BOR plus SYSTEM

for home

EPIC
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Installation system BORplus

Product description

FOR USE IN HOT&COLD TAP WATER
AND HEATING SYSTEMS

Top worldwide manufacturer of plastic pipe systems

Table of contents

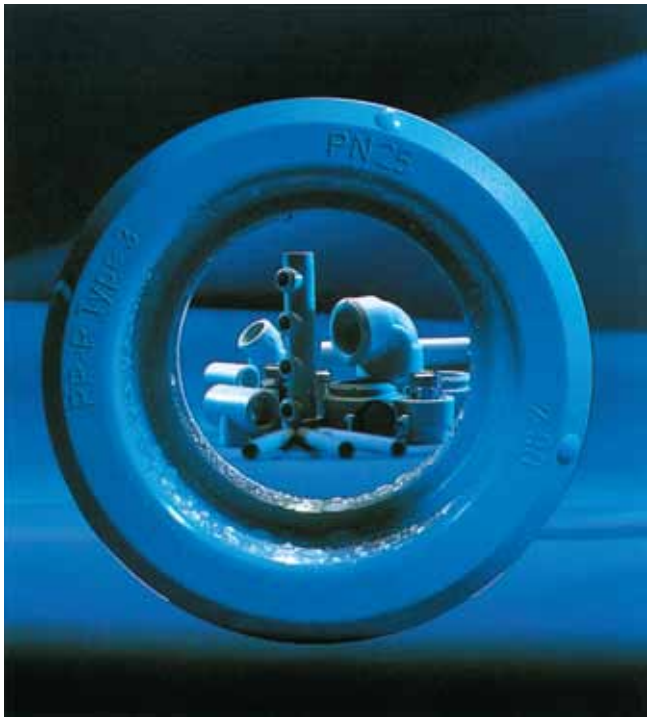
I. Background information 3
1. Basic data 3
2. System application 3
3. Advantages 3
II. System characteristics 4
1. Scope and conditions of use 4
2. Product range 4
3. Pipes – matching pipe types with system operation parameters 4-5
4. Fittings 6
5. Approvals and certificates 6
6. PPR-CT (Polypropylene Random Copolymer Crystalline Temperature) 6-7
7. UV Protection 7-8
III. Assembly 8
1. Connection technique 8
2. Installation guide 9
3. Welding process parameters 10
4. Pipe connection 10
IV. Guarantee 11
V. Product description 12-20

I. Background information

BORplus is an all-inclusive, high-quality, and well-tested polypropylene installation system.

Operational safety and useful life of over 50 years of BORplus is based on factors such as top-quality raw materials, strict control of the manufacturing process, and fusion-welding connection techniques used during assembly.

1. Basic data



BORplus is made of type 3 polypropylene (PP-R). This material is resistant to simultaneous and long-term exposure to temperature and pressure of the medium, as well as 100% resistant to corrosion and exposure of over 300 different chemical substances at various temperatures.

BORplus PPR Pipes are manufactured with an acceptable tolerences in the ID and wall thickness as per the DIN standards 8077 & 8078 and EN ISO 15874.

Top-quality granulated plastic materials used to manufacture BORplus system include:

BOREALIS (RA 130E-8427), Vestolen P 9421, and TIPPLEN CS4-8000 G.

*** PPR-CT**

Polypropylene random copolymer crystalline temperature (ppr-ct) is an enhanced crystalline structure is created through special nucleation process that makes ppr operate at higher pressures at elevated temperatures offering at least 50% improved strength.

2. System application

BORplus can be used both in assembly of new systems or for repairs of existing systems:

- water systems (hot and cold tap water)
- heating systems (radiator heating)
- cooling systems (chilled water)

in all types of residential buildings (single-family houses and apartment blocks) and public utility facilities.

Given its good chemical resistance, the system can also be used for the following applications:

- industry (compressed air systems, various types of process piping)
- agriculture and horticulture

3. Advantages

- fittings constructed with accordance to requirements of pressure class PN 25
- lifetime – over 50 years
- secure and quick assembly – fusion-welding guarantees absolute tightness of connections
- low noise level – vibrations are damped, sounds are absorbed
- low linear resistance factor (k=0.007) – no pipe encrustation
- reduced local resistance factors (even up to 60%) – unique design of fittings
- low thermal conductivity coefficient (0.21 W/mxK) – reduced thermal losses
- sanitary (hygienic) aspects (neutral to water)
- resistant to many chemicals

* Available in fiber Composite PPR-CT.

II. System characteristics

1. Scope and conditions of use

Table 1. Product range and properties of pipes. (PN20)

System type	cold tap water systems	hot tap water systems	central heating systems
Operating pressure P [b]	25.9	12.9	6.4
Operating temperature top [°C]	20	60	80
Maximum emergency temperature t_e [°C]	-	110	110
Maximum operating time at t_e			

Note: Emergency temperature (t_e) refers to periods of system breakdowns (e.g. control systems) when temperature might rise to levels presented in the table above during the total operating time of 100 hours during 50 years of use, with the maximum emergency operating time up to 3 hours.

2. Product range

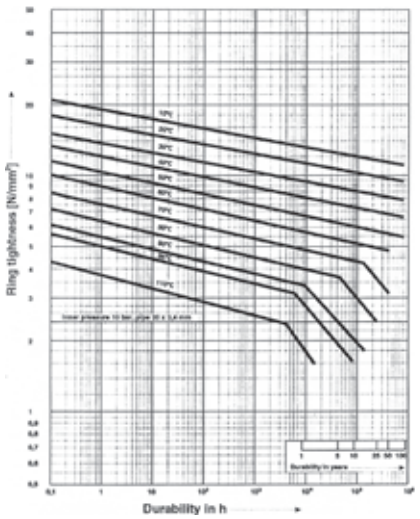
- Homogenous PPR pipes class PN 10, PN 16, PN 20, diameter range: 20 -160 mm.
- PPR pipes stabilized with a perforated aluminium insert, range diameter: 20 -160 mm.
- PPR fittings, range diameter: 20 -160 mm.
- PPR fittings with fused elements (female and male threads).
- PPR ball and straight valves.
- Accessories and fastening tools.
- PPR-CT Fiber pipes PN 20, PN 25 range dia meter 20 -160.
- UV Protected Pipes & Fitting.

