

PRODUCT CERTIFICATE

NAME OF PRODUCT

Boldan In-House Lining System

MANUFACTURER

Boldan Oy
Matkuntie 3
05200 Rajamäki
Finland



PRODUCT DESCRIPTION

Boldan In-House Lining System (previously known as Metro Lining system) is a renovation method for sewerage pipes. The method is suitable for renovation of concrete, cast iron and plastic pipes.

The system includes cleaning of the pipeline, filming of the cleaned pipeline, needed reparation for the old pipeline, installing of the polyester - or glass fiber liner impregnated with two-component epoxy resin, installation of branches and filming of the end result.

The system also includes coating of the inner side of old cast-iron floor gullies or installation of a plastic floor gully insert. With the renovation method a new pipe is formed inside the old pipe. The service life of the existing pipeline can be extended with the method.

This certificate includes renovation of pipes of inside diameter between 30-200 mm.

The installation of the Boldan In-House Lining System is done by installation companies trained and licensed by the Boldan Oy, which have a quality control agreement with Eurofins Expert Services Oy.

The components in the Boldan In-House Lining System are positive tested compatible and non-tested components shall not be used with the renovation method.

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 R041 and section 3. The general certification procedures are based on the certification system of Eurofins Expert Services Oy.

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

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REGULATIONS, STANDARDS AND INSTRUCTIONS

1 Regulations and product requirement standards

In the opinion of Eurofins Expert Services Oy, Boldan In-House Lining System, if used in accordance with the provisions of this certificate, will contribute to meet the relevant requirements of the Finnish building legislation as stated in the following:

1047/2017	<i>Ympäristöministeriön asetus rakennusten vesi- ja viemärlaitteistoista, 22.12.2017</i> <i>Decree of the water supply and sewerage applications 1047/2017 issued by Finnish Ministry of the Environment 22.12.2017</i>
EN ISO 11296-1	<i>Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Part 1: General</i>
EN ISO 11296-4	<i>Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Part 4: Lining with cured-in-place pipes (in main parts)</i>

2 Other standards and instructions

The following European standards also have relevance for the use of Boldan In-House Lining System (any nationally determined parameters shall separately be considered):

RIL 107-2012	Rakennusten veden- ja kosteudeneristysohjeet <i>(Instructions for water and moisture proofing of buildings)</i>
Sisä RYL 2013	Rakennustöiden yleiset laatuvaatimukset, Talonrakennuksen sisätyöt, Rakennustietosäätiö, 2012, (RT 14-11103) <i>(Code of Building Practice, Internal finishes)</i>

PRODUCT INFORMATION

3 Product description, marking and quality control

The Boldan In-House Lining System consists of following stages: Cleaning of the pipeline, filming of the cleaned pipeline, installing of the polyester liner impregnated with two-component epoxy resin, opening and installation of branches, inspection of the end result with a camera and renovation of old cast-iron floor gullies by coating or with floor gully insert.

Following polyurethane coated polyester liners are used with the Boldan In-House Lining System:

- Boldan 1D Liner SN4 (previously known as Flexi FR Tube)
- Boldan 3D Liner SN4 (previously known as Flexi FR Tube 3D)
- Boldan 3D Liner SN8
- Boldan 1D Liner SN8
- ULTRAFLEX HDS 5,5 mm
- tt38s
- polyolefin coated polyester liners 1D STEAMLINER 4 mm and 5 mm (previously known as OF-liner)
- and polyurethane coated glass fiber liner Flexi Glassliner.

The size of the liner is chosen according to the pipe to be renovated.

