

Characteristics and Typical Uses of PE100 RC Materials and Pipes

MCsSz Conference, Budapest January 2017
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Creating Trust in High Quality PE Pipes



Since 1999, PE100+ Association aims to

- Assure consistent quality at the highest level in the production and application of PE100+ pipe materials (quality label)
- Support the pipe industry with tools to facilitate design and installation of PE100+ pipes

PE100+ certified producers meet and exceed EN/ISO standard requirements on 3 key properties:

- Creep rupture strength - IPT acc. ISO 1167 for long-term strength
- Stress Crack Resistance / Slow Crack growth Resist.(SCR) – Notched Pipe Test acc. ISO 13479
- Rapid Crack Propagation (RCP) resistance – S4 acc. ISO13477

New Solutions for Old Problems



Purpose: transport liquids from A to B or to store liquids

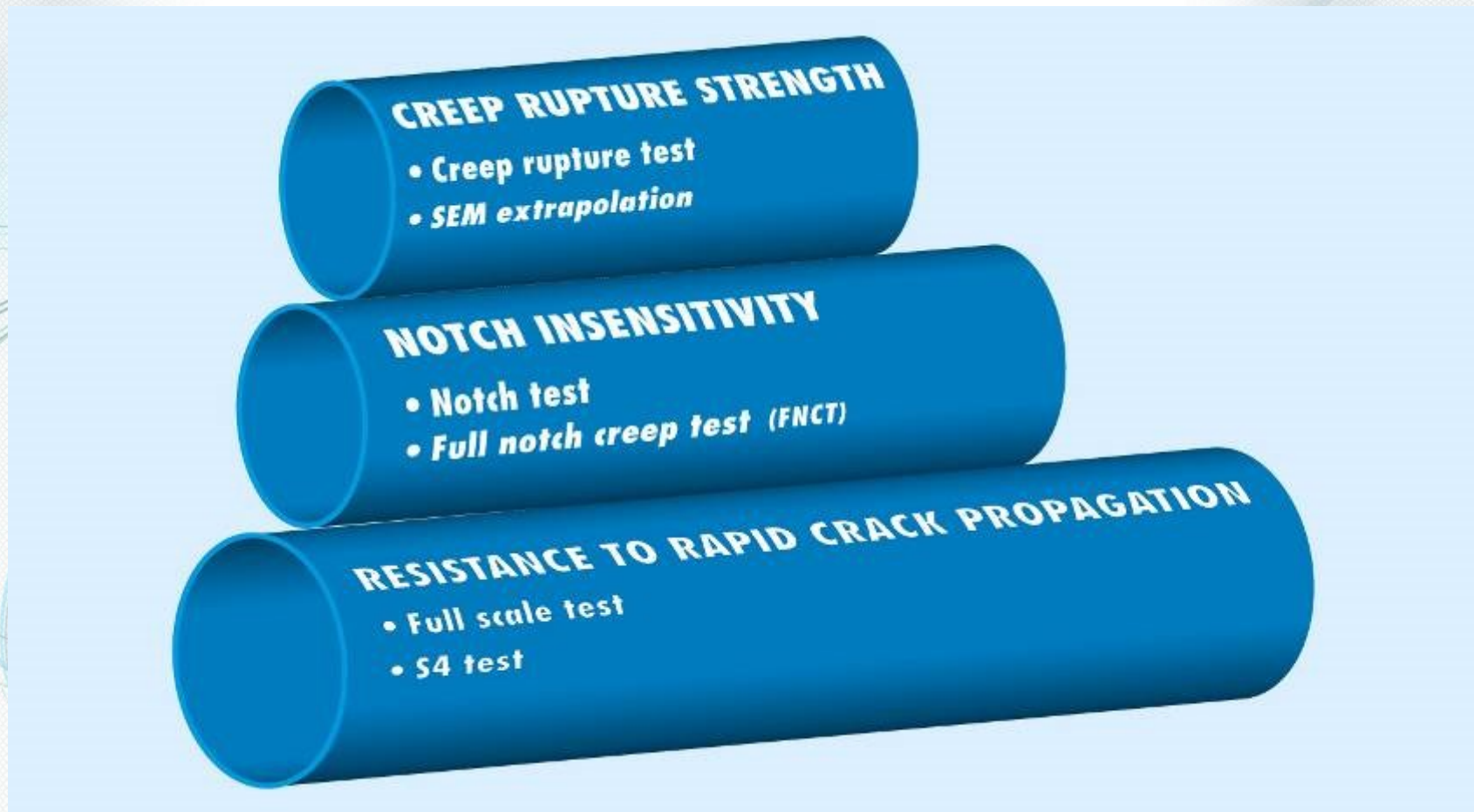


Increasing Requirements for New Applications

- Processability
- Installation techniques
- Weldability
- Resistance to:
 - » Pressure
 - » Temperature
 - » Disinfection
 - » Abrasion
 - » Chemicals
 - » Aging
 - » Weathering / UV



For the End User a „Good“ Pipe Made from HDPE Exhibits a Balance of Properties



PE100: 3rd generation of pipe grade polyethylene after PE63 and PE80

3 key properties:

- Minimum Required Strength (MRS) – provides long-term strength and creep rupture strength.
- Stress crack resistance (SCR) – also referred to as slow crack growth resistance.
- Rapid crack propagation (RCP) resistance

