

# KOMFORT UNDERFLOOR HEATING PIPES

## FACT SHEET



### The "Komfort" PE-RT pipe:

- Highly flexible
- Excellent thermal properties
- Quality assured
- Exceptional Value
- Protected oxygen diffusion barrier
- Inhibits scaling and corrosion
- 100 % Recyclable
- High temperature resistance
- Very long lifespan
- Low friction rate for an improved flow
- Certified by international institutes
- 10 years fully insured warranty

The "Komfort" PE-RT pipe is a 5 layer composite pipe with integral oxygen barrier. It is suitable for use with cold and hot water installations within buildings for underfloor and wall heating systems under specified design pressures and temperatures appropriate to the class of application according to ISO 22391.

The pipe is available in the following dimensions: 10mm with 1.5mm wall & 16mm diameter with 2mm wall thickness

The "Komfort" underfloor heating pipe is produced according to the standards DIN 16833/16834/4721/4726 and ISO 22391 accompanied by certification from the German institutes SKZ for mechanical strength, MPA for oxygen barrier and by guarantee of 2.000.000 CHF that covers their good function.

In accordance with the current underfloor heating standard, DIN 4726, the pipes have to have a life-span of at least 50 years with a safety factor of 2.5 and fulfill the current dimensioning tolerance levels.

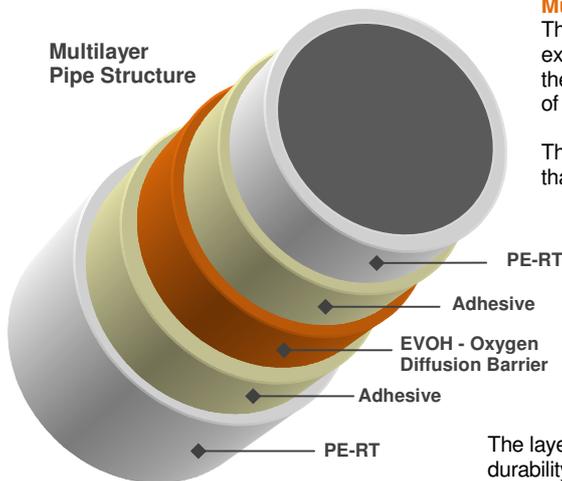
The durability of our pipes have been tested over a long period of time at SKZ, Süddeutsches Kunststoff Zentrum and the results shows a theoretical life-span of 490 years with a safety factor of 2.5.

"Komfort" underfloor heating pipes have superior flexibility with a smooth surface, contributing to a more economical performance from the underfloor heating system which can improve efficiency and running costs.

Our Komfort pipe is made from a special type of polyethylene, DOWLEX 2344E. Komfort PE-RT Pipe (Polyethylene of Raised Temperature resistance) has a unique molecular structure and crystalline microstructure which provides excellent Long-term hydrostatic strength (LTHS) at high temperatures without the need for cross-linking.

### Flexibility

The Komfort pipe has advanced flexibility essentially thanks to two factors; the molecular structure of the pipe material Dowlex 2344E and also because of the diffusion barrier being in the centre of the pipe wall. With the diffusion barrier (EVOH) being in the centre of the pipe it has the advantage of being subject to a smaller bending radius and at the same time is protected by the Komfort pipe's outer layers.



### Multilayer Pipe Structure

This diagram shows the five layers of the Komfort underfloor heating multilayer pipe. The external and internal layers are made of high-grade polyethylene Dowlex 2344E PE-RT with the EVOH oxygen diffusion barrier in the centre of the pipe wall. EVOH is a formal copolymer of Ethylene and Vinyl Alcohol.

The oxygen barrier layer is firmly fused with the internal and external layer by an adhesive, so that all layers are constructed into a permanently bonded unit.

### Why are the layers assembled in this way?

It is important that the EVOH diffusion barrier layer is located in the centre of the pipe layers so that it is protected because even though it is highly functional it is sensitive to moisture. Institute tests confirm that when the EVOH layer is subject to hot water temperatures of 95°C after several hundred hours the hot water attacks the EVOH layer.

The layer then swells, becomes brittle and cracks and as a result no longer contributes to the durability of the pipe. By having the layers fused together in the order that the Komfort pipe is in, the EVOH layer is protected against this happening. By positioning the EVOH diffusion barrier in the centre of the pipe layers it is also protected against possible minor damage that can take place during transport and installation.

