PoliMarky®
since 1984

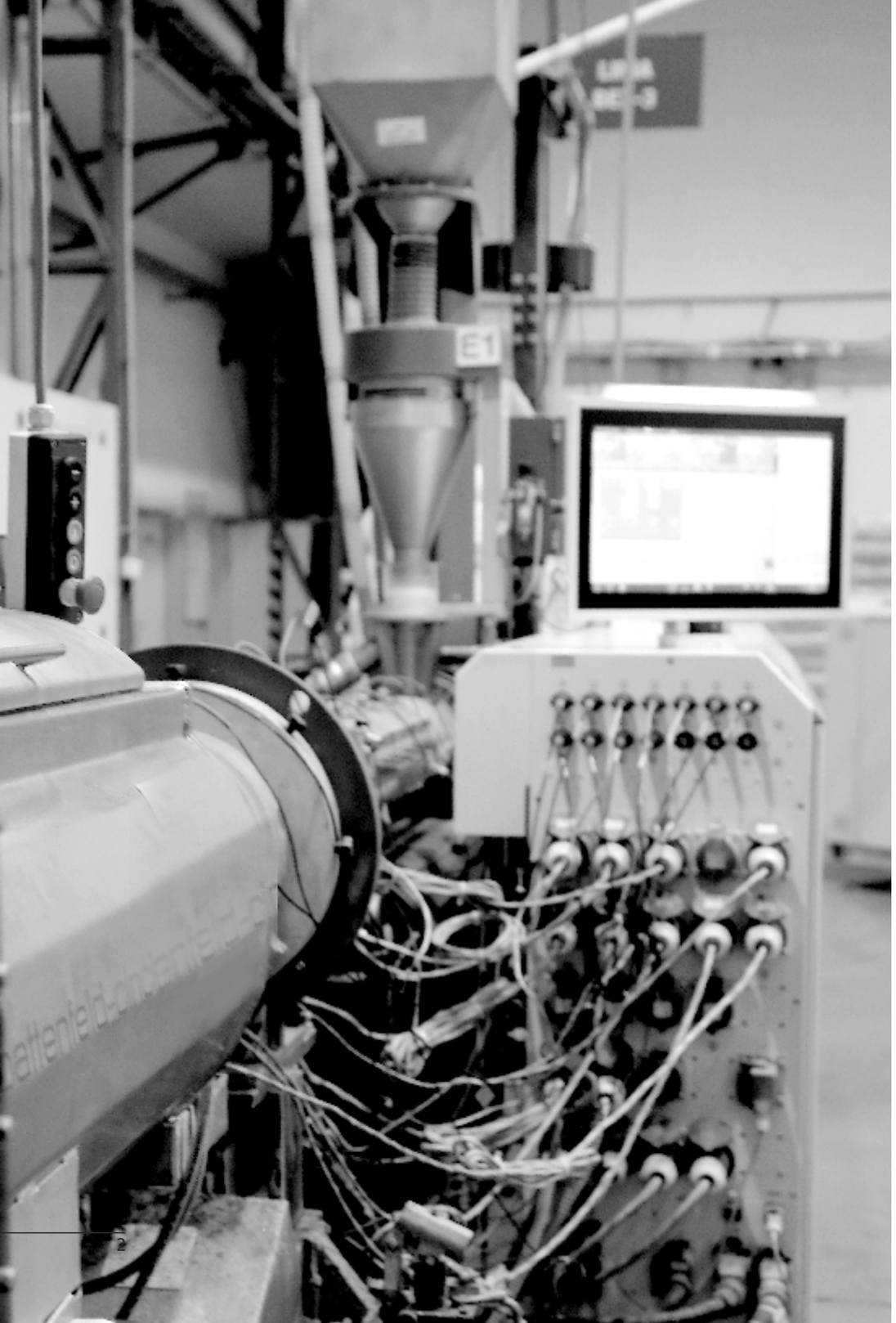
Fundusze Europejskie Polska Wschodnia

Rzeczpospolita Polska

PARP Grupa PFR

Unia Europejska Europejski Fundusz Rozwoju Regionalnego

installation systems



New

LONG GLASS-FIBRE STABILISED SANDWICH TUBES PP-R/PP-LFT/PP-R*

Application

- hot and cold water installations
- heating systems

Advantages

- 5% higher failure strength against internal pressure and 10% higher mechanical strength
- reduction of the thermal expansion coefficient from 0.062 mm/(m*K) to 0.039 mm/(m*K)
- reduction in installation costs through a reduction in the amount of tube section compensation (due to a reduction in the coefficient of linear expansion of the pipe), which translates into a reduction in potential sources of leakage
- reduced assembly time by using fewer supports due to the increased rigidity of the tube

* planned implementation Q1 2021

NEW

TUBES WITH HALOGEN-FREE FLAME RETARDANT BLENDS PP-HFFR/PP-GF/PP-RCT **

Application

- installations for high-temperature central heating with the possibility of potable water transfer

Advantages

- higher fire resistance class
- in contact with fire, self-extinguishing product, no toxic chemical release
- does not contain heavy metals, which will increase the safety of persons in the fire area
- no dripping of hot material during a fire propagating the flame along the installation route

**scheduled for implementation Q3 2021

POLIMARKY is a Polish family-owned company which has been on the market for over 37 years. From the very beginning, the company has focused on high-tech solutions for modified plastics for boring and injection moulding.
It is also a manufacturer of installation systems for the construction of internal water supply, high-temperature heating and surface heating systems in single- and multi-family buildings or industrial facilities.

The broad product portfolio is created in a production facility equipped with state-of-the-art machinery and a Research and Development Department. One of the pillars defining the directions of development and research is the idea of "smart compounding", which makes it possible to supply the market with products of high, stable quality.

Headquarters of the company Polimarky Rzeszów

Branch of the company Polimarky Zaczernie


PoliMarKy®
PP-HFFR/PP-GF/PP-RCT
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PoliMarKy®
PP-R/PP-LFT/PP-R
PoliMarKy®
PP-R S-25

Polimarky installation systems are used for the construction of heating, cold and hot water installations in housing, public utility and industrial buildings, both in new investments and modernised facilities. Manufactured on the basis of PP-3; PP-4 and PE material. The systems have been used in Poland and around the world for many years, which means that they can now be counted among the group of well-known and proven systems. The high quality of the technological process and the special properties of polypropylene guarantee high service life, guaranteed for life (min. 50 years), combined with very good resistance to chemical compounds.

