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TECHNICAL PRESCRIPTIONS
FOR
**PREFABRICATED SYNTHETIC LINERS FOR
MANHOLES AND INSPECTION CHAMBERS**
System requirements

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FOREWORD

This document contains the functional requirements and the test methods for prefabricated synthetic liners for manholes and inspection chambers in combination with the manhole or inspection chamber. The prefabricated liners can be used on all parts of the manhole or inspection chamber (base unit, chamber unit, shaft unit, cover slab, reducing slab, adjusting unit, taper). The prefabricated liners can be used to improve some properties of the manholes or inspection chambers. The requirements included in these PTV respond to needs established by the various interested parties according to local customs.

This PTV only describes the system requirements for a combination of a prefabricated synthetic liner and a new manhole or inspection chamber. The requirements for the prefabricated synthetic liner itself are described in PTV 845-1.

This PTV doesn't describe the requirements for the base material of the manhole or inspection chamber itself. These materials are described in other normative documents.

1 INTRODUCTION

1.1 TERMINOLOGY

1.1.1 Definitions

Delivery age	For some base materials for the manholes or inspection chambers, their certification has foreseen a minimum delivery age. (f.e. for concrete this minimum delivery age can be 7 or 14 days). The delivery age for the combination of the prefabricated synthetic liners and sockets with those base materials is the same as stipulated for the base material.
Impartial body	Body that is independent of the supplier or user and is entrusted with conducting the assessment of deliveries.
Producer	The party responsible for producing the system.
Production unit	Technical facility/facilities tied to a geographical location used by a producer and in which one or more systems are made.
Supplier	The party having to ensure that the system complies with the technical requirements. This definition can apply to the producer, the dealer, the importer or the distributor.
System	The result of an industrial activity or process. Meant by this in the context of these technical prescriptions is a combination of a prefabricated synthetic liner and a socket with a manhole or inspection chamber.
Test	Technical action comprising the determination of one or more properties of system according to a specified process.
Reference document	Document specifying the technical characteristics with which the materials, equipment, raw materials, production process and/or the system must comply (a standard, specification or any other technical specification).

1.1.2 Abbreviations

PTV Technical Prescriptions

1.1.3 References

ISO 7500-1	Metallic materials - Calibration and verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Calibration and verification of the force-measuring system
PTV 845-1	Technical prescription for prefabricated synthetic liners for manholes and inspection chambers: product requirements

This PTV contains dated and undated references. Only the cited version applies to dated references. The latest version always applies to undated references, including any errata, addenda and amendments.

1.2 AVAILABILITY OF THIS PTV

The current version of this PTV is available free of charge on the COPRO website.

A paper version of this PTV can be ordered from COPRO. COPRO has the right to charge for this.

No changes may be made to the original PTV approved by the advisory board and/or confirmed by the Management Body of COPRO.

1.3 STATUS OF THIS PTV

1.3.1 Version of this PTV

This PTV concerns version 3.0, which replaces version 2.0.

1.3.2 Approval of this PTV

This PTV was approved by the Advisory Board on the 18th of May 2022.

1.3.3 Confirmation of this PTV

This PTV was confirmed by the Management Body of COPRO on the 12th of December 2023.

1.4 HIERARCHY OF RULES AND REFERENCE DOCUMENTS

1.4.1 Legislation

If certain rules contained in this PTV are inconsistent with applicable law, the rules arising from the legislation shall prevail. It is the responsibility of the supplier to monitor this and report any contradictions to COPRO in advance.

1.4.2 Directives concerning health and safety

If certain technical requirements are inconsistent with the directives concerning health and safety, such directives shall prevail. It is the responsibility of the supplier to monitor this and report any contradictions to COPRO in advance.

1.4.3 Tender documents

If certain rules from the applicable tender documents are inconsistent with these technical requirements, the supplier can report this to COPRO.

1.5 QUESTIONS AND COMMENTS

Questions or comments concerning these technical requirements are directed to COPRO.

2 POSITIONING OF TECHNICAL REQUIREMENTS

2.1 PTV REDACTION

2.1.1 Redaction of this PTV

These technical requirements for the system of prefabricated synthetic liners and the manholes or inspection chambers are drawn up by the advisory board for Synthetic liners for manholes and inspection chambers of COPRO.

2.2 OBJECTIVES

2.2.1 Purpose of this PTV

The aim of this PTV is to specify requirements for the system of prefabricated synthetic liners in combination with new manholes or inspection chambers.

2.3 SCOPE

2.3.1 Subject of these technical requirements

This PTV contains the functional requirements to which a prefabricated synthetic liner and socket (if applicable) for manholes and inspection chamber must comply in combination with a manhole or inspection chamber. The prefabricated synthetic liner and socket (if applicable) can only be used in combination with new manholes or inspection chambers and not for renovation of existing manholes or inspection chambers. They can be used on all parts of the manhole or inspection chamber (base unit, chamber unit, shaft unit, cover slab, reducing slab, adjusting unit, taper).

2.3.2 Circulars

COPRO can supplement this PTV with one or more circulars forming an integral part of this PTV.

2.4 REFERENCE DOCUMENTS

2.4.1 Product standards

There aren't any applicable standards.

2.4.2 Tender documents

There aren't any applicable tender documents.

2.4.3 Test methods

The applicable test methods are mentioned in clause 3 and 4.

2.4.4 Other

Other applicable reference documents are mentioned in clause 1.1.3.

3 REQUIREMENTS

3.1 PRODUCTION UNIT AND EQUIPMENT

3.1.1 Production unit

The production unit (in its entirety and all its parts) is presumed to comply with all the applicable laws concerning the environments, operation, economic, et cetera.

There aren't any supplementary requirements for the production unit.

3.1.2 Production equipment

There aren't any requirements for the production equipment.