3. Pipes - matching pipe types with system operation parameters

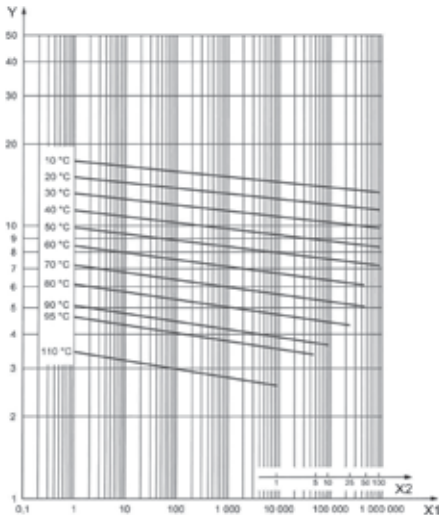
Depending on the required operating conditions for different temperature and pressure values, the following pipe pressure range is available.:

- PN 10 pipes - cold water systems with operating temperature up to 20°C and pressure up to 12.9 bar
- PN 16 pipes - cold water systems with operating temperature up to 20°C and pressure up to 19.5 bar, as well as hot water systems with operating temperature up to 60°C and pressure up to 10.4 bar.
- PN 20 pipes and stabilized pipes - cold and hot water systems with operating temperature up to 60°C and pressure up to 12.9 bar, as well as central heating systems with operating temperature up to 80°C and pressure up to 6.4 bar.

PP pipes stabilized with a aluminium insert strengthen the pipe and reduce its thermal elongation.



Durability of installation



Life Time of PPR-CT System

Permissible working pressures for pipes made of type 3 polypropylene.

Temperature [°C]	Years of service	Pipe grade (according DIN 8077/8078)			
		Nominal pressure			
		PN 10	PN 16	PN 20	PN 25
		Permissible working pressure [bar*]			
10	1	17,6	28,2	35,2	44.2
	5	16,5	26,5	33,1	41.8
	10	16,1	25,8	32,3	40.4
	25	15,6	25,0	31,2	39.1
	50	15,2	24,3	30,4	38.1
	100	14,8	23,7	29,6	37.1
20	1	14,9	23,9	29,9	37.8
	5	14,1	22,6	28,3	35.4
	10	13,7	22,0	27,5	34.4
	25	13,3	21,3	26,7	33.4
	50	12,9	20,7	25,9	32.4
	100	12,5	19,5	25,1	31.4
30	1	12,8	20,5	25,6	32.1
	5	12,0	19,2	24,0	30.1
	10	11,6	18,6	23,2	29.1
	25	11,2	17,9	22,4	28.1
	50	10,9	17,5	21,9	27.4
40	1	10,8	17,3	21,6	27.1
	5	10,1	16,2	20,3	25.4
	10	9,9	15,8	19,7	24.7
	25	9,5	15,2	18,9	23.7
	50	9,2	14,7	18,4	23.1
50	1	9,1	14,6	18,3	23.1
	5	8,5	13,7	17,1	21.4
	10	8,3	13,2	16,5	20.7
	25	8,0	12,8	16,0	20.0
	50	7,7	12,4	15,5	19.4
60	1	7,7	12,4	15,5	19.4
	5	7,2	11,5	14,4	18
	10	6,9	11,1	13,9	17.4
	25	6,7	10,7	13,3	16.7
	50	6,5	10,4	12,9	16
70	1	6,5	10,5	13,1	16.4
	5	6,0	9,6	12,0	15.0
	10	5,8	9,3	11,6	14.7
	25	4,9	7,9	9,9	12.7
	50	4,3	6,8	8,5	10.7
80	1	5,5	8,8	10,9	13.7
	5	4,8	7,7	9,6	12.0
	10	4,0	6,4	8,0	10.0
	25	3,2	5,1	6,4	8.0
95	1	3,9	6,2	7,7	9.7
	5	2,6	4,1	5,2	6.3
	(10)	2,2	3,5	4,3	5.3

Explanations:

* Permissible working pressure as given at safety factor 1,5

– recommended application cold water installation

– recommended application hot water installation

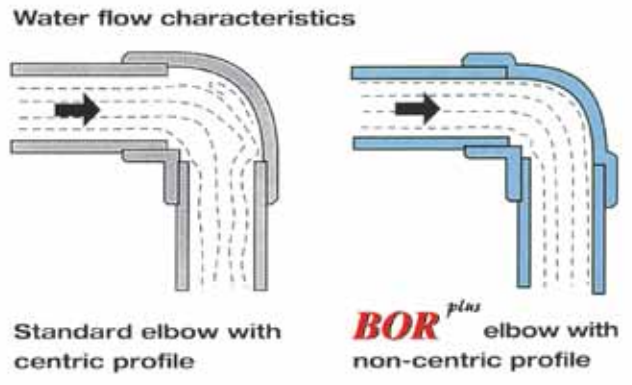
– recommended application central heating installation

4. Fittings

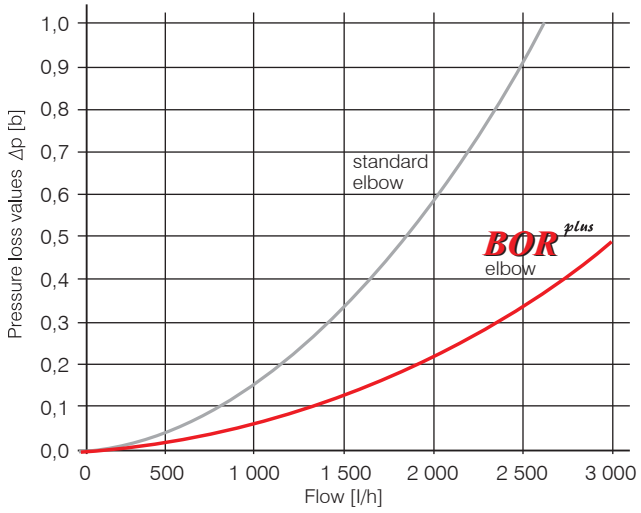
Compared to other PPR systems, the distinguishing characteristics of BORplus fittings include:

- Smoother transition at the fitting-pipe point of contact, reducing flow irregularities
- Shift of the axis of symmetry in 90° elbows outside the fitting (diameter range: 20 – 40 mm), directing the main stream of the flow to a more rounded arch

As a result, BORplus ensures a threefold reduction of hydraulic los-ses compared to other PPR systems.



Pressure loss values



5. Approvals and certificates

In line with current requirements for products and materials used in and sanitary certificates of the National Institute of Hygiene construction, BORplus has all technical approvals of COBRTIINSTAL.

BOR Plus system meterials are under acceptance in several European countries among the others in Germany for DVGW. The final results of testing are anticipated in the beginning 1999. BOR Plus Installation System fulfills the requirements of the following DIN standards:

1. DIN 8077. Rohre aus Polypropylene (PP). Mafle. (Germany).
2. DIN 8078. Rohre aus Polypropylene (PP) Typ 1, 2, 3, Allgemeine Güteanforderungen, Prüfung. (Germany).
3. DIN 16962. Rohrverbindungen und Rohrleitungsteile für Druckrohrleitungen aus Polypropylene (PP). Teil 1 bis 11. (Germany).
4. EN ISO 15874 (Europe).

6 . PPR-CT (Polypropylene Random Copolymer Crystalline Temperature)

Polypropylene Random Copolymer Crystalline Temperature (PPR-CT) is the latest invention in polymers piping industry, developed with a crystalline structure that exhibits an improved pressure rating at elevated temperatures.

A special nucleation pr□Cess that enables the pipe to operate at higher pressures at elevated temperatures with the same wall thickness of normal PPR, this high pressure rating allow to down-gauge to a thinner wall pipe offering higher hydraulic capacities and cost savings.

