A Borouge newsletter for the pipe industry

BorPipe

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MEMBER OF PE100+ ASSOCIATION

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Borouge

SHAPING the FUTURE with PLASTICS

Editor's Note

Recently we held the first PE 100 + association seminar in Asia and selected India as the host country. Next month, we will participate in a leading global water congress in Beijing – the IWA World Water Congress and Exhibition. The events we participate serve as a useful platform to promote and introduce our high quality approach towards the piping industry, water companies and governmental bodies. Specified polyethylene (PE) material and environmental friendly products should be used for one of the most precious resources we have on earth – water. Without it, there would be no life.

Most of us count on being able to turn on a faucet and get fresh, clean water from the tap. Many of us do not give much thought to where water comes from or how it gets to that tap. We just expect it to be there. It's a valuable resource, often taken for granted.

Today, the world faces a growing freshwater crisis. Access to it has become an urgent matter. The World Bank has forecasted that demand for household water, in urban areas, should double by 2025, and industrial use for water to triple. The UN estimates that 1.2 billion people, of whom many are children, are currently in jeopardy, due to a lack of adequate water and sanitation.

With our Borstar Enhanced PE for flexible, durable and leak-free pipe systems, we would like to contribute to a better world where every drop of water can be preserved and efficiently distributed.

Take one example in India where water is fast becoming a source of conflict between cities and the countryside. The competing claims have exposed a simmering rift between urban and rural India. With 17 percent of the world's population consuming just 4 percent of the planet's fresh water, India is struggling with a water crisis that has gripped the entire country. As the population of 1.1 billion people grows, by 18 million a year, the situation is only expected to worsen. A vast percentage of water in India is used for agriculture, but increasing migration to cities and towns and rapid industrialisation is creating new needs.

Another similar situation we notice is in China, where the country faces water challenges to support its population as well as agriculture requirements. Due to the climate changes and the rapid industrialisation growth in rural areas, the lack of clean drinking water is a real challenge.

To address China's water shortage and help alleviate drought in the north, the government is spending almost 500 billion Yuan (US$62.5 billion) on a diversion scheme to ship the water north. China will build a canal north from the Three Gorges Dam that ultimately will tunnel under the Yellow River to bring some 38 to 48 billion cubic meters of water to the dry Yellow, Huaihe, and Haihe rivers.

To illustrate the scarcity of water, domestic water in Australia, can even be more expensive than bottom-end prices for Australian wine (as the wine industry is experiencing an oversupply.) For domestic use, Australians currently pay between $1 and $2 per cubic meter for water. However, prices are already much higher in many developed nations, such as Germany, which pay about $10 per cubic meter for its domestic water.

The UN has declared water as a basic human right. Join us on our quest to promote specified PE material for the preservation and distribution of water, and contribute to a better world – without water leakages and shortages.

Andre Van Uffelt
Business Manager Pipe

Borouge to participate in leading global water event

Borouge is pleased to participate in the upcoming IWA World Water Congress and Exhibition in Beijing, China, from 10 to 14 September 2006.

Held at the Beijing International Convention Centre (BICC), the biennial event is slated to attract about 5,000 water professionals and experts to discuss the challenges and solutions to the world's pressing water problems. The event, hosted by IWA and the Chinese Ministry of Construction, will draw top water professionals from both the international community and China. Exhibitors and visitors to the event will include the world's leading water companies, manufacturers, utilities, consultants, research institutes, NGOs and government bodies.

During the much-anticipated event, Borouge will demonstrate how its Borstar® Enhanced Polyethylene (PE) is able to meet the needs of pipe manufacturers, utilities, water and environment professionals. Our stand is located at Level 2, Booth 543, of the exhibition hall. Come see us!

To showcase the benefits of PE pipes over more traditional materials, we will also organise two seminars on 11 and 13 September at the Beijing Continental Grand Hotel from 4pm to 5.30pm. Mike Shepherd, a Senior Consultant from Thames Water Utilities, the largest water company in the UK, will present his insights on selecting the most appropriate pipeline system, and the challenges faced in implementing a major water mains replacement project in London. Come join us!

The previous 2004 IWA event was held in Marrakech, Morocco and the next one (2008) will be in Vienna, Austria.

