



PKS-THERMPIPE®

Exploiting free energy from wastewater and soil

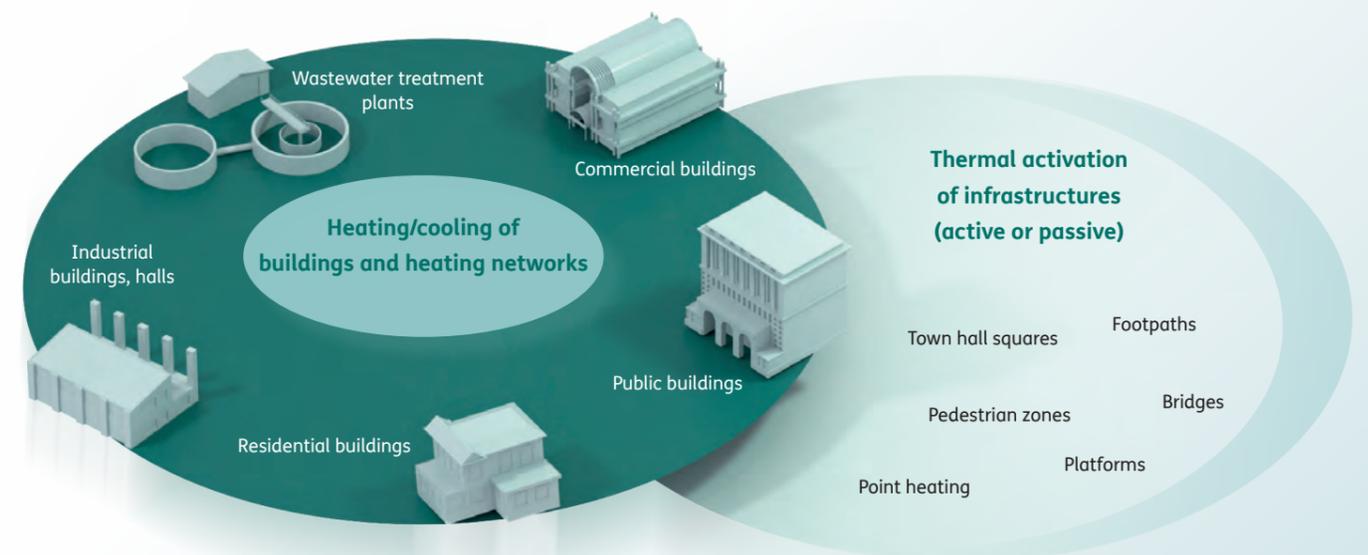


PKS-THERMPIPE®

Free energy from wastewater and soil

There is enormous potential in wastewater that is too good to “throw away”: residual heat. PKS-THERMPIPE® sewer pipes, including integrated heat exchangers, make it possible to use this free energy source for environmentally friendly building heating and cooling.

