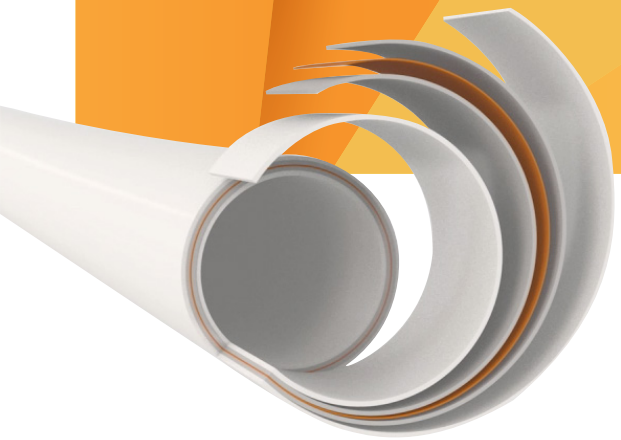


Processing instructions

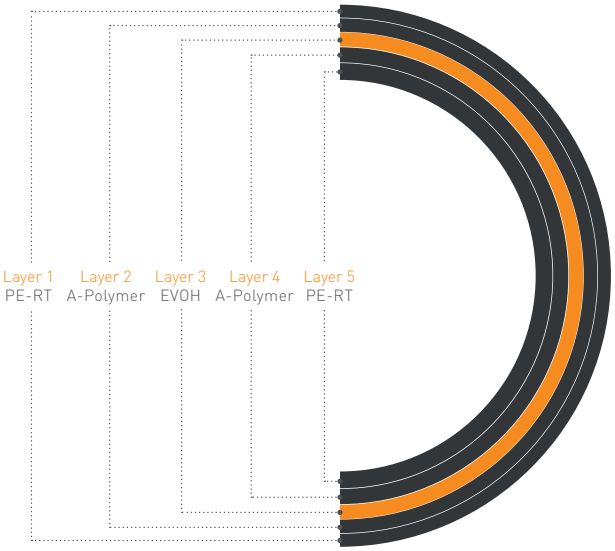
ENEFLEX 5-layer pipes

General

The ENEFLEX 5-layer pipes are made of the high-performance material PE-RT according to ISO 22319.
The ENEFLEX 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.

Application fields

ENEFLEX pipes are mainly used in panel heating and radiator connection. Other main applications include cooling ceilings, geothermal surface collectors, concrete core activation, bio-gas systems and heat recovery systems.



Standards and guidelines

ENEFLEX 5-layer pipes are produced according to the international standards DIN ISO 22391 / DIN ISO 24033 / DIN ISO 21003 / DIN 16833. In addition, according to the national standards BRL 5602, BRL 5607 and the SKZ guidelines HR 3.16. The oxygen tightness is determined according to ISO 17455 and DIN EN ISO 291 and fulfils the requirements according to DIN 4726, BRL 5602 and BRL 5607. The production and product monitoring is carried out by KIWA N.V. and SKZ Würzburg. The pipes meet the requirements of ISO 10508 class 4/6 bar, underfloor heating and class 5/6 bar, radiator connection.

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ISO 10508 CLASS 4 (FLOOR HEATING)

	TEMPERATURE	LIFETIME	OVERAL SERVICE COEFFICIENT
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
$T_{malfunction}$	100 °C	100 hours	1,0

Remark: Temperature Profile during 50 years

ISO 10508 CLASS 5 (RADIATOR CONNECTION)

	TEMPERATURE	LIFETIME	OVERAL SERVICE COEFFICIENT
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
$T_{malfunction}$	100 °C	100 hours	1,0

Remark: Temperature Profile during 50 years

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) ≤ 0.32 mg/(m^2 – d) at 40 °C (application class 4) or
b) ≤ 3,60 mg/(m^2 – d) at 80 °C (application class 5).
ENEFLEX 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.

Bending radii

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 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. Experience has shown that systems with single fixings require distances of about 50 cm to meet the above requirements.

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.

Storage instructions

Plastic pipes made of PE-RT can be exposed to outdoor weather conditions for up to 6 months. The pipes are provided with a special light protection. In case of intensive weathering, ENEFLEX 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 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.
The ENEFLEX 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.

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. ENEFLEX 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 ENEFLEX 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 ENEFLEX 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 "warm laying" 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.

Of course, no antifreeze of any kind may be used on pipes carrying drinking water and the pipes must be completely drained immediately after installation. In addition, it should be noted that the manufacturer's instructions for the tools, which often work hydraulically, must always be observed when installing press connectors.

Leak test for underfloor heating systems according 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

Leak test for underfloor heating systems according to DIN EN 1264-4

Building object/Address:

Building owner:

Heating company:

Built-in metres of heating pipe:

Pipe dimension:

System created on:

Commissioning 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.

Confirmation:

Location/Date:

Building owner/client:
(stamp/signature)

Location/Date:

Site manager/architect:
(stamp/signature)

Location/Date:

Heating engineer:
(stamp/signature)