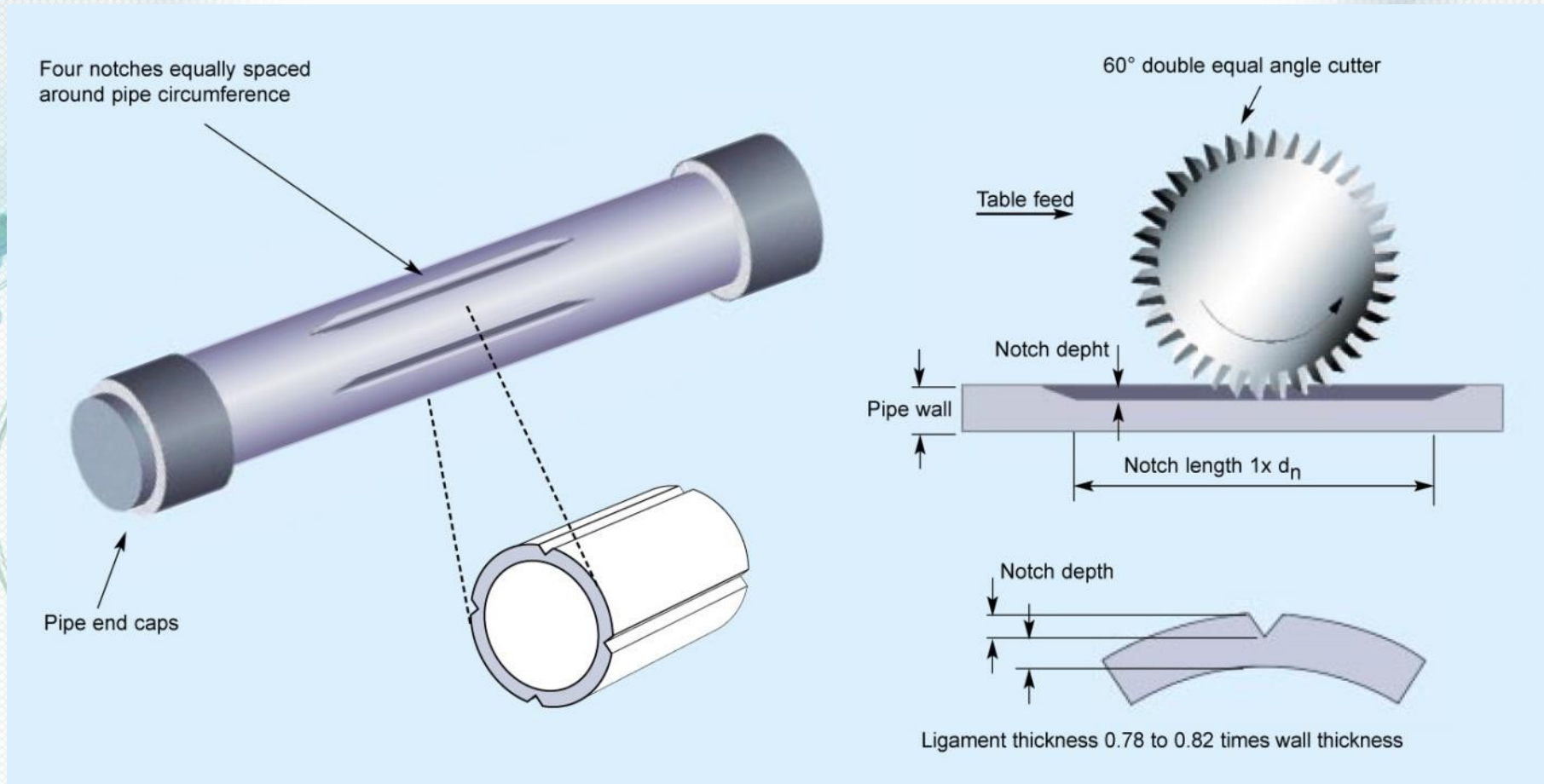
PE100 RC = resistance to cracking

- Advanced resin with increased stress crack resistance
- Maintains same MRS and rapid crack resistance as conventional PE100
