

IMPROVING YOUR LIVING ENVIRONMENT



SAFE DRINKING WATER

Weholite for marine applications | VipLiner saves time and money

PIPE WORLD – THE KWH PIPE CUSTOMER JOURNAL



“Flexible, leakproof pipe was essential for the Talega storm drain system.”

Talega, California, storm drain slithers like a snake down the valley incline for 6,700 feet.



*Jeff Langdon, PE
Associate RBF Consulting*

“The US Corps of Engineers required that the development of the 3,500 acre Talega community not impact negatively on the adjacent Segunda Descecha creek. Without a storm drain system, the Talega development would have almost doubled run off in the area and overwhelmed natural downstream drainage,” says Jeff Langdon, an Associate with RBF Consulting.

“Potential soil movement was another key consideration in our system design. We had to find a solution that was flexible, could economically follow the creek bed, and was completely leakproof,” Jeff notes. “We chose Weholite HDPE pipe, in 96" to 120" diameters and long laying lengths that could be used in the tight construction area and had the flexibility to accommodate 75 bends,” Jeff stated.

Watertight joints and the flexibility of a pipe that will deflect rather than crack under stress made Weholite the natural choice for Talega. The fact that it's also light weight, corrosion and abrasion resistant make Weholite the secure, reliable choice for all water main, sanitary sewer and storm water applications.

www.kwhpipe.com



EDITORIAL



Improving Your Living Environment

Four words that describe KWH Pipe's strategy – “Improving Your Living Environment” – provide the theme for this issue of Pipe World magazine. They reflect our business idea, which is to supply piping systems, solutions and machinery that enhance our daily life and contribute to the sustainable development of our living environment.

Environmental issues are with good reason becoming more and more relevant in our daily lives. Everyone values clean water, air and a healthy living environment. Considerable effort is made everyday to ensure a better environment, but unfortunately violations also occur.

KWH Pipe has identified its responsibility and is increasing its efforts to sustain and improve community environments. The range of products and solutions is increasing and our personnel around the world are in daily contact with projects for distributing water, repairing leaking water distribution lines, treating sewage and pipe installations to prevent flooding or for drainage or providing heating or cooling to our homes.

So far, we have concentrated on our home markets in Europe, North America and Southeast Asia. Today, however, our years of knowledge and experience are available even more widely. Mobile production is a new economical concept in the piping business. It enables us to serve our customers where they want to be served – at home, close to their living environment. We offer them extended services from supply deliveries to turnkey installations.

All product systems and solutions are built in fully recyclable thermoplastics, which unlike many other materials don't crack or corrode, and have a very long lifespan.

To get a better picture of KWH Pipe capabilities, Pipe World presents you with a selection of projects and installations which KWH Pipe has been involved with recently.

Let's improve our living environment together!

Jan-Erik Nordmyr
Editor in chief
Director, Business Development

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 Saksan Jansangiem, KWH Pipe.
Editors: Kynämies Oy, Tel. +358 9 1566 8510
Press: Frenckellin Kirjapaino Oy

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APPOINTMENTS

Wiik & Hoeglund Public Co. Ltd

In August Mr Peter J. van Haren, was appointed Executive Director for Wiik & Hoeglund Public Co. Ltd and is responsible for KWH Pipe's operations in Thailand. As of 1 December 2004 Mr van Haren will also be Area Director for Asia with responsibility for Thailand and Malaysia.



Extron Engineering Ltd

A new Managing Director was appointed for Extron Engineering Ltd. As from August 2004, the operations of the plastics technology producing division are being headed by Mr. Jukka Vehmas, M.Sc. (Eng.). Mr. Vehmas was the Technology Director at Uniglass Engineering Ltd. Extron Engineering operates from Toijala, Finland.



KWH Pipe, Technology

KWH Pipe, Technology established a sales office in Lahti, Finland, in September 2004 for its new business area, Fitting Production Systems (moulds and automatic equipment). The business area is global. Mr Pekka Säävälä, B.Sc. (Eng) was appointed Business Manager, Fitting Production Systems, as of 10th September 2004. Mr Säävälä previously held various managerial positions at Tooler Oy.



KWH Pipe Poland – Company of the Year 2004

TECHNOLOGY | We are pleased to inform you that KWH Pipe Poland has won TYTAN 2004 Award in the Company of the Year category. TYTAN is granted by the Polish Association for Trenchless Technology, Polish Foundation for Trenchless Technologies and magazine "Technologie Bezwykopowe" (Trenchless Technology).

The award ceremony took place at 2nd International Conference "Trenchless Technologies LIVE 2004" in Cracow.

Since the beginning of its activity KWH Pipe Poland has contributed to the development of trenchless technologies in Poland. Polyethylene pipes made by KWH Pipe have been used in technologically advanced large-diameter renovation projects and record-breaking horizontal culverts.

We express our sincere thanks for this prestigious award. We also thank all the companies co-operating with us for the last 11 years.

– KWH Pipe Poland

Factory delivery to Togliatti, Russia

from Vaasa will begin in December 2004 and the factory will begin production in March 2005.

Depending on pipe size, the capacity of the plant will be 300–500 kilometres of district heating pipe a year. The factory will start to manufacture 50–1000 mm district heating pipes and 125–900 mm pressure pipes. KWH Pipe Technology will be responsible for installing and starting up the equipment in Togliatti, as well as training the customer's employees.

KWH PIPE TECHNOLOGY WILL SUPPLY THE FOLLOWING ITEMS FOR THE PLANT:

- Two extruder lines (630 and 1000 mm) for manufacturing PE casing pipes and PE pressure pipes.
Equipment for PU-insulation of straight district heating pipes.
Equipment for manufacturing fittings for PE pressure pipes and district heating pipes.
Equipment for producing air conditioning duct elements.
Equipment for producing PU half-shells.
Site welding machinery.
Quality control equipment.

VipLiner to Japan

VIPLINER | In July 2004 a full set of basic VipLiner relining equipment for pipe module sizes Ø160–560 mm was delivered to KWH Pipes Weholite Licensee Tori-i Kasei Co., Ltd. in Japan.

The "VipLiner package" comprised also training and trademark license for VipLiner. Prior to the delivery of the equipment extensive manufacturing, prefabrication and field installation training was held in Vaasa.

Currently there is no similar technology for sewer relining available on the Japanese market and Vip Liner is expected to fill the gap.



The representatives of Tori-i Kasei Co., Ltd. came to Finland, Kurikka, to get acquainted with the VipLiner relining equipment.