Definition: According to the definition found within industry standard ASTM F2389, PP-RCT means polypropylene random copolymer with modified crystallinity and temperature resistance. PP-RCT is a copolymer of propylene and at least one comonomer, where the propylene is more than 50% of the composition. PP-RCT piping products are rated for continuous operation at 82C° temperature, with pressure rating depending on their wall type (SDR). PP-RCT pipes also may include reinforcement layers for benefits such as reducing longitudinal thermal expansion/contraction.

Overview: PP-RCT is a high-temperature plastic pressure piping system first used for plumbing and hydronic heating in the 2000's in Europe and introduced to North America in the 2010's. PP-RCT pipes also provide resistance to highly acidic and basic solutions. Other uses include industrial and food-grade piping. Joints can be heat-fused. The high heat and/or pressure performance makes PP-RCT pipes suitable for demanding applications, such as pressure piping (plumbing, hydronics) in commercial high-rise buildings.

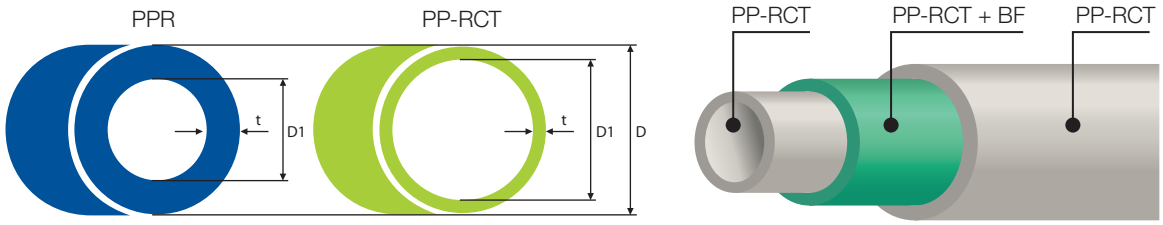
PP-R and PP-RCT Advantages

- Safety of potable water and long-term reliability
- Resistance to corrosion, tuberculation, deposits
- Chlorine and chloramine resistance
- Lightweight, easy to transport
- No scrap value, avoiding jobsite theft
- Durability and toughness to survive jobsite installations
- No flame, glue or solders are used for joining, heat-fused joints
- Available in wide range of sizes
- Natural Insulator, low thermal conductivity
- Professional installed appearance

PP-R and PP-RCT Applications

- Hot- and cold-water plumbing distribution, residential and
- commercial
- Hydronic piping and distribution (radiators, fan coils, etc.)
- Heating and chilled water piping
- Suitable for many industrial and prCess piping applications
- Food processing
- Compressed Air

Explanatory notes:
t = wall thickness
D = external diameter
D1 = internal diameter



Permissible working. Pressure and temperature for PPR-CT

Temperature	Operating Time [years]	SDR 11 PPR-CT	SDR 9 PPR-CT	SDR 7.4 PPR-CT	SDR 6 PPR-CT
20°C	10	19	23.9	30.1	37.9
	25	18.6	23.5	29.6	37.2
	50	18.4	23.1	29.2	36.7
30°C	10	16.4	20.6	26	32.7
	25	16.1	20.2	25.5	32.1
	50	15.8	19.9	25.1	31.6
40°C	10	14.1	17.7	22.3	28.1
	25	13.8	17.3	21.8	27.5
	50	13.6	17.1	21.5	27.1
60°C	10	10.1	12.7	16	20.2
	25	9.9	12.4	15.7	19.8
	50	9.7	12.2	15.4	19.4
70°C	10	8.5	10.7	13.5	16.9
	25	8.3	10.4	13.1	16.5
	50	8.1	10.2	12.9	16.2
80°C	10	7	8.9	11.2	14.1
	25	6.9	8.6	10.9	13.7
95°C	5	5.3	6.7	8.5	10.7

Permissible operating pressures in bar (including allowable a safety factor of 1.25)

Permissible working. Pressure and temperature for PPR-CT

Temperature	Operating Time [years]	SDR 11 PPR-CT	SDR 9 PPR-CT	SDR 7.4 PPR-CT	SDR 6 PPR-CT
20°C	10	15.8	19.9	25.1	31.6
	25	15.5	19.6	24.6	31
	50	15.3	19.3	24.3	30.6
30°C	10	13.6	17.2	21.7	27.3
	25	13.4	16.9	21.2	26.8
	50	13.2	16.6	20.9	26.4
40°C	10	11.7	14.7	18.6	23.4
	25	11.5	14.4	18.2	22.9
	50	11.3	14.2	17.9	22.6
60°C	10	8.4	10.6	13.4	16.8
	25	8.2	10.4	13.1	16.5
	50	8.1	10.2	12.8	16.2
70°C	10	7	8.9	11.2	14.1
	25	6.9	8.7	10.9	13.8
	50	6.8	8.5	10.7	13.5
80°C	10	5.9	7.4	9.3	11.7
	25	5.7	7.2	9.1	11.4
95°C	5	4.4	5.6	7.1	8.9

Permissible operating pressures in bar (including a safety factor of 1.5)

7. UV Protection

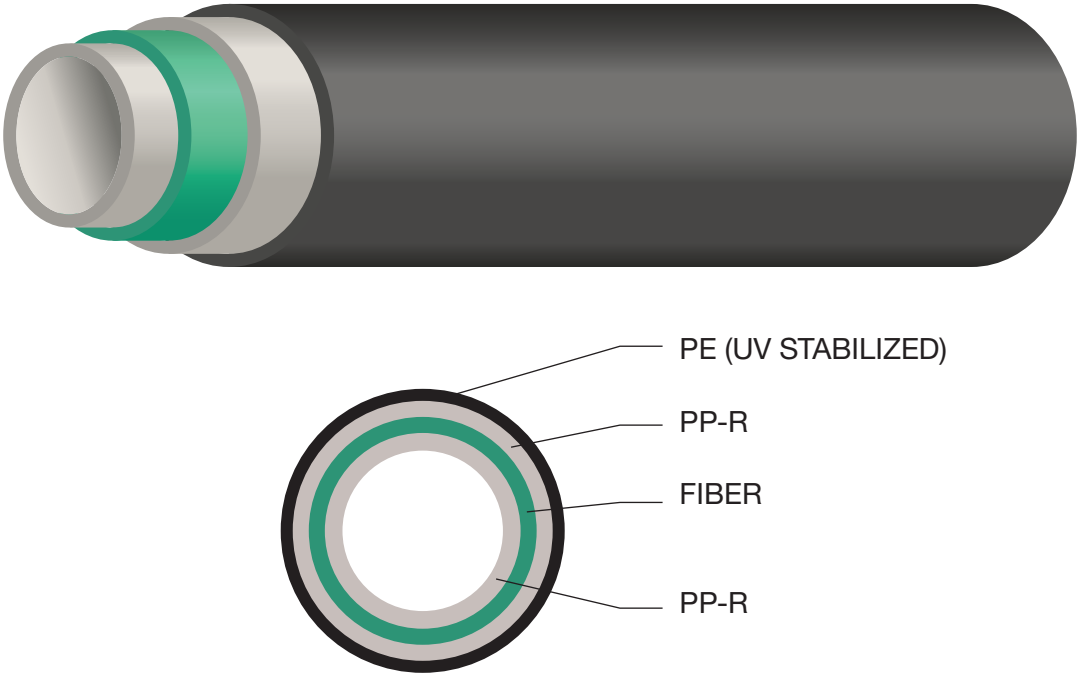
PPR & PPR- CT pipes and fittings are designed for indoor use. They are not stabilized for direct Ultraviolet (UV) exposure. Over Time, UV exposure causes degradation, resulting in decreases in the pipe's physical and chemical properties and long-term performance. If the pipes are to be used outdoors, they should be buried or encased in a protective wrap coating or treated described below.
Ultraviolet radiation is an electromagnetic radiation presents in sunlight. So, when PPR pipes are exposed to sunlight for a long period it would affect the pipes by changing its color and chalk its surface.

