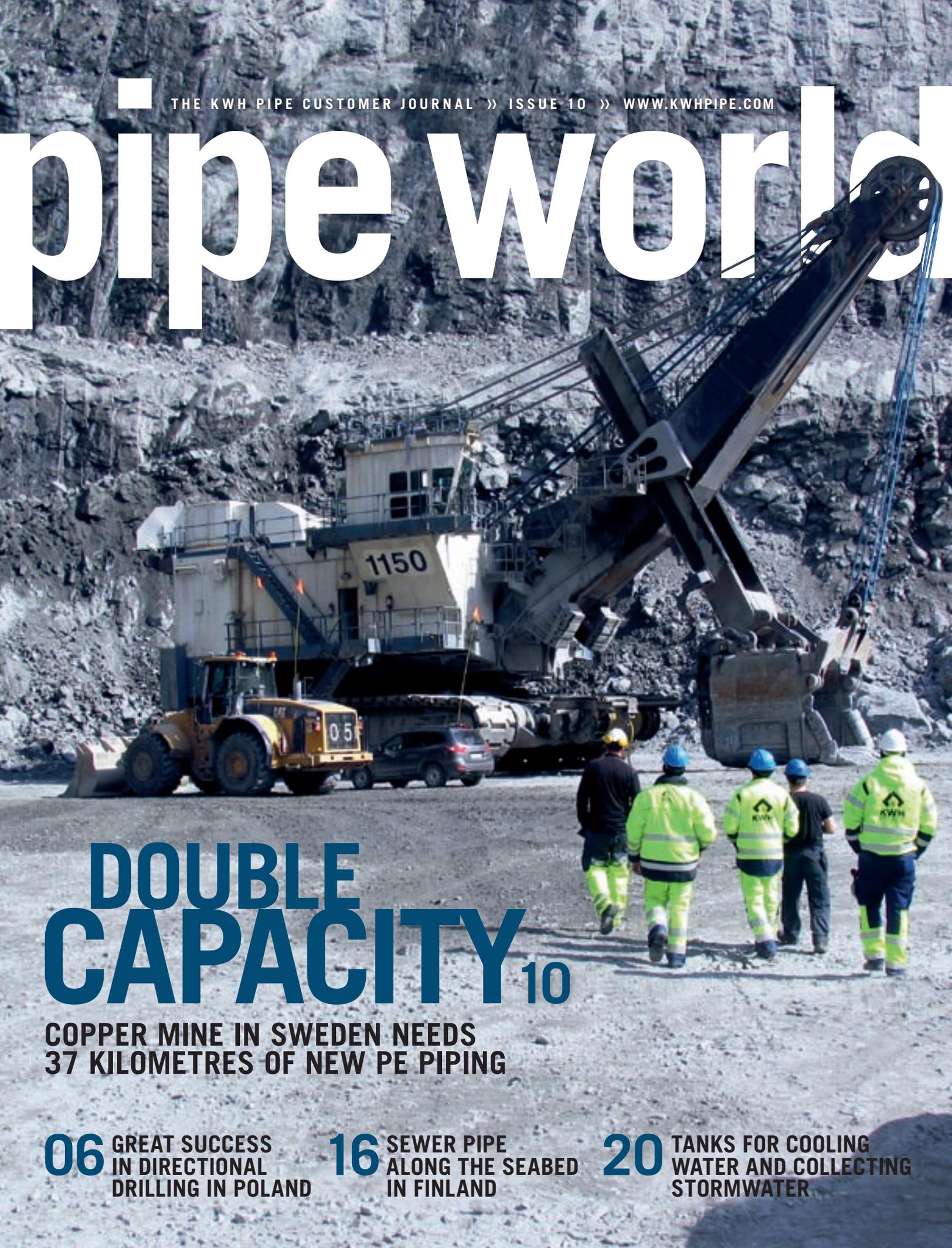


pipe world



DOUBLE CAPACITY₁₀

**COPPER MINE IN SWEDEN NEEDS
37 KILOMETRES OF NEW PE PIPING**

06 GREAT SUCCESS
IN DIRECTIONAL
DRILLING IN POLAND

16 SEWER PIPE
ALONG THE SEABED
IN FINLAND

20 TANKS FOR COOLING
WATER AND COLLECTING
STORMWATER

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more than a complete district heating pipe system

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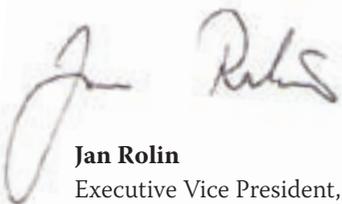
EDITORIAL

“Energy” and “financial crisis” seem to be the words on everyone’s lips these days. The difference between the two is that the financial crisis will pass, but the need for energy will not decrease. This means that the trend towards better energy efficiency will continue. The current slow-down in the economy in combination with stricter environmental policies will only put further pressure on higher energy efficiency. This, of course, is also something for which Mother Nature will be grateful.

The use of combined heat and power plants is one step in the right direction, another step is to realise how to create a balance in the use of different types of energy. To use electricity for heating is, for example, less energy efficient than using district heating, as these two are created in the same process. Consideration also needs to be given to local resources and which types of fuel are the most energy efficient in respect to local conditions.

During the last few years, district energy networks have been built and expanded at a much higher rate than before. In the early days of electricity production the energy created during cooling was not utilised. Hot water, created through cooling the process in the combined heat and power plant, is transported underground in pre-insulated piping systems to individual buildings for heat or industrial use. The district heating network functions as a cooling load for the production of power and heat and by using district heating from the cooling load, the efficiency of the whole system increases.

It is up to ourselves, both companies and individuals, to make thoughtful choices about how we use our energy. In this respect, KWH Pipe is contributing by reducing waste and optimising the use of energy at our factories. We are committed to taking responsibility for a more energy efficient future together with our customers and partners.



Jan Rolin

Executive Vice President, District Energy



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SAFE STORAGE OF COMBUSTIBLE SUBSTANCES

KWH Pipe has developed antistatic Weho tanks for the storage of combustible substances. They are conductive both inside and outside, and, unlike certain materials, the conductivity does not decrease with time.

Antistatic Weho tanks are a safe and reliable option for the storage of combustible substances for industry and energy applications. They can be installed horizontally or vertically at any angle, under or above ground. Tanks can be tailor-made with compartments, pump shafts and manholes and, if needed, combined with WehoAntistatic pressure pipes to form a complete system.

MEKONG WATER PROJECT

The Dong Tam BOO (Build-Own-Operate) Water Supply Project is a multi-million dollar project in the Mekong Delta of the Tien Giang Province in Vietnam. The project was developed by CII, a public listed company based in Ho Chi Minh City, and its partners. The project is being implemented by CII's subsidiary Dong Tam Water BOO (DTW), and managed by GDH, an Australian consulting firm.

The project includes a new intake and water treatment plant with a capacity of 90,000 m³/day and incorporating 45 km of clean water mains constructed from DN/OD 900mm and 800mm pipes. The project started in early 2008 and is scheduled to be ready for operation in 2010. DTW decided to use PE-HD pipe. The supplier and manufacturer of the WehoPipe piping system is Wiik & Hoeglund Plc, KWH Pipe's subsidiary in Thailand.

Recently, approximately 5 km of pipeline was installed. The local contractor has been very pleased with the progress, and the production rate over the last two months indicates that the project will be finished ahead of schedule.

FASTER, LIGHTER AND STRONGER

Steel manufacturer chooses water storage tanks made of polyethylene.

Siam Yamato Steel Company Ltd, a recent customer of Wiik & Hoeglund, is a leading Japanese-Thai joint venture specialising in manufacturing large hot-rolled structural steel. They state that the performance of their factory in Thailand depends on the efficiency of their water management system.