Renovation of Stockholm's Moderna Muséet

RENOVATION | The heart of the city of Stockholm, with its idiosyncratic blend of old and new architecture, is situated at the outlet of Lake Mälaren into the Bothnian Sea. The proximity of water is characteristic of the entire city, particularly its very centre. There are numerous sites of historical importance here, such as Skeppsholmen island, where the ill-fated Royal flagship Vasa was built in the 17th century.

Today, Skeppsholmen hosts culture and art; the Moderna Museet (Modern Museum) has occupied the highest point on the island for many years. The museum was renovated by the Statens Fastighetsverk (National Property Board) this year, with considerable investments in facilities for exhibitions and education, and offices. The interior climate was given high priority in the renovation process. Air quality was ensured with a

ventilation system that regulates humidity and temperature in all rooms of the museum. For keeping the large rooms at the appropriate temperature, a cooling agent was found in Strömmen, the waterway surrounding Skeppsholmen: cold water from the very bottom is pumped into a heat exchanger, which cools the air in the ventilation system.

KWH Pipe Sverige AB supplied PE pipes, diam. 500 mm for the district cooling system consisting of 1,000 m of pipes and fittings, intake filters and welding. The contractor, Aros Water, installed the district cooling pipeline on commission from the National Property Board. The KWH Pipe delivery of a system with all functions related to the pipeline was chosen above all for its quality. The concrete weights were supplied by Meag. The filter designed for the intake of cooling water is made of perforated Weholite.





Domestic heating

The Ämmässuo landfill site in Espoo is to produce district heating for homes in the area. Gas from the landfill will be conveyed through plastic pipes to the Kivenlahti heating plant, where it will be turned into thermal energy for the district heating network.

Excavators were busy digging the route for the new gas pipe at Kivenlahti in Espoo during April. The trench was being made for KWH Pipe's 400 mm PN4 Weho-gas gas pipe, which was laid along a length of 11 kilometres. This is the largest plastic pipe size for natural gas made in Finland.

The pipe deliveries had to keep pace with what turned out to be a quickly advancing project. The project was a collaborative effort between the power company E.ON Finland and Helsinki Metropolitan Area Council (YTV).

"The technical aspects of the gas pipe were finalized in August 2004. Gas was flowing through it at the end of September, and the gas used as a fuel for the Kivenlahti heating plant in late October," explains engineer Timo Aho from E.ON Finland's district heating division.

The large pipe diameter was chosen to ensure efficient power transmission. The potential exists for expanding the use of landfill gas for district heating in the future.

"The use of landfill gas has been talked about a lot, but there wasn't an easy solution because there are no residential areas or industry near the landfill. So there was nobody to use the energy. But in autumn 2002 the whole situation was looked at again," Aho recalls.

Espoo Sähkö, as it then was, and Helsinki Metropolitan Area Council (YTV) set about drawing up an agreement in earnest in January 2003, and the agreement was finalized in April the same year. The power company changed its

name to E.ON Finland Oyj in August 2003, though this didn't affect the project.

NO ANCIENT RELICS FOUND

"The Ämmässuo landfill produces a huge volume of gas – currently 6,100 cubic metres per hour, with a calorific value about half that of natural gas. With the current arrangements in place, Ämmässuo can heat about 2,000 individual houses annually," says Aho.

The option of running a long gas pipe turned into a tempting proposition. Different routes were investigated, with the aim that the gas could be sent for combustion at the Kivenlahti heating plant. The next stage was to submit the necessary permit applications.

"Permission of the relevant landowners was needed as well as installation and landscape permits from the City of Espoo. Permission was also applied for from the Safety Technology Authority (TUKES) and the Finnish Road Administration. The permits were subject to the consultation process, Espoo City Museum being among those consulted. It transpired that the line of the pipe would have to be confirmed through an archaeological dig at Perinki in Espoo," Aho explains.

The archaeological excavations were carried out in October 2003, during which it was discovered that the area contained nothing that pointed to the existence of ancient relics.

E.ON Finland's project-related investment includes a new heating plant boiler and furnace. »

from landfill gas

"The technology in place will allow all the landfill gas to burn cleanly. The new boiler will guarantee that we observe the emissions requirements," says Timo Aho.

Landfill gas is formed as organic waste material decomposes in oxygen-free conditions. This is a biological process that results in greenhouse gases harmful to the environment, but which also contain energy. The gas contains mainly methane and carbon dioxide, alongside small amounts of other compounds.

SNOW ACCELERATED THE WORK

The contract was won by Finnish Road Enterprise, for whom Jukka Lindroos is leading the project.

"Being the first time that a power company is working like this with the YTV Waste Management Department, it's a very interesting project to be involved in," says Lindroos.

Although southern Finland doesn't normally have that much snow, last winter there was a thick covering, which actually helped progress with the project.

"The snow allowed us to transport the pipes across it in 200-metre sections, which

meant the welding could be done at the welding site beforehand. Thanks to the snow, the pipes could be hauled into place without damaging them," Lindroos explains.

A HIGH-TEMPO PROJECT

The work was done by three welding teams and one outside team. Each team welded eight to ten joints a day, which meant that the three teams together could install about 400-600 metres each day. This was so efficient that the machines at KWH Pipe's Vaasa plant could not produce pipe fast enough at the initial stage. However, KWH Pipe was able to adjust its production process to meet the tight timetable.

"KWH Pipe reacted quickly to increase its capacity. They provided a very good service," says Lindroos.

In addition to the normal excavation work, directional drilling was undertaken at the site in order to pass beneath a river. This is a fast and cost-effective method that leaves no mark on the terrain.

LANDFILL OF 46 MILLION CUBIC METRES
In recent years the gas produced at Ämmäs-

suo landfill has been burnt off as a flare.

"As a result, the production of gas has not led to environmental damage, but on the other hand such combustion has been a waste of the useful energy produced at the landfill," explains Lindroos.

YTV will be responsible for gas collection and the pumping stations, as it has been till now. Production engineer Sauli Kopalainen explains that last year approximately 46 million cubic metres (230 GWh) of gas was collected from the Ämmässuo landfill, which is equivalent to 23,000 cubic metres of light fuel oil.

"The gas is collected at four gas pumping stations, from which it is then conveyed to the booster station to be dried. After this, pressure is increased and the gas conducted into the pipes," says Kopalainen.

Finland's existing plants utilizing landfill gas handle up to 1,000 cubic metres per hour. By contrast, the Kivenlahti plant will be handling up to 6,000-7,000 cubic metres per hour.

"There's enough gas to last decades, but to begin with the agreement will be in force until the end of 2008," says Kopalainen. •



The gas pipe was laid in Espoo during the spring at a brisk rate of 400-600 metres per day.