An additional advantage is the low thermal conductivity compared to traditional installations, which has a very significant impact on the economic aspect of using hot water and central heating installations.

The hygienic properties of polypropylene tubes and fittings are also important, so that the quality parameters of potable water are not compromised by the flow of overgrown and corroded tubes inside the building.

APPLICATION

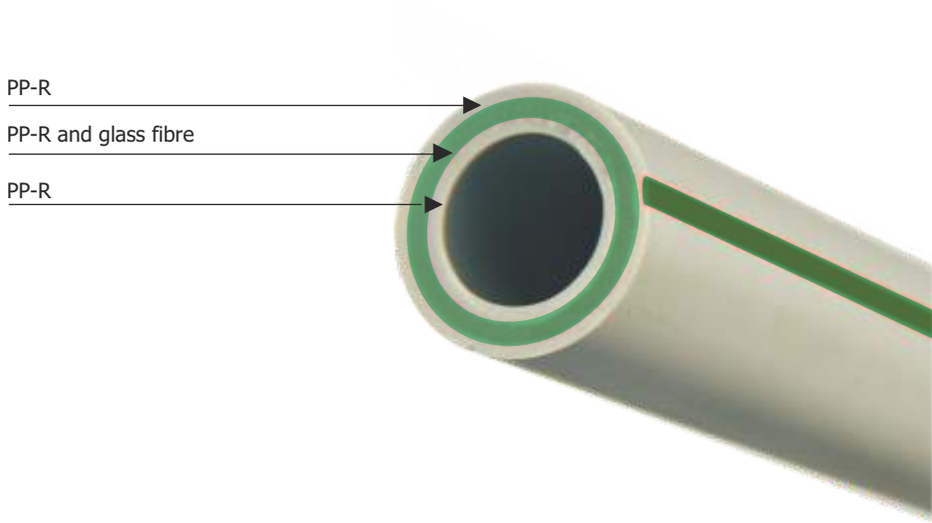
The Polimarky system is designed for both new installations and renovation of existing installations for:

- water (hot and cold domestic water),
- heating systems (radiator and surface heating),
- refrigeration (chilled water),
- in all types of residential buildings (single and multi-family) and public buildings, industrial facilities.

Thanks to its very good chemical resistance, the system can also be used in:

- industry (compressed air systems, various types of industrial gas systems),
- process pipelines,
- agriculture and horticulture

CROSS-SECTION OF A SANDWICH TUBE



SYSTEM ADVANTAGES:

- high service life — more than 50 years,
- reliable and fast assembly — welding ensures absolute tightness of joints,
- low noise — does not transmit vibrations and absorbs sounds,
- low linear resistance coefficient (k = 0.008) — no tube overgrowth,
- low thermal conductivity coefficient (0.22 W/m*K) — limited heat loss,
- hygienic (inert to water),
- resistance to a wide range of chemical compounds

RESISTANCE TO CHEMICAL CORROSION

Type 3 polypropylene is chemically resistant to most chemicals, both organic and inorganic. Restrictions on the use of this material relate to strongly oxidising substances such as concentrated sulphuric acid, nitric acid, chlorine, bromine and derivatives. Ultraviolet radiation can have an adverse effect on polypropylene products and therefore components made of this material should be adequately protected by insulation or by applying a protective coating.

This requirement applies only to parts of the installation exposed to direct sunlight for an extended period of time.

BIOLOGICAL PROPERTIES

Type 3 polypropylene is chemically resistant to Polypropylene products which are completely biologically inert. Tubes made of polypropylene are certified by the National Institute of Hygiene for use in installations for the transmission of potable water, which is confirmed by hygienic certificates obtained by Polimarky for the PP-R system.

TUBE SMOOTHNESS

Polypropylene tubes are very smooth compared to normal steel pipes (the absolute roughness coefficient is approximately 0.007 mm). This allows higher flow velocities than in steel pipes.

ACCUMULATION OF ELECTRIC CHARGES

Polypropylene accumulates static electricity on its surface and should not be used to transmit flammable or explosive substances.

TRANSPORT AND STORAGE

PP tubes should be stored horizontally on level, flat ground to avoid bending in stacks, the height of which should not exceed 1.2 m. The storage area should protect PP-R tubes from direct sunlight. They can be stored at various temperatures, but it should be remembered that at low temperatures (around 0°C and below) polypropylene becomes brittle and should be handled with particular care.


PoliMarky
CHG21201232
14.12.20

SYSTEM COMPONENTS

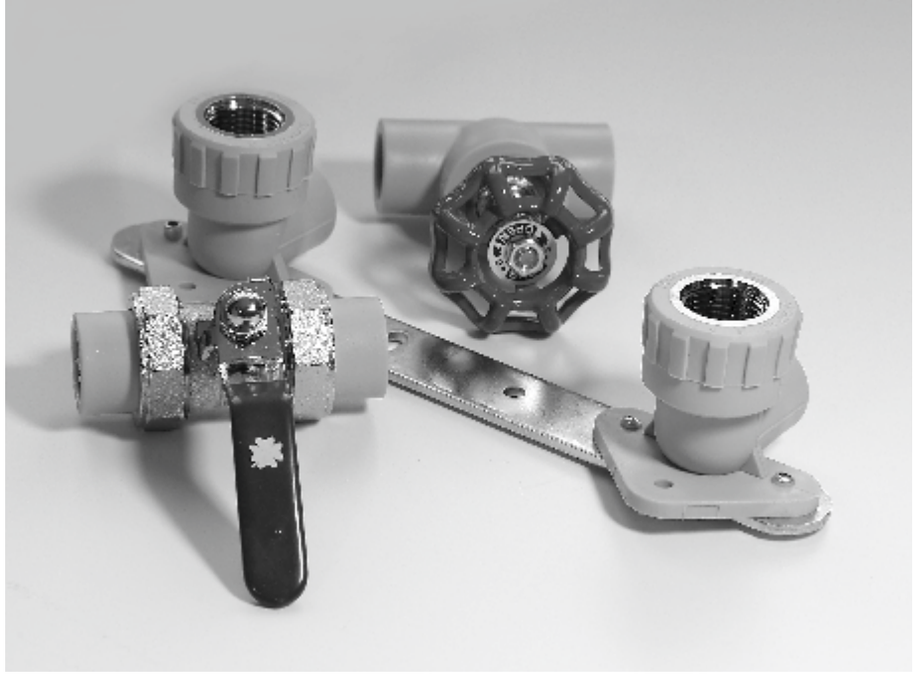
The POLIMARKY system comprises:

