don‘t crack under pressure

# Setting Higher Standards to Promote Use of PE 100

## Turkey Seminar, April 3 2003

PE100+ ASSOCIATION

by PE100+ Association

# Introduction

- Background
- PE100+ Association Brief
- Material Testing Issues
- PE100+ Promotion Platform
- Advisory Committee
- Reference Cases of PE100 Pipes
- Conclusions

# Background

- Polyethylene (PE) - a well-established pipe material in gas and water transport

- PE 100 - the standard material for highly demanding applications

An association of producers - a promotion place needed by the pipe industry in PE and PE 100 with common quality objectives

# PE100+ Association

- Founded on 24th February, 1999 by Borealis, Elenac and Solvay
- Consisting of five board member companies currently - **ATOFINA, Basell, Borealis, BP Solvay PE, and SABIC**
- Supported by Technical Committee and Advisory Committee

# Scope of PE100+ Association

- **Establish** a quality label for PE100+ products
- **Assure** consistent quality at the highest level in the production and application of PE 100 pipe materials
- **Promote** usage of PE piping systems in general
- **Focus** towards end-users with more information support
- **Welcome** any polyethylene manufacturer whose materials comply with the enhanced requirements of the PE100+ Association

# Ahead of Standardisation

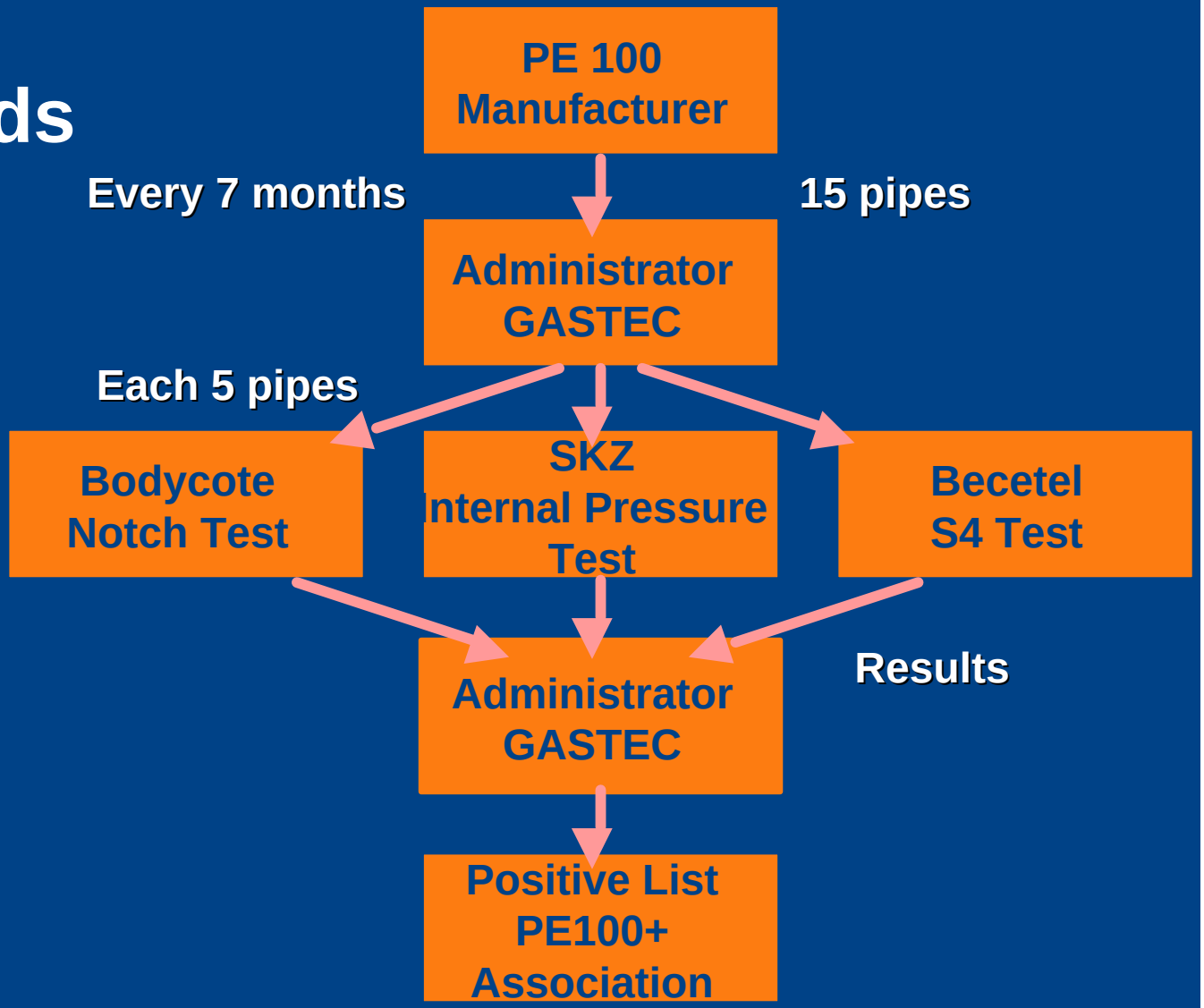
- On technical level, the Association has the objective to be at the forefront
- On ISO level, norms exist for water and gas pipes in PE. On CEN level, they hopefully exist in near future
- The Association therefore wants
  - to set requirements for reliable PE 100 materials
  - to install a neutral quality control scheme