A UV stabilizer added into the resin as a shield to UV radiation to protect the product from a long term UV radiation exposure; these multilayer pipes are developed with an external Polyethylene UV-stabilized layer to protect the pipes from damage.

This method is applicable for full range of pipes sizes and nominal pressures so it can be used for outdoor application.

The resistance of the BORplus UV system against UV-radiation was tested by an accredited test laboratory. In planned intervals during the complete process, samples were taken in order to check possible mechanical changes based on a tensile test and it is approved for the contact with potable water and is the best choice for boiler connection on the top to the tapping points – outdoor and indoor.

It can be used as an ideal distribution system for Hot & Cold Water in residential and commercial buildings as well as for irrigation systems.



III. Assembly

1. Connection technique

In general, BORplus pipes and fittings are connected using the poly fusion welding technique at 260 - 280°C. This technique guarantees permanent fusion of the fitting and piping material, producing a uniform weld. As a result, the connection has even greater strength than the pipe itself.

Alternatively it is possible to use fittings with nickel-coated fused
brass elements with male or female threads, or flanged sleeves. With these techniques, polypropylene systems can be connected to any other material used in installation technologies.

2. Installation guide

1. Pipes should be cut down to required length, at 90^0 to the axis, using appropriate tools (pipe shears or cutters).

2. Before welding, pipes and fittings must be cleaned (to remove dust, grease, etc.) and dried.

3. Mark the required depth of pipe insertion into the fitting (for a given outer pipe diameter - see the table).

4. Before welding any stabilized PP pipes, a layer of aluminium with the outer plastic coating must be removed along the entire depth of the weld. To remove the aluminium coat, use a special coarse file with the diameter that fits pipe dimensions.

5. Simultaneously insert the pipe end and slide the fitting over corresponding heating tips of the welder (heated up to 260 - 280^0 C earlier) Keep the required heating time - see heating time values for different system dimensions.

6. After heating, remove both elements from heating tips and push the pipe into the fitting flange up to the depth marked earlier. The welding time depends on the outer diameter of the pipe. Good welds should have a double, uniform fin of material pushed out to the surface, along the circumference connected elements.

7. It is recommended to keep the connection fixed for the next 10 - 20 seconds, allowing the weld to cool down partially and achieve the initial strength. It is now possible to make other connections of the system. Full load of the weld is allowed only when the connection has cooled down completely.

3. Welding process parameters

Pipe diameter [mm]	Welding depth [mm]	Heating time* [s]	Welding time [s]	Cooling time [mm]
20	14	5 (3)	4	2
25	15	7 (4)	4	2
32	16	8 (4)	6	4
40	18	12 (6)	6	4
50	20	18 (9)	6	4
63	24	24 (12)	8	6
75	26	30 (15)	10	8
90	29	40 (20)	10	8
110	32.5	50 (25)	10	8

Note:
Values presented in the table refer to PN 16, PN 20 pipes and stabilized pipes.
· Heating time values in barckets refer to PN 10 pipes.
· With the outside temperature below +5°C, the heating time should be increased by 50%.

4. Pipe connection

Distances between (sliding) supports are given in cm for horizontal pipes made of:

polypropylene pipes (homogenous)

Pipe outside diameter [mm]	Temperature of flowing water [°C]					
	20	30	40	50	60	70
20	80	75	70	70	65	60
25	85	85	85	80	75	70
32	100	95	95	90	85	75
40	110	110	105	100	95	85
50	125	120	115	110	105	90
63	140	135	130	125	120	105
75	155	150	145	135	130	115
90	170	165	160	155	150	145
110	190	185	180	175	160	155

polypropylene pipes (stabilized)

Pipe outside diameter [mm]	Temperature of flowing water [°C]					
	20	30	40	50	60	70
20	135	125	120	120	110	100
25	145	145	145	135	125	120
32	170	160	160	150	145	125
40	185	185	180	170	160	145
50	210	205	200	185	180	150
63	235	230	220	210	200	180
75	250	245	235	225	210	190
90	265	260	250	240	230	210
110	270	265	255	245	235	215

IV. Guarantee

Wavin-Metalplast-Buk Sp. z o.o. guarantees trouble-free operation of the BOR^plus installation system for the period of 10 years after the date of purchase of products covered by the guarantee, regardless of the date when the system is put into operation.

This guarantee covers all elements of the BOR^plus installation system manufactured or supplied by Wavin (excluding assembly tools). Any compensation is guaranteed only on condition that all principles of assembly, design, and operation have been complied with, as per Wavin's recemmendations or generally accepted principles of construction technology.

If any other products (pipes or fittings) are used in the assembly instead of BOR^plus installation products supplied by Wavin, this guarantee shall be null and void.

Any other types of damage (such as mechanical system damage, frost damage, etc.) or assembly-related errors and faults are not covered by this guarantee.

If any defects are identified, Wavin hereby reserves the right to test the defective system on-site within 7 days after any defect is identified, before any corrective action is taken. In addition, the user should present the receipt of purchase of products covered by this guarantee when any defect is reported. Defects shall be reported to and the said receipt shall be presented at the point of sale where products covered by this guarantee were purchased. Failure to do so relieves Wavin of any and all liability under this guarantee.

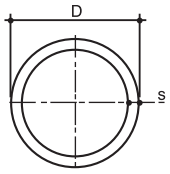
This guarantee covers the return of costs incurred by any third person to make good or disassemble defective products as well as to assemble, supply, and re-install defect-free products.

This guarantee does not cover any lost oppertunity compensation, in particular related to downtimes, business interruptions, reduced value, or any other consequential damage. Any further claims shall be excluded.

Wavin hereby reserves the right to contract any third-party specialist companies to carry out any repairs of the system, at Wavin's discretion.

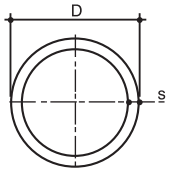
Any period of repair shall not extend the total guarantee period.

