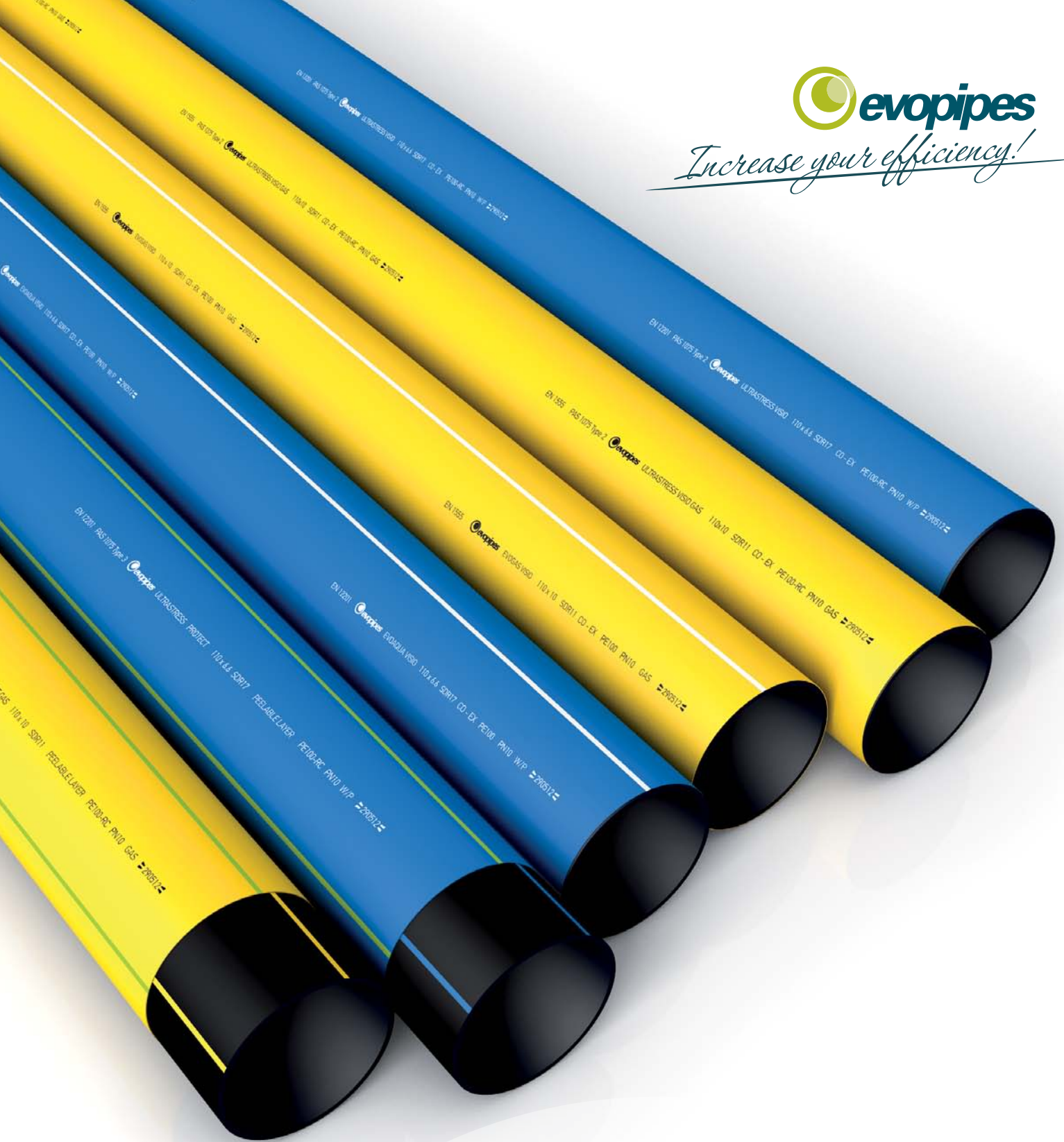




*Increase your efficiency!*



PRESSURE PIPE SYSTEMS  
for alternative and traditional  
construction methods

## PIPELINE CONSTRUCTION

The growing demand for faster and economically more viable methods of pipeline construction has resulted in new construction technologies, for instance, relining, burst lining, horizontal directional drilling, and open trench installation without sand bed with repeated use of the soil. These construction methods impose higher technological requirements for the pipes than traditional methods. Therefore, pipes produced for these construction methods are manufactured from the new generation material PE100-RC or PE100-RC + PP.

