District Heating Networks

Why Aquatherm?
AQUATHERM PP-R CAN IMPROVE THE DE-CARBONISATION OF HEATING IN THE UK

Since the 1st Generation of Heat networks which provided heat with steam, there have been many technological advances which now allow us to run district heating networks at much lower temperatures, reducing heat loss from the network and also reducing the amount of carbon emissions from the network.

WHAT IS DISTRICT HEATING?

District Heating (or Heat Networks) is a system of underground pipes that can distribute heat for residential or commercial heating requirements from a centralised Combined Heat and Power (CHP) Unit.

WHY IS DISTRICT HEATING BEING DEVELOPED?

Europes goal is to reduce its carbon emissions by 80% in 2050 from 1990 levels. District heating is key to reducing carbon emissions from the current levels emitted from heating residential and commercial properties. More efficient ways of delivering the heat has resulted in temperatures of the water in district heating being reduced to between 50 and 90°C for the 4th generation systems. 

Delivering the heated water with minimum heat loss and maximum efficiency is where Aquatherm PP-R excels.

Aquatherm pipes help reduce carbon emissions in the production process, right through to the delivery of the heat to the properties.

DISTRICT HEATING BENEFITS OUR ENVIRONMENT.

District heating reduces Greenhouse gas emissions through the use of a wide range of low carbon and renewable heat sources. It will improve the security of energy supply by diversifying the energy sources for heating and reducing our dependance on fossil fuel imports. Aquatherm will improve the efficiency of how the heating is delivered, whilst also offering a supply of heat that is good value and contributes to reducing fuel poverty.
Environmental protection is taken very seriously by Aquatherm! Our Aquatherm PP-R pipe systems feature not only a long service life, but also excellent environmental and social compatibility. From the origin of the company, Aquatherm has placed emphasis on the fact that its products and manufacturing processes should not pollute our sensitive ecosystems, and ensured development of fully recyclable materials which can be added, problem-free, to new production.

Aquatherm PP-R also stores energy, so this can be recovered during the recycling process to further reduce the environmental impact of Aquatherm PP-R.

A key purpose of a heat network is to help meet our climate change goals. Heat losses from the network and electricity used for pumping and other purposes need to be taken into account in the CO2 emissions calculations when determining the feasibility of heat networks.

When comparing Aquatherm's EPD (1m of DN20) with a steel equivalent (SSAB 1kg converted to 1m of DN200), steel gives a Global warming potential of 3 times that of Aquatherm PP-R per meter of pipe (DN200)\(^1\&2\).

Because Aquatherm PP-R doesn't corrode or scale, pumping power will not need to be increased, meaning that electrical energy for pumping won't need to be increased during the life of the system reducing the carbon emissions compared to a steel system.

Aquatherm pipes have a smooth inner wall which allows the heated water to flow with less resistance than with a metal pipe.
HEALTH AND SAFETY

Reducing health and safety risks is of primary importance in any project. Aquatherm can help you achieve an injury free environment.

Fusion welding of Aquatherm PP-R pipes is carried out by using a heat plate to heat both sections to be fused together. When put together, the two heated sections fuse to make one length of pipe.

This process not only removes the need for naked flames and hot works permits, but it also give a more secure connection than that can withstand impacts as well as the rest of the pipe due to the strength and flexibility of the pipe and connections.

Along with the speed of installation, due to the light weight of Aquatherm PP-R compared to steel alternatives, manual handling is less of an issue. So Aquatherm PP-R can help you to sustain an injury free environment.

Aquatherm PP-R doesn’t required the use of any solvents or chemicals so there are No COSSH assessments required for Aquatherm piping systems.
The cost of heat networks is a major barrier to their implementation. Costs should be minimised over the life of the asset, but with due regard for opportunities for future proofing. The cost of using Aquatherm PP-R can reduce installation costs as well as giving the options to easily connect to other services with our range of easily fitted Aquatherm adaptors.

Aquatherm PP-R pipe fusion is much quicker than welding the steel equivalent. A butt fusion joint on a DN200 Aquatherm PP-R SDR 11 pipe takes 6 mins to heat and 35 mins to fuse and cool. That's 41 minutes to connect 2 lengths of DN200 pipe. Compare that to steel (approx. 4 hrs to weld DN200 sch. 40 and 2hrs for Sch. 20) and you can see that there are massive savings to be made on installation which will contribute to making the whole project more viable.

Due to the flexibility of Aquatherm PP-R, the route of the network could possibly take a more direct route than if other materials were used, as circumnavigating existing services can be carried out easily and quickly. Our Prefabrication service can also allow for sections to be fused off site and shipped to the site ready to fit saving on site fitting time.

