



### 1. Name

PE-RT/EVOH/PE-RT floor-heating multilayer pipe

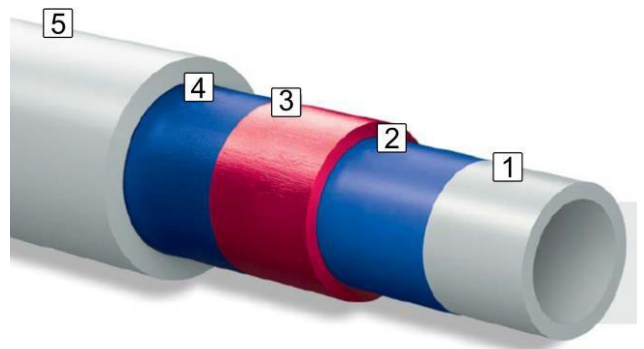
### 2. Product features and intended use

The multilayer pipe PE-RT/EVOH/PE-RT is designed and manufactured by Capricorn for surface heating/cooling systems. Thanks to its flexibility and high performance, the pipe is ideal for manifold systems. It complies with the standards EN ISO 21003 and DIN 4726. It is hygiene certified by the Polish National Institute of Hygiene (PZH certificate).

### 3. Design

The pipe comprises 5 layers: PE-RT/EVOH/PE-RT

1. Outer protective layer, Type II PE-RT
2. Adhesive and bonding layer
3. Inner layer, EVOH
4. Adhesive and bonding layer
5. Inner layer, Type II PE-RT



The inner and outer pipes are made of Type II PE-RT.

The anti-diffusion EVOH layer prevents oxygen ingress. Thanks to its 5-layer design, the EVOH barrier is protected against environmental conditions such as water seepage and mechanical damage.

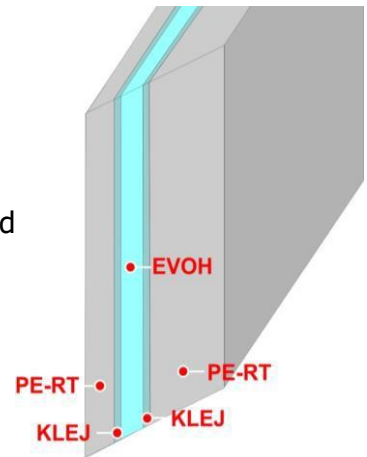
Made entirely of plastics, the pipe has a uniform structure, which makes it durable, corrosion-resistant, and non-reactive with metals.

#### 4. Principle of operation

In surface heating/cooling systems, the pipe acts as a radiator/cooler in order to supply or dissipate the heat transferred by the water flowing inside it in indoor installations. The pipe has smooth surfaces and negligible flow resistance, ensuring perfect water conveyance, both in heating and cooling systems.

The anti-diffusion barrier:

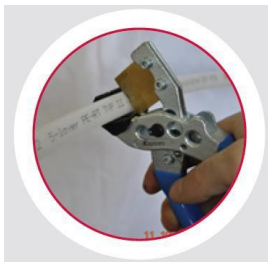
- the EVOH barrier – shields the system from oxygen penetration
- the EVOH barrier is protected against mechanical damage and moisture by means of outer and inner PE-RT shells.



#### 5. Installation guidelines

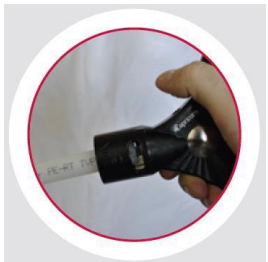
Installation can be carried out only in temperatures above 0 °C. The piping must be protected against external sources of heat, such as blow heaters or IR heaters, etc.

Prepare the pipe for assembly following the instructions provided by the fitting manufacturer. During installation the pipe is subject to standard processing:



##### **Cutting:**

Clean and quick cutting at 90°.



##### **Edge calibration and chamfering:**

Calibrate the pipe end to restore the circularity of the edge after cutting. Depending on the guidelines provided by the fitting manufacturer, the pipe end should be either chamfered or left unprocessed.



##### **Joining:**

While making connections, follow the guidelines provided by the fitting manufacturer, selecting proper tools and methods of assembly.

To protect the pipework from shearing forces and other damage occurring at wall entries, pass the product along a casing pipe such as a corrugated conduit.

While assembling a piping system or during interior finishing work, be extra careful not to damage the pipe mechanically by impact from a sharp object.

## 6. Example application



## 7. Technical parameters and materials used

The pipe, which is manufactured using modern production lines in Capricorn S.A. facilities, is subject to continuous control at all stages of manufacture. Additionally, each lot is laboratory tested before being marketed.

