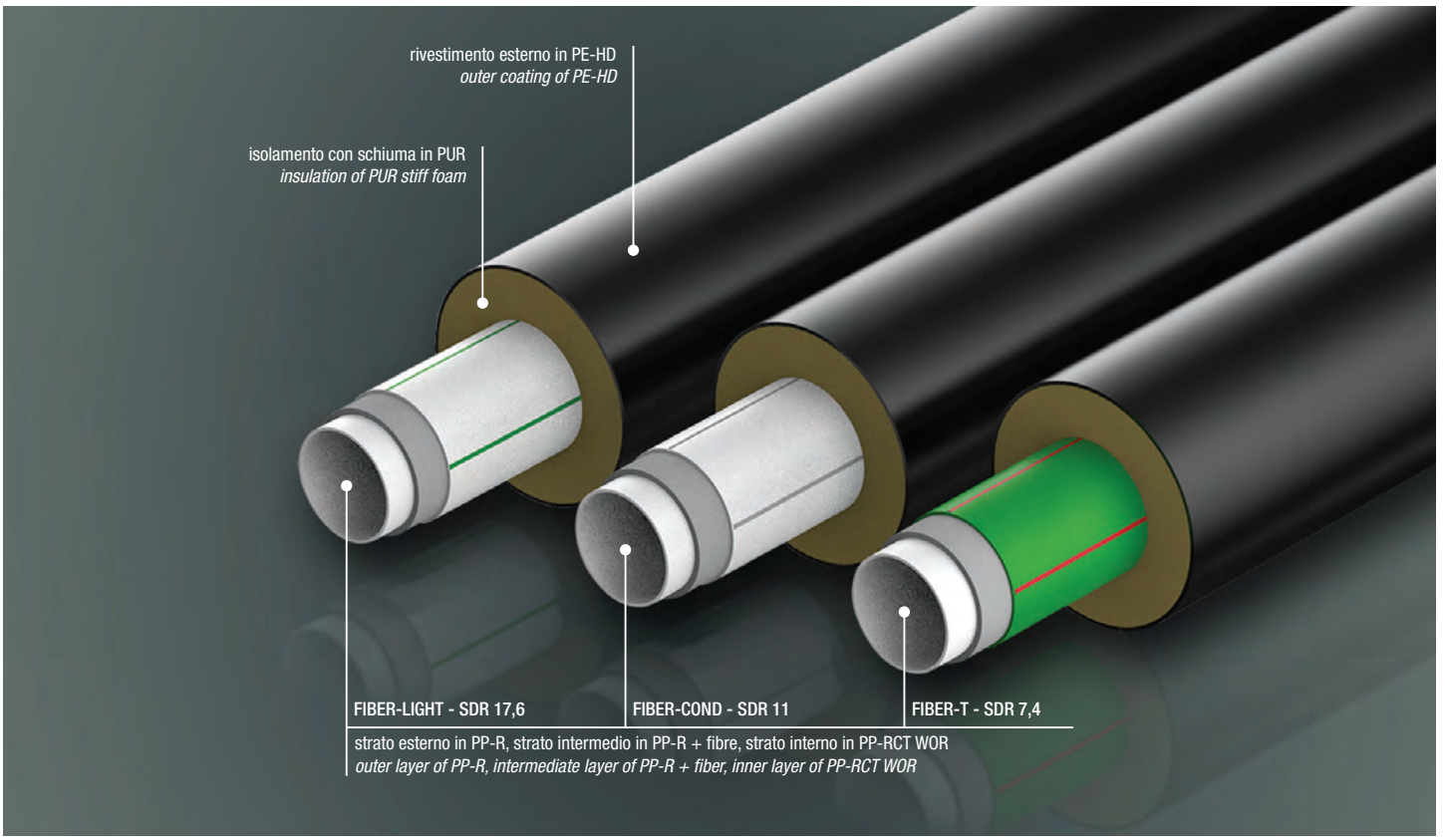
NB: the indicated weights are the real ones of the item during the production phases, therefore they can change according to the dimensional variations of the product.

Fields of application

The wide range of diameters and the wide choice of pipes available allow the system to be used in the most diverse application areas of the residential, industrial and tertiary sector, for domestic water systems, heating systems, irrigation and compressed air.
For other uses than those indicated, please contact our Technical Office.

Standards and Certifications

Product in reference with the most important internatio-nal standards, including EN ISO 15874, DIN 8077-8078, ASTM F2389. Compliant with all organoleptic standards for the transport of hot and cold drinking water, heating, cooling and compressed air.
The fusio-technik system has also obtained certification from the most important bodies in Europe and in the world. The first IIP, ICC-ES and Lloyd's Register certified fibre-reinforced PP-R pipe.
Certifications available on the site www.aquatechnik.it, on the download page.



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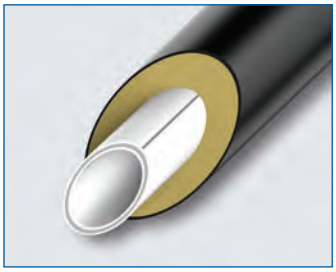


Description

Pre-insulated pipe made of PUR (rigid polyurethanic foam) protected by casing sheath hose, made with faser FIBER-COND service pipe (SDR 11) in PP-RCT WOR with high resistance against high temperature and oxidation process, especially suitable for mechanical installations: heating, air conditioning and compressed air systems, transport of technological fluids. Suitable for the transport of drinking water, cold and at medium temperature (max 50° C). The high performances of the raw materials used make it possible to install systems with pipes of lower thi-ckness compared to conventional ones, thus increasing the total water flow.

Data sheet

Raw material: PP-RCT WOR/PP-RF/PP-R
Series: S 5
Thermal conductivity at 20°C: λ 0,190 W/mK Coefficient of linear thermal expansion (CLTE):
α 0,035 mm/mK
Internal roughness: 0,007 mm
Colour: inner layer white, external layer white with grey stripes, black outer casing
Size: from Ø 32 to 315 mm

Product specifications

Item	SDR	Internal pipe			External pipe		Insulation thickness	DN	Pipe	H_2O cont.	Pipe weight		
		Ø ext.	int. Ø	Thick.	ext. Ø	Thick.					naked	preinsulated	pipe
		mm	mm	mm	mm	mm	mm		m	l/m	Kg/m	Kg/m	Kg/m
61462UPC	11	32,0	26,2	2,9	90,0	3,0	26,0	25	5,8	0,539	0,283	1,346	7,4
61464UPC	11	40,0	32,6	3,7	110,0	3,0	32,0	32	5,8	0,835	0,438	1,830	10,1
61466UPC	11	50,0	40,8	4,6	110,0	3,0	27,0	40	5,8	1,307	0,680	2,029	11,3
61468UPC	11	63,0	51,4	5,8	125,0	3,0	28,0	50	5,8	2,075	1,070	2,642	14,7
61470UPC	11	75,0	61,4	6,8	140,0	3,0	29,5	65	5,8	2,961	1,499	3,306	18,5
61472UPC	11	90,0	73,6	8,2	160,0	3,0	32,0	80	5,8	4,254	2,171	4,312	24,2
61474UPC	11	110,0	90,0	10,0	200,0	3,2	41,8	--	5,8	6,362	3,282	6,356	35,7
61476UPC	11	125,0	102,2	11,4	225,0	3,4	46,6	100	5,8	8,203	4,054	7,808	43,9
61478UPC	11	160,0	130,8	14,6	250,0	3,6	41,4	125	5,8	13,437	6,733	10,950	61,9
61480UPC	11	200,0	163,6	18,2	315,0	4,1	53,4	150	5,8	21,021	10,695	17,047	96,5
61482UPC	11	250,0	204,6	22,7	400,0	4,8	70,2	200	5,8	32,878	16,607	26,501	149,9
61484UPC	11	315,0	257,8	28,6	450,0	5,2	62,3	250	5,8	52,198	26,330	37,658	214,1
61462UPL	11	32,0	26,2	2,9	90,0	3,0	26,0	25	11,6	0,539	0,283	1,346	15,5
61464UPL	11	40,0	32,6	3,7	110,0	3,0	32,0	32	11,6	0,835	0,438	1,830	21,1
61466UPL	11	50,0	40,8	4,6	110,0	3,0	27,0	40	11,6	1,307	0,680	2,029	23,4
61468UPL	11	63,0	51,4	5,8	125,0	3,0	28,0	50	11,6	2,075	1,070	2,642	30,6
61470UPL	11	75,0	61,4	6,8	140,0	3,0	29,5	65	11,6	2,961	1,499	3,306	38,3
61472UPL	11	90,0	73,6	8,2	160,0	3,0	32,0	80	11,6	4,254	2,171	4,312	50,1
61474UPL	11	110,0	90,0	10,0	200,0	3,2	41,8	--	11,6	6,362	3,282	6,356	73,8
61476UPL	11	125,0	102,2	11,4	225,0	3,4	46,6	100	11,6	8,203	4,054	7,808	90,7
61478UPL	11	160,0	130,8	14,6	250,0	3,6	41,4	125	11,6	13,437	6,733	10,950	127,6
61480UPL	11	200,0	163,6	18,2	315,0	4,1	53,4	150	11,6	21,021	10,695	17,047	198,7
61482UPL	11	250,0	204,6	22,7	400,0	4,8	70,2	200	11,6	32,878	16,607	26,501	308,9

* *Pre-insulated pipe weight refers to 1 meter pipe totally insulated and coated.*

** *Rod weight refers to the insulated and coated rod except the two terminal parts (cut back), measuring 19 cm each.*

NB: the indicated weights are the real ones of the item during the production phases, therefore they can change according to the dimensional variations of the product.

Field of application

The system is especially recommended to realize mecha-nical systems, heating and conditioning. The pipes are suitable for the transport of drinking water at low tem-peratures (max 50°C).

To set up for the conveyance of liquids and/or different substances and for the transport drinking water with tem-peratures above 50°C, contact our Technical Department: Tel +39 (0) 331 307015 - Fax +39 (0) 331 306923 - e-mail ufficio.tecnico@aquatechnik.it

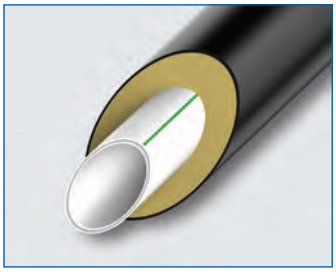
Standards and Certifications

Product in reference with the most important internatio-nal standards, including EN ISO 15874, DIN 8077-8078, ASTM F2389. Compliant with all organoleptic standards for the transport of hot and cold drinking water, heating, cooling and compressed air.

The fusio-technik system has also obtained certification from the most important bodies in Europe and in the world. The first IIP, ICC-ES and Lloyd's Register certified fibre-reinforced PP-R pipe.

Certifications available on the site www.aquatechnik.it, on the download page.

faser iso FIBER-LIGHT



Description

Pre-insulated pipe made of PUR (rigid polyurethanic foam) protected by casing sheath hose, made with faser FIBER-LIGHT service pipe (SDR 17,6) in PP-RCT WOR with high resistance against high temperature and oxidation process, especially suitable for mechanical installations with medium pressure and temperature: heating, air conditioning and compressed air systems, transport of technologi-cal fluids. Suitable for the transport of drinking water, cold and at low temperature (max 30°C).

Data sheet

Raw material: PP-RCT WOR/PP-RF/PP-R
Series: S 8.3
Thermal conductivity at 20°C: λ 0,190 W/mK Coefficient of linear thermal expansion (CLTE): α 0,035 mm/mK
Internal roughness: 0,007 mm
Colour: inner layer white, external layer white with green stripes, black outer casing
Size: from Ø 125 to 315 mm

Product specifications

Item	SDR	Internal pipe			External pipe		Insulation thickness	DN	Pipe	H_2O cont.	Pipe weight		
		Ø ext.	int. Ø	Thick.	ext. Ø	Thick.					naked	preinsulated	pipe
		mm	mm	mm	mm	mm	mm		m	l/m	Kg/m	Kg/m	Kg/m
61476UZPC	17,6	125,0	110,8	7,1	225,0	3,0	46,6	100	5,8	9,642	2,789	6,543	36,5
61478UZPC	17,6	160,0	141,8	9,1	250,0	3,0	41,4	150	5,8	15,792	4,545	8,762	49,2
61480UZPC	17,6	200,0	177,2	11,4	315,0	3,0	53,4	---	5,8	24,661	7,055	13,407	75,3
61482UZPC	17,6	250,0	221,6	14,2	400,0	3,0	70,2	200	5,8	38,568	10,965	20,859	117,2
61484UZPC	17,6	315,0	279,2	17,9	450,0	3,0	62,3	250	5,8	61,224	17,296	28,624	161,7
61476UZPL	17,6	125,0	110,8	7,1	90,0	3,0	46,6	100	11,6	9,642	2,789	6,543	74,5
61478UZPL	17,6	160,0	141,8	9,1	110,0	3,0	41,4	150	11,6	15,792	4,545	8,762	100,0
61480UZPL	17,6	200,0	177,2	11,4	110,0	3,0	53,4	---	11,6	24,661	7,055	13,407	153,1
61482UZPL	17,6	250,0	221,6	14,2	125,0	3,0	70,2	200	11,6	38,568	10,965	20,859	238,2

* *Pre-insulated pipe weight refers to 1 meter pipe totally insulated and coated.*

** *Rod weight refers to the insulated and coated rod except the two terminal parts (cut back), measuring 19 cm each.*

NB: the indicated weights are the real ones of the item during the production phases, therefore they can change according to the dimensional variations of the product.

Fields of application

The system is especially recommended to realize mecha-nical systems, heating and conditioning. The pipes are su-itable for the transport of drinking water at low tempera-tures (max 30°C). To set up for the conveyance of liquids and/or different substances and for the transport drinking water with temperatures above 30°C, contact our Tech-nical Department: Tel +39 (0) 331 307015 - Fax +39 (0) 331 306923 - e-mail ufficio.tecnico@aquatechnik.it

Standards and Certifications

Product in reference with the most important internatio-nal standards, including EN ISO 15874, DIN 8077-8078, ASTM F2389. Compliant with all organoleptic standards for the transport of hot and cold drinking water, heating, cooling and compressed air. The fusio-technik system has also obtained certification from the most important bo-dies in Europe and in the world. The first IIP, ICC-ES and Lloyd's Register certified fibre-reinforced PP-R pipe. Certifications available on the site www.aquatechnik.it, on the download page.

Features of PUR insulation

The pipe, fittings and special parts insulation process is carried out in reference to UNI EN 253.
This process is performed using specific computerised equipment that monitors the stoichiometric dosing, mixing of the two base components (polyol and isocyanate) and injection of the mixture in real time.
The polyaddition reaction between these two reagents leads to the formation of a polyurethane product (PUR) obtained by reaction between isocyanate and polyol, with the addition of catalysts and water like expanding agent, which increase the reaction rate and promote the forma-tion of stiff expanded foam, with high thermal insulation capacity.
The coaxiality of the items is guaranteed by special spacers made of polymeric material, placed at appropriate distances.
The use of these spacers also limits the tensions genera-ted during the expansion of the PUR foam and also ensu-res the concentricity of the casing outer hose/pipe.

Physical and technical features	*Results*
Core density	≃35 Kg/m³
Closed-cell content	> 90%
Compression strenght with 10% deformation	> 300 KPa
Thermal conductivity initial	0,0227 W/mK
(EN 12667) *Thermal conductivity aged*	0,027 W/mK
Absorption in water at 100°C after 90 min	0,2 %
(EN 11825-2) *Euroclass*	F

Features of the external PE-HD casing pipe

The outer "casing" hose, made of PE-HD and compliant with product Standards UNI EN 253, is designed to protect the polyurethane foam, especially in underground instal-lations.
The physical characteristics of polyethylene (PE), conside-red one of the best materials in terms of chemical and electrochemical resistance, make the iso-technik system particularly resistant to:

- *weathering, and in particular to the action of UV rays, through the use of antioxidant additives in the polymeric material of the casing hose;*
- *electrolytes and stray currents in the soil.*

To facilitate adhesion between the inner surface of the casing hose and the polyurethane foam, the inner surface of the casing is first of all subjected to a "corona treatment" which modifies the surface tension and consequently the wettability of the inner surface of the pipe, consequently optimising the adhesion of the polyurethane foam and en-suring high stability of the entire system.

Physical and technical features	*Results*
Density	0,950 g/cm³
Thermal conductivity λ	0,40 W/mK
Thermal expansion coefficient	α 0,18
Modulus of elasticity	800 MPa

Dimensional features of pipes and fittings

Internal service pipe	*PUR insulation thickness*	*External PE-HD casing pipe*	*Thickness of the external PE-HD casing pipe*
Ø (d) mm	mm	Ø (De) mm	mm
32	26,0	90	3,0
40	32,0	110	3,0
50	27,0	110	3,0
63	28,0	125	3,0
75	29,5	140	3,0
90	32,0	160	3,0
110	41,8	200	3,2
125	46,6	225	3,4
160	41,4	250	3,6
200	53,4	315	4,1
250	70,2	400	4,8
315	62,3	450	5,2

Example of thermal dispersion calculation in overhead installations

Ø *pipe*		iso *faser* FIBER-T			iso *faser* FIBER-COND			iso *faser* FIBER-LIGHT		
service pipe	*outer casing*	*with fluid medium T*			*with fluid medium T*			*with fluid T medium*		
		40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C
mm	mm	(W/m)	(W/m)	(W/m)	(W/m)	(W/m)	(W/m)	(W/m)	(W/m)	(W/m)
32	90	3,0	5,3	7,5	3,1	5,4	7,7			
40	110	3,1	5,4	7,8	3,1	5,5	7,9			
50	110	3,9	6,8	9,7	4,0	7,0	9,9			
63	125	4,4	7,8	11,1	4,5	8,0	11,4			
75	140	4,9	8,5	12,1	5,0	8,7	12,4			
90	160	5,2	9,2	13,1	5,4	9,4	13,5			
110	200	5,1	9,0	12,8	5,3	9,2	13,1			
125	225	5,2	9,2	13,1	5,4	9,4	13,4	5,5	9,6	13,7
160	250				7,0	12,2	17,4	7,1	12,5	17,8
200	315				6,9	12,1	17,3	7,1	12,4	17,7
250	400				6,8	11,9	17,0	6,9	12,1	17,3
315	450				8,8	15,4	22,0	9,1	15,9	22,7

Air temperature 20°C
λ = 0,027 W/mK (EN 12667)

For buried installations apply specific parameters and models considering:
• soil features • burial depth • type and numbers of pipe • temperatures • everything that can influence its behaviour.

Total thermal insulation

The use of polymeric materials for the production of service pipes, gives the iso-technik system such a low level of total thermal insulation that thermal dispersions are almost completely eliminated. This emerges from the analysis of the thermal conductivity characteristics (λ) of the service pipes.
Polypropylene (and even more fibre-reinforced) has a thermal conductivity factor that is 99,6% lower than steel:

λ steel = 52 W/mK
λ fibre-reinforced polypropylene = 0,19 W/mK

The features described above, together with the thermal insulation factor of the PUR foam and those of the outer casing pipe, ensure performance as quantified below.