**FINLAND'S EXISTING PLANTS UTILIZING LANDFILL GAS
HANDLE UP TO 1,000 CUBIC METRES PER HOUR.
THE KIVENLAHTI PLANT WILL BE HANDLING UP
TO 6,000-7,000 CUBIC METRES PER HOUR.**

ESPOO'S GAS PIPELINE

- 10,735 metres DE 400 mm PN4 Wehogas pipes and fittings

WEHOGAS PIPES

- Plastic gas pipes manufactured in accordance with the SFS-EN 1555-2 standard.
- Maximum operating pressure of the Wehogas pipes is
PE 80 SDR 11 in pipe 4 bar
PE 100 SDR 11 in pipe 8 bar
- With the new European standard, the size range of gas pipes has been increased to 630 mm. This also allows a plastic pipe to be used in the E.ON Finland Oyj transmission pipe project.
- The advantage of plastic is that installation costs are significantly lower compared with steel pipes.



ESPOO – KIRKKONUMMI DISTRICT HEATING

Deliveries of the Weotherm district heating pipes for the Laajakallio to Jorvas section:

- Pipe DN300/500 L = 16 m over 6 km
- Valve elements DN300/500
- Over 200 TSC joints, some of which with angled sleeves.

E.ON Finland's network gains around two hundred new customers each year. Currently, there are about 7,200 district heating customers nationwide, and sales last year totalled 2.5 TWh. In the Helsinki region, including Kirkkonummi, there are approximately 5,200 district heating customers.

"About 97 per cent of district heating is sold to major customers such as apartment blocks, major offices and commercial centres. Low-rise residential areas include a lot of private residential customers, but altogether they comprise only a few per cent of the total," explains Seppo Alanen, E.ON Finland's district heating director.

Each year, E.ON Finland builds about 25-30 kilometres of new district heating pipeline in Finland, most of which is located in Espoo.

"We install pipes throughout the year. The manufacturer's specified minimum temperature for the piping is -17°C, but even last winter the temperature dropped that low only

E.ON Finland's sales of district heating are growing at a steady annual rate. The new district heating pipeline from Espoo to Kirkkonummi will be almost 20 kilometres long.

Savings with district heating

once or twice," explains engineer Mauno Hiirikoski.

For users, district heating is an inexpensive and convenient form of heating. It is also an environmentally friendly alternative. E.ON produces most of its district heating as combined heat and power production, which reduces emissions considerably compared to separate heat production. Combined heat and power production means that the heat produced in power generation is recovered and used in district heating.

ONE PIECE AT A TIME

E.ON Finland is currently installing a new district heating pipeline from Espoo to Kirkkonummi. Kirkkonummi is one of the fastest growing towns in Finland, with new residential districts under construction.

The district heating pipeline is being built in parallel with construction of the sewage transfer pipeline from Kirkkonummi to Espoo.

"We noticed that the sewage pipeline route was very suitable for us, too. Having a project timetable jointly with the sewage pipeline allowed us – with municipal assistance – to obtain the construction permits from private landowners," explains Alanen.

The construction work has been done piece by piece.

"Installation of the first section, from Kirkkonummi to Laajakallio, began at the start of 2002. In August, the pipeline was extended from Laajakallio to the LM Ericsson production plant at Jorvas. Next, the line will be built between Espoo and Sarfvik. This section is scheduled for completion in winter 2005."

The district heating pipes are installed by two welders and one excavator. The pipe being

used is KWH Pipe's DN 300/500 Weotherm pipe. TSC joints are made on-site by KWH Pipe's installation team. The rate of progress is about a hundred metres a week.

"There are a lot of sections across open fields in Espoo, where we'll be digging deeper trenches for the pipes, but no subsurface drainage will be necessary. In these areas the welding is done at the edge of the trench rather than in it. For this reason, the jointing technology we're using is the KWH Pipe TSC electric-welded extension. The jointing method allows the pipe to bend when it's laid in the trench. A normal shrinkage joint wouldn't cope with it," explains Hiirikoski.

KWH Pipe's products were chosen on the basis of a tendering process. The quality of materials is tested by the Finnish District Heating Association, which grants quality marks. The Association takes samples from the pipes held in stock by different power companies, including E.ON Finland. •



The new boiler at the Kivenlahti heating plant will ensure that the landfill gases burn cleanly.

New treatment plant at St. Petersburg

The South-West Treatment Plant (SWTP) is the third-biggest sewage treatment facility in St. Petersburg after the Central Station of Aeration (CSA) and North Station of Aeration (NSA).

Construction of the SWTP was launched in 1986 under the project called GUP Lengiproinzhpriekt. However, because of a lack of financing, the construction process was suspended in 1993 with the installation 60 % ready.

In order to improve the ecological environment in the region and eliminate non-treated effluent discharge into the Baltic Sea basin, negotiations were held between the City Government and the governments of Scandinavian countries, which resulted in a decision to complete the construction of the SWTP with financial participation by donors from Scandinavian countries, GUP Saint Petersburg Vodokanal and credit from the Nordic Investment Bank. The following organizations have taken part in the project's financing: NIB (Nordic Investment Bank), EBRD, EIB (European Investment Bank), NEFCO (Nordic Environmental Finance Corporation), SIDA (Swedish International Development Cooperation Agency), DEPA, TACIS, SWEDFUND, FINNFUND and GUP Saint Petersburg Vodokanal. In terms of the structure of its financing, the SWTP project was one of the less conventional.



The South-West Treatment Plant will solve the problem of treating the sewage in St. Petersburg. The water treatment uses ultraviolet irradiation instead of chlorine for the disinfection of treated effluent.

In order to increase the efficiency of effluent purification, the use of reagents during the purification process is provided for.



A MODERN SEWAGE TREATMENT

The SWTP capacity will be 330,000 m³ per day. After the SWTP is commissioned, the problem of treating the city sewage will be practically solved and similar big facilities will not be built in St. Petersburg in future.

The technological structure of the SWTP effluent discharge is the usual one found in Russia and other countries: primary sedimentation, biological treatment in aeropacks, secondary sedimentation, disinfection and discharge of treatment effluent into the Gulf of Finland. In order to increase the efficiency of effluent purification, the use of reagents during the purification process is provided for.

It is worth mentioning that all the essential technological and auxiliary equipment at the facilities is up-to-date and meets all eco-

logical safety requirements. The pipeline materials for this unique project have been supplied by KWH Pipe Ltd. (Finland). In total, KWH have supplied over than 42 km of pipes, including gravity pipelines and pressurized systems of both PVC and polyethylene, as well as district heating cogeneration pipes. But the unique aspect for St. Petersburg (like the project as a whole) is that for the first time Weholite effluent pipelines have been supplied and installed in this region. The pipes through which the SWTP makes discharges into the Gulf of Finland are made of polyethylene Ø2000/2220 mm, with a total length of 1,400 m, including a 200 m outfall of underwater laying. An interesting fact is that the welding services for most of the pipelines have been rendered by a service team from ZAO KWH Pipe Russia.

