



WEHOLITE - CUSTOM BUILT SYSTEMS

Storm drain system in Talega, CA | WehoPuts to Lufussa, Honduras

PIPE WORLD - THE KWH PIPE CUSTOMER JOURNAL



“Leaky pipe is a waste of my time and everyone’s money.”



The fact that it's leakproof is just one of the reasons Weholite high density polyethylene (HDPE) pipe has proven to be the right solution for water and waste water projects around the world.

Watertight joints, light weight, corrosion and abrasion resistance plus the flexibility of a pipe that will deflect rather than crack under stress are all advantages that have made HDPE pipe the standard for critical gas distribution applications. Weholite pipe's patented structural wall process makes it possible to translate these advantages to pipes of up to 120" in diameter.

Don't waste time and money. Choose Weholite HDPE pipe for all your, low pressure piping applications.

www.kwhpipe.com



EDITORIAL



Pipe World for our partners

Generally speaking the piping business, especially in large diameter pipe systems, is regional as the cost of transportation is critical for the viability of the project. The bigger the “hole” the more expensive the transportation. Naturally, our company, KWH Pipe, operates under the same laws of nature as all other pipe manufacturers.

However, our operations are not confined just to areas local to our production units. Our experience and knowledge can today be utilised by our customers anywhere in the world. Our new Project Services division, is one remarkable step in the direction where KWH Pipe can offer turnkey project services, including local production, on a worldwide basis.

The Pipe World customer magazine you now hold in you hand is a forum where we want to share our experience and achievements with our partners world-wide. Pipe World will present the experiences and projects KWH Pipe have accomplished all around the world as the only plastic pipe manufacturer supporting customers with production facilities on three continents. This we hope will give you a better in-depth understanding and picture of why plastic is a competitive alternative in all piping installations.

In this first issue of Pipe World magazine you will become acquainted with the Weholite Pipework System.

Weholite was developed some 20 years ago by KWH Pipe, as the first plastic pipe in the world produced up to and including 3000 mm diameter. Today the position of Weholite structured walled pipe systems is stronger than ever and our customers around the world have found ever more areas of application for Weholite.

Evidence of this is the eight licensees who produce the world's best pipe at their own locations.

I hope you all will enjoy the articles and features presented in this journal.

Welcome to the Pipe World!

Jyrki Uurtio
Managing Director

PIPE WORLD

KWH Pipe Ltd, P.O.Box 21
FIN-65101 Vaasa, Finland
Telephone +358 6 326 5511
Telefax +358 6 316 7115

Editor in Chief: Mr Jan-Erik Nordmyr
Pipe World Editorial Board: Mr Maciej Batkowski,
Ms Marlene Fremleson-Ohlis, Mr David Fuerth,
Mr Jonas Lindeman, Mr Jan-Erik Nordmyr and
Mr Wong Fook Weng, KWH Pipe.
Editors: Kynämies Oy, Tel. +358 9 1566 8510
Press: Frenckellin Kirjapaino Oy

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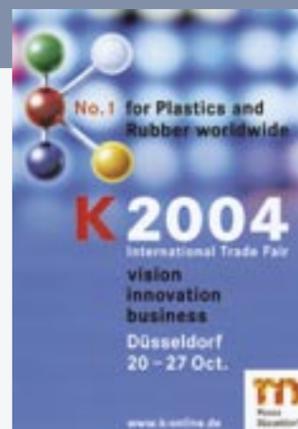
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Welcome to Düsseldorf!

KWH Pipe takes part in the International Trade Fair for Plastics and Rubber worldwide in Düsseldorf, Germany October 20-27.2004.

KWH Pipe Stand Nr. 11F26 See you in Düsseldorf!

New Weholite licensee

WEHOLITE | At the end of 2003, KWH Pipe Ltd, Technology signed a Weholite Licensing Agreement with Petzetakis Africa. The company is a member of the Petzetakis Group, which is a listed company with its headquarters in Greece.

Petzetakis Africa is the former plastic pipe and flexible hose manufacturer, Main Industries, which was acquired by the Petzetakis Group in 2001. Petzetakis Africa operates from Rosslyn in South Africa and has branches

covering the Southern African region.

Over the last few years, the potential for Weholite has proved to be very good in the South African market and the demand is also expected to increase in neighbouring regions. Traditionally the South African market for Weholite has mainly been in storm water applications, but demand for value added products, like manholes, is predicted to catch up.

At present there are three Weholite production lines installed and the Weholite factory is planned to be operating at full capacity during the spring of 2004. Full market penetration for Weholite is expected to be reached during 2005.



APPOINTMENTS



Jan-Erik Nordmyr



Stefan Gros



Anders Nystrand



Tapio Tyni

KWH Pipe Ltd

• **Mr Jan-Erik Nordmyr**, (M.Sc. Econ.), has been appointed Director of Business Development as of 13th October 2003. Mr Nordmyr has previously worked at Wärtsilä Power Plants Division. He is located in Vaasa.

• **Mr Stefan Gros**, (Lic.Eng.), has been appointed Product Development Director as of 1st January 2004. He has previously been employed as Technology Director of Wärtsilä Power Plant Unit. He is located in Vaasa.

Both Jan-Erik Nordmyr and Stefan Gros are members of the KWH Pipe General Management Team (GMT).

Project Services

• **Mr Anders Nystrand** (B.Sc. Civ.Eng.) has been appointed Project Manager as of 13th April 2004 of the newly established Project Services organization. He has previously worked as Project Engineer at Wärtsilä Power Plants.

