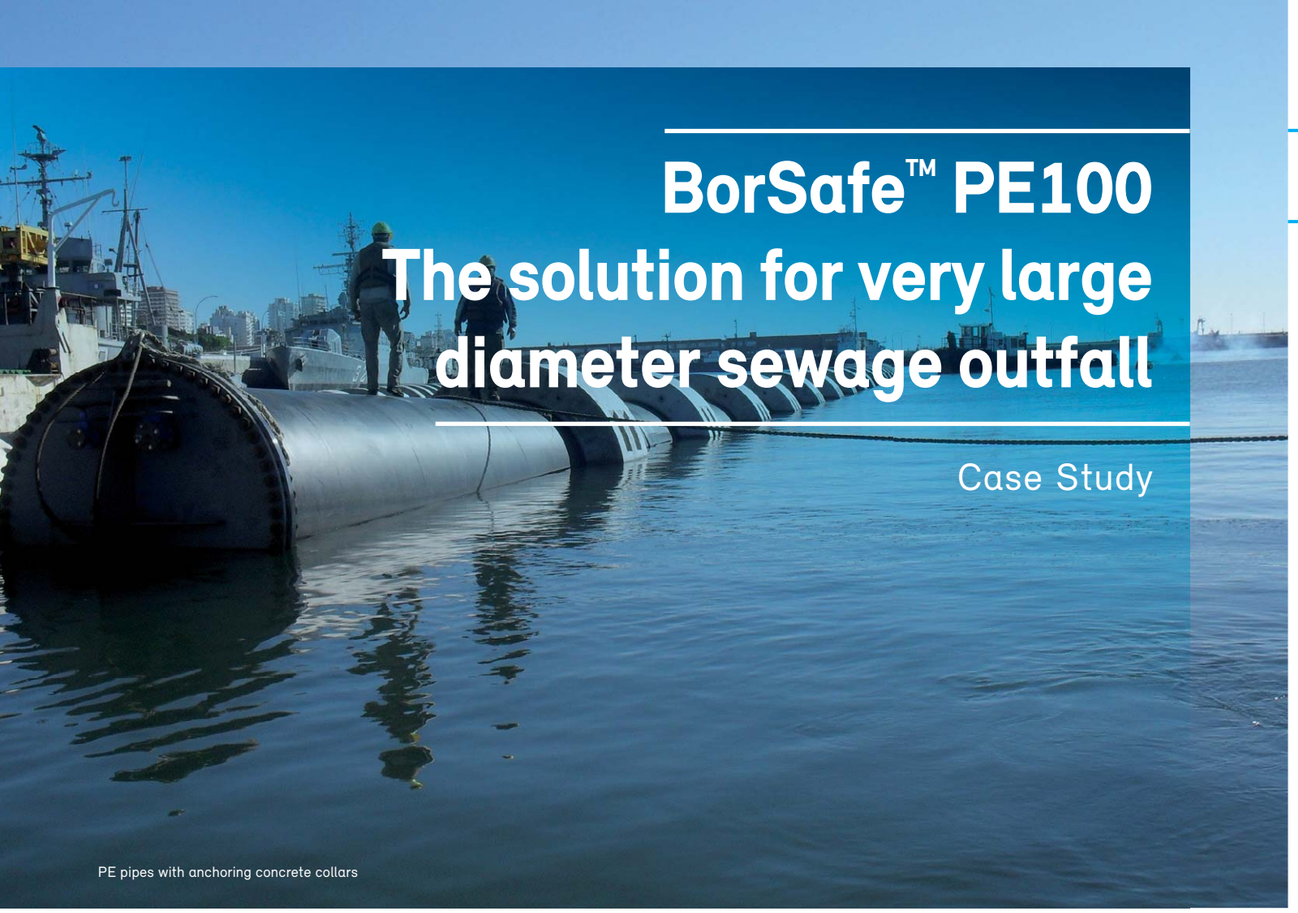

BorSafe™ PE100
The solution for very large diameter sewage outfall

Case Study

PE pipes with anchoring concrete collars

Located on the Atlantic coast approximately 400 km south of Buenos Aires, Mar del Plata is Argentina's premier recreation and conference seaside resort, as well as a major fishing port. During the course of each summer its resident population of some 600,000 is added to by over six million holidaymakers. Over the years this massive seasonal throughput of visitors had placed an increasing burden on the city's sea outfall sewerage infrastructure.

The growing problem of Mar del Plata's waste water disposal presented the danger of sea and beach contamination, incurring an associated health risk, as well as threatening the area's valuable tourist industry, which makes a substantial contribution to the regional economy. To remedy the situation it was decided to replace the ageing outfall with one that could cope with exceptional seasonal demand and deliver a quality environment for residents and visitors alike.

Meeting the challenge of scale

Because of the very high peak volume of treated waste to be discharged, it was determined that the outfall pipe would have to be of extra large diameter. And, that the actual outfall would need to be sufficiently far removed from the coastline to avoid the tide returning waste inshore and onto the resort's beaches. Furthermore, the heavy commercial and naval vessel traffic in the coastal area into and out of the port, dictated that the pipe needed to be secured in the seabed.