Quick facts:

IWA World Water Congress and Exhibition

Date: **10-14 September 2006**

Venue: **Beijing International Convention Centre (BICC)**

Borouge Booth at: **Level 2, Booth 543**

Borouge Reception & Seminar: PE Pipe Solutions for Urban Water Distribution

Date: **11 & 13 September**

Time: **4pm-5.30pm**

Venue: **Beijing Continental Grand Hotel (near Beijing International Convention Centre)**

Wuzhou Hall, Level 2

8 Bei Chen Dong St., North Sihuan Road,

An Ding Men Wai, Beijing, China

Please contact us at **infopipe@borouge.com** to attend the seminar

Come see us at Level 2, Booth 543!

Inaugural PE100+ Association Seminar in India

Four members of PE100+ Association - Borealis, Borouge, Basell and Ineos Polyolefins, recently joined hands to organise a first-ever pipe seminar in India, with the objective of providing support to the Indian pipe industry. This is the first time the PE100+ Association organised a roadshow outside Europe.

The momentous event took place at Hyatt Regency, Mumbai, on 28 July 2006. Eminent national and international speakers addressed the select audience of over 110 pipe professionals. There were two technical sessions, both followed by a very lively question and answer session.

David Walton and PR. Singhvi exchanging views on the latest developments in the pipe industry.

Honourable Minister for Water Resources, Government of Maharashtra, Shri Ramraje Naik Nimbalkar, graced the event and delivered the inaugural address. The keynote speaker was Mr Ulrich Schulte, Vice President – Marketing of the PE100+ Association.

Eight papers were presented, covering developments in HDPE pipe technology, industry status and outlook for India, case studies for water and gas distribution and relining of old pipelines. It also addressed the current level of Indian standards and test facilities available and the need to align with international standards. The conference was attended by end-users like municipal corporations, gas companies, statutory bodies, leading pipe converters and project consultants.

Didier Nozahic, Marketing Manager, Pipe, Borouge Singapore and Dr David Walton, Application Marketing Manager, Water and Gas, Borealis, presented papers in the conference, while S. Pattabiraman, Senior Sales Manager Borouge India, conducted the whole seminar and Chanchal Dasgupta, Technical Service Manager Borouge India, prepared and supervised all conference support activities.

Borouge and Borealis were front-runners to make this seminar a real success. Initiated in 2005 by Borouge, the concept of a PE100+ seminar in India was debated a few times among the members of the Association till a go-ahead was given. The next step

Speakers at the inaugural PE100+ event in India. From L-R: Didier Nozahic, A R Parasuraman, Saurin Patel and Dr S K Verma.

was to establish common ground to operate with the local branches of Basell and Ineos. Thanks to the professionalism and the integrity of our Indian colleagues, the Indian PE100+ seminar was handled successfully, according to the principles and rules of the Association.

"In a world becoming global, the mission of PE100+ Association outside Europe is to give each country the opportunity to lift-up the quality mindset of the water and gas distribution sectors. Despite efforts to develop the usage of highly specified PE100 compounds during the last 5-6 years, India uses predominantly natural PE materials with masterbatch for water distribution pipe networks. By joining forces, the members of PE100+ Association has shown the way to prolong here in India a 50 years success story of polyethylene for water and gas distribution in Europe," commented Didier Nozahic. "The penetration of PE pipe systems in India is below the full potential level due to lacking confidence in PE materials. During this seminar, we addressed solutions to the Indian industry to move forward to cost effective PE pipe networks, and we remain optimistic of seeing more Indian projects realised with PE100, short-listed by the PE100+ Association."

Founded on 24 February 1999, the PE 100+ Association is an industry organisation of several polyethylene (PE) manufacturers, whose objective is to promote consistent quality at the highest level in the production and use of polyethylene for PE100 pipes.

By monitoring the most critical properties of enhanced requirements, the Association issues a "PE100+ Quality Materials list" on a regular basis. The requirements of PE100+ are more stringent than ISO or CEN standards for PE100. In addition, to remain in the positive list, a PE material has to fulfil these requirements once in every seven months after going through tests in third party laboratories. Currently, seven PE manufacturers in the world have PE pipe materials classified as PE100+.

Borouge PE100 HE3490-LS, manufactured in Ruwais, is qualified since January 2006, and Borouge is a Board member of the Association. After this successful conference in India, the association might have plans to organise other seminars in the Middle East and Asia Pacific region e.g. China. We can predict more members of the Association will be eager to join Borouge for future roadshows.

Lively Question and Answer session

PIPE COATING CORNER

Borcoat™ PE system for pipe coating – Approvals & Track Records

Since its introduction in Asian markets in 1999, Borouge-Borealis bimodal HDPE system has been approved and recognised as a reliable and efficient system by a large number of oil and gas companies and authorities.