Pipes



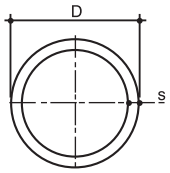
PN 10 pipe, 4 m long (UV Protection availabe)

product code	former product code	D [mm]	s [mm]	unit of measure
3045030100	9503010	20	1,9	m
3045030130	9503013	25	2,3	m
3045030160	9503016	32	2,9	m
3045030190	9503019	40	3,7	m
3045030220	9503022	50	4,6	m
3045030250	9503025	63	5,8	m
3045030280	9503028	75	6,8	m
3045030310	9503031	90	8,2	m
3045030340	9503034	110	10,0	m



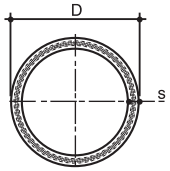
PN 16 pipe, 4 m long (UV Protection availabe)

product code	former product code	D [mm]	s [mm]	unit of measure
3045025100	9502510	20	2,8	m
3045025130	9502513	25	3,5	m
3045025160	9502516	32	4,4	m
3045025190	9502519	40	5,5	m
3045025220	9502522	50	6,9	m
3045025250	9502525	63	8,6	m
3045025280	9502528	75	10,3	m
3045025310	9502531	90	12,3	m
3045025340	9502534	110	15,1	m



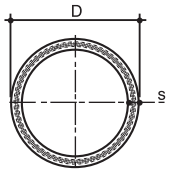
PN 20 pipe, 4 m long (UV Protection availabe)

product code	former product code	D [mm]	s [mm]	unit of measure
3045040100	95 020 10	20	3.4	m
3045040130	95 020 13	25	4.2	m
3045040160	95 020 16	32	5.4	m
3045040190	95 020 19	40	6.7	m
3045040220	95 020 22	50	8.3	m
3045040250	95 020 25	63	10.5	m
3045040280	95 020 28	75	12.5	m
3045040310	95 020 31	90	15	m
3045040340	95 020 34	110	18.4	m
3045040370	95 020 37	125	20.8	m
3045040400	95 025 40	160	26.6	m



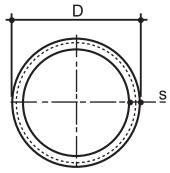
PN 20 Faser pipe, 4 m long (UV Protection availabe)

product code	former product code	D [mm]	s [mm]	unit of measure
3045040100	95 040 10	20	2.8	m
3045040130	95 040 13	25	3.5	m
3045040160	95 040 16	32	4.4	m
3045040190	95 040 19	40	5.5	m
3045040220	95 040 22	50	6.9	m
3045040250	95 040 25	63	8.6	m
3045040280	95 040 28	75	10.3	m
3045040310	95 040 31	90	12.3	m
3045040340	95 040 34	110	15.1	m
3045040360	95 040 36	125	17.1	m
3045040370	95 040 40	160	21.9	m



PN 25 Faser pipe, 4 m long (UV Protection availabe)

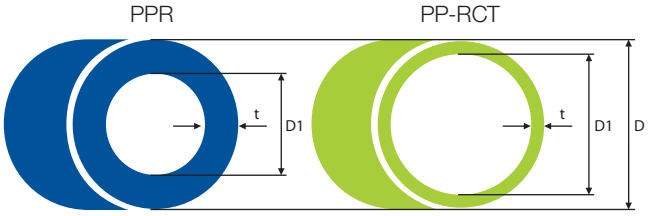
product code	former product code	D [mm]	s [mm]	unit of measure
3055050100	95 060 10	20	3.4	m
3055050130	95 060 13	25	4.2	m
3055050160	95 060 16	32	5.4	m
3055050190	95 060 19	40	6.7	m
3055050220	95 060 22	50	8.4	m
3055050250	95 060 25	63	10.5	m
3055050280	95 060 28	75	12.5	m
3055050310	95 060 31	90	15	m
3055050340	95 060 34	110	18.4	m
3055050360	95 060 36	125	20.8	m
3055050370	95 060 40	160	26.6	m



PN 25 stabilized pipe, 4 m long

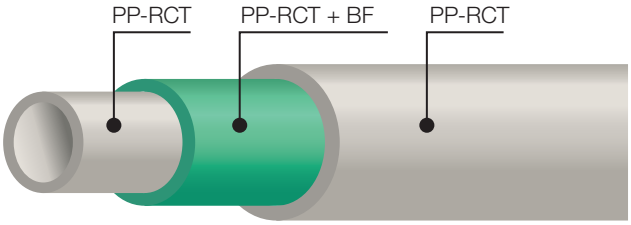
product code	former product code	D [mm]	s [mm]	unit of measure
32450500102	95 050 10	20	3.4	m
32450500132	95 050 13	25	4.2	m
32450500162	95 050 16	32	5.4	m
32450500192	95 050 19	40	6.7	m
32450500222	95 050 22	50	8.4	m
32450500252	95 050 25	63	10.5	m
32450500280	95 050 28	75	12.5	m
32450500310	95 050 31	90	15	m
32450500340	95 050 34	110	18.4	m

Explanatory notes:
t = wall thickness
D = external diameter
D1 = internal diameter



PN20 PPR-CT FIBER

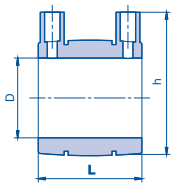
product code	Size [mm]	Thickness [mm]	measure
PPRCT9507010	20	2.8	m
PPRCT9507013	25	3.5	m
PPRCT9507016	32	4.4	m
PPRCT9507019	40	5.5	m
PPRCT9507022	50	6.9	m
PPRCT9507025	63	8.6	m
PPRCT9507028	75	10.3	m
PPRCT9507031	90	12.3	m
PPRCT9507034	110	15.1	m
PPRCT9507036	125	17.1	m
PPRCT9507037	160	21.9	m



PN25 PPR-CT FIBER

product code	Size [mm]	Thickness [mm]	measure
PPRCT9508010	20	3.4	m
PPRCT9508013	25	4.2	m
PPRCT9508016	32	5.4	m
PPRCT9508019	40	6.7	m
PPRCT9508022	50	8.3	m
PPRCT9508025	63	10.5	m
PPRCT9508028	75	12.5	m
PPRCT9508031	90	15	m
PPRCT9508034	110	18.3	m
PPRCT9508036	125	20.8	m
PPRCT9508037	160	26.6	m

Electro Fusion Socket



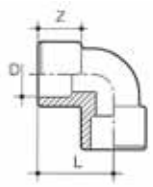
Electro Fusion Socket

product code	former product code	D [mm]	L [mm]	H [mm]	unit of measure
3047701800	77 018 00	20	26.5	55.0	szt.
3047701802	77 018 02	25	26.5	55.0	szt.
3047701804	77 018 04	32	25.0	52.0	szt.
3047701806	77 018 06	40	25.0	52.0	szt.
3047701808	77 018 08	50	25.0	52.0	szt.
3047701810	77 018 10	63	30.0	63.0	szt.
3047701812	77 018 12	75	33.0	70.0	szt.
3047701814	77 018 14	90	36.0	75.0	szt.
3047701816	77 018 16	110	40.0	87.0	szt.