- Especially suitable for trenchless applications
- Approx. 25% of PE used in trenchless technology in Europe is PE100RC

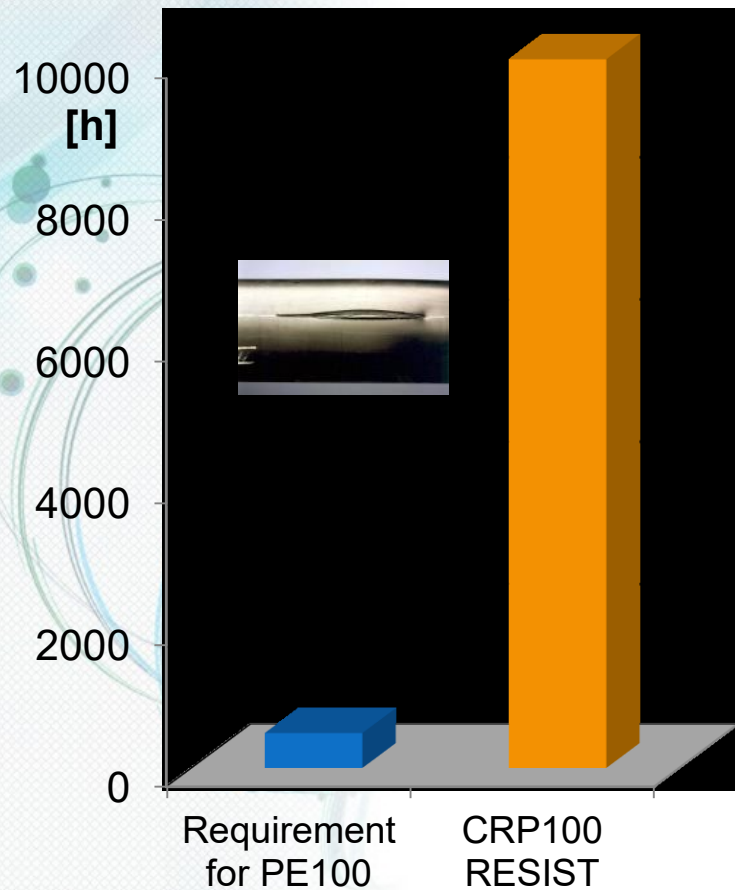
Scratched Pipe Surface Requires Resistance to Slow Crack Growth



