

## BorPipe Newsletter June 2006 – 1<sup>st</sup> edition

### Editorial,

By Andre Van Uffelt, Business Unit Manager Pipe

Welcome to the first issue of **BorPipe**, a new magazine from Borouge Business Unit Pipe for our customers in the pipe industry.

The purpose of this magazine is to share with you the news and information on market and application trends in the pipe industry and the Borouge/Borealis products developed to satisfy your requirements and those of our constantly evolving marketplace.

It is important for us to effectively communicate our product offering innovations and to assure that the benefits provided by our product portfolio are delivered to you and throughout the value chain. We will provide you with up to date internal and external evaluations of our products, which will increase your interest and assure we continue to have an effective dialogue with you.

Each issue of **BorPipe** will feature a lead article on a specific market area or major events in the Middle East and Asian Pacific area. The articles will be based on input from various participants in the value chain, such like machine manufactures, converters, utility companies, institutes, steel pipe manufacturers, water and gas companies.

The lead article in our first issue concerns the PE 100+ Association, a global association of raw material suppliers. Their main objective is to guarantee consistent quality at the highest level in the production and use of PE100 pipe materials

We hope that you will find **BorPipe** a useful publication, and look forward to meeting up with you in the future.

To get in contact with us, please call or contact us by e-mail at [BorPipe@borouge.com](mailto:BorPipe@borouge.com).  
On behalf of Borouge business unit Pipe.

### Borstar® HE3490-LS qualified by PE100+ Association



In early 2006 Borouge became an official member of the PE100+ Association, an industry organisation comprising of polyethylene (PE) manufacturers. Borouge's Borstar® HE3490-LS Black pipe grade passed all testing required to be short-listed on the PE100+ Association "Quality Materials List". Borouge is the 6th raw material supplier to have its PE100 short-listed after Borealis, Total Petrochemicals, Ineos, Basell, Sabic and Prime Polymers.

The PE100+ Association ensures the highest quality of PE100 pipe products by continuously monitoring three fundamental properties:

- Creep Rupture Strength,
- Stress Crack Resistance
- Resistance to Rapid Crack Propagation.

On behalf of the PE100+ Association, Kiwa Gastec Certification B.V., an independent testing authority in the Netherlands is repeating the test rounds together with various independent and internationally accredited test institutes. The results are published every 7 months in a list of “PE100+ Quality Materials”. Requirements are set out below:

Established in 1999, the PE100+ Association’s main objective is to guarantee consistent quality at the highest level in the production and use of PE100 pipe materials. The Association has an Advisory Committee comprising representatives from the gas and water industries, pipe and fitting manufacturers and contractors. Although the main role is market guidance and feedback, the committee helps ensure that industry requirements are fulfilled.

Joining PE100+ is a leverage tool to achieve step changes in many countries where Borouge is a key operator as a provider of advanced PE Pipe solutions. Borouge will act to ensure technical requirements of PE100+ Association will be specified for demanding piping projects, especially for water and industrial applications where low quality materials are still used (“false PE100” and “salt & pepper pipe”).

As a first initiative, Borouge will co-organise on July 28th with other members of the association a PE100+ Road show in Mumbai, India.

More information on PE100+ Association on [www.pe100plus.net](http://www.pe100plus.net)

Property	Test Method	CEN/ISO requirements	PE 100+ Association Requirements
<b>Creep Rupture Strength</b>	Pressure test at 20°C and 12.4 MPa	> 100 h	<u>&gt; 200 h</u>
<b>Stress Crack Resistance</b>	Pipe notch test at 80°C and 9.2 bar	> 165 h	<u>≥ 500 h</u>
<b>Resistance to Rapid Crack Propagation</b>	S4 Test at 0°C	pc > (MOP/2.4 – 13/18)	<u>pc &gt; 10 bar</u>



## About 40 kilometres of PE100 Pipe DN1600 for Borouge2 complex

Borouge2 is the project name of a World class extension project comprising the construction of two Borstar PP units (400 Ktons each) and one Borstar PE unit (540 Ktons). With this extension, Borouge's capacity in Ruwais (UAE) will, by 2010, reach 2 millions tons per annum.

Borouge and Borealis have cooperated very closely with the engineering group Foster & Wheeler (F&W) to evaluate the integration of polyolefin materials for all piping systems. The objective for the three partners was to select the best pipe system providing superior durability in excess of traditional materials used for projects in the Middle East region (e.g. GRP and Ductile Iron for large diameters, PVC pipe for irrigation).