KWH Pipe Finland

Ulvila Factory

• **Mr Tapio Tyni** will be responsible for operations at the Ulvila factory covering production, quality control, warehouse and logistics as of 1st May 2004. Mr Tyni has been working for 27 years in our company.

• The Ulvila factory's Site Manager **Timo Alaranta** has retired on a half-time pension as of 1st May 2004. Thereafter, he will be working three days a week and concentrating on strategic development and implementation of the unit's key development areas.

Forenade Plast, Malaysia

• **Mr Lee Ah Chee** has been appointed as Acting Factory Manager who will oversee the daily running of production, stock control and administration departments in the factory as of 1st April 2004.

• **Mr. Lai Ah Ying** has resumed the responsibilities of QA & Development Manager and will oversee the day to day running of the QA & QC department at the factory as of 1st April 2004.



Back row from left to right Anders Andtbacka, Cristian Vestman, Ulf Berg, Ingemar Björklund and Ole Löfmark. Sitting down from left to right Michel M. Gillon, Jan-Erik Nordmyr and George Merry.

Project Services strengthen KWH Pipe's customer service

SERVICE | A Project Services organization has been established at KWH Pipe Ltd in Vaasa, Finland. The main responsibilities for the Project Services organization will include providing support for project development, sales and execution, especially in areas where KWH Pipe Group is not physically present. The organization will also provide support with technical and commercial expertise as well as handling special projects, for example, mobile production.

THE PROJECT SERVICES ORGANIZATION:

- **Jan-Erik Nordmyr**, Director
- **Anders Andtbacka**, Product Manager, Weholite
- **Ulf Berg**, Project Manager
- **Anders Nystrand**, Project Manager
- **Christian Vestman**, Project Manager
- **Ole Löfmark**, Project Manager, Senior Technical Advisor
- **George Merry**, Managing Director, KWH Pipe UK Ltd
- **Malcolm Sheldon**, International Sales Manager, KWH Pipe North America

CONSULTANTS:

- **Michel M. Gillon**, Equipower International
- **Ingemar Björklund**, IBCO AB



Weholite – custom built systems

High-quality plastic pipe is the up-to-date solution for construction site requirements. The Weholite pipework system is ideal for the installation of new culverts or for relining existing ones. Weholite can also be used for drainage and sewage systems and general multi-pipe use anywhere and everywhere. Plastic pipes are also an alternative worth considering for industrial buildings.

When it comes to really large plastic pipes, it could be said that there's not much information but plenty of prejudice. Product Manager Juha Kainulainen has to continually wrestle with the basics even though sales of plastic pipes, both large and small diameters, are increasing year by year.

"Many people think that the maximum dimension for a plastic pipe is less than a metre, although in fact we can make pipes with a diameter of as much as 3 metres. It's not generally known how many different uses there are for pipes made of high-quality materials with modern production techniques," says Kainulainen.

He goes on to point out that anyone who is planning a contract ought to think about the overall installed price of the job when doing the cost calculations. High-quality plastic pipe is not cheap, but it often reduces the overall costs because it can often be installed more quickly and easily than traditional materials. »»

Corrosion-resistant chemical tank

KWH Pipe has specially fabricated an extra-large, highly corrosion-resistant chemical storage tank that was required at the Kokkola wastewater treatment plant in Northern Finland. A traditional steel tank would not have been able to resist the highly corrosive liquid, but plastic can.

A new flocculation chemical was being tried out in the treatment process at the Kokkola wastewater treatment plant, which gave promising results. The trial was conducted using a tank owned by the chemical manufacturer and the decision to adopt this new chemical meant that the plant had to acquire its own tank.

"We weighed up the pros and cons during a series of site visits. We considered renting, or trying to get hold of a second-hand tank, but there were no special tanks on the market which fitted the bill," explains Esa Jokela, director of the Kokkola waterworks.

STEEL GIVES, BUT PLASTIC DOESN'T

The new flocculation chemical is PAX poly-aluminium chloride, an extremely corrosive liquid. A traditional steel tank was out of the question and acid-resistant stainless steel would have been an extremely expensive alternative.

The search for the right material began to bear fruit when it became clear that polythene pipe stood up well to the chemical. Reinforced plastic, in other words GRP, would have been another possible material, but manufacturing the tank out of Weholite pipe turned out to be easier than using fibreglass as Weholite is easy to fabricate.

"We discussed a couple of different solutions with KWH Pipe, but in the end we decided on a combination of two plastic pipes. Price came into the equation as well," recalls Esa Jokela.

As there were going to be alterations at the wastewater treatment plant in a few years' time, when the chemical tank was acquired, it had to be borne in mind that it had to be able to be transferred from one place to another. A rigid pipe construction that was brought to the site already pre-fabricated, was certainly going to be able to be moved to another location at a later date.

INSULATION WITH AIR AND POLYURETHANE

As well as being able to withstand the corrosive chemical, the tank also needed to have good insulation properties as the PAX liquid cannot stand severe frost and it has to be in use all the year round. The chemical can stand a few degrees of frost, but at -15°C it becomes less fluid and the thicker liquid cannot be dispensed into the process normally.

"By putting two plastic pipes, one inside the other, we were able to put a layer of polyurethane between the two to give us the extra insulation we needed. At the same time the plastic pipes themselves have a cellular structure and the air trapped within the material gives a layer of insulation," explains Tom Karnela, regional manager of KWH Pipe.