Two-component Boldan epoxy resins used in the renovation method are:

- BA (BA10, BA15, BA30, BA60, BA140)
- BD (BD15, BD30, BD45, BD60)

- BDA (BDA15, BDA30, BDA45, BDA60)
- BDA+ (BDA+15, BDA+30, BDA+60)
- BE (BE15, BE30, BE60, BE180)
- BX (BX10, BX15, BX30, BX60, BX180)
- BC (BC15, BC30, BC60)
- B1 (B1 15, B1 30, B1 60, B1 180)

Cleaning of the pipes and gullies is done by removing the old sediments with a water and, if necessary, by milling. Cleaning can be repeated if necessary. Local failures in the pipe system are repaired or part of pipes are changed before the installation. Lining will not be conducted if the material of the cast iron pipe does not resist the cleaning.

The liner is impregnated with two-component epoxy resin before installation of the liner. The impregnated liner is installed with inversion technique by the help of pressurized air or water pressure. The liner is cured by using cold or hot curing. The nominal thickness of the new lining is 2.0 – 4,5 mm depending on the pipe diameter.

The tightness of new sewerage line is inspected and documented by a tightness test in case the HVAC-work instructions of the specific building site insists this.

The branches are opened with an opening blade or by robotic lateral re-instatement cutter. The edges of the liner are finished with grinding tool. Branch pieces, impregnated with the epoxy resin and certified to the system and delivered by the Boldan Oy, are installed to the branches.

The old cast-iron floor gullies can be renovated by installation of a plastic floor gully insert delivered and accepted by the Boldan Oy. Alternatively, the floor gully can be coated with Spray Coat FC epoxy resin.

Quality of the end result is followed and evaluated with a video camera. Possible defects shall be repaired.

A record is kept of the installation work where is written the installation site, date, raw materials used, machinery, settings, power, methods and installation steps.

External quality control is carried out according to the contract on quality control between the certificate holder and Eurofins Expert Services Oy and according to the contract on quality control between the installation companies and Eurofins Expert Services Oy. See also point 6, Installation.

4 Delivery and storage on site

The Boldan In-House Lining System is delivered as an entity or it can be used for renovation of certain parts of the system. A prerequisite of using the method is always investigated before starting the work.

DESIGN INFORMATION

5 General

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

Installation companies trained and licensed by the Boldan Oy, and certified by Eurofins Expert Services Oy, conducts the installation of the Boldan In-House Lining System. The validity of the certificate may be confirmed at Eurofins Expert Services Oy web pages <https://sertifikaattihaku.fi>.

The applicability of the system is assessed before starting the work.

7 Performance in relation to moisture

The Decree of the moisture behaviour of the buildings 782/2017 issued by Finnish Ministry of the Environment 24.11.2017 is followed with the waterproofing and moisture insulations.

A new surface layer is formed with the Boldan In-House Lining System inside the old pipe, which prevents moisture problems due to the pipework.

8 Durability

Boldan In-House Lining System increases service life of the sewerage pipework and gullies. The durability properties of the method has been assessed with ageing tests in water and air at the temperature of + 70 °C -80°C (see Table 1). The tests endured between 3000-3450 hours, which theoretically corresponds to 16-18 years. According to the test results, the service life of the sewage pipes renovated with the method can be expected to be approximately 30-50 years in normal service temperatures and moisture conditions of heated buildings. The expected service life depends on the used epoxy resin, see table 1. As basis for assessment the service life, average operating temperature of +15 °C, strength and stiffness properties of the product and Arrhenius equation has been used. Estimated service life can be applied for the sewerage line renovated by the Boldan In-House Lining System provided that the instructions of Boldan Oy are followed with the installation and maintenance.

9 Environmental aspects

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

At the installation site, the waste management and disposal of the non-used materials is taken care.

INSTRUCTIONS FOR INSTALLATION AND USE

10 Manufacturer's instructions

The installation work is done according to the written instructions of the Boldan Oy, Boldan In-House Lining System Menetelmäopas (user manual), version 3.3 (V3.3) 11.12.2020

TECHNICAL SURVEY

11 Initial assessment

Eurofins Expert Services Oy has performed evaluation based on manufacturer's documentation, test results and calculations. Technical properties of materials and building parts are presented in Table 1.

