

## NAME OF PRODUCT

Tubus System waste water  
pipe renovation method

## CERTIFICATE HOLDER

WBF Invest AB  
Designvägen 3  
S-435 33 Mölnlycke  
SWEDEN

## MANUFACTURER

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## PRODUCT DESCRIPTION

Tubus System is a waste water pipe renovation method. The method consists of the following stages: cleaning of the pipes with a standard high powered auger, rinsing the pipes with both hot and cold tap water, drying the pipes, inspection of the condition of the pipes with a camera, reparation of local failures, installation of the Tubus System liquid form glass reinforced polyester into pipes with a high pressure application system, 3 – 5 times depending on the condition of the renovated pipes, inspection of the end result with the camera and video recording.

The wall thickness of the Tubus System polyester pipe inside the old pipe is 3 – 5 mm. With the Tubus System, the service life of the sewage pipe system, can be prolonged.

Tubus System is suitable for renovation of pipes with diameter from 50 mm to 200 mm. Tubus System polyester pipe can be installed in lengths up to 40 m in cast iron pipes and up to 20 m in PVC and PP pipes.

## CERTIFICATION PROCEDURE

This certificate is based on an initial type assessment of the product, and an initial inspection of the factory and the factory production control according to sections 3.4 and 15. The general certification procedures are based on the certification system of VTT Expert Services Ltd.

This certificate is valid until January 29, 2017. The conditions of validity are described in section 15.

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## REGULATIONS, STANDARDS AND INSTRUCTIONS

### 1. Regulations and standards on product requirements

1.1 According to VTT Expert Services Ltd's evaluation, the Tubus System fulfils the requirements presented in the following various parts of the National Building Code of Finland and standards that are essential to its use:

C1	<i>Sound insulation and noise abatement in building, Regulations and guidelines 1998, as per section 8 of this certificate</i>
C 2	<i>Moisture, Regulations and guidelines 1998, as per section 9 of this certificate</i>
EN 13566-1	Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Part 1: General
EN 13566-4	Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Part 4: Lining with cured-in-place pipes

### 2. Other standards and instructions

2.1 The manufacturer of the product has stated that the materials used in the manufacture and the manufacturing process itself complies with the following guidelines and standards:

RIL 107-2000: Guidelines for water and moisture insulation in buildings, Finnish Association of Civil Engineers (RIL) 2000

## PRODUCT INFORMATION

### 3. Product description, marking and quality control

3.1 Tubus System is a waste water pipe renovation method. The method consists of the following stages: cleaning of the pipes with a standard high powered auger, rinsing the pipes with both hot and cold tap water, drying the pipes, inspection of the condition of the pipes with a camera, reparation of local failures, installation of the Tubus System liquid form glass reinforced polyester into pipes with a high pressure application system, 3 – 5 times depending on the condition of the renovated pipes, inspection of the end result with the camera and video recording.

3.2 Local failures in the pipe system are covered with the use of a fiber glass mould that is inserted to the inside of the pipe before application of the Tubus System polyester material.

**3.3** Renovation cannot be done if the old pipes do not resist cleaning.

**3.4** External quality control is carried out according to the certification contract between the manufacturer in Finland and VTT Expert Services Ltd. External quality control of the polyester material is carried out by SP Technical Research Institute of Sweden according to a separate quality control contract.

## **4. Delivery and storage on site**

**4.1** Tubus System can either be delivered as renovation method for whole sewage system or can be used for renovation of certain parts of the system.

**4.2** Prerequisite for the use of Tubus System, is, that the sewage system is inspected before the installation.

# **DESIGN INFORMATION**

## **5. General**

**5.1** Design information given in this certificate is based on the assumption that constructional solutions, attachment methods and other initial data are in compliance with this certificate and that given requirements, instructions and standards are followed.

## **6. Structural performance**

**6.1** Tubus System has no effect on the load bearing properties of a building.

## **7. Sound insulation**

**7.1** Tubus System has no effect on the sound insulation of a building.

## **8. Moisture technical properties**

**8.1** Waterproofing and moisture insulation conforms to the National Building Code of Finland, part C2, Moisture, Regulations and guidelines 1998.

**8.2** Tubus System forms the new pipe inside the old sewage pipes and this prevents moisture problems due to the piping system.

**8.3** Handling or renovation of the floor drains is not part of the renovation system.

## **9. Thermal insulation performance**

**9.1** Tubus System does not affect the thermal insulation properties of the building.

## **10. Fire safety**

**10.1** The effect of Tubus System on the fire safety of a building has not been evaluated.

## 11. Durability

11.1 Tubus System increases the service life of the sewage piping system. The durability of the Tubus System pipes has been assessed with long term loading tests and ageing tests at + 80 °C in air and in water. According to the test results the service life of the pipes renovated with Tubus System can be expected to be in normal residential environment about 50 years.

## INSTRUCTIONS FOR INSTALLATION AND USE

### 12. Installation

12.1 Installations shall be performed according to the installations instructions of the certificate holder and manufactured dated on 21.9.2007.

## TECHNICAL ASSESSMENT

### 13. Testing and analysis for this certificate

13.1 In the assessment program of the Tubus System the properties presented in the table 1 have been tested.:

Table 1. A summary of test results of Tubus System.

<b>Property</b>	<b>Unit</b>	<b>Test method</b>	<b>Requirement</b>	<b>Result</b>
Hardening time, + 23 °C	min		Is declared	With inhibitor 45 min
Elongation	%	ISO 178	Is declared	1,5
Bending stress	MPa	ISO 178	Is declared	56
Elastic modulus in bending	MPa	ISO 178	Is declared	4200
Short term ring stiffness	MPa	EN 1228	Is declared	8
Creep factor, $\alpha_{50 \text{ v, dry}}$		EN 761	Is declared	0,2
Durability		Heat ageing tests in air and in water at +80 °C:, 10 months	Is declared	Service life is estimated based on the results
Service life, + 15 °C	years		Is declared	About 50
Thickness of the Tubus System pipe wall	mm	ISO 2808	Is declared	≥ 3mm
Thermal shock resistance		Thermal cycling test 15°C/ 93°C, 1500 cycles	Tight	Water tight in PP and cast iron pipes

## VALIDITY OF THE CERTIFICATE

### 14. Validity period of the certificate

This certificate is valid until January 29, 2017.

### 15. 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 certification. A list of valid certificates is available from VTT Expert Services Ltd.

### 16. Other conditions

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

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, VTT Expert Services Ltd 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.

VTT Expert Services Ltd finds Tubus System to be suitable for use in construction as described in this certificate. This certificate no. VTT-C-7931-12 has been awarded as described above to WBF Invest AB.

On behalf of VTT Expert Services Ltd on January 30, 2012



Lina Markelin-Rantala  
Team Manager



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