Potential uses of PKS-THERMPIPE®



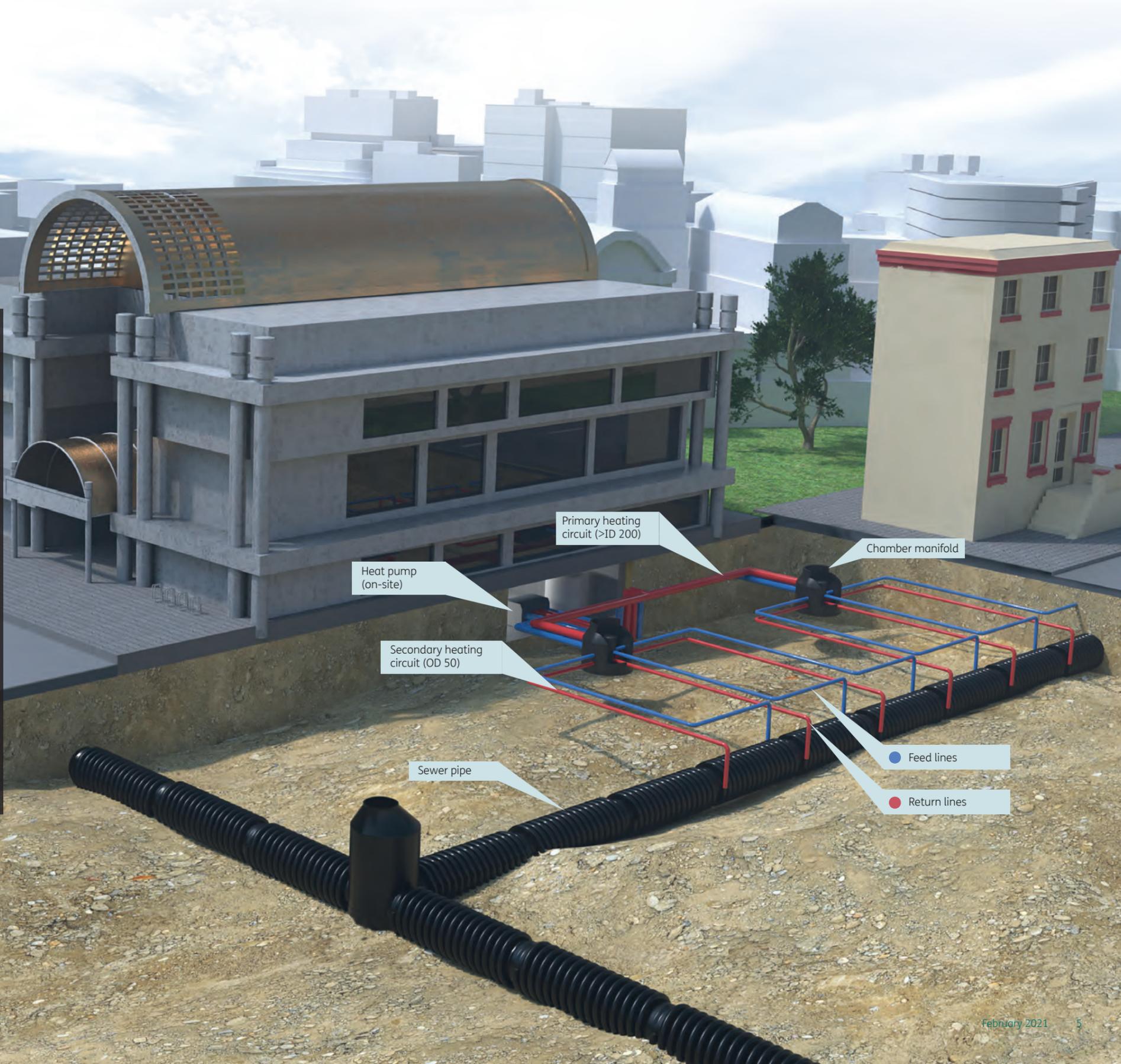
Obtain sustainable energy on site

Heating and cooling using 50% less energy

Wherever people live and work, wastewater is produced. In most cases, it is disposed of unused in the wastewater system. And this despite the fact that the free residual heat of 15 °C on average can be used directly on site using PKS-THERMPIPE®. This innovative sewer pipe system extracts the thermal energy from wastewater and the soil and transfers it to a heat pump via a secondary heating circuit. In this way, nearby buildings such as offices, hotels or entire residential quarters can be heated and cooled energetically. This saves up to 50% of the primary energy.

Plan ahead and save in the future

Even if the use of wastewater energy is not yet an issue in a wastewater system's planning phase, its heat exchanger function can be activated at a later date. Until then, PKS-THERMPIPE® can be operated as a normal wastewater pipe system. All our sewer pipe systems have a guaranteed service life of over 100 years: a sustainable investment in the future.