In early 2008, Siam Yamato built a new factory on Maptaphut Industrial Estate. Hydrotek Company, Ltd, the contractor responsible for this turnkey project, recommended the use of Weho tanks, PE-HD water storage tanks developed by KWH Pipe.

"In this project we needed to place the water storage tanks up on a tower 40 metres from the ground," says

White is the lucky colour for Siam Yamamoto.

Mr **Sakarin**, Hydrotek's on-site engineer. The purpose of the tanks is to use a high-rise water storage system and utilise the natural gravity flow to provide a pressurised water service for the factory. "Weho tanks are highly durable and their life span is three times longer compared with similar tanks made of concrete. Moreover they have lower maintenance costs and the light weight of the tanks made them very suitable for this particular project compared with concrete or steel. We needed to use only a medium size crane instead of a gigantic machine to lift the Weho tanks up on to the tower, which certainly saved us a lot on installation and machinery costs", Mr Sakarin confidently states.

Two Weho tank units with an internal diameter of three metres and each able to contain up to 120 m³ of water, were prefabricated at Wiik & Hoeglund Plc's plant. The prefabrication procedure was three times faster than the production of steel tanks.

The Weho tanks, with a total capacity of 240 m³, have successfully passed the on-site testing and stand ready for use at the production facility at the new factory.





Jan Rolin



Peter Engstrand



John Reinlund



Tina Hellman



Mathias Skog



Nina Tyni



Paweł Radzikowski

KWH Pipe Group

Mr Jan Rolin, B.Sc. (Eng.), has been appointed Executive Vice President, District Energy, and a member of KWH Pipe General Management Team as of August 1st, 2008. He has previously worked as Director for District Energy in the European organisation. Mr. Rolin continues as Director for KWH Thermopipe.

Mr Peter Engstrand, M.Sc. (Econ.), has been appointed Executive Vice President, Europe, for the plastic pipe businesses and a member of KWH Pipe General Management Team as of August 1st, 2008. He has previously worked as Factory Director, Scott Health & Safety Oy.

KWH Pipe Holding

Mr John Reinlund, M. Sc. (Econ.), has been appointed Manager, Business Development and Marketing, as of August 1st, 2008. He has previously worked as Marketing & BI Coordinator at KWH Pipe Holding.

Ms Tina Hellman, M. Sc. (Econ.), has been appointed Marketing & BI Coordinator, as of October 1st, 2008.

KWH Thermopipe

Mr Mathias Skog has been appointed Product Manager for pre-insulated piping systems as of September 1st, 2008. He has previously worked as Project Engineer in KWH Thermopipe's sales.

KWH Pipe Finland

Ms Nina Tyni has been appointed Sales Manager for environmental products as of August 15th, 2008. She has previously worked as District Manager in western Finland.

KWH Pipe Poland

Mr Paweł Radzikowski, M.Sc. (Eng.), has been appointed Production Manager as of June 1st, 2008. He has previously worked as Operations Manager for Sonoco.

WEHOLITE USED FOR DETENTION AND SETTLING TANKS IN BREDEVOORT

The municipality of Aalten in the Netherlands needed a system for running the city of Bredevoort's sewage to the sewage treatment plant in a dosed fashion. The council decided that they needed a detention and settling tank; a buffer in which the sewage could sink and then clean water could flow out. By releasing the sewage system, the sunken sewage water could be pumped back out of the tank and into the sewage system.

After consultation with NKI Neede, KWH Pipe's distributor in the Netherlands, the council chose detention tanks made of polyethylene. The detention and settling tanks were manufactured in NKI Neede's special production hall. The tanks were made of Weholite pipe.

The benefits of a detention and settling tank made of Weholite include the potential for building the tank from start to finish in the production hall, the light weight of the pipe, and its lifespan compared with concrete pipes, just to name a few. The speed at which a polyethylene tank can be installed is also a significant advantage.

In Bredevoort, this task was finished within one day.

www.nkineede.nl



PROSHOP AT KWH PIPE IN DENMARK

For customers who only occasionally use equipment for welding plastic pipes, investment in own machinery might be too expensive. In Denmark, KWH Pipe has therefore started a ProShop concept, where it is possible to hire welding equipment instead of owning it yourself. Here, customers can find everything from electrofusion or butt-fusion welding machines to scraping tools. The ProShop concept has been available in Finland for several years.

A complete list of all available equipment for hire and prices can be found at the website www.kwhpipe.dk.



Great success in **DIRECTIONAL DRILLING**

In 2007 record-length large-diameter pipelines were installed under the Oder river in Szczecin in northwestern Poland by means of horizontal directional drilling (HDD).



The “Improvement of water quality in Szczecin” programme, which was approved for implementation in 2000, is one of the largest pro-ecological projects in Central and Eastern Europe in recent years. Valued at EUR 288 million, including an EUR 190 million grant from the Cohesion Fund (formerly ISPA – Instrument for Structural Policies for Pre-Accession), the programme is aimed at upgrading the city’s water supply and sewage treatment system.

For years, Szczecin has depended on an outdated water and sewage network as well as on inefficient mechanical-chemical wastewater treatment plants. The result has been low-quality drinking water, seasonal water shortages in parts of the city and heavy pollution of the Oder and the Baltic Sea. The situation was problematic not only for the city’s 400,000 inhabitants. The low efficiency of the municipal water supply and sewage network as well as the popular perception of Szczecin as a major environmental polluter discouraged potential investors and stifled the city’s economic growth.

Navigating through Szczecin’s busy city centre

The key element in the programme is the construction of the mechanical-chemical-biological Pomorzany wastewater treatment plant along with a delivery network of four pumping stations with pressure pipelines. The construction contract for two of the pumping stations, Białowieska and Górny Brzeg, together with the delivery network, was signed in 2005 and work is currently under way at Grabów and Dolny Brzeg. The record-length horizontal directional drilling (HDD) crossings under the Oder were carried out as part of the installation of the delivery pipelines.

Grabów and Dolny Brzeg pumping stations service a drainage area covering the central and northern parts of Szczecin. As this is a combined reception area of fluming sewage systems, the pumping stations and pipelines are designed to pump sewage during dry as well as wet weather. The capacity of the Grabów pumping station is 3,420 cubic metres per hour during dry weather and 6,480 cubic metres per hour during wet weather. Excess water collected during rainy weather is redirected to a retention reservoir. The capacity of the Dolny Brzeg pumping station is 1,080 cubic metres per hour and 4,968 cubic metres per hour respectively. Sewage from both pumping stations is transported to the Pomorzany treatment plant by two parallel pressure pipelines, both over 12 km long. During dry weather and periods of low precipitation only one of the pipelines will be in operation. During wet weather, sewage is pumped through both pipelines.

The location of the pumping stations and the treatment plant posed a challenge. The pumping stations are situated in the northern part of Szczecin whilst the Pomorzany treatment plant is located in the south. Due to the distance between the pumping stations and the treatment plant, the pipeline path cut through a busy city centre, including two crossings under the Oder and one under Kanał Parnicki. Such a daunting engineering task called for a contractor with significant experience in large-scale water management projects. After a tender, the contract was awarded to Hydrobudowa 9 P.B. S.A. Poznań. KWH Pipe, which had previously delivered the pressure pipeline for the Górny Brzeg pumping station, was entrusted with the delivery of the polyethylene pipes for the project.



The experience of the contractor and the use of WehoPipe pressure pipes allowed for successful completion of this challenging task.

Taking into consideration the difficult installation environment and the wish to minimize the burden on the city’s inhabitants, the contractor decided to employ three different technologies for installing the pipeline: open trench technology, microtunneling and horizontal directional drilling (HDD), which was used to construct the six longest trenchless crossings with a total length of 3 km.