Cold fluid example

Piping iso FIBER-T Ø 50 mm (external Ø 110 mm) art. 61366PC

- *Ambient T = 35°C;*
- *Fluid T = 9°C;*
- *Internal pipe diameter = 36,2 mm;*
- *Length of non-underground section = 7500 m;*
- *Fluid speed = 1 m/s;*
- *Insulation thickness = 32 mm;*
- *Non-insulated pipe surface T = approx. 18°C;*
- *Insulated pipe surface T = approx. 33°C.*

Hot fluid example

Piping iso FIBER-T Ø 50 mm (external Ø 110 mm) art. 61366PC

- *Ambient T = 20°C;*
- *Fluid T = 60°C;*
- *Internal pipe diameter = 36,2 mm;*
- *Length of non-underground section = 7500 m;*
- *Fluid speed = 1 m/s;*
- *Insulation thickness = 32 mm;*
- *Non-insulated pipe surface T = approx. 45°C;*
- *Insulated pipe surface T = approx. 23°C.*

PLEASE NOTE: *these two indicative estimates were obtai-ned using a theoretical calculation model available at our Technical Department, applying the following assumptions:*

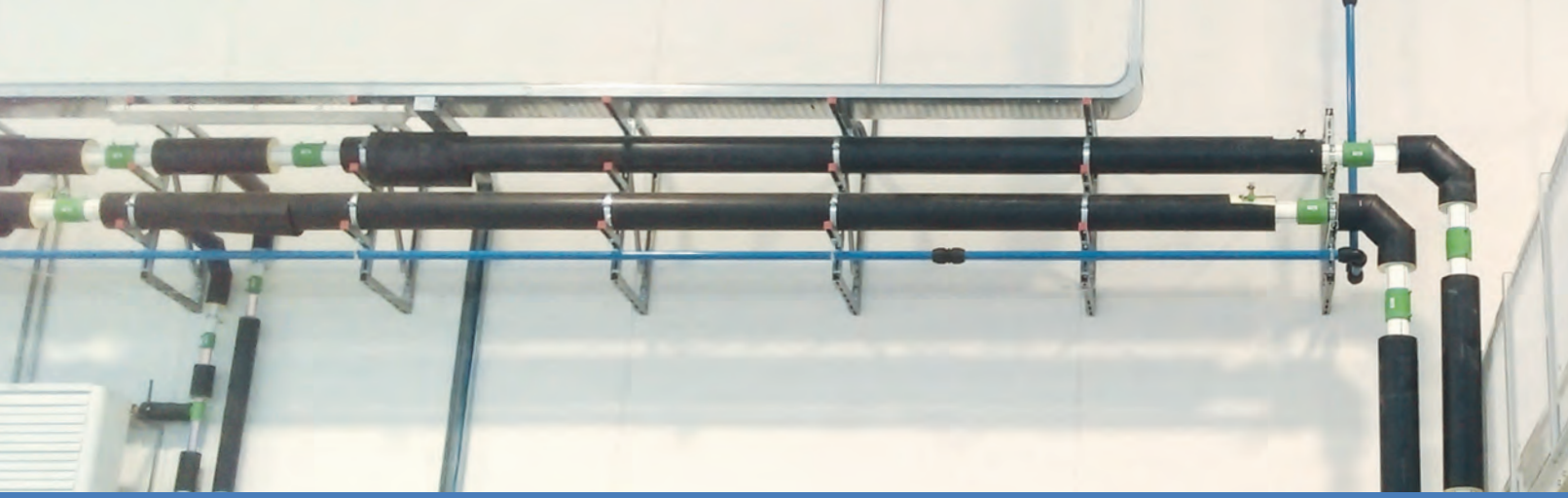
- *External Heat Transfer = 10 W/m²K;*
- *Internal Heat Transfer = negligible.*

Fittings

The iso-technik fittings are made by welding fusio-tech-nik fittings with segmented pipes of the faser FIBER-T, faser FIBER-COND and faser FIBER-LIGHT ranges. Employed fittings are of the following types:

- *of PP-R (SDR 5) up to Ø 125 mm*
- *of PP-RCT (SDR 11 e SDR 17,6) up to Ø 160 mm. Thus made products are then pre-insulated by PUR (ri-gid polyurethanic foam) and protected by casing sheath hose. Each end is protected by special caps, then each fitting is individually packaged.*

Iso-technik Department, in order to meet market requests and requirements, can made special parts on specific design requests.
This department is supported by a technical studio with a team of qualified personnel who, in addition to managing the design part needed to create the details tailored to the customer, is also able to suggest the customer in choosing the most appropriate type of product, based on the condi-tions of use.



Pipe applications

- Recommended for technical advantages
- Possible use
- Not suitable

	faser iso FIBER-T SDR 7,4	*faser* iso FIBER-COND SDR 11	*faser* iso FIBER-LIGHT SDR 17,6
Drinking water at high temperature	Recommended	Possible	Possible
Drinking water at low temperature	Recommended	Recommended	Recommended
Heating	Possible	Recommended	Recommended
Conditioning/cooling	Possible	Recommended	Recommended
Chilled water	Possible	Recommended	Recommended
Swimming pools	Possible	Recommended	Recommended
Heating/ Cooling for sports facilities	Possible	Recommended	Recommended
Conveying chemicals*	Recommended	Recommended	Recommended
Rainwater	Possible	Possible	Possible
Irrigation	Possible	Recommended	Recommended
Compressed air	Recommended	Possible	Possible
Floor heating and cooling	Possible	Recommended	Recommended
Naval	Recommended	Recommended	Recommended
District heating**	Possible	Recommended	Recommended
Civil geothermal plants	Possible	Recommended	Recommended
Industrial geothermal plants	Possible	Recommended	Recommended
Agriculture	Possible	Recommended	Recommended
UV exposure	Recommended	Recommended	Recommended
Fire resistance	Not suitable	Not suitable	Not suitable

* After a corporate technical evaluation

** At high temperature (max 90°C)

Designing with iso-technik system

How to choose the most suitable system

The specific solutions and the range of diameters also optimise the design work. The iso-technik system can be used to install distribution networks for hot or cold drin-king water, reuse water distribution networks, heating/air conditioning networks and technological plants. The design with the iso-technik system offers the following advantages:

- ***simplification in the calculation process and application of the products in the projects;***
- ***contribution to reducing the dispersion of heat from the distribution networks*** *(thermal conductivity of service pipe λ 0,19 W/mK);*
- ***reduction of electrical consumption of the circulating pumps,*** *thanks to the low friction coefficient;*
- ***extended service life, over 50 years,*** *by following the brochure guidelines;*
- ***eco-sustainability: 100% recyclable.***

During the design stage, Aquatechnik provides its consul-tancy through its Technical Department (ufficio.tecnico@aquatechnik.it).

The choice of the most suitable system will be guided by the specificity of the plant to be installed, depending on whether it requires lines for drinking water or mechanical installations (air conditioning, compressed and industrial air in general). In the latter case, it is necessary to verify the chemical compatibility with the fluid supplied.

Operating conditions closed circuit plants, heating, air conditioning, district heating

Exercise period	*Temperature*	*Years of operation*	*faser* iso FIBER-T **SDR 7,4** *SF 1,25	*faser* iso FIBER-COND **SDR 11** *SF 1,25	*faser* iso FIBER-LIGHT **SDR 17,6** *SF 1,25
			bar	bar	bar
Constante temperature at 70°C 30 days/year of which	75°C	5	16,2	10,3	6,1
		10	15,7	9,9	6,0
		25	15,2	9,6	5,8
		50	15,0	9,5	5,7
	80°C	5	15,0	9,5	5,7
		10	14,8	9,4	5,6
		25	14,3	9,0	5,4
		50	14,0	8,9	5,3
	85°C	5	13,8	8,7	5,2
		10	13,5	8,5	5,1
		25	13,0	8,2	4,9
		50	12,8	8,1	4,8
	95°C	5	11,4	7,2	4,3
		10	10,9	6,9	4,1
		25	10,6	6,7	4,0
		50	10,4	6,6	3,9
Constante temperature at 70°C 60 days/year of which	75°C	5	16,0	10,1	6,0
		10	15,5	9,8	5,8
		25	15,2	9,6	5,7
		50	14,6	9,2	5,5
	80°C	5	14,8	9,4	5,6
		10	14,3	9,0	5,4
		25	14,0	8,9	5,3
		50	13,4	8,5	5,1
	85°C	5	13,5	8,5	5,1
		10	13,0	8,2	4,9
		25	12,8	8,1	4,8
		50	12,2	7,7	4,6
	95°C	5	10,9	6,9	4,1
		10	10,6	6,7	4,0
		25	10,4	6,6	3,9
		50	9,8	6,2	3,7
Constante temperature at 70°C 90 days/year of which	75°C	5	15,5	9,8	5,9
		10	15,4	9,7	5,8
		25	14,7	9,3	5,5
		50	14,2	9,0	5,4
	80°C	5	14,3	9,1	5,4
		10	14,2	9,0	5,3
		25	13,5	8,6	5,1
		50	13,0	8,2	4,9
	85°C	5	13,0	8,2	4,9
		10	12,9	8,1	4,8
		25	12,3	7,8	4,6
		50	11,8	7,4	4,4
	95°C	5	10,6	6,7	4,0
		10	10,5	6,6	3,9
		25	9,8	6,2	3,7
		50	9,4	5,9	3,6

* SF= *Safety factor*

Note 1:
for applications with chilled water mixed with ethylene glycol or glycerine, -20°C limit temperature. In this case, separate the lines from the circulators with specific anti-vibration joints.

Note 2:
values in the table are approved by IIP (Istituto Italiano dei Plastici).

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Operating conditions Sanitary

Temperature	*Years of operation*	*faser* iso FIBER-T **SDR 7,4** *SF 1,5	*faser* iso FIBER-COND **SDR 11** *SF 1,5	*faser* iso FIBER-LIGHT **SDR 17,6** *SF 1,5
		bar	bar	bar
10°C	10	31,3	19,9	12,0
	25	30,4	19,3	11,5
	50	29,6	18,8	11,3
	100	28,0	17,7	10,6
20°C	10	28,5	18,1	10,8
	25	27,4	17,4	10,4
	50	26,8	17,0	10,2
	100	25,3	16,1	9,6
30°C	10	25,4	16,1	9,7
	25	24,5	15,5	9,2
	50	23,9	15,2	9,1
	100	22,7	14,4	8,6
40°C	10	22,3	14,2	8,5 *
	25	21,5	13,7	8,2 *
	50	21,1	13,4	8,0 *
	100	20,1	12,8	7,7 *
50°C	10	19,2	12,2	7,3 *
	25	18,7	11,8	7,1 *
	50	18,2	11,5	6,9 *
	100	17,5	11,1	6,6 *
60°C	10	16,2	10,3 *	6,2 *
	25	15,5	9,8 *	5,9 *
	50	15,4	9,7 *	5,8 *
70°C	10	13,1	8,3 *	5,0 *
	25	12,7	8,0 *	4,8 *
	50	12,5	7,9 *	4,7 *
80°C	10	11,0	7,0 *	4,2 *
	25	10,4	6,6 *	4,0 *
95°C	5	8,5	5,4 *	3,2 *
	10	7,9	5,0 *	3,0 *

* SF= *Safety factor*

Note 2:
values in the table are approved by IIP (Istituto Italiano dei Plastici).

APPROVATO IIP APPROVED

* *Applicable working conditions only with the prior approval of Aquatechnik Technical Management*

Operating conditions other kind of installations

Temperature	*Years of operation*	*faser* iso FIBER-T **SDR 7,4** *SF 1,25	*faser* iso FIBER-COND **SDR 11** *SF 1,25	*faser* iso FIBER-LIGHT **SDR 17,6** *SF 1,25
		bar	bar	bar
10°C	10	37,9	24,0	14,4
	25	36,5	23,1	13,8
	50	35,5	22,5	13,5
	100	33,5	21,2	12,7
20°C	10	34,2	21,7	13,0
	25	32,9	20,9	12,5
	50	32,1	20,3	12,2
	100	30,4	19,2	11,5
30°C	10	30,5	19,3	11,6
	25	29,1	18,4	11,0
	50	28,7	18,2	10,9
	100	27,3	17,3	10,3
40°C	10	26,8	17,0	10,2
	25	25,8	16,4	9,8
	50	25,3	16,0	9,6
	100	24,1	15,3	9,2
50°C	10	23,1	14,6	8,8
	25	22,5	14,2	8,5
	50	21,8	13,8	8,3
	100	21,0	13,3	7,9
60°C	10	19,4	12,3	7,4
	25	18,7	11,9	7,1
	50	18,4	11,7	7,0
	100	17,8	11,3	6,8
70°C	10	15,7	9,9	6,0
	25	15,2	9,6	5,8
	50	15,0	9,5	5,7
80°C	10	13,3	8,4	5,0
	25	12,7	8,0	4,8
95°C	5	10,1	6,4	3,8
	10	9,6	6,1	3,6

* SF= *Safety factor*

Note 2:
values in the table are approved by IIP (Istituto Italiano dei Plastici).

APPROVATO IIP APPROVED

Compressed air

The iso-technik system technical features, along with the ease of processing and installation, make this product particularly suitable to create compressed air carrying systems. In addition, the wide piping range allows the best system to be created at the best price, based on the performance requested. The right piping to use must be chosen considering the working pres-sure required by the design and the type of installation planned.
Although pre-insulation of compressed air networks doesn't give proper advantages in performance and energy saving, it can nevertheless give a great advan-tage in terms of noise pollution. In order to satisfy re-quest of silent plants, the iso-technik range can be the best solution.
Having such a wide choice is made possible thanks to the high performance of all the pipes produced by Aquatechnik. It is recommended to properly assess any legislative or regulatory requirements and to identify nets with specific colors (e.g. label application).

Pipe continuous pressure drops

Pressure drops are a reduction in pressure caused by resistances that oppose the movement of a fluid.
Frictional losses can be either continuous or localised: the continuous ones occur along the lenght of a pipe; whereas localised losses occur at fitting changes in direction or pipe size (i.e. reductions, diverters, tee, el-bows, influxes, valves, filters, etc.).

Calculating continuous pressure drops
For every metre of pipe, continuous water pressure drops can be calculated with the general formula:

$$r = \left(F_a \cdot \frac{1}{D} \cdot \rho \cdot \frac{v^2}{2}\right)/100$$

where:
r = *unitary continuous pressure drop (mbar/m)*
F_a = *friction factor, dimensionless*
ρ = *water density (Kg/m³)*
v = *average water speed (m/s)*
D = *internal pipe diameter (m)*

Note the pipe diameter, water speed and its density. The only unknown parameter is the friction factor (F_a), which depends on the fluid flow speed and the pipe roughness.
PP-R pipes have smooth inner surfaces that pose low resistance to hot and cold fluid flow and, as such, are less prone to limescale build-up which, over time, reduces the actual end user flow rates.
These factors allow for higher water speeds in distribu-tion networks without the negative consequences that can arise in metal piping (turbulence, noise, reduced flow rate).
The tables below are helpful in properly sizing the hot and cold water adduction lines for every type of system.
The present tables have been determined by using the formula for pipes with low roughness.

NB: *for localized pressure drops, refer to the Fusio-technik catalogue.*

Continous pressure drop SDR 7,4

Rugosity	0,007	
pecific weight	998,00 kg/m³	977,20 kg/m³
Temperature	20°C	70°C
Viscosity	1,00E-06 m²/s	4,13E-07 m²/s

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

Q	De	32		40		50		63		75		90		110		125	
	Di	23,2		29,0		36,2		45,8		54,4		65,4		79,8		90,8	
0,01	R	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,02		0,02		0,01		0,01		0,00		0,00		0,00		0,00	
0,02	R	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,05		0,03		0,02		0,01		0,01		0,01		0,00		0,00	
0,03	R	0,06	0,04	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,07		0,05		0,03		0,02		0,01		0,01		0,01		0,00	
0,04	R	0,09	0,07	0,03	0,02	0,01	0,01	0.00	0.00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,09		0,06		0,04		0,02		0,02		0,01		0,01		0,01	
0,05	R	0,13	0,11	0,05	0,04	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,12		0,08		0,05		0,03		0,02		0,01		0,01		0,01	
0,06	R	0,19	0,15	0,06	0,05	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,14		0,09		0,06		0,04		0,03		0,02		0,01		0,01	
0,07	R	0,24	0,19	0,08	0,07	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,17		0,11		0,07		0,04		0,03		0,02		0,01		0,01	
0,08	R	0,31	0,24	0,11	0,08	0,04	0,03	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,19		0,12		0,08		0,05		0,03		0,02		0,02		0,01	
0,09	R	0,38	0,30	0,13	0,10	0,05	0,04	0,01	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,21		0,14		0,09		0,05		0,04		0,03		0,02		0,01	
0,10	R	0,45	0,36	0,16	0,12	0,05	0,04	0,02	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,24		0,15		0,10		0,06		0,04		0,03		0,02		0,02	
0,12	R	0,62	0,49	0,22	0,17	0,08	0,06	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,28		0,18		0,12		0,07		0,05		0,04		0,02		0,02	
0,14	R	0,82	0,64	0,28	0,22	0,10	0,08	0,03	0,03	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00
	V	0,33		0,21		0,14		0,09		0,06		0,04		0,03		0,02	
0,16	R	1,03	0,81	0,36	0,28	0,12	0,10	0,04	0,03	0,02	0,01	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,38		0,24		0,16		0,10		0,07		0,05		0,03		0,02	
0,18	R	1,27	1,00	0,44	0,35	0,15	0,12	0,05	0,04	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,43		0,27		0,17		0,11		0,08		0,05		0,04		0,03	
0,20	R	1,52	1,20	0,53	0,42	0,18	0,15	0,06	0,05	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,47		0,30		0,19		0,12		0,09		0,06		0,04		0,03	
0,30	R	3,09	2,44	1,07	0,85	0,37	0,29	0,12	0,10	0,05	0,04	0,02	0,02	0,01	0,01	0,00	0,00
	V	0,71		0,45		0,29		0,18		0,13		0,09		0,06		0,05	
0,40	R	5,12	4,04	1,77	1,40	0,62	0,49	0,20	0,16	0,09	0,07	0,04	0,03	0,01	0,01	0,01	0,01
	V	0,95		0,61		0,39		0,24		0,17		0,12		0,08		0,06	
0,50	R	7,56	5,97	2,62	2,07	0,91	0,72	0,30	0,24	0,13	0,10	0,06	0,04	0,02	0,02	0,01	0,01
	V	1,18		0,76		0,49		0,30		0,22		0,15		0,10		0,08	
0,60	R	10,40	8,21	3,61	2,84	1,26	0,99	0,41	0,32	0,18	0,14	0,08	0,06	0,03	0,02	0,02	0,01
	V	1,42		0,91		0,58		0,36		0,26		0,18		0,12		0,09	
0,70	R	13,63	10,75	4,72	3,73	1,65	1,30	0,54	0,43	0,24	0,19	0,10	0,08	0,04	0,03	0,02	0,02
	V	1,66		1,06		0,68		0,43		0,30		0,21		0,14		0,11	
0,80	R	17,21	13,58	5,96	4,71	2,08	1,64	0,68	0,54	0,30	0,24	0,13	0,10	0,05	0,04	0,03	0,02
	V	1,89		1,21		0,78		0,49		0,34		0,24		0,16		0,12	
0,90	R	21,15	16,69	7,33	5,78	2,56	2,02	0,84	0,66	0,37	0,29	0,15	0,12	0,06	0,05	0,03	0,03
	V	2,13		1,36		0,87		0,55		0,39		0,27		0,18		0,14	
1,00	R	25,44	20,07	8,81	6,95	3,07	2,43	1,01	0,79	0,44	0,35	0,19	0,15	0,07	0,06	0,04	0,03
	V	2,37		1,51		0,97		0,61		0,43		0,30		0,20		0,15	
1,20	R	35,00	27,61	12,13	9,57	4,23	3,34	1,38	1,09	0,61	0,48	0,25	0,20	0,10	0,08	0,05	0,04
	V	2,84		1,82		1,17		0,73		0,52		0,36		0,24		0,19	
1,40	R	45,83	36,16	15,88	12,53	5,54	4,37	1,81	1,43	0,80	0,63	0,33	0,26	0,13	0,10	0,07	0,06
	V	3,31		2,12		1,36		0,85		0,60		0,42		0,28		0,22	
1,60	R	57,90	45,68	20,06	15,83	7,00	5,52	2,29	1,81	1,01	0,80	0,42	0,33	0,16	0,13	0,09	0,07
	V	3,79		2,42		1,56		0,97		0,69		0,48		0,32		0,25	
1,80	R	71,15	56,14	24,65	19,45	8,60	6,78	2,81	2,22	1,24	0,98	0,52	0,41	0,20	0,16	0,11	0,09
	V	4,26		2,73		1,75		1,09		0,77		0,54		0,36		0,28	
2,00	R	85,56	67,51	29,64	23,39	10,34	8,16	3,38	2,67	1,49	1,18	0,62	0,49	0,24	0,19	0,13	0,10
	V	4,73		3,03		1,94		1,21		0,86		0,60		0,40		0,31	
2,20	R	101,09	79,76	35,03	27,63	12,22	9,64	4,00	3,15	1,76	1,39	0,74	0,58	0,29	0,23	0,15	0,12
	V	5,21		3,33		2,14		1,34		0,95		0,66		0,44		0,34	
2,40	R	117,72	92,88	40,79	32,18	14,22	11,22	4,65	3,67	2,05	1,62	0,86	0,68	0,33	0,26	0,18	0,14
	V	5,68		3,64		2,33		1,46		1,03		0,71		0,48		0,37	
2,60	R			46,92	37,02	16,36	12,91	5,35	4,22	2,36	1,87	0,99	0,78	0,38	0,30	0,21	0,16
	V			3,94		2,53		1,58		1,12		0,77		0,52		0,40	
2,80	R			53,42	42,14	18,63	14,70	6,09	4,81	2,69	2,12	1,12	0,89	0,44	0,34	0,24	0,19
	V			4,24		2,72		1,70		1,21		0,83		0,56		0,43	
3,00	R			60,27	47,55	21,02	16,58	6,88	5,43	3,04	2,40	1,27	1,00	0,49	0,39	0,27	0,21
	V			4,54		2,92		1,82		1,29		0,89		0,60		0,46	