A distinctive feature of water treatment at the SWTP compared with the main active city sewage treatment facilities is the process for removing biogenic matters (nitrogen and phosphorus) from effluent water and the use of ultraviolet irradiation instead of chlorine for the disinfection of treated effluent.

After treatment the effluent content will meet HELCOM international requirements.

As for sewage sludge, its removal from the facilities, is provided for through compression by means of concentration tanks, dewatering by centrifuges in a separate plant and burning in special stoves. The ash created subsequently can be used for city services, the heat can be used for the generation of electrical power to meet the SWTP's own needs. •



Safe Drinking Water

Recent legislation by the Federal Government in the USA has required major changes in how water is supplied to the Pacific Palisades, Santa Monica Mountains and West Los Angeles areas of California.

The legislation requires additional water treatment throughout the country for water in open reservoirs subject to surface water runoff.

As a consequence, the Los Angeles Department of Water and Power (DWP) is building new facilities at the Stone Canyon Reservoir Complex located in the Santa Monica mountains 13 miles north-east of the City of Los Angeles.

The Stone Canyon Reservoir is actually two reservoirs. The lower reservoir, built in 1921, is the largest in the DWP system,

storing 3.38 billion gallons (12.8 billion litres) of water (10,370 acre feet). The Upper Reservoir, built in 1954, holds 138 million gallons (522 million litres).

For the past 5 years, the Los Angeles Reservoir supplied water through a pipeline to the Upper Stone Canyon Reservoir. The history of the Los Angeles water improvement dates back to 1913, when a 233-mile (375 km) long aqueduct system was built to transport water from the eastern Sierra Nevada Mountains. Subsequent projects include the Mono Basin extension in 1940,

the 177-mile-long Owens Valley aqueduct in 1970 and the State Water Project or "California Aqueduct" also in 1970.

Up until this year water from the Upper Stone Canyon Reservoir flowed into the Lower Reservoir through a spillway. Water was then distributed to customers in the service area.

With the addition of new treatment facilities, most of the water entering the Stone Canyon complex will instead be diverted via a 4,500 foot (1,370 meters) submerged 63" (1,600 mm) DR 21 Sclairpipe system (see "After" diagram). New treatment facilities will include a new chlorination station along the pipeline and a membrane filtration plant at the bottom end of the pipeline.

Sclairpipe was specified for the pipeline because of its fused, leak-tight joints, flexibility and resistance to corrosion.

As Sclairpipe is extruded in long lengths and fuse welded together, it allows for 4,500 feet of pipe to be deployed in one length. Its flexibility simplifies installation. After lengths are fused together, the pipe is floated into the Lower Reservoir and pos-

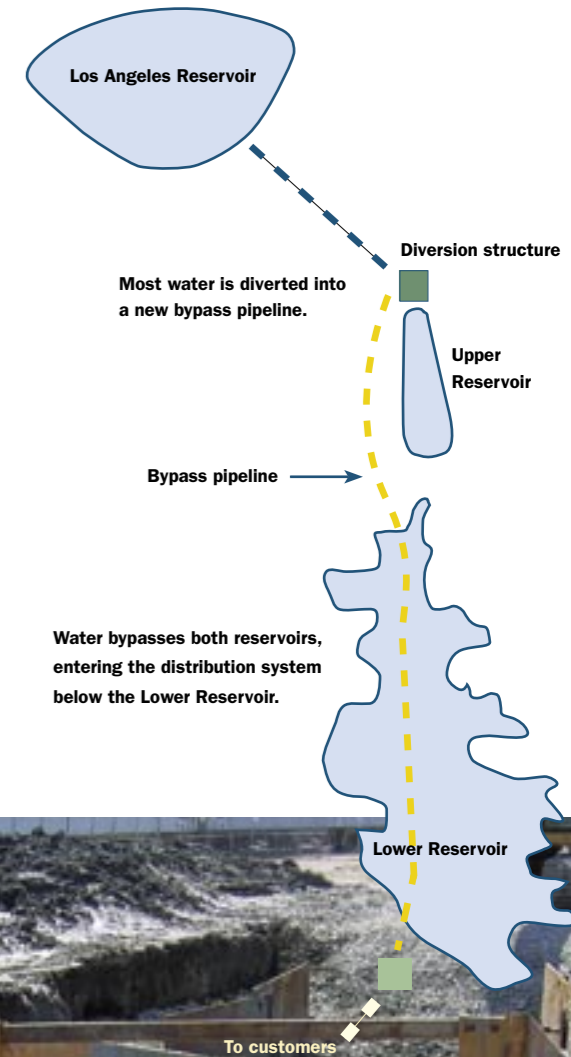
NEW TREATMENT FACILITIES WILL INCLUDE A NEW CHLORINATION STATION ALONG THE PIPELINE AND A MEMBRANE FILTRATION PLANT AT THE BOTTOM END OF THE PIPELINE.

itioned above, where it will rest on the reservoir's bottom. By controlling the amount of air in the pipe, the system can be placed precisely on the reservoir's bottom.

No other pipe material can be submerged as easily. And, no other material would be as resistant to corrosion in a submerged environment.

The new facilities at Stone Canyon will allow a higher volume of water to bypass the Lower Reservoir and be delivered directly to customers in the service area. In addition, the membrane filtration plant will allow DWP to continue to use water in the Lower Reservoir, while maintaining an emergency potable water supply.

A water quality improvement project, Stone Canyon, will meet the objectives of improved taste, color and odor, while meeting community and environmental values in a cost-effective manner in serving more than 3.5 million people. •



CREDITS

- Owner:**
Los Angeles Department/
Water & Power
- Consulting Engineers:**
Parsons Engineering, Pasadena, CA
- Prime Contractor:**
Kiewit Co., Los Angeles, CA

- SUBMERGED PIPE**
- Subcontractor:**
Underwater Resources,
San Francisco, CA
- Diagrams/Photographs:**
- Internet:**
www.stonecanyon-reservoir.com

In the city of Kolkata, India, the old inside diameter 1,550 mm welded steel filtered water transmission pipe had been damaged by chemical corrosion caused by waste from a sulfuric acid plant, growth of tubercules, scaling off due to galvanic corrosion, and ingression of tree roots.

More than two million gallons of treated water were supplied along B.T. road to Kolkata Municipality. A large amount of unaccounted water leaked out of the water supply system. Ingression of sub soil water through corrosion holes led to an uncontrolled water quality situation. Open trench renovation would have an impact on the congested city.

