

FACTSHEET

PE-RT

- Not just a PEX without crosslinking

Bernd Kaufmann, Johannes Stumpf

1 PE-RT - NOT JUST A PEX WITHOUT CROSSLINKING

PE-RT (polyethylene of raised temperature resistance) is produced by a special procedure that manipulates the side chains to appear very regularly with similar length. These regular side chains are able to form macromolecular superstructures that are almost as strong as the connections in the molecular chains itself and are therefore able to fix the chains in place to each other. These macromolecular superstructures are already comparably strong as crosslinking ties.

Thus, crosslinking of PE-RT is not necessary at all!

2 MYTHS AND FACTS ABOUT PE-RT

THERE IS NO EXPERIENCE WITH PE-RT PIPES

PE-RT has been developed in the 1990s and is being used since then for underfloor heating and sanitary applications in a massive scale in Europe and all over the world.

IT IS NOT POSSIBLE TO COMPARE PE-RT TO PEX

Requirements for applications are defined by ISO10508 in application classes. If a certain pressure level for a specific application class is needed and pipes made of different material have this rating they are absolutely comparable.

PE-RT IS NOT OXYGEN TIGHT

Right, as well as all other polymeric pipe materials like PEX, PE, PB etc. oxygen can diffuse through PE-RT. Therefore an additional layer of ethylene vinyl alcohol (EVOH) is needed to prevent the diffusion of oxygen in PE-RT and PEX pipes for heating applications.

PE-RT DOES NOT PASS SOME TESTS WHEREAS PEX DOES

In regard of the application (underfloor heating, tap water etc.) all relevant tests have been passed by PE-RT as well as PEX pipes. Some, for the application irrelevant properties, may have not been tested or specific standards for PE-RT have not been created.

However, they are irrelevant for the use as underfloor heating or tap water pipe.

PEX IS THE STRONGER AND MORE DURABLE MATERIAL

This is a historic myth! PEX has been invented in the 1960s and was a material with far superior long term properties as all other comparable polymeric materials that have been known at that time. This archaic fact has been used as a marketing instrument ever since then. PE-RT, invented in the 1990s, is the more modern and sophisticated material. Tests, based on application requirements, show that both materials can be considered as equally suited in regard of their long term behaviour.

PEX IS ABLE TO WITHSTAND HIGHER TEMPERATURES THAN PE-RT?

Only for a few seconds PEX is able to withstand 200°C and more. After a short while the material degrades and gets unusable.

PEX IS BETTER SUITED FOR LOW TEMPERATURES (E.G. SNOW MELTING SYSTEMS)

All PEs are very good suited for the use in temperatures below 0°C. They all have a glass transition point around -100°C. So below this temperature the material gets brittle and is not useable anymore. This is the case for PEX as well as PE-RT.

PEX'S SHORT TIME HIGHER TEMPERATURE RESISTANCE IS AN INDICATOR FOR LONGER LIFETIME

No, the lifetime of plastic is determined by long term stress curves. In the case of plastic pipes long term hydrostatic stress curves (LTHS) are used. A world wide used procedure to create these LTHS is in place: ISO 9088. Out of these curves the pipe's resp. the pipe's material properties after 50 years or more can be derived.

This is the measure for lifetime expectation!

PEX PIPES CAN BE REPAIRED BY HEAT

It is possible to get the PEX material into its original shape by applying heat, thus repairing links. However, the heat will destroy the EVOH and the adhesive layers of a multi-layer pipe used in heating applications. This creates potential weaknesses that will lower the lifetime of the complete heating system. Heat brings the material's original form back, only. This procedure can not form new molecular chain links.

Thus, it is not possible to repair holes or similar material defects!

PEX PIPES FOR TAP WATER CAN BE USED IN HEATING APPLICATIONS

Tap water PEX pipes do not have an EVOH barrier layer. Oxygen gets into the heating circuit and leads to corrosion of ferrous components.

3 ADVANTAGES OF PE-RT

PLASTIC PIPES ARE ENVIRONMENTALLY CRITICAL AND USE HUGE AMOUNTS OF RESOURCES

As long as plastic will and can be recycled its environmental footprint is not critical. Even with the additional layers (EVOH and adhesive) a PE-RT pipe can easily be recycled. However, it is impossible to recycle PEX.

IN CONTRAST TO PEX, PE-RT IS SAFE TO USE IN TAP WATER

Due to the crosslinking, regardless of the type of PEX, special ingredients have to be added to the material. Some of these substances are very dangerous to human health and the environment. If not all of these substances are being used up for forming the crosslinking they will migrate into the water thus creating a potential health risk.

PE-RT IS MORE COST EFFECTIVE THAN PEX

Thanks to the unique molecular formation, PE-RT does not need any additional crosslinking procedures (heat treatment, radiation treatment, special peroxidic ingredients etc.) and can therefore be produced resource-efficient.

PEX CAN POLLUTE THE ENVIROMENT

PE-RT does not emit hazardous substances like VOC (volatile organic compounds) into the surrounding air. Benzene, Ketone and others have already been found leaking from PEX pipes. These substances are leftovers from the quite complicated chemistry needed for forming the crosslinking. In PE-RT these substances cannot come out because they are not included in the first place because crosslinking is not required.