The majority of the installation work was carried out using open trench technology. Microtunneling was used to a limited degree, most notably under key junctions, which could not be closed to traffic i.e. under Dubois street (4 x 140 m of DN/OD 800 mm pipeline), Floriana street (2 x 260 m of DN/OD 1,000 mm pipeline) and Jana z Kolna street (2 x 204 m of DN/OD 1000 mm pipeline). Sections of the pipeline installed using the open trench and microtunneling technology consisted of standard PE-HD pipes DN/OD 1000 x 59,3 PN 10 SDR 17 delivered from the KWH Pipe production plant in Kleszczów in central Poland. KWH Pipe also provided a welding machine and a service team, which handled most of the welding.

Exceptional demands

Even though standard WehoPipe pressure pipes proved adequate for sections of the pipeline laid using the open trench and microtunneling methods, installation using HDD technology over long distances at approximately 20m below ground level required pipes with a reinforced structure. As noted by **Przemysław Brzeziński**, who was jointly responsible for installation work on behalf of Hydrobudowa 9, this is due to the characteristics of HDD tunnels and the installation process. **Waldemar Musiolik**, a KWH Pipe representative for the project, confirms that pipes used in directional drilling must meet exceptional demands: "The pipes are pulled through underground tunnels over considerable distances. Therefore, they must withstand the associated loads."

The contractor opted for pipes with an increased wall thickness. Following discussions with KWH Pipe's technical department and experts in directional drilling, a decision was made to use customized WehoPipe DN/OD 1033.2 x 75.9 SDR 13.6 MOP 12.5. The wall thickness was increased towards the outside, leaving the inner diameter identical to that of a standard pipe (881.4mm). The greater wall thickness translated into increased tensile strength for the pipe, which is of vital importance during this kind of installation with important consequences for the pressure of the transported medium.

The construction of the HDD tunnels was exceptionally challenging due to difficult geological conditions. Even during pilot drillings the installation team encountered numerous obstacles, such as brick and concrete blocks near the outlet of one of the bores and steel objects under the Oder riverbed. The pipes were manufactured and delivered to the installation site in custom-length, 15-metre sections in order to minimize the number of pipe joints.

Digging deep to break the European record

The route of the pressure pipelines connecting the pumping station Dolny Brzeg with the Pomorzany treatment plant runs parallel to the Oder river starting on Jana z Kolna street, passing by Wyspa Pucka (Pucka Island), along the banks of Kanał Parnicki and further through floodland in the inter-embankment zone. The closeness to the river required the use of special technologies. Trenches along Jana z Kolna street were, for example, reinforced with sheet pile and dewatered with wellpoints. Crossings under the Oder and Kanał Parnicki were performed using HDD.



Drilling began at the end of July 2006, when the first three pilot holes were drilled under the Oder on the route leading from the Customs Office to Trasa Zamkowa. The second crossing, under Kanał Parnicki, starts on Bulwar Gdański and ends between the channel bank and Marynarska street on Wyspa Pucka. The second crossing on the Oder runs from Wyspa Pucka to the Pomorzany treatment plant. Pilot holes on the latter two routes were drilled between November and December 2006 and in January and February 2007.

The first pilot hole near the Customs Office was enlarged in December of 2006. This was soon followed by the introduction of a 460-m-long section of the pipeline. Four weeks later, a second, 465 m pipe was installed. In both cases the operation was largely trouble-free and took around 8 hours.

Construction work under Kanał Parnicki took place in February 2007. Two pipes, 360 and 570 metres long, were installed within a few weeks of one another. Due to a restricted amount of space near the crossing, the pipelines were welded on Wyspa Pucka, floated and then towed to the installation site by tugboat. The entire shorter pipe was pulled out of the water and placed on rollers. The longer section was introduced into the tunnel directly from the channel. This was the first time in Poland that a pipe this size was transported and brought into operation almost entirely from the water. Installation of the two pipes took five and eight hours respectively.

Installation in the vicinity of Wyspa Pucka was carried out between March and April 2007. The 620 and 626 m long pipes, installed in nine and eleven hours respectively, set a new European record for the length of large-diameter pipeline



The project took place in the heart of a functioning urban agglomeration in Szczecin, under demanding hydro-geological conditions.



The pipes were pulled over considerable distances. The difficult installation environment and the wish to minimize the burden on the inhabitants were taken into account.



from the Baltic Sea. Despite complications, which as noted by Mr Musiolik are “not uncommon in adverse installation conditions”, the experience and expertise of the contractor and his close cooperation with the KWH Pipe service staff allowed for successful completion of the task.

More HDD projects in the pipeline

The execution of HDD crossings under the Oder and Kanał Parnicki did not conclude the construction of pressure pipelines for the Grabów and Dolny Brzeg pumping stations. Currently, equipment is being installed in the machinery chambers. The contractor is also planning an additional, 400 metre crossing under Kanał Rybny, north of Wyspa Pucka. Initially, open trench technology was planned for this section of the pipeline. However, after an analysis of hydro-geological conditions, the contractor decided to use his recent experience and opted for horizontal directional drilling.

The contractor’s decision to continue to work with HDD technology shows his satisfaction with WehoPipe as well as with KWH Pipe. Mr Brzeziński appreciates WehoPipe’s durability and flexibility, which are inherent qualities of high-density polyethylene material. He also points to the special characteristics of the pipe such as the homogeneity of the wall structure irrespective of the thickness, the butt-fusion welding, which guarantees that the surface of the finished pipeline is tight and smooth, and the competitive price. Mr Brzeziński has also expressed satisfaction with the working relationship between the contractor and KWH Pipe, both in terms of technical consultancy as well as flexibility and punctual delivery.

introduced into a HDD bore.

The former record, also set in Poland, belonged to a 516 m pipe laid under the Dead Vistula in Gdańsk in 2000. Interestingly, this pipe was also manufactured by KWH Pipe.

During pullback the pipelines were partly filled with bentonite grout, which flowed out through a series of holes drilled in the pipelines’ heads. Once the installation was completed, a special pig was used to remove the bentonite. To make this possible, the inner welding beads were removed from the pipeline during welding.

Despite demanding geological conditions, the installation was carried out without major problems. The project did face one major challenge during the welding operations, which to a large extent took place on a floodland in the inter-embankment zone on Wyspa Pucka. The area was flooded twice during installation by rising waters of the Oder, pushed back inland by a strong wind

FOR MORE INFORMATION ON WEHOPIPE PRESSURE PIPES AND THEIR APPLICATIONS IN HDD PROJECTS IN POLAND, PLEASE VISIT WWW.KWH.PL.

At the brink of the open pit of the Aitik mine in northern Sweden, you feel very small indeed. The trucks that are hardly visible at the bottom of the 400-metre-deep pit prove to be gigantic when they come up loaded with ore. A full-grown person is only half the height of the wheels on these monsters.

Aitik, owned by Boliden, is already one of the biggest copper mines in Europe, but this is not enough. The demand for copper is insatiable, and the mine will be expanded to double its current annual 18 million tonnes to 36 million tonnes ore processed. The old concentrator plant, which is now on the brink of the pit, will be replaced and a new plant will be built several kilometres away.

The concentrator plant grinds the crushed raw ore into fines and separates the valuable metal concentrate from worthless tailings in a flotation process. After dewatering, the copper concentrate is transported in bulk to the Rönnskär smelter and the waste material is pumped to the tailings pond.

“The flow capacity of the reclaimed process water pipelines, for instance, is 10,500 cubic metres per hour,” says **Bengt Flyckt**, who is in charge of the project.

Flyckt and his consulting firm PRiMAB have a great deal of experience in consultation concerning demanding mine operations for companies such as Boliden and LKAB, and he knows how important it is to find a reliable comprehensive solution. KWH Pipe is one of the few poly-

ethylene pipe producers who can offer comprehensive system solutions from pipe dimensioning and material deliveries to welding and installation. In the Aitik project, KWH Pipe delivers pressure-tested piping ready for use by the client. The total length of the pipelines is 37 kilometres: 25 kilometres of water pipes and 12 kilometres of pipes transporting slurry. KWH Pipe has manufacturing plants in Finland and Sweden with the capacity to match a project of this size.