### Why is this test relevant when the heating pipes are not subjected to 95°C in practice?

It is to ensure that long-term protection is not endangered. The test results lead to the concern that even ambient moisture (e.g. during installation) could damage the oxygen blocking layer in the long term or even destroy it completely which can then lead to deposit corrosion.

### Is the Komfort pipe safe from oxygen input and corrosion?

The 5 layer design means that the barrier layer is reliably protected against moisture and damage.

The Komfort pipe's oxygen diffusion barrier is no longer in permanent contact with environmental influences which therefore prevents the risk of it being damaged. An exchange of oxygen through the pipe wall due to a damaged oxygen diffusion barrier layer is practically entirely excluded.

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### QUALITIES OF THE KOMFORT PE-RT PIPE

#### No shrinkage

There is a very minor extension when the pipe gets hot; PE-RT pipe has a thermal expansion coefficient of  $1.95 \cdot 10^{-4} /K$  at 20-70°C and when the pipe cools down again it goes back to its original dimension.

#### Enhanced strength with increased resistance to pressure

Pressure tests have shown that the Komfort 5 layer composite pipe is resistant to a higher pressure than pipes with an equal wall thickness without an oxygen diffusion barrier (even at high temperatures). EVOH is durable and has a melting point of over 180°C.

#### Increased flexibility

With PE-RT multilayer pipe there is no need for the additional cross-linking process; so the pipe has greater innate flexibility and the pipe becomes more bendable making the installation of the underfloor heating pipe work much easier.

#### Oxygen diffusion barrier is protected resulting in a long life span

The EVOH layer is protected by the PE-RT and adhesive layers which prohibits the oxygen diffusion barrier being negatively affected by damage and moisture. The "Komfort" composite 5 layer pipe has practically no oxygen exchange and this state remains stable as the oxygen diffusion barrier layer (EVOH) is protected. The oxygen permeability is below  $0.01g/m^3d$  which is considerably below the DIN 4726 requirements of  $0.1g/m^3d$ . The excellent properties of Dowlex are further improved by the integrated EVOH layer.

#### Weldability

Thanks to the non-crosslinked structure with the appropriate equipment the external layer of PE-RT can be welded.

### PHYSICAL PROPERTIES

- Density of raw material  $0.933 \text{ gr/cm}^3$ , according to International Standard ASTM D1505 – Test method equivalent to ISO 1183-2
- Flow of raw material  $0.64\text{gr}/10 \text{ min}$ , according to International Standard ASTM D1238 (190°C/2, 16Kg) – As in Melt Flow Rate ISO 1133
- Thermal conductivity  $0.4\text{W/mK}$  at 60°C, according to German Institute for Standardisation DIN 52612-1
- Linear elongation coefficient  $1.95 \cdot 10^{-4}/K$ , according to German Institute for Standardisation DIN53752-A at 20-70°C.
- Softening limit (VICAT point) 123°C, according to International Standards ASTM 1525
- Elasticity Factor 550 Mpa



### COMPLIES WITH THE FOLLOWING STANDARDS



#### ISO 22391

The classification for the classes of application according to ISO 10508 is:

For pipe dimension 10mm x 1.5 mm: 10 bar for class 1 and class 4, 8 bar for class 2 and class 5

For pipe dimension 16mm x 2.0 mm: 8 bar for class 1 and class 4, 6 bar for class 2 and class 5

#### DIN 16833

Basic PE-RT regulations

As of May 2001, DIN 16833 regulates non-cross linked polyethylene pipes of raised temperature resistance (PE-RT). As a result, radiator connections and waterborne underfloor heating systems with PEOC, PE-RT and PE-X pipes are equal.

#### DIN 4721

Usage regulations for PE-RT:

DIN 4721 corresponds to DIN 4726 and is applicable for PE-RT pipes.

Dowlex 2344E conforms to DIN 4721 rules that regulate plastic piping systems for waterborne underfloor heating and radiator systems. Our Komfort pipe is marked PE-RT – all pipes affected by these regulations should be marked with PE-RT. The pipe oxygen barrier EVOH is certified by German MPA – NRW according to standard DIN 4726.

#### Deutsche Rohr-Zertifizierung (DIN CERTCO) in accordance with DIN 4726 and DIN 4721

This German certification relates to underfloor heating and radiator systems. All regulations in accordance with DIN 4726 and DIN 4721 are recorded and monitored by a test institute such as SKZ.



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