Plastic Union

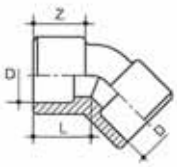
product code	former product code	D [mm]	L [mm]	L1 [mm]	L2 [mm]	L3 [mm]	D1 [mm]	unit of measure
3045824010	9584010	20	39	19	23	25	28	szt.
3045824113	9584113	25	52	22	27	29	34	szt.
3045824316	9584316	32	61	24	30	36	41	szt.
3045824419	9584419	40	76	26	37	43	53	szt.
3045824521	9584521	50	86	35	43	49	66	szt.
3045824624	9584624	63	97	40	50	55	81	szt.

Elbows



Elbow 90°

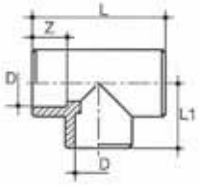
product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045140100	95 140 10	20	19	26	szt.
3045140130	95 140 13	25	21	30	szt.
3045140160	95 140 16	32	24	35	szt.
3045140190	95 140 19	40	29	42	szt.
3045140220	95 140 22	50	34	50	szt.
3045140250	95 140 25	63	40	60	szt.
3045140280	95 140 28	75	46	70	szt.
3045140310	95 140 31	90	50	86	szt.
3045140340	95 140 34	110	56	105	szt.
3045140370	95 140 37	125	61	103	szt.
3045140400	95 140 40	160	61	111	szt.



Elbow 45°

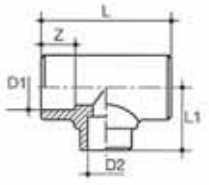
product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045146100	95 146 10	20	15	16	szt.
3045146130	95 146 13	25	16	18	szt.
3045146160	95 146 16	32	18	20	szt.
3045146190	95 146 19	40	21	23	szt.
3045146220	95 146 22	50	24	26	szt.
3045146250	95 146 25	63	28	31	szt.
3045146280	95 146 28	75	31	35	szt.
3045146290	95 146 29	90	36	35	szt.
3045146300	95 146 30	110	39	38	szt.
3045146370	95 146 37	125	41	40	szt.
3045146400	95 146 40	160	52	50	szt.

Tees



Tee

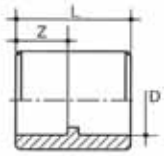
product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045155100	95 155 10	20	15	54	27	szt.
3045155130	95 155 13	25	19	63	32	szt.
3045155160	95 155 16	32	25	76	38	szt.
3045155190	95 155 19	40	31	91	45	szt.
3045155220	95 155 22	50	39	109	55	szt.
3045155250	95 155 25	63	50	134	67	szt.
3045155280	95 155 28	75	59	156	78	szt.
3045155310	95 155 31	90	72	179	89	szt.
3045155340	95 155 34	110	98	210	105	szt.
3045155370	95 155 37	125	43	209	103	szt.
3045155400	95 155 40	160	109	218	113	szt.



Reducer tee at branching

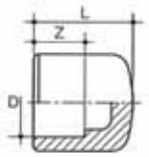
product code	former product code	D1 [mm]	D2 [mm]	D1 [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045159130	95 159 13	25	20	25	16	63	30	szt.
3045159160	95 159 16	32	20	32	18	68	34	szt.
3045150160	95 160 16	32	25	32	18	76	36	szt.
3045159190	95 159 19	40	20	40	21	81	29	szt.
3045150190	95 160 19	40	25	40	21	81	41	szt.
3045161190	95 161 19	40	32	40	21	91	43	szt.
3045159220	95 159 22	50	20	50	25	89	43	szt.
3045160220	95 160 22	50	25	50	24	97	47	szt.
3045161220	95 161 22	50	32	50	24	97	49	szt.
3045162220	95 162 22	50	40	50	28	28	109	szt.
3045161250	95 161 25	63	32	63	28	119	58	szt.
3045162250	95 162 25	63	40	63	28	119	60	szt.
3045163250	95 163 25	63	50	63	28	134	63	szt.
3045162280	95 162 28	75	40	75	31	139	68	szt.
3045163280	95 163 28	75	50	75	31	139	71	szt.
3045164280	95 164 28	75	63	75	31	156	75	szt.
3045163310	95 163 31	90	50	90	36	140	72	szt.
3045164310	95 164 31	90	63	90	36	148	74	szt.
3045165310	95 165 31	90	75	90	36	160	78	szt.
3045165330	95 165 33	110	63	110	41	152	93	szt.
3045165340	95 165 34	110	75	110	38	156	87	szt.
3045165350	95 165 35	110	90	110	43	178	93	szt.
3045165370	95 165 37	160	90	160	52	193	120	szt.
3045165400	95 165 40	160	110	160	47	207	104	szt.

Coupler



product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045105100	95 105 10	20	15	32	szt.
3045105130	95 105 13	25	16	35	szt.
3045105160	95 105 16	32	18	39	szt.
3045105190	95 105 19	40	21	44	szt.
3045105220	95 105 22	50	24	50	szt.
3045105250	95 105 25	63	28	58	szt.
3045105280	95 105 28	75	31	66	szt.
3045105310	95 105 31	90	36	89	szt.
3045105340	95 105 34	110	42	101	szt.
3045105370	95 105 37	125	47	90	szt.
3045105400	95 105 40	160	51	109	szt.

Pipe cap

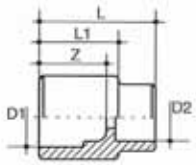


product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045223100	95 223 10	20	15	28	szt.
3045223130	95 223 13	25	16	32	szt.
3045223160	95 223 16	32	18	36	szt.
3045223190	95 223 19	40	21	42	szt.
3045223220	95 223 22	50	24	50	szt.
3045223250	95 223 25	63	28	58	szt.
3045223280	95 223 28	75	31	65	szt.
3145223310	95 223 31	90	37	72	szt.
3145223315	95 223 33	110	41	79	szt.
3145223425	95 223 36	125	43	82	szt.
3145223400	95 223 40	160	45	85	szt.

Bypass

product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045230100	95 230 10	20	22	86	szt.
3045230130	95 230 13	25	27	93	szt.
3045230160	95 230 16	32	34	101	szt.