A lot of exchanges took place between the companies, also involving value chain members like pipe manufacturers and contractors, to define together the best conditions to go ahead with PE and PP pipe systems. All service conditions of all pipe networks were assessed by the design department of F&W, to safeguard the long term durability of all pipe systems.

Finally Foster & Wheeler granted the technical acceptance of PE100 pipe system for about 40 Km of 1600 mm diameter and 1Km of 1200 mm diameter for the largest pipe networks of Borouge2 project, including the Seawater, Supply, Return, Closed Circuit Cooling Water (CCCW) and the Outfall. Among the main benefits of shifting from GRP to PE pipe, is the established installation cost, which will be dramatically reduced as the time schedule for installation and commissioning will be compressed compared with GRP. Long lengths of pipe should be extruded by the shore in the vicinity of Abu Dhabi city, and the pipes should be conveyed directly to the chemical complex on the sea by a tugboat.

Last but not least, PP Pipe systems are also specified for Sewage and Indoor plumbing, and all irrigation systems will be based on PE materials.

The execution phase has now started. We can assume the 40 Kilometers of PE Pipe will be commissioned as per schedule by end 2008, and Borouge2 will benefit from its innovative pipe systems over a design period of 30 years.



### Summary Table

Project description	Borouge2, Industrial complex, UAE
Application/Product	Sewage, Supply water, Close Circuit Water, Outfall
Grade(s) Used	PE100 Borstar HE3490-LS
Functional Requirements	Large diameter pipe systems Stringent service conditions (Temperature & Chemicals) Execution phase on time
Benefits	Respect of project time schedule (fast installation) Potential global cost savings on project phase Proven cost savings (Limited maintenance during operation) Excellent logistic with local sourcing of PE pipes World scale record PE pipe for industrial applications - New piping policy from Engineering companies

## Borstar® HE3490-IM – Solving problems with new PE100 pressure fittings manufacture

Borealis has launched Borstar® HE3490-IM, a new Hexene based Borstar PE100 material specifically designed for the injection moulding of PE100 pressure pipe fittings. This solution provides the fitting manufacturers with a better alternative to the extrusion materials which they currently use – a material that combines the higher pressure performance of a PE100 material with the processing friendliness of a PE80.

Customer trials in Europe have yielded positive feedback. Eurostandard produces specialized fittings for pressurized gas and water pipelines, and Giuseppe Fontanazzi, Technical Director, commented on their experience of using the new Borstar grade: “Borealis has succeeded in developing a material which combines good flow characteristics with excellent strength. Borstar® HE3490-IM is enabling us to mould complex, intricate PE100 fittings more efficiently and cost-effectively than before

thanks to the shorter cycle times and less scrap. At the same time we are seeing clear improvements to the consistency in quality in areas such as the fitting openings and the surface finish on the products we deliver to our customers.”

Trials conducted in China gave a similar outcome at both Shangdong Shengli and Jiang Ying Da Wei, where a smoother product surface and lower cycle time compared to processing standard PE100 were achieved.

Borstar® HE3490-IM has being developed using Borealis recently launched proprietary Borstar PE 2G technology, a multi-modal process that enables the molecular tailoring of PE to provide added value solutions. Please do not hesitate to contact any Sales Manager or Technical Service Manager on Borstar® HE3490-IM.



>Conventional PE100



>Borstar® HE3490-IM

## Beta-PPR™ – The innovative raw material for hot and cold water systems

### Beta-PPR RA7050 - Grades

	Beta-PPR RA7050	Beta-PPR RA7050-GN
Colour	Steel grey	Green
RAL colour code	7042	6024
CRS at 70 °C/50 years	5.0 MPa	5.0 MPa
MFR (230/2.16)	0.3 g/10min	0.3 g/10min
Modulus of Elasticity	900 MPa	900 MPa



**Thinner Pipes with better long term properties with the new Borealis Beta® PPr RA7050 product range**

Plastic pipes made from Polypropylene Random Copolymer (PP-R) were introduced more than 20 years ago. Since then, they have been used mainly for hot and cold water pipe systems and contributed to the growth and acceptance of plastic pipes for plumbing and heating systems. While system components have been gradually improved over the time, no resin improvement of particular significance has happened in the last 20 years.