The process water system is a closed loop constantly reclaiming water from the tailings and clarification ponds. Acid leach water from the mine and waste rock stockpiles are collected and PH-adjusted by lime addition before it is pumped to the tailings pond. Raw water from the nearby Lina and Vassara rivers is added only on demand at the end of the winter season. Last winter no raw water at all was needed.

A highly challenging project

The Project Services unit of KWH Pipe are experts in major, highly challenging projects requiring more than the mere delivery of pipes. They can offer a complete service according to customer needs, including design, welding, installation and project management.

In this particular project, the pipes have been dimensioned for the most economical pump cross section, and the special dimensioning of the pipes minimizes the need for raw material.

Double capacity

FOR AITIK COPPER MINE IN SWEDEN

The Aitik copper mine will double its capacity and for that, it needs 37 kilometres of new piping. The polyethylene piping supplied by KWH Pipe will be able to withstand acid water and aggressive slurry flows in tough Arctic conditions.





The external conditions are tough, and the water flowing in the pipes is partly acidic and corrosive. The pipes are laid on the ground or inside embankments and have to withstand tough climactic conditions, potential depression of the ground and pressures up to 16 bar caused by great height differences. Considering all these conditions, polyethylene pipes stand out as the optimal choice.

A resemblance with the Talvivaara project

Similar conditions can be found at a mine located in Talvivaara, northern Finland, where KWH Pipe is also responsible for a similar comprehensive solution using polyethylene piping. The experience gained there was of great help in the selection process. The capacity to withstand corrosion and mechanical resistance were the determining factors when the final choice was made.

“We compared it with other materials such as stainless steel and glass reinforced plastic (GRP), and the final choice was made between GRP and polyethylene. GRP pipes are joined with sockets with or without locking aids. Each socket joint allows only a small angle deviation and this involves a leakage risk under mechanical stress”

The water pipes are laid on the ground and joined by welding them into a continuous pipeline. When the pipeline is complete, earth is piled up around it so that it is surrounded by an embankment. This protects the pipeline and reduces the risk of freezing during down periods potentially occurring during the cold winters of the north.

There is also the risk of depression of the ground, since a major part of the earthwork is done during the winter months. According to Flyckt, polyethylene pipes are extremely durable. They can even withstand a vacuum inside without collapsing, which gives an additional safety margin in case of unexpected pressure surges.

The welding work began in May 2008 and will continue up to the end of 2009 with a break during the coldest period. KWH Pipe is responsible for laying the pipes and cooperates with YIT, which provides electricity installations and PEAB, which provides ground excavation and backfill. Bengt Flyckt praises their smooth cooperation.

“All parties work together as a team and see the big picture, not only their own role in it,” he says.

Boliden has successfully used polyethylene pipes for demanding mine applications before. The Tara zinc mine in Ireland had a similar polyethylene pipe system installed in 1976 by KWH Pipe, and it has not been worn out yet, says Flyckt.

LONG LIFE WITH ABRASION-RESISTANCE

The slurry pipes transport tailings mixed with water to the tailings pond. It is a challenging mixture and the pipes must withstand enormous stress. It resembles sand-blasting, where grains of sand are blown with compressed air at, for instance, a rusty metal surface to clean it before painting.

Paint, rust and even metal can be removed through sandblasting if there is a hard, unyielding surface underneath. If the surface is soft and pliable, the sand grains bounce off without doing damage.

Slurry pipes have to withstand wear in the same way. If the pipe wall is not soft when the sand grains hit it, a hole is quickly worn through it.

Steel pipes are often lined with a rubber layer to create a soft, abrasion-resistant inner surface. Such a layer protects the pipe but may come loose on the inside and wear away from large parts of the pipe wall.

Aitik opted for polyethylene pipes delivered by KWH Pipe. Polyethylene has excellent abrasion-resistance properties, which give it a long life in slurry pipelines.



ENERGY CONSUMPTION AND POLYETHYLENE PIPES – ARE THEY A

positive match?

Educated at the Norwegian Institute of Technology (NHT) in Trondheim, Norway in 1955, Senior Civil Engineer Einar Grann-Meyer has had the advantage of dealing with many different types of pipe material; from wood to steel, ductile iron, asbestos cement, GRP, PVC and polyethylene.

“**M**y focus during the last 15 years has been on PE pipes, both solid wall and structured wall. These pipes have given engineers an excellent pipe product, ranging from the low-pressure area to the high-pressure area, and with a wide range of pipe dimensions. In the low-pressure area I want to emphasize the Weholite pipe, a supreme pipe both structurally and economically,” Mr Grann-Meyer says.

Being a specialist on visco-elastic PE pipes does not mean that Mr Grann-Meyer has lost his interest in the traditional pipe materials with which he started when he was a young engineer. On the contrary, having extensive knowledge in this area gives him an advantage when it comes to the competition between various pipe materials, with decisions based on fair and sound engineering principles, of course.

“It also gives me the chance to better understand the structural behaviour of visco-elastic pipes versus the pure elastic one,” he explains.

Engineering and design of polyethylene pipes

The proper engineering and design of solid and structured wall PE-HD pipes was very much

simplified by the introduction of a standard dimension ratio figure, SDR, for pipe in all computation models, with the SDR figure being the ratio of the pipe’s outer dimension and its wall thickness. This means that $SDR = d_e/e$ is consequently a dimensionless parameter, instead of having a wide variation of pipe diameters and pressure classes, which actually constitutes more than 170 variants above DN/OD 40 mm. In contrast, the total number of relevant SDR figures is only 6, and is found between 26 and 9. The computation models that benefit from this substantial reduction cover the following calculation subjects:

- the hoop stress and compression
- the radial buckling capacity and deformation
- the critical strain in axial and radial direction
- the stress and strain due to axial bending
- the pipe’s moment of inertia
- the surge velocity

To simplify the structural design of Weholite pipes, Grann-Meyer introduced the terms “*Equivalent wall thickness*” and “*Equivalent SDR figure*”, both terms being a function of the pipe’s ring stiffness figure: i.e. for SN4 the SDR equivalent is 24 and for SN8 the SDR equivalent is 22. With this design grip the Weholite pipe is transformed into a solid wall PE pipe and all relevant computation models for this pipe are made applicable.

Facing the competition from other pipe materials, engineers should utilize the advantages of PE pipes as much as possible. The pipe structure should be optimized in order to be competitive in price and the hydraulic

transport should be optimized with respect to its operational costs. "Looking from this angle, a lazy selection of the PE pipe from its pressure class is definitely not acceptable or the way to go. The knowledge is available, why not use it to sharpen the competition?" Grann-Meyer states.

Transportation of fluid in closed conduits

The transportation of fluids, water, gas and oil requires energy because of the friction head loss created by the flow. The required energy is usually provided by gravity or pumping or by a combination of both.

Once there is enough gravity height for transporting a fluid, the hydraulic calculations are reduced to finding the minimum pipe diameter that balances the hydraulic requirements. This is a pure and simple technical/economical design exercise. In this respect the PE-HD pipes are a big advantage for the engineer due to the stability of the internal pipe surface, as the friction factor remains a constant, regardless of the age of the pipe. Tailing pipelines represent an exception to this statement, generally, and are handled on the basis of other design requirements.

In cases where energy is required by pumping, the equivalent loss of energy must be converted into a kind of "today's cost", to be considered in the total cost picture. Projects in this respect could, for example, be seawater intakes, pumping mains for sea or fresh water, and hydroelectric power plants. In these types of projects, PE-HD pipes, both solid and structured wall, are very valuable and applicable within a pressure range of -1.0 to +25 bar.