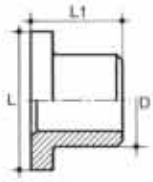
Reducers



Reducers

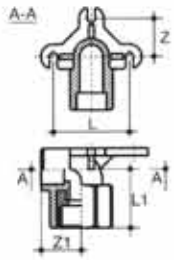
product code	former product code	D1 [mm]	D2 [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045111130	95 111 13	25	20	16	42	29	szt.
3045111160	95 111 16	32	20	18	45	33	szt.
3045112160	95 112 16	32	25	18	46	33	szt.
3045111190	95 111 19	40	20	21	48	39	szt.
3045112190	95 112 19	40	25	21	50	39	szt.
3045113190	95 113 19	40	32	21	52	39	szt.
3045112220	95 112 22	50	25	24	55	46	szt.
3045113220	95 113 22	50	32	24	57	46	szt.
3045114220	95 114 22	50	40	24	59	46	szt.
3045113250	95 113 25	63	32	28	61	52	szt.
3045114250	95 114 25	63	40	28	63	52	szt.
3045115250	95 115 25	63	50	28	66	52	szt.
3045114280	95 114 28	75	40	31	68	58	szt.
3045115280	95 115 28	75	50	31	71	58	szt.
3045116280	95 116 28	75	63	31	75	58	szt.
3045115310	95 115 31	90	50	24	65	30	szt.
3045116310	95 116 31	90	63	28	70	34	szt.
3045117310	95 117 31	90	75	31	74	38	szt.
3045118250	95 118 25	110	50	41	93	54	szt.
3045118270	95 118 27	110	63	38	93	40	szt.
3045118290	95 118 29	110	75	35	90	40	szt.
3045180312	95 118 31	110	90	33	93	42	szt.
3045180352	95 118 35	125	110	47	94	61	szt.
3045180372	95 118 37	160	125	54	102	68	szt.
3045180402	95 118 40	160	110	54	103	73	szt.

Flanged fleeve



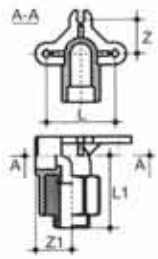
product code	former product code	D [mm]	L [mm]	L1 [mm]	unit of measure
3045238250	9523825	63	95	63	szt.
3045238280	9523828	75	110	71	szt.
3045238312	9523831	90	136	80	szt.
3045238342	9523834	110	169	49	szt.
3045238425	9523842	125	191	52	szt.
3045238385	9523838	160	188	119	szt.

Threaded elements



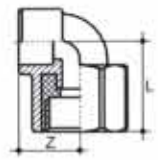
90° elbow with female thread (wall-mounted)

product code	former product code	D [mm]	Z [mm]	Z1 [mm]	L [mm]	L1 [mm]	unit of measure
3045310100	9531010	20x½"	25	26	49	38	szt.
3045310130	9531013	25x½"	25	30	49	41	szt.
3045311100	9531110	20x¾"	28	26	55	40	szt.
3045311130	9531113	25x¾"	28	30	55	42	szt.



90° elbow with male thread (wall-mounted)

product code	former product code	D [mm]	Z [mm]	Z1 [mm]	L [mm]	L1 [mm]	unit of measure
3045330100	9533010	20x½"	25	26	49	52	szt.
3045330130	9533013	25x½"	25	30	49	55	szt.
3045331100	9533110	20x¾"	28	26	55	55	szt.
3045331130	9533113	25x¾"	28	30	55	57	szt.

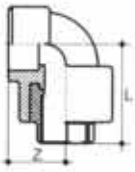


90° elbow with female thread

product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045390100	9539010	20x½"	26	38	szt.
3045390130	9539013	25x½"	30	41	szt.
3045391100	9539110	20x¾"	26	40	szt.
3045391130	9539113	25x¾"	30	42	szt.
3045391160	9539116	32x¾"	32	46	szt.

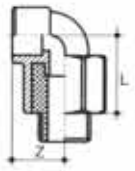
* Metal insert available in DZR & nickle plated brass

Threaded elements continued



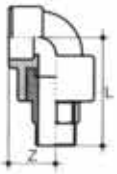
90° elbow with female thread and wrench unit

product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045395160	9539516	32x1"	34	59	szt.



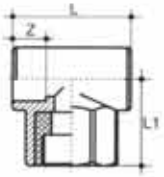
90° elbow with male thread

product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045400100	9540010	20x½"	26	52	szt.
3045400130	9540013	25x½"	30	55	szt.
3045401100	9540110	20x¾"	26	55	szt.
3045401130	9540113	25x¾"	30	57	szt.
3045401160	9540116	32x¾"	32	61	szt.



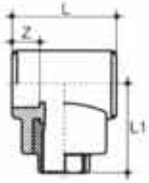
90° elbow with male thread and wrench unit

product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3045405160	9540516	32x1"	34	78	szt.



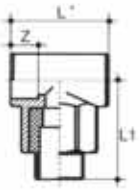
Tee with female thread at branching

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045410100	9541010	20x½"x20	15	51	52	szt.
3045411100	9541110	20x¾"x20	15	51	55	szt.
3045410130	9541013	25x½"x25	16	59	55	szt.
3045411130	9541113	25x¾"x25	16	59	57	szt.
3045411150	9541115	32x½"x32	18	63	43	szt.
3045411160	9541116	32x¾"x32	18	63	59	szt.



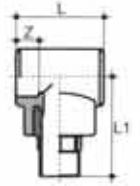
Tee with female thread at branching, with wrench unit

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045415160	9541516	32x1"x32	18	68	78	szt.



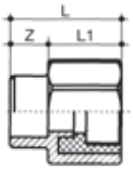
Tee with male thread at branching

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045420100	9542010	20x½"x20	15	51	52	szt.
3045421100	9542110	20x¾"x20	15	51	55	szt.
3045420130	9542013	25x½"x25	16	59	55	szt.
3045421130	9542113	25x¾"x25	16	59	57	szt.
3045421160	9542115	32x½"x32	18	63	61	szt.
3045421160	9542116	32x¾"x32	18	63	59	szt.



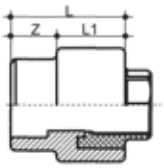
Tee with male thread at branching, with wrench unit

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045425160	9542516	32x1"x32	18	68	78	szt.



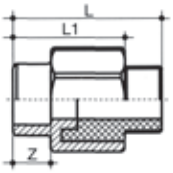
Coupler with female thread

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045350100	9535010	20x½"	15	43	28	szt.
3045350130	9535013	25x½"	16	46	28	szt.
3045351100	9535110	20x¾"	15	46	31	szt.
3045351130	9535113	25x¾"	16	47	31	szt.



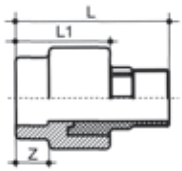
Coupler with female thread and wrench unit

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045362160	9536216	32x1"	18	64	51	szt.
3045363190	9536319	40x1¼"	21	72	57	szt.
3045364220	9536422	50x1½"	24	80	62	szt.
3045365250	9536525	63x2"	28	90	68	szt.
3045366280	9536628	75x2½"	31	98	73	szt.



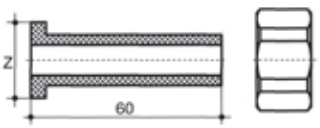
Coupler with male thread

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045370100	9537010	20x½"	15	57	43	szt.
3045370130	9537013	25x½"	16	58	46	szt.
3045371100	9537110	20x¾"	15	61	46	szt.
3045371130	9537113	25x¾"	16	62	47	szt.