Beta-PPR™ is the new generation of PP-R material developed by Borealis, opening the way to a new material class: PP-RCT (designated according to ISO 1043-1), which offers higher safety performance and facilitates new applications. Beta-PPR™ bears the following innovative characteristics compared to conventional PP-R:

- Improved design strength: 5.0 MPa at 70°C/50 years, which is >50% higher than old PP-R at 3.21 MPa.
- Dimensioning with DVGW (German association of companies for the gas

and water industry) W544 design basis (70°C/50 years and Sf=1.5) allows SDR 7.4 (S3.2) instead of SDR6 (S2.2) pipes. This gives 13% less raw material consumption in pipe production versus regular PP-R

- Higher hydraulic capacity or higher pressure can be realised

The innovative characteristics bring about benefits of higher extrusion line speed, use of higher percentage of smaller pipes in real installations (depends on layout and conditions of specific object), optimised hydraulic capacity with the use of Dendrit Design Program.

In Borouge region, pipe customers may not be able to immediately enjoy a reduction of wall thickness, offered by the Beta-PPR, due to current version of ISO/EN standard which still have not been revised to include the new dimensioning. It is recommended that they refer to the new SKZ (Suddeutsches Kunststoffinstitut/Germany) guideline HR3.34 (Jan 2006) "Specification for tests

and inspection – Pressure pipe systems made of PP-RCT” for description on requirements, dimensioning, testing and 3<sup>rd</sup> party inspection.

For processing of Beta-PPR™, it is recommended that the melt temperature of

the material leaving the die head lies between 220-230°C, this will avoid the manufacture of pipes that shows brittle behaviour at the freezing temperature.

## Pipe Coating Corner - PP system at 2000 meters depth and 130°C.

At the occasion of the 6th Oil & Annual Oil and Gas pipelines in the Middle East Conference, 15-16th May 2006 held in Abu Dhabi, Borouge has presented a paper co-written with Borealis on the Polypropylene coating systems for deep sea application, and the global performances of PP multilayer systems.

This paper called “Innovative PP coating solutions for deep sea and high temperature projects” can be downloaded on [www.borouge.com](http://www.borouge.com), section literature.



## Website – Pipe websites to visit

Being well informed about PE and PP plastic pipe systems is a must to develop our industry. We have selected several Web sites for you.

Description	Address
Borouge	<a href="http://www.borouge.com">www.borouge.com</a>
Borealis	<a href="http://www.borealisgroup.com/pipe">www.borealisgroup.com/pipe</a>
PE100+ Association	<a href="http://www.PE100plus.net">www.PE100plus.net</a>
Plastic Pipe (Plastic Europe & Teppfa)	<a href="http://www.plastic-pipes.com">www.plastic-pipes.com</a>
Plastics Pipe Conference PP XIII, Washington	<a href="http://www.plasticspipes.com">www.plasticspipes.com</a>
PIPA, Australian Plastics Pipe Association	<a href="http://www.pipa.com.au">www.pipa.com.au</a>
IWA, International Water Association	<a href="http://www.iwahq.org">www.iwahq.org</a>

## Pipe event Calendar

July 28 <sup>th</sup>	1 <sup>st</sup> Indian PE100+ Association Road Show, Mumbai	Contact: S. Pattabiraman, HP +91 22 2674 7702 <a href="mailto:s.pattabiraman@borouge.com">s.pattabiraman@borouge.com</a>
September 10 <sup>th</sup> – 14 <sup>th</sup>	IWA World Water Congress and September, Beijing	Annual Convention of the International Water Association <a href="http://www.iwahq.org">www.iwahq.org</a>
October 2 <sup>nd</sup> – 5 <sup>th</sup>	Plastics Pipes XIII Omni Shoreham Hotel Washington D.C.	8 papers from Borealis personnel will be presented <a href="http://www.plasticspipes.com">www.plasticspipes.com</a>
November 15 <sup>th</sup> -17 <sup>th</sup>	Greenbuild 2006 International Conference & Expo Colorado Convention Center Denver, CO	<a href="http://www.greenbuildexpo.org">www.greenbuildexpo.org</a>
January 13 <sup>th</sup> – 15 <sup>th</sup>	Arabplast 2007 Dubai World Trade Centre, UAE	<a href="http://www.alfajer.net/arabplast">www.alfajer.net/arabplast</a>

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