Well combined

PKS sewage pipe + heat exchanger = PKS-THERMPIPE®

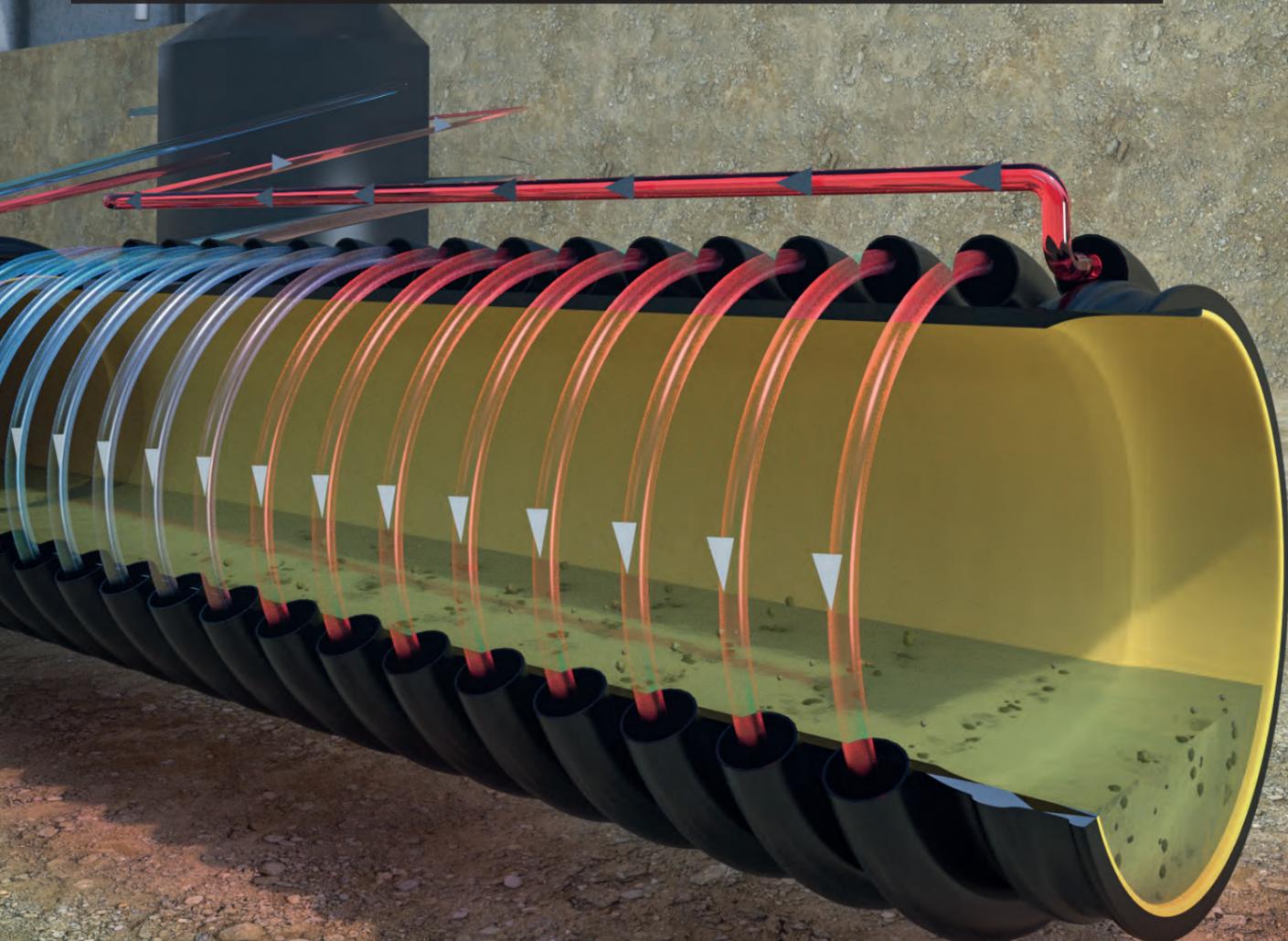
High operational reliability

Our profiled PKS sewer pipes have been successfully used worldwide in wastewater disposal for many decades. These recyclable PE 100 plastic pipes are resistant, permanently tight weldable, unbreakable and guarantee maintenance-free use.

PKS-THERMPIPE® pipes offer the same advantages, but can also be used as heat exchangers. For this purpose the outer profile is used as a secondary heating circuit, which spirals around PKS-THERMPIPE®. A heat transfer fluid circulates in it and transports the heat to the heat pump.

Constant energy supply

PKS-THERMPIPE® uses the heat of the surrounding soil as primary energy as fluctuation. Waste water provides an additional heat boost. If the thermal energy generated in this way exceeds the current demand, it is released into the ground and temporarily stored there - similar to a battery. This makes the system independent of daily fluctuation or irregular wastewater discharges. A constant energy supply is guaranteed.



Here's how it works:

Planning, design, implementation

The PKS-THERMPIPE® system's static and thermal design is project-related and is based on the structural conditions, the existing energy potential (wastewater, geothermal energy) and the energy re-