The internal diameter of the inner pipe is 2,000 mm and the external diameter is 2,175 mm. The corresponding dimensions for the outer pipe are 2,400 mm and 2,592 mm so that the total insulation layer is over half a metre. The volume of the tank is about 32 cubic metres.

"A tank like this is fabricated entirely by hand, and the plastic is really easy to work. The ends of the pipes are welded on, the filling hatches are added and we might even build a ladder on the outside of the tank. Each job is individually planned in detail," says Karnela.

The Kokkola wastewater treatment plant is located on the sea shore, so in winter it is subject to conditions of extreme cold. Careful calculations are made in advance of the tank's energy efficiency and connections for electric heating cables are built in at the construction stage so the heating can be turned on to prevent the liquid getting too viscous when it gets really cold. ●

Plastic pipe is manufactured out of polyethylene, a safe and familiar material that has been carefully studied and of which there are decades of experience. Polythene is one of the most widely used plastics there are.

LIGHTNESS A BIG PLUS

Let's take a building site located in a tricky place with poor transport links, for example. Besides special trucks, bringing heavy materials to the site calls for proper site roads that are able to withstand constant use.

Compared with traditional types of pipe, plastic pipes are easy to handle and due to their light weight they do not require special lifting gear and standard site equipment is ideal. Lightweight pipes are safe to handle, too.

"It's much, much easier to handle plastic pipes while they're being transported and when they're on site," says Kainulainen.

Pipes can also be delivered to the site in long runs, which cuts down on jointing time.

"Besides rapid installation times, another advantage is the fact that you can work plastic pipe with normal tools. You can easily cut plastic pipe with an ordinary wood saw."

FLEXIBLE AND STRETCHABLE

Plastic pipe is also unbeatable when it comes to its ability to flex according to different ground loadings.

"Plastic gives, so plastic pipelines are not affected by frost heave or traffic loads," says Kainulainen.

Once installed in the ground, high-quality plastic pipe stands up to the highest loadings without fracturing.

"Plastic pipe changes shape, but doesn't crack or split under normal conditions. The deformations that do occur in normal installations are so small that they don't even affect the water-tightness of the pipe," explains Kainulainen.

Plastic pipe is a dependable choice; it is entirely rust-free and nothing can leach out of it into the soil. Plastic pipe stands up well to the harsh conditions in the North and has demonstrated in practice that it can take changing weather conditions and hard frost without flinching.



ECONOMY IN BALANCE

High-quality plastic pipe is not always the cheapest alternative, but beats many other materials hands down when it comes to overall economy, especially as many people try to reduce costs at the installation stage. Plastic pipe shows savings over the whole life cycle as it is unlikely to bring unwelcome surprises in ten years' time.

"Maintenance costs are low since plastic pipe does not need changing at the first opportunity. An installation carried out in good-quality materials will last a long time," continues Kainulainen.

He points out that an ordinary plastic bag does not decay instantly, so common sense tells us that plastic pipes made out of tougher material last for ages.

VERSATILITY IN APPLICATION

When certain things are designed and produced regularly, a routine is developed for materials procurement. Now and again, a situation crops up where a start has to be made on looking for new materials and new solu-

THE DIAMETER OF THE PIPE SYSTEM CAN BE AS MUCH AS THREE METRES AND THE PIPELINES CAN BE MADE 100% WATERTIGHT AND AIRTIGHT.

tions, because the existing ones are no longer effective.

"Weholite's variability and versatility is a great advantage, since it means you don't have to give up a tried and trusted material. The connections, jointing method and anything else that's necessary can be tailored to suit the application and the site," explains Kainulainen.

SIMPLY WEHOLITE

Weholite can be used to construct complete pipework systems for transporting air or liquids on land, in the sea, or air. The diameter of the pipe system can be as much as three metres and the pipelines can be made 100% watertight and airtight. What other material could do this? Simplicity is increased by the fact that the attributes are already there in the product; everything is included in the basic

price. Weholite pipes do not need additional expensive treatment in the way of internal finishes etc.

Weholite pipework systems include all the components required for constructing complete drainage and sewerage infrastructures, such as bends, Y-junctions and gullies. The Weholite Pipework System can be tailored as required to produce the desired result. The range of Weholite fittings is factory-made and ready to be installed, so there is no need to adjust them on site; everything is ready for installation, which speeds up the work.

The new Weholite pipework system includes product programmes where pipes, connections and junctions are all standardised. "The choice is clear and simple, and there are very few special product names to remember, which makes life a lot easier on site," says the practical Kainulainen. ●

Talega is an idyllic new residential community of 3,500 acres of mixed-use development including 3,860 homes. Named a “Masterpiece Community of the Year,” it is located within the rolling hills and coastal valleys on the eastern edge of San Clemente, CA about three miles from the Pacific Ocean.

Drainage and environmental concerns were paramount in planning the community.

Without a highly flexible storm drain system, the project would have encountered problems and almost doubled the runoff in the area and overwhelmed the downstream natural drainage facilities.

The “by-pass” storm drain system is directly adjacent to the Segunda Descecha Canada creek and crosses the creek in two locations. The natural creek meanders through the community for more than two miles and was protected by the installation of three bridges and 10 detention basins.

The storm drain slithers like a snake down the incline for 6,700 feet (2,042 m). It has 75 elbows with bend angles between

11° and 68°.

“The storm drain system was designed to capture developed area flows and some of the natural flows in order to reduce the flow in the natural creek, and thereby, control the scour of the natural creek bed,” says James B. Yates, PE, Sr. Project Manager for Talega Associates. “The low flow and a reasonable amount of natural flow was designed to be kept in the creek to sustain the plant life along the creek,” he added.

