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Certificate No. C-12402-18
Issued on June 29, 2018
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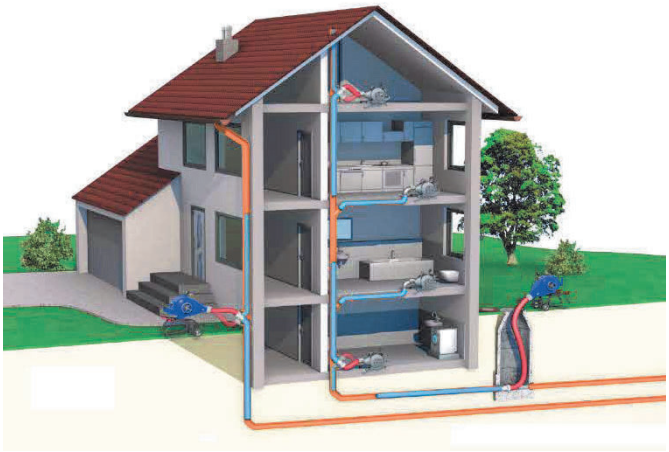
Valid until June 28, 2023

PRODUCT CERTIFICATE

NAME OF PRODUCT

DrainLiner Method - sewer pipe renovation system



MANUFACTURER

Trelleborg Pipe Seals GmbH
Dr.-Alfred-Herrhausen-Allee 36
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Germany

PRODUCT DESCRIPTION

DrainLiner Method is a system for the repair of in-house sewer pipes. The method is suitable for the renovation of concrete, cast iron and plastic pipes.

The method consists of the following stages: cleaning of the pipes, inspection of the condition of the pipes, installation of the liner impregnated with an epoxy resin system, installation of connections and inspection and documentation of the end result.

As a result a new sewer pipe is created inside the old one. This method can be used to renovate and extend the lifetime of existing drain pipes.

The certification of DrainLiner Method - system for the repair of sewer pipes covers pipes with nominal diameter from 50 mm to 200 mm.

CERTIFICATION PROCEDURE

This certificate has been issued by Eurofins Expert Services Ltd, which is a certification body (S017) accredited by FINAS.

This certificate is based on an initial type assessment of the product, an initial inspection of the factory and the factory production control according to the certification criteria SERT R041. The general certification procedures are based on the certification system of Eurofins Expert Services Ltd.

The conditions of validity of this certificate are described in section 14.

TABLE OF CONTENTS

REGULATIONS, STANDARDS AND INSTRUCTIONS

1 Regulations and product requirement standards

In the opinion of Eurofins Expert Services Ltd, DrainLiner Method, if used in accordance with the provisions of this certificate, will contribute to meet the relevant requirements of the Finnish building legislation and other relevant European standards as stated in the following:

1047/2017	Decree of the Ministry of the Environment on Water supply and sewerage equipment of properties, 22.12.2017
EN ISO 11296-1	Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Part 1: General
EN ISO 11296-4	Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Part 4: Lining with cured-in-place pipes (mainly)

2 Other standards and instructions

The certificate holder has declared that the following guidelines and standards apply to the manufacture and use of the product:

Sisä RYL 2013	*Code of Building Practice, Internal finishes,* Rakennustietosäätiö, 2012, (RT 14-11103)

PRODUCT INFORMATION

3 Product description, marking and quality control

The DrainLiner Method consists of cleaning the sewer piping, inspecting the condition of the pipes, installing of the polyester liner impregnated with an epoxy resin system, installing of connections and inspecting and documenting of the end result.

Trelleborg's epoxy resin systems EPROPOX FC15, EPROPOX FC30 and EPROPOX HC120+ are used in the DrainLiner Method. In DrainLiner Method DrainPlusLiner coated with a polyurethane film is used. The size of the liner is chosen according to the pipe to be renovated.

The drains are cleaned by high pressure water and, if necessary, also mechanically. The cleaning result and identification of the damage is done using a TV camera. Plastic and concrete pipes are normally cleaned by water pressure. DrainLiner Method cannot be used for repairing extreme offsets, collapsed pipes or large cross-sectional reductions and longitudinal cracks of pipe connections. Minor defects can be detected, but do not prevent the use of DrainLiner Method. Locally deteriorated pipe parts are replaced or repaired before lining.

The lining process consists of the following steps: definition of liner size and length, definition of resin type, calculation of material consumption and mixing of epoxy, impregnation of liner with epoxy resin systems, passing the liner through a calibrating roller, installation of liner with inversion unit, curing with steam or hot water or installation with head of water and curing with water, cleaning the relined pipe section, disassembly and recording the repair job for documentation and quality control. Additional short liners may be installed to support the liner or a protective film DrainPreLiner can be installed before lining. The liner is cured with hot water or steam. Curing time is chosen based on the

type of resin and curing method. The nominal thickness of the new lining is 3 mm minimum depending on the pipe diameter.

Pipe connections are done using the DrainLCR-B method using prefabricated pieces sewn in the form of top-hat to fit the pipe connection.

After the final cure of the epoxy, the lining forms a new pipe next to the original pipe wall, thereby forming a tube in the pipe, a system in which the coated side of the liner is inside the sewer pipe inside and thus in contact with the sewer water

The cured pipe is cleaned and inspected to verify if the installation was successful with help of a TV camera. The installation is inspected to verify that there is no excess material in the pipe and that any wrinkles do not interfere with the drainage operation/ flow. The TV recording video clip is recorded as part of the site documentation. Possible quality deviations are corrected.

Installation work is documented in the Liner Installation Report, with information about the installation site, date, raw materials used, equipment, settings, used methods and installation steps.