Table 1. Summary of the properties of the Boldan In-House Lining System

Property	Test method	results (as average)
Hardening time of liner impregnated with epoxy without curing with water or steam declared by the manufacturer ¹⁾ .		<p><u>BDA</u></p> <p>120 min/ +23 °C 60 min/ +60 °C</p> <p><u>BA</u></p> <p>140 min/ +23 °C 50 min/ +60 °C</p> <p><u>BE</u></p> <p>180 min/ +23 °C 30 min/ +60 °C</p> <p><u>BX</u></p>

		<p>180 min/ +23 °C 30 min/ +60 °C</p> <p><u>BDA⁺</u> 120 min/ +23 °C 60 min/ +60 °C</p> <p><u>BD</u> 120 min/ +23 °C 60 min/ +60 °C</p> <p><u>BC</u> hardener 15: 120 min/20°C hardener 30: 240 min/20°C hardener 60: 720 min/20°C</p> <p><u>B1</u> (20°C) B1 15: 3h B1 30: 8h B1 60: 18h B1 180: 24h</p>
Short term ring stiffness with the tested epoxy resins	EN ISO 9969	<p><u>BDA15</u> 8,8 kN/m² (DN150 pipe, wall thickness 4,5 mm)</p> <p><u>BA30</u> 15,34 kN/m² (DN100 pipe, wall thickness 3,7 mm)</p> <p><u>BE30</u> 15,59 kN/m² (DN100 pipe, wall thickness 3,9 mm)</p> <p><u>BX30</u> 12,73 kN/m² (DN100 pipe, wall thickness 3,8 mm)</p> <p><u>BDA⁺30</u> 15,34 kN/m² (DN100 pipe, wall thickness 4,15 mm)</p> <p><u>BD30</u> 10,71 kN/m² (DN100 pipe, wall thickness 3,90 mm)</p> <p><u>BC30</u> 8,34 kN/m² (DN100 pipe, wall thickness 3,8 mm)</p> <p><u>B1</u> 10,10 kN/m² (DN150 pipe, wall thickness 4,6 mm)</p>
Durability - Service life, + 15 °C	Heat ageing tests in water and air +70 °C, 3450 h	<p><u>BDA</u> 50 years</p> <p><u>BA</u> 50 years</p> <p><u>BE</u></p>

	tests in +80 °C, duration 3450 h	50 years <u>BX</u> 30 years <u>BDA⁺</u> 30 years <u>BD</u> 30 years <u>BC</u> 50 years <u>B1</u> 50 years
Smoothness of the inner side	Visual check	≤ 5 %, Requirement fulfilled
Tightness and durability of the renovation method: - Branch - Tightness of joint between gully insert and renovated pipe line - Tightness of joint between coated gully and renovated pipe line	Thermal cycling test 15°C/ 93°C, 1500 cycles	Requirement fulfilled
<p>¹⁾ The curing times of the different hardeners can be asked from the certificate holder.</p>		

12 Other material

Safety data sheets of the product are available from the certificate holder.

VALIDITY OF THE CERTIFICATE

13 Validity period of the certificate

This certificate is valid until 6.8.2022.

The validity of the certificate will be ended, if the product falls into the scope of CE-marking.

The validity of the certificate may be confirmed at Eurofins Expert Services Oy web pages <https://sertifikaattihaku.fi>.

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 / certification.

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 Oy does not bind itself to indemnification liability concerning personal injury or other damage that may directly or indirectly result from using the product described in this certificate.

This updated certificate C-12120-2017 (issued first on 7.8.2017) has been granted as described above to Boldan Oy.

On behalf of Eurofins Expert Services Oy on 19.5.2021

Katja Vahtikari
Manager, Certification & Inspection

Tatu Toivonen
Assessor

This document has been signed electronically

This certificate is the English version of the original certificate. In case of dispute, the Finnish original certificate is valid.