The pipe is made of specially designed PE-RT material, suitable for surface heating systems. PE-RT stands denotes for polyethylene with enhanced impact temperature resistance. Thanks to its excellent properties (extra octene bonds) it does not require cross-linking processes. Type II PE-RT is a latest generation plastic used for the manufacture of surface-heating pipes.

### Materials used

	Material	Parameter
<b>PE-RT/EVOH/PE-RT</b>		
<b>PE-RT type</b>	Type II PE-RT	Dowlex 2388
<b>Number of layers</b>	5	–
<b>Inner layer</b>	EVOH	–
<b>Wall thickness [mm]</b>	–	2
<b>Max. temp. during failure (up to 100 hours) [oC]</b>	–	100
<b>Heat transfer coefficient [W/(m*K)]</b>	–	0.4

<b>Linear expansion coefficient k</b> [mm/(m*K)]	–	0.019
<b>Elastic modulus N/mm<sup>2</sup></b>	–	approx. 500
<b>Roughness (absolute) µm</b>	inner pipe	1.5
<b>Bend radius r</b>		5 x D
<b>Anti-diffusion barrier [mg/(m<sup>2</sup> • d)]</b>	EVOH	40 °C ≤ 0.32 [mg/(m <sup>2</sup> • d)] 80 °C ≤ 3.6 [mg/(m <sup>2</sup> • d)]
<b>DIN 4726</b>	–	compliant
<b>Design lifetime</b>	200 years	at 55 °C / 1.5 bar

### PE-RT/EVOH/PE-RT multilayer pipe for heating systems, by application classes

Application class	T <sub>max</sub> [°C]	P <sub>D</sub> [bar]			
		ø 16	ø 17	ø 18	ø 20
<b>4</b>	70	8	6	6	6
<b>5</b>	90	6	6	6	4

## 8. Chemical resistance

Chemical agent	20 °C	60 °C	Chemical agent	20 °C	60 °C
acetone	A	A	ethylbenzene	C	E
benzaldehyde	A	B	phenol	A	A
amyl alcohol	A	A	formaldehyde	A	A
ethyl alcohol	A		glycerine	A	A
methyl alcohol	A	A	glycol	A	A
gas ammonia	A	A	heptane	A	C
aniline	A	B	hexane	A	C
ammonium nitrate	A	A	iso-octane	A	C
potassium nitrate	A	A	potassium iodide	A	A
sodium nitrate	A	A	nitric acid (50%)	C	C
benzene	C	E	nitric acid (25%)	A	A
petroleum spirits	A	C	nitric acid (10%)	A	A
petrol (standard)	A	C	benzoic acid	A	A
petrol (super)	A	C	chromic acid (20%)	A	A
liquid bromine	E	E	phosphoric acid (85%)	A	C
bromine vapour	E	E	hydrochloric acid (35%)	A	A
gas butane	A	A	sulphuric acid, oleum (95%)	A	C
liquid butane	A		sulphuric acid (50%)	A	A
gas chlorine, dry	E	E	sulphuric acid (25%)	A	A
gas chlorine, wet	C	E	stearic acid	A	A
liquid chlorine	E		formic acid	A	A
potassium chlorate	A	A	acetic acid	A	A
sodium chloride	A	A	xylene	C	E
calcium chloride	A	A	cresol	A	C
potassium chloride	A	A	urea	A	A
ammonium chloride	A	A	potassium permanganate	A	A
stannous chloride	A	A	hydrogen peroxide (90%)	A	E
ethylene chloride	C	D	hydrogen peroxide (30%)	A	A

<b>methylene chloride (dichloromethane)</b>	C		<b>naphthalene</b>	A	C
<b>sodium chloride</b>	A	A	<b>nitrobenzene</b>	B	C
<b>chloroethane</b>	C		<b>ethyl acetate</b>	A	C
<b>sodium chlorite</b>	A	A	<b>diesel fuel</b>	A	C
<b>chloroform</b>	D	E	<b>heating oil</b>	A	C
<b>chlorobenzene</b>	C	E	<b>gas propane</b>	A	A
<b>cyclohexane</b>	A	B	<b>liquid propane</b>	A	
<b>cyclohexanole</b>	A	A	<b>sodium hypochlorite (50%)</b>	A	A
<b>cyclohexanone</b>	A	C	<b>petroleum</b>	A	C
<b>tetrachloroethane</b>	D	E	<b>copper salts</b>	A	A
<b>tetrachloroethylene</b>	C	E	<b>iron salts</b>	A	A
<b>carbon tetrachloride</b>	C	E	<b>brine</b>	A	A
<b>carbon disulphide</b>	C		<b>sulphur</b>	A	A
<b>ethyl ether</b>	B		<b>hydrogen sulphide</b>	A	A
<b>chlorinated water</b>			<b>toluene</b>	C	E
<b>sodium hydroxide</b>			<b>trichloroethylene</b>	C	E
			<b>water</b>	A	A

