

TYCROC PERT PIPES

PROCESSING & INSTALLATION INSTRUCTIONS



GENERAL

Tycroc PERT 5-layer pipes are made of the high-performance material PE-RT. Tycroc PERT pipe is an oxygen-tight composite pipe that consists of 5 layers. The base pipe and the outer layer are made of PE-RT and thus enclose the sensitive EVOH layer. In order to ensure an inseparable connection of the materials, they are firmly fused together by layers of adhesive polymer. The result is a high quality, highly flexible pipe with a securely protected oxygen barrier layer to ensure a long service life of the pipe (50 years warranty).

APPLICATION FIELDS

Tycroc PERT pipes are mainly used for floor heating. Other main applications include cooling ceilings and floors, as well as heating ceilings and walls. Pipes are also allowed to use for radiator connection.

OXYGEN TIGHTNESS

Oxygen-tight pipes must, according to DIN 4726, at a temperature of 40°C for application according to ISO 10508 Class 4 or 80 °C for application according to ISO 10508 Class 5, have an area-related oxygen permeability of:

- a) $\leq 0,32 \text{ mg}/(\text{m}^2 - \text{d})$ at 40 °C (application class 4);
- b) $\leq 3,60 \text{ mg}/(\text{m}^2 - \text{d})$ at 80 °C (application class 5).

Tycroc PERT 5-layer pipes are many times lower than these limits due to the use of a high-performance EVOH and the 5-layer structure of the pipe.

PIPE CONDITION

When visually inspected without magnification, the inner and outer surfaces of the pipes shall be smooth, clean and as far as possible free from scoring, cavities and other surface defects which would cause the pipes not to meet the requirements of ISO 22391. The material shall not have any visible impurities. Slight deviations in the appearance of the colour are permissible. The pipe ends must be cut burr-free and perpendicular to the pipe axis.

CUTTING AND STORAGE

The cutting of Tycroc PERT pipes is easy, using professional tools as plastic pipe cutter.

In case of intensive weathering, Tycroc PERT pipes should be protected by cardboard or black foil. The pipes must be transported, stored and handled in such a way that they are protected from any damage. Plastic pipes must not be exposed to direct sunlight.

PIPE FASTENING

The pipes and their fastening systems must be secured in such a way that their planned horizontal and vertical position is maintained. The fastening distance required to meet these requirements depends on the pipe dimensions and the pipe fastening systems. The manufacturer shall specify the maximum permissible spacing of the fixings from each other. The smaller the distances between the fixings, the greater the safety with regard to the position of the pipes. The fastening distances depend on the system.

BENDING RADIUS

The smallest permissible bending radius "r" corresponds to 5 times the tube diameter. For dimensions 20 mm and larger, we recommend a bending radius of 8 times the pipe diameter. Furthermore, the bending radius depends on the ambient temperature or the temperature of the pipe. The colder the temperature, the more rigid the pipe, the larger the bending radius. The recommended bending radius refers to a pipe temperature of 20°C.

PIPE COUPLINGS

All couplings in the floor construction must be precisely positioned and designated in the revision drawing. Brass clamp and press connectors are recommended as connecting elements. The connectors are plugged on according to the manufacturer's instructions and screwed to the pipes. System marks are only valid with the certified connectors. Tycroc PERT 5-layer pipes are tested and approved as a system with the corresponding clamp and press connectors as a system according to DIN Certco and KIWA/KOMO.

ARRANGEMENT OF HEATING CIRCUITS

The arrangement depends on the purpose, shape and details (floor material, windows, external or internal walls) of the room. Two most basic patterns are spirally and in series.

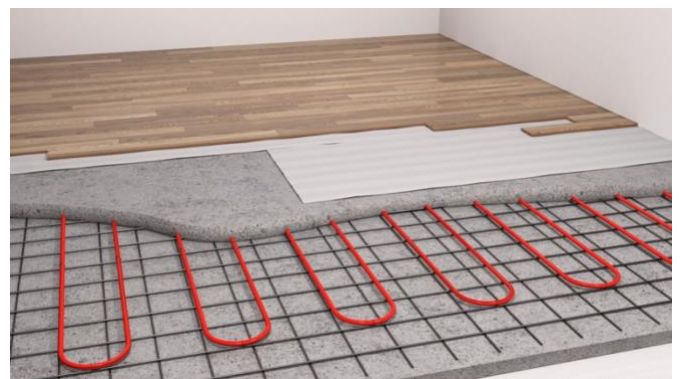
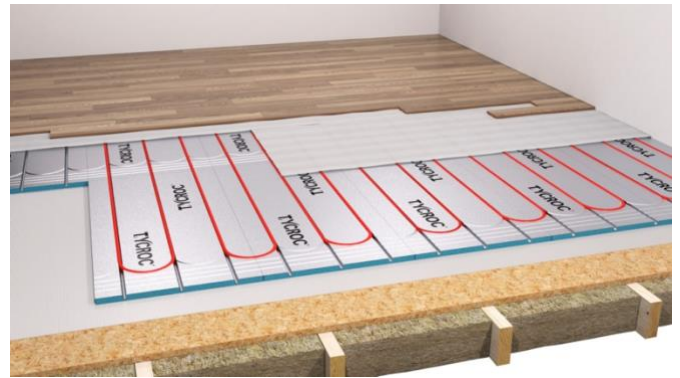
The spiral pattern ensures the most uniform temperature distribution of the heating surface, as the supply and the return pipes are located next to each other in turn.