Q	De	32	40	50	63	75	90	110	125
	Di	23,2	29,0	36,2	45,8	54,4	65,4	79,8	90,8
3,20	R		67,48 53,24	23,53 18,57	7,70 6,07	3,40 2,68	1,42 1,12	0,55 0,43	0,30 0,24
	V		4,85	3,11	1,94	1,38	0,95	0,64	0,49
3,40	R		75,03 59,20	26,17 20,65	8,56 6,75	3,78 2,98	1,58 1,24	0,61 0,48	0,33 0,26
	V		5,15	3,31	2,06	1,46	1,01	0,68	0,53
3,60	R		82,92 65,43	28,92 22,82	9,46 7,46	4,18 3,30	1,74 1,37	0,68 0,53	0,37 0,29
	V		5,45	3,50	2,19	1,55	1,07	0,72	0,56
3,80	R		91,15 71,92	31,79 25,08	10,40 8,21	4,59 3,62	1,91 1,51	0,74 0,59	0,40 0,32
	V		5,76	3,69	2,31	1,64	1,13	0,76	0,59
4,00	R			34,78 27,44	11,38 8,98	5,02 3,96	2,09 1,65	0,81 0,64	0,44 0,35
	V			3,89	2,43	1,72	1,19	0,80	0,62
4,20	R			37,88 29,88	12,39 9,78	5,47 4,32	2,28 1,80	0,89 0,70	0,48 0,38
	V			4,08	2,55	1,81	1,25	0,84	0,65
4,40	R			41,09 32,42	13,44 10,61	5,94 4,68	2,48 1,95	0,96 0,76	0,52 0,41
	V			4,28	2,67	1,89	1,31	0,88	0,68
4,60	R			44,41 35,04	14,53 11,46	6,42 5,06	2,68 2,11	1,04 0,82	0,56 0,44
	V			4,47	2,79	1,98	1,37	0,92	0,71
4,80	R			47,85 37,75	15,65 12,35	6,91 5,45	2,88 2,27	1,12 0,88	0,61 0,48
	V			4,67	2,92	2,07	1,43	0,96	0,74
5,00	R			51,39 40,55	16,81 13,26	7,42 5,86	3,10 2,44	1,20 0,95	0,65 0,51
	V			4,86	3,04	2,15	1,49	1,00	0,77
5,20	R			55,04 43,43	18,01 14,21	7,95 6,27	3,32 2,62	1,29 1,02	0,70 0,55
	V			5,05	3,16	2,24	1,55	1,04	0,80
5,40	R			58,80 46,39	19,24 15,18	8,49 6,70	3,54 2,79	1,38 1,09	0,75 0,59
	V			5,25	3,28	2,32	1,61	1,08	0,83
5,60	R			62,66 49,44	20,50 16,17	9,05 7,14	3,77 2,98	1,47 1,16	0,79 0,63
	V			5,44	3,40	2,41	1,67	1,12	0,87
5,80	R			66,63 52,57	21,80 17,20	9,63 7,59	4,01 3,17	1,56 1,23	0,84 0,67
	V			5,64	3,52	2,50	1,73	1,16	0,90
6,00	R			70,70 55,78	23,13 18,25	10,21 8,06	4,26 3,36	1,65 1,31	0,90 0,71
	V			5,83	3,64	2,58	1,79	1,20	0,93
6,20	R				24,50 19,33	10,82 8,53	4,51 3,56	1,75 1,38	0,95 0,75
	V				3,77	2,67	1,85	1,24	0,96
6,40	R				25,90 20,43	11,44 9,02	4,77 3,76	1,85 1,46	1,00 0,79
	V				3,89	2,75	1,91	1,28	0,99
6,60	R				27,33 21,56	12,07 9,52	5,03 3,97	1,96 1,54	1,06 0,84
	V				4,01	2,84	1,97	1,32	1,02
6,80	R				28,79 22,72	12,72 10,03	5,30 4,18	2,06 1,63	1,12 0,88
	V				4,13	2,93	2,03	1,36	1,05
7,00	R				30,29 23,90	13,38 10,55	5,58 4,40	2,17 1,71	1,17 0,93
	V				4,25	3,01	2,08	1,40	1,08
7,50	R				34,18 26,97	15,09 11,91	6,29 4,97	2,45 1,93	1,32 1,04
	V				4,55	3,23	2,23	1,50	1,16
8,00	R				38,27 30,19	16,90 13,33	7,05 5,56	2,74 2,16	1,48 1,17
	V				4,86	3,44	2,38	1,60	1,24
9,00	R				47,03 37,10	20,77 16,38	8,66 6,83	3,36 2,65	1,82 1,44
	V				5,47	3,87	2,68	1,80	1,39
10,00	R					24,97 19,70	10,41 8,22	4,05 3,19	2,19 1,73
	V					4,30	2,98	2,00	1,55
20,00	R						35,02 27,63	13,61 10,74	7,37 5,81
	V						5,96	4,00	3,09
30,00	R								14,98 11,82
	V								4,64

Continous pressure drop SDR 11

Rugosity	0,007	
Specific weight	998,00 kg/m³	977,20 kg/m³
Temperature	20°C	70°C
Viscosity	1,00E-06 m²/s	4,13E-07 m²/s

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

Q	De	32	40	50	63	75	90	110	125	160	200	250	315
	Di	26,2	32,6	40,8	51,4	61,4	73,6	90,0	102,2	130,8	163,6	204,6	257,8
0,01	R	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
0,02	R	0,02 0,01	0,01 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,04	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
0,03	R	0,03 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,06	0,04	0,02	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
0,04	R	0,05 0,04	0,02 0,01	0,01 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,07	0,05	0,03	0,02	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00
0,05	R	0,08 0,06	0,03 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,09	0,06	0,04	0,02	0,02	0,01	0,01	0,01	0,00	0,00	0,00	0,00
0,06	R	0,10 0,08	0,04 0,03	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,11	0,07	0,05	0,03	0,02	0,01	0,01	0,01	0,00	0,00	0,00	0,00
0,07	R	0,14 0,11	0,05 0,04	0,02 0,01	0,01 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,13	0,08	0,05	0,03	0,02	0,02	0,01	0,01	0,01	0,00	0,00	0,00
0,08	R	0,17 0,14	0,06 0,05	0,02 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,15	0,10	0,06	0,04	0,03	0,02	0,01	0,01	0,01	0,00	0,00	0,00
0,09	R	0,21 0,17	0,07 0,06	0,03 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,17	0,11	0,07	0,04	0,03	0,02	0,01	0,01	0,01	0,00	0,00	0,00
0,10	R	0,25 0,20	0,09 0,07	0,03 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,19	0,12	0,08	0,05	0,03	0,02	0,02	0,01	0,01	0,00	0,00	0,00
0,12	R	0,35 0,28	0,12 0,10	0,04 0,03	0,01 0,01	0,01 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,22	0,14	0,09	0,06	0,04	0,03	0,02	0,01	0,01	0,01	0,00	0,00
0,14	R	0,46 0,36	0,16 0,13	0,06 0,04	0,02 0,01	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,26	0,17	0,11	0,07	0,05	0,03	0,02	0,02	0,01	0,01	0,00	0,00
0,16	R	0,58 0,46	0,20 0,16	0,07 0,06	0,02 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,30	0,19	0,12	0,08	0,05	0,04	0,03	0,02	0,01	0,01	0,00	0,00
0,18	R	0,71 0,56	0,25 0,20	0,09 0,07	0,03 0,02	0,01 0,01	0,01 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,33	0,22	0,14	0,09	0,06	0,04	0,03	0,02	0,01	0,01	0,01	0,00
0,20	R	0,85 0,67	0,30 0,24	0,10 0,08	0,03 0,03	0,01 0,01	0,01 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,37	0,24	0,15	0,10	0,07	0,05	0,03	0,02	0,01	0,01	0,01	0,00
0,30	R	1,74 1,37	0,61 0,49	0,21 0,17	0,07 0,06	0,03 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,56	0,36	0,23	0,14	0,10	0,07	0,05	0,04	0,02	0,01	0,01	0,01
0,40	R	2,87 2,27	1,02 0,80	0,35 0,28	0,12 0,09	0,05 0,04	0,02 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,74	0,48	0,31	0,19	0,14	0,09	0,06	0,05	0,03	0,02	0,01	0,01
0,50	R	4,24 3,35	1,50 1,19	0,52 0,41	0,17 0,14	0,07 0,06	0,03 0,02	0,01 0,01	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	0,93	0,60	0,38	0,24	0,17	0,12	0,08	0,06	0,04	0,02	0,02	0,01
0,60	R	5,84 4,61	2,07 1,63	0,71 0,56	0,24 0,19	0,10 0,08	0,04 0,03	0,02 0,01	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	1,11	0,72	0,46	0,29	0,20	0,14	0,09	0,07	0,04	0,03	0,02	0,01
0,70	R	7,65 6,03	2,71 2,14	0,93 0,74	0,31 0,25	0,13 0,11	0,06 0,04	0,02 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	1,30	0,84	0,54	0,34	0,24	0,16	0,11	0,09	0,05	0,03	0,02	0,01
0,80	R	9,66 7,62	3,42 2,70	1,18 0,93	0,39 0,31	0,17 0,13	0,07 0,06	0,03 0,02	0,02 0,01	0,00 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	1,48	0,96	0,61	0,39	0,27	0,19	0,13	0,10	0,06	0,04	0,02	0,02
0,90	R	11,87 9,37	4,20 3,32	1,45 1,14	0,48 0,38	0,21 0,16	0,09 0,07	0,03 0,03	0,02 0,01	0,01 0,00	0,00 0,00	0,00 0,00	0,00 0,00
	V	1,67	1,08	0,69	0,43	0,30	0,21	0,14	0,11	0,07	0,04	0,03	0,02
1,00	R	14,28 11,26	5,06 3,99	1,74 1,37	0,58 0,46	0,25 0,20	0,11 0,08	0,04 0,03	0,02 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00
	V	1,86	1,20	0,77	0,48	0,34	0,24	0,16	0,12	0,07	0,05	0,03	0,02
1,20	R	19,64 15,50	6,96 5,49	2,40 1,89	0,80 0,63	0,34 0,27	0,15 0,11	0,06 0,04	0,03 0,02	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00
	V	2,23	1,44	0,92	0,58	0,41	0,28	0,19	0,15	0,09	0,06	0,04	0,02
1,40	R	25,72 20,30	9,11 7,19	3,14 2,48	1,05 0,83	0,45 0,36	0,19 0,15	0,07 0,06	0,04 0,03	0,01 0,01	0,00 0,00	0,00 0,00	0,00 0,00
	V	2,60	1,68	1,07	0,68	0,47	0,33	0,22	0,17	0,10	0,07	0,04	0,03
1,60	R	32,49 25,64	11,51 9,08	3,96 3,13	1,32 1,04	0,57 0,45	0,24 0,19	0,09 0,07	0,05 0,04	0,02 0,01	0,01 0,00	0,00 0,00	0,00 0,00
	V	2,97	1,92	1,22	0,77	0,54	0,38	0,25	0,20	0,12	0,08	0,05	0,03
1,80	R	39,93 31,51	14,14 11,16	4,87 3,84	1,63 1,28	0,70 0,55	0,30 0,23	0,11 0,09	0,06 0,05	0,02 0,02	0,01 0,01	0,00 0,00	0,00 0,00
	V	3,34	2,16	1,38	0,87	0,61	0,42	0,28	0,22	0,13	0,09	0,05	0,03
2,00	R	48,02 37,89	17,00 13,42	5,86 4,62	1,96 1,54	0,84 0,66	0,36 0,28	0,14 0,11	0,07 0,06	0,02 0,02	0,01 0,01	0,00 0,00	0,00 0,00
	V	3,71	2,40	1,53	0,96	0,68	0,47	0,31	0,24	0,15	0,10	0,06	0,04
2,20	R	56,73 44,76	20,09 15,85	6,92 5,46	2,31 1,82	0,99 0,78	0,42 0,33	0,16 0,13	0,09 0,07	0,03 0,02	0,01 0,01	0,00 0,00	0,00 0,00
	V	4,08	2,64	1,68	1,06	0,74	0,52	0,35	0,27	0,16	0,10	0,07	0,04
2,40	R	66,07 52,12	23,39 18,46	8,06 6,36	2,69 2,12	1,16 0,91	0,49 0,39	0,19 0,15	0,10 0,08	0,03 0,03	0,01 0,01	0,00 0,00	0,00 0,00
	V	4,45	2,88	1,84	1,16	0,81	0,56	0,38	0,29	0,18	0,11	0,07	0,05
2,60	R	76,00 59,96	26,91 21,23	9,27 7,31	3,10 2,44	1,33 1,05	0,56 0,44	0,22 0,17	0,12 0,09	0,04 0,03	0,01 0,01	0,00 0,00	0,00 0,00
	V	4,83	3,12	1,99	1,25	0,88	0,61	0,41	0,32	0,19	0,12	0,08	0,05
2,80	R	86,52 68,27	30,64 24,17	10,55 8,33	3,52 2,78	1,51 1,19	0,64 0,51	0,25 0,19	0,13 0,11	0,04 0,03	0,01 0,01	0,00 0,00	0,00 0,00
	V	5,20	3,36	2,14	1,35	0,95	0,66	0,44	0,34	0,21	0,13	0,09	0,05
3,00	R	97,63 77,03	34,57 27,28	11,91 9,40	3,98 3,14	1,71 1,35	0,72 0,57	0,28 0,22	0,15 0,12	0,05 0,04	0,02 0,01	0,01 0,00	0,00 0,00
	V	5,57	3,60	2,30	1,45	1,01	0,71	0,47	0,37	0,22	0,14	0,09	0,06

Q	De	32	40	50	63	75	90	110	125	160	200	250	315
	Di	26,2	32,6	40,8	51,4	61,4	73,6	90,0	102,2	130,8	163,6	204,6	257,8
3,20	R	109,30 86,24	38,70 30,54	13,33 10,52	4,45 3,51	1,91 1,51	0,81 0,64	0,31 0,25	0,17 0,13	0,05 0,04	0,02 0,01	0,01 0,00	0,00 0,00
	V	5,94	3,84	2,45	1,54	1,08	0,75	0,50	0,39	0,24	0,15	0,10	0,06
3,40	R		43,04 33,96	14,82 11,70	4,95 3,90	2,13 1,68	0,90 0,71	0,35 0,27	0,19 0,15	0,06 0,05	0,02 0,02	0,01 0,01	0,00 0,00
	V		4,08	2,60	1,64	1,15	0,80	0,53	0,41	0,25	0,16	0,10	0,07
3,60	R		47,56 37,53	16,38 12,93	5,47 4,32	2,35 1,85	0,99 0,78	0,38 0,30	0,21 0,16	0,06 0,05	0,02 0,02	0,01 0,01	0,00 0,00
	V		4,32	2,75	1,74	1,22	0,85	0,57	0,44	0,27	0,17	0,11	0,07
3,80	R		52,28 41,25	18,01 14,21	6,01 4,74	2,58 2,04	1,09 0,86	0,42 0,33	0,23 0,18	0,07 0,06	0,02 0,02	0,01 0,01	0,00 0,00
	V		4,55	2,91	1,83	1,28	0,89	0,60	0,46	0,28	0,18	0,12	0,07
4,00	R		57,19 45,13	19,70 15,54	6,58 5,19	2,83 2,23	1,20 0,94	0,46 0,36	0,25 0,20	0,08 0,06	0,03 0,02	0,01 0,01	0,00 0,00
	V		4,79	3,06	1,93	1,35	0,94	0,63	0,49	0,30	0,19	0,12	0,08
4,20	R		62,29 49,15	21,46 16,93	7,16 5,65	3,08 2,43	1,30 1,03	0,50 0,40	0,27 0,22	0,08 0,07	0,03 0,02	0,01 0,01	0,00 0,00
	V		5,03	3,21	2,03	1,42	0,99	0,66	0,51	0,31	0,20	0,13	0,08
4,40	R		67,58 53,32	23,28 18,37	7,77 6,13	3,34 2,64	1,41 1,11	0,54 0,43	0,30 0,23	0,09 0,07	0,03 0,03	0,01 0,01	0,00 0,00
	V		5,27	3,37	2,12	1,49	1,03	0,69	0,54	0,33	0,21	0,13	0,08
4,60	R		73,04 57,63	25,16 19,85	8,40 6,63	3,61 2,85	1,53 1,20	0,59 0,46	0,32 0,25	0,10 0,08	0,03 0,03	0,01 0,01	0,00 0,00
	V		5,51	3,52	2,22	1,55	1,08	0,72	0,56	0,34	0,22	0,14	0,09
4,80	R		78,69 62,09	27,11 21,39	9,05 7,14	3,89 3,07	1,64 1,30	0,63 0,50	0,35 0,27	0,11 0,08	0,04 0,03	0,01 0,01	0,00 0,00
	V		5,75	3,67	2,31	1,62	1,13	0,75	0,59	0,36	0,23	0,15	0,09
5,00	R		84,52 66,68	29,11 22,97	9,72 7,67	4,18 3,30	1,77 1,39	0,68 0,54	0,37 0,29	0,12 0,09	0,04 0,03	0,01 0,01	0,00 0,00
	V		5,99	3,83	2,41	1,69	1,18	0,79	0,61	0,37	0,24	0,15	0,10
5,20	R			31,18 24,60	10,41 8,21	4,47 3,53	1,89 1,49	0,73 0,57	0,40 0,31	0,12 0,10	0,04 0,03	0,01 0,01	0,00 0,00
	V			3,98	2,51	1,76	1,22	0,82	0,63	0,39	0,25	0,16	0,10
5,40	R			33,31 26,28	11,12 8,77	4,78 3,77	2,02 1,59	0,78 0,61	0,42 0,34	0,13 0,10	0,05 0,04	0,02 0,01	0,01 0,00
	V			4,13	2,60	1,82	1,27	0,85	0,66	0,40	0,26	0,16	0,10
5,60	R			35,50 28,01	11,85 9,35	5,09 4,02	2,15 1,70	0,83 0,65	0,45 0,36	0,14 0,11	0,05 0,04	0,02 0,01	0,01 0,00
	V			4,29	2,70	1,89	1,32	0,88	0,68	0,42	0,27	0,17	0,11
5,80	R			37,75 29,78	12,60 9,94	5,42 4,27	2,29 1,81	0,88 0,69	0,48 0,38	0,15 0,12	0,05 0,04	0,02 0,01	0,01 0,00
	V			4,44	2,80	1,96	1,36	0,91	0,71	0,43	0,28	0,18	0,11
6,00	R			40,06 31,60	13,37 10,55	5,75 4,53	2,43 1,92	0,93 0,74	0,51 0,40	0,16 0,12	0,05 0,04	0,02 0,01	0,01 0,00
	V			4,59	2,89	2,03	1,41	0,94	0,73	0,45	0,29	0,18	0,12
6,20	R			42,42 33,47	14,16 11,17	6,09 4,80	2,57 2,03	0,99 0,78	0,54 0,43	0,17 0,13	0,06 0,05	0,02 0,02	0,01 0,01
	V			4,74	2,99	2,10	1,46	0,98	0,76	0,46	0,30	0,19	0,12
6,40	R			44,85 35,38	14,97 11,81	6,44 5,08	2,72 2,15	1,05 0,83	0,57 0,45	0,18 0,14	0,06 0,05	0,02 0,02	0,01 0,01
	V			4,90	3,09	2,16	1,51	1,01	0,78	0,48	0,30	0,19	0,12
6,60	R			47,33 37,34	15,80 12,47	6,79 5,36	2,87 2,27	1,10 0,87	0,60 0,48	0,19 0,15	0,06 0,05	0,02 0,02	0,01 0,01
	V			5,05	3,18	2,23	1,55	1,04	0,80	0,49	0,31	0,20	0,13
6,80	R			49,86 39,34	16,65 13,13	7,16 5,65	3,03 2,39	1,16 0,92	0,64 0,50	0,20 0,16	0,07 0,05	0,02 0,02	0,01 0,01
	V			5,20	3,28	2,30	1,60	1,07	0,83	0,51	0,32	0,21	0,13
7,00	R			52,46 41,39	17,51 13,82	7,53 5,94	3,18 2,51	1,22 0,97	0,67 0,53	0,21 0,16	0,07 0,06	0,02 0,02	0,01 0,01
	V			5,36	3,38	2,37	1,65	1,10	0,85	0,52	0,33	0,21	0,13
7,50	R			59,19 46,70	19,76 15,59	8,49 6,70	3,59 2,83	1,38 1,09	0,76 0,60	0,23 0,18	0,08 0,06	0,03 0,02	0,01 0,01
	V			5,74	3,62	2,53	1,76	1,18	0,91	0,56	0,36	0,23	0,14
8,00	R				22,12 17,46	9,51 7,50	4,02 3,17	1,55 1,22	0,85 0,67	0,26 0,21	0,09 0,07	0,03 0,02	0,01 0,01
	V				3,86	2,70	1,88	1,26	0,98	0,60	0,38	0,24	0,15
9,00	R				27,19 21,45	11,69 9,22	4,94 3,90	1,90 1,50	1,04 0,82	0,32 0,25	0,11 0,09	0,04 0,03	0,01 0,01
	V				4,34	3,04	2,12	1,42	1,10	0,67	0,43	0,27	0,17
10,00	R				32,69 25,79	14,05 11,09	5,94 4,69	2,28 1,80	1,25 0,99	0,39 0,31	0,13 0,11	0,05 0,04	0,02 0,01
	V				4,82	3,38	2,35	1,57	1,22	0,74	0,48	0,30	0,19
20,00	R						19,98 15,77	7,69 6,06	4,20 3,32	1,30 1,03	0,45 0,35	0,16 0,12	0,05 0,04
	V						4,70	3,15	2,44	1,49	0,95	0,61	0,38
30,00	R							15,63 12,33	8,54 6,74	2,65 2,09	0,91 0,72	0,32 0,25	0,11 0,08
	V							4,72	3,66	2,23	1,43	0,91	0,58
40,00	R								14,13 11,15	4,38 3,45	1,51 1,19	0,52 0,41	0,17 0,14
	V								4,88	2,98	1,90	1,22	0,77
50,00	R									6,47 5,10	2,23 1,76	0,77 0,61	0,26 0,20
	V									3,72	2,38	1,52	0,96
60,00	R									8,90 7,02	3,07 2,43	1,06 0,84	0,35 0,28
	V									4,47	2,86	1,83	1,15
80,00	R									14,73 11,62	5,09 4,01	1,76 1,39	0,59 0,46
	V									5,96	3,81	2,43	1,53
100,00	R										7,52 5,93	2,60 2,05	0,87 0,68
	V										4,76	3,04	1,92
150,00	R											5,28 4,17	1,76 1,39
	V											4,56	2,88
200,00	R												2,92 2,30
	V												3,83
250,00	R												4,31 3,40
	V												4,79
300,00	R												5,93 4,68
	V												5,75