Notched Pipe Test According to ISO 13479



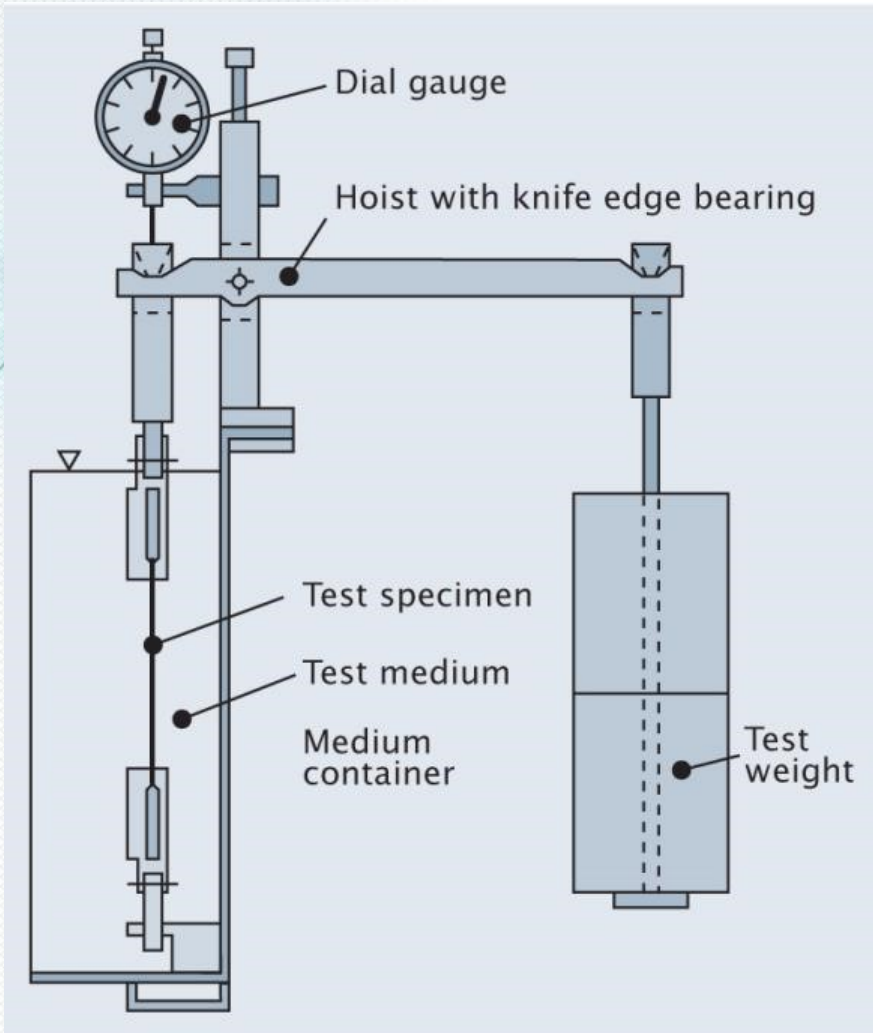
Notched Pipe Test According to ISO 13479



Notched Pipe Test Requirements:

- EN 1555 > 500h
- PE 100+ Association > 500h
- PAS 1075 > 1 year (8760 h)