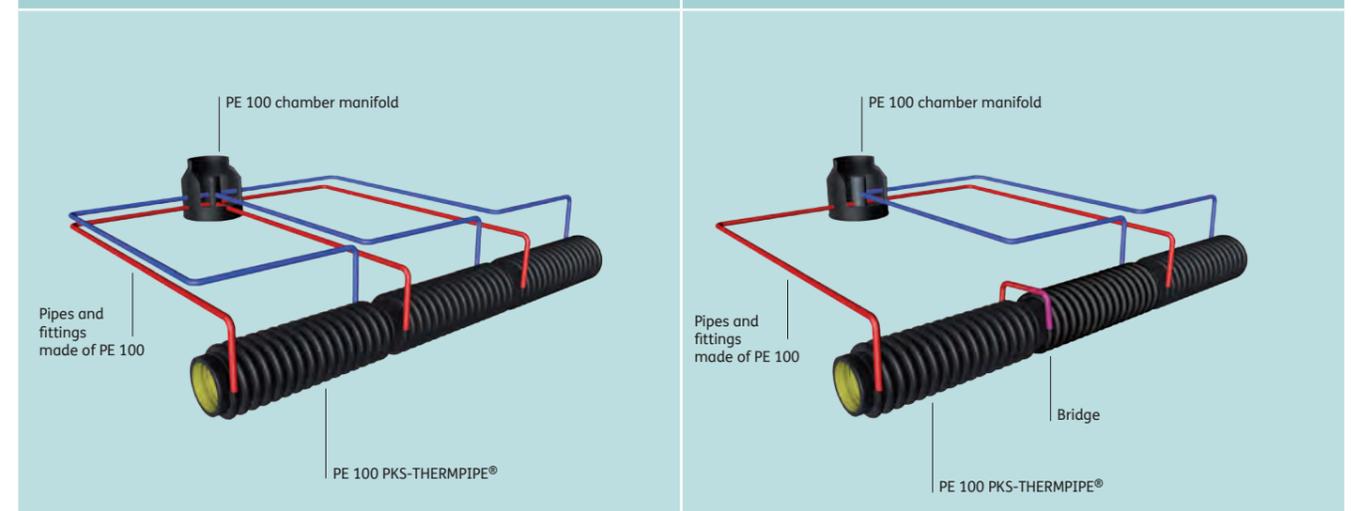
quirements of the units to be supplied. The PKS-THERMPIPE®s, which are welded together, are connected to the chamber manifold using our available fittings and pipes made of PE-100 materials.

From the chamber manifold, the pipes lead into the building, e.g. to a heat pump and thus to the energy conversion.

Energy efficiency through variable installation

For higher energy efficiency, the individual pipes are connected to the manhole in parallel: this ensures low pressure losses and makes it possible to switch off individual circuits.

Combinations of parallel and series connection are possible: minimising installation costs due to half the number of circuits and heat transfer piping.



Our services

- Support in all project phases, starting with planning, through construction to final acceptance.
- Project-specific consideration with regard to withdrawal values and performance.
- Dimensioning/transfer of your sketches/planning documents/designs to our pipe systems, taking into account the applicable standards/guidelines for sewer pipes according to ATV-DVWK-A 127 and DIN 16961.
- Complete pipe and manhole production from one source.
PKS sewer pipe system made of PE | customised prefabricated manholes | heating circuit pipes made of PE or SurePEX

From the field

Project report PKS-THERMPIPE® Weihermühle Essing

The former “Essinger Hof” inn was purchased by a craftsmen group named Bauproma in 2017 after its closure, the aim of that group was the renovation and conversion into a building with 18 residential units. For decades, the “little Blautopf” karst spring belonging to the property fed the water turbine in the basement of the inn in the Weihermühle district. When the building was renovated, use of the available water power was to be included in the concept. An essential component of the building’s renovation was integrating the water turbine into a sustainable concept for energy generation for the building.

Therefore the “old” turbine was removed. The new installation site is now in an auxiliary building that was designed purely as a technical building. The old turbine pipeline made of concrete pipes was dismantled – the underwater channel, which carries the works water back into the Weihermühlen stream and further into the old rivercourse of the Altmühl, was largely retained. The spring – with its existing concrete inlet structure was left in place. The average flow rate of the karst spring is 400 l/s at a constant water temperature of 8°C. The spring thus represents an on-going and renewable resource. Here, the real special feature is

the dual spring water usage. Due to the drop height of approx. 5.0 m between the water level of the “little Blautopf” and the underwater channel, the kinetic energy of the water can be used to generate electricity, just like in any other water power plant. Furthermore, thermal energy is extracted from the spring water and the surrounding soil. For this purpose, the headrace pipe was designed with the additional option “PKS-THERMPIPE®”.