In June 2002, KMC invited international bids from PE-HD pipe manufacturers with experience in the relining of large-diameter pipes.

With 17 years of experience in the HDPE pipe business, Wiik & Hoeglund Plc. won this international bid with a relining technique that is not only fast to install, but also minimizes disruption to traffic inside the city. The PE-HD pipes, DN/OD 1,400 mm SDR 30 PE 100, were manufactured and transported from the KWH factory in Thailand to Kolkata. Construction began in March 2003. KWH and the local civil contractor performed a field investigation to



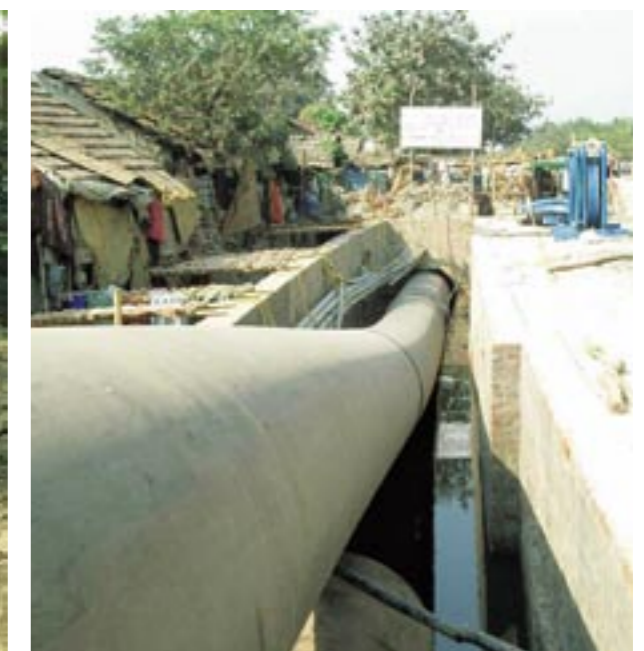
Renovation with large diameter PE-HD pipe



KWH Pipe in Thailand

Wiik & Hoeglund Public Co., Ltd., Thailand is a subsidiary of KWH Pipe Ltd. The company manufactures and distributes High Density Polyethylene (PE-HD), Low Density Polyethylene (PE-LD), Polypropylene Pipe & Fittings, Weholite and also WehoDuo double wall pipes. The company's products are certified for TISI standards and the ISO 9001 quality system of the International Standardization for Organization.

Wiik & Hoeglund Public Co., Ltd.
444 MBK Tower, 10th Floor
Phayathai Road, Pathumwan
Bangkok 10330, Thailand



determine the condition and obstructions inside the DN/ID 1,550 mm steel pipe, and then removed them, cleaned the line thoroughly and pulled the test-head to check the passageway. Two entry pits and two exit pits were excavated. Three sections of prefused PE-HD pipe were welded by WH Pipe (Thailand) Ltd., a Wiik & Hoeglund associate company.

Pipe strings in 262, 262 and 482 m

lengths were pulled into place using a cable and winching arrangement, section by section. The end connections were jointed with stubends and backing rings. Grouting at end connections and anchoring to valves and appurtenances were completed prior to backfilling with compacted sand. Construction inclusive of the hydrostatic pressure test, was completed in a record time of 45 days, much ahead of the project target

date. Besides design and planning of the whole system and installation the Project Services team of KWH Pipe assisted with technical on-site support.

Apart from the relining work, KWH also manufactured and supplied the PE-HD pipes, DN/OD 1,400 mm SDR 26 PE 100, 3,500 meters in length for the fresh laying installation. •

When Queen Victoria opened the Katrine scheme at Mugdock in 1859, Glasgow led the world in providing clean drinking water to its people. Since then, enormous volumes of water have run through this old Victorian pipework system. However, time has taken its toll and as we entered the 21st century, the system could unfortunately no longer safely provide the clean water required by its citizens

The new £120 million water treatment works at Mugdock will ensure the clean water supply for the City of Glasgow for years to come. The new pipework, which is over one metre in diameter, in addition to two huge new holding tanks with two reservoirs will distribute water to the city from Scottish Water's Mugdock treatment works. The first new holding tank at Bankell, will be big enough to store water to supply the city for 11 hours. The other reservoir will be placed on the hillside at Barrachan.

The entire project was delayed during the planning process and caused some controversy among environmentalists mainly because of the fear that one of the Glaswegians' most loved beauty spots was being threatened by the new work. However both Scottish Water and main contractor Gleeson pledged that the new reservoirs will be almost invisible. In addition to this, Scottish Water authorised £1 million to be



The new £120 million water treatment works at Mugdock will ensure the clean water supply for the City of Glasgow for years.

The work will be finished in June 2007 and at its peak, around 300 people will work on the construction sites.



SUPPLIED BY KWH PIPE (UK)

- A twin 1,100 mm PE.100, PN.6.3, SDR.26 pipeline.
- A 1,000 mm PE.100, PN.6.3, SDR.26 pipeline plus associated fittings.
- In total, a minimum of 4,500 metres of 1,100 mm diameter and 550 metres of the 1,000 mm diameter pipework will be required by the end of the project over 100 stub-flanges and an assortment of pre-fabricated polyethylene bends have.
- In the past few years, KWH Pipe and M.J. Gleeson have been involved in several large-diameter poly-

ethylene pipework projects, where co-operation by means of technical support etc. has meant cost-efficient solutions for all parties.

○ The pipework is produced in non-standard 14.5 metre lengths, to reduce installation costs on site, and is transported to site on 'flat-bed' trailers with 4 pipes per trailer.

○ The pipework was welded by a KWH 1,200 mm butt-fusion machine, owned and operated by a specialist welding contractor (A.G. Wilson), who has also been involved in previous large diameter polyethylene projects between M.J. Gleeson and KWH Pipe also been supplied.

Better water quality for Glasgow

spent on landscaping the project to minimize the impact on the environment.

The new works will filter the 1,800 million litres of water a day which flow down from Loch Katrine in the Trossach to more than 700,000 customers in and around Glasgow. The new technology will also cut the risk of an outbreak of water-borne bacteria such as cryptosporidium. This bug, which can

kill the very young or the very vulnerable, usually comes from animal droppings that find their way into the water supply.

Despite the environmental concerns, there was no disputing the fact that Glasgow needed better water quality. The Mugdock works represents the flagship of Scottish Water's three year investment programme. It is anticipated that the work

will be finished in June 2007 and at its peak, around 300 people will work on the construction sites.