A – resistant, B – practically resistant, C – sufficiently resistant, D – little resistant, E – not resistant

## 9. Test procedures

The pipe is tested during the manufacturing process and afterwards. The tests include:

- appearance and marking control as per ISO 21003-2
- dimension check as per ISO 161-1
- patency test
- longitudinal contraction as per ISO 2505:2005
- resistance to internal pressure as per ISO 1167
- melt mass-flow rate test
- breaking test

## 10. Codes

$\varnothing$	Code	Length [m]	Product name
<b>16x2</b>	<b>9-8596-200-00-08-16</b>	200	SURFACE HEATING PIPE PE-RT/EVOH/PE-RT 16X2, 200 m coil
<b>17x2</b>	<b>9-8596-200-00-08-17</b>	200	SURFACE HEATING PIPE PE-RT/EVOH/PE-RT 17X2, 200 m coil
<b>18x2</b>	<b>9-8596-200-00-08-18</b>	200	SURFACE HEATING PIPE PE-RT/EVOH/PE-RT 18X2, 200 m coil
<b>20x2</b>	<b>9-8596-300-00-08-20</b>	300	SURFACE HEATING PIPE PE-RT/EVOH/PE-RT 20X2, 300 m coil
<b>16x2</b>	<b>9-8596-500-00-08-16</b>	500	SURFACE HEATING PIPE PE-RT/EVOH/PE-RT 16X2, 500 m coil
<b>17x2</b>	<b>9-8596-500-00-08-17</b>	500	SURFACE HEATING PIPE PE-RT/EVOH/PE-RT 17X2, 500 m coil

<b>16x2</b>	<b>9-8596-600-00-08-16</b>	600	SURFACE HEATING PIPE PE-RT/EVOH/PE-RT 16X2, 600 m coil
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## 11. Packing and storage

Diameter	Coil dimensions [cm] inner dia.	Coil weight [kg]	No. of coils on pallet
<b>Coils in cardboard packaging on pallet</b>			
<b>16x2</b>	40	48 kg (500 m)	6
<b>17x2</b>	40	31 kg (300 m)	6
<b>18x2</b>	40	42 kg (400 m)	6
<b>20x2</b>	40	40 kg (300 m)	6

### ATTENTION!

- The pipes should be protected from sunlight during storage and delivery.
- The pipes which are stored in temperatures under  $-10\text{ }^{\circ}\text{C}$  should be protected from impact, denting or mechanical strain.



## 12. OEM

Our OEM product offer includes PE-RT/EVOH/PE-RT pipes. We have a state-of-the-art production line for PE-RT/EVOH/PE-RT 5-layer pipe, fitted with control elements at every stage of the manufacturing process. We supply highest-quality pipes to our OEM partners, and we can customise the following aspects:

- manufacturing capabilities: 15x2, 16x2, 17x2, 18x2, 20x2 mm; maximum diameter in our manufacturing processes: 32 mm
- winding of coils of desired length
- packaging of coils in stretch film or cardboard
- branding/marketing of pipe using an ink-jet industrial printer
- colour customisation

## 13. Standards and certificates

- EN ISO 21003 – Multilayer piping systems for hot and cold water installations inside buildings,
- DIN 4726 – Protection from oxygen diffusion,
- PZH hygiene certificate: HK/W/0880/01/2014.



#### **14. Advantages**

- top quality materials – type II PE-RT ensures optimal performance
- recyclable
- the pipe has an oxygen barrier (EVOH) to prevent the ingress of oxygen into the installation
- the EVOH oxygen barrier is protected from damage with the PE-RT outer layer
- high chemical and mechanical resistance
- no need to use dedicated fittings with a metal–metal divider
- small bend radius, easy assembly
- the product is ideal for both large-surface areas and individual rooms
- safety of use
- ideal performance in surface heating/cooling systems
- hygienically neutral
- made of corrosion-resistant materials
- resistant to scaling ensures pipework with minimum pressure and velocity losses

#### **15. Warranty and liability**

During installation work always follow the occupational Health and Safety regulations included in CAPRICORN construction regulations and standards. Detailed information on the terms and conditions of our warranty and scope of liability is available at [www.capricorn.pl](http://www.capricorn.pl).

#### **16. Manufacturer**

##### **Capricorn S.A.**

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