The reason the storm drain project was undertaken, agrees Jeff Langdon, PE, Associate, RBF Consulting, “was to limit or stop erosion of the creek stream bed; and to protect the houses, roadways and bridges at the top of the hill. The natural stream was very erosive and there was a potential over time it could start to erode the toe of the

slopes and then cause stability problems. There was also the habitat issue. We could not alter the natural stream bed with corrective grading or lining.”

SOIL MOVEMENT KEY FACTOR

The Segunda Descecha watercourse is an area of unique vegetation, a result of brackish ground waters in the area. The US Corp of Engineers required that the development did not impact negatively on this unique vegetative area.

“Potential soil movement was the key factor in selecting a flexible HDPE pipe alternative,” said Jim Yates. “The potential for differential settlement was of concern to us so that we could maintain drainage in the line. Our geologists at Stoney-Miller estimated that we could see one to three inch-

es of settlement occur along the line, but that was within the tolerance of the Weholite pipe’s ability to deflect,” he added.

In addition to the soil issues and flexibility of the pipe, Weholite by KWH Pipe was “selected because of the long laying lengths that could be used in the tight construction area,” said Jeff Langdon. The tight access meant that the Contractor couldn’t work from the sides but had to come directly overhead to lay the pipe and backfill as they went along.

“It was pretty tight, as narrow as 20 feet (6,5 m) wide for pipe up to 10 feet (3 m) in diameter,” said Frank Robles, Superintendent for Sukut Construction. “The line is like a meandering walking trail. But the Weholite pipe was easy to handle despite the large diameters and long lengths available,” he added.

The 6,700 feet (2,042 m) Weholite

Storm Drain system consists of 3,516 feet (1,072 m) of 84 inch (2,134 mm) diameter pipe at the top, then 426 feet (130 m) of 96 inch (2,439 mm) diameter, 2,560 feet (780 m) of 108 inch (2,743 mm) diameter and the final 225 feet (69 m) of 120 inch (3,048 mm) diameter at the bottom end. The increasing pipe size as the system moves downstream is typical with long storm drains as the systems collect more and more water as they move down.

Because of the downstream and natural drainage limitations, seven detention basins were built along the Creek with three on another tributary. “These detention basins, along with the by-pass Weholite storm drainage system helped lessen the major storm runoff flows to below pre-development levels,” said Jim Yates. ●

Storm drain system serves Talega development



84” (2,134 mm) pipe that is strung out adjacent to where the trench was to be excavated.



84” (2,134 mm) pipe being installed



The section of 108” (2,743 mm) pipe that was constructed on a 25% grade.

Wärtsilä Finland, one of the leading suppliers of diesel engine based power stations is building a 250 MW electrical power station in Lufussa, Honduras, Central-America. The power station is one of the largest of its kind and when it is in operation, it will employ in the region of 100 staff.



Lufussa powerstation

equipped with WehoPuts 70

The project was financed by the World Bank and the financing contract included a special clause on the on-site sewage treatment facilities. The World Bank has specific requirements for the treatment of sewage that are as stringent as the EU-directive for domestic sewage treatment.

KWH Pipe has developed a modular, small to medium scale "family" of sewage treatment plants, called WehoPuts. WehoPuts is a Sequencing Batch Reactor, activated sludge process, with a full aeration face, a chemical precipitation face and a full

anoxic face for total nitrogen reduction. To date, this product is unique, as currently there is no other commercial product with this capability available on the market.

In the face of strong international competition, KWH Pipe won the bid to supply the unit to Lufussa. According to Business Manager Stefan Sandbacka of KWH Pipe, reasons for winning the contract were a combination of the extremely good treatment results achievable with WehoPuts, the high flexibility of the modular system, the total cost of installation and economy of use. The treatment results clearly show that the treatment capability of WehoPuts is much higher than the minimum requirement of The World Bank. They also exceed the results of most municipal treatment plants and also the requirements of legislation for rural areas in Denmark and Finland which are currently the most demanding in the world.

The modular treatment plant consists of 5 tanks that are fabricated out of Weho-lite pipework. The first tank is a pumping station that collects the sewage from the power station and pumps it into the buffer tank. From the buffer tank the sewage will

be batch fed into the two process tanks 3 and 4 for biological and chemical treatment. While the process is running the incoming sewage is stored in the buffer tank. The fifth tank contains the electrical cabinets, compressors, chemical pumps and chemical tank.

From the buffer tank onward everything is doubled. There are 2 process tanks with feed pump, clean water pump, sludge pump, chemical pump, compressor and automation control systems for each tank. This gives additional security as there is always one tank working. There is also flexibility in the control of the process, which gives a smooth start up to the biological process and the build up of activated sludge.

During the commissioning of the power station, there will only be a few workers on site. The WehoPuts system will then be set to run at only "half batch" in one of the process tanks.

ONLY TREATED EXCESS SLUDGE IS PRODUCED

When approximately half of the work force is on site the process will be set to "normal batch" in the same tank.

WehoPuts	Requirements for water treatment in rural areas in Finland	Measured WehoPuts 30 treatment result in real operation
Substance	% reduction	% reduction
• Biological oxygen demand BOD ₇	90 (<30 mg/l)	99 (1.9 mg/l)
• Phosphorus P	85 (<2 mg/l)	97 (0.8 mg/l)
• Total Nitrogen N	40 (<43 mg/l)	93 (10.4 mg/l)
• Ammonia		>99 (0.68 mg/l)

World Bank Requirement: BOD₇ 83% (<50 mg/l), Phosphorous 85% (<2 mg/l), N - , Ammonia 85% (10 mg/l)

When the whole work force is on site, half of the activated sludge in the first tank will be moved to the second process tank. When that tank is brought into use, it will already contain fully grown activated sludge, meaning the treatment process will be run with full biological capability.