Optimized flow velocity in transportation of fluids

The previous section discussed the energy aspect relative to the transportation of fluids, but did not relate the flow value relative to the energy costs, only that those costs should be considered. Grann-Meyer here poses an important question:

"In the transportation of fluids, combined with the consumption of energy, is it possible to find a useful parameter by which the transportation system might be defined as truly optimized?"

In other words, can one parameter be defined as the most economical?

In the transportation of fluids the engineer will find the optimized piping system within a certain area. It is possible to find the optimized flow

velocity, $V_{opt.}$, theoretically by using a derivation process. This optimized flow turns out to be a function of the flow, Q , in m^3/s , the unit price of the pipe and its installation, the unit price of electricity (one kWh) and the pipe's SDR figure.

The formula is of general character and applicable to all conventional pipe materials. It has been developed on the basis of PE-HD solid wall pipes, but since the SDR figure is one of the parameters, it can be used also for Weholite pipes. The calculated value of $V_{opt.}$ will have a margin, say $\pm 20\%$, which is demonstrated below.

When the formula is analysed with respect to the unit cost of energy, the following can be concluded:

$U_{c \text{ kWh}} = 100\%$	$V_{opt.} = 100\%$	$d_i = 100\%$
$= 200\%$	$= 82\%$	$= 110\%$
$= 300\%$	$= 73\%$	$= 117\%$

Consequently, with increasing energy costs, the PE-HD pipe's diameter must be increased to keep the flow velocity at an optimized level.

The competitiveness of PE-HD pipes

"The obvious advantages of PE pipes, be they solid or structured wall, may not be as clear for a potential client as they are for the PE pipe producer," Grann-Meyer reflects.

The engineer's objectivity, knowledge and experience are in this respect necessary elements in the process of convincing the client. But they must be based on sound engineering principles and an expressed will to optimize the design.

"Optimized design means that the most economical design is put on the table, taking into consideration also the cost of energy if this element is involved, which is usually the case," he stresses.

PE-HD pipes represent a superior pipe product in all respects, and designed correctly, they are strong in any kind of competition. In the low-pressure area, Weholite pipes have special advantages due to their high structural strength combined with low weight and relatively low price. Correctly designed and installed, this pipe should be more or less unbeatable.

"I usually say that there is only one limit for PE pipes, technically speaking, and that is pressure. Theoretically and practically, this limit is found around 25 bar, partly up to 30 bar. The equivalent application area is consequently more or less unlimited." Grann-Meyer concludes.

"OPTIMIZED DESIGN MEANS THAT THE MOST ECONOMICAL DESIGN IS PUT ON THE TABLE, TAKING INTO CONSIDERATION ALSO THE COST OF ENERGY IF THIS ELEMENT IS INVOLVED, WHICH IS USUALLY THE CASE."

Weholite goes HUGE

KWH Pipe raised the bar in the polyethylene pipe industry when it produced DN/ID 3.3 m Weholite pipe for the Aberfeldie Run-of-River Hydro redevelopment project.

The Aberfeldie generating station is located on the Bull River, 30 km east of Cranbrook, British Columbia, deep in the Canadian Rockies. The original facility was built in 1922, and then rebuilt in 1953. Now in the 21st century, as part of BC Hydro's Resource Smart Programme, construction of an upgraded facility was needed to increase the generating capacity from 5MW to 27MW, increasing the supply of clean energy to the region and creating jobs both during and after construction.

With case histories of previous hydro projects demonstrating the success of Weholite, representatives from KWH Pipe Canada's western office were able to respond to BC Hydro's requirements by providing engineering and costing proposals.

After four years of development, the project received the go-ahead in the spring of 2007.

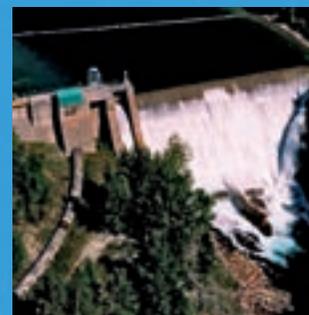
Built on the side of a mountain, the Aberfeldie project posed many interesting challenges where Weholite provided the solution. For one, – the lighter the better – and Weholite was the ideal choice for ease of handling in such remote and mountainous terrain. When compared to other piping materials, Weholite presented an effective cost alternative. As stated by KWH's **Darrell Sallenbach**, "this large diameter Weholite facilitated BC Hydro in completing the upgrade to the Aberfeldie Hydro Generating Station by being an economical alternative to other piping materials."

KWH's plant in Saskatoon churned out DN/ID 3.3 m Weholite, in 12.8 m lengths. The pipes were loaded and trucked, with the assistance of pilot cars, to the site. All together over 70 truckloads of pipe snaked their way along 1,000 km trip via the TransCanada highway, across the Prairies, through the Rockies and south to the Cranbrook region.

Construction started in the summer of 2007, offering local sub-trades employment during the process, with a scheduled completion date in the autumn of 2008. Weholite, 3.3 m in diameter at 1.5 bar working pressure, was installed over a length of 855 m. Additionally, fourteen mitred elbows, two 1200 mm inspection chambers and a small quantity of solid wall pipe ranging from DN/OD 630 mm to 1400 mm, were required to complete the installation. Joining of the pipes was completed by KWH's field technician services using their semi-automatic internal welder.

The redevelopment of the Aberfeldie Hydro Facility will assist in filling the growing gap between total electrical supply and demand in British Columbia. Once completed, the Aberfeldie Dam and Generating facility will produce enough clean energy to supply 10,500 residential customers annually, reducing the need for importing energy.

This project demonstrates how Weholite PE-HD pipe is the ideal choice for hydroelectric applications.



WHEN COMPARED TO OTHER PIPING MATERIALS, WEHOLITE PRESENTED AN EFFECTIVE COST ALTERNATIVE.



Västerås is building a simple light-weight stormwater pipe system with plastic pipes that are threaded together into long, tight and durable pipelines.

Thread joints make it easy

An industrial estate in Västerås, Sweden, has been busy laying a stormwater pipeline. The building of a large new warehouse will start soon, and the water flowing in an old ditch must be led away from the area before construction begins.

A new stormwater pipeline must be laid to lead the ditchwater away to an existing stormwater tunnel located one kilometre away under a road and a parking lot.

Since the schedule was tight, the customer decided to use plastic piping in parts of the pipeline to save time.

“We were in a hurry and could not go under the parking lot before the summer holiday season, so we decided that plastic pipes should be used for that part of the pipeline,” says **Jan Nordahl**, who represents the customer, the energy company Mälarenergi.

The choice for the rest of the pipeline was simple. The fastest and best option was to use plastic piping for the entire stretch of the pipeline.

“Concrete piping is heavier and more difficult to work with. Plastic pipes are easier to install and the work proceeds faster,” says Jan Nordahl.

With full-time work, 48 metres of piping can be laid in one day: three 16-metre-long pipes are jointed to form a single pipeline. The progress of the work depends on the speed of excavation.

The pipes used are structured-wall Weholite polyethylene pipes.

The spiral structure of Weholite forms the basis for the thread with which the pipe ends are jointed. Pipes were delivered from the factory ready for threading together. If needed, it is also easy to make the threads in the field. Jointing is a piece of cake. One and a half revolutions is sufficient for a sandtight and secure joint.

“If greater tightness is required, it is possible to have up to six revolutions or to weld the pipe so



that the joint is completely tight”, says **Rolf Finnman** of KWH Pipe.

The bedding of the trench must have the right gradient, one per mil is enough for this pipeline. The pipe to be jointed is lowered with an excavator, and the threads are greased with an environmentally friendly material so that screwing them on becomes easy. The pipes are also equipped with a strap to facilitate turning them into place.