- PPR homogeneous SDR 11 (S 5; PN 10) tubes, in the diameter range of 20–110 mm, intended for cold water installations with working temperature up to 20°C and pressure of 10 ba;.
- PPR homogeneous SDR 6 (S 2,5; PN 20) tubes in diameters of 16–110 mm, designed for cold and hot water installations with working temperature up to 60°C and pressure of 10 bar, and central heating installations with working temperature up to 80°C and pressure of 6 bar;
- PPR homogeneous SDR 6 (S 2,5; PN 20) tubes in rings, in diameters ranging from 12 to 20 mm, intended for cold and hot water installations with the operating temperature up to 60°C and pressure of 10 bar, and central heating installations with the operating temperature up to 80°C and pressure of 6 bar;
- composite long glass-fibre-stabilised PP-R/LFT SDR 6 (S 2.5; PN 20) tubes in diameters of 20–110 mm, designed for cold and hot water as well as central heating installations, low-temperature with a working temperature of 60°C and pressure of 6 bar, the pressure for class 4 applications is 10 bar, 6 bar is for high-temperature heating;
- composite PP-R/GF tubes stabilised with glass fibre SDR 7.4 (S 3.2; PN 16) in diameters of 20–110 mm, intended for cold and hot water as well as central heating installations, low-temperature with a working temperature of 60°C and pressure of 6 bar, the pressure for class 4 applications is 10 bar, 6 bar is for high-temperature heating;
- composite HFFR-RCT/GF tubes — stabilised with glass fibre SDR 6 (S 2,5; PN 20) in diameters of 20–40 mm — hot water and central heating systems with working temperature of 80°C and pressure of 10 bar, used in wooden Scandinavian and Canadian type houses, frame construction, holiday houses, where the use of the above-mentioned tubes is to reduce the flammability class of the wooden building and increase the safety of people in the event of fire. Flame retardancy of these tubes will ensure that no harmful substances are released on contact with fire. The tubes have been provided with a flame retardant layer, which gives them additional properties, while also fulfilling the application of PP-R/RCT tubes;
- PE-RT tubes with and without EVOH barrier in diameters 10–32 mm, designed for surface heating;
- PP-R fittings in the diameter range 16–110 mm;
- RCT fittings in the diameter range 20– 40 mm;
- additional accessories and installation tools

PHYSICAL AND MECHANICAL PROPERTIES OF POLYPROPYLENE AND POLYETHYLENE

property	measurement method	unit	PP-R	PP-R/GF	PP-RCT/GF	PE-RT
modulus of elasticity	ISO 527-1	MPa	900	1500	1650	650
density	ISO1183	kg/m^3	900-910	935-945	940-950	935-945
melt mass flow index MFR (PPR, PP-R/GF, PP-RCT/GF: 230˚C/2,16 kg, PE-RT:190˚C/5 kg)	PN-EN ISO 1133		0,3	0,3	0,3	2
a yield strength	ISO 527-1, -2	MPa	27	32	34	17
elongation at yield point	ISO 527-1, -2	%	12	11	10	40
stress at break	ISO 527-1, -2	MPa	32	22	22	20
elongation at break	ISO 527-1, -2	%	200	200	120	500
r Charpy notched impact strength (hammer 2J)	ISO 179 23˚C -30˚C	kJ/m^2	30 2,2	25 3,2	20	no break 40
Vicat softening temperature A50 (50°C /h1ON)	ISO 306	˚C	130	135	135	124
bending stress	ISO 178	MPa	54	62	66	47

All information regarding the physical properties of our products has been provided to the best of our knowledge.



In installations made of polypropylene, we are dealing with relatively high duct elongations. This phenomenon does not usually occur in traditional installations. The problem of expansion must be solved already at the design stage by determining the necessary compensations.

If the operating temperature of the system is higher than the ambient temperature at the time of installation, the duct is elongated; if the operating temperature of the system is lower than the ambient temperature at the time of installation, the duct is shortened.

Linear elongations should be compensated for by appropriate duct routing or the use of compensators.

When installing hot-water and central heating tubes on the surface and in shafts, changes in tube length caused by thermal expansion of the material must be taken into account.

Prevent the effects of these extensions through compensatory solutions. In the case of insulating tubes in a wall cavity, thermal insulation carried out in accordance with current regulations leaves the tube sufficient freedom to operate (tube elongations placed directly in the floor in concrete) and tube connections (polyfusion welded) can be poured rigidly into the concrete screed without the use of a covering layer.

In this case the concrete layer surrounding the tube does not allow for thermal expansion, the tube takes up all the stresses (they will be less than the critical values). For strength reasons the concrete layer above the tube should be at least 4 cm thick.

All information regarding the physical properties of our products has been provided to the best of our knowledge.