Continous pressure drop SDR 17,6

Rugosity	0,007	
Specific weight	998,00 kg/m³	977,20 kg/m³
Temperature	20°C	70°C
Viscosity	1,00E-06 m²/s	4,13E-07 m²/s

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

Q	De	125		160		200		250		315	
	Di	110,8		141,8		177,2		221,6		279,2	
0,10	R	0,00	0,00								
	V	0,01									
0,20	R	0,00	0,00	0,00	0,00						
	V	0,02		0,01							
0,30	R	0,00	0,00	0,00	0,00	0,00	0,00				
	V	0,03		0,02		0,01					
0,40	R	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
	V	0,04		0,03		0,02		0,01			
0,50	R	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
	V	0,05		0,03		0,02		0,01			
0,60	R	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
	V	0,06		0,04		0,02		0,02			
0,70	R	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,07		0,04		0,03		0,02		0,01	
0,80	R	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,08		0,05		0,03		0,02		0,01	
0,90	R	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,09		0,06		0,04		0,02		0,01	
1,00	R	0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,10		0,06		0,04		0,03		0,02	
1,20	R	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,12		0,08		0,05		0,03		0,02	
1,40	R	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,15		0,09		0,06		0,04		0,02	
1,60	R	0,03	0,03	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,17		0,10		0,06		0,04		0,03	
1,80	R	0,04	0,03	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	V	0,19		0,11		0,07		0,05		0,03	
2,00	R	0,05	0,04	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00
	V	0,21		0,13		0,08		0,05		0,03	
2,20	R	0,06	0,05	0,02	0,01	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,23		0,14		0,09		0,06		0,04	
2,40	R	0,07	0,05	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,25		0,15		0,10		0,06		0,04	
2,60	R	0,08	0,06	0,02	0,02	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,27		0,16		0,11		0,07		0,04	
2,80	R	0,09	0,07	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,29		0,18		0,11		0,07		0,05	
3,00	R	0,10	0,08	0,03	0,03	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,31		0,19		0,12		0,08		0,05	
3,20	R	0,12	0,09	0,04	0,03	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,33		0,20		0,13		0,08		0,05	
3,40	R	0,13	0,10	0,04	0,03	0,01	0,01	0,00	0,00	0,00	0,00
	V	0,35		0,22		0,14		0,09		0,06	
3,60	R	0,14	0,11	0,04	0,03	0,02	0,01	0,01	0,00	0,00	0,00
	V	0,37		0,23		0,15		0,09		0,06	
3,80	R	0,16	0,12	0,05	0,04	0,02	0,01	0,01	0,00	0,00	0,00
	V	0,39		0,24		0,15		0,10		0,06	
4,00	R	0,17	0,13	0,05	0,04	0,02	0,01	0,01	0,00	0,00	0,00
	V	0,42		0,25		0,16		0,10		0,07	
4,20	R	0,19	0,15	0,06	0,05	0,02	0,02	0,01	0,01	0,00	0,00
	V	0,44		0,27		0,17		0,11		0,07	
4,40	R	0,20	0,16	0,06	0,05	0,02	0,02	0,01	0,01	0,00	0,00
	V	0,46		0,28		0,18		0,11		0,07	
4,60	R	0,22	0,17	0,07	0,05	0,02	0,02	0,01	0,01	0,00	0,00
	V	0,48		0,29		0,19		0,12		0,08	
4,80	R	0,23	0,18	0,07	0,06	0,03	0,02	0,01	0,01	0,00	0,00
	V	0,50		0,30		0,19		0,12		0,08	
5,00	R	0,25	0,20	0,08	0,06	0,03	0,02	0,01	0,01	0,00	0,00
	V	0,52		0,32		0,20		0,13		0,08	
5,20	R	0,27	0,21	0,08	0,07	0,03	0,02	0,01	0,01	0,00	0,00
	V	0,54		0,33		0,21		0,13		0,08	
5,40	R	0,29	0,23	0,09	0,07	0,03	0,02	0,01	0,01	0,00	0,00
	V	0,56		0,34		0,22		0,14		0,09	
5,60	R	0,31	0,24	0,10	0,07	0,03	0,03	0,01	0,01	0,00	0,00
	V	0,58		0,35		0,23		0,15		0,09	

Q	De	125	160	200	250	315
	Di	110,8	141,8	177,2	221,6	279,2
5,80	R	0,33 0,26	0,10 0,08	0,04 0,03	0,01 0,01	0,00 0,00
	V	0,60	0,37	0,24	0,15	0,09
6,00	R	0,35 0,27	0,11 0,08	0,04 0,03	0,01 0,01	0,00 0,00
	V	0,62	0,38	0,24	0,16	0,10
6,20	R	0,37 0,29	0,11 0,09	0,04 0,03	0,01 0,01	0,00 0,00
	V	0,64	0,39	0,25	0,16	0,10
6,40	R	0,39 0,30	0,12 0,09	0,04 0,03	0,01 0,01	0,00 0,00
	V	0,66	0,41	0,26	0,17	0,10
6,60	R	0,41 0,32	0,13 0,10	0,04 0,03	0,02 0,01	0,01 0,00
	V	0,68	0,42	0,27	0,17	0,11
6,80	R	0,43 0,34	0,13 0,10	0,05 0,04	0,02 0,01	0,01 0,00
	V	0,71	0,43	0,28	0,18	0,11
7,00	R	0,45 0,36	0,14 0,11	0,05 0,04	0,02 0,01	0,01 0,00
	V	0,73	0,44	0,28	0,18	0,11
7,50	R	0,51 0,40	0,16 0,12	0,06 0,04	0,02 0,01	0,01 0,00
	V	0,78	0,48	0,30	0,19	0,12
8,00	R	0,57 0,45	0,18 0,14	0,06 0,05	0,02 0,02	0,01 0,01
	V	0,83	0,51	0,32	0,21	0,13
9,00	R	0,71 0,55	0,22 0,17	0,08 0,06	0,03 0,02	0,01 0,01
	V	0,93	0,57	0,37	0,23	0,15
10,00	R	0,85 0,67	0,26 0,21	0,09 0,07	0,03 0,02	0,01 0,01
	V	1,04	0,63	0,41	0,26	0,16
20,00	R	2,85 2,24	0,88 0,69	0,31 0,24	0,11 0,08	0,04 0,03
	V	2,08	1,27	0,81	0,52	0,33
30,00	R	5,80 4,55	1,80 1,41	0,62 0,49	0,22 0,17	0,07 0,06
	V	3,11	1,90	1,22	0,78	0,49
40,00	R	9,59 7,53	2,97 2,33	1,03 0,81	0,36 0,28	0,12 0,09
	V	4,15	2,53	1,62	1,04	0,65
50,00	R	14,18 11,12	4,39 3,45	1,52 1,20	0,53 0,41	0,18 0,14
	V	5,19	3,17	2,03	1,30	0,82
60,00	R		6,04 4,74	2,10 1,64	0,72 0,57	0,24 0,19
	V		3,80	2,43	1,56	0,98
80,00	R		10,00 7,84	3,47 2,72	1,20 0,94	0,40 0,31
	V		5,07	3,25	2,08	1,31
100,00	R			5,13 4,02	1,77 1,39	0,59 0,46
	V			4,06	2,59	1,63
150,00	R				3,60 2,83	1,20 0,94
	V				3,89	2,45
200,00	R				5,96 4,68	1,99 1,56
	V				5,19	3,27
250,00	R					2,94 2,31
	V					4,09
300,00	R					4,04 3,17
	V					4,90
350,00	R					5,30 4,15
	V					5,72

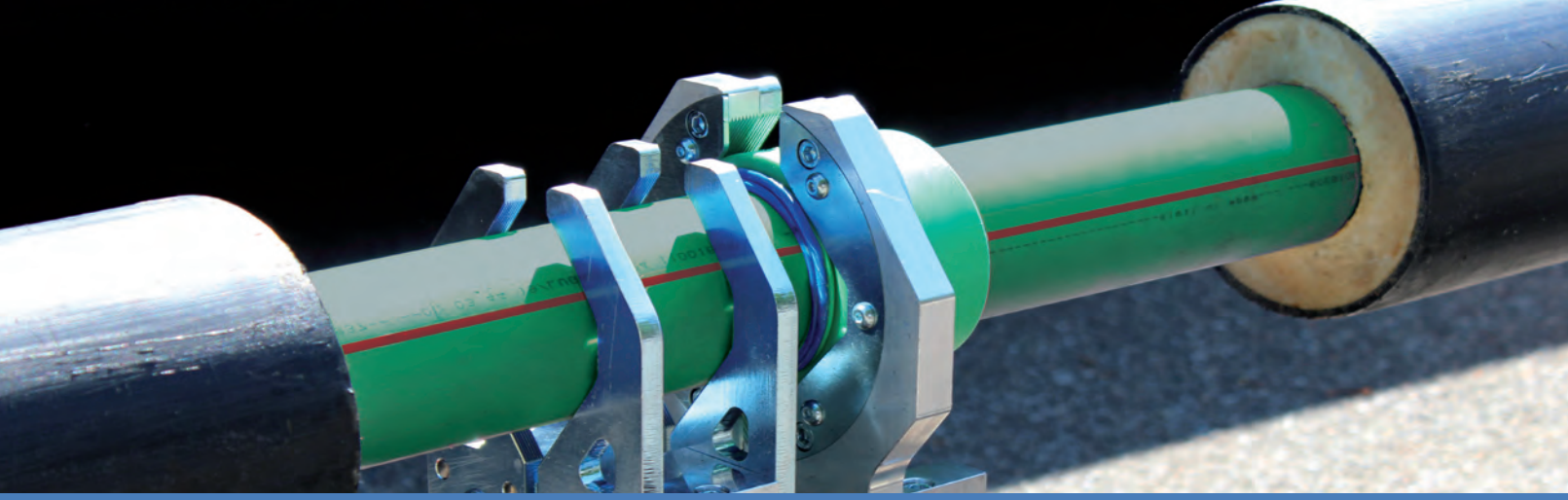
Comparison table between steel preinsulated pipes and faser iso-technik pipes

Acciaio preisolato *Preinsulated steel*						iso-technik FIBER-T					
		De	Di	Peso *Weight*	PD	De	Di	Peso *Weight*	%	PD	%
DN	pollici *inch*	mm	mm	Kg/m	mbar/m	mm	mm	Kg/m		mbar/m	
25	1”	33,7	27,3	**3,54**	**20,59**	32	23,2	**1,46**	-58,9	**18,87**	**-8,3**
32	1”¼	42,4	36,0	**4,60**	**14,49**	40	29,0	**2,00**	-56,6	**14,27**	**-1,5**
40	1”½	48,3	41,9	**5,04**	**11,95**	50	36,2	**2,29**	-54,6	**10,84**	**-9,3**
50	2”	60,3	53,9	**6,25**	**8,68**	63	45,8	**3,05**	-51,2	**8,09**	**-6,7**
65	2”½	76,1	69,7	**7,73**	**6,26**	90	65,4	**5,14**	-33,6	**5,15**	**-17,7**
80	3”	88,9	82,5	**9,15**	**5,05**	110	79,8	**7,59**	-17,0	**4,03**	**-20,2**

Acciaio preisolato *Preinsulated steel*						iso-technik FIBER-COND					
		De	Di	Peso *Weight*	PD	De	Di	Peso *Weight*	%	PD	%
DN	pollici *inch*	mm	mm	Kg/m	mbar/m		mm	mm	Kg/m		mbar/m
25	1”	33,7	27,3	**3,54**	**20,59**	32	26,2	**1,35**	-62,0	**17,41**	**-15,4**
32	1”¼	42,4	36,0	**4,60**	**14,49**	40	32,6	**1,83**	-60,2	**13,22**	**-8,7**
40	1”½	48,3	41,9	**5,04**	**11,95**	50	40,8	**2,03**	-59,7	**9,95**	**-16,7**
50	2”	60,3	53,9	**6,25**	**8,68**	63	51,4	**2,64**	-57,7	**7,48**	**-13,8**
65	2”½	76,1	69,7	**7,73**	**6,26**	75	61,4	**3,31**	-57,2	**5,98**	**-4,5**
80	3”	88,9	82,5	**9,15**	**5,05**	90	73,6	**4,31**	-52,9	**4,76**	**-5,7**
100	4”	114,3	107,1	**13,23**	**3,63**	125	102,2	**7,81**	-41,0	**3,16**	**-12,9**
125	5”	139,7	131,7	**17,39**	**2,79**	160	130,8	**10,95**	-37,0	**2,31**	**-17,2**
150	6”	168,3	159,3	**22,74**	**2,19**	200	163,6	**17,05**	-25,0	**1,76**	**-19,6**
200	8”	219,1	206,5	**39,78**	**1,58**	250	204,6	**26,50**	-33,4	**1,33**	**-15,6**
250	10”	273,0	260,4	**52,01**	**1,17**	315	257,8	**37,66**	-27,6	**1,00**	**-14,8**

Acciaio preisolato *Preinsulated steel*						iso-technik FIBER-LIGHT					
		De	Di	Peso *Weight*	PD	De	Di	Peso *Weight*	%	PD	%
DN	pollici	mm	mm	Kg/m	mbar/m	mm	mm	Kg/m		mbar/m	
100	4”	114,3	107,13	**13,23**	**3,63**	125	110,8	**6,54**	-50,5	**2,68**	**-26,1**
150	6”	168,3	159,3	**22,74**	**2,19**	160	141,8	**8,76**	-61,5	**1,80**	**-17,8**
200	8”	219,1	206,5	**39,78**	**1,58**	250	221,6	**20,86**	-47,6	**1,12**	**-28,9**
250	10”	273,0	260,4	**52,01**	**1,17**	315	279,2	**28,62**	-45,0	**0,84**	**-28,4**

PD = pressure drop
Pressure drop value with water at 20°C and flow speed of 2 m/s



Instruction to process

Single-sealing repairing joint

Components of single-sealing joint-kit

The packaging of the single-sealing repairing join-kit includes:

- *n° 1 pre-holed heat-shrinking casing pipe with pre- applied sealant bands inside;*
- *n° 2 curing caps;*
- *n° 2 end caps for welding;*
- *n° 1 bicomponent dose (1 bottle polyol + 1 bottle isocyanate);*
- *Istructions and warnings.*

- ***For serie 62012PCZ*** *PP-R coupling sleeve up to Ø 125 mm (butt-welding from Ø 160 to 315 mm).*
- ***For serie 62122PCZ***

PP-R coupling sleeve and reducer up to Ø 125 mm; PP-RCT reducer from Ø 160 to 315 mm (butt-welding).

Additional processing material

- *polyfusion welding machine (item 50113);*
- *matrix for polyfusion welding machine (item 52120);*
- *emery cloth, grain 50÷70;*
- *cleaning liquid (item 50330);*
- *cleaning cloths;*
- *rasp;*
- *hammer (0,5 Kg);*
- *cutter;*
- *whiteout or marker;*
- *plastic funnel (contained 0,5 Kg) only for vertical foaming;*
- *LPG cylinder with reduction, pressure relief valve with overpressure;*
- *LPG torch with pilot and regulator with bell burner 50 mm, 2 m. long piping, short handle and/or industrial heat gun.*

Perform the welding operation by following the instructions that are described in the technical catalogue. Before welding the second end, make sure that you intro-duced the heat-shrinking casing pipe still covered with the supplied film.

Measure the length of the casing pipe and subtract the length of the non-insulated pipe from the detected measure. Divide the result by two: the obtained measure must be mea-sured from the end of the pre-insulated pipe and marked with a white marker so that the position of heat-shrinking casing pipe ends will be clear.