The excavator operator places the pipe so that it is threaded into the right groove from the beginning. The beginning of the thread has been placed on top, and a few careful moves will have the pipe ends in place. Then the pipe can be screwed on to the already laid pipe section. Some sand piled on the side of the pipe will guarantee that the pipe does not start rolling away. The excavator’s dipper then hooks a sling attached to the strap and starts lifting it slowly, causing the pipe to rotate and screw itself slowly and steadily onto the thread.

The whole operation is over in a matter of minutes. The strap is unhooked and all that remains to be done is to fill the trench and move on to dig for the next pipe section.

“The joints will hold even if the earth moves. The threads ensure a secure joint,” says Rolf Finnman. The inspection chambers are made of the same material. Stub-outs for connections are welded on and the entire inspection chamber is lowered down into the hole and jointed with Flexseal couplings and threads. This pipeline has several sharp bends, for instance where it circles a site with archaeological relics, and at the bend there is an inspection chamber for inspection and cleaning.



INFO

- » Stormwater pipeline approx. 1,000 metres, DN/ID 1,600 mm, gradient 1 per mil.
- » Pipe quality Weholite, material PE-HD.
- » Joints: Thread joints with Flexseal couplings



Sewer pipe along the seabed

The wastewater generated in Kaarina, Finland will in the future be carried to a new treatment plant in Turku in a pipeline most of which lies on the seabed. Powerman Oy, a Turku-based civil engineering company, is responsible for installing a ten-kilometre stretch of the line, which is made of DN/OD 800 mm pipes.

Upgradings and renovations of wastewater management systems help to keep civil engineering contractors busy, and demanding municipal engineering work is also an important source of work for Powerman Oy.

The company, which was established in 1990, is an expert in both new construction and the renovation of old structures. It does most of its work in the provinces of Western and Southern Finland but is also involved in special contracts in other parts of the country.

Powerman specializes in different types of foundation work, hydraulic engineering, and building and concrete work at industrial facilities. The company has also participated in a large number of projects involving waterworks and wastewater treatment plants.

“Municipal engineering accounts for a large share of our turnover. Slightly more than half of the contracts are for municipalities, towns and cities. The Helsinki Metropolitan Area has kept us busy and in that region we use outside subcontractors as often as possible,” explains **Altti Lehto**, managing director of Powerman Oy.

The customers of the company, which has a turnover of between EUR 12 and 14 million, also include regional environment centres, industrial firms, housing companies, construction businesses and private homeowners. Powerman has 50 employees, but subcontractors push the numbers working at its sites to about one hundred.

“In principle, the installation of the sewer in

Kaarina is a routine thing for us. The fact that the pipes have a large diameter means, however, that those doing the installation must be particularly skilled. When the work involves large pipes, everything from welding to weighting is more difficult. A large size makes the work more challenging,” says Lehto.

Offshore work all winter

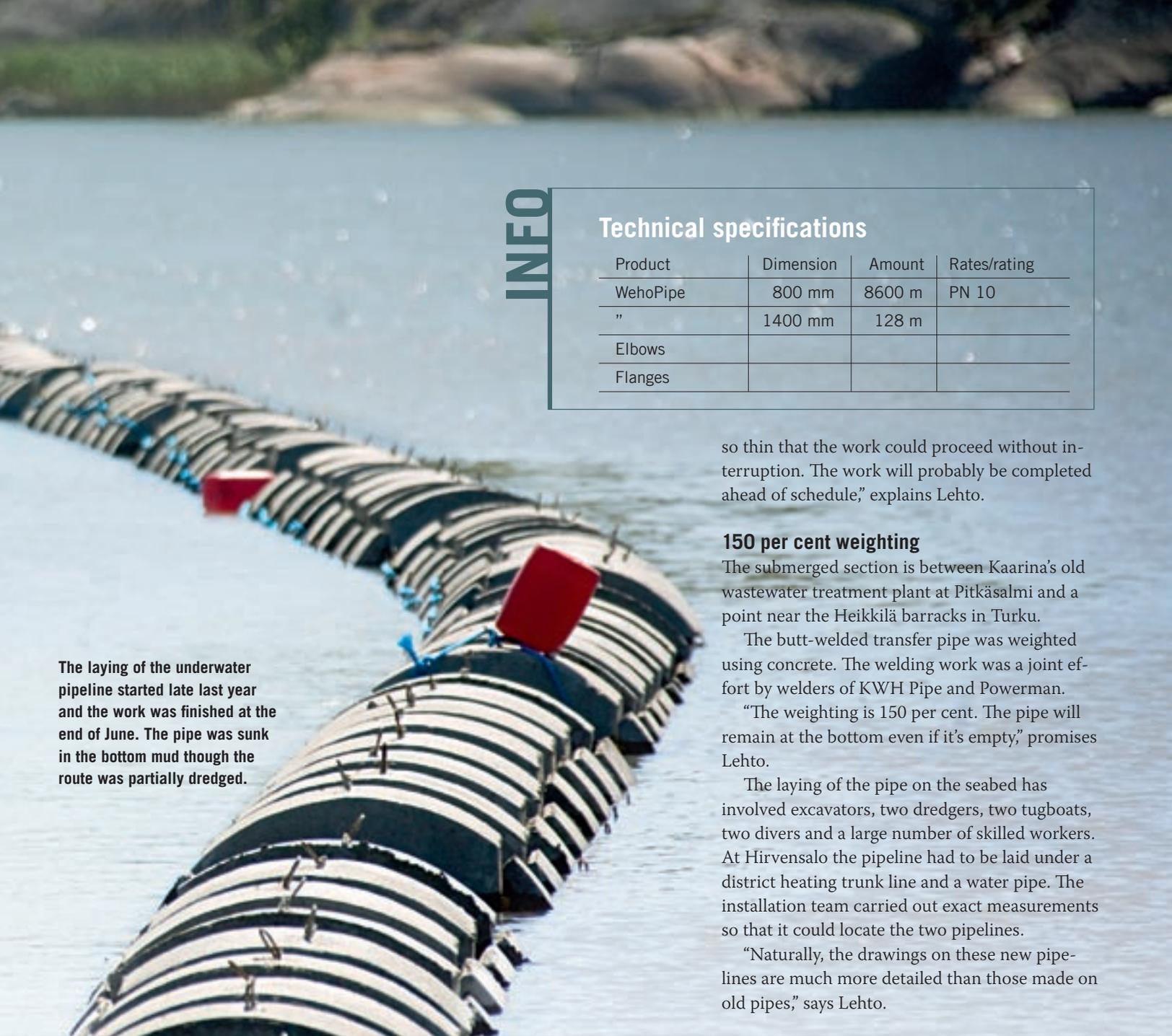
The work, which started last year, is part of the project by the municipality of Kaarina to improve its wastewater management systems.

The wastewater generated by the City of Kaarina is still treated at a municipality-owned precipitation plant at Rauvola using a biological and chemical treatment process. The facility will, however, be closed down when the transfer line is ready, and in the future, the wastewater will be treated at a new plant in Turku operated by Turun Seudun Puhdistamo Oy.

“We are installing two 800 mm pipes side by side. The work has also been challenging in terms of timetables. Nowadays, contracts have little leeway in terms of time,” explains Altti Lehto.

On the positive side, Lehto points out that mild winter weather has helped to speed up the process. As about six kilometres of the pipeline is on the seabed, lack of ice cover off Turku made the work easier.

“In fact, we could almost have done the whole job in one go. Normally, the laying of pipes on the bottom of the sea must be suspended for the coldest period. Now, however, the ice cover was



INFO

Technical specifications

Product	Dimension	Amount	Rates/rating
WehoPipe	800 mm	8600 m	PN 10
"	1400 mm	128 m	
Elbows			
Flanges			

The laying of the underwater pipeline started late last year and the work was finished at the end of June. The pipe was sunk in the bottom mud though the route was partially dredged.

so thin that the work could proceed without interruption. The work will probably be completed ahead of schedule," explains Lehto.