PE 100 pipes’ positive material properties could be exploited for the laying of the headrace channel. The individual pipes were connected using the integrated e-socket. In this way, the individual pipes could be welded by material engagement, with guaranteed tensile strength and permanent tightness. Furthermore, due to its flexible material, the pipe line could be laid without bends (and thus without hydraulic losses) to suit the terrain. Another advantage of PE 100 service water pipes is their absolutely smooth and abrasion-resistant pipe surface. Thanks to the measures described above, the renovated residential building

can now be supplied with thermal energy entirely from renewable sources. To this end, a combination of water power and energy generation from water and soil is used. The approx. 9 kW of electrical power generated by the turbine is used for operating the heat pump. The energy extracted from the spring water and surrounding soil of approx. 40 kW (cooling power) is supplied to the heat pump via the brine manifolds.

Scope of supply:

- 30 m PKS-THERMPIPE® ID 800 (5 pipes)
- 6 m PKS spiral pipe ID 800 (1 pipe)
- 5x PE-100 pipe, blue, d50, SDR11, coiled bundle of 50 metres each
- 1x PE-100 pipe, blue, d63, SDR11, coiled bundle of 300 metres each
- 1x compensating bend ID 800 PKS
- 1x fitting piece ID 800 PKS for length adjustment on site
- 2 wall tie-in systems ID 800 TP for existing buildings
- 1 conical transition component ID 800 TP to turbine connection with deposited stainless steel flange and flushing connection
- 4 Frank brine manifolds incl. mounting structure(s)
- all utensils required for welding (welding machine and welding set as well as socket pressure tester)

FRANK services

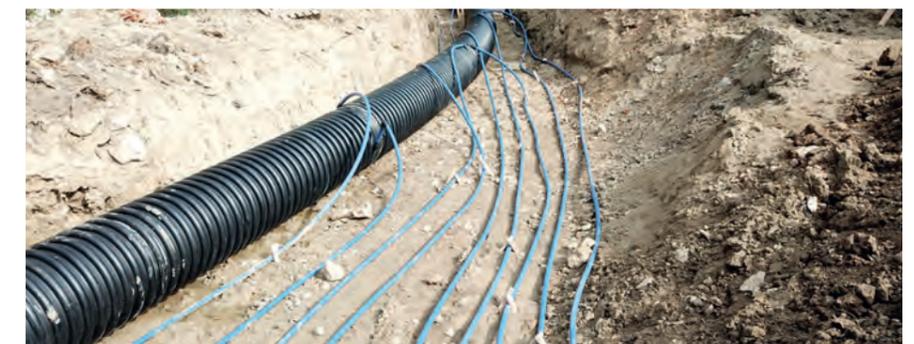
- Project planning and design of the sewer pipe section
- Support with energy-related technical design
- Site supervision incl. training of laying personnel



Overview of the drive water channel / PKS-THERMPIPE® ID 800 from the “little Blautopf” (right) to the turbine (left)



Brine manifold for the circuits



PKS-THERMPIPE® ID 800 with connected fluid pipes approx. 50 mm

From the field

PKS-THERMPIPE® property report Wimaria Stadion (Weimar)

As part of a research project, a section (36 m) of an existing concrete canal in Weimar was equipped with the PKS-THERMPIPE® system. Its heating capacity is approx. 22 kW. The heat is used in a sports facility (heating and service water heating). The existing gas heating system was expanded to include heat pump technology. The pipes lie at a bed depth of approx. 4.5 m and transport the wastewater of the approx. 5,000 inhabitants of Thuringia's fourth largest city. The wastewater volume is approx. 14 l/s at tempera-

tures between 15 and 20 °C. In addition to the components already mentioned, which were installed in the ground, further investments were made in the heating system area. In addition to a high-temperature heat pump of the type SWP 270 H (heating: capacity: 26.5 kW) and two multifunctional storage tanks (MFS 830 S) with 830 l each for the drinking water supply and a separating buffer storage tank of the same size, various measuring devices were also installed to document the system's performance.



Scope of supply:

- 36 m PKS-THERMPIPE® ID 500 (pipes, 1 fitting piece incl. manhole connection socket and puddle flange)
- Electro fusion socket d 560 mm
- Manhole type 1 with horizontal manifold set
- 300 m PE-100 pipe d 50 mm, SDR 11
- Electro fusion fittings d 50 mm in SDR 11 for heating circuits

FRANK services

- Project planning and design of the sewer pipe section
- Site supervision incl. training of the laying personnel

External power

Thermal design and optimisation of plant parameters by the Forschungsinstitut für Tief- und Rohrleitungsbau Weimar e. V. (FITR).



Possible applications

PKS-THERMPIPE® generates sustainable energy ...