By using emery cloth (sandpaper), abrade the pre-insulated pipe by about 0,1 ÷ 0,25 mm by rubbing its end: start from the drawn line towards the inside to remove impurities and the oxidized layer of the insulator. Repe-at the operation on both sides.

Clean the ends, which were previously ground with the cleaning liquid (item 50330), and then perform a preheating operation by using the torch up to about 40° in the area to be coated.

Remove the packaging of the heat-shrin-king casing pipe by using a cutter. Do not damage the pipe casing.

The sealant bands are already pre-ap-plied inside the the heat-shrinking ca-sing pipe. Remove the protective paper inside. Place the heat-shrinking casing pipe by paying attention that its ends overlap on the sealants bands.

Heat the heat-shrinkable band evenly; the band will start acting as glue. At the end of the operation there will be a slight leakage of sealing material at the sides of the heat-shrinkable band. Repeat the operation for both heat-shrinkable bands.

Mix the bicomponent products by pou-ring the polyol content into the isocya-nate container: after that, shake quickly for a few seconds, and then pour the content into one of the two holes.
WARNING! *This operation must be carried out in very short times because the chemi-cal reaction of the mixture is immediate.*

9

Place the two supplied curing caps by paying attention that the vent opening is not pushed inside the hole. After that, wait for about 5-10 minutes, in relation to the outside temperature, so that the introduced mixture becomes foam.

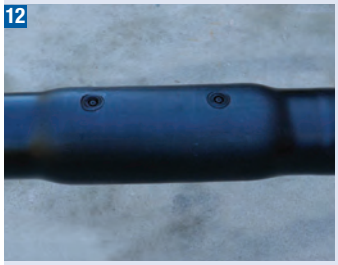
10

With a light hammer blow, pop the drilled curing caps. The hardened foam will look like the picture in the yellow box. With a rasp, slightly scrape the material to remove foam residues; after that, wipe with a cloth soaked in the cleaning liquid (item 50330) to finish the cleaning operation.

11

Weld the supplied end caps by polyfusion, and then comply with melting and cooling times.

12



Now, the installation of the single-seal restoration joint has been completed.

Double-sealing repairing joint

Components of double-sealing repairing joint-kit *The packaging of the single-sealing repairing join-kit includes:*

- *n° 1 pre-holed heat-shrinking casing pipe with preapplied sealant bands inside*
- *n° 2 shrinkable bands*
- *n° 2 curing caps*
- *n° 2 end caps for welding*
- *n° 1 bicomponent dose*
  (1 bottle polyol + 1 bottle isocyanate)
- *Istructions and warnings*
- *For serie 62012PCX*
  PP-R coupling sleeve up to Ø 125 mm (butt-welding from Ø 160 to 315 mm)
  For serie 62122PCX
  PP-R coupling sleeve and reducer up to Ø 125 mm; PP-RCT reducer from Ø 160 to 315 mm (butt-welding).

Additional processing material

- *polyfusion welding machine (item 50113)*
- *matrix for polyfusion welding machine (item 52120)*
- *emery cloth, grain 50÷70*
- *cleaning liquid (item 50330)*
- *cleaning cloths*
- *rasp*
- *hammer (0,5 Kg)*
- *cutter*
- *whiteout or marker*
- *plastic funnel (contained 0,5 Kg) only for vertical foaming*
- *LPG cylinder with reduction, pressure relief valve with overpressure*
- *LPG torch with pilot and regulator with bell burner 50 mm, 2 m. long piping, short handle and/or industrial heat gun*

Follow all the instructions up to 12, then proceed with the following ones

13

After performing the cleaning operation with the cleaning liquid (item 50330), remove the packaging film from the shrin-kable band, and then place it on the welding of the casing pipe by paying attention that the middle line of the band correspond to the welding line.
Repeat the operation on both sides.

14

The shrinkable band has butilic glue in-side: remove the protection paper. Place the shrinkable bands by paying attention that its end overlap the previously realized welding.

15

Heat the heat-shrinkable band evenly: the band will start acting as glue.
At the end of the operation there will be a slight leakage of sealing material at the sides of the heat-shrinkable band. Repeat the operation for both heat-shrin-kable bands.

16

The double-seal joint assures maximum sealing and insulation by preventing any seepage risk.

Instructions regarding the flame relevant to weather conditions by using torch

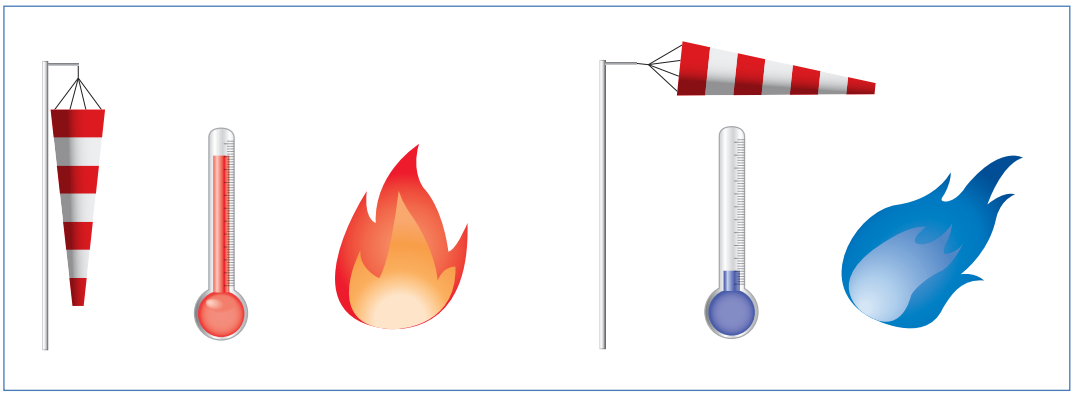
To correctly perform the welding operation, it is impor-tant that the flame adapts to the weather conditions of the building yard. In case of external and heat-shrinking thin-walled pipes, without wind, high external temperatu-res and reduced space in the ditch

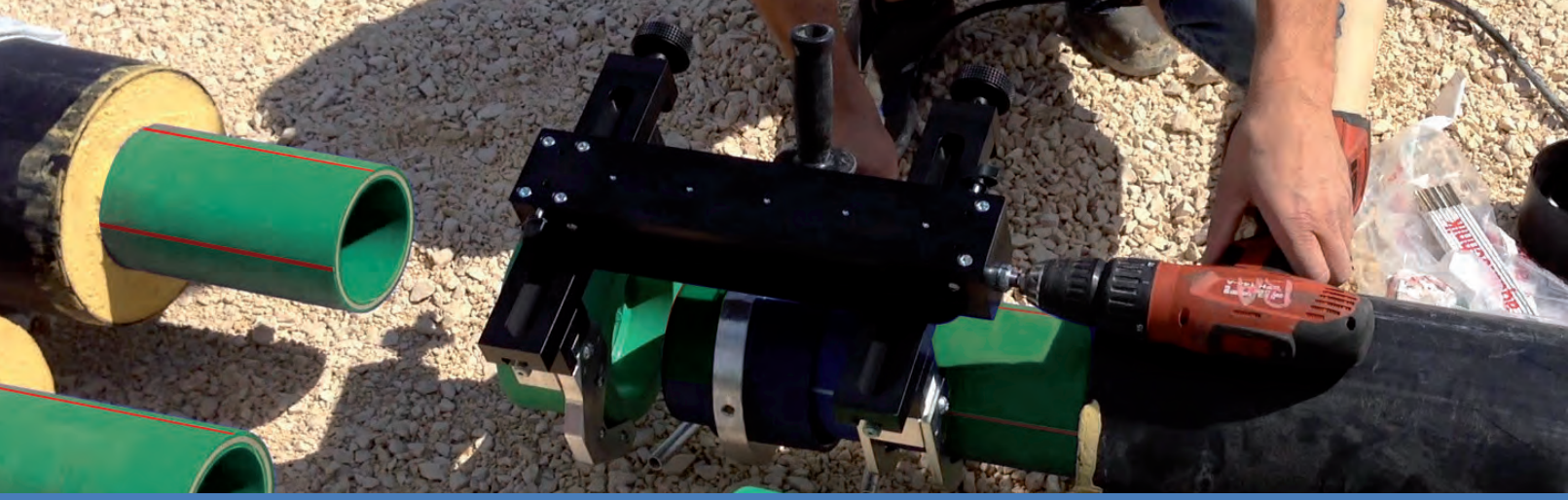
LANGUID YELLOW FLAME

In case of external and heat-shrinking thick-walled pipes, strong wind, and low external temperatures

STRONG BLUE FLAME

Furthermore, remember that you need to perform the wel-ding operations always by means of circular and homoge-neous movements.





Operating time for estimated handwork

The execution times described were detected from com-pleted works and carried out according to our technical instructions. With regard to welding times, they refer to the time required for completing the joint between the parts (pipe/pipe or pipe/fitting) using the equipment in-dicated by Aquatechnik.
The "in machine" cooling times of the thermo-welded pieces, which are generally considered dead time, are not to be considered as execution costs, since they do not require the use of personnel.

Dimension Ø (mm)		Welding time for service and casing pipe (sec)						
external casing pipe	internal service pipe	butt-welding	polyfusion M/F	electric-welding	cutting to size (cut-back)	closing collar	joint kit single-sealing	joint kit double sealing
90	32		50	240	186	210	365	564
110	40		66	290	220	240	410	598
110	50		84	350	220	240	410	598
125	63		114	430	245	270	455	670
160	90		216	585	295	338	572	840
200	110		272	690	354	405	687	1008
225	125		312	775	375	453	770	1129
250	160	780		950	420	507	863	1264
315	200	900		1150	510	614	1044	1530
400	250	1080		1380	625	755	1275	1867
450	315	1300		1650	695	840	1420	2075

The described operating times were detected by works done according to our technical guidelines in a team of two operators.
Welding-time are the time of execution only of the union between the parts through the equipment indicated by Aquatechnik.
Cooling times in the machine/equipment of the welded parts are not to be considered as they do not require the employment of personnel.

***NB:** any clamping implementation times, transport to site times and insulation implementation times are excluded. The lightweight nature of the materials allows for quick, safe handling without using lifting equipment.*

General recommendations about the installation

Installation inside a ditch (burial)

The pipes are generally buried at a certain depth below ground level or, more frequently, below the road surface. In the case of aqueduct pipelines, adequate protection for the conveyed fluid is required, both for preserving the organoleptic characteristics and for protecting against frost, as well as to prevent intentional contamination. The installation depth depends on the function of the pipeline and the site conditions: especially in correspon-dence of city centres, in fact, the coexistence of several sub-service networks involves the need to organise the available space, by positioning each of them at a diffe-rent level.
In general, for water supply it is economically advanta-geous to position the pipes at a depth between 1,20 - 1,30 m in city centres and around 0,50 m for external aqueducts.

Standard UNI 11149 requires that the minimum excava-tion width must be at least 20 cm above the diameter of the pipe to be contained.
If the minimum required depth cannot be observed, the pipe must be protected with concrete or tubular sheaths. The type of trench to be carried out must be evaluated, in the initial design stage, according to the composition of the soil and installation depth.
The trenches are classified as follows:

- *narrow trench (Bb ≤3dn con H ≤2B)*
- *wide trench (3dn<B2B)*
- *infinite trench (B ≥ 10dn con H ≥ 2B)*

where:
H = coverage height
B = trench width

The pipeline can also be assembled outside the trench, therefore the installation process can also take place for successive sections with the aid of mechanical means. In order to exclude any possibility of contamination, it is mandatory to place the sewer system at a lower level than the distribution network, with depths constrained by the need to provide adequate slopes for each section.

The pipes are installed after a topographical survey for lo-cating the pipeline trajectory; the pipes are housed in continuous trenches with vertical walls (rock excavations) or sub-vertical trenches, depending on the type of soil: compact soil only requires inclinations of 10-15%, while loose soil requires much higher values or support of the excavation with adequate "shoring" (reinforced excavation). The pipes must be covered with selected and suitably compacted material, up to a height of 20 cm above the upper level of the pipeline, while the remaining portion is filled with excavation material and, if necessary, restoring or resurfacing the road, always taking care to provide an adequate level of compaction.

Table about installation centre distance

	Dimensions mm											
Casing PE	Ø *outer (De)*	90	100	125	140	160	200	225	250	315	400	450
A1	*Installation centre distance*	150	200	250	250	250	250	250	250	400	400	400

Typical heights in a ditch

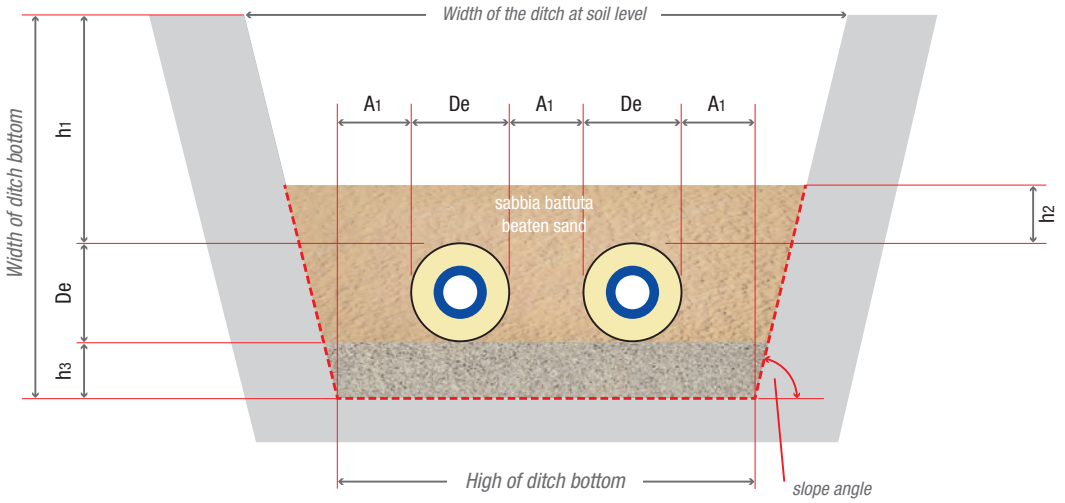
Legend

h1
minimum height of the filling-up with riddled material from excavation debris, the 80 cm height is the minimum value to prevent soil freezing, mechanical tamping with a vibrator with max. pressure 100 Kpa

h2
minimum height of sand layer above the pipes with mixed medium 0-4mm granulometry, manually tamped

h3
minimum height of sand layer on the bottom of the excavation with mixed medium 0-4 mm grain size, manually tamped

De
outside diameter of the pipes



NOTE: the width of the ditch at soil level and the slope inclination angle depend on the type of soil; by starting from the calculation of the ditch bottom, according to the quality of soil, the slope inclination will be selected to prevent landslides.

In the case of excavations in the presence of water it is advisable to provide mechanical drainage, especially when using electrical equipment and/or devices.
It is recommended to manually level and compact the sand bed around the pipes (h2/h3), while the backfilling (h1) between the sand bed and the ground level can take place with the aid mechanical vibrators for compaction, ensuring that the minimum height of the soil is 40-50 cm in total above the pipes.
During backfilling operations, suitable signalling tape must be placed around the area. For the excavation areas subject to heavy traffic (>35 q) reinforced concrete slabs must be provided.

Overhead installations with bracket-type collars

For overhead installations outside the trench, use the cen-tre distance table for iso-technik installed horizontally. For iso-technik pipes installed vertically, increase the distance by 20%.
All fastening bracket collars should be of fixed-point type; for each fixed point, provide 2 bracket collars. The type of bracket collar should take into account the external dia-meters of the pipe.
The size of the bracket plate must, however, be at least L 40 mm x 3 mm th., the profile of the bracket collar bracket is of naked type and therefore without a rubber profile.

Multilayer iso faser FIBER-T pipes clamping (cm)

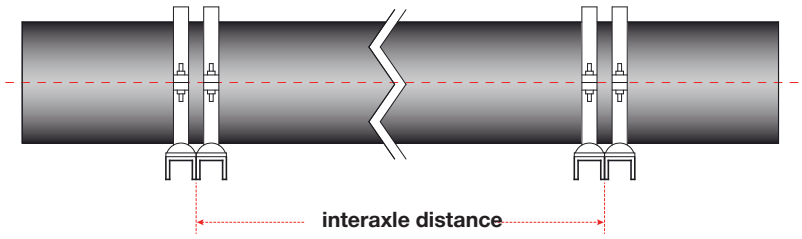
Δt	Ø 32	Ø 40	Ø 50	Ø 63	Ø 75	Ø 90	Ø 110	Ø 125
0°C	160	180	205	230	245	260	290	320
20°C	120	135	155	175	185	195	215	240
30°C	120	135	155	175	185	195	210	225
40°C	110	125	145	165	175	185	200	215
50°C	110	125	145	165	175	185	190	195
60°C	105	120	135	155	165	175	180	185
70°C	95	110	130	145	155	165	170	175

Multilayer iso faser FIBER-COND pipes clamping (cm)

Δt	Ø 32	Ø 40	Ø 50	Ø 63	Ø 75	Ø 90	Ø 110	Ø 125	Ø 160	Ø 200	Ø 250	Ø 315
0°C	155	175	200	225	240	255	275	285	290	300	310	315
20°C	115	135	155	170	180	190	205	210	215	225	235	240
30°C	115	130	150	165	175	185	195	200	205	215	225	230
40°C	105	120	145	160	170	180	185	195	195	205	220	225
50°C	100	115	140	155	165	175	175	180	185	195	215	220
60°C	95	110	125	145	155	160	160	165	175	185	190	195
70°C	85	100	120	135	145	150	155	160	165	175	180	190

Multilayer iso faser FIBER-LIGHT pipes clamping (cm)

Δt	Ø 125	Ø 160	Ø 200	Ø 250	Ø 315
0°C	285	290	300	310	315
20°C	210	215	225	235	240
30°C	200	205	215	225	230
40°C	195	195	205	220	225
50°C	180	185	195	215	220
60°C	165	175	185	190	195
70°C	160	165	175	180	190



Washing the sanitary system

Once the systems have been built and the seal test has been done as indicated by the EN 806-4 European standard, proceed with flushing; if using water-air mixtures, the compressor or compressed air tanks must be equipped with an oil separating filter.
Flush sections of piping not exceeding 100 m in length. Start from the grip point, ascending through the stand-pipes and proceeding floor by floor.
The flow speed must be at least 2 m/s, the water change at least 20 times the volume contained by the piping. For each floor, open the sample point furthest from the standpipe and continue on all the other points.
When the operation is complete, close the sample points in reverse, drain the system if it is unused or if there is a risk of ice forming.
Write up the procedure registration report to hand in to the Work Management and building owner.

Preventive measures against the spread of Legionella

Prevention during the design phase is an efficient way to combat the risk of Legionella proliferation
Regarding sanitary systems, be sure to:

- *avoid pipes with blind ends or without circulation;*
- *prevent the lines from ending with stagnations, putting in rings at the end distributions;*
- *provide for periodic, simple cleaning;*
- *carefully choose the materials (using pipes with extremely low surface roughness, p.e. PP-R 0,007 mm with total passage fittings reduces the risk of deposits that may favour bacterial proliferation);*
- *prevent the formation of biofilm, sedimentation and limescale.*

Disinfection systems for fusio-technik pipes

The faser family fusio-technik pipes were completely renovated through the use of PP-RCT, the result of years of studies in the research and development division.
Aquatechnik added a package of WOR (White Oxidation Resistance) additives to the already exceptional features of the PP-RCT, with the dual function of improving performance at high temperatures over time and significantly slowing the oxidation process of plastic materials under the aggressive effect of highly oxidising substances that may be diluted in water.
The PP-RCT WOR fibre-reinforced fusio-technik pipes are especially suitable for systems that require line sanitation via the continuous chlorination technique, garantee the water potability.

