PraxisStudie

SIMONA

ewb

SIMONA® PE 100 Liner Pipes – reduction method for rehabilitation of drinking water main in Bern

Left: the pre-welded SIMONA® PE 100 Liner Pipe string; top right: welding (heated-tool butt welding) of the SIMONA® PE 100 Liner Pipes; bottom right: after welding both the internal and external beads are removed with a special-purpose tool

In the Swiss capital of Bern a DN 300 mm grey cast iron drinking water main dating back to 1959 and spanning a length of 350 metres was rehabilitated. Owing to the high volume of traffic and the high cost of repair, it was not possible to consider an open-cut, conventional method of construction. For this reason, a decision was taken to renew the old grey cast iron pipeline by means of the reduction process (swagelining) using tough, pressure-resistant SIMONA® PE 100 Liner Pipes.

The project at a glance

Project
Rehabilitation of a drinking water main in Bern, Switzerland

Requirements
Suitability for trenchless pipelaying by means of the reduction method (swagelining), “close-fit” lining

Client
ewb Energie Wasser Bern

Contractor
Rudolf Frutig Leitungsbau, Mühlethurnen, Switzerland

Technical support
Rudolf Frutig Leitungsbau, Switzerland
SIMONA AG, Switzerland

Products used
- SIMONA® PE 100 Liner Pipes for the reduction process d 315 mm, SDR 17, PN 10

Method of laying
Reduction process (swagelining)

Duration of project
10 weeks

Continued overleaf ▶

From left to right: SIMONA® PE 100 Liner Pipes are drawn through a tapered die, thus reducing their outside diameter. During pipe insertion both the permissible tensile force and the change in pipe geometry are subjected to continuous monitoring. After pipe insertion and the end of the pulling action the PE liner pipe is deformed back towards the old pipe inside wall to create a “close fit” (picture on the right: situation after approx. 5 hours; restoration is completed after approx. 48 hours).

SIMONA® PE 100 Liner Pipes – PE 100 pressure pipes to meet the highest demands

Initial situation

Two water main bursts had already caused damage in Weissensteinstrasse. To repair the very busy road in a traffic-friendly way, a search was undertaken to identify a suitable pipelaying method. The pipe bursting method and the inliner method using a GRP Liner proved to be unfeasible because of pipes crossing the site, the risk of road surface warping, and a future service pressure of up to 10 bar. In view of this, the so-called reduction process was selected (swagelining).

Task

In addition to the demands made on the pipes regarding future service, e.g. a pressure rating of up to 10 bar and the absorption of static loads, the pipe also had to be suitable for trenchless pipelaying methods. The pipes had to be flexible in order to reduce their cross section with appropriate elasticity. They also had to withstand the high tensile forces and thrust forces that occur during the pipelaying process.

Solution

The reduction process (swagelining) was developed for the rehabilitation of gas mains, potable water mains and sewer pipes. In this relining method without any annular space (“close-fit” lining) special-purpose SIMONA® PE 100 Liner Pipes are uniformly reduced in diameter to such an extent that they can be pulled into the existing old pipe without sustaining any damage. The PE pipe string is drawn through a tapered die so that the cross section of the PE pipe string is reduced by cold forming. When the pulling action has been completed, the PE pipe string expands again owing to the elasticity of the material and provides a snug fit round the inside wall of the old pipe without leaving any annular space (“close fit”).

Despite a minimal reduction in the hydraulic cross section, the special-purpose SIMONA® PE 100 Liner Pipe also improves the hydraulic performance of the pipeline. The reduction process saves the need for labour-intensive, time-consuming and expensive civil engineering work and avoids unnecessary environmental impact. In addition, local residents and road traffic are inconvenienced far less than in the case of conventional methods.

The entire construction project was successfully completed within a period of only a few weeks, to the satisfaction of everyone involved. The head of the pilot project at Energie Wasser Bern sees enormous potential for using this trenchless pipelaying method, not only in Bern but throughout the whole of Switzerland.

SIMONA® PE 100 Liner Pipes for the reduction process

Properties

- Special-purpose material, specially matched to the reduction process (swagelining)
- Notch resistance
- Long service life
- Strong, integral and permanently watertight welded joints
- No incrustation
- Excellent hydraulic properties due to very low wall unevenness
- High abrasion resistance
- High corrosion resistance
- High flexibility
- Good chemical resistance
- Good storage properties due to insensitivity to frost and ultraviolet radiation

Further information

SIMONA AG Schweiz
Industriezone
Bäumlimattstrasse 16
CH-4313 Möhlin
Phone +41 (0)61 855 90 70
Fax +41 (0)61 855 90 75
mail@simona-ch.com

ewb Energie Wasser Bern
Monbijoustrasse 11
CH-3001 Bern
Phone +41 (0)31 321 34 24
info@ewb.ch

Rudolf Frutig Leitungsbau
Mösli 15
CH-3127 Mühlethurnen
Phone +41 (0)79 311 34 25
rudolf.frutig@bluewin.ch