The Borcoat™ HDPE system passes and exceeds major existing standards and local specifications e.g., DIN30670, NFA49710 and CAN/CSA-Z245.21-02.

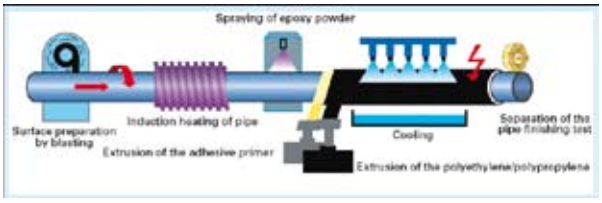
Some major approvals and qualifications achieved so far on pipes coated with Borcoat™ HE3450 and Borcoat™ ME0420 include:

- **China :** CNPC
- **India :** EIL, Tractebel, GAIL, BPCL, HPCL, GSPL
- **Iran :** NIGC, NIOC, NIOEC, SADID
- **Egypt :** Petrojet
- **Pakistan :** SNGPL
- UAE : Takreer, GASCO, DEWA, ATHEER
- **Qatar :** Dolphin, Total
- **Kuwait :** KOC
- **Oman :** PDO, Sohar Refinery, Galfar
- **Sudan :** SPCC
- **Libya :** AGIP Oil Company

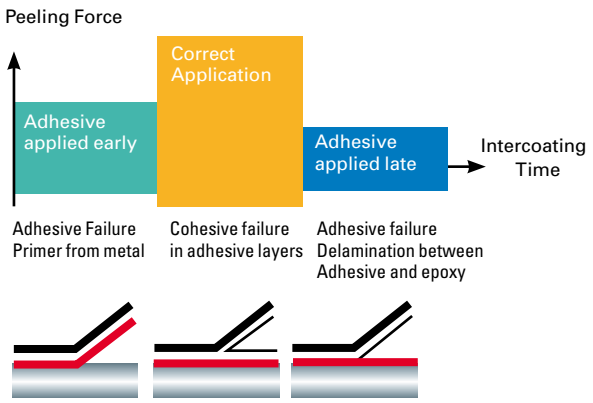
Borouge track records of some projects using Borcoat™ PE system

Project name	End user	Pipeline dimension	Country	Year
Jamnagar Loni Pipeline Project	GAIL	1200 km 16"	India	2002
West East Pipeline Project	CNPC	900 km 40"	China	2002-03
Vizag Secunderabad LPG Pipeline	GAIL	588 km 10 & 12"	India	2003
Gas Infrastructure Devp. Project	SNGPL	804 km 8 to 36"	Pakistan	2002-03
NIGC – I & II	NIGC	626 km 24 to 56"	Iran	2002-04
Multi Products Pipeline Project	SPCC	741 km 12"	Sudan	2004
B-Sharara Melitah Onshore Pipeline	AGIP Oil	327 km 30"	Libya	2004
Mashad-Doosti Dam Pipeline Project	Khorasan Water	170 km 80"	Iran	2005
Inter Refineries Pipeline Project	Takreer	515 km 10 & 12"	UAE	2005
Mundra Delhi Pipeline Project	HPCL	1048 km 16&18"	India	2005
Dolphin Energy Project	Dolphin	360 km 36 & 48"	Qatar	2005
Dahej Uran Pipeline Project	GAIL	496 km 18 to 30"	GAIL	2006

Few practical tips for 3LPE coating



1. **Peel strength – Cohesive and adhesive failure – Dependence on intercoating time:**



2. **Cohesive and adhesive failures – which is more desirable?**
For low peel strength adhesives (old generation, LDPE type) the common mode of failure is cohesive failure within the adhesive layer.

However, for very high peel strength grafted copolymer adhesives, the mode of failure, especially at ambient temperature becomes irrelevant, as the failure takes place from the weakest point in the coating, which is not necessarily within the adhesive and can be anywhere (cohesive or adhesive).

Borcoat system gives very high peel strength at ambient temperature. This ensures that even at elevated temperature or after several years of service life the bond strength will still remain high.

3. **Relation between Bond strength and temperatures of steel pipe, adhesive and PE top coat layers**
For good bonding, the adhesive and PE top coat layers temperatures should always be higher than the steel pipe temperature, so that after cooling the top coat will shrink and will have a tight grip on the steel pipe. If the steel pipe temperature is higher than adhesive and PE web

Few practical tips for 3LPE coating (Continued)

temperature, the coating tends to become loose after cooling.