External quality control of DrainLiner Method is carried out according to the contract on quality control between the manufacturer and Eurofins Expert Services Ltd and the contracts on quality control between the installation companies and Eurofins Expert Services Ltd, see section 6 Installation.

4 Delivery and storage on site

The DrainLiner Method can either be delivered as renovation method for the whole sewage system or it can be used for renovation of certain parts of the system. Conditions for the use of the method is always checked before starting work.

The chemicals used are stored in sealed containers in a room where the temperature is about +15 °C to +25 °C. If the room has drainage, it shall be ensured that the chemicals cannot drain.

DESIGN INFORMATION

5 Genereal

The design information given in this certificate is based on the assumption that the structural solutions, fastening methods and other initial data are accordant to this certificate and the given requirements, instructions and standards are followed.

6 Installation

The DrainLiner renovation method is installed by Trelleborg Pipe Seals GmbH's licensed and trained installation companies with Eurofins Expert Services Ltd's certificate of production quality control. The validity of the certificate can be checked by Eurofins Expert Services Ltd website.

The suitability of the renovation method is to be checked before starting work.

7 Performance in relation to moisture

Water and moisture insulation is subject to land use and regulations and instructions issued under the Construction Act.

With DrainLiner Method a new sewer pipe is formed on the inside of the old pipe, which prevents moisture problems caused by the sewage piping system.

8 Durability

The DrainLiner method increases the service life of the sewage piping system. The durability of the used materials have been assessed using aging tests in water and air at + 70° C. The duration of the test, all resin types, was 3000 h, corresponding to the theoretically approx. 15.5 years. The material retained its characteristics in such a way that it is estimated to last for about 50 years in the normal operating temperatures and conditions of the drainage pipes of heated residential buildings. Material lifetime estimation is based on the average operating temperature of + 15 °C, material strength and rigidity using the Arrhenius equation as an evaluation criterion. The service life estimation can be applied to DrainLiner's renovated piping when installed and maintained according to the Trelleborg Pipe Seals GmbH instructions.

9 Environmental aspects

Installation companies have access to material safety data sheets of products. Appropriate personal protective equipment is used when installation work is done and the safety and security of residents is ensured.

The disposal of waste and the proper disposal of unused materials is arranged by the installation company on the installation site.

INSTRUCTIONS FOR INSTALLATION AND USE

10 Manufacturer’s instructions

Installations shall be performed according to Trelleborg Pipe Seals GmbH’s installation instructions according to the documents below:

1. DrainLining Method Statement 1 (Hot water cure) Version 4.3
2. DrainLining Method Statement 2 (Steam cure) Version 4.3
3. DrainLining In House Method Statement Version 2.1

TECHNICAL SURVEY

11 Initial assessment

Eurofins Expert Services Ltd has performed evaluation based on manufacturer’s documentation and on testing of used materials as well as testing of a renovated sewer. Technical properties of a sewer renovated with DrainLiner Method when using resins EPROPOX FC15, EPROPOX FC30 and EPROPOX HC120+ are presented in table 1.

Table 1. A summary of properties of DrainLiner Method

Property	Test method	Results, average
Hardening time of liner impregnated with epoxy without curing with water or steam		FC15: 330 min/ +10 °C 120 min/ +20 °C 90 min/ +25 °C FC30: 600 min/ +10 °C 240 min/ +20 °C 150 min/ +25 °C HC120+: 120 min/ +25 °C
Short term ring stiffness	EN ISO 9969	FC30: 7 kN/m^2 (DN 200, wall thickness 3,0 mm) HC120+: 7 kN/m^2 (DN 200, wall thickness 3,0 mm)
Durability - Service life, average operating temperature +15 ºC	Heat aging tests in air and in water at +70ºC, duration of test 3000 h	Service life, estimation based on the results: 50 years
Wall thickness of the final lining	ISO 7685	min. 3,0 mm
Smoothness of the inner surface	Visual inspection	≤ 5 %, Requirement fulfilled
Water tightness and durability of the renovation method: - Connections	EN 877 Thermal cycling test 15°C / 93°C, 1500 cycles	Water tight

12 Other material

Product Safety Data Sheets are available from the manufacturer Trelleborg Pipe Seals GmbH.

VALIDITY OF THE CERTIFICATE

13 Validity period of the certificate

This certificate is valid until June 28, 2023.

This certificate shall be updated, if the product falls into the scope of CE-marking.

Real time information about the validity of the certificate can be found on website of Eurofins Expert Services Ltd.

14 Conditions of validity

The certificate is valid assuming that no fundamental changes are made to the product, and that the manufacturer has a valid contract on quality control.

15 Other conditions

The references made in this certificate to standards and instructions are valid in the format used at the time the certificate was signed.

The recommendations in this certificate concerning the safe use of this product are minimum requirements that shall be satisfied when using the product. The certificate does not override current or future requirements imposed by laws and statutes. In addition to the issues presented in this certificate, design, manufacturing and use shall follow appropriate construction methods.

The manufacturer is in charge of the product's quality and factory production control. In awarding this certificate, Eurofins Expert Services Ltd does not bind itself to indemnification liability concerning personal injury or other damage that directly or indirectly may result.

Eurofins Expert Services Ltd finds DrainLiner Method to be suitable for use in construction as described in this certificate.

This certificate No C-12402-18 has been granted as described above to Trelleborg Pipe Seals GmbH.

On behalf of VTT Expert Services Ltd on June 29, 2018.

Tiina Ala-Outinen
Business Manager

Annamaija Naula-Iltanen
Assessor

This document has been signed electronically