### Installation methods

OPEN TRENCH INSTALLATION METHOD						
Open trench installation in a sand bed	+	+	+	+	+	+
Open trench installation without sand bed	-	-	+	+	+	+
Ploughing into the soil <sup>1)</sup>	+/-	+/-	+	+	+	+
TRENCHLESS INSTALLATION METHOD						
Horizontal directional drilling	-	-	+	+	+	+
Burst lining	-	-	-	-	+	+
Relining <sup>2)</sup>	-	-	+/-	+/-	+	+
	EVOAQUA VISIO	EVOGAS VISIO	ULTRASTRESS VISIO	ULTRASTRESS VISIO GAS	ULTRASTRESS PROTECT	ULTRASTRESS PROTECT GAS

<sup>1)</sup> Permissible, if the device is equipped with a sand supply system.

<sup>2)</sup> Permissible, if assessment of the condition of the internal pipe surface has been performed in order to avoid external damage of the guided pipe that exceeds 15% of the pipe wall thickness.

### Brief description of trenchless installation methods

**HORIZONTAL DIRECTIONAL DRILLING** is used for the construction of new or the reconstruction of old pipelines. The old pipelines can remain fully functional during the reconstruction. Only short term interruptions of work may occur in order to perform new connections. Use of this method is suitable for areas where trench works must be avoided due to, for instance: water bodies, roads and railroads, squares, buildings, etc.

### BURST LINING

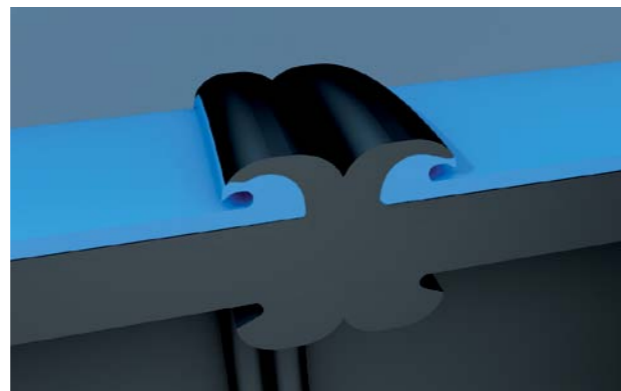
is used if the old pipeline is heavily deformed or its diameter does not conform with the new requirements. A hydraulic burst head is used as the guide, which builds the way for the new pipe. The specific nature of the method permits the drawing in of a pipe of the same diameter or larger than the existing one. Advantages of the method:

- Reconstruction of easily bursting pipes made of materials like ceramic, concrete, cast iron, polymer, steel, etc. is possible.
- The flow rate parameters of the new pipe are higher or equal to the throughput capacity of the reconstructed pipe (drawing in of a pipe with larger diameter is possible).
- Compact equipment permits operation in restricted conditions.

**RELINING** method is used for reconstruction of old pipelines. An ULTRASTRESS pipe with a slightly smaller diameter is drawn into the old pipe. This method is used in several cases of reconstruction. Only the beginning of the pipeline span that has to be reconstructed and junctions of the pipe are excavated during the works.

### Advantages of VISIO

- VISIO two layered pipe solution guarantees additional identification of visual defects during transportation and construction of the pipes:
- If damage affecting more than 10% of the pipe wall thickness appears, the defect is easily detectable, as the black base layer of the pipe is visualised (10% damage to thickness of the pipe wall is permissible and does not considerably affect the service life of the pipe). If the black layer is revealed, the decision regarding further use of the pipe must be made.
  - The black rim of the seam serves as a visual indicator of good quality welding (the black base layer of the pipe is welded) according to the provisions of ISO 12176-1 standard.



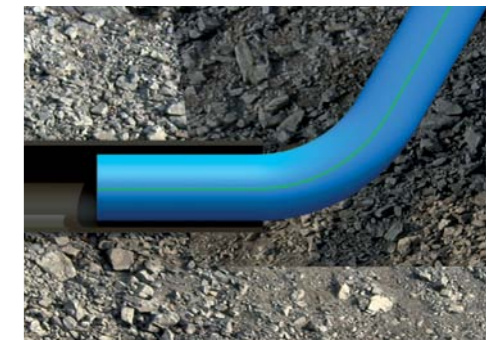
Cross section of the seam rib



Horizontal directional drilling



Burst lining



Relining

### PIPE CONNECTIONS

TYPE OF CONNECTION	NOMINAL/EXTERNAL PIPE DIAMETER DN/OD, [mm]
By using compression fittings	20 to 110
By using flanges	63 to 630
By electrofusion jointing	20 to 630
By buttfusion jointing	90 to 630