... for authorities



... for shopping centres



... for schools



... for swimming pools



... for hospitals



... for hotels ...

Requirements for wastewater energy recovery

1. Densely developed residential or industrial areas with relatively large wastewater volumes (dry weather flow ≥ 15 l/s).
2. Customers with a correspondingly high heat demand ($\geq 50 - 200$ kW). These can include, for instance: schools, kindergartens, public authorities, shopping centres, hospitals, hotels, swimming pools, larger residential units, etc.
3. Short distances (approx. 100 m, max. 500 m) between heat recovery plant and sewer
4. System temperature for heat recovery (return pipe) not exceeding 50 °C (the lower, the better)

Product range

PKS-THERMPIPE® pipes

Guideline values for PKS-THERMPIPE® system abstraction rates

ID	Q [W/m]	ID	Q [W/m]
500	550	1300	1320
600	640	1400	1420
700	740	1500	1520
800	840	1600	1610
900	930	-	-
1000	1030	-	-

Larger nominal diameters on request



PKS-THERMPIPE®

These pipes are statically designed for specific projects in accordance with ATV-DVWK-A 127 and produced in accordance with DIN 16961. The project-specific design or the production adapted to it guarantees the user an economically dimensioned pipe system with optimum stiffness.

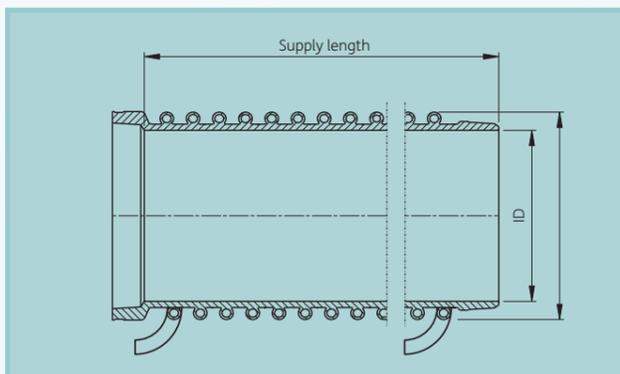
- Standard length 6 m (special lengths on request)
- Nominal widths from ID 500 - ID 1600 (larger on request)
- made of PE 100
- with a bright-coloured, DIBt-approved moulding material for the inner layer (F100+)

Connection techniques

- as welding system (integrated electro fusion socket)
- as plug-in system (with double sealing)

Requirements for PKS-THERMPIPE®

1. Renewal / new installation
2. Collectors with no / few house connections (discharges potentially via manholes)
3. Bivalent heating system at the consumer



Product range

PKS-THERMPIPE® chamber manifold

PKS-THERMPIPE® chamber manifolds

The connection pipes of the THERMPIPE sections' individual brine circuits are combined at one or more central points in chamber manifolds. These chamber manifolds, which are completely pre-assembled at the factory, facilitate the system's connection and commissioning. All necessary shut-off and regulating valves are already pre-assembled. This simplifies flushing and breathing and enables the system to be hydraulically balanced.



High-quality balancing valves enable exact hydraulic balancing in the event of differing connecting pipe lengths and ensure the optimum thermal utilisation of each pipe section.

The chamber manifolds are equipped according to the project or exactly to the customer's requirements. In the case of increased static requirements, from pressing groundwater to truck traffic load, the suitability is documented by means of a verifiable structural analysis.

Thanks to the manifolds' adaptable design, a suitable solution can be found for every system size.

- Chamber sleeve and base made of PE material
- Shaft diameters from 400 mm to 2000 mm
- available for loads ranging from passenger to heavy loads



Connecting pipes at the chamber manifold in horizontal design



Manifold components in the chamber

FRANK

Personal. Flexible. Competent.

Plastic pipeline systems are an indispensable part of today's world. They are widely used in gas and drinking water distribution systems, cooling and heating installations, sewerage networks and many other fields.

Our system solutions made in plastic have stood the test of time: for over 50 years, the FRANK Group has been among the leading suppliers of plastic pipes – offering everything from standard straight sections to custom-engineered solutions.

Do you have any queries? Please don't hesitate to contact us!

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We supply tried and tested plastic piping systems made in PE, PP, PVDF and ECTFE that are being optimised and improved on an ongoing basis. In addition to tubes, pipes and fittings, we provide welding and other connection techniques, plastic valves, semi-finished goods, geosynthetics, accessories for biogas plants and components for shallow geothermal systems.



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