Since the biological treatment is based on the lifecycle of microbes, dead microbes will build up excess sludge in the process tank, which has to be removed at regular intervals. As there is no vacuum equipment in the neighbourhood, WehoPuts is

equipped with a sludge-removal unit which can be operated by the personnel responsible for the treatment plant.

All domestic sewage from the power station is taken for treatment in WehoPuts. Hence no untreated septic sludge is produced on site. Only treated excess sludge is produced. After a short composting period this treated sludge can be used for soil improvement at the site.

WehoPuts70 Honduras was installed in May 2004, with handover and commissioning, in November 2004. ●

In July 2003 it was necessary to renovate a section of a worn-out reinforced concrete collector in the Wrocław sewage system in Poland. The sewage canal under repair is 2.5 metres in diameter, was built between 1970–1974 and is one of the major collectors that cross the city center.



By employing Weholite technology some arches (up to 16 degrees) could be tackled thanks to adjusting the length and shape of the elements to the curve of the collector.

Fast and easy in Wrocław using Weholite DN/ID 2000

The reason for the renovation of the collector was its poor condition caused by the ongoing erosion of the concrete eating up to 70 mm of the wall of the collector, which was approximately one third of the overall wallthickness.

A 231-meter-long section was repaired. The selected technology was short-length relining that consists of inserting of Weholite polyethylene modules into the worn-out collector. Weholite pipes were supplied in lengths of 6 and 3 meters. This helped to minimize the size of the launch chamber and reduce the road traffic problems.

The use of Weholite technology during the renovation works made it possible to sustain sewage reception. Assembly works were performed on an operating collector.

RENOVATION WORKS

- **Project:** Renovation of a reinforced concrete DN 2500 sewage canal
- **Location and deadline:** Wrocław, Poland, July/August 2003
- **Method of renovation:** Short-length relining with Weholite pipes DN/ID 2,000 mm
- **Length of canal:** 231m
- **Pipe jointing method:** Extrusion welding
- **Pipework Supplier:** KWH Pipe Poland
- **Contractor:** PRIS Wrocław
- **Investor:** MPWiK Wrocław

RELINING USING WEHOLITE TECHNOLOGY GUARANTEES:

- leaktightness
- long-lasting performance
- no corrosion
- fast and easy installation



Weholite for road culverts

The Swedish National Road Administration chooses Weholite for road culverts. It was installed in the new extension to main highway 27 outside Borås, Sweden. Average traffic flow in the area is 6,000–7,000 vehicles/24 h.

Road culverts without joints give considerable added safety compared with culverts that have joints. One of the three double culverts with a 2,000 mm diameter has also been chosen by KWH Pipe as a subject for further study. The Swedish National Testing and Research Institute will perform continuous deformation measurements. This will enable comparison with KWH Pipe's own calculations, which is a useful way of comparing theory and practice.

ENVIRONMENTALLY ADAPTED ROAD CULVERTS

The fisheries section of the County Administration had demanded that all road culverts of over 1,200 mm diameter should have rocks spread along the bottom of the culvert. This was required in order to imitate the bottom of a natural stream and create a better, more natural environment for fish and other aquatic organisms and plants.

The use of large road culverts in polyethylene seems to be heading in the same favourable direction taken by smaller diameters in the late 1980s. KWH Pipe has noted a considerable demand for dimensions between 800 mm and 2,000 mm in diameter. This is primarily due to the corrosion resistance of the material; a polyethylene culvert does not require any separate corrosion protection.

The lightness of the pipe and the potential for long lengths without joints contribute to making it an attractive alternative in terms of total economy, and it also has a lifespan of up to 100 years. What other material could compete with that? ●

The contractor, NCC, who had submitted the lowest tender for the first phase, offered its client, the Swedish National Road Administration, a cost saving if it was allowed to exchange the specified concrete culverts for Weholite polyethylene culverts.

Thanks to this, not only did the Swedish National Road Administration save on overall costs but all the culverts were laid as 2,000 mm diameter pipes without joints (a total of 258 metres). The culverts were welded together, which gives them unbeatable technical properties.



The underground water tank that was installed for the municipality of Soini, Finland guarantees residents a supply of clean household water. Peaks in the consumption of household water can be evened out in the area with the help of the Lappajärvi underground water tank.

The municipality of Soini is situated in the Province of Western Finland in the Suomenselkä watershed area. Its new underground water tank guarantees a supply of clean household water for the residents in the northern part of the municipality. The water tank is part of a large building contract: by the year 2006, a water main connecting the municipalities of Alajärvi, Soini and Lehtimäki will be completed.

“Here in Soini, which is over 200 metres above sea level, there are not many gravel deposits and thus no ground water reserves, so we have to buy some of our water from elsewhere,” explains Pentti Honkola from the local authority.

Soini has its own water pumping plant in the main built-up area. The plant has a concrete underground water tank with a building for pressure boost on top of it, but it only provides enough water for the central area. The new underground water tank supplied by KWH Pipe makes water distribution easier throughout the whole municipality because water can now be stored for the other residents. During the night water is pumped into the new tank from Porasharju, in Alajärvi and during the day household water is supplied from the tank.

