

TYCROC PERT PIPES

PROCESSING & INSTALLATION INSTRUCTIONS



GENERAL

Tycroc PERT 5-layer pipes are crafted from high-performance PE-RT material. These oxygen-tight composite pipes consist of five layers: the base pipe and outer layer are made of PE-RT, securely encasing the sensitive EVOH oxygen barrier layer. To ensure seamless integration, the layers are bonded with adhesive polymer. The result is a premium, highly flexible pipe with a protected oxygen barrier, guaranteeing a long service life of up to 50 years (warranty included).

APPLICATION FIELDS

Tycroc PERT pipes are primarily designed for floor heating. Additional applications include:

- Cooling ceilings and floors;
- Heating ceilings and walls;
- Radiator connections.

OXYGEN TIGHTNESS

According to DIN 4726 standards, oxygen-tight pipes must meet the following area-related oxygen permeability limits:

- At 40°C (ISO 10508 Class 4): $\leq 0.32 \text{ mg}/(\text{m}^2 - \text{d})$;
- At 80°C (ISO 10508 Class 5): $\leq 3.60 \text{ mg}/(\text{m}^2 - \text{d})$.

Tycroc PERT 5-layer pipes significantly exceed these standards due to the use of high-performance EVOH and their advanced 5-layer construction.

PIPE CONDITION

Upon visual inspection (without magnification), the inner and outer surfaces of Tycroc PERT pipes must be smooth, clean, and free from imperfections such as scoring, cavities, or defects that would prevent compliance with ISO 22391 standards. The material must be free from visible impurities. Minor variations in color are acceptable. Pipe ends must be cut burr-free and perpendicular to the pipe axis.

CUTTING, STORAGE AND DECOILING

Cutting Tycroc PERT pipes is straightforward with the use of professional tools, such as a plastic pipe cutter.

To prevent damage during storage or transport, pipes should be protected from adverse weather conditions using cardboard or black foil. They must not be exposed to direct sunlight.

Recommendation: To enhance efficiency and streamline installation, the use of a pipe decoiler is highly recommended.

PIPE FASTENING

Pipes and their fastening systems must be secured to maintain their planned horizontal and vertical positions. The required fastening distance depends on the pipe dimensions and fastening systems used. The manufacturer specifies the maximum permissible spacing between fixings. Smaller fixing distances enhance the stability of the pipe positions. Fastening distances may vary depending on the system used.

BENDING RADIUS

The smallest permissible bending radius r is five times the pipe diameter. For pipe dimensions of 20 mm or larger, a bending radius of eight times the pipe diameter is recommended. The bending radius is influenced by the ambient or pipe temperature. Colder temperatures increase pipe rigidity, requiring a larger bending radius. The recommended bending radius assumes a pipe temperature of 20°C.

PIPE COUPLINGS

All couplings within the floor construction must be accurately positioned and indicated in the revision drawing. Brass clamp and press connectors are recommended as connection elements. These connectors should be installed following the manufacturer's instructions and securely fastened to the pipes. System compliance is valid only when certified connectors are used.

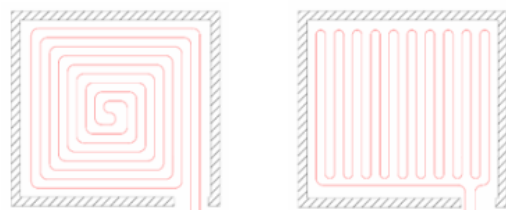
Tycroc PERT 5-layer pipes are rigorously tested and approved as part of a system with corresponding clamp and press connectors, certified by DIN Certco and KIWA/KOMO.

ARRANGEMENT OF HEATING CIRCUITS

The arrangement of heating circuits depends on the purpose, room shape, and specific details such as floor material, windows, and external or internal walls. The two primary patterns are spiral and serial:

- **Spiral Pattern:** This design ensures uniform temperature distribution across the heating surface, as the supply and return pipes are alternately placed side by side.
- **Serial Pattern:** In this design, the surface temperature decreases linearly from the start to the end of the circuit. The beginning of the circuit should be positioned near areas with the highest heat loss, such as external walls, windows, or terraces.

