This document is a preview generated by EVS

Plastics piping systems for renovation of underground water supply networks - Part 4: Lining with cured-in-place pipes (ISO 11298-4:2021)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

This document is a preview generated by EVS

See Eesti standard EVS-EN ISO 11298-4:2021 sisaldab Euroopa standardi EN ISO 11298-4:2021 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 11298-4:2021 consists of the English text of the European standard EN ISO 11298-4:2021.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 21.04.2021.	Date of Availability of the European standard is 21.04.2021.
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 23.040.20, 23.040.45, 93.025

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis-ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis-ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11298-4

April 2021

ICS 23.040.20; 23.040.45; 93.025

English Version

Plastics piping systems for renovation of underground water supply networks - Part 4: Lining with cured-in-place pipes (ISO 11298-4:2021)

Systèmes de canalisation en plastique pour la rénovation des réseaux enterrés d'alimentation en eau - Partie 4: Tubage continu par tubes polymérisés sur place (ISO 11298-4:2021)

Kunststoff-Rohrleitungssysteme für die Renovierung von erdverlegten Wasserversorgungsnetzen - Teil 4: Vor Ort härtendes Schlauchlining (ISO 11298-4:2021)

This European Standard was approved by CEN on 18 March 2021.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2021 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN ISO 11298-4:2021 E

This document is a preview generated by EVS

European foreword

This document (EN ISO 11298-4:2021) has been prepared by Technical Committee ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids" in collaboration with Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems” the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2021, and conflicting national standards shall be withdrawn at the latest by October 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 11298-4:2021 has been approved by CEN as EN ISO 11298-4:2021 without any modification.

This document is a preview generated by EVS

Contents

Page

Foreword ... **v**
Introduction ... **vi**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **2**
3.1 General terms ... 2
3.2 Techniques ... 4
3.3 Characteristics ... 4
3.4 Materials ... 5
3.5 Product stages ... 5
3.6 Service conditions ... 5
4 Symbols and abbreviated terms ... **5**
4.1 Symbols ... 5
4.2 Abbreviated terms ... 7
5 Pipes at the "M" stage ... **7**
5.1 Materials ... 7
5.2 General characteristics ... 9
5.3 Material characteristics ... 9
5.4 Geometric characteristics ... 9
5.5 Mechanical characteristics ... 10
5.6 Physical characteristics ... 10
5.7 Jointing ... 10
5.8 Marking ... 10
6 Fittings at the "M" stage ... **10**
7 Ancillary components ... **10**
8 Fitness for purpose of the installed lining system at the "I" stage ... **11**
8.1 Materials ... 11
8.2 General characteristics ... 11
8.3 Material characteristics ... 11
8.4 Geometric characteristics ... 12
8.4.1 General ... 12
8.4.2 CIPP wall structure ... 12
8.4.3 Wall thickness ... 12
8.5 Mechanical characteristics ... 12
8.5.1 Reference conditions for testing ... 12
8.5.2 Test requirements ... 12
8.6 Physical characteristics ... 16
8.7 Additional characteristics ... 16
8.7.1 Leak tightness of liner terminations ... 16
8.8 Sampling ... 17
9 Installation practice ... **17**
9.1 Preparatory work ... 17
9.2 Storage, handling and transport of pipe components ... 17
9.3 Equipment ... 17
9.4 Installation ... 18
9.4.1 Environmental precautions ... 18
9.4.2 Installation procedures ... 18
9.4.3 Simulated installations ... 18
9.5 Process-related inspection and testing ... 19
9.6 Lining termination ... 19
9.7 Reconnections to existing pipeline system ... 19

This document is a preview generated by EVS

© ISO 2021 – All rights reserved

9.8 Final inspection and testing 19
9.9 Documentation 19
Annex A (informative) **CIPP components and their functions** **20**
Annex B (normative) **Cured-in-place pipes — Determination of short-term flexural properties** **21**
Annex C (normative) **Cured-in-place pipes — Determinationof long-term flexural modulus under dry or wet conditions** **31**
Annex D (normative) **Cured-in-place pipes — Determination of long-term flexural strength under dry or wet conditions** **36**
Bibliography **39**

This document is a preview generated by EVS

© ISO 2021 – All rights reserved

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 8, *Rehabilitation of pipelines systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 11298 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This document is a preview generated by EVS

© ISO 2021 – All rights reserved

Introduction

This document is a part of a system standard for plastics piping systems of various materials used for renovation of existing pipelines in a specified application area. System standards for renovation dealing with the following applications are either available or under preparation:

— the ISO 11296 series, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks*;

— the ISO 11297 series, *Plastics piping systems for renovation of underground drainage and sewerage networks under pressure*;

— the ISO 11298 series, *Plastics piping systems for renovation of underground water supply networks* (including this document);

— the ISO 11299 series, *Plastics piping systems for renovation of underground gas supply networks*.