Linear elongation of PPR ducts as a function of temperature difference

Tube section length [m]	INCREASE IN DUCT LENGTH [mm] Temperature difference Δt [°C]							
	10	20	30	40	50	60	70	80
1	1,16	2,32	3,48	4,64	5,80	6,96	8,12	9,28
2	2,32	4,64	6,96	9,28	11,60	13,92	16,24	18,56
3	3,48	6,96	10,44	13,92	17,40	20,98	24,36	27,84
4	4,64	9,28	13,92	18,56	23,20	27,84	32,48	37,12
5	5,80	11,60	17,40	23,20	29,00	34,80	40,60	46,40
6	6,96	13,92	20,88	27,84	34,80	41,76	48,72	55,68
7	8,12	16,24	24,36	32,48	40,60	48,72	56,84	64,96
8	9,28	18,56	27,84	37,12	46,40	55,68	64,96	74,24
9	10,44	20,88	31,32	41,46	52,20	62,64	73,08	83,52
10	11,60	23,20	34,80	46,40	58,00	69,60	81,20	92,80

Linear elongation of PP-RCT/GF tubes as a function of temperature difference

Tube section length [m]	INCREASE IN DUCT LENGTH [mm] Temperature difference Δt [°C]							
	10	20	30	40	50	60	70	80
1	0,62	1,25	1,87	2,50	3,12	3,74	4,37	4,99
2	1,25	2,50	3,74	4,99	6,24	7,49	8,74	9,98
3	1,87	3,74	5,62	7,49	9,36	11,23	13,10	14,98
4	2,50	4,99	7,49	9,98	12,48	14,98	17,47	19,97
5	3,12	6,24	9,36	12,48	15,60	18,72	21,84	24,96
6	3,74	7,49	11,23	14,98	18,72	22,46	26,21	29,95
7	4,37	8,74	13,10	17,47	21,84	26,21	30,58	34,94
8	4,99	9,98	14,98	19,97	24,96	29,95	34,94	39,94
9	5,62	11,23	16,85	22,46	28,08	33,70	39,31	44,93
10	6,27	12,48	18,72	24,95	31,20	37,44	43,68	49,92

Linear elongation of PP-R/GF tubes as a function of temperature difference

Tube section length [m]	INCREASE IN DUCT LENGTH [mm] Temperature difference Δt [°C]							
	10	20	30	40	50	60	70	80
1	0,98	1,95	2,93	3,91	4,89	5,86	6,84	7,82
2	1,95	3,91	5,86	7,82	9,77	11,72	13,68	15,63
3	2,93	5,86	8,79	11,72	14,66	17,59	20,52	23,45
4	3,91	7,82	11,72	15,63	19,58	23,45	27,36	31,26
5	4,89	9,77	14,66	19,54	24,43	29,31	37,20	39,06
6	5,86	11,72	17,59	23,45	29,31	35,17	41,03	46,90
7	6,84	13,68	20,52	27,36	34,20	41,03	47,87	54,71
8	7,82	15,63	23,45	31,26	39,08	46,90	54,71	62,53
9	8,79	17,59	26,38	35,17	43,97	52,76	61,55	70,34
10	9,77	19,54	29,31	39,08	48,85	58,62	68,39	78,16

COMPOSITE STABILISED PP-R/GF TUBES

Tubes stabilised with a glass fibre reinforced layer of the PPR polypropylene random copolymer system are intended for cold and hot water and central heating installations.
They can also be used in air conditioning and compressed air systems. Tubes are fibreglass stabilised and produced in diameters ranging from 20
mm to 110 mm in the dimension series SDR 7.4 (S 3.2; PN 16) and SDR 6 (S 2.5; PN 20).
Composite-multilayer tubes consist of three concentrically arranged layers:
- the outer layer and the inner wall of the tube are made of homogeneous plastic — PPR polypropylene random copolymer.
- the middle-reinforced layer is a mixture of PPR polypropylene random copolymer and glass fibre.

Operating parameters of tubes in specific installations taking into account temperature distributions and operation
Times over the 50-year lifetime of the installation are shown in the table.

Operating parameters of stabilised tubes made of PP-R/GF in installations

Application classes/ type of installation	Max. system operating pressure Poper [bar]	Operation temperature toper [°C]	Operation time toper [years]	Max.temp. toper [°C]	Operation time toper [years]	Permissible failure temp. t_a/2 [°C]	Permissible operation temp. t_a [h]
Cold water installation	10	20 /1	50	-	-	-	-
Application class 1/3 (domestic hot water installation)	10	60 /1	49	80	1	95	100
Application class 4/3 (underfloor heating and low temperature radiators)	6	20 40 60 /1	2,5 plus 20 plus 25	70	2,5	100	100
Application class 5/3 (high temperature radiators)	6	20 60 /1 80	14 plus 25 plus 10	90	1	100	100

1. Temperatures taken as design temperatures
2. The emergency temperature refers to periods of plant failure (e.g. control) when the temperature may rise to the above-mentioned temperature in a total operating time of 100 hours during 50 years of operation, while a single continuous emergency operation should not exceed 3 hours.
3. Application classes in accordance with ISO 10508; 1995

All information regarding the physical properties of our products has been provided to the best of our knowledge.

PRESSURE TESTS

All water installations must, in accordance with the Technical Conditions for the Execution and Commissioning of Construction and Installation Works, be pressure-tested before being covered and insulated, the test pressure being 1.5 times the operation pressure.

The material properties of PPR technology lead to tube deformations during the pressure test. This affects the outcome of the test. The high coefficient of linear thermal expansion of POLIMARKY ducts also influences the result. The temperature difference between the tube's environment and the test medium leads to pressure changes. A temperature change of 10°K corresponds to a pressure deviation of 0.5 to 1 bar. For this reason, when pressure-testing installations with POLIMARKY tubes, the temperature of the test medium must remain constant. The pressure test shall be carried out as a preliminary, main and final test.

For the initial test, a test pressure equivalent to 1.5 times the highest possible operation pressure shall be applied. This pressure must be generated twice within a period of 30 minutes, 10 minutes apart. After a further 30 minutes of testing, the pressure must not drop by more than 0.6 bar. There shall be no leakage. The main test shall be carried out immediately after the initial test. The main test time is 2 hours. During this time the test pressure, as read after the initial test, shall not decrease by more than 0.2 bar.

After completion of the preliminary and main test, a final (impulse) test must be carried out. In this test, a pressure of 10 and 1 bar is alternately applied for 4 cycles of at least 5 minutes. Between each test cycle, the tube network is to be left unpressurised. There shall be no leakage at any point of the tested installation.