3.1.3 Stock management

There aren't any requirements for the production equipment.

3.2 SEMI-FINISHED PRODUCTS

3.2.1 Prefabricated synthetic liners and connection sockets

3.2.1.1 Each prefabricated synthetic liner and connection socket is presumed to comply with the applicable legislation. prefabricated synthetic liners and connection sockets harmful to the environment and health are excluded.

3.2.1.2 The prefabricated synthetic liners and connection sockets meet the requirements of PTV 845-1.

3.2.2 Sewer elements

The sewer elements meet the applicable requirements.

3.3 PRODUCTION PROCESS

3.3.1 Production process and production parameters

The production of a manhole or inspection chamber including a prefabricated synthetic liner and connection socket shall be in accordance with the requirements of the producer of the prefabricated synthetic liner and connection socket, if those requirements exist.

3.4 COMBINATION OF MANHOLE OR INSPECTION CHAMBER WITH PREFABRICATED SYNTHETIC LINER AND CONNECTION SOCKET

3.4.1 General

- 3.4.1.1 The combination of a manhole or inspection chamber with a prefabricated synthetic liner and connection socket meets the requirements set out in clauses 3.4.2 to 3.4.4.
- 3.4.1.2 The supplier shall in each case declare the performance for the characteristics set out in articles 3.4.2 to 3.4.4 for the combination of a manhole or inspection chamber with a prefabricated synthetic liner and connection socket.

3.4.2 Water tightness

The requirements for the water tightness of the combination of a manhole or inspection chamber with a prefabricated synthetic liner and connection socket are the same as the requirements for the manhole or inspection chamber alone and shall be tested following the instructions for the manhole or inspection chamber.

3.4.3 Pull-off resistance of the liner

The pull-off resistance of the prefabricated synthetic liner shall be reached on the minimum delivery age of the manhole or inspection chamber and one year after the prefabricated synthetic liner is built into the manhole or inspection chamber.

The pull-off resistance is determined according clause 4.3 of this PTV on 3 different places, judiciously spread over the whole liner, clause 4.3 of this PTV.

The determination of the pull-off resistance after one year shall be executed on the same element that was used to determine the pull-off resistance on the minimum delivery age.

Each individual result shall be $\geq 0,4$ MPa.

3.4.4 Maximum height of the chemical resistance

If the prefabricated synthetic liner is used to protect the base material of the manhole or inspection chamber against aggressive substances, then the producer has to declare the maximum height upon which the manhole or inspection chamber is protected. In this case, all possible exposed parts of the manhole or inspection chamber beneath this height, including the parts assuring the connection between two parts of the manhole or inspection chamber (sleeve, spigot) shall be covered by the liner or the seal.

4 TEST METHODS

4.1 SAMPLING

4.1.1 Sampling

Sampling is according the requirements for sampling of the manhole or inspection chamber.

4.2 SAMPLE PREPARATION

4.2.1 Sample preparation

The manhole or inspection chamber with the prefabricated synthetic liner shall be conditioned in the same conditions as the manhole or inspection chamber would be stored if it was produced without the liner.

4.3 PULL-OFF RESISTANCE

4.3.1 Aim and principle

This test is used to determine the strength of the connection between the prefabricated liner and the manhole or inspection chamber.

4.3.2 Instruments

For this test, the following equipment is needed:

- a metal piece (preferable a square 5 x 5 cm);
- glue (or another method) to fix the metal piece to the liner. This glue may not affect the properties of the liner material;
- a testing machine with the possibility to increase the force with a constant rate, complying with ISO 7500-1, class 2 or better. The testing machine shall be equipped with the necessary tools so that it can apply the force on the metal piece.

4.3.3 Sample preparation

The surface of the liner is cleaned, so that it is free from dust, grease, ...

If necessary, the surface is dried.

The area where the metal piece will be glued is defined. When the liner has provisions to ensure a solid connection to the base material, then the metal piece shall be connected above this provisions.

The test piece is isolated from the rest of the liner: therefore, around the perimeter of this defined area, cuts are made through the liner. These cuts shall have a depth of at least the thickness of the liner + 5 mm in the substrate (e.g. concrete).

The metal piece is glued (or another method) on the defined area. Excessive glue is carefully removed, so that the test piece is completely isolated from the liner.

4.3.4 Method

The force is applied perpendicular to the surface of the liner.

The force is increased linear by 100 N/s for a square of 5 x 5 cm. For other dimensions, the increase is calculated proportional.

The maximum force is registered.

The location of the fracture shall be registered: between the metal piece and the glue, in the glue, between the glue and the liner, in the liner, between the liner and the base material of the manhole or inspection chamber, in the base material of the manhole or inspection chamber.

4.3.5 Result

The pull-off force is calculated as the quotient of the maximum force and the area of the contact surface between the liner and the metal piece. The result is expressed in MPa with one decimal.

If the pull-off force is more than the required minimum, then the test result complies. The location of the fracture is only informative.

If the pull-off force is less than the required minimum, then there are two possibilities. Depending on the location of the fracture, the test is considered as valid or invalid:

- 1) The test is considered valid and the result is not complying if:
 - the fracture is situated in the liner,
 - or, the fracture surface is situated partly in the base material of the manhole or inspection chamber and partly between the liner and the base material and the surface contains less than 25 % of base material.
- 2) In all other cases, the test is considered as invalid and should be repeated.

4.3.6 Test report

The test report sets out at least:

- the details of the laboratory,
- the details and identification of the sample (manhole or inspection chamber and liner),
- the date of the test,
- the result of the pull-off force according to clause 4.3.5,
- the place of the fracture,
- a reference to this PTV.

6 ASSESSMENT OF DELIVERIES

The assessment of deliveries is part of the self-monitoring control by the customer.