These system standards are distinguished from those for conventionally installed plastics piping systems by the requirement to verify certain characteristics in the “as-installed” condition, after site processing. This is in addition to specifying requirements for plastics piping systems components “as manufactured”.

Each of the system standards comprises a:

— *Part 1: General*

and all applicable renovation technique family-related parts, which for water supply networks include or potentially include the following:

— *Part 2: Lining with continuous pipes;*

— *Part 3: Lining with close-fit pipes;*

— *Part 4: Lining with cured-in-place pipes* (this document);

— *Part 5: Lining with discrete pipes;*

— *Part 6: Lining with adhesive-backed hoses;*

— *Part 10: Lining with sprayed polymeric materials;*

— *Part 11: Lining with inserted hoses.*

The requirements for any given renovation technique family are specified in Part 1, applied in conjunction with the other relevant part. For example, ISO 11298-1 and this document together specify the requirements relating to lining with cured-in-place pipes. For complementary information, see ISO 11295. Not all technique families are pertinent to every area of application and this is reflected in the part numbers included in each System Standard.

A consistent structure of clause headings has been adopted for all parts of ISO 11298 to facilitate direct comparisons across renovation technique families.

Figure 1 shows the common part and clause structure and the relationship between the ISO 11298 series and the system standards for other application areas.