With the help of the new underground water tank it is also easier for the local authority to control peaks in water consumption and to guarantee water supply in emergencies. Because of the tank, the municipality can also help its neighbours when necessary through the new connecting water main.

If something happens at one of the water intake plants belonging to a municipality in the area, water can be distributed in different directions.

An underground water tank made of plastic is quick and easy to install. Water tanks supplied by KWH Pipe are both a container and a pumping chamber in one so there is no need to maintain the pumping chamber separately. The supply of electricity can be considered as the only operating cost for the underground tank.

An underground water tank saves operating costs

EVERYTHING IN THE SAME PACKAGE

Plans had already been made for a traditional concrete tank and an above ground pump house. KWH Pipe’s alternative, however, seemed sensible because it has only one pipe and the maintenance area is situated at the head of the pipe. During construction it was still possible to suggest improvements, one of which was the installation of a clear pipe in the maintenance area to monitor the water level in the tank.

Pressure in the water pipe network is boosted by pumps. Because they are situated inside KWH Pipe’s underground water

tank, the servicing and pumping chamber premises, unlike the separate building adjacent to a traditional concrete tank, do not require any maintenance.

In addition to savings in operating costs, the location of the pipes influenced the choice made by Soini.

“We have some problems here with ground water so concrete construction would also have been more difficult to implement. In addition, the bedrock deeper down would have increased the costs to an intolerable level. The quick installation of a tank made out of pipe is also a significant advantage”, explains Honkola.



Installing the tank went quickly because the 8-tonne tank was lifted into place with a crane and covered over immediately.



To keep the Soini underground water tank firmly in place, foundations were cast on both sides. Workmen tightened several straps over the tank from links in the foundation.

SOINI AND LAPPAJÄRVI TANKS MADE OF WEHOLITE PIPE

- The tank in Soini has a capacity of 80 cubic metres and the tank in Lappajärvi 100 cubic metres.
- The tank in Soini is 20 metres long, with an internal diameter of 2,400 mm. The tank in Lappajärvi is 24.5 metres long and its internal diameter is also 2,400 mm. The tanks have a section partitioned off with a wall in which the booster unit is located.
- Both tanks are placed under ground and have two hatches: one providing access to the tank and the other to the pumping chamber.

INSTALLATION IN ONE DAY

The 20 metre tank, which was manufactured at KWH Pipe’s Vaasa factory, was installed in Soini in one day. The installation itself went quickly because the tank was lifted into place with a crane and immediately covered.

Foundations were cast on both sides of the tank to ensure that the tank stayed in place even if there were changes in ground water levels.

No subsoil drainage was installed at the site – instead an outlet chamber 500 millimetres in diameter was built at the base of the tank through which any water collecting there could be pumped out.

The tank was covered on top with a five centimetre thick heat-insulation board so that the water in the tank would not freeze. In addition, half a metre of gravel was spread on top of the tank. •

The installation of an underground water tank in Lappajärvi, Finland went without a hitch. The tank was built for the Water-Works Co-operative, which will be able to supply water to the neighbouring municipality of Evijärvi when the connecting main between Lappajärvi and Evijärvi is completed in 2006. The tank also functions as the Co-operative’s own auxiliary tank.

The tank, which was manufactured at KWH Pipe’s Vaasa factory, was taken to Lappajärvi as a special delivery. The straps needed for the transfer were put in place at the factory so it was possible to begin moving the tank immediately after the truck arrived. The tank was installed in the pit 45 minutes after it arrived on the site.

The pit for the tank was equipped with subsoil drainage. The soil contained a lot of glacial till so a bed of fine sand was made for the tank. The filling process went well, and altogether the installation work took about four days.

WATER FOR EVIJÄRVI

The need for a tank arose when Lappajärvi Water-works Cooperative signed a 15-year water supply contract with the municipality of Evijärvi.

100 cubic metre underground water tank fits neatly into the pit

An underground water tank can be used to control water consumption peaks and thus make a constant supply of water possible. In this way the water supply to the municipality of Evijärvi could flow without affecting normal consumption or causing changes in pressure.

About 5.5 kilometres of pipework and connections will be installed in Lappajärvi and approximately 4.5 kilometres will be laid in Evijärvi.

Using the traditional method, there would have been an underground concrete tank on top of which a pump house would have been constructed. Now the whole system could be assembled together inside the tank in the same package. The booster pumping chamber is at one end of the tank and manufactured from pipe. Doing things this way made the project more economical and easier to install. In principle the tank can also be moved. •

Suseåen is the longest river in Zealand in Denmark and it has a considerable water flow. At the rivermouth, the river flows out through the busy town of Næstved. Due to traffic arrangements, the river has been covered over for many years, and the water has been conducted through a couple of huge concrete tunnels, hidden underground and underneath the road network.

Project Suseåen in Zealand

Recently, however, a decision was made to uncover Suseåen again to bring the watercourse back into view as an element of the townscape. It proved impossible to free the river's existing channel, as this would have involved excessive problems with traffic arrangements. Instead, a new channel was established in parallel with the existing one, but adjacent to the road network. This also made it possible to use the old concrete tunnels as overflow sewers in the event of exceptionally heavy rainfall.

In connection with this project, the sewer network was also to be renewed along the same stretch, and this was to be done with a minimum of excavation in order to avoid disrupting the traffic. Consequently, it was decided that a new sewer pipe would be installed in the existing concrete tunnels, to be connected with the town's existing



The 150-metre sewer pipe on its way into the harbour for transportation to the installation site. Note the flexibility of the pipe as it bends.