# Technical Requirements

| Property | Test Method | EN/ISO Standard Requirement | PE 100+ Requirement |
|---|---|---|---|
| Creep Rupture Strength | Internal pressure test at 20°C and 12.4 MPa<br>ISO 1167 | > 100 h | > 200 h |
| Stress Crack Resistance (SCG) | Pipe notch test at 80°C and 9.2 bar<br>ISO 13479 | > 165 h | > 500 h |
| Resistance to Rapid Crack Propagation (RCP) | S4 test at 0°C<br>ISO 13477 | Pc> MOP/2,4 – 13/18<br>Pc: critical pressure<br>MOP: max. operat. pressure | > 10 bar |

All tests are performed on 110 mm SDR 11 pipes

# Test Rounds


PE 100
Manufacturer
Every 7 months
15 pipes
Administrator
GASTEC
Each 5 pipes
Bodycote
Notch Test
SKZ
Internal Pressure
Test
Becetel
S4 Test
Results
Administrator
GASTEC
Positive List
PE100+
Association

# Positive List of Materials

| Product | Manufacturer |
|---|---|
| Finathene® XS10 H (blue) | ATOFINA |
| Finathene® XS10 B (black) | ATOFINA |
| Hostalen® CRP 100 black | Basell Polyolefine GmbH |
| Hostalen® CRP 100 blue | Basell Polyolefine GmbH |
| Hostalen® CRP 100 orange/yellow | Basell Polyolefine GmbH |
| Borstar® HE3490-LS (black) | Borealis AB |
| Borstar® HE3492-LS (orange) | Borealis AB |
| Borstar® HE3494-LS (blue) | Borealis AB |
| Vestolen® A 6060 R (black) | SABIC |
| Eltex® TUB 121 (black) | BP Solvay Polyethylene |
| Eltex® TUB 125 N2025 (orange) | BP Solvay Polyethylene |
| Eltex® TUB 124 N2025 (blue) | BP Solvay Polyethylene |