In the case of the serial pattern, the temperature of the heated surface decreases linearly. With a serial pattern the beginning of the circuit should be placed near the places with the greatest heat loss (external walls, windows, terraces).

The choice of the heating circuit does not affect overall efficiency of the heating system, but affects the temperature distribution on the surface of the room.

HEATING PIPE INSTALLATION SYSTEMS

1. Heating circuits in Tycroc UHP panels. According to the previously prepared project, install the Tycroc PERT underfloor heating pipe of the appropriate thickness and length (consumption standard: 1m² = 5m pipe). Detailed information in Tycroc UHP panels installation instructions from www.tycroc.com.
2. Heating circuits cast in concrete. According to the previously prepared project, install the Tycroc PERT underfloor heating pipe of the appropriate thickness and length.
 - The concrete layer on top of the pipes the thickness must be 30 - 90 mm. The thickness of the concrete layer affects the space speed of temperature regulation.
 - Standard pipe installation distance is 100, 150, 200, 250 or 300 mm. This ensures an even temperature distribution.
 - Use a wire to fix the pipes to the reinforcing mesh.
 - Maximum distance between the fixing points is 750 mm, distance between the fixing points at the bends and U-turns is 200 mm.
 - It is also allowed to use other specially designed pipe installation systems accordingly the producers' instructions.
3. Heating circuits cast in anhydrite (gypsum-based leveling). According to the previously prepared project, install the Tycroc PERT underfloor heating pipe of the appropriate thickness and length. The installation and maintenance procedure must strictly follow the recommendations of the product manufacturer.



INSTALLATION IN COLD OUTDOOR TEMPERATURES

If there is a risk of frost, suitable measures must be taken, such as the use of antifreeze or temperature control of the building. Tycroc PERT pipes are not subject to any restrictions with regard to their usability at low temperatures. Since the base material does not become brittle, there is basically no loss of quality – even if the pipes are processed or used at temperatures well below the freezing point at 0°C.

If Tycroc PERT pipes have to be installed at low temperatures, the installer initially faces the challenge of reduced flexibility. In principle, however, installation is completely unproblematic even at very low sub-zero temperatures, as the minimum permissible bending radius does not change even at low temperatures. In practice, however, a few measures have proven to make installation much easier.

If possible, the pipes should not be stored outdoors at temperatures below freezing. By storing the pipes at room temperature, they remain flexible and can be laid easily. Original factory-packed Tycroc PERT pipes do not contain any residual moisture and are completely dry, so no on-site draining or drying is necessary.

In Scandinavian countries in particular, the method of “warmlaying” is used when outside temperatures are extremely low. For this, the pipes are filled with a warm frost-proof water-glycol mixture before installation, which is then also used to pressurise the heating system.

1. Polyethylene resistant to high temperatures (PE-RT)
2. Adhesive layer (A-Polymer)
3. Oxygen barrier (EVOH)
4. Adhesive layer (A-Polymer)
5. Polyethylene resistant to high temperatures (PE-RT)



PIPES MAXIMUM CIRCUIT (from the flow to the return manifold)

Tycroc PERT 16x2,0 mm	ca 120 m
Tycroc PERT 17x2,0 mm	ca 135 m
Tycroc PERT 20x2,0 mm	ca 180 m

*All the circuits must be installed in appropriate thickness and length accordingly the according to the previously prepared project.

TECHNICAL PROPERTIES PE-RT TYPE II

Material	PE-RT Type II acc. to ISO 22391
Max. operating temperature acc. ISO 10508 Class 5 [°C]	90
Max. operating pressure acc. ISO 10508 Class 5 [bar]	6
Thermal conductivity [W/mK] at 20 °C DIN 52612	0,41
Coefficient of linear thermal expansion [mm/mK] DIN 52328	0,195
Surface roughness inside [mm] acc. Prandl/Colebrook	0,007
Oxygene diffusion barrier DIN 4726 [mg/(m ² -d)] 40 °C (class 4)	< 0,32
Oxygene diffusion barrier DIN 4726 [mg/(m ² -d)] 80 °C (class 5)	< 3,60

APPROVALS AND CERTIFICATIONS

KIWA KOMO BRL 5602, Certification Nr.: K86478	Yes
DIN CERTCO, Certification Nr.: 3V399 PE-RT	Yes
Oxygene diffusion barrier acc. to DIN 4726	Yes
Oxygene diffusion barrier acc. to ISO 17455	Yes
SKZ A 748 acc. HR 3.16	Yes
European system proof for service conditions acc. ISO 10508 Class 4 and class 5, certification number: ETA 17/1013	Yes