150 per cent weighting

The submerged section is between Kaarina's old wastewater treatment plant at Pitkäsalmi and a point near the Heikkilä barracks in Turku.

The butt-welded transfer pipe was weighted using concrete. The welding work was a joint effort by welders of KWH Pipe and Powerman.

"The weighting is 150 per cent. The pipe will remain at the bottom even if it's empty," promises Lehto.

The laying of the pipe on the seabed has involved excavators, two dredgers, two tugboats, two divers and a large number of skilled workers. At Hirvensalo the pipeline had to be laid under a district heating trunk line and a water pipe. The installation team carried out exact measurements so that it could locate the two pipelines.

"Naturally, the drawings on these new pipelines are much more detailed than those made on old pipes," says Lehto.

ASSISTANCE FROM WESTERN NEIGHBOUR

can get help from its plant in Sweden and that is also where the pipes for the Kaarina project came from. "Our system is flexible," he points out.

Altti Lehto confirms that, even though at times the fitters were working flat out, the deliveries went without hitches and the supplies were on schedule. As part of the contract, Powerman also built a connection between the new Kakola wastewater treatment plant and existing main sewers in Turku and between Kakola's discharge pipe with the existing discharge sewer. Originally, it was intended to build these lines from 1,400-millimetre polyethylene pipes. However, the City of Raisio decided at a late stage to move the treatment of its wastewater to Turku. This meant that the plans had to be revised and 1,600-millimetre steel pipes had to be used for a number of sections.

KWH Pipe is the main pipe supplier for the project. According to **Seppo Rautiainen**, director of Municipal Technology sales at KWH Pipe Finland, the deliveries for Kaarina took place during an extremely busy period. However, he adds that in situations like this KWH Pipe



"A large size makes the work more challenging," says Altti Lehto, managing director of Powerman Oy.



TRANSFER LINE

for large wastewater treatment plant

Kymen Vesi Oy is building a large wastewater treatment plant in the district of Mussalo in Kotka, Finland. The construction of the new facility began in December 2007 and the plant will become operational in February 2009.

Immediately after the completion of the new facility, renovation of the old treatment plant will start. The work should be ready in November 2009.

When completed, the Mussalo wastewater treatment plant will be the fourth biggest in Finland. It will have equipment for pretreating wastewater, an aeration basin, a final sedimentation basin and a control building. The aeration basin will have a total volume of 23,800 cubic metres with room for expansion into a facility of 30,500 cubic metres. The plant will have four water-treatment lines, the deployment of which will depend on the amount of wastewater coming to the plant.

The new facility will be used for treating wastewater originating from Kotka, Anjalankoski, Pyhtää and Hamina. It is located near Mussalo harbour, about ten kilometres from the centre of Kotka. The plant will be jointly owned by the City of Kotka, City of Anjalankoski and the municipality of Pyhtää.

At the same time, Kymen Vesi is also carrying out renovations on the pipelines that will lead the waste water to the new plant. KWH Pipe plays an important role as a supplier of equipment for these projects.

Weholite pipes selected for transfer lines

The pipes for the transfer lines and the associated welding are supplied entirely by KWH Pipe. According to **Ari Vaarala**, operations manager at KWH Pipe, the installation work has proceeded without hitches: "Skanska Infra, the main contractor, had built solid foundations, so we could do our part in one go. Because the project did not involve any unusual procedures or materials, two fitters were able to complete the first stage in two weeks. Of course, the fact that Weholite pipes are supplied in long sections helped to speed up the job. The number of joints is small and we didn't need to spend too much time on joints per metre of pipe."

KWH Pipe was selected as the pipe supplier for the project because it has all the required products in its range. The dimensions for the transfer line pipes were between DN/ID 500 and 1,200 mm. The fact that KWH Pipe has products with fatigue-resistant and absolutely leak-proof joints was a major factor in its favour. Weldability was an essential requirement.

"KWH also offered to do the welding, which means that everybody knew where the buck stops. I think it was an easy choice for the customer. After all, we were able to provide the customer with a solution, not just products," says Vaarala.

Fatigue-resistance a distinct advantage

The customer was already familiar with the products involved, though the thermal fusion method used for Weholite was something new. The joints produced with thermal fusion are both fatigue-resistant and leak proof, and because of its attractiveness the method is finding increasing use in pipeline building.

"Fatigue-resistance is important because soil movements and fluctuations in loading may cause a weak joint to break. Especially in this project where the joints are located under other structures, fatigue-resistance is essential.

Another factor making thermal fusion more popular is our ability to produce Weholite solutions for both sewers and low-pressure systems. In fact, this is the only correct way of making joints in low-pressure applications. When the maximum pressure is 2 bar, Weholite is an unbeatable solution, both technologically and, above all, financially," explains Vaarala.

Because of its lightness, Weholite is an excellent choice for a Mussalo-type site. Installation can proceed quickly and safely and the pipes can be easily transported even on difficult terrain.

The structured-wall construction of Weholite is particularly advantageous during foundation work. The bedding does not need to withstand the same amount of load as with heavier pipe materials. Weholite is a pipe with smooth external and internal surfaces.

Spiral welding is used on the pipes, which are made either of polyethylene or polypropylene. Weholite pipes can be used for entire systems that carry liquids on land, under water and in the air. The inner diameter of the pipe may be up to three metres.

Weholite pipes are flexible, which means that they can withstand a wide range of loads, vibration, tension and soil movements. The standard product has the ring stiffness required of underground sewers (SN 4 or SN 8). These rates are adequate for all construction work.

THE STRUCTURED-WALL CONSTRUCTION OF WEHOLITE IS PARTICULARLY ADVANTAGEOUS DURING FOUNDATION WORK.



INFO

» WehoPipe pipes (PN 10) supplied as 12-metre sections

- 140 mm
- 160 mm
- 200 mm
- 500 mm
- 560 mm
- 800 mm
- 1,000 mm

» All the above-mentioned also include corner-welded elbows, sleeves and flanges.

» Weholite SN 8, 15-metre sections

- 1,125/1,000 mm
- 1,350/1,200 mm

» Elbows were also supplied.

» 2x saddle manholes of 900 mm

» WehoTel cable jacketing pipes (A-class double wall pipes) in 6-metre sections

- 110 mm
- 160 mm





Tanks for cooling water and

**Architects
Lundgaard &
Tranberg A/S
produced an
exceptionally
exciting design
for the new
headquarters
of SEB at the
corner of
Bernstoffsgade
and Kalvebod
Brygge in
Copenhagen,
Denmark.**

Landscape architects SLA created a landscape garden that winds between the two buildings from the street level near Bernstoffsgade to about 8 m above the surrounding ground. In this staircase-shaped garden, trees were planted and greeneries laid out to give an overall impression of a 'green' area. The actual foundation of the garden was built of concrete.

Rambøll was in charge of all technical consultation and project planning, including the building of an effective drainage system under the entire plot to prevent unexpected buoyancy. A system for gathering surface water from non-traffic areas was also built; this water is used for an extensive irrigation and dripwater system in the garden, so as to minimize the use of drinking water for the watering of trees and bushes.

Between the two buildings and under the garden there is a two-storey underground parking facility. The stormwater from this area is gathered in a separate drainage system for cleansing in an

oil trap before discharging it into the public sewer network.

Sea water used for cooling

Rambøll in consultation with SEB designed a system that uses sea water from the Copenhagen harbour to cool the two buildings. Horizontal directional drilling was used to install two inlet pipes and one outfall pipe of DN/OD 500 mm WehoPipe, PN10, with two DN/ID 2500 mm Weho tanks, each with a depth of 4.5 m, forming a buffer tank.

In each of these two tanks, two pumps were installed together with the required pressure pipes, valves, level control, etc.

The return tank for the cooling water is also a Weho tank, DN/ID 3000 mm with a depth of 4.7 m.

