Replacing leaking concrete water main

In the SanMaoDian district of MengHe Town, local residents received their water supply from the Changzhou General Water Company through a 160mm diameter reinforced concrete pipe. This 4km long pipeline was installed in 1980 and over recent years has had to be repaired on numerous occasions due to failures. The failures resulted in the contamination of the resident’s water supply and brought frequent disruption to the busy access road to the nearby houses and workshops. Therefore, the water company decided it was time to replace the concrete pipe with a new water main – an action that is in line with the Chinese government’s policy to improve rural water supply networks. However, digging up and replacing a water main under a road in China is no easy matter and requires a lot of time consuming paper work and coordination with many different government departments. In addition, new regulations issued by the Changzhou Municipal Government had put further restrictions on disturbing the local roads.

Replacing the concrete water main without opening up the road

The water company approached trenchless pipe installation experts within the Jiangsu SADE General Construction & Engineering Company. Different options were discussed and eventually it was decided to replace the old water main with a 225mm diameter PE pipe using a pipe bursting technique. This would enable the capacity of the main to be increased by using a pneumatic breaker head to break open the old concrete main and pull through a new larger diameter PE100 pipe into position.

Pipe bursting technology and HSCR PE100 material for the replacement pipe

Although trenchless insertion techniques, such as relining with “Swageling” and folded liners, are often used in major cities such as Shanghai to rehabilitate old pipelines, there is less experience in China regarding the replacement of old pipelines using the pipe bursting method. Therefore, the local water engineers were keen to closely monitor progress and identify the pros and cons of the process. As there was concern regarding surface damage to the pipe during installation, SADE recommended the use of a High Stress Crack Resistant (HSCR) PE100 compound to produce the pipe. Therefore, the 225mm SDR17 pipe was produced by the Shandong Shengbang Plastics Company using BorSafe HE3490-LS-H PE100 compound from Borouge.
Borouge is a leading provider of innovative, value creating plastics solutions. A joint venture between the Abu Dhabi National Oil Company (ADNOC), one of the world’s major oil and gas companies, and Austria based Borealis, a leading provider of chemical and innovative plastics solutions, Borouge is a groundbreaking joint venture at the forefront of the next generation of plastics innovation. With its base in the United Arab Emirates and Marketing & Sales head office in Singapore, Borouge employs more than 3,000 people representing over 40 nationalities and serves customers in 50 countries across the Middle East, Asia and Africa. Building on the unique Borstar® and Borlink™ technologies and over 50 years of experience in polyolefins, Borouge provides innovative, sustainable and value creating plastics solutions for infrastructure (pipe systems, and power and communication cables), automotive and advanced packaging applications that address global challenges such as climate change, food protection, access to fresh water, energy conservation, healthcare and waste management. In 2010 Borouge tripled the annual production capacity of its plant in Abu Dhabi to 2 million tonnes, and with further expansion to 4.5 million tonnes in 2014, Borouge and Borealis will have a combined annual production capacity that address global challenges such as climate change, food protection, access to fresh water, energy conservation, healthcare and waste management. In 2010 Borouge tripled the annual production capacity of its plant in Abu Dhabi to 2 million tonnes, and with further expansion to 4.5 million tonnes in 2014, Borouge and Borealis will have a combined annual production capacity that address global challenges such as climate change, food protection, access to fresh water, energy conservation, healthcare and waste management.

The benefits

BorSafe HE3490-LS-H HSCR PE100 material has been specially developed for trenchless technology. Using a hexene co-monomer in the Borstar® bimodal polymerisation process produces a material having a molecular structure that is far less vulnerable to any crack growth from the external scores and notches that can arise during trenchless installation. This provides additional security when using trenchless technology to install pipelines.

It was also important that the butt fusion joints between the pipe lengths were produced to the highest quality as the pipe was subjected to relatively high axial forces during installation. The joint quality was assured by the use of an automatic butt fusion welding machine and the axial loads were minimised by providing a smooth entry slope lined with rubber matting at each entry pit.

The water engineers were extremely impressed with the progress of the project which they believed will enable them to replace many of their old water mains without digging up the roads. Although there was some concern that the vibration might cause damage to adjacent services the SADE engineers showed them how the use of buried steel side plates can significantly limit the spread of the vibration through the soil. These safety measures avoided any damage to the adjacent services and enabled 100 metres of new water main to be installed every two days without digging up the complete road.

Summary table

<table>
<thead>
<tr>
<th>Customer Name</th>
<th>Shandong Shengbang Plastics / Jiangsu SADE Construction Co. / Changzhou Water Co.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application/product</td>
<td>Replacing leaking water main by pipe bursting</td>
</tr>
<tr>
<td>Grade(s) used</td>
<td>BorSafe™ HE3490-LS-H</td>
</tr>
</tbody>
</table>
| Functional requirements | • Resistant to crack growth from possible surface damage  
   • Durable system with a long leak free life |
| Benefits | • High resistance to cracking from surface damage  
   • Welded joints can withstand forces during installation by pipe bursting  
   • Flexible and easy to handle  
   • Corrosion resistant  
   • PE systems require no maintenance  
   • PE systems are the most durable  
   • Trenchless pipe bursting with PE pipe provides the lowest “Whole Life Cost” |

Disclaimer

The information contained herein is to our knowledge accurate and reliable as of the date of publication. Borouge extends no warranties and makes no representations as to the accuracy or completeness of the information contained herein, and assumes no responsibility regarding the consequences of its use or for any printing errors. Our products are intended for sale to industrial and commercial customers. It is the customer’s responsibility to inspect and test our products in order to satisfy himself as to the suitability of the products for the customer’s particular purpose. The customer is also responsible for the appropriate, safe and legal use, processing and handling of our products. Nothing herein shall constitute any warranty (express or implied, of merchantability, fitness for a particular purpose, compliance with performance indicators, conformity to samples or models, non-infringement or otherwise), nor is protection from any law or patent to be inferred. No statement herein shall be construed as an endorsement of any product or process. No one is authorised to make representations or give warranties or assume any other liabilities on behalf of Borouge except if in writing and signed by a duly authorised Borouge employee. Insofar as products supplied by Borouge are used in conjunction with third party materials, it is the responsibility of the customer to obtain all necessary information relating to the third party materials and ensure that Borouge products when used together with these materials are suitable for the customer’s particular purpose. No liability can be accepted in respect of the use of Borouge products in conjunction with other materials. The information contained herein relates exclusively to our products when not used in conjunction with any third party materials.