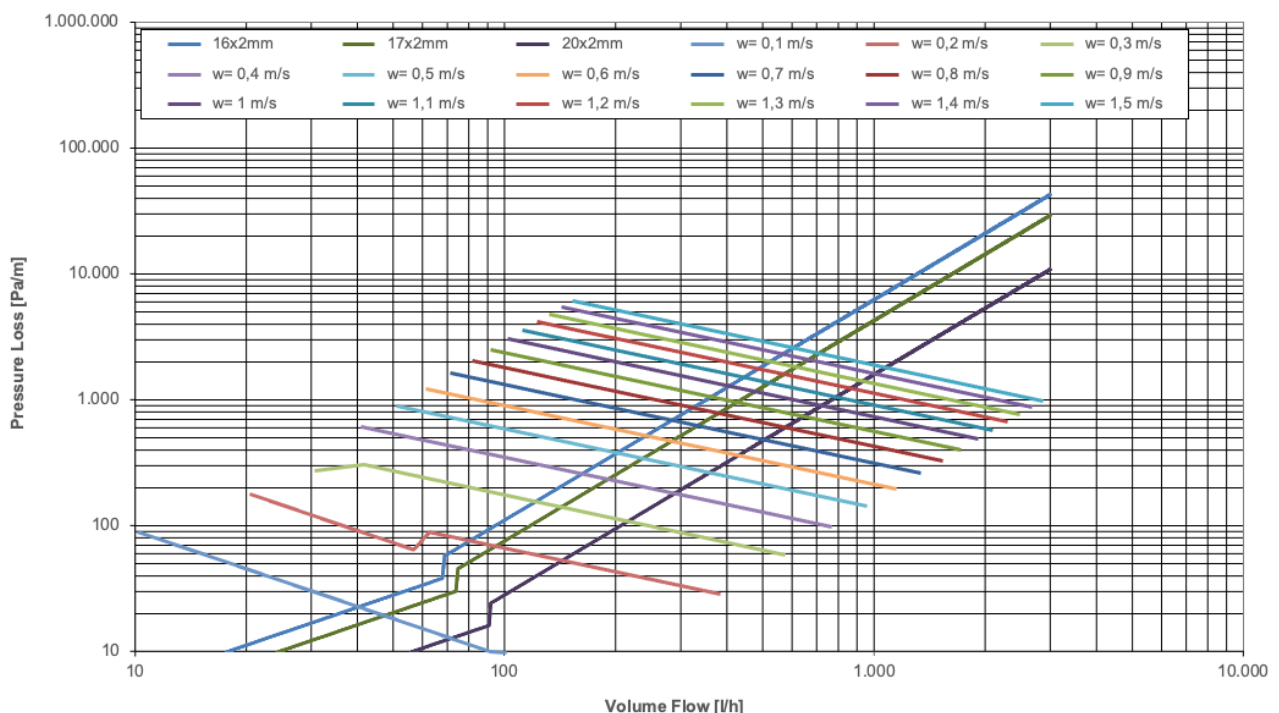
ISO 10508 CLASS 4 (floor heating)

	TEMPERATURE	LIFETIME	OVERAL SERVICE COENFICIENT
T cold	20 °C	2,5 years	1,25
T design	40 °C + 60 °C	20 years + 25 years	1,5
T max	70 °C	2,5 years	1,3
T malfuction	100 °C	100 hours	1,0

ISO 10508 CLASS 5 (radiator connection)

	TEMPERATURE	LIFETIME	OVERAL SERVICE COENFICIENT
T cold	20 °C	14 years	1,25
T design	60 °C + 80 °C	25 years + 10 years	1,5
T max	90 °C	1 year	1,3
T malfuction	100 °C	100 hours	1,0

PRESSURE LOSS DIAGRAM FOR TYCROC PERT 5-LAYER PE-RT PIPES, AT 20°C



LEAK TEST ACCORDINGLY TO DIN EN 1264-4

The tightness of the heating circuits of the underfloor heating system is ensured by a pressure test immediately before the screed is laid. The leak test can be carried out with water or compressed air. In deviation from the VOB, the test pressure here is twice the operating pressure, but at least 6 bar. In addition to DIN EN 1264-4:2009-11, the maximum time of the leakage test is to be limited to 48 hours when pressing with air.

INSPECTION PROTOCOL

Name and address of the object under construction: _____

Heating installation company: _____

Length of installed Tycroc PERT pipes: _____ Diameter: _____

Tycroc PERT pipe-marking: _____

System installed on: _____ Initial operation on: _____

Requirements:

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Documentation:

Max. Perm operating pressure: _____ Test pressure: _____ Load duration: _____

The leak tightness was determined; permanent changes in shape did not occur on any component. YES / NO

Confirmation:

Location / Date: _____ Location / Date: _____

Building owner / client: _____ Site manager / architect:
(name and signature) _____ (name and signature) _____

Location / Date: _____

Heating engineer:
(name and signature) _____