WARRANTY

POLIMARKY guarantees failure-free operation of the system installation for a period of 10 years from the date of purchase (irrespective of the date of commissioning). Specific warranty conditions
are posted at:
www.polimarky.pl under the installation systems tab

INSTALLATION PRINCIPLES — WELDED CONNECTIONS / SOCKET CONNECTIONS

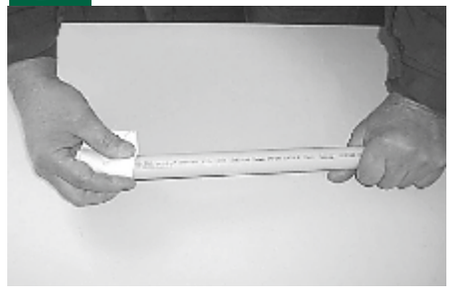
Welded connections and socket connections — such connections consist in simultaneous heating of the ends of ducts (tubes, fittings), bringing them to the required degree of plasticity, and then pressing the end of the pipe into the socket of the fitting. After cooling down the joint, a homogeneous connection is obtained without any additional material. If the joint is properly made, excess plastic is visible around the perimeter of the weld.

Welding of the PP-R system must be carried out at temperatures above +5°C

1. PREPARATION FOR WELDED JOINTS

2. CUTTING

3. CLEANING



4. MARKING

5. MARKING THE MUTUAL POSITIONING OF THE TUBE AND FITTING BEFORE WELDING

6. SET THE TEMPERATURE OF THE WELDING MACHINE TO 260°C.

WELDING PROCESS PARAMETERS

Tube outside diameter [mm]	Welding depth **[mm]	Warm-up time *[s]	Welding time **[s]	Cooling time [s]
16	13	5	4	2
20	14	5 (3)	4	2
25	15	7 (3)	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

* at outdoor temperatures below +50C the heating time should be increased by 50%
** insertion depth of the tube into the fitting

NOTE: The tube must not be inserted too deeply into the fitting as this can lead to narrowing or, in extreme cases, even to the tube becoming blocked. The joint may still be adjusted during this time. Any corrections are only limited to the mutual axial alignment of the tube and fitting within the range of a few degrees. Rotation of elements is not permitted.

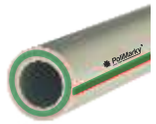
NOTE: The first welding may be carried out five minutes after the welding temperature (i.e. 260°C) has been reached.

7. WELDING AND COOLING

COMPOSITE TUBES

PPR/GF SDR 7,4 (S 3,2; PN 16) TUBES

Diameter	Unit of measure	Quantity per pack	Weight
Ø 20 x 2,8	mb	160	0,15
Ø 25 x 3,5	mb	100	0,24
Ø 32 x 4,4	mb	60	0,39
Ø 40 x 5,5	mb	40	0,62
Ø 50 x 6,9	mb	20	0,85
Ø 63 x 8,6	mb	12	1,48
Ø 75 x 10,3	mb	12	2,40
Ø 90 x 12,3	mb	8	3,41
Ø 110 x 15,1	mb	4	4,40



PPR/LFT SDR 6 (S 2,5; PN 20) TUBES

Diameter	Unit of measure	Quantity per pack	Weight
Ø 20 x 3,4	mb	160	0,18
Ø 25 x 4,2	mb	100	0,28
Ø 32 x 5,4	mb	60	0,45
Ø 40 x 6,7	mb	40	0,69
Ø 50 x 8,3	mb	20	1,02
Ø 63 x 10,5	mb	12	1,78
Ø 75 x 12,5	mb	12	2,88
Ø 90 x 15,0	mb	8	4,09
Ø 110 x 18,3	mb	4	5,28

HFFR-RCT/GF SDR 6 (S 2,5; PN 20) TUBES

Diameter	Unit of measure	Quantity per pack	Weight
Ø 20 x 3,4	mb	160	0,18
Ø 25 x 4,2	mb	100	0,28
Ø 32 x 5,4	mb	60	0,45
Ø 40 x 6,7	mb	40	0,69

PPR TUBES

PP-R SDR 6 (S 2,5; PN 20) TUBE

Diameter	Unit of measure	Quantity per pack	Weight
Ø 16 x 2,7	mb	200	0,11
Ø 20 x 3,4	mb	160	0,17
Ø 25 x 4,2	mb	100	0,27
Ø 32 x 5,4	mb	60	0,43
Ø 40 x 6,7	mb	40	0,67
Ø 50 x 8,3	mb	20	1,05
Ø 63 x 10,5	mb	12	1,65
Ø 75 x 12,5	mb	12	2,34
Ø 90 x 15,0	mb	8	3,36
Ø 110 x 18,3	mb	4	5,05

PP-R SDR 11 (S 5; PN 10) TUBE

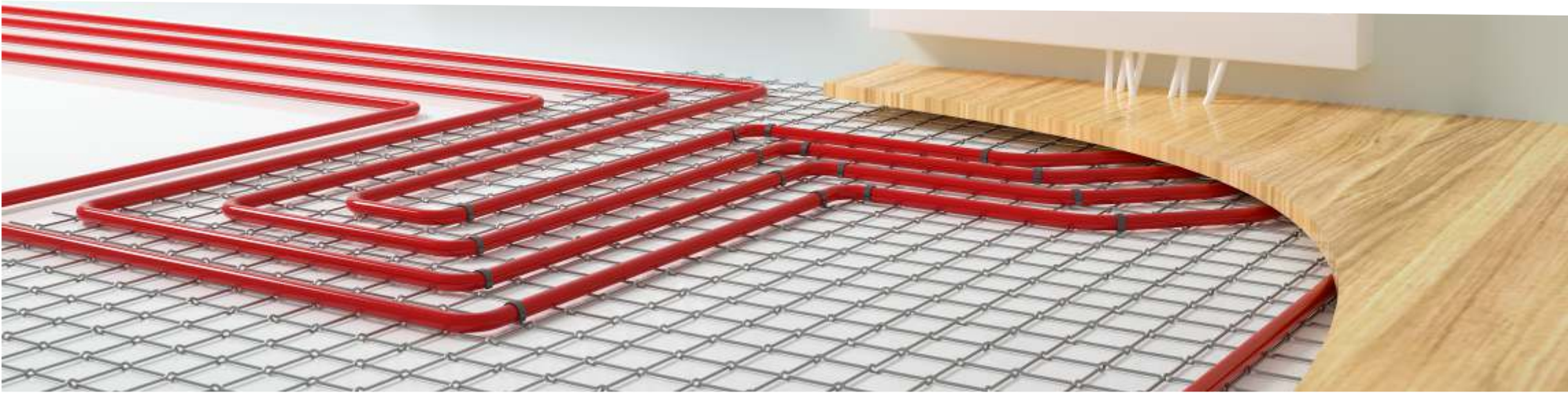
Diameter	Unit of measure	Quantity per pack	Weight
Ø 20 x 1,9	mb	160	0,11
Ø 25 x 2,3	mb	100	0,16
Ø 32 x 2,9	mb	60	0,26
Ø 40 x 3,7	mb	40	0,41
Ø 50 x 4,6	mb	40	0,63
Ø 63 x 5,8	mb	20	1,00
Ø 75 x 6,8	mb	8	1,39