Disinfection techniques

Disinfection processes must be designed and carried out with the goal of:

- *safeguarding humans from the presence of bacteria in water, overexposure to oxidising agents and the risk of burns;*
- *maintaining the chemical-physical requirements requi- red by European Directive 98/83/EC regarding the qua- lity of potable water intended for human consumption;*
- *conserving the environment from pollution by oxidising loads deriving from waste waters;*
- *ensuring the integrity and duration of the components making up the systems.*

A) Chemical disinfection of potable water *Continuously disinfecting potable water chemically must be done with a maximum concentration of 0,2 mg/l of free chlorine.*
The water temperature must not exceed 70°C.
Should the presence of bacteria be ascertained, it is pos-sible to carry out a hyperchlorination process up to twice a year. To define times, temperatures and doses, consult the Technical Department.
Once complete, flush the systems with cold potable water. If necessary, neutralise the oxidising loads in the waste water in order to avoid polluting the environment. Chlorine super shock has extremely negative effects on metal pipes in that it accelerates corrosion.
Fusio-technik pipes, however, have a greater resistance to chemical compounds and can undergo this type of treat-ment for several years without any reduction in perfor-mance. There are new types of treatment available consi-sting in the use of chlorine dioxide and monochloramine. We have not reliable data for these sanitization products, therefore contact our Technical Department for more information.

B) Thermal disinfection of the system *Temperatures at 70°C for at least 3 minutes in every part of the system. To carry out in the event of ascertained bacterial presence, protecting people from the risk of burns and scalds.*
Thermal and hyperchlorination disinfections must never be carried out at the same time.
Disinfection processes must be carried out by properly qualified personnel; we recommend filling out a log with the doses, temperatures and pressures detected during the processes.

In systems made with Aquatechnik products that requi-re washing or permanent sanitation actions, it is always advisable to consult the Technical Department, writing to the following e-mail address:
ufficio.tecnico@aquatechnik.it

Testing the system

1) Final system testing, general instructions

Every system installed - sanitary and water supply, he-ating or other - must be tested by the installing com-pany in compliance with the laws or standards in force The testing process involves a series of tests to be carried out during installation or when the system is completed, prior to masonry work or backfilling: the acceptability of the system is subject to the tests being passed successfully. The Italian Decree of the Ministry of Public Works da-ted 12/12/1985 states that: "The field acceptance test for internal pressure tests the conduits at the end of the various construction, transport, installation and junction operations: it represents the final inspection of the work, with global significance for the different operations. The minimum testing pressure is set at a single value for all different types of piping related to the operating pressure (pe), subject to the possibility of the design engineer specifying higher values in the Special Tender Specifications, considering the purpose of the work". Therefore, as a result of the rights and responsibilities assigned to the design engineer in defining the test con-ditions, it is believed that, depending on the type of sy-stem, the size and the length of the network, it is up to the design engineer to define the acceptance test methods.

2) System testing according to UNI EN 806-4 "Specifications for plants in buildings for the conveyance of water intended for human consumption"

Acceptance test methods are given by way of example below:

UNI EN 806-4 - Italian Decree of the Ministry of Public Works dated 12/12/1985 - UNI EN 805 -UNI 11149 - DIN 1988 - UNI EN 13941.

UNI EN 805: 2002 defines two methods:

- *for pressure drops;*
- *for water leakage.*

Below illustrates the acceptance test method in complian-ce with UNI EN 806-4 procedure C, modified according to Aquatechnik suggestions. It is in any case the respon-sibility of the design engineer to define these conditions.

The test can be carried out with water. Where permitted by national regulations, use of low pressure air without oil or inert gases is allowed.

The pressure gauges must be accurate to 0,2 bar and must be mounted at the lowest point of the system. Standard UNI EN 806-4 provides for different procedures. Aquatechnik, based on thirty years of experience, sugge-sts that the system is tested as required by Standard UNI EN 806-4 (procedure C) but applying a pressure of 15 bar.

2) System testing procedure according to UNI EN 806-4

The purpose of this indication is to ensure a high level of safety during the testing process, without compromising the functionality of the fusio-technik system and to consider the viscoelastic behaviour, typical of polymeric materials.

It is advisable to carry out the test by following the pro-cedures below:

A- PRE-TEST

test duration 60 minutes (1 hour)

- *Fill the system, making sure all the air pockets are removed, then close all vents and the bleed valves.*
- *Connect the variable pressure pump to the most suitable terminal, filling the network up to a maximum pressure of 15 bar.*

PLEASE NOTE: this pressure must be reduced if there are radiators, taps and valves in the system.

- *After 30 minutes, record the measured pressure and perform a visual inspection to locate any obvious leaks within the system.*
- *After a further 30 minutes, record the measured pressure.*

If the pressure drop is less than 0,6 bar, the system can be considered as having no obvious leaks and the pre-test may be considered successful.

B- FINAL TEST

test duration 120 minutes (2 hours)

- *If the pre-test is successful, leave the pressure constant for the next 120 minutes (2 hours).*
  In this period of time, perform a further visual inspection to locate any leaks within the system. If after 120 minutes (2 hours) the pressure drop is less than 0,2 bar, the final test can be considered completed successfully.

- *Complete the test report in all its parts.*

3) Flushing

Immediately after the test, the sanitary and water supply system must be flushed with potable water.
The hot water and cold water pipes must be flushed se-parately with filtered potable water (no particle ≥ 150 µm) and all precautions must be taken to protect any sensitive equipment.
Utility filters should be removed to increase the flow while those upstream of the system should be washed or re-newed after flushing.
For further details please refer to Standard EN 806-4.

4) Disinfection

Disinfection is not generally required for single-family homes or small alterations/extensions.
If required, disinfection can be performed for system sections with the following sequence: service pipes, supply pipes, storage tanks, distribution pipes.
During the process, make sure that no water is drawn and that the disinfectants used comply with the require-ments for water treatment contained in the standards or regulations in force.
Disinfectants must also be compatible with the water system components (pipes, fittings, gaskets, etc.).

Regulation to create systems with fusio-technik system

The purpose of the following regulation is to clarify the competences and responsibilities regarding heating, cooling and hydrothermal sanitary systems in general, made with materials produced by Aquatechnik.

1 *The competences and responsibilities of Aquatechnik® group s.p.a. exclusively regard the materials of its own construction and supply, covered by a standard warranty, for any manufacturing flaws or defects.*

2 *The company is relieved from any possible claims that may regard:*

a) Any type and kind of malfunctioning systems.

b) Broken pipes and/or fittings caused by transport in the construction or work sites; failure to carry out hydraulic testing as indicated in the technical guide; carrying aggressive fluids; materials from other origins inserted into the system that can cause collateral damage or wear on the original piping.

c) Errors in hydraulic, electrical or electronic connections made by installation technicians.

The competences and responsibilities in making the systems are shown in a diagram below.

Object of the system	Responsible individual
System estimate, calculation and sizing according to the standards in force.	Professional office and/or freelancer qualified for thermotechnical design
Installation of the necessary materials, including: thermoplastic pipes and fittings, insulation in compliance with the standard to form distribution and connection networks to terminal heating elements, distribution manifolds, regulation equipment, boiler and central heating plant, various testing, system start-up and all other work pertaining to the system.	Company specialised in thermo-hydraulic installations and technical service centres
Electrical connections to control equipment, to service thermostats, safety devices and all other work pertaining to the electrical or electronic parts.	Company specialised in electrical installations
Thermoplastic pipes and fittings for hydraulic circuits, accessories and components made by the company itself.	Aquatechnik group spa

Integrated Quality/Environment management system

Aquatechnik has chosen quality as the guideline to manage its production and commercial activity.
The production site, founded in the 90s, immediately embraced the ISO 9001 quality system, adhering to the operating rules and methods to ensure maximum quality products manufactured with monitored processes.
This went hand in hand with the expansion of the testing laboratories which, in addition to ensuring continual moni-toring of the created products, make up a specialised research and development centre, essential resources in today's business philosophy.
Always attentive to the care of our planet, the company has always been operated according to processes with low environmental impact, using recyclable to 100% raw materials, implementing also the Standard ISO 14001 and realizing an integrated Quality/Environment Management System, whose effectiveness has been attested with the new certification obtained in the year 2019.
Using an integrated Quality/Environment Management System, and respecting the Standards ISO 9001 and 14001 strengthened the desire to improve all the depart-ments by growing not only from a technical point of view, but also from a human one.
In this sense, Aquatechnik focused on the concept of service, which consists in providing its customers and all users an efficient, punctual partner who can guarantee solutions at 360°.
The company's professionalism and care are put into ef-fect in a completed cycle that starts from designing the product, going on to developing it and checking its techni-cal qualities, then reaching distribution and continuing, fi-nally, in efficient after-sales customer service, guaranteed by specialised technical personnel.
Thanks to efficient consulting during the estimate, design and installation stages, the customer can thus take advan-tage of a sure, on-hand service that is ready to respond to all queries, clearing up any doubts and imparting the necessary installation knowledge and techniques. Aquatechnik products undergo rigid approval tests by the most influential international institutes that continuously monitor production and control processes.
The high quality standard reached has allowed Aquatechnik to obtain the most important worldwide certifications.

Contractual Liability warranty and Product Liability

The contractual liability warranty complies with the provi-sions contained in the Civil Code from clause 128 to 145. Aquatechnik guarantees that all its fusio-technik series products are free of compliance flaws and/or defects. The warranty has a duration of 2 years from the delivery date to its customers, becoming void two months after the defect is discovered.
Liability for damage due to a defective product is governed by the provisions contained in Part IV, Title II, clauses 114 to 127 of Legislative Decree 206/2005 (Consumer Code) and by the EEC Directive 85/374/EEC dated 25/07/1985. Aquatechnik guarantees the Fusio-technik system for ten years from the production date. The provision of the ac-tion aimed at damage compensation stands, once three years have passed from the day in which the damaged party received or should have received recognition of the damage, defect and identity of the responsible party. With a maximum coverage for personal injury equal to € 15.000.000,00, the insurance covers any damage that may derive from using pipes and fittings found to be exceptionally defective in their lack of the safety that can be legitimately expected of them, considering all the circumstances, including:

(a) how the product was put into circulation, its appear-ance, its obvious features, the instructions and warnings provided;
(b) the use for which the product can be reasonably intended and the behaviours that, in relation to said use, can be reasonably foreseen;
(c) the time in which the product was put into circulation; that is, lacking the safety usually offered by other models of the same series.

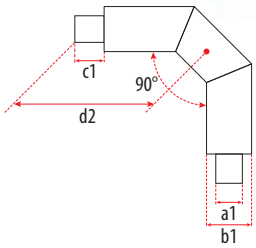
Product liability is not valid in the following cases:
a) for polyfusion welding and joining with PP-R done er-roneously;
b) for work with equipment and assembly done with materials not originating from the fusio-technik system manufacturing company;
c) for pipe or fitting installations that do not respect the technical instructions and warnings noted in the original documents published by the manufacturing company, on which system installation companies are required to be updated;
d) for the use of previously deteriorated material as a result of carelessness and/or negligence (i.e.: nicks, vio-lent impacts, incisions, twisting of parts assembled with polyfusion welding, assembly of conical and/or non-cal-ibrated threading, crushing, exposure to sunlight, open flames, etc.);
e) for abnormal system operation, excessive heating equipment temperatures, internal pressures exceeding the standards, aggressive agents in the fluids, building structure settling, fluid freezing, perforations, formation of ice in the pipes, etc. and, however, in all cases in which the defect that caused the damage was not in ex-istence when the manufacturer put the product in circu-lation;
f) for lack of standard-compliant hydraulic testing indi-cated in the technical guidelines;
g) if the manufacturer did not produce the product to be sold or for any other type of free distribution, or if the manufacturer did not manufacture or distribute the prod-uct within its professional business activity;
h) if the defect is due to the fact that the product is com-pliant with a mandatory legal standard or a binding pro-vision;
i) if the state of scientific and technical knowledge at the time the manufacturer put the product in circulation did not yet allow the product to be considered defective;
j) should the product defect not depend on the quality of the components but rather on how it was used in creat-ing the final product.

Competent Court
All cases of controversy shall be the competence of the Busto Arsizio court - VA - Italy.

Warranty activation
When finding a possible production flaw or defect, the installing company must communicate it in writing to the dealer from which the merchandise was purchased; ***Aquatechnik Technical Assistance*** *shall arrive on site to ascertain the truthfulness of the defect via exams at its laboratory or by appointed bodies.*
Once the real cause of the defect has been confirmed and acknowledged as such, the installation company that suffered the damage shall be asked to provide an estimate of the costs to restore the system, followed by due settlement of the event.

Attention
Should the Technical Assistance confirm that the presumed defects cannot be attributed to Aqua-technik material, all the expenses sustained for the verifications shall be charged to the installing com-pany or other customer.
The company reserves the right to make changes or replacements without prior notice regarding its products and its technical documents, on which users are invited to periodically update themselves.

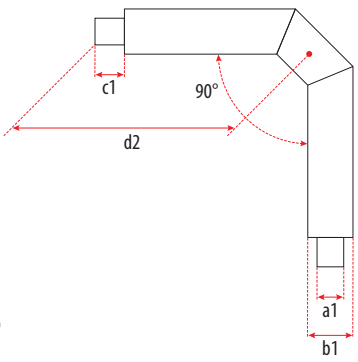
Items and dimensions iso FIBER-T SDR 7,4



iso FIBER-T elbow 90°

made of PP-R fittings and faser FIBER-T multilayer pipe with special fibers, green colour with red strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour

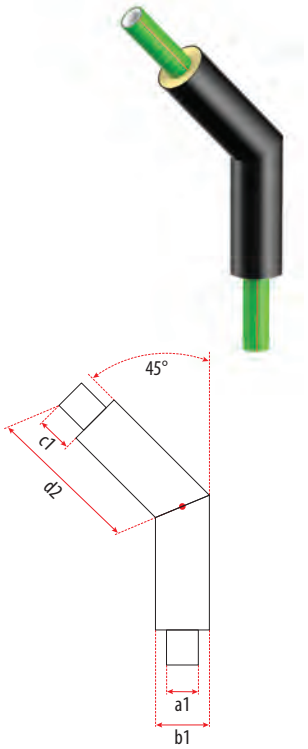
Item	SDR	a1	b1	d2	c1	Weight	
		mm	mm	mm	mm	kg	pack
63112PCT	7,4	32	90	500	190	1,11	1
63114PCT	7,4	40	110	500	190	1,66	1
63116PCT	7,4	50	110	500	190	2,10	1
63118PCT	7,4	63	125	500	190	2,87	1
63120PCT	7,4	75	140	500	190	3,77	1
63122PCT	7,4	90	160	500	190	5,01	1
63124PCT	7,4	110	200	500	190	7,74	1
63126PCT	7,4	125	225	500	190	9,63	1



iso FIBER-T elbow 90° long

made of PP-R fittings and faser FIBER-T multilayer pipe with special fibers, green colour with red strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour

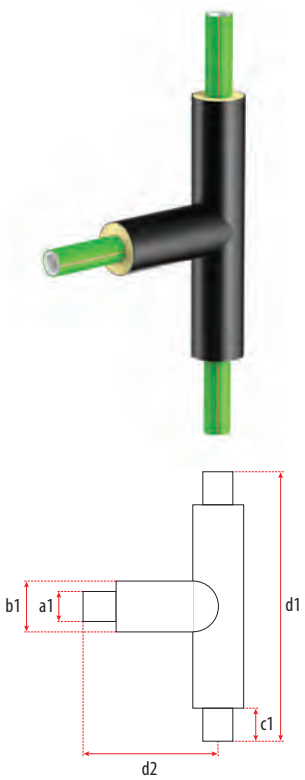
Item	SDR	a1	b2	d2	c1	Weight	
		mm	mm	mm	mm	kg	pack
63112PLT	7,4	32	90	1000	190	2,76	1
63114PLT	7,4	40	110	1000	190	3,62	1
63116PLT	7,4	50	110	1000	190	4,32	1
63118PLT	7,4	63	125	1000	190	5,85	1
63120PLT	7,4	75	140	1000	190	7,64	1
63122PLT	7,4	90	160	1000	190	10,11	1
63124PLT	7,4	110	200	1000	190	15,44	1
63126PLT	7,4	125	225	1000	190	19,72	1



iso FIBER-T elbow 45°

made of PP-R fittings and faser FIBER-T multilayer pipe
with special fibers, green colour with red strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

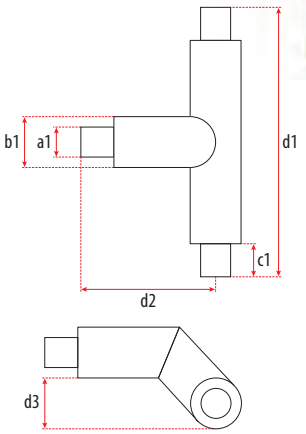
Item	SDR	a1	b2	d2	c1	*Weight*	
		mm	mm	mm	mm	kg	*pack*
63512PCT	7,4	32	90	500	190	1,13	1
63514PCT	7,4	40	110	500	190	1,61	1
63516PCT	7,4	50	110	500	190	1,99	1
63518PCT	7,4	63	125	500	190	2,72	1
63520PCT	7,4	75	140	500	190	3,60	1
63522PCT	7,4	90	160	500	190	4,85	1
63524PCT	7,4	110	200	500	190	7,28	1
63526PCT	7,4	125	225	500	190	9,43	1



iso FIBER-T tee

made of PP-R fittings and faser FIBER-T multilayer pipe
with special fibers, green colour with red strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

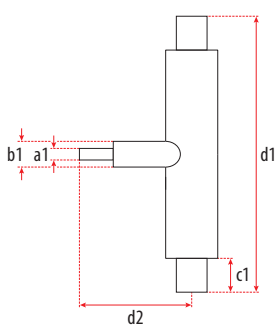
Item	SDR	a1	b1	d1	d2	c1	*Weight*	
		mm	mm	mm	mm	mm	kg	*pack*
64112PCT	7,4	32	90	1000	500	190	1,63	1
64114PCT	7,4	40	110	1000	500	190	2,28	1
64116PCT	7,4	50	110	1000	500	190	2,80	1
64118PCT	7,4	63	125	1000	500	190	3,91	1
64120PCT	7,4	75	140	1000	500	190	5,25	1
64122PCT	7,4	90	160	1000	500	190	7,00	1
64124PCT	7,4	110	200	1000	500	190	10,66	1
64126PCT	7,4	125	225	1000	500	190	13,58	1



iso FIBER-T over-run tee

made of PP-R fittings and faser FIBER-T multilayer pipe with special fibers, green colour with red strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour

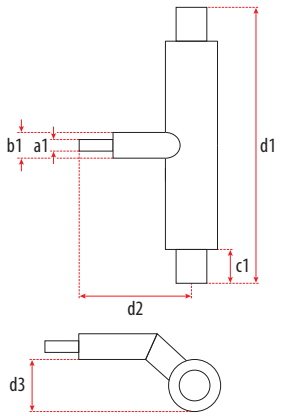
Item	SDR	a1	b1	d1	d2	d3	c1	*Weight*	
		mm	mm	mm	mm	mm	mm	kg	*pack*
64112PST	7,4	32	90	1000	750	100	190	2,12	1
64114PST	7,4	40	110	1000	750	120	190	3,02	1
64116PST	7,4	50	110	1000	750	120	190	3,71	1
64118PST	7,4	63	125	1000	750	135	190	5,15	1
64120PST	7,4	75	140	1000	750	150	190	6,95	1
64122PST	7,4	90	160	1000	750	170	190	9,30	1
64124PST	7,4	110	200	1000	750	210	190	13,98	1
64126PST	7,4	125	225	1000	750	235	190	18,53	1



iso FIBER-T reduced tee

made of PP-R fittings and faser FIBER-T multilayer pipe with special fibers, green colour with red strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour