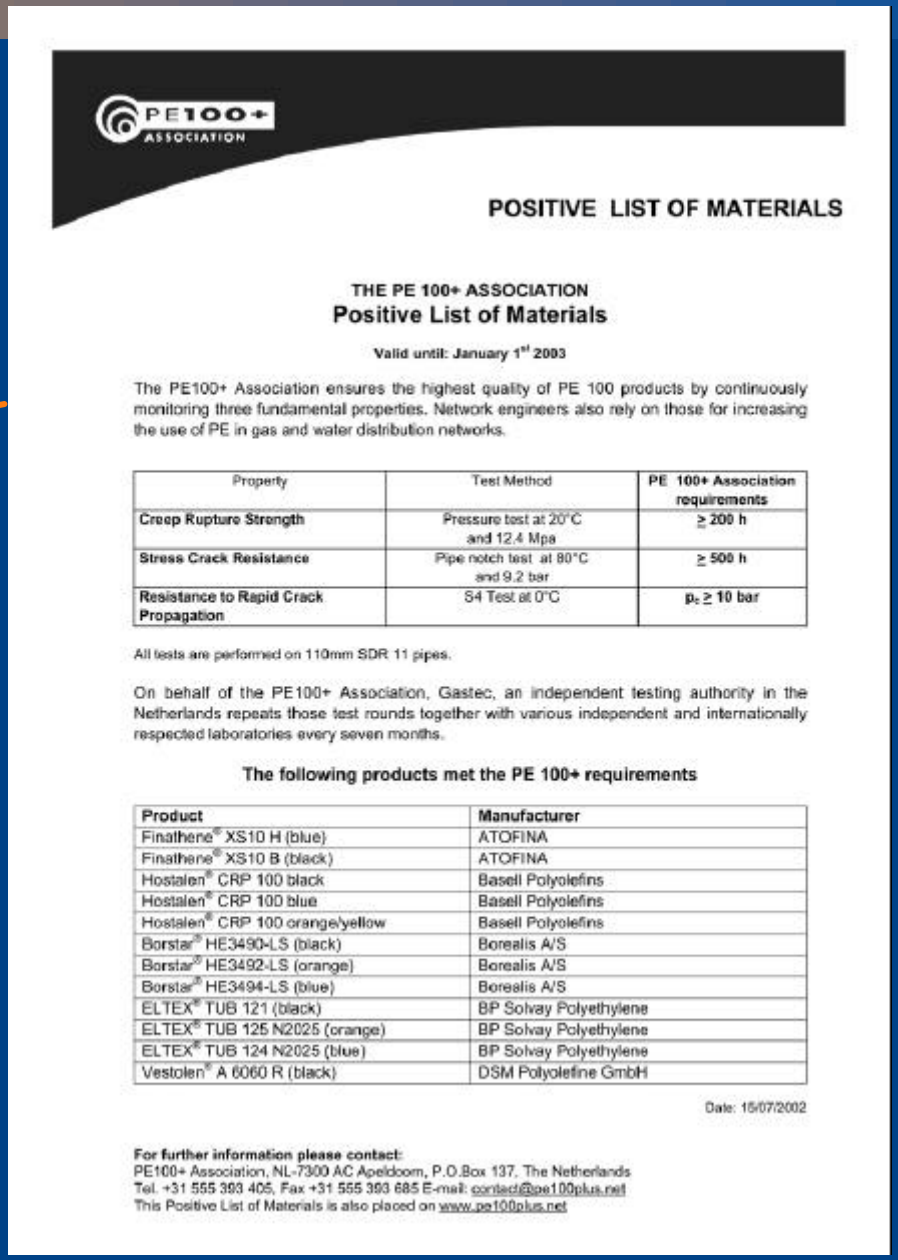
**As a result of the testing rounds, this positive list is regularly updated**

# Positive List of Materials (Example)

Valid: January 1st, 2003

**Product**

Finathene® XS10 H (blue)
Finathene® XS10 B (black)
Hostalen® CRP 100 black
Hostalen® CRP 100 blue
Hostalen® CRP 100 orange/yellow
Borstar® HE3490-LS (black)
Borstar® HE3492-LS (orange)
Borstar® HE3490-LS (blue)
ELTEX® TUB 121 (black)
ELTEX® TUB 125 N2025 (orange)
ELTEX® TUB 124 N2025 (blue)
Vestolen® A 6060 R (black)



POSITIVE LIST OF MATERIALS

THE PE 100+ ASSOCIATION
**Positive List of Materials**

**Valid until: January 1st 2003**

The PE100+ Association ensures the highest quality of PE 100 products by continuously monitoring three fundamental properties. Network engineers also rely on those for increasing the use of PE in gas and water distribution networks.

| Property | Test Method | PE 100+ Association requirements |
|---|---|---|
| **Creep Rupture Strength** | Pressure test at 20°C and 12.4 Mpa | ≥ 200 h |
| **Stress Crack Resistance** | Pipe notch test at 80°C and 9.2 bar | ≥ 500 h |
| **Resistance to Rapid Crack Propagation** | S4 Test at 0°C | $p_c \geq 10$ bar |

All tests are performed on 110mm SDR 11 pipes.

On behalf of the PE100+ Association, Gastec, an independent testing authority in the Netherlands repeats those test rounds together with various independent and internationally respected laboratories every seven months.