PIPE	MATERIAL USED	OPTIMUM USE
EVOAQUA (EN 12201-2:2012)	entire pipe PE80 or PE100	Standard pipes for water supply, gas, pressure sewerage in open trench with bedding and filling according to EN 1610, ENV 1046, EN 12327, EN 12007-2
EVOGAS (EN 1555)		
EVOAQUA VISIO (EN 12201-2:2012)	both layers PE 100	In open trenches without bedding and filling according to EN 1610, ENV 1046, EN 12327, EN 12007-2 (does not apply to soil filled in around the pipe) Laying into the soil with a plough or a milling cutter according to EN 1610, ENV 1046, EN 12327, EN 12007-2 (does not apply to soil filled around the pipe)
EVOGAS VISIO (EN 1555)		
ULTRASTRE SS VISIO (EN 12201-2:2012, PAS1075 type 2)	both layers PE1 00 - RC	Horizontal directional drilling according to EN 12889, EN 14457 drawing into the old pipe* according to EN 12889, EN 14457
ULTRASTRESS VISIO GAS (EN 1555, PAS1075 type 2)		
ULTRA STRESS PROTECT (EN 12201-2:2012, PAS1075 type 3)	base pipe PE100 - RC + 10% protective layer made of enhanced PP	burst lining EN 12889, EN 14457
ULTRA STRESS PROTECT GAS (EN 1555, PAS1075 type 3)		relining EN 12889, EN 14457

\* Permissible, if assessment of the condition of the internal pipe coating has been performed in order to avoid external damage to the guided pipe in the amount of 15% of the pipe wall

Note: Buttfusion jointing should be carried out according to ISO 12176-1 standard requirements. Electrofusion jointing should be carried out according to ISO 12176-2 standard requirements.

### Advantages of the PE100-RC material pipes designed for alternative methods

PE100-RC material pipes are resistant to long term expansion of cracks, scratching and point type loads.

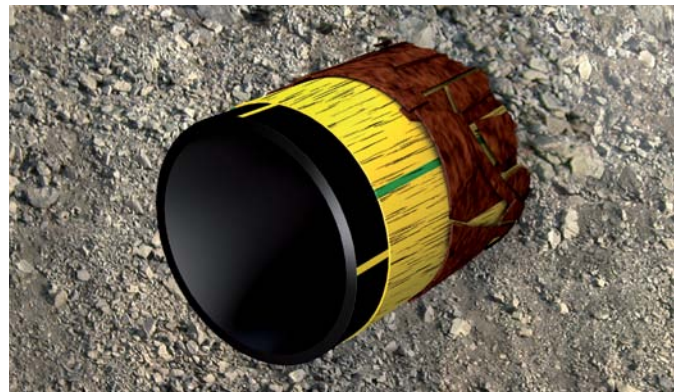
Point type loads are especially common during assembly of the pipelines using trenchless installation methods (for instance, as a result of friction against the stones that are present in the soil). In case of a point type load, tension and plastic deformations are produced in the material, which may cause cracks in the internal surface of the pipe.

PE100-RC pipes with PP coating provide additional durability against scratching in cases of especially complex installation, for instance, while burst lining.

VISIO layer helps to identify the pipe damage that has occurred during installation.



Point type damage in case of PE100 or PE80 standard pipes

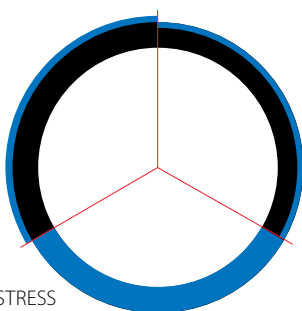


PP protective layer absorbs damage to the surface

### CLASSIFICATION OF EVOPIPES PRODUCTS ACCORDING TO PROVISIONS OF PAS\* 1075

\* PAS = Publicly Available Specification serves as an addition to the existing system of normative acts and directives and refers to polyethylene pipes that are intended for installation using alternative construction methods.

Type 3 - ULTRASTRESS PROTECT      Type 2 - ULTRASTRESS VISIO



Type 1 - ULTRASTRESS

Type 1 – monolith wall pipe made of PE100 – RC material. Sizes of the pipe conform to EN 12201, EN 1555.

Type 2 – 2 layer pipe made of PE100 – RC material, 10% VISIO layer, 90% base layer. Sizes of the pipe conform to EN 12201, EN 1555.

Type 3 – monolith wall pipe made of PE100 – RC material with polypropylene (PP) protective layer, the green lines identify additional protective layer.

Sizes of the base pipe conform to EN 12201, EN 1555.