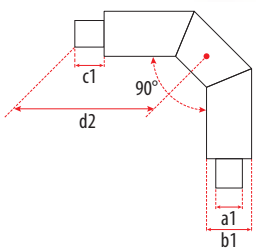
Item	SDR	a1	b1	d1	d2	c1	*Weight*	
		mm	mm	mm	mm	mm	kg	*pack*
642460PCT	7,4	40-32-40	110-90-110	1000	500	190	2,18	1
642500PCT	7,4	50-32-50	110-90-110	1000	500	190	2,54	1
642510PCT	7,4	50-40-50	110-110-110	1000	500	190	2,72	1
642560PCT	7,4	63-32-63	125-90-125	1000	500	190	3,13	1
642580PCT	7,4	63-40-63	125-110-125	1000	500	190	3,51	1
642600PCT	7,4	63-50-63	125-110-125	1000	500	190	3,74	1
642640PCT	7,4	75-32-75	140-90-140	1000	500	190	3,93	1
642660PCT	7,4	75-40-75	140-110-140	1000	500	190	4,48	1
642680PCT	7,4	75-50-75	140-110-140	1000	500	190	4,69	1
642700PCT	7,4	75-63-75	140-125-140	1000	500	190	4,93	1
642796PCT	7,4	90-32-90	160-90-160	1000	500	190	5,08	1
642798PCT	7,4	90-40-90	160-110-160	1000	500	190	5,23	1
642800PCT	7,4	90-50-90	160-110-160	1000	500	190	5,43	1
642820PCT	7,4	90-63-90	160-125-160	1000	500	190	6,23	1
642840PCT	7,4	90-75-90	160-140-160	1000	500	190	6,66	1
642854PCT	7,4	110-32-110	200-90-200	1000	500	190	7,42	1
642856PCT	7,4	110-40-110	200-110-200	1000	500	190	7,57	1
642858PCT	7,4	110-50-110	200-110-200	1000	500	190	7,76	1
642860PCT	7,4	110-63-110	200-125-200	1000	500	190	8,09	1
642880PCT	7,4	110-75-110	200-140-200	1000	500	190	9,36	1
642900PCT	7,4	110-90-110	200-160-200	1000	500	190	10,05	1
642934PCT	7,4	125-50-125	225-110-225	1000	500	190	9,43	1
642936PCT	7,4	125-63-125	225-125-225	1000	500	190	10,22	1
642938PCT	7,4	125-75-125	225-140-225	1000	500	190	12,01	1
642940PCT	7,4	125-90-125	225-160-225	1000	500	190	12,33	1
642960PCT	7,4	125-110-125	225-200-225	1000	500	190	13,27	1



iso FIBER-T over-run reduced tee

made of PP-R fittings and faser FIBER-T multilayer pipe
with special fibers, green colour with red strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

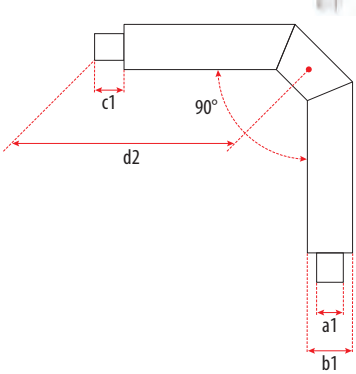
Item	SDR	a1	b1	d1	d2	d3	c1	*Weight*	
		mm	mm	mm	mm	mm	mm	kg	*pack*
642460PST	7,4	40-32-40	110-90-110	1000	750	120	190	2,78	1
642500PST	7,4	50-32-50	110-90-110	1000	750	120	190	3,04	1
642510PST	7,4	50-40-50	110-110-110	1000	750	120	190	3,40	1
642560PST	7,4	63-32-63	125-90-125	1000	750	135	190	3,66	1
642580PST	7,4	63-40-63	125-110-125	1000	750	135	190	4,33	1
642600PST	7,4	63-50-63	125-110-125	1000	750	135	190	4,63	1
642640PST	7,4	75-32-75	140-90-140	1000	750	150	190	4,49	1
642660PST	7,4	75-40-75	140-110-140	1000	750	150	190	5,22	1
642680PST	7,4	75-50-75	140-110-140	1000	750	150	190	5,62	1
642700PST	7,4	75-63-75	140-125-140	1000	750	150	190	6,13	1
642796PST	7,4	90-32-90	160-90-160	1000	750	170	190	5,70	1
642798PST	7,4	90-40-90	160-110-160	1000	750	170	190	6,05	1
642800PST	7,4	90-50-90	160-110-160	1000	750	170	190	6,43	1
642820PST	7,4	90-63-90	160-125-160	1000	750	170	190	7,48	1
642840PST	7,4	90-75-90	160-140-160	1000	750	170	190	8,29	1
642854PST	7,4	110-32-110	200-90-200	1000	750	210	190	8,40	1
642856PST	7,4	110-40-110	200-110-200	1000	750	210	190	8,51	1
642858PST	7,4	110-50-110	200-110-200	1000	750	210	190	8,89	1
642860PST	7,4	110-63-110	200-125-200	1000	750	210	190	9,50	1
642880PST	7,4	110-75-110	200-140-200	1000	750	210	190	11,15	1
642900PST	7,4	110-90-110	200-160-200	1000	750	210	190	12,35	1
642934PST	7,4	125-50-125	225-110-225	1000	750	235	190	10,62	1
642936PST	7,4	125-63-125	225-125-225	1000	750	235	190	11,23	1
642938PST	7,4	125-75-125	225-140-225	1000	750	235	190	13,60	1
642940PST	7,4	125-90-125	225-160-225	1000	750	235	190	14,45	1
642960PST	7,4	125-110-125	225-200-225	1000	750	235	190	16,15	1



iso FIBER-COND elbow 90°

made of PP-R fittings and faser FIBER-COND multilayer pipe with special fibers, white colour with grey strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour

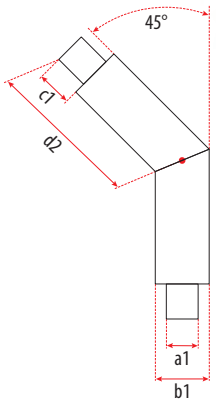
Item	SDR	a1	b2	d2	c1	Weight	
		mm	mm	mm	mm	kg	pack
63112UPCC	11	32	90	500	190	1,01	1
63114UPCC	11	40	110	500	190	1,51	1
63116UPCC	11	50	110	500	190	1,86	1
63118UPCC	11	63	125	500	190	2,52	1
63120UPCC	11	75	140	500	190	3,27	1
63122UPCC	11	90	160	500	190	4,32	1
63124UPCC	11	110	200	500	190	6,73	1
63126UPCC	11	125	225	500	190	8,49	1



iso FIBER-COND elbow 90° long

made of PP-R fittings and faser FIBER-COND multilayer pipe with special fibers, white colour with grey strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour

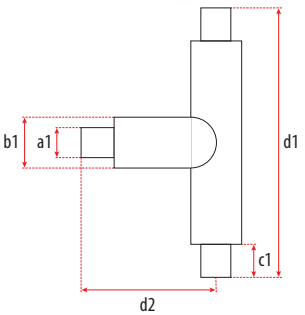
Item	SDR	a1	b2	d2	c1	Weight	
		mm	mm	mm	mm	kg	pack
63112UPLC	11	32	90	1000	190	2,37	1
63114UPLC	11	40	110	1000	190	3,30	1
63116UPLC	11	50	110	1000	190	3,83	1
63118UPLC	11	63	125	1000	190	5,08	1
63120UPLC	11	75	140	1000	190	6,50	1
63122UPLC	11	90	160	1000	190	8,51	1
63124UPLC	11	110	200	1000	190	13,02	1
63126UPLC	11	125	225	1000	190	16,67	1
63128UPLC	11	160	250	1000	190	20,05	1
63130UPLC	11	200	315	1000	190	30,72	1
63132UPLC	11	250	400	1000	190	47,04	1
63134UPLC	11	315	450	1000	190	64,47	1



iso FIBER-COND elbow 45°

made of PP-R fittings and faser FIBER-COND multilayer pipe
with special fibers, white colour with grey strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

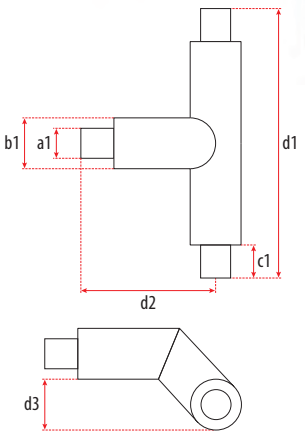
Item	SDR	a1	b2	d2	c1	*Weight*	
		mm	mm	mm	mm	kg	*pack*
63512UPCC	11	32	90	500	190	1,02	1
63514UPCC	11	40	110	500	190	1,45	1
63516UPCC	11	50	110	500	190	1,73	1
63518UPCC	11	63	125	500	190	2,32	1
63520UPCC	11	75	140	500	190	3,01	1
63522UPCC	11	90	160	500	190	4,01	1
63524UPCC	11	110	200	500	190	6,02	1
63526UPCC	11	125	225	500	190	7,82	1
63528UPCC	11	160	250	500	190	9,64	1
63530UPCC	11	200	315	500	190	14,92	1
63532UPCC	11	250	400	500	190	22,76	1
63534UPCC	11	315	450	500	190	32,75	1



iso FIBER-COND tee

made of PP-R fittings and faser FIBER-COND multilayer pipe
with special fibers, white colour with grey strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

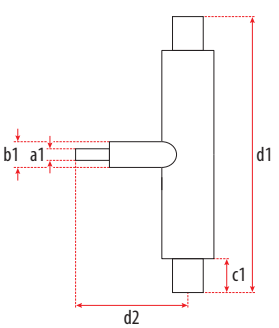
Item	SDR	a1	b1	d1	d2	c1	*Weight*	
		mm	mm	mm	mm	mm	kg	*pack*
64112UPCC	11	32	90	1000	500	190	1,47	1
64114UPCC	11	40	110	1000	500	190	2,05	1
64116UPCC	11	50	110	1000	500	190	2,42	1
64118UPCC	11	63	125	1000	500	190	3,33	1
64120UPCC	11	75	140	1000	500	190	4,38	1
64122UPCC	11	90	160	1000	500	190	5,79	1
64124UPCC	11	110	200	1000	500	190	8,83	1
64126UPCC	11	125	225	1000	500	190	11,30	1
64128UPCC	11	160	250	1500	750	190	13,35	1
64130UPCC	11	200	315	1500	750	190	32,82	1
64132UPCC	11	250	400	1500	750	190	48,45	1
64134UPCC	11	315	450	1500	750	190	68,62	1



iso FIBER-COND over-run tee

made of PP-R fittings and faser FIBER-COND multilayer pipe
with special fibers, white colour with grey strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

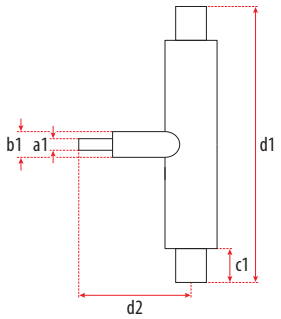
Item	SDR	a1	b1	d1	d2	d3	c1	*Weight*	
		mm	mm	mm	mm	mm	mm	kg	*pack*
64112UPSC	11	32	90	1000	750	100	190	1,93	1
64114UPSC	11	40	110	1000	750	120	190	2,73	1
64116UPSC	11	50	110	1000	750	120	190	3,25	1
64118UPSC	11	63	125	1000	750	135	190	4,45	1
64120UPSC	11	75	140	1000	750	150	190	5,89	1
64122UPSC	11	90	160	1000	750	170	190	7,82	1
64124UPSC	11	110	200	1000	750	210	190	12,11	1
64126UPSC	11	125	225	1000	750	235	190	15,09	1
64128UPSC	11	160	250	1000	750	260	190	17,53	1
64130UPSC	11	200	315	1500	1000	325	190	39,76	1
64132UPSC	11	250	400	1500	1000	410	190	59,94	1
64134UPSC	11	315	450	1500	1000	460	190	84,96	1



iso FIBER-COND reduced tee

made of PP-R fittings and faser FIBER-COND multilayer pipe
with special fibers, white colour with grey strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

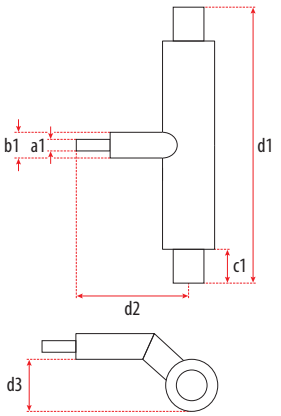
Item	SDR	a1	b1	d1	d2	c1	*Weight*	
		mm	mm	mm	mm	mm	kg	*pack*
642460UPCC	11	40-32-40	110-90-110	1000	500	190	1,97	1
642500UPCC	11	50-32-50	110-90-110	1000	500	190	2,24	1
642510UPCC	11	50-40-50	110-110-110	1000	500	190	2,40	1
642560UPCC	11	63-32-63	125-90-125	1000	500	190	2,68	1
642580UPCC	11	63-40-63	125-110-125	1000	500	190	3,04	1
642600UPCC	11	63-50-63	125-110-125	1000	500	190	3,24	1
642640UPCC	11	75-32-75	140-90-140	1000	500	190	3,29	1
642660UPCC	11	75-40-75	140-110-140	1000	500	190	3,86	1
642680UPCC	11	75-50-75	140-110-140	1000	500	190	4,03	1
642700UPCC	11	75-63-75	140-125-140	1000	500	190	4,20	1
642796UPCC	11	90-32-90	160-90-160	1000	500	190	4,21	1
642798UPCC	11	90-40-90	160-110-160	1000	500	190	4,32	1
642800UPCC	11	90-50-90	160-110-160	1000	500	190	4,49	1
642820UPCC	11	90-63-90	160-125-160	1000	500	190	5,29	1
642840UPCC	11	90-75-90	160-140-160	1000	500	190	5,65	1
64285U4PCC	11	110-32-110	200-90-200	1000	500	190	6,14	1
642856UPCC	11	110-40-110	200-110-200	1000	500	190	6,26	1
642858UPCC	11	110-50-110	200-110-200	1000	500	190	6,41	1
642860UPCC	11	110-63-110	200-125-200	1000	500	190	6,68	1



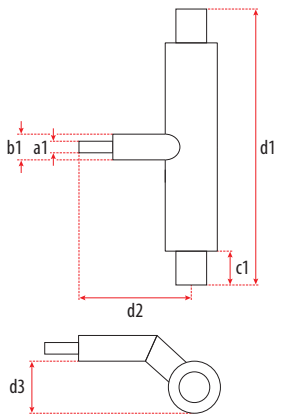
Item	SDR	a1	b1	d1	d2	c1	Weight	
		mm	mm	mm	mm	mm	kg	pack
642880UPCC	11	110-75-110	200-140-200	1000	500	190	8,01	1
642900UPCC	11	110-90-110	200-160-200	1000	500	190	8,60	1
642934UPCC	11	125-50-125	225-110-225	1000	500	190	7,80	1
642936UPCC	11	125-63-125	225-125-225	1000	500	190	8,52	1
642938UPCC	11	125-75-125	225-140-225	1000	500	190	10,54	1
642940UPCC	11	125-90-125	225-160-225	1000	500	190	10,72	1
642960UPCC	11	125-110-125	225-200-225	1000	500	190	11,46	1
642976UPCC	11	160-63-160	250-125-250	1000	500	190	11,64	1
642978UPCC	11	160-75-160	250-140-250	1000	500	190	11,92	1
642980UPCC	11	160-90-160	250-160-250	1000	500	190	12,37	1
642990UPCC	11	160-110-160	250-200-250	1000	500	190	13,75	1
643000UPCC	11	160-125-160	250-225-250	1000	500	190	13,78	1
643010UPCC	11	200-63-200	315-125-315	1500	750	190	28,37	1
643012UPCC	11	200-75-200	315-140-315	1500	750	190	28,50	1
643014UPCC	11	200-90-200	315-160-315	1500	750	190	29,46	1
643016UPCC	11	200-110-200	315-200-315	1500	750	190	30,82	1
643018UPCC	11	200-125-200	315-225-315	1500	750	190	31,74	1
643020UPCC	11	200-160-200	315-250-315	1500	750	190	34,17	1
643044UPCC	11	250-32-250	400-90-400	1500	750	190	43,04	1
643046UPCC	11	250-40-250	400-110-400	1500	750	190	43,33	1
643048UPCC	11	250-50-250	400-110-400	1500	750	190	43,58	1
643050UPCC	11	250-63-250	400-125-400	1500	750	190	44,00	1
643052UPCC	11	250-75-250	400-140-400	1500	750	190	44,46	1
643054UPCC	11	250-90-250	400-160-400	1500	750	190	45,17	1
643056UPCC	11	250-110-250	400-200-400	1500	750	190	46,45	1
643058UPCC	11	250-125-250	400-225-400	1500	750	190	47,50	1
643060UPCC	11	250-160-250	400-250-400	1500	750	190	49,05	1
643070UPCC	11	250-200-250	400-315-400	1500	750	190	49,48	1
643094UPCC	11	315-200-315	450-315-450	1500	750	190	66,93	1
643096UPCC	11	315-250-315	450-400-450	1500	750	190	69,63	1

iso FIBER-COND over-run reduced tee

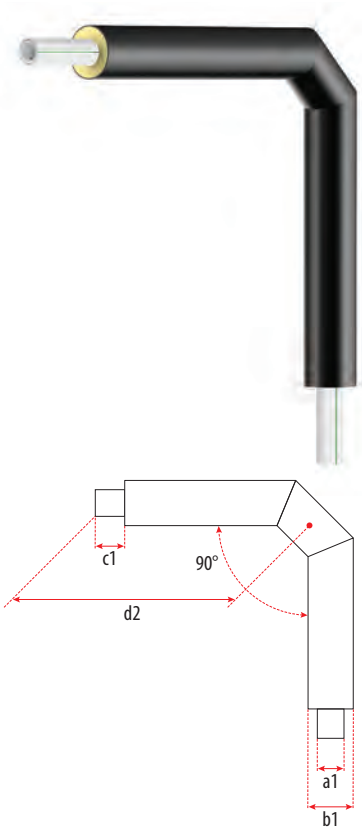
made of PP-R fittings and faser FIBER-COND multilayer pipe with special fibers, white colour with grey strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour



Item	SDR	a1	b1	d1	d2	d3	c1	Weight	
		mm	mm	mm	mm	mm	mm	kg	pack
642460UPSC	11	40-32-40	110-90-110	1000	750	120	190	2,54	1
642500UPSC	11	50-32-50	110-90-110	1000	750	120	190	2,71	1
642510UPSC	11	50-40-50	110-110-110	1000	750	120	190	3,02	1
642560UPSC	11	63-32-63	125-90-125	1000	750	135	190	3,17	1
642580UPSC	11	63-40-63	125-110-125	1000	750	135	190	3,79	1
642600UPSC	11	63-50-63	125-110-125	1000	750	135	190	4,06	1
642640UPSC	11	75-32-75	140-90-140	1000	750	150	190	3,81	1
642660UPSC	11	75-40-75	140-110-140	1000	750	150	190	4,56	1
642680UPSC	11	75-50-75	140-110-140	1000	750	150	190	4,89	1
642700UPSC	11	75-63-75	140-125-140	1000	750	150	190	5,29	1