The main waterworks, containing state-of-the-art filter technology, will be partially sunk into the ground and hidden between two ridges of mature trees. Once the main works are completed more trees and bushes will be planted around the plant and grass

will be planted over the two huge storage tanks. Although the success of incorporating the work into the environment will be measured by the local people, Gleeson has in the past been given full marks in an independent report for its environmental and safety record at its Mugdock construction sites. •

Denmark is a front-runner in Windpower



Denmark has long been a front-runner in the development and use of windpower. The country is also a major exporter of high-tech windpower plants and parks.

Some years back it was decided that a windpower park consisting of 20 windmills would be built in the waters outside Copenhagen harbour to mark the status of Denmark as the world leader in the windpower industry. This wind park produces more than 90,000 MWh of electricity each year, contributing to about 3 % of Copenhagen's requirement.

Inside each windmill there are numerous electricity cables to keep in position. All cables are therefore gathered into separate cable jacketing pipes before they leave the mill. KWH Pipe Denmark delivered almost 2 kilometres of cable jacketing pipes which were transformed into about 200 separate pipes to lead the cables inside the mills, from top to bottom.

This windpark next to Copenhagen was successfully completed in 2001 with the help of KWH Pipe,

which was also chosen to be the pipe contractor to the world's biggest Windpower-park in the sea established in 2002 by Nysted, south of the island of Fyn. The "Nysted Havmølle" windpower park consists of 72 windmills spread over a 24 km² area out at sea. All together this park produces electricity for 145,000 single family homes. As environmental issues become increasingly important it's worth noting that the windmills at Nysted cut down emissions of CO₂ by about 500,000 tons a year.

Windpower has a strong position in the production of clean energy in Denmark. Being chosen to be the supplier of cable jacketing to these prestigious projects was an acknowledgement of the values and quality that KWH Pipe represents. •

If you're interested in reading more about the installations, visit www.middelgrunden.dk and www.nystedhavmoellepark.dk



VipLiner saves time and money

The VipLiner technique has previously been used to reline pipes with a diameter of 560 mm. "Now we are also able to renovate 1,000 mm concrete pipes. Other new dimensions are 710, 760, 800 and 900 mm. The modular length of this section was 3.2 metres. We can tailor the dimension to any module length according to the customer's need," says Ari Vaarala, Manager of Renovation, KWH Pipe.

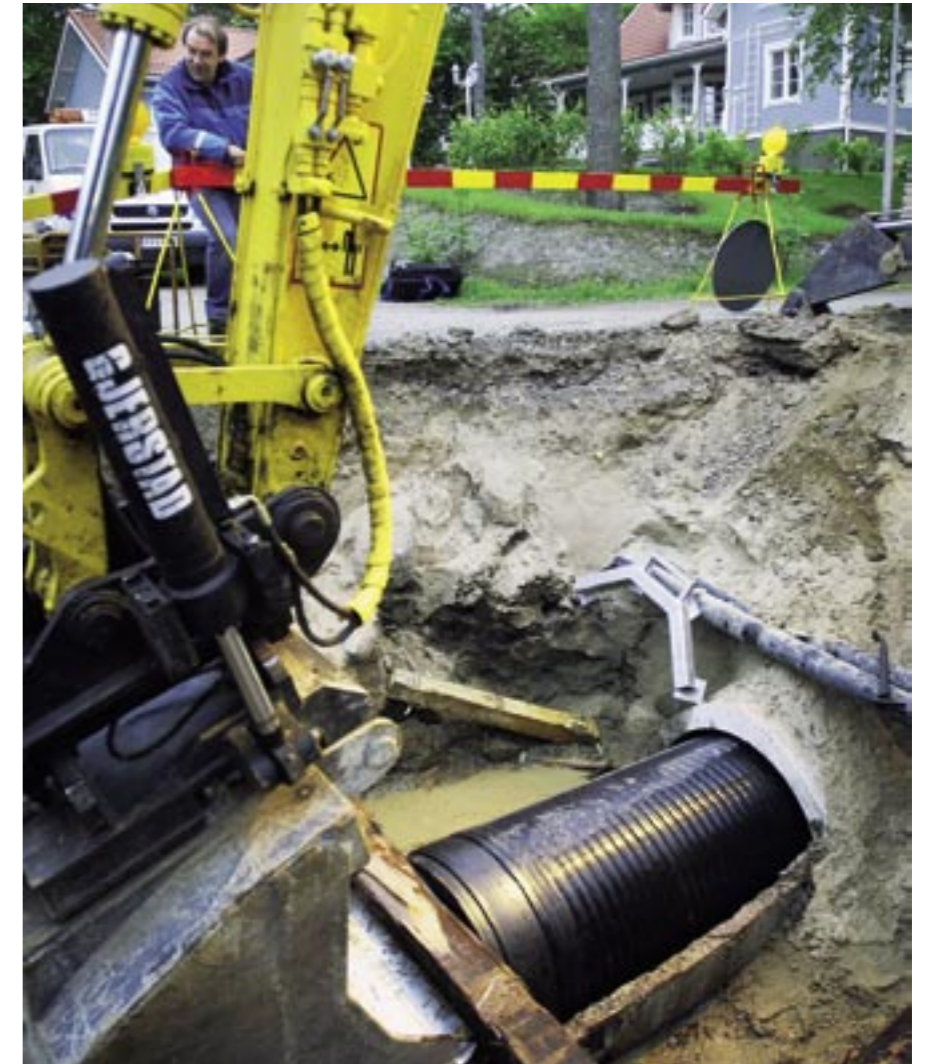
In June an old concrete sewer pipe belonging to Vaasan Vesi Oy (the Vaasa City waterworks) was renovated using the VipLiner technique. The existing concrete sewer pipe was over 30 years old and had an internal diameter of 800 mm. The length of the old pipe was 340 metres. It was replaced with a plastic pipe that had an external diameter of 760 mm and a module length of 3.2 m.

"The renovated pipeline is the second of our central treatment plant's main sewers. The total flow rate in a day is approximately 48,000–50,000 cubic metres. We are talking about a large amount of water," explains Lars Luomala, project manager at Vaasan Vesi.

EVEN HEAVY RAIN WOULD NOT PREVENT THE PROJECT'S COMPLETION

KWH Pipe was the main contractor for the project and carried out all the excavation and installation work. All pumping stations were shut down and pipelines emptied of running water. It was an absolute precondition for the renovation work that no sewage could get into the environment, because the section to be renovated was located by the sea.

The pumping stations could not be idle for



The requirement was that not a litre of sewage should be allowed to overflow at Viikintie in Vaasa and that did not happen either.

more than 4–5 hours. For this reason the project had to be carried out at night.