As the melt layers looses temperature very fast (especially for adhesive, where the film thickness is much lower), it is normally good to keep a higher melt temperature of adhesive than PE top coat. It is also necessary that the melt temperature should always be measured near the point of contact of melt with the steel pipe and not at the die exit.

A typical temperature setting for Borcoat system is :

Steel pipe temp	– 200 – 205 deg C
Adhesive melt temperature	– 230 – 235 deg C
PE top coat melt temp.	– 220 – 225 deg C

4. **Relation of Cathodic disbondment with epoxy film thickness:**
Experiments have shown that a lower Epoxy film thickness tends to result in higher disbondment radius with the same overall thickness of 3LPE coating. Some experimental values are given below:

Dry epoxy film thickness	Overall thickness 3LPE	Disbondment radius after 90 days at 65OC
50 microns	3 mm	19.5 mm
80 microns	3 mm	15.0 mm
200 microns	3 mm	7.5 mm

Calendar of Pipe Events

Date	Event	More information
10-14 September	IWA World Water Congress and Exhibition, Beijing, China	Annual Convention of the International Water Association www.iwahq.org. Visit our stand at Level 2, Booth 543!!!
12-14 September	Gulf Eco 2006, Oman's Environment Exhibition, Oman International Exhibition Centre, Sultanate of Oman	www.oite.com/gulfeco/index.asp
2-5 October	Plastics Pipes XIII Omni Shoreham Hotel Washington D.C, USA	8 papers from Borealis will be presented www.plasticspipes.com
28 October-1 November	Big 5, Middle East Construction and Contracting industry Exhibition, Dubai, UAE	www.thebig5exhibition.com
26-30 November	WEPTEX 2006, The 2nd Saudi Int'l Water, Environment, Pumps & Pipes Technology Exhibition, Dhahran, Saudi Arabia	www.dhahran-expo.com/exhibition/2006/epowerweptex
5-8 December	OSEA, 16th International Oil & Gas Exhibition & Conference, Singapore	www.osea-asia.com
13-15 January 2007	Arabplast 2007, The Plastic Fair in the Middle East, Dubai World Trade Centre, UAE	www.alfajer.net/arabplast
13-15 March 2007	WETEX 2007, Water, Energy, Technology and Environment Exhibition, Dubai World Trade Centre, UAE	

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 informative and useful web sites for you.

Description	Address
Borouge	www.borouge.com
Borealis	www.borealisgroup.com/pipe
PE100+ Association	www.PE100plus.net
Plastic Pipe (Plastic Europe &Teppfa)	www.plastic-pipes.com
Plastics Pipe Conference PP XIII, Washington	www.plasticspipes.com
PIPA, Australian Plastics Pipe Association	www.pipa.com.au
IWA, International Water Association	www.iwahq.org
Water industry in China	www.h2o-china.com
Gas industry in China	http://newsgasshow.com

Trenchless pipe rehabilitation project in Shanghai saves 400 trees

A 20 year-old DN300 cast iron pipe network, about 2.6km, is currently renovated in the district of Pudong, Shanghai. A trenchless rehabilitation technique, based on Polyethylene PE100 pipes called "Swagelining", has been adopted to rehabilitate the leaking iron pipe network.

Over a period of merely four years, Shanghai Pudong Water Company has intervened a total number of 36 times for repairs and maintenance on this pipe section. Leakages have occurred at the joints and also across the iron pipes, with a lot of disruptions, resulting in complaints from residents.

The Swagelining technique has been adopted, in the rehabilitation project, because of several factors. Firstly, the 300mm network, crossing two main roads, will adversely affect traffic in the event of an opened trench. Secondly, 400 trees along the road would be felled if an opened trench method was used. Thirdly, only a close-fit rehabilitation process to keep high water flow after renovation will work. Hence, the Swagelining technique has been selected.

The job was contracted to Shanghai Pudong Water Supply & Drainage Construction Engineering Co. Ltd, a subsidiary of Sade (France), a member of Veolia Water group. Altogether 30 pits will be dug. The pits are used to introduce the PE pipe sections and connect these to other sub-networks. The first part of the project was initiated at end of July 2006, with the installation of the bypass scheduled to be completed within three months.

Borouge has supplied the black PE100 compound Borstar® HE3490-LS to Shanghai Chinaust Plastics Corp. Ltd. This ready-made PE compound, qualified by PE100+ Association, meets all its quality requirements.

Undoubtedly, this new PE pipe section will distribute drinking water of improved quality for the next 100 years. And the 400 tress, saved by the selection of Swagelining process, will continue to provide much needed greenery and shade to the residents in Pudong.

Contacts:

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