This document is a preview generated by EVS

© ISO 2021 – All rights reserved

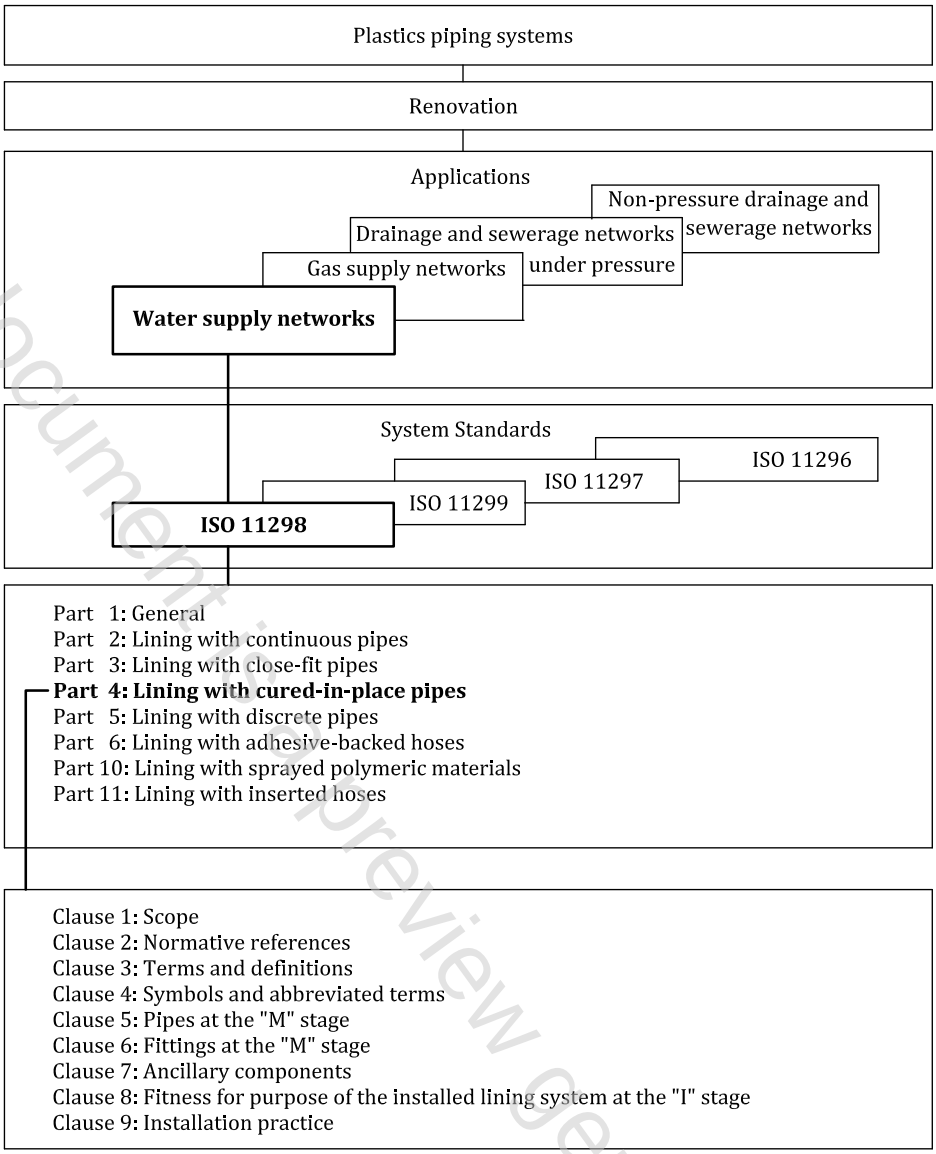


Figure 1 — Format of the renovation system standards

This document is a preview generated by EVS

© ISO 2021 – All rights reserved

Plastics piping systems for renovation of underground water supply networks —

Part 4: Lining with cured-in-place pipes

This document is a preview generated by EVS

1 Scope

This document, in conjunction with ISO 11298-1, specifies requirements and test methods for cured-in-place pipes and fittings used for the renovation of water supply networks, which transport water intended for human consumption, including raw water intake pipelines.

It applies to independent (fully structural, class A) and interactive (semi structural, class B) pressure pipe liners, as defined in ISO 11295, which do not rely on adhesion to the existing pipeline. It applies to the use of various thermosetting resin systems, in combination with compatible fibrous carrier materials, reinforcement, and other process-related plastics components (see 5.1).

It does not include requirements or test methods for resistance to cyclic loading or the pressure rating of CIPP liners where passing through bends, which are outside the scope of this document.

It is applicable to cured-in-place pipe lining systems intended to be used at a service temperature of up to 25 °C.

NOTE For applications operating at service temperatures greater than 25 °C, guidance on re-rating factors can be supplied by the system supplier.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 75-2:2013, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 178:2019, *Plastics — Determination of flexural properties*

ISO 899-2:2003, *Plastics — Determination of creep behaviour — Part 2: Flexural creep by three-point loading*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 7432, *Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods to prove the design of locked socket-and-spigot joints, including double-socket joints, with elastomeric seals*

ISO 7509, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of time to failure under sustained internal pressure*

ISO 7685:2019, *Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial ring stiffness*

ISO 8513:2016, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Test methods for the determination of the initial longitudinal tensile strength*

ISO 8521:2020, *Glass-reinforced thermosetting plastic (GRP) pipes — Test methods for the determination of the initial circumferential tensile wall strength*

© ISO 2021 – All rights reserved

ISO 8533, *Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods to prove the design of cemented or wrapped joints*

ISO 10468, *Glass-reinforced thermosetting plastics (GRP) pipes — Determination of the ring creep properties under wet or dry conditions*

ISO 10639:2017, *Plastics piping systems for pressure and non-pressure water supply — Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin*

ISO 10928:2016, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Methods for regression analysis and their use*

ISO 11295:2017, *Classification and information on design and applications of plastics piping systems used for renovation and replacement*

ISO 11298-1:2018, *Plastics piping systems for renovation of underground water supply networks — Part 1: General*

ISO 13002, *Carbon fibre — Designation system for filament yarns*

ISO 14125:1998, *Fibre-reinforced plastic composites — Determination of flexural properties*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11298-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 General terms

3.1.1
carrier material
porous component of the *lining tube* (3.1.8), which carries the liquid *resin system* (3.1.14) during insertion into the pipe being renovated and forms part of the installed lining system once the resin has been cured

3.1.2
CIPP product
cured-in-place pipe of a particular design, produced from a *lining tube* (3.1.8) of specified materials, with a wall structure which is uniquely defined for each diameter/wall thickness combination, and which is impregnated with a specific *resin system* (3.1.14) and installed by a specific process

3.1.3
close fit
situation of the outside of the installed liner relative to the inside of the existing pipeline, which can either be an interference fit or include a small annular gap resulting from shrinkage and tolerances only

3.1.4
composite
combination of cured *resin system* (3.1.14), *carrier material* (3.1.1) and/or *reinforcement* (3.1.13), excluding any internal or external membranes

3.1.5
curing
process of resin polymerization, which can be initiated or accelerated by the use of heat or exposure to light

This document is a preview generated by EVS

© ISO 2021 – All rights reserved