Calculations showed the system required a pipe with a diameter of two metres and that it would have to extend almost four kilometres offshore. This presented challenges in respect of the production and installation of such a large pipeline, not least in respect of the material to be used, given that the pipe would also be exposed to both the external corrosive effect of seawater and the internal flow of domestic and industrial sewage water. It would also have to withstand abrasions and minor impacts during transportation, assembly and laying without being adversely affected.

In considering the physical demands and total cost, and following a review of solutions for similar outfall projects, the Sanitary Works Department of Mar del Plata – the local extension of the country's National Board of Water Works and Sanitation – in conjunction with technical advisors, identified high density polyethylene (PE) as the material that satisfied all key criteria.

A dedicated durable pipe solution

In consultation with Tehmco S.A. of Chile, BorSafe™ HE3490-LS was selected as the most suitable material for this application. Tehmco was contracted as pipeline planner and manufacturer because it is one of the few companies worldwide capable of producing PE pipes with a diameter of two metres, and the only plastics converter in South America with that proven capability.

A PE100+ quality listed material, BorSafe HE3490-LS is specifically designed for the production of very large diameter, thick wall pressure pipe systems. The material's LS designation marks it as an excellent low sag performance PE grade. This is an essential quality for efficient production of large pipes with a high wall thickness. With standard PE grades, the material flows to the bottom of the pipe, leading to inconsistent wall thicknesses and ovality instead of circularity in the finished pipe, as well as higher production costs. Additionally, pipes made from BorSafe grades are resistant to corrosive, harsh environments, as well as being resistant to slow crack growth and rapid crack propagation. Importantly, BorSafe HE3490-LS already has a successful global track record in large industrial pipe applications and this is complemented by the fact that the material itself has no negative impact on its service environment.

The pipes for the Mar del Plata project were specified at 2,000 mm outside diameter with 76.9 mm wall thickness (PN6/SDR26). The total installed length of the pipeline measured 3,810 metres. The pipe was manufactured in 12-metres sections at Tehmco's plant in Santiago de Chile and the 315 sections were transported by lorry across mountainous country to Mar del Plata in weekly convoys; an exercise requiring more than 300 lorry journeys. Assembly, involving the butt welding of pipes in 330-metres strings for laying at sea, was undertaken by Tehmco at one of Mar del Plata's shipyards. Pipe connection with the onshore waste water treatment plant and submarine installation was carried out by Argentine engineering contractor, Constructora Supercemento. To ensure stay-in-place security on the seabed, throughout its length Constructora Supercemento fitted the pipeline with a total of 630 concrete collars, spaced six metres apart, each weighing 18 tonnes.

PE pipes being pushed into the water

Contributing to a sustainable future

Preliminary work on the project began in April 2009 and was initially scheduled to take two years. However, the devastating earthquake that struck Chile in February 2010 caused pipe production to be temporarily suspended and the completion date amended. Ultimately the outfall pipe system was completed in September 2012 and is expected to serve the city for the next 50 years. According to those parties involved in the outfall development, BorSafe HE3490-LS has performed well throughout each phase of the project and the end result is very satisfactory. Key is that the outfall will meet the city's expectations for the long-term performance of distant, safe dispersal of effluent, eliminating the risk of beach pollution and allowing the sustainable further development of Mar del Plata far into the future.

Borealis and Borouge are leading providers of innovative plastics solutions that create value for society. Building on the unique Borstar® and Borlink™ technologies and 50 years of experience in polyolefins, Borealis and Borouge support key industries including **infrastructure, automotive and advanced packaging.** Their manufacturing capacity reaches over 5.4 million tonnes of polyethylene and polypropylene per year. **Borealis** is headquartered in Vienna, Austria, and operates in over 120 countries with around 6,200 employees worldwide. **Borouge**, its joint venture with the Abu Dhabi National Oil Company (ADNOC), employs approximately 1,700 people, has customers in more than 50 countries and its headquarters are in Abu Dhabi in the UAE and Singapore. Together, both companies provide services and products to customers around the world. Borealis offers a wide range of base chemicals, including melamine, phenol, acetone, ethylene and propylene servicing a wide range of industries. Together with Borouge the two companies will produce approximately 6 million tonnes of Base Chemicals in 2014. Borealis also creates real value for the agricultural industry with a large portfolio of fertilizers. The company distributes approximately 2.1 million tonnes per year. This volume will increase to around 5 million tonnes by the end of 2014. Borealis and Borouge proactively benefit society by taking on today's challenges and are working to drive ideas forward. Both companies are committed to the principles of Responsible Care®, driving improved safety performance within the chemical industry and contributing to addressing the world's water and sanitation challenges through product innovation and their Water for the World™ programme. **For more information visit:** www.borealisgroup.com, www.borouge.com, www.waterfortheworld.net

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