Aquatherm's fusolen PP-R has excellent insulation values of just 0.15 W/(mK) and coupled with the excellent properties of the PUR insulation (0.03W/(mK)) in our pre-insulated pipes (Aquatherm ti), fitting our pipes in above ground routes such as service areas for buildings should not be a problem. The high impact resistance of Aquatherm PP-R will also reduce the risk of accidental damage. This could save significant capital costs of avoiding above ground installation.

Aquatherm PP-R's weight is a big advantage to the system as this allows for different installation methods for district heating systems, including horizontal directional drilling or the pull-through technique.

To allow for a complete polymer system to give optimum performance and a speedy install, Aquatherm have teamed up with REHAU to allow you to install a perfect combination of polymer pipes direct from the Heat source to the properties. Enquire at info@aquatherm-uk.com for more information.
The GaBi 2015 LCA data set (GaBi 6 software system for life-cycle engineering, developed by think-step) for polypropylene states 55% of the embodied energy within polypropylene can be utilized in the recycling or recovery process; therefore, only 45% of the PED for PP-R is actually from consumed energy in the original material manufacturing.

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LIFE CYCLE

A heat network is a high capital cost asset and usually needs a long period to provide a sufficient return on investment. It is therefore essential that the network is designed for a long life and low maintenance requirements.

Aquatherm PP-R can easily withstand the required temperatures and pressures required for 4th Generation District heating systems. As the energy efficiency of properties improve, the heat supplied can be reduced and when the heat is reduced, the life expectancy of the Aquatherm PP-R system will increase.

The life expectancy within the 4th generation district heat range can even exceed 100 years in the right conditions.

For exact / project specific service life information and system warranties, please feel free to contact us on technical@aquatherm-uk.com or call us on (01444) 250500 and we will be able to supply you with the specific information for your project.

If district heating systems were to be combined with Aquatherm Orange System or Aquatherm Black system, this would facilitate the reduction of the heat supplied to buildings, prolonging the life of the system and saving energy required to produce the heat.

Aquatherm PP-R pipes are available as Aquatherm OT (Oxygen Tight). These pipes have an Oxygen Barrier fitted to make the pipe oxygen tight and thus conform with the requirements of DIN 4726.

The Performance of Aquatherm PP-R pipes should not deteriorate during its life. This is because our pipes do not scale or corrode. This means that chemical cleaning or use of a pig isn't required. This will reduce maintenance costs and reduce the time that the system is to be taken out of service for maintenance.
SO WHY AQUATHERM?

District Heating has changed for the better, and now it’s time for us to do the same. Why choose 1st Generation systems (like steel) with 4th Generation developments when Aquatherm can help you to maintain an injury free environment, whilst also helping to reduce carbon emissions and substantially reduce the installation time of a project, saving costs and making the project more viable.

Aquatherm PP-R weighs less than steel. 1m of 200mm Steel = 42.5kg, 1m of 200mm Aquatherm = 10.6kg. This will reduce the manual handling issues on site.

Aquatherm PP-R has a pipe K value of 0.16 compared to Steel K value of 43.

Aquatherm is more environmentally friendly in production and operation than steel. EPD’s show, that based on 1 meter of DN200 pipe, Aquatherm’s Global Warming potential (GWP) is 1/3 of the GWP for steel tube (SSAB EPD) production on a cradle to gate basis1&2.

Below are just some of the many advantages of Aquatherm piping systems:
• Flexible - improves installation options
• Oxygen tight - conforms to DIN 4726
• Corrosion resistant - Aquatherm pipes will never corrode
• High heat stability - Aquatherm pipes will easily handle temps required for 4th Generation district heating
• High impact rate - Aquatherm pipes can handle impact, which can prevent repairs being required from accidental damage.
• No build up of scale - Scale does not build up in Aquatherm pipes, reducing pumping energy required and regular de-scaling of pipes.
• Requires less maintenance - Aquatherm pipes do not require the use of pigs to clean. Once installed they should be problem free for their life cycle.
• Easily adaptable - easy to fit adaptors allow for Aquatherm to be connected to other systems, and easy installation allows for easy diversion around obstacles.

Aquatherm UK offer training at our Offices or we can come to you and provide the required training.

Don’t just take our word for it though. When we asked a customer why they used Aquatherm ti pre-insulated pipe on a recent district heating project in the UK, as well as the installation savings, they added that,

“Using Aquatherm PP-R avoids the requirements for expansion loops as the pipe is self-compensating. This reduces site time significantly and minimises the need for extensive traffic management and improves the customer experience of the installation works”.

Corrosion and scaling within steel pipes cause higher pumping rates, using more energy which defeats the object of district heating. Aquatherm PP-R pipes do not scale or corrode giving optimal performance for their entire service life.

References