If there had been a sudden rain storm, then the VipLiner technique would have made it possible to stop the work.

"The rain water would then have been allowed to flow through its normal route into the pipeline and the renovation work could have continued after the rain had stopped.

The technique makes it possible to use the pipeline during renovation, if needed," explains Ari Vaarala.

"The size of the pipe was fairly large, but relining progressed quickly. The VipLiner technique suited this section well, and the costs were also reasonable. The local residents were not disturbed by the work either," continues Luomala. •

EASY TECHNIQUE

○ VipLiner is a short, modular pipe relining technique and an easy way to renovate old, leaky concrete sewers. The renovation work can be carried out from a manhole without having to do any excavation. Disruption to traffic is therefore kept to a minimum. Similarly, there is no need for bypass discharges because the pipeline to be renovated can be used the whole time.



Construction phase of Biofilter showing piping. Wood chips will be placed over the piping for the biofiltration process. Note that the Weholite pipe is perforated to pass the odorous gases to the wood chips.



ST. PAUL, MINNESOTA, USA – The Metropolitan Council Environmental Services has been very cognizant of the anticipated objections by downwind residents, including residents of the downtown area of the city of St. Paul, to odors emanating from its new sewage treatment plant. That’s why they included a biofiltration system as part of the project.

Biofilter protects

from sewage treatment gases

Widely used in Europe for odor control, this technology has only recently gained significant application in North America. First investigated in the 1960s in California, it was not until 1995 that applications expanded to include a variety of industrial discharges.

The new St. Paul sewage processing plant replaces an older plant that had reached the end of its life.

The biofilter consists of a header/lateral perforated pipe system that is covered by six to eight feet of wood chips. The sewage

treatment tanks are covered and fans deliver the odiferous gases produced to the biofilter.

POLLUTANTS ARE ABSORBED ONTO THE WOOD CHIPS

During the biofiltration process, the contaminated air is slowly percolated through the wood chips. The pollutants are absorbed onto the wood chips, where surface microorganisms exist on the surface. The microorganisms biologically consume or metabolize the pollutants at the same time, producing energy, biomass, and metabolic end products, namely CO₂ and H₂O. The biofiltration process results in a complete decomposition of the pollutants, without creating any hazardous byproducts, while allowing the filter material to continually regenerate itself.

While the name biofilter is commonly used and accepted, the term bio-catalyst or bio-reactor would be more suitable.

ASH IS USED AS A CONSTITUENT IN CONCRETE FOR ROADS

The new St. Paul treatment plant, like the old one, is equipped with boilers that burn the dewatered and dried solid sewage waste to produce steam. The steam drives a 3 MW steam turbine generator that produces approximately 50 % of the power required by the process. The solid sewage waste is reduced to a very fine ash that is



KWH PIPE IN NORTH AMERICA

○ **KWH Pipe (Canada) Ltd.** is a leading manufacturer of Polyethylene Pipe and Fittings in the North American market. The company has two large plants located in Huntsville, Ontario, Canada and Saskatoon, Saskatchewan, Canada. Both plants manufacture the company's full line of solid wall products, Weholite and Fabricated Fittings. Sales and Marketing through North America is provided by a professional sales team including several experienced engineers located in sales offices throughout the continent.

pneumatically conveyed to storage silos. From there the ash is removed by road tankers and sold to a company in the state of Ohio that uses the ash as a constituent in concrete used for road construction.

The perforated pipe bed beneath the wood chips consists of 6", 8" and 10" (150, 200 and 250 mm) Sclairpipe fabrications plus 36", 48" and 60" (900, 1,200 and 1,500 mm) Weholite pipe fabrications. The header assemblies were fabricated at the Huntsville, Ontario (Canada) plant of KWH Pipe Ltd. and shipped mostly complete for ease of installation.

The rest of the piping joints were completed on site by KWH Pipe technicians using extrusion welding or through the use of electrofusion couplers by the contractor.

KWH Pipe's Weholite was selected because of the cost savings it provided over alternative piping and because of its leak-proof, fully fused joints.

BIOFILTRATION TECHNOLOGY HAS DOZENS OF USES

Biofiltration is a simple, low cost technology that can reduce odor emissions by

as much as 95 %. As well as municipal wastewater treatment facilities, biofilters have been successfully used in industrial wastewater treatment, chemical manufacturing, food processing, breweries, the tobacco industry, paper and cardboard processing, and livestock and poultry facilities. •

CREDITS

- **Owner:** Metropolitan Council Environment Services
- **Consultants:** Brown & Calwell
- **Contractors:** NewMech Companies, Inc.
- **Note:** All located in St. Paul, Minnesota

Solution to Warsaw's sewage problem

Warsaw is among one of Europe's few capitals that does not have a modern sewage treatment plant.

Only a third of Warsaw's sewage arrives to an outdated mechanical plant. The remaining part of it flows directly into the Wisła – Poland's largest river, with no treatment whatsoever. Decades ago a decision was taken to build a new treatment plant named "South". However its implementation was constantly postponed, mainly due to the lack of means for investment. Pre-accession funds made it possible to launch the construction of a new treatment plant and sewage pipelines – even before the entry of Poland in the EU.

The construction of the new treatment plant and pipelines will improve the situation already by 2005. The new treatment

plant "South" will solve the sewage treatment problem of the Southern left-bank Warsaw – which is the main part of the city. In the meantime, the existing "North" treatment plant will be subject to modernization in order to allow for the treatment of 100 % of Warsaw's sewage in seven years.

A very important component of the city's new sewage treatment system is made of the main sewage pressure pipelines, leading sewage to the new treatment plant.

The Polish branch of KWH Pipe provides pipes for that implementation. There are only a handful of pipe manufacturers in the world with the capacity to provide pipes of such large diameters. Along with components required for jointing, technical expertise and know-how in laying large-diameter PE-HD pipes KWH Pipe was a natural choice. •

PIPE DELIVERY CONSISTED OF

- **Lot 1a section A:** two inlet polyethylene pressure pipelines for untreated waste water DN/OD 1,000 mm, SDR 27.6 total with total length of 10,578 m (2 x 5,289 m).
- **Lot 1a section B** and Lot 1b: outlet polyethylene pressure pipeline for treated waste water DN/OD 1,400 mm, SDR 27.6 with total length of 9,063 m.