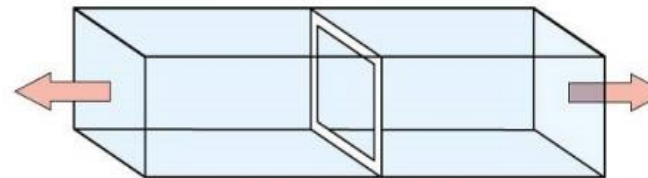
FNCT According to ISO 16770



FNCT

Full Notch Creep Test

tensile test



Test specimen: 110 x 10 x 10 mm
Notch: 1,6 mm ; full circumference

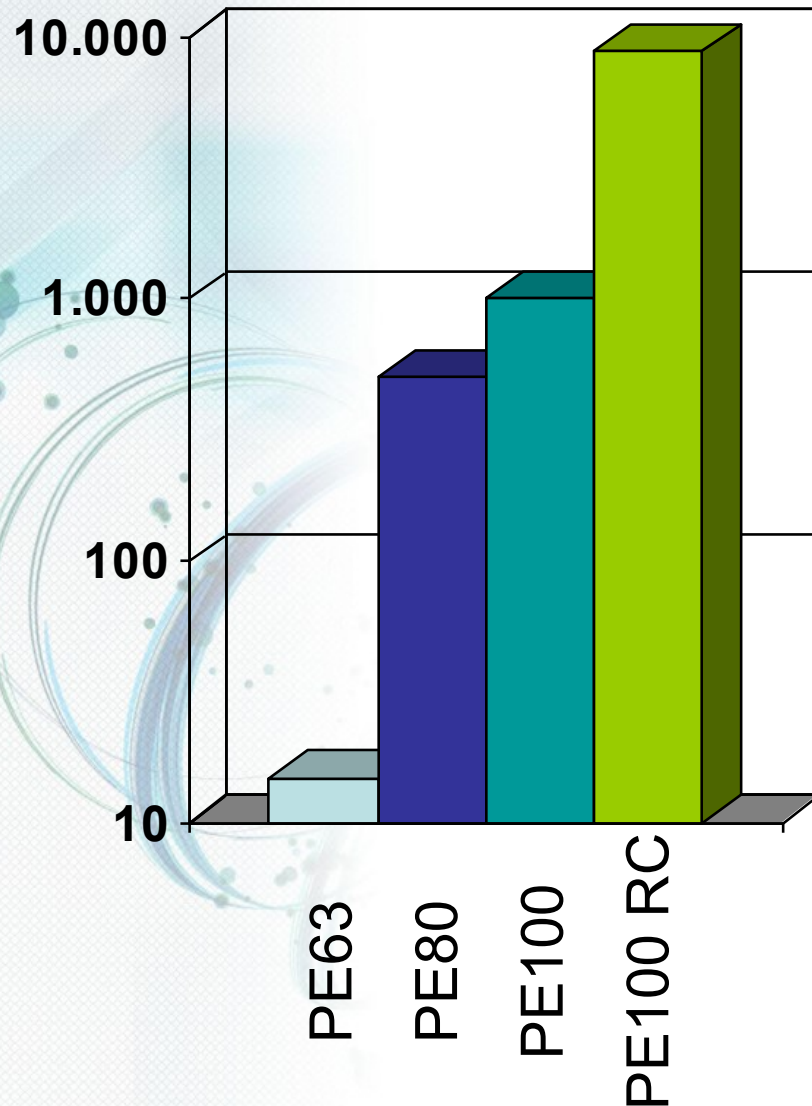
test conditions

$\sigma = 4,0 \text{ MPa}$
 $T = 80^\circ \text{ C}$
2% Arkopal N 100

M. Fleissner: "Slow crack growth and creep strength of polyethylene pipes", Kunststoffe 77 (1987) 45.

Test specimen

Increased Slow Crack Resistance Through Advanced Technology



FNCT Requirements:

- DIBt >300h
- DVGW GW 323 >3300h
- PAS 1075 >8760h

Outstanding Stress Crack Resistance

PE100 RC materials provide high safety for:

- » Installation without sand embedding
- » Direct backfilling / re-use of excavated soil
- » Installation by ploughing-in or milling
- » No dig installation, e.g. Horizontal drilling / Burst lining



Trenchless installation

Trenchless technology used increasingly compared to trench installation as it:

- Reduces collateral impact during installation
- Increases speed of installation project
- Has no need for sand bedding
- Has no need to discharge original soil

Key advantages of PE100 plastic pipe over (ductile) iron in trenchless installations are:

- Metal pipes need fittings with large outer diameter; PE100 pipes can be welded
- Lack of flexibility of metal pipe complicates installation in angles and corners