**The following products met the PE 100+ requirements**

| Product | Manufacturer |
|---|---|
| Finathene® XS10 H (blue) | ATOFINA |
| Finathene® XS10 B (black) | ATOFINA |
| Hostalen® CRP 100 black | Basell Polyolefins |
| Hostalen® CRP 100 blue | Basell Polyolefins |
| Hostalen® CRP 100 orange/yellow | Basell Polyolefins |
| Borstar® HE3490-LS (black) | Borealis A/S |
| Borstar® HE3492-LS (orange) | Borealis A/S |
| Borstar® HE3494-LS (blue) | Borealis A/S |
| ELTEX® TUB 121 (black) | BP Solvay Polyethylene |
| ELTEX® TUB 125 N2025 (orange) | BP Solvay Polyethylene |
| ELTEX® TUB 124 N2025 (blue) | BP Solvay Polyethylene |
| Vestolen® A 6060 R (black) | DSM Polyolefine GmbH |

Date: 15/07/2002

**For further information please contact:**
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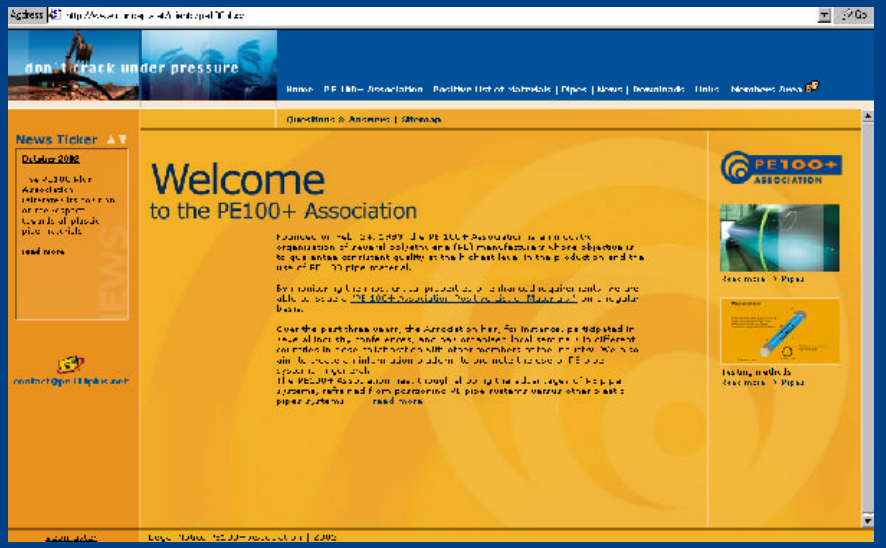
Tel. +31 555 393 405, Fax +31 555 393 685 E-mail: contact@pe100plus.net
This Positive List of Materials is also placed on www.pe100plus.net

# PE100+ Promotion Platform

- PE100+ Association website
  - handytool to interact with the Association
- Local seminar rounds
  - show the outstanding performance of the piping material polyethylene 100 (PE 100)
  - ensure all the participants about the safety transport possibilities of drinking water, natural gas and industrial fluids using pipelines made of PE
- Industry conferences
  - strengthen usage of PE pipes
  - exchange latest information on PE100 pipes

# Website - www.pe100plus.net

- General Information
- Association and Industry News
- Events
- Reference Installations
- Published Articles
- Q&A Section
- Download Center
- Link Center
- contact@pe100plus.net



# Local Seminar Rounds

| Year | Country | Location |
|---|---|---|
| 2000 | Poland | Warsaw |
| 2000 | France | Paris, Lyon, Nantes |
| 2001 | Spain | Seville, Madrid, Bilbao, Barcelona |
| 2001 | Italy | Bologna, Bari, Iskia, Naples |
| **2003** | **Turkey** | **Ankara** |


# Industry Conferences

- Wiesbaden Conference in Germany
- Dubai Plastic Pipe Conference in UAE
- American Gas Association (AGA) Conference in USA
- Plastics Pipes Conference