While the choice of the heating circuit does not impact the overall efficiency of the heating system, it significantly affects the temperature distribution across the room's surface.



HEATING PIPE INSTALLATION SYSTEMS

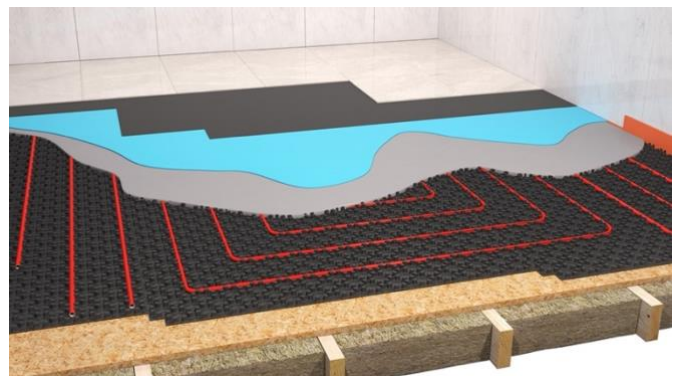
1. Heating Circuits in Tycroc UHP Panels

Install the Tycroc PERT underfloor heating pipe of the specified thickness and length based on the pre-prepared project plan (consumption standard: 1m² = 5m pipe). For detailed instructions, refer to the Tycroc UHP installation instructions available at www.tycroc.com.



2. Heating Circuits in Tycroc NOB Wet Installation Panels

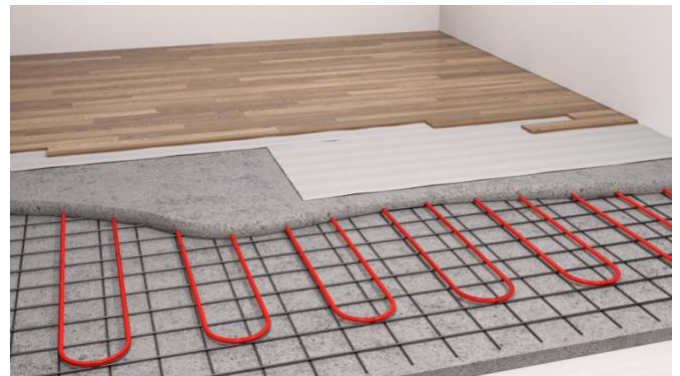
Install the Tycroc PERT underfloor heating pipe of the specified thickness and length, following the pre-prepared project plan (consumption rate is determined by the installation distance). For more details, refer to the Tycroc NOB installation instructions available at www.tycroc.com



3. Heating Circuits Cast in Concrete

Install the Tycroc PERT underfloor heating pipe of the appropriate thickness and length based on the pre-prepared project plan.

- The concrete layer covering the pipes must be 30–90 mm thick. The thickness affects the system's temperature regulation responsiveness.
- Standard pipe installation distances are 100, 150, 200, 250, or 300 mm to ensure even temperature distribution.
- Fix pipes to the reinforcing mesh using wire.
- Maximum spacing between fixing points is 750 mm, while spacing at bends and U-turns should be 200 mm.
- Alternatively, other specialized pipe installation systems may be used, provided the manufacturer's instructions are followed.



4. Heating Circuits Cast in Anhydrite (Gypsum-Based Leveling)

Install the Tycroc PERT underfloor heating pipe of the specified thickness and length as outlined in the pre-prepared project plan. Ensure installation and maintenance procedures strictly adhere to the product manufacturer's recommendations.

INSTALLATION IN COLD OUTDOOR TEMPERATURES

When installing Tycroc PERT pipes in environments with frost risks, appropriate precautions should be taken, such as using antifreeze or ensuring temperature control within the building. Tycroc PERT pipes are fully functional at low temperatures, as the base material remains non-brittle, preserving quality even when processed or used in sub-zero conditions.