The Project

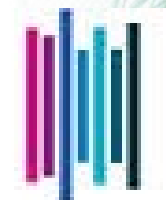
- Target was to provide an online technical guide to the use of PE100 pipe in trenchless applications for new installation and rehabilitation works.
- The purpose of the guide is to enable users to understand the properties of PE100 and how it can best be used in trenchless technology in water, gas and sewerage applications.
- The guide provides information for designers to use in designing trenchless works; and a decision process to identify which methods may be used for a specific project to meet the hydraulic and mechanical needs.
- The guide is available online for everybody to use.



Sponsors



Exova

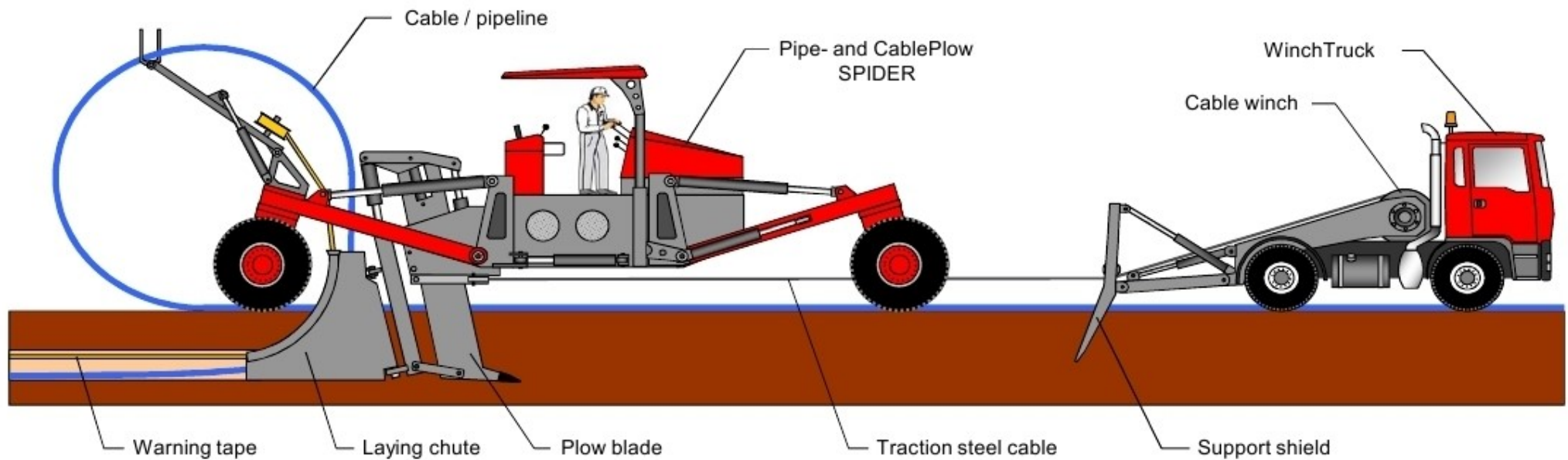


DOWNLEY
CONSULTANTS

PE100 in Trenchless Technology

11 installation methods	Water Mains	Gas Mains	Sewage		Cables
			Gravity	Pressure (Rising Mains)	
NEW installation with PE pipe	HDD Impact Moling Mole Ploughing	HDD Impact Moling Mole Ploughing	Pilot tube microtunnelling	HDD Impact Moling Mole Ploughing	HDD Impact Moling Mole Ploughing
Rehabilitation with PE pipe	Sliplining Close-fit lining* Pipe bursting Pipe splitting Pipe extraction	Sliplining Close-fit lining Pipe bursting Pipe splitting Pipe extraction	Pipe bursting Pipe splitting Pipe reaming	Sliplining Close-fit lining Pipe bursting Pipe splitting Pipe extraction	

Mole Ploughing



Mole Ploughing





CREATING TRUST IN HIGH QUALITY PE PIPES

PE100+ ASSOCIATION

PE TECHNICAL GUIDANCE

PE100+ MATERIALS



Plastic Pipes XVIII - Berlin2016

PE100+ Association *Don't crack under pressure*

PE100+ Association

Founded on Feb. 24, 1999, the **PE100+ 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 the use of polyethylene for **PE100 pipes**.