PP-R SDR 6 (S 2,5; PN 20) TUBE IN A CIRCLE

Diameter	Unit of measure	Quantity per pack	Weight
Ø 10 x 1,3	mb	200	0,08
Ø 12 x 2,0	mb	200	0,09
Ø 14 x 2,0	mb	200	0,10
Ø 16 x 2,0	mb	100	0,12

PE-RT tube with EVOH barrier			
Diameter	Unit of measure	Quantity per pack	Weight
10 x 1,3*	mb	200	0,07
12 x 2,0*	mb	200	0,08
14 x 2,0*	mb	200	0,09
16 x 2,0*	mb	200	0,10
18 x 2,0*	mb	200	0,10
18 x 2,5*	mb	100	0,11
20 x 2,0*	mb	100	0,16
25 x 2,3*	mb	100	0,17

* custom-made product



Bypass

Diameter	Unit of measure	Quantity per pack	Weight
20	pcs.	70	0,06
25	pcs.	50	0,09
32	pcs.	30	0,17
40*	pcs.	20	0,25

Short bypass

Diameter	Unit of measure	Quantity per pack	Weight
20	pcs.	120	0,06
25	pcs.	90	0,09
32	pcs.	50	0,17

Compensation

Diameter	Unit of measure	Quantity per pack	Weight
20	pcs.	15	0,12
25	pcs.	7	0,25
32	pcs.	5	0,47
40	pcs.	5	0,89

PPR FITTINGS

Straight elbow 45°

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16*	pcs.	600	0,01	
20	pcs.	300	0,02	√
25	pcs.	200	0,02	√
32	pcs.	100	0,05	√
40	pcs.	50	0,80	√
50	pcs.	20	0,14	
63	pcs.	10	0,29	
75	pcs.	10	0,44	
90	pcs.	6	0,78	
110	pcs.	4	1,10	

Straight elbow 90°

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16*	pcs.	500	0,01	
20	pcs.	300	0,02	√
25	pcs.	170	0,02	√
32	pcs.	80	0,05	√
40	pcs.	50	0,80	√
50	pcs.	20	0,10	
63	pcs.	10	0,22	
75	pcs.	10	0,34	
90	pcs.	6	0,44	
110	pcs.	4	0,78	

Nipple elbow 45°

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16*	pcs.	600	0,01	
20	pcs.	300	0,02	√
25	pcs.	200	0,02	√
32	pcs.	100	0,03	
40	pcs.	50	0,04	

Nipple elbow 90°

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16*	pcs.	500	0,01	
20	pcs.	300	0,02	√
25	pcs.	200	0,03	√
32	pcs.	100	0,05	√
40	pcs.	50	0,06	

* custom-made product

Elbow 90° female thread

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16 x 1/2*	pcs.	200	0,06	
20 x 1/2	pcs.	100	0,05	V
20 x 3/4	pcs.	100	0,10	V
25 x 1/2	pcs.	100	0,06	V
25 x 3/4	pcs.	100	0,10	V
32 x 3/4	pcs.	100	0,09	
32 x 1*	pcs.	50	0,12	

Elbow 90° male thread

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16 x 1/2*	pcs.	150	0,07	
20 x 1/2	pcs.	100	0,07	V
20 x 3/4	pcs.	100	0,08	V
25 x 1/2	pcs.	100	0,08	V
25 x 3/4	pcs.	100	0,09	V
32 x 3/4	pcs.	80	0,11	
32 x 1*	pcs.	50	0,14	

Elbow 90° wall female thread

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16 x 1/2*	pcs.	100	0,06	
20 x 1/2	pcs.	100	0,06	V
25 x 1/2	pcs.	70	0,07	
25 x 3/4	pcs.	70	0,10	V

Elbow 90° wall male thread

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16 x 1/2*	pcs.	100	0,08	
20 x 1/2	pcs.	70	0,08	V
25 x 1/2	pcs.	70	0,08	
25 x 3/4	pcs.	70	0,11	V

* custom-made product

PPR FITTINGS

T-piece

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16*	pcs.	300	0,01	
20	pcs.	200	0,02	V
25	pcs.	100	0,02	V
32	pcs.	50	0,06	V
40	pcs.	20	0,08	V
50	pcs.	10	0,17	
63	pcs.	10	0,35	
75	pcs.	6	0,50	
90	pcs.	4	1,00	
110	pcs.	5	1,45	

T-piece female thread

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16 x 1/2*	pcs.	150	0,06	
20 x 1/2	pcs.	100	0,06	V
20 x 3/4	pcs.	70	0,10	
25 x 1/2	pcs.	70	0,10	V
25 x 3/4	pcs.	70	0,11	
32 x 3/4	pcs.	70	0,14	
32 x 1*	pcs.	50	0,25	

T-piece male thread

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16 x 1/2*	pcs.	150	0,08	
20 x 1/2	pcs.	100	0,08	V
20 x 3/4	pcs.	70	0,09	
25 x 1/2	pcs.	70	0,12	V
25 x 3/4	pcs.	70	0,11	
32 x 3/4	pcs.	70	0,12	
32 x 1*	pcs.	50	0,12	