While the pipes maintain their minimum permissible bending radius at low temperatures, reduced flexibility can pose a challenge during installation. However, with a few practical measures, installation remains straightforward:

Storage Recommendations:

- Avoid storing pipes outdoors in sub-freezing temperatures.
- Store pipes at room temperature whenever possible to maintain flexibility and ease of handling.

Dry Pipes:

- Factory-packaged Tycroc PERT pipes are completely dry, containing no residual moisture. This eliminates the need for on-site draining or drying.

“Warmlaying” Technique:

- In extremely cold conditions, particularly in Scandinavian countries, a “warmlaying” method is employed.
- Pipes are pre-filled with a warm, frost-proof water-glycol mixture before installation. This mixture is also used to pressurize the heating system.

By following these practices, Tycroc PERT pipes can be installed efficiently and effectively, even in extreme cold climates.

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

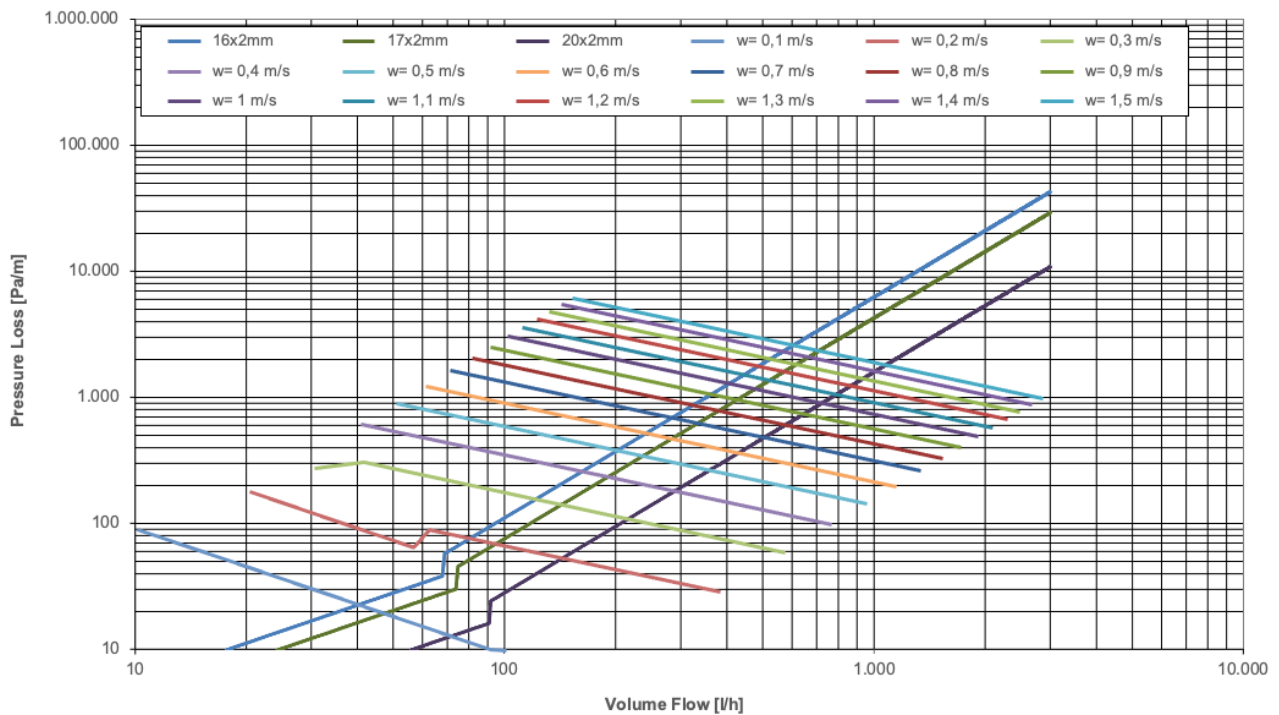
ISO 10508 CLASS 4 (floor heating)

	TEMPERATURE	LIFETIME	OVERAL SERVICE COEFICENT
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 COEFICENT
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:

The tightness of the heating circuits of the underfloor heating 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.

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)
