

BorECO™ PP delivers a tough highway drainage solution

Complex urban developments require solutions that are technologically sound as well as sensitive to environmental concerns. These were the primary considerations to be taken into account by the city of Brescia in northern Italy when it came to enlarge and extend its south bypass to cope with ever growing arterial traffic flows around the city. The extension included the addition of a third lane plus emergency lane over a distance of 4,800 meters.

Adding complexity to this work was the introduction of an intersection involving a three traffic-flow levels concept, incorporating two viaducts and a tunnel. Key to this bypass reconstruction was the development of a storm water drainage system that would ensure a safe water-free surface and minimise maintenance costs over the long-term. The system not only had to cope with the dispersal



of greater volumes of water but it also had to be easily accommodated in an already congested underground environment and able to withstand traffic-generated loads and vibrations over a long service life.

Construction that minimises disruption

Vital to the drainage project was that in addition to meeting stringent quality criteria it had to be completed within a tight time frame and cause no hold-ups to traffic-flow during its construction. To meet these challenges infrastructure experts from the Province of Brescia and the main contractors,

Profacta and Adige Bitumi Impresa, were assigned to the task. In analysing the situation the team decided that to avoid traffic disruption required a piping solution that had low handling and labour factors and enabled fast laying without risk of compromising final in-use performance.

A sustainable pipe solution with innovative materials

Following a complete review of options, and in keeping with the overall innovative approach to the project, it was decided to use an innovative plastic material solution for the pipe system. In conjunction with Centratubi, a leading Italian plastic pipe producer and member of the System Group, a major supplier to the European infrastructure market, polypropylene was selected as having the best fit with the project's construction and performance demands.

According to System Group's Leonardo Pasquini: "Borealis' BorECO™ polypropylene (PP) was identified as the material delivering the ideal

combination of mechanical properties. Developed specifically for non-pressure drainage and sewerage pipes, fittings and inspection chambers, this high molecular weight block copolymer brings the very high stiffness and impact strength, together with the superior durability, crucial to these applications."

Moreover, the outstanding mechanical performance of BorECO PP combined with good processing characteristics enables the extrusion of thinner-walled pipes at lower weight per pipe meter than old-generation materials such as concrete lined steel (CLS) pipe, thereby making handling and installation easier and faster.

Installation time and cost savings

Says Pasquini: "Low weight is a valuable advantage specific to the BorECO PP pipe solution. For example if you take pipe with a diameter of 1,000 mm, with the traditional CLS construction it is possible to lay approximately 70 meters per day. However, with BorECO PP pipe a daily lay-rate of 204 meters can be achieved. This not only

represents a considerable saving in laying costs but also significant time saving on project execution and completion."

Contributing to time savings was the use of electro-fusion jointing technology, a process which is automated and fast and which ensures leak-tight connections.

Sustainable long-term performance

Completed and becoming operational in 2008, the Brescia south bypass storm water drainage system comprised 4,800 meters of 1,200 mm diameter pipe, rated SN16, produced in BorECO BA212E in compliance with European standards EN1852/prEN13476. This BorECO grade delivers an optimum balance of high stiffness and high impact strength, which combined with its durability, resistance to chemicals and environmental hazards such as vibration and ground movement, give the pipes a potential service life in excess of 100 years.

BorECO™ BA212E	Physical properties (Typical values)
MFR 230°C/2.16kg ISO 1133 (g/10m)	0.3
Tensile modulus 23°C ISO 527-2 (MPa)	1700
Tensile stress at yield 23°C (Kj/m2) +23°C/-20°C	31
Charpy notched impact strength ISO 179/1eA +23°C/-20°C	50/5

Leading Innovation

Borealis continues its tradition of leading PP pipematerial innovation with the recent launch of BorECO™ BA2000. This pioneering high modulus (2000MPa) PP exceeds all requirements of the newly created S14 class in the revised EN1852 standard and provides further dimensioning options for non-pressure solid wall pipes. BorECO™ BA2000 allows pipe manufacturers to produce heavy duty pipes without mineral

fillers and without additional investment in new production equipment. It goes beyond currently available stiffness whilst simultaneously maintaining excellent impact performance. BorECO™ BA2000's outstanding resistance to corrosion, abrasion and chemicals provides pipes with longterm durability of at least 100 years – contributing to the protection of the environment through leakage prevention.

Borealis and Borouge are leading providers of innovative, value creating plastics solutions. With more than 40 years of experience in polyolefins and using our unique Borstar® technology, we focus on the infrastructure, automotive and advanced packaging markets across Europe, the Middle East and Asia. Our production facilities, innovation centres and service centres work with customers in more than 170 countries to provide materials that make an essential contribution to society and sustainable development. We are committed to the principles of Responsible Care® and to leading the way in 'Shaping the Future with Plastics'™.

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