We promote better quality for PE100 materials

By monitoring the most critical properties of enhanced requirements, we are able to issue a "**PE 100+ Quality Materials list**" on a regular basis.

The PE100+ Association has, through showing the advantages of PE pipe systems, refrained from positioning PE pipe systems versus others plastic or iron pipes systems.

No-Dig technical Guide

Welcome to the Online Guide to the use of Trenchless Technology for installation of PE100 pipes.

This Guide has been developed by the PE100+ Association and co-sponsors TEPPFA, Exova, Radius Systems and Downley Consultants with the purpose of enabling users, designers, specifiers and decision makers to make use of the full range of trenchless technologies to install PE100 pipe either as new pipe or for rehabilitation and replacement of existing underground pipes.

The Guide will identify the properties, benefits and applications of PE100 in trenchless techniques for use by designers and decision makers and will enable you to decide which methods are applicable to a specific project.

PE100 pipe is central to water and gas distribution systems in many regions of the world. PE100 is approved for these applications and is the preferred pipe material in small and medium diameter pressure networks for customers in many countries. PE100 is also ideally suited for use with a range of trenchless technologies. Whether new installation, rehabilitation or replacement of existing mains, trenchless technologies are often the most efficient and cost-effective, and least disruptive, methods to use. In all of them the objective is to have a PE100 pipe in the ground carrying water, gas or wastewater safely and efficiently.

This Guide will help you to decide whether trenchless techniques could be used to install PE100 on a specific project, which ones could be used most effectively, and what key points need to be considered in deciding which technology to specify and use. The Guide includes a decision process to identify applicable trenchless methods based on project parameters as well as descriptions of all the methods and their practicalities. Links are included to manufacturers of materials, components and equipment for further information where you may need it.

This is not a design guide. When considering decisions on specific projects the user will need to undertake a design based on hydraulic (or gas) capacity requirements in order to establish the diameter and pressure capability of the PE100 pipe. These two design results will be used as input data to the decision process in this Guide which will lead to solutions showing how the design requirements can be met with PE100 and trenchless technology.

[Using the guidelines](#)

You can use the Trenchless Guidelines in one of two ways. Firstly as an informative tool by browsing through the list of [Trenchless Methods](#). This route contains the information for you to assess for yourself whether a method is applicable to your needs. Alternatively by selecting the [Design and Decision](#) route you will be led through the design requirements and input process to gather your project specific and other relevant data. Through this route you will be guided by our tool to the trenchless methods which may be applicable for your project.

[Design and Decision Module](#)[Trenchless Methods](#)

<http://www.pe100plus.com/PE-Pipes/No-Dig-technical-Guide/r1098.html>

Part I: Decision Model

- Enter parameters of a specific project
 - » *Project type (new, rehabilitation, gas, water)*
 - » *Hydraulic needs (diameter and pressure)*
 - » *Soil types*
 - » *Alignment and length*
 - » *For rehabilitation only – existing pipe material and diameter*
- Model will calculate standard PE diameter and SDR to meet the needs
- Model will list trenchless methods that are feasible to achieve what is required.
- User can click on the methods listed for a full description of the method.

Part II: Trenchless Methods

- For each method information is provided on:
 - » *General description of the technique*
 - » *Applications of PE100 (gas/water mains, services, sewer force mains)*
 - » *Installation procedure*
 - » *Equipment*
 - » *Practicalities – range of soil types, diameter, pressure and length ranges*
 - » *Excavations, space and access requirements*
 - » *Design, specification and planning*
 - » *Health, safety and environmental considerations*
 - » *Standards and Codes of Practice*

PE100+ ASSOCIATION

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