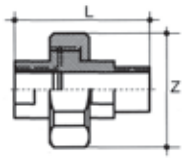
Coupler with male thread and wrench unit

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3045382160	9538216	32x1"	18	83	51	szt.
3045383190	9538319	40x1¼"	21	91	57	szt.
3045384220	9538422	50x1½"	24	102	62	szt.
3045385250	9538525	63x2"	28	114	68	szt.
3045386280	9538628	75x2½"	31	123	73	szt.
3045386310	9538631	90x3"	36	127	84	szt.



Half-union with female thread

product code	former product code	D [mm]	Z [mm]	unit of measure
3045430100	9543010	20x½"	24	szt.
3045431130	9543113	25x¾"	30	szt.
3045433190	9543319	32x1"	34	szt.
3045434210	9543421	40x1¼"	38	szt.
3045435240	9543524	50x1½"	44	szt.
3045436270	9543627	63x2"	52	szt.

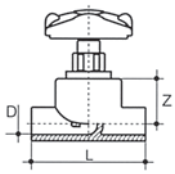


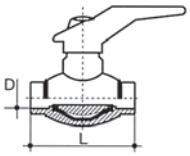
Half-union with male thread

product code	former product code	D [mm]	Z [mm]	unit of measure
3045440100	9544010	20x½"	32	szt.
3045441130	9544113	25x¾"	39	szt.
3045443160	9544316	32x1"	48	szt.
3045444190	9544419	40x1¼"	57	szt.
3045445210	9544521	50x1½"	69	szt.
3045446240	9544624	63x2"	81	szt.

* Metal insert available in DZR & nickle plated brass

Valves





Straight valve

product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3245500100	9550010W	20	28	69	szt.
3245500130	9550013W	25	30	80	szt.
3245500160	9550016W	32	39	89	szt.
3245500190	9550019W	40	41	112	szt.
3245500220	9550022W	50	48	136	szt.
3245500250	9550025W	63	60	162	szt.

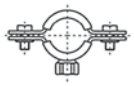
Ball valve

product code	former product code	D [mm]	L [mm]	unit of measure
3245515100	9551510W	20	60	szt.
3245515130	9551513W	25	65	szt.
3245515160	9551516W	32	71	szt.
3245515190	9551519W	40	85	szt.
3245515220	9551522W	50	100	szt.
3245515250	9551525W	63	115	szt.

Concealed valve with chromium

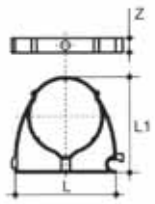
20 mm	95 600 10	pcs.	5
25 mm	95 600 13	pcs.	5
32 mm	95 600 16	pcs.	5

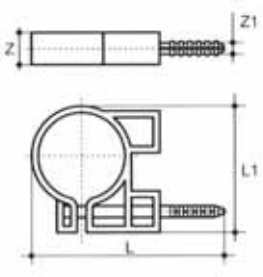
Steel Clamp with rubber insert



product code	former product code	D [mm]	unit of measure
3145803100	9580310	20	szt.
3145803130	9580313	25	szt.
3145803160	9580316	32	szt.
3145803190	9580319	40	szt.
3145803220	9580322	50	szt.
3145803250	9580325	63	szt.
3145803280	9580328	75	szt.
3145803310	9580331	90	szt.
3145803340	9580334	110	szt.
3145803360	9580336	160	szt.

Support clamps





Plastic clamps

product code	former product code	D [mm]	Z [mm]	L [mm]	L1 [mm]	unit of measure
3145800100	9580010	20	14	46	38	szt.
3145800130	9580013	25	14	51	45	szt.
3145800160	9580016	32	14	57	50	szt.
3145800190	9580019	40	14	70	63	szt.
3145800220	9580022	50	14	80	72	szt.
3145800250	9580025	63	14	96	87	szt.
3145800280	9580028	75	15	105	100	szt.
3145800310	9580031	90	15	128	121	szt.

Plastic clamps with a wall plug

product code	former product code	D [mm]	Z [mm]	Z1 [mm]	L [mm]	L1 [mm]	unit of measure
3145805100	9580510	20	14	8	64	38	szt.
3145806130	9580513	25	18	10	75	44	szt.
3145805160	9580516	32	17	10	92	53	szt.
3145805190	9580519	40	17	10	101	60	szt.
3145805220	9580522	50	19	12	110	70	szt.
3145805250	9580525	63	23	12	87	88	szt.

Plugs

Pressure test plug (blue)

product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3145955010	9595501	½"	32	62	szt.
3145955020	9595502	¾"	39	91	szt.

Pressure test plug (red)

product code	former product code	D [mm]	Z [mm]	L [mm]	unit of measure
3145955030	9595503	½"	32	62	szt.
3145955040	9595504	¾"	39	91	szt.

Pipe cutter

product code	former product code	D [mm]	unit of measure
3145815040	9581540	20-40	szt.
3145815750	9581575	40-63	szt.
3145815860	9581586	75-110	szt.

Welders

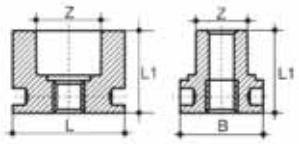
Welding Machine

product code	former product code	D [mm]	unit of measure
3145825740	9582575	20-63	szt.
3145825760	9582576	75-110	szt.
3145825780	9582578	125	szt.
3145825790	9582579	160	szt.

Electro Fusion Welding Machine

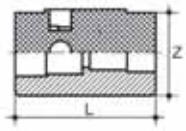
product code	former product code	D [mm]	unit of measure
3145835800	9583580	20-110	szt.

Heating tip



product code	former product code	D [mm]	unit of measure
3145935100	9593510	20	szt.
3145935130	9593513	25	szt.
3145935160	9593516	32	szt.
3145935190	9593519	40	szt.
3145935220	9593522	50	szt.
3145935250	9593525	63	szt.
3145935280	9593528	75	szt.
3145935310	9593531	90	szt.
3145935340	9593534	110	szt.
3145935360	9593536	160	szt.

Coarse file for stabilised pipes



product code	former product code	D [mm]	unit of measure
3145932063	9592063	20-63	szt.
3145937510	9597510	75-110	szt.
3145931250	9591250	125	szt.
3145931600	9591600	160	szt.

for home

Installation system BORplus

Product description

“WAVIN for home” sanitary and heating installation system

Our goal is to provide our individual and institutional investors with top-quality building installation and heating systems. Based on many years of experience, access to cutting-edge technologies, innovative solutions, and focus on customer needs, we are able to offer the following range of reliable products:

- PVC soil & waste system and Wavin AS low-noise sanitary system,
- sanitary and heating installation systems: BORplus,
- Wavin QuickStream syphonic roof drainage system,
- Kanion gutter systems,
- around the house drainage,
- linear drainage system,
- individual sewer treatment system.

All Wavin products come with complete catalogue documentation and support of our technical experts.