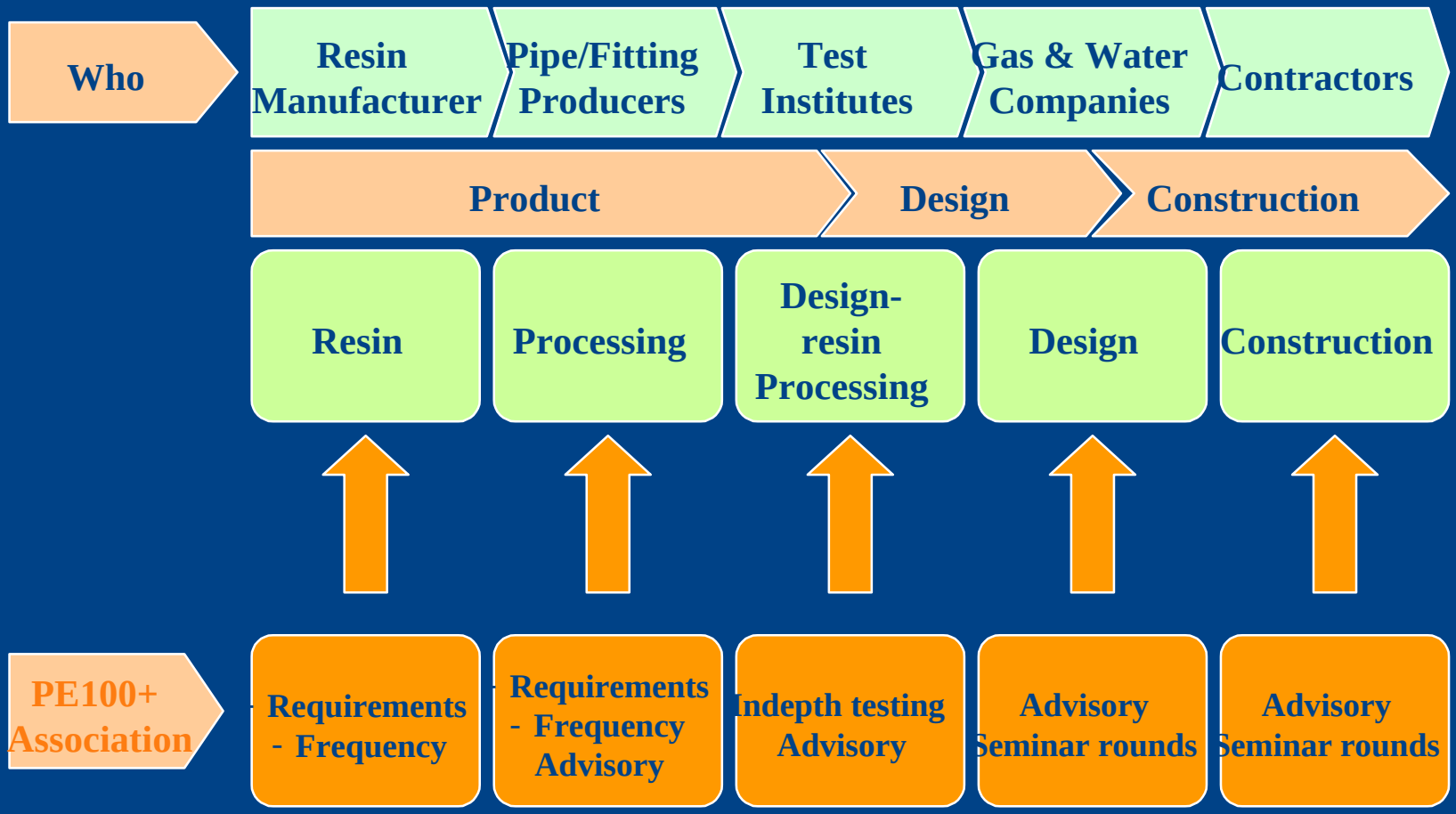
# Advisory Committee

- Consists of individuals not affiliated with any member who are experts in the field of pressure pipes and fittings for use in gas and water supply systems, sewage disposal and industrial and mining applications
- Provides advice to the PE100+ Association on matters relating to the use and promotion of PE100+ products

# Advisory Committee Meeting

- Several members of the Advisory Committee made presentations how to guarantee the value throughout the chain.
- Points of view from very different sources led to a common approach for promoting quality PE

# PE100+ Role in Quality Chain



# 1.400 mm PE 100 pipe installed in Shetland Islands

- Protection pipe for oil exploration at Shetland Islands
- Pipe production at Pipelife Norge AS
- 163 m one piece pipe
- Transport over 1,000 km by towing on the water only in 3 days

**PE 100 was chosen thanks to**

- **Large diameter → Excellent extrusion properties**
- **Easy transport on water → Lower transport cost**
- **PE 100: Borstar® HE3490-LS**

**163 m one piece PE 100 pipe**

- **PE 100 1,400 mm pipeline**
- **Wall thickness 100 mm**
- **430 kg/m pipe weight**
- **Extrusion output rate 1 m/h**

# Biggest underwater PE 100 pipe disposal of treated municipal effluent in Greece

- Greece's Patras municipality decided in 1996 for a biological cleaning site
- Large diameter PE 100 pipe to transport cleaned municipal effluent
- Jacketing concrete blocks to prevent system floating
- Highly appreciation by the end-user