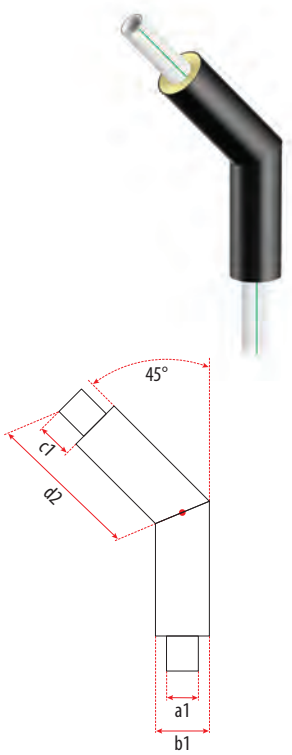
Item	SDR	a1	b1	d1	d2	d3	c1	Weight	pack
		mm	mm	mm	mm	mm	mm	kg	
642796UPSC	11	90-32-90	160-90-160	1000	750	170	190	4,80	1
642798UPSC	11	90-40-90	160-110-160	1000	750	170	190	5,10	1
642800UPSC	11	90-50-90	160-110-160	1000	750	170	190	5,41	1
642820UPSC	11	90-63-90	160-125-160	1000	750	170	190	6,43	1
642840UPSC	11	90-75-90	160-140-160	1000	750	170	190	7,12	1
642854UPSC	11	110-32-110	200-90-200	1000	750	210	190	7,08	1
642856UPSC	11	110-40-110	200-110-200	1000	750	210	190	7,15	1
642858UPSC	11	110-50-110	200-110-200	1000	750	210	190	7,46	1
642860UPSC	11	110-63-110	200-125-200	1000	750	210	190	7,96	1
642880UPSC	11	110-75-110	200-140-200	1000	750	210	190	9,63	1
642900UPSC	11	110-90-110	200-160-200	1000	750	210	190	10,67	1
642934UPSC	11	125-50-125	225-110-225	1000	750	235	190	8,92	1
642936UPSC	11	125-63-125	225-125-225	1000	750	235	190	9,42	1
642938UPSC	11	125-75-125	225-140-225	1000	750	235	190	11,87	1
642940UPSC	11	125-90-125	225-160-225	1000	750	235	190	12,32	1
642960UPSC	11	125-110-125	225-200-225	1000	750	235	190	13,98	1
642976UPSC	11	160-63-160	250-125-250	1000	750	260	190	12,68	1
642978UPSC	11	160-75-160	250-140-250	1000	750	260	190	13,29	1
642980UPSC	11	160-90-160	250-160-250	1000	750	260	190	14,18	1
642990UPSC	11	160-110-160	250-200-250	1000	750	260	190	19,43	1
643000UPSC	11	160-125-160	250-225-250	1000	750	260	190	17,30	1
643010UPSC	11	200-63-200	315-125-315	1500	1000	325	190	29,56	1
643012UPSC	11	200-75-200	315-140-315	1500	1000	325	190	30,36	1
643014UPSC	11	200-90-200	315-160-315	1500	1000	325	190	31,51	1
643016UPSC	11	200-110-200	315-200-315	1500	1000	325	190	33,92	1
643018UPSC	11	200-125-200	315-225-315	1500	1000	325	190	35,58	1
643020UPSC	11	200-160-200	315-250-315	1500	1000	325	190	38,48	1
643044UPSC	11	250-32-250	400-90-400	1500	1000	410	190	43,74	1
643046UPSC	11	250-40-250	400-110-400	1500	1000	410	190	44,27	1
643048UPSC	11	250-50-250	400-110-400	1500	1000	410	190	44,67	1
643050UPSC	11	250-63-250	400-125-400	1500	1000	410	190	45,41	1
643052UPSC	11	250-75-250	400-140-400	1500	1000	410	190	46,26	1
643054UPSC	11	250-90-250	400-160-400	1500	1000	410	190	47,50	1
643056UPSC	11	250-110-250	400-200-400	1500	1000	410	190	50,00	1
643058UPSC	11	250-125-250	400-225-400	1500	1000	410	190	51,78	1
643060UPSC	11	250-160-250	400-250-400	1500	1000	410	190	53,64	1
643070UPSC	11	250-200-250	400-315-400	1500	1000	410	190	53,76	1
643094UPSC	11	315-200-315	450-315-450	1500	1000	460	190	73,83	1
643096UPSC	11	315-250-315	450-400-450	1500	1000	460	190	81,72	1



iso FIBER-LIGHT elbow 90° long

made of PP-R fittings and faser FIBER-LIGHT multilayer pipe with special fibers, white colour with green strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour

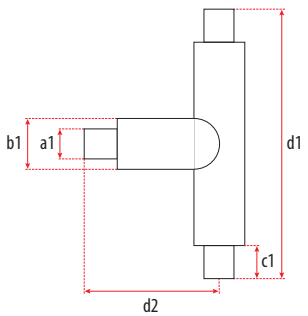
Art. *Item*	SDR	a1	b2	d2	c1	Peso *Weight*	
		mm	mm	mm	mm	kg	confezione *pack*
63126UZPLC	17,6	125	225	1000	190	14,06	1
63128UZPLC	17,6	160	250	1000	190	16,10	1
63130UZPLC	17,6	200	315	1000	190	23,94	1
63132UZPLC	17,6	250	400	1000	190	36,63	1
63134UZPLC	17,6	315	450	1000	190	49,68	1



iso FIBER-LIGHT elbow 45°

made of PP-R fittings and faser FIBER-LIGHT multilayer pipe with special fibers, white colour with green strips, preinsulated with PUR stiff foam, protected by a PE-HD coating black colour

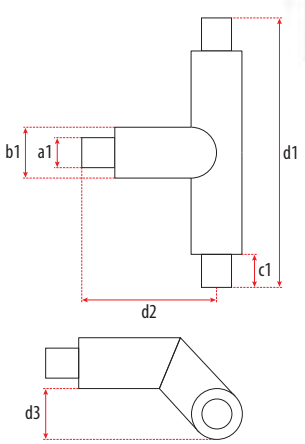
Item	SDR	a1	b2	d2	c1	*Weight*	
		mm	mm	mm	mm	kg	*pack*
63526UZPCC	17,6	125	225	1000	190	6,48	1
63528UZPCC	17,6	160	250	1000	190	7,76	1
63530UZPCC	17,6	200	315	1000	190	11,70	1
63532UZPCC	17,6	250	400	1000	190	17,78	1
63534UZPCC	17,6	315	450	1000	190	24,40	1



iso FIBER-LIGHT tee

made of PP-R fittings and faser FIBER-LIGHT multilayer pipe
with special fibers, white colour with green strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

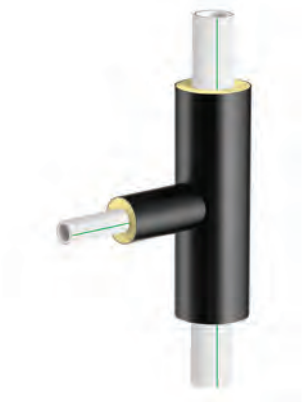
Item	SDR	a1	b1	d1	d2	c1	*Weight*	
		mm	mm	mm	mm	mm	kg	*pack*
64126UZPCC	17,6	125	225	1000	500	190	9,35	1
64128UZPCC	17,6	160	250	1000	500	190	10,08	1
64130UZPCC	17,6	200	315	1500	500	190	24,49	1
64132UZPCC	17,6	250	400	1500	500	190	36,76	1
64134UZPCC	17,6	315	450	1500	500	190	50,59	1

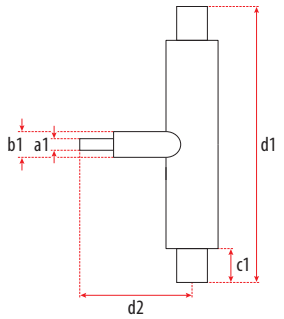


iso FIBER-LIGHT over-run tee

made of PP-R fittings and faser FIBER-LIGHT multilayer pipe
with special fibers, white colour with green strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

Item	SDR	a1	b1	d1	d2	d3	c1	*Weight*	
		mm	mm	mm	mm	mm	mm	kg	*pack*
64126UZPSC	17,6	125	225	1000	750	235	190	13,14	1
64128UZPSC	17,6	160	250	1000	750	260	190	12,19	1
64130UZPSC	17,6	200	315	1500	1000	325	190	29,24	1
64132UZPSC	17,6	250	400	1500	1000	410	190	44,23	1
64134UZPSC	17,6	315	450	1500	1000	460	190	60,86	1



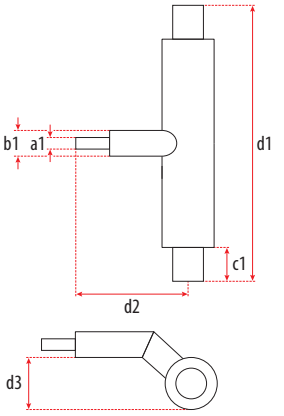


iso FIBER-LIGHT reduced tee

made of PP-R fittings and faser FIBER-LIGHT multilayer pipe
with special fibers, white colour with green strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

Item	SDR	a1	b1	d1	d2	c1	*Weight*	
		mm	mm	mm	mm	mm	kg	*pack*
642934UZPCC	17,6	125-50-125	225-110-225	1000	500	190	6,53	1
642936UZPCC	17,6	125-63-125	225-125-225	1000	500	190	7,27	1
642938UZPCC	17,6	125-75-125	225-140-225	1000	500	190	9,48	1
642940UZPCC	17,6	125-90-125	225-160-225	1000	500	190	9,66	1
642960UZPCC	17,6	125-110-125	225-200-225	1000	500	190	10,45	1
643000UZPCC	17,6	160-125-160	250-225-250	1000	500	190	13,66	1
643020UZPCC	17,6	200-160-200	315-250-315	1500	750	190	25,75	1
643060UZPCC	17,6	250-160-250	400-250-400	1500	750	190	39,57	1
643070UZPCC	17,6	250-200-250	400-315-400	1500	750	190	40,00	1
643094UZPCC	17,6	315-200-315	450-315-450	1500	750	190	53,48	1
643096UZPCC	17,6	315-250-315	450-400-450	1500	750	190	50,48	1

NB: reduced arms with a diameter less then 125 mm of faser FIBER-COND (SDR 11).



iso FIBER-LIGHT over-run reduced tee

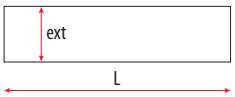
made of PP-R fittings and faser FIBER-LIGHT multilayer pipe
with special fibers, white colour with green strips,
preinsulated with PUR stiff foam,
protected by a PE-HD coating black colour

Item	SDR	a1	b1	d1	d2	d3	c1	*Weight*	
		mm	mm	mm	mm	mm	mm	kg	*pack*
642934UZPSC	17,6	125-50-125	225-110-225	1000	750	235	190	7,65	1
642936UZPSC	17,6	125-63-125	225-125-225	1000	750	235	190	8,16	1
642938UZPSC	17,6	125-75-125	225-140-225	1000	750	235	190	10,81	1
642940UZPSC	17,6	125-90-125	225-160-225	1000	750	235	190	11,26	1
642960UZPSC	17,6	125-110-125	225-200-225	1000	750	235	190	12,92	1
643000UZPSC	17,6	160-125-160	250-225-250	1000	750	260	190	13,71	1
643020UZPSC	17,6	200-160-200	315-250-315	1500	1000	325	190	29,04	1
643060UZPSC	17,6	250-160-250	400-250-400	1500	1000	410	190	42,83	1
643070UZPSC	17,6	250-200-250	400-315-400	1500	1000	410	190	44,35	1
643094UZPSC	17,6	315-200-315	450-315-450	1500	1000	460	190	56,32	1
643096UZPSC	17,6	315-250-315	450-400-450	1500	1000	460	190	59,85	1

NB: bracci ridotti con diametro inferiore a 125 mm in tubo *faser* FIBER-COND (SDR 11).

NB: reduced arms with a diameter less then 125 mm of faser FIBER-COND (SDR 11).

Join accessories

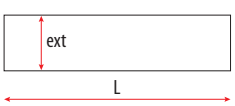


Single-sealing repairing joint kit

on-site PUR foam kit consisting of:

- *1 perforated casing pipe (shrink wrap) with butyl sealing rings*
- *1 bi-component dosage (polyol-isocyanate)*
- *2 end caps • 2 curing caps*
- *coupling sleeve (SDR 5) up to Ø 125 mm included (butt-welding from Ø 160 mm)*

Item	SDR	Service tube		Casing pipe		Weight	
		Ø internal	Ø external	ext	L		
		mm	mm	mm	mm	kg	pack
62012PCZ	5	32	90	100	700	0,84	1
62014PCZ	5	40	110	120	700	1,09	1
62016PCZ	5	50	110	120	700	1,05	1
62018PCZ	5	63	125	135	700	1,34	1
62020PCZ	5	75	140	150	700	1,61	1
62022PCZ	5	90	160	170	700	1,96	1
62024PCZ	5	110	200	215	700	2,82	1
62026PCZ	5	125	225	240	700	3,41	1
62028PCZ	-	160	250	265	700	2,98	1
62030PCZ	-	200	315	340	700	4,42	1
62032PCZ	-	250	400	420	700	6,61	1
62034PCZ	-	315	450	470	700	7,82	1

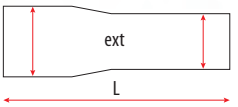


Double-sealing repairing joint kit

on-site PUR foam kit consisting of:

- *1 perforated casing pipe (shrink wrap) with butyl sealing rings*
- *2 shrinking bands*
- *1 bi-component dosage (polyolisocyanate)*
- *2 end caps • 2 curing caps*
- *coupling sleeve (SDR 5) up to Ø 125 mm included (butt-welding from Ø 160 mm)*

Item	SDR	Service tube		Casing pipe		Weight	
		Ø internal	Ø external	ext	L		
		mm	mm	mm	mm	kg	pack
62012PCX	5	32	90	100	700	1,07	1
62014PCX	5	40	110	120	700	1,40	1
62016PCX	5	50	110	120	700	1,37	1
62018PCX	5	63	125	135	700	1,69	1
62020PCX	5	75	140	150	700	2,00	1
62022PCX	5	90	160	170	700	2,41	1
62024PCX	5	110	200	215	700	3,42	1
62026PCX	5	125	225	240	700	4,13	1
62028PCX	-	160	250	265	700	3,82	1
62030PCX	-	200	315	340	700	5,66	1
62032PCX	-	250	400	420	700	9,29	1
62034PCX	-	315	450	470	700	11,06	1

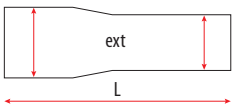


Single-sealing reduced repairing joint kit

on-site PUR foam kit consisting of:

- *1 perforated casing pipe (shrink wrap) with butyl sealing rings*
- *1 bi-component dosage (polyol-isocyanate)*
- *2 end caps • 2 curing caps*
- *coupling sleeve (SDR 5) and reducer in PP-R up to Ø 125 mm included, reducer (SDR 11) in PP-RCT from Ø 160 mm, reducer (SDR 17,6) in PP-RCT from Ø 200 mm.*

Item	SDR	Service tube		Casing pipe		Weight	
		Ø internal	Ø external	ext 1	L		
		mm	mm	mm	mm	kg	pack
62122PCZ	5	40-32	110-90	120-100	700	1,05	1
62128PCZ	5	50-32	110-90	120-100	700	1,10	1
62130PCZ	5	50-40	110-110	120-120	700	1,17	1
62134PCZ	5	63-32	125-90	135-100	700	1,29	1
62136PCZ	5	63-40	125-110	135-120	700	1,40	1
62138PCZ	5	63-50	125-110	135-120	700	1,44	1
62139PCZ	5	75-40	140-110	150-120	700	1,68	1
62140PCZ	5	75-50	140-110	150-120	700	1,68	1
62142PCZ	5	75-63	140-125	150-135	700	1,84	1
62152PCZ	5	90-63	160-125	170-135	700	2,05	1
62153PCZ	5	90-75	160-140	170-150	700	2,18	1
62157PCZ	5	110-75	200-140	215-150	700	2,90	1
62159PCZ	5	110-90	200-160	215-170	700	3,03	1
62170PCZ	5	125-90	225-160	240-170	700	3,58	1
62172PCZ	5	125-110	225-200	240-215	700	4,01	1
62174PCZ	11	160-110	250-200	265-215	700	4,55	1
62176PCZ	11	160-125	250-225	265-240	700	4,85	1
62182PCZ	11	200-160	315-250	340-265	700	5,96	1
62184PCZ	11	250-160	400-250	420-265	700	8,99	1
62186PCZ	11	250-200	400-315	420-340	700	9,60	1
62200PCZ	11	315-250	450-400	470-420	700	15,28	1
62182ZPCZ	17,6	200-160	315-250	340-265	700	5,28	1
62184ZPCZ	17,6	250-160	400-250	420-265	700	7,51	1
62186ZPCZ	17,6	250-200	400-315	420-340	700	8,45	1
62200ZPCZ	17,6	315-250	450-400	470-420	700	12,81	1



Double-sealing reduced repairing joint kit

on-site PUR foam kit consisting of:

- *1 perforated casing pipe (shrink wrap) with butyl sealing rings*
- *2 shrinking bands*
- *1 bi-component dosage (polyol-isocyanate)*
- *2 end caps • 2 curing caps*
- *coupling sleeve (SDR 5) and reducer in PP-R up to Ø 125 mm included, reducer (SDR 11) in PP-RCT from Ø 160 mm, reducer (SDR 17,6) in PP-RCT from Ø 200 mm.*

Item	SDR	*Service tube*		*Casing pipe*		*Weight*	
		Ø internal	*Ø external*	ext 1	L		
		mm	mm	mm	mm	kg	*pack*
62122PCX	5	40-32	110-90	120-100	700	1,32	1
62128PCX	5	50-32	110-90	120-100	700	1,37	1
62130PCX	5	50-40	110-110	120-120	700	1,48	1
62134PCX	5	63-32	125-90	135-100	700	1,62	1
62136PCX	5	63-40	125-110	135-120	700	1,74	1
62138PCX	5	63-50	125-110	135-120	700	1,78	1
62139PCX	5	75-40	140-110	150-120	700	2,03	1
62140PCX	5	75-50	140-110	150-120	700	2,04	1
62142PCX	5	75-63	140-125	150-135	700	2,22	1
62152PCX	5	90-63	160-125	170-135	700	2,45	1
62153PCX	5	90-75	160-140	170-150	700	2,60	1
62157PCX	5	110-75	200-140	215-150	700	3,40	1
62159PCX	5	110-90	200-160	215-170	700	3,56	1
62170PCX	5	125-90	225-160	240-170	700	4,17	1
62172PCX	5	125-110	225-200	240-215	700	4,68	1
62174PCX	11	160-110	250-200	265-215	700	5,27	1
62176PCX	11	160-125	250-225	265-240	700	5,63	1
62182PCX	11	200-160	315-250	340-265	700	7,00	1
62184PCX	11	250-160	400-250	420-265	700	10,75	1
62186PCX	11	250-200	400-315	420-340	700	11,55	1
62200PCX	11	315-250	450-400	470-420	700	18,24	1
62182ZPCX	17,6	200-160	315-250	340-265	700	6,32	1
62184ZPCX	17,6	250-160	400-250	420-265	700	9,27	1
62186ZPCX	17,6	250-200	400-315	420-340	700	10,40	1
62200ZPCX	17,6	315-250	450-400	470-420	700	15,77	1

Closing collar

water-stop, heat-shrinking

Item	Diameter internal	Diameter external	pack
	mm	mm	pack
69612PC	32	90	1
69614PC	40	110	1
69616PC	50	110	1
69618PC	63	125	1
69620PC	75	140	1
69622PC	90	160	1
69624PC	110	200	1
69626PC	125	225	1
69628PC	160	250	1
69630PC	200	315	1
69632PC	250	400	1
62634PC	315	450	1

Sealing ring

for wall passage

Item	Ø internal pipe	Ø external pipe	Ø external ring	pack
	mm	mm	mm	pack
69662PC	32	90	130	1
69664PC	40	110	150	1
69666PC	50	110	150	1
69668PC	63	125	165	1
69670PC	75	140	180	1
69672PC	90	160	200	1
69674PC	110	200	240	1
69676PC	125	225	265	1
69678PC	160	250	290	1
69680PC	200	315	355	1
69682PC	250	400	440	1
69684PC	315	450	490	1

Tapered matrix

to weld the PE closing plug for repairing joint

Item	D	pack
	mm	pack
52120	25	1

Curing caps

made with PE, with vent opening, spare part for repairing joint

Item		pack
		pack
52150		10

End caps

made with PE, to be welded, spare part for repairing joint

Item		
		pack
52152		10

Cleaning liquid

for all cleaning operations

Item		
	litro *liter*	*pack*
50330	1	1

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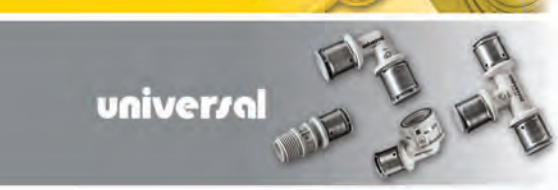

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