The three tanks are connected to the three sea-water pipes and also to each other with solid-wall polyethylene pipes, allowing the greatest possible flexibility in case of blockage or other problems in the system.

◀ All the tanks are placed in a 'tank trench' along Kalvebod Brygge.

▼ Each tank was delivered as a complete element that could be lifted into place immediately.

▶ Seen in the overall context, the tank assembly does not look like much, but it actually consists of polyethylene tanks which are so large that in Denmark only KWH Pipe is capable of producing them.



collecting stormwater

Stormwater from the garden is collected with an ACO-Drain system and led through a sand trap (DN/ID 2000 mm Weho tank, depth 4.5 m) to a storage tank (DN/ID 3000 mm Weho tank, depth 4.5 m).

The sand trap and storage tank are also connected with WehoPipe PE-HD pipe, and from the storage tank there is an overflow pipe to the return tank, so that if there is much rain and therefore minimal need for watering the garden, the excess stormwater is conveyed to the harbour together with the return water from the cooling system.

All the tanks were placed in a 'tank trench' along Kalvebod Brygge whose bottom elevation is -2.5 m. To secure the tanks against buoyancy they were fitted with a solid 40 mm PE footplate that extends about 200 mm beyond the external tank wall.

Based on a buoyancy calculation, a concrete block was cast on top of the footplate to such a

height as to ensure the necessary stability. Moreover, the structured wall of the tanks was filled with water to give the tanks extra weight, which provides extra security against buoyancy.

All underground pipe connections were welded.

Heavy traffic load sustained

The tops of the tanks are located at different levels because of the stepwise design of the garden, and in places where traffic will pass over the tanks a well ring was installed around each tank, topped by a concrete cover which can sustain a traffic load of up to 40 tonnes.

In areas with only pedestrian traffic, a concrete cover was placed directly over the Weho tank.

The concrete underlay for the garden was poured over the concrete covers referred to above, so that the only remaining access to the tanks is through steel covers set in the concrete.

INFO

» **Project:** Installation of tanks for cooling water and gathering of stormwater in connection with the construction of SEB's new headquarters in Copenhagen.

» **Builder:** SEB Ejendomme

» **Consultant:** Rambøll

» **Contractor:** M.J. Eriksson A/S

» **Installation:**

- 2 x DN/ID 2400 mm,
2 x DN/ID 3000 mm and
1 x DN/ID 2000 mm
Weho tanks with depths
between 4.5 m and
4.7 m.

- Connected with PE100,
PN10 pressure pipes in
varying sizes.

TALLINN DISTRICT HEATING COMPANY OPTS FOR quality

Tallinna Küte, an Estonian district heating company, supplies most of Tallinn with heat through a pipe network of 400 kilometres. The company has embarked on a difficult process of upgrading and renovating the lines and the work is being carried out using KWH Thermopipe's pipe systems.

An international expert in plastic pipes, KWH Pipe is a European-wide player in the sector. One of the countries in which KWH Pipe is doing brisk business is Estonia, where KWH Pipe has entered into partnership with Tallinna Küte, the main producer and supplier of district heating in Tallinn.

Under a 30-year contract, the business of the Estonian company has been leased to Dalkia International, a French operator. Tallinna Küte signed the contract in January 2002 and the lease covers all the heating plants and networks of AS Tallinna Soojus.

Becoming a subsidiary of the international Dalkia Group has meant increased funds for investment and made the Estonian company more efficient. The pipe network is now being extensively upgraded.

Tallinna Küte purchases its Wehotherm district heating pipes from KWH Thermopipe.

"The practical side of the purchases is the responsibility of our local company KWH Pipe Eesti AS. The focus in the construction is on building new pipelines and on rehabilitation of existing in-situ insulated networks," explains **Mikael Masar** of KWH Thermopipe.

The district heating network of Tallinna Küte is about 400 kilometres long, and it supplies two-



thirds of all households in Tallinn with heat. The company has three large and eight small boiler rooms, which provide 40 per cent of the heat sold. The remaining 60 per cent is purchased from subcontractors. The company has a staff of 280 and last year it generated a turnover of EUR 52.9 million.

Giant on the European district heating market

The Dalkia Group also has a second subsidiary in Estonia: AS Eraküte, which has networks in 15 municipalities. This makes Dalkia the biggest producer of district heating in the country.

Dalkia International is also a major player in European markets. It has operations in 38 countries, making it Europe's top producer of district heating and the continent's largest owner of district heating networks.

Leasing operations to such a big partner has helped Tallinna Küte strengthen its technological



Janek Trumsi of Tallinna Küte and Rein Seppel of KWH Pipe are cooperating closely in the renovation of Tallinn's district heating network.

projects at short notice.

"We are very pleased. KWH Pipe's local representatives know their business and provide excellent service," says Trumsi.

He points out that delivering the products on schedule is critical: "The products we order go directly to the site and the way they are supplied always has an impact on the installation work. Problems with deliveries will cause unnecessary delays."

The work often involves street closures and consideration must also be given to the operation of other sewer lines, water pipes and power cables. Sometimes these services to consumers must be cut for limited periods. All this means that receiving the material as agreed is crucial.

"Ultimately, the reputation of Tallinna Küte in the eyes of its customers depends on the pipe deliveries," explains Trumsi.

Highly competitive pipe markets

There are many suppliers of district heating pipes on the Estonian market.

"From our point of view it is a very good thing that there are many manufacturers represented on the local market. It helps to ensure reliable deliveries and guarantee there will be no nasty surprises," says Janek Trumsi.

In his view, local stockpiles give KWH Pipe a definite head start over its competitors and enable the company to provide its customers with high-quality service.

About 90 kilometres of the pipes in Tallinn's 400-kilometre long district heating network are pre-insulated.

"Renovating old pipelines is a continuing process both in the capital and elsewhere in Estonia. New insulated products have helped to cut thermal losses in the network," explains Janek Trumsi.

In 1998, thermal losses in Tallinn amounted to 21 per cent but last year the figure had dropped to 17 per cent.

"There are also fewer leaks. In ten years, the number of leaks has halved," says Trumsi, quoting statistics.

In addition to being reliable, pre-insulated pipes also have other advantages.

"Because they are all standard designs they are easy to order and install. They are also safer because it is easier to monitor leaks than in the old materials," says Trumsi, listing the benefits of the new products.

base. The Estonian firm is cooperating with its parent company in all areas and is able to rely on Dalkia's resources in heat production and transfer, staff, purchases, and information technology.

"It is important for Dalkia to have reliable partners in the areas where it has business. At the same time, all its subsidiaries have a free hand in their operations and consideration is always given to local requirements," says **Janek Trumsi**, Tallinna Küte's network director.

Local stocks a big plus

KWH Pipe Eesti has contracts with Tallinna Küte and Eraküte.

"KWH Pipe has always been a reliable supplier. We have been cooperating with the company for more than 10 years now," notes Janek Trumsi.

As KWH Pipe keeps stocks in Tallinn, it is able to deliver products for local district heating

RENOVATING OLD PIPELINES IS A CONTINUING PROCESS BOTH IN THE CAPITAL AND ELSEWHERE IN ESTONIA. NEW INSULATED PRODUCTS HAVE HELPED TO CUT THERMAL LOSSES IN THE NETWORK.

Reliable and durable **Weho tanks**



A lower-level water retention tank. The inside measurement of the Weho tank is 2,400 mm, it is 25 m long and has a volume of 100 m³. The internal diameter is 2,200 mm and the pumping chamber is attached to the end of the tank.

Weho tanks as complete deliveries

Examples of solutions:

- Lower-level retention tanks
- Alkalization tanks
- Chemical tanks
- Septic tanks
- Balancing tanks
- Overflow tanks
- Flood water basins

WehoPuts domestic wastewater treatment plants

- Wide range of products: treatment plants for single households and small villages
- Excellent treatment results
- Need little maintenance