The individual pipe sections, each 12 metres in length and 1,500 mm in diameter, were assembled using an extrusion welding technique, carried out inside the pipe. The picture shows the extruder, which is mounted on a specially constructed carriage.

sewer network further along the line. KWH Pipe (Danmark) AS was chosen as supplier for this phase of the project, and the company was to both deliver and install the new sewer pipe.

The best solution was to assemble the individual lengths of pipe outside the concrete tunnels. This was done in an open area with access to a harbour basin. Here, KWH's own installation team welded together the pipe components, each of them 12 metres in length and 1,500 mm in internal diameter. Finally, a single, complete sewer pipe could be transported into one of the concrete tunnels, where it was installed and connected with the existing sewer system nearby. The new pipe had been finished with a 90° bend to allow it to be connected to the existing sewer system.

The new sewer pipe was manufactured in Weholite, which is a particularly strong

and durable, yet very lightweight, material. Transportation of the completed pipe section across the harbour basin, from the welding site to the installation site, was no problem either, as the pipe floated and was easy to handle.

However, it was important to fix the sewer pipe very firmly inside the concrete duct, since the water level rises and falls in the tunnel which is often used as an overflow for the Suseåen river at peak discharge. The changes in water level would affect the lightweight pipe unless it was properly fixed. Thus, the pipe was installed using huge fixings which were tightened around the pipe and then fastened to the floor and wall of the concrete tunnel.

In this way, it was possible to install some 150 metres of new sewer line with a 1,500 mm diameter in the middle of a busy town without any traffic disruptions at all. ●

Great things are happening in Nykøbing Falster. The town, which lies on the lovely Guldborgsund strait, wants a more presentable seafront facade. A major improvement scheme has now been started, including a plan to open up the Tingsted river, which has long been covered over, and turn it into a harbour canal, as a sort of inner harbour basin.

However, the town has had problems with the sewer system and storm drains along the harbour front for some time now. Whenever there is heavy rainfall, the sewers overflow. "The solution chosen for this problem was to lay some 300 metres of PE pipe as a kind of overflow basin which can accommodate the enormous volumes of water from really heavy rains," explains Hans-Kristian Høen-Beck at KWH Pipe AS, which supplied these gigantic pipes.

It is far from the easiest task that the contractor, Troels Jørgensen of Kettinge has ever undertaken. "Apart from the fact that these are the biggest pipes I have ever dealt with, the job is also unusual because the pipes are to be laid less than 10 metres from the waters of the Guldborgsund strait. This means that the ground is more likely to give way when we use the diggers. When we backfill the trenches which involves driving over the ground on top of the pipes, they give way slightly and become oval. That is not a problem in itself, but it does place certain demands on the type of fill we use. We have had to make some adjustments as we go along," says Troels Jørgensen.

SPECIAL WELDING TECHNIQUE

When the pipes have been laid in the

trench dug for them, they are welded together with special equipment. The welding operation is carried out inside the pipe, and the resulting welding seam is at least as strong as the pipe itself.

One of the advantages of PE pipe over a more traditional material such as concrete, for example, is that special inspection chambers can be mounted directly on the PE pipe. This makes access easy and safe.

A promenade and a public beach will be created along the area where the PE pipes have been laid.

"This is an exciting project which will give the town a much more interesting look," says Troels Jørgensen. He employs 150 men and is carrying out the work as a subcontractor in cooperation with Mogens Petersen in Nyborg. ●



The work with the huge pipes is made more difficult by the Guldborgsund strait, whose waters can be seen right next to the excavation site.

PE PIPE IN SANDWICH FORMATION

The pipes in question are PE pipe installed in a sandwich construction which is easy to make. The pipework supplied by KWH Pipe was Weholite – a lightweight drainage pipe-work system. The pipe for this particular application was 2 metres in internal diameter and came in 18-metre lengths. A total of 300 metres of pipe were delivered for this installation.

Taking on Guldborgsund

'Gold coast': Prestigious harbour improvement project starts in Nykøbing Falster in Denmark.



Ventilation system for Måløv

KWH Pipe (Danmark) AS was selected as the supplier of pipe for the external section of the ventilation system at a new building in Måløv, some 20 km from Copenhagen, for Novo Nordisk, a major Danish medical company.

The contractor for the new building, Per Aarsleff A/S, has been contracted to supply a corrosion-free ventilation system. Novo Nordisk had had bad experience with the previous ventilation pipes

manufactured in steel, as they proved unable to withstand the condensation and in turn, corrosion, produced by the exhaust gases.

Per Aarsleff A/S turned to KWH Pipe, which had just the right product for this type of application: Weholite. A total of 136 metres of pipe with an internal diameter of 2,000 mm was installed from the external ventilation shaft into the building and then back to the external ventilation shaft.

In addition to being completely air tight, Weholite pipes are not corroded by either water or other liquids (including chemicals). This makes Weholite particularly well suited for ventilation applications.

This is, in fact, a new application for this type of pipe, which is normally used for conducting rainwater, wastewater, chemicals and other liquids. But if the results live up to expectations, KWH Pipe is counting on more orders for similar applications. •



Over the last decade Weholite has successfully gained new markets and is currently being manufactured on five continents. Weholite is today manufactured under KWH Pipe Ltd licence by eight licencees worldwide.