Blanking plug

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16*	pcs.	300	0,01	
20	pcs.	300	0,01	V
25	pcs.	200	0,01	V
32	pcs.	150	0,02	V
40	pcs.	100	0,04	
50	pcs.	70	0,06	
63	pcs.	30	0,12	
75	pcs.	20	0,17	
90	pcs.	15	0,32	
110	pcs.	12	0,56	

Reduction

Diameter	Unit of measure	Quantity per pack	Weight
20/16	pcs.	500	0,01
25/20	pcs.	300	0,01
32/25	pcs.	250	0,02
40/32	pcs.	150	0,02

Coupler

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16*	pcs.	500	0,01	
20	pcs.	300	0,01	√
25	pcs.	200	0,02	√
32	pcs.	150	0,03	√
40	pcs.	70	0,05	√
50	pcs.	50	0,08	
63	pcs.	30	0,15	
75	pcs.	15	0,21	
90	pcs.	12	0,32	
110	pcs.	12	1,46	

Coupler female thread

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16 x 1/2	pcs.	200	0,04	
20 x 1/2	pcs.	200	0,05	√
20 x 3/4	pcs.	100	0,07	√
25 x 1/2	pcs.	100	0,07	√
25 x 3/4	pcs.	100	0,08	√
32 x 1	pcs.	70	0,12	√
40 x 1 1/4	pcs.	50	0,21	√
50 x 1 1/2	pcs.	20	0,45	
63 x2	pcs.	15	0,78	
75 x 2 1/2	pcs.	10	0,98	
90 x 3	pcs.	9	1,22	
110 x 4	pcs.	12	1,33	

Coupler male thread

Diameter	Unit of measure	Quantity per pack	Weight	RCT
16 x 1/2	pcs.	200	0,05	
20 x 1/2	pcs.	160	0,05	√
20 x 3/4	pcs.	100	0,09	√
25 x 1/2	pcs.	100	0,09	√
25 x 3/4	pcs.	100	0,09	√
32 x 1	pcs.	70	0,18	√
40 x 1 1/4	pcs.	30	0,21	√
50 x 1 1/2	pcs.	20	0,46	
63 x2	pcs.	15	0,69	
75 x 2 1/2	pcs.	10	1,00	
90 x 3	pcs.	9	1,10	
110 x 4	pcs.	5	1,23	

PPR FITTINGS

Reducing coupler

Diameter	Unit of measure	Quantity per pack	Weight	RCT
20/16	pcs.	300	0,01	
25/16*	pcs.	300	0,01	
25/20	pcs.	200	0,01	√
32/20	pcs.	150	0,02	√
32/25	pcs.	150	0,02	√
40/16*	pcs.	150	0,02	
40/20	pcs.	70	0,02	
40/25	pcs.	70	0,02	√
40/32	pcs.	70	0,03	√
50/32	pcs.	50	0,04	
50/40	pcs.	50	0,05	
63/40	pcs.	50	0,80	
63/50	pcs.	40	0,11	
75/40	pcs.	30	0,11	
75/50	pcs.	30	0,11	
75/63	pcs.	30	0,15	
90/50	pcs.	18	0,17	
90/63	pcs.	18	0,16	
90/75	pcs.	15	0,19	
110/50	pcs.	9	0,22	
110/63	pcs.	14	0,23	
110/75	pcs.	14	0,25	
110/90	pcs.	10	0,28	

Reducing T-piece

Diameter	Unit of measure	Quantity per pack	Weight	RCT
20/16*	pcs.	100	0,01	
25/16*	pcs.	150	0,01	
25/20	pcs.	100	0,01	√
32/20	pcs.	50	0,02	√
32/25	pcs.	50	0,02	√
40/16*	pcs.	60	0,02	
40/20	pcs.	30	0,02	√
40/25	pcs.	30	0,02	√
40/32	pcs.	30	0,03	
50/20	pcs.	20	0,04	
50/25	pcs.	20	0,05	
50/32	pcs.	20	0,04	
50/40	pcs.	20	0,05	
63/25	pcs.	10	0,80	
63/32	pcs.	10	0,11	
63/40	pcs.	10	0,80	
63/50	pcs.	10	0,11	
75/40	pcs.	9	0,11	
75/50	pcs.	9	0,11	
75/63	pcs.	9	0,15	
90/50	pcs.	4	0,17	
90/63	pcs.	4	0,16	
90/75	pcs.	4	0,19	
110/50	pcs.	5	0,22	
110/63	pcs.	5	0,23	
110/75	pcs.	5	0,25	
110/90	pcs.	5	0,28	

* custom-made product

Ball valve

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20	pcs.	50	0,12
25	pcs.	50	0,14
32	pcs.	40	0,19
40	pcs.	20	0,36
50	pcs.	10	0,52
63	pcs.	8	0,69

Ball valve with two half pipe joint

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20	pcs.	50	0,48
25	pcs.	30	0,51
32	pcs.	35	0,69
40	pcs.	16	0,92

Concealed ball valve

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20	pcs.	30	0,48
25	pcs.	30	0,51

Handle

Diameter [mm]	Unit of measure	Quantity per pack	Weight[kg]
16*	pcs.	200	0,01
20	pcs.	1000	0,01
25	pcs.	800	0,01
32	pcs.	500	0,02
40	pcs.	200	0,03
50	pcs.	170	0,04
63	pcs.	100	0,05

Mounting plate

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
100	pcs.	200	0,07

Mounting plate with screws

Średnica [mm]	Unit of measure	Ilość w opakowaniu	Weight [kg]
150	pcs.	250	0,09

Flare female thread

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20x1/2	pcs.	100	0,06
25x3/4	pcs.	100	0,11
32x1	pcs.	70	0,24

Flare male thread

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20x1/2	pcs.	100	0,09
25x3/4	pcs.	100	0,14
32x1	pcs.	70	0,24

Internal thread half union

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20x1/2	pcs.	300	0,04
25x3/4	pcs.	100	0,06

Poppet valve

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20	pcs.	50	0,48
25	pcs.	35	0,51
32	pcs.	30	0,65