The main reason for choosing PE pipes for that project is their set of very good functional qualities:

- long-lasting
- lowest failure factor in water-pipe and sewage systems
- resistance to corrosion and abrasion
- high chemical resistance
- low pressure loss due to smooth internal wall surface
- ease at jointing pipes into very long sections
- reliability (failure-free, long life expectancy, strength) of the connections

CREDITS

- **Year** 2004
- **Project name** Main Collectors for Warsaw South Waste Water Treatment Plant
- **Company / Municipality** City of Warsaw
- **Implementing Agency** National Fund for Environmental Protection and Water Management
- **Program** ISPA
- **Type of installation** Main sewage pipelines transporting sewage to Warsaw Water Treatment Plant
- **Medium** Municipal sewage
- **Size and length of pipes** Lot 1a: PN 1,000 x 36.2 SDR 27.6 PN6 PE 100 L=10,578 m
PN 1,400 x 50.6 SDR 27.6 PN6 PE 100 L=5,340 m
Lot 1b: PN 1,400 x 50.6 SDR 27.6 PN6 PE 100 L=3,723 m

Over the last 40 years, polyethylene pipes have gained a wide acceptance for use in marine applications, for outfalls, intakes as well as river crossings. The reasons for this success can be found in the good engineering properties of the polyethylene material: Leak tightness, light weight, flexibility and corrosion resistance.

As the use of polyethylene for marine applications has increased, so have the installed diameters. Solid-wall PE pipes of size 1,600 mm outside diameter have been installed in several projects, and the need for increasingly larger sizes keeps on growing.

To cope with this demand, plastic pipe manufacturers have an option to use high-quality structured-wall pipes in sizes up to 3,000 mm internal diameter. Structured-wall polyethylene pipes offers several advantages over traditional pipe materials for large diameter pipes, while retaining the desirable properties of solid-wall PE pipes in the marine field.

A pipe installed underwater must fulfill a selection of functional requirements. The most important of these arise from:

WORKING PRESSURE AND EXTERNAL LOAD

○ **Close to the landfall**, marine pipelines are trenched under the sea floor. A pipe ring stiffness of 4–6kN/m² is sufficient to withstand the external load of the sea bottom. Outfall pipelines operate under a moderate internal overpressure, normally not exceeding 2bar. The Weholite pipe can meet both of these requirements.

INSTALLATION FORCES

○ **During sinking**, the pipe is subjected to far higher stresses than during its actual



Weholite for marine applications

use. A bending radius capability of 50 times outside diameter is needed to allow for a smooth S-bend sinking operation. For large pipe diameters, the pulling force needed to uphold the bending radius can grow large. Structured-wall pipes can also be submerged using open ends, decreasing the loads on the pipe system during sinking

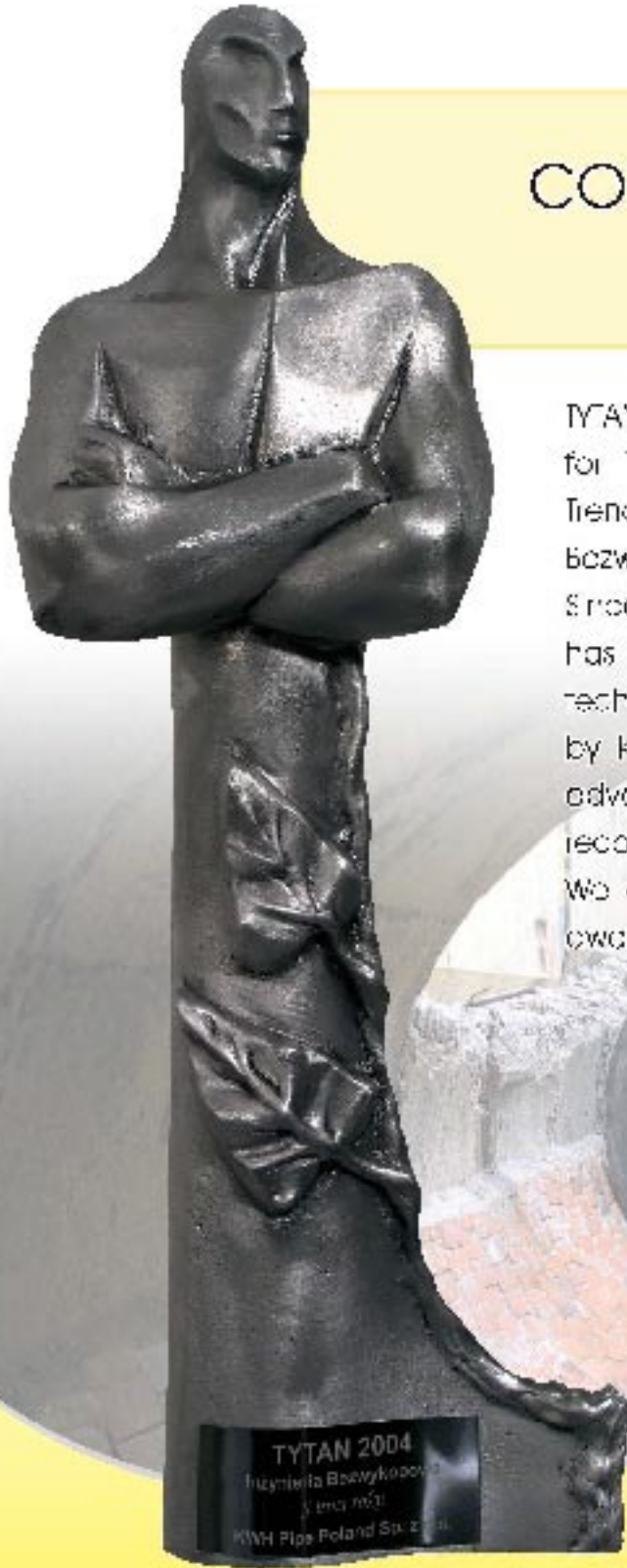
STREAM AND WAVE FORCES

○ The pipe must not be overstressed or moved on the seabed. A suitable weighting system is called for.

UNEVEN SEA BEDS AND SETTLEMENTS

○ **Larger pipe sizes** generally have a decreasing ability to accept settlements and uneven seabeds. In this respect, structured-wall pipes have an advantage because of their pipe wall design, which more readily adapts itself.

As a high-quality structured-wall system, Weholite has proven itself in numerous marine installations, both for water intake lines and cooling water as well as sewage outfalls.



COMPANY OF THE YEAR 2004 KWH PIPE POLAND

TYTAN award is granted by the Polish Association for Trenchless Technology, Polish Foundation for Trenchless Technologies and magazine "Inżynieria Bezwykopowa" (Trenchless Engineering).

Since the beginning of its activity KWH Pipe Poland has contributed to the development of trenchless technologies in Poland. Polyethylene pipes made by KWH Pipe have been used in technologically advanced large-diameter renovation projects and record-breaking horizontal culverts.

We express our sincere thanks for this prestigious award.