Weholite licencing

The first Weholite licence was granted in 1993 and during September 2003 the 20 years anniversary of Weholite was celebrated in Vaasa, Finland. The “Weholite family” has been growing steadily ever since and the Weholite licencees can be found in UK, Italy, Iceland, South Africa, Tanzania, Oman, Chile and Japan.

The majority of the Weholite licencees have a background as plastic pipe manufacturers, which have desired to differentiate themselves from the competition by offering a unique product such as Weholite. Today, most of the licencees have developed niche Weholite products, which enable them to find new market segments and thus receive higher margins.

LICENCING OF WEHOLITE TECHNOLOGY

Weholite is a patented continuous production process created to optimise raw material usage in the manufacturing of structured wall plastic pipes of different ring stiffness classes. The structure of the Weholite pipe gives a favourable weight/ring stiffness ratio compared with other lightweight pipe concepts. The product is designed to compete mainly against traditional materials, like concrete and steel, for example, in the larger diameter range up to NS 3,000 mm for non-pressure applications such as gravity sewerage, drainage, storm water, road culverts and retention tank systems. In

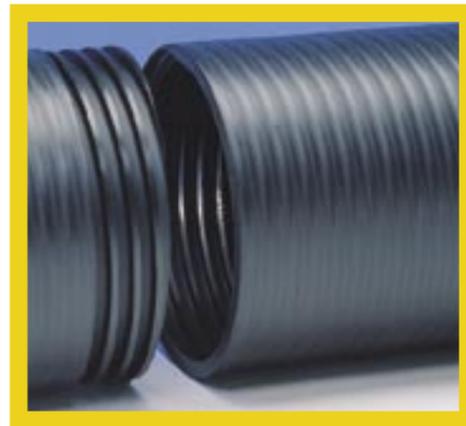
addition, Weholite offers great potential for added-value fabricated products like manholes and tanks.

Since KWH Pipe is a plastics pipe producer as well as a pipe production equipment manufacturer, it has been fortunate to be able to develop the Weholite production machinery along with the pipe manufacturing process. Consequently, in connection with a Licencing Agreement, KWH Pipe is in a position to supply a complete production machinery set-up including straight pipe production, fitting manufacturing, joint fabrication, field joint equipment and quality control. Furthermore, training for operation and support services is available on request.





Weholite jointing methods



There are numerous jointing methods for Weholite, with properties adjusted to the needs of different applications. This wide choice of jointing methods in itself is an advantage for the pipe system, and helps to adapt Weholite to new application

fields. Some of the more popular jointing systems are:

- **Welded joints**
- **Threaded joints**
- **Socket (Bell and Spigot) joints**
- **Sleeve joints**



THREADED JOINT

The threaded joint is a unique feature of the Weholite pipework system. The thread is an inherent structural part of the pipe wall, which is revealed by removing a part of the exterior or interior pipe wall. The threaded joint is quick and easy to install, even for sizes up to 2,000 mm. Small sizes can be turned manually. For larger sizes, a sling is wound around the pipe and fastened onto the excavator bucket. Lifting the excavator arm rotates the pipe. The threaded joint is ideal for relining applications, as it has a high tensile strength and does not add to the external diameter. Watertightness is obtained by adding a weld seam.

EXTRUSION WELDING

Extrusion welds provide fully watertight joints, that can also be pulled, or even submerged. Extrusion welds can either be made manually or by using welding machines specially developed by KWH Pipe. Machines are optimized for various pipe size ranges, welding either from the outside or from the inside of the pipe.

SOCKET (BELL AND SPIGOT) JOINT

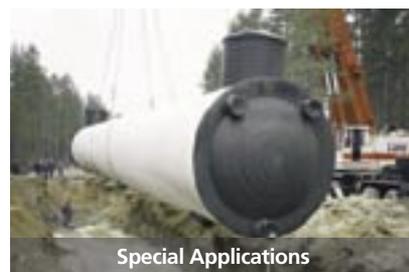
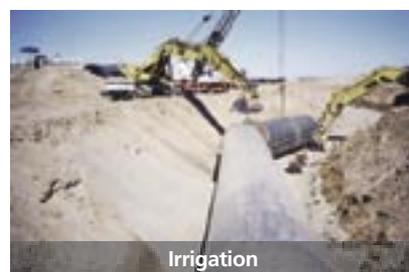
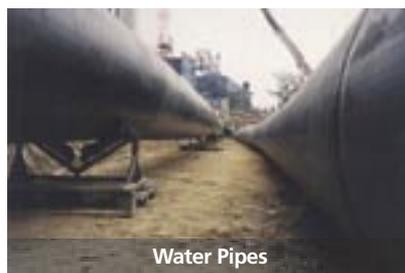
Easy-to-install integral sockets are available with rubber seals from DN/ID 350 to DN/ID 800. The rubber-sealed sockets fulfill normal European tightness requirements for sewage pipes. Plain sockets are also available in DN/ID 1,000. To adjust for non-standard pipe lengths, double sockets are also available in the same size ranges.

SLEEVE JOINTS

There are a number of sleeve joint solutions available for Weholite:

- **Flex-seal** is a rubber wrap-around sleeve, which is tightened by steel straps on the outside.
- **Heat-shrink** sleeves shrink to provide a tight joint when heated up during installation.
- **Both of these types** are well suited to be used together with the thread joint for additional tightness.

Complete engineering - our speciality



International **Pipe Specialist**



KWH Pipe Ltd
P.O. Box 21
FIN-65101 Vaasa, Finland
Tel. +358 6 326 5511
Telefax +358 6 315 3088
www.kwhpipe.com

www.kwhpipe.com