Wall mounting coupler

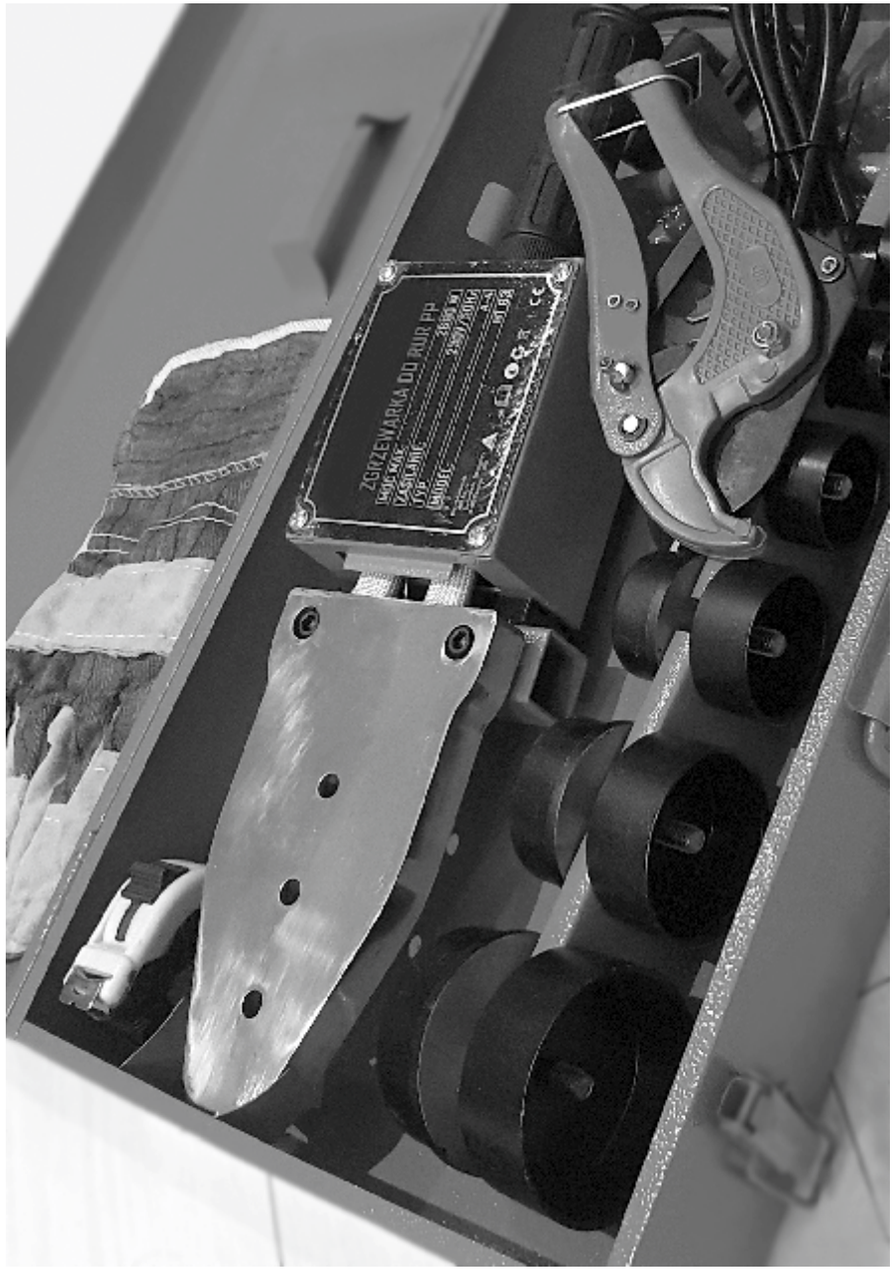
Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20x1/2	pcs.	200	0,24

Steel strip for batteries

Diameter [mm]	Unit of measure	Quantity per pack	Weight [kg]
20	pcs.	100	0,10

Skew filter

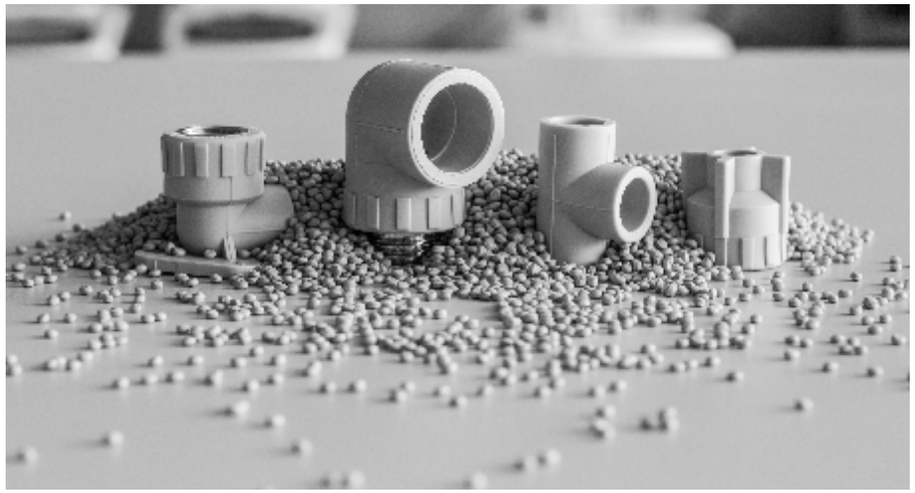
Średnica [mm]	Unit of measure	Quantity per pack	Weight [kg]
20	pcs.	90	0,06



PPR ACCESSORIES

heating kit			
Power [W]	Unit of measure	Quantity in package	Weight [kg]
2450	pcs.	1	-

Shears			
cutting diameter [mm	Unit of measure	Quantity in package	Weight [kg]
Ø 16 -40	pcs.	1	0,66



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Polimarky Sp. z o. o. Sp. K.
ul. Bieszczadzka 10 a, 35-082 Rzeszów
tel. +48 17 85 05 200
e-mail: systemy@polimarky.pl
Zaczernie 190 B, 36-062 Zaczernie
www.polimarky.pl