**PE 100 was chosen thanks to**

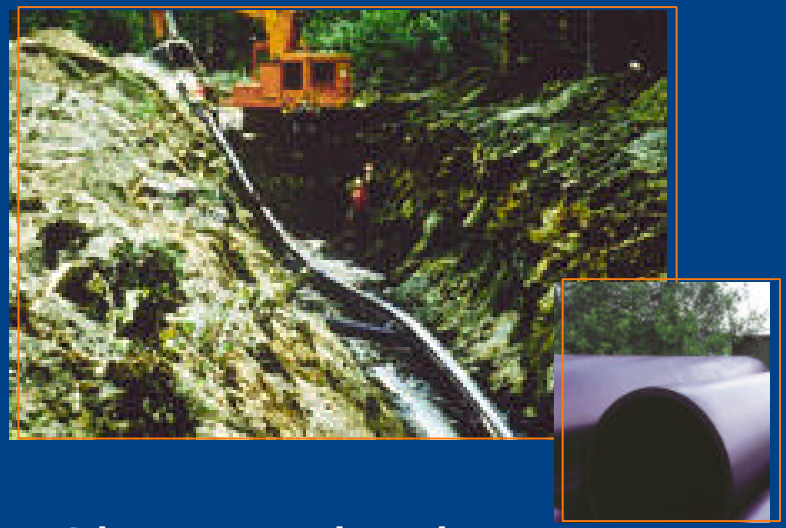
- **Blue coloured pipes**
  **➔ Immediately identification**
- **Wall-thickness reduction**
  **➔ Cost improvement**
- **Reduced project cost**
  **➔ Roughly 14% less than PE 80**
- **PE 100: ELTEX® TUB124**

**1.44 km transportation pipe**

- **PE 100 1,200 mm pipeline**
- **SDR 26**
- **Operation pressure 6.3 bar**
- **Stick lengths of 14 m**
- **Jacketing concrete blocks**

# First gas high pressure PE 100 pipeline for 12 bar, Vladimir, Russia

- Vladimir Oblast in Western Russia
- Russia is one of the mayor natural gas producers in the world
- Natural gas represents 53% of the entire Russian energy market
- The use of PE for gas distribution
- started beginning of the 1960s



**PE 100 was chosen thanks to**

- **High corrosion durability**
  **➔ Low cost of maintenance**
- **Better flowing qualities**
  **➔ Lower friction losses**
- **PE 100: Finathene® XS10B**

**1 km connection pipe**

- **PE 100 160 mm pipeline**
- **Operation pressures up to 12 bar (SDR 7.4)**
- **Stick length of 12 m**
- **Butt-welded**

# Alpine village Grindelwald - PE 100 water distribution

- Switzerland's Grindelwald started 100 years ago to install public water transportation due to a major fire accident
- Present installation amounts to 42 km
- Earlier used PE 80 and cast iron pipes needed to be replaced

**PE 100 was chosen thanks to**

- **Easy jointing → Lower cost by butt- and flange jointing**
- **Easy laying and high flexibility → No heavy building machines**
- **Lowest maintenance - Decrease maintenance cost**
- **PE 100: Hostalen® CRP 100**

**Over 1 km fall pipeline in two parts**

- **PE 100 125 - 180 mm pipeline**
- **Operation pressures up to 16 bar (SDR 11) and up to 25 bar (SDR 7.4)**
- **Mainly butt-welded**

# 710 mm wastewater pressure pipe made of PE 100

- Portugal's Foz do Arelho submarine-outfall pipeline
- Environmental protection against waste water contamination
- Installation of a 2.2 km submarine-outfall made of PE 100
- Basic bid was in concrete and PVC

**PE 100 was chosen thanks to**

- **Quick and unproblematic installation ➔ Lower installation cost**
- **Operational safety ➔ excellent lifetime**
- **Easy handling ➔ improved safety**
- **PE 100: Vestolen® A 6060 R black**

**2.2 km submarine-outfall pipeline**

- **PE 100 710 mm pipeline**
- **27.2 mm wall thickness**
- **Operation pressure 6.3 bar**
- **31 Mio. litre/day of max. hydraulic capacity**

# Conclusions

- In the past, the PE100+ Association focused on testing and quality control
- Promotion issues are at least as important
- Together with the Advisory committee, the PE100+ Association will construct a decision model showing both performance and advantages of PE pipe systems over the whole quality chain