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**Plastics piping systems for renovation  
of underground water supply  
networks —**

**Part 2:  
Lining with continuous pipes**

**iTeh STANDARD PREVIEW**  
*Systemes de canalisation en plastiques pour la renovation des reseau  
enterrés d'alimentation en eau —  
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## 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](http://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](http://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 on 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). (standards.iteh.ai)

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 pipeline systems*.

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

## Introduction

This document is a part of a system standard for plastics piping systems of various materials used for the renovation of existing pipelines in a specified application area. System standards for renovation deal with the following applications:

- ISO 11296, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks*;
- ISO 11927, *Plastics piping systems for renovation of underground drainage and sewerage networks under pressure*;
- ISO 11298, *Plastics piping systems for renovation of underground water supply networks* (this application);
- ISO 11299, *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 system 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 under pressure include or potentially include the following:

- *Part 2: Lining with continuous pipes (this document);*
- *Part 3: Lining with close-fit pipes;*
- *Part 4: Lining with cured-in-place pipes;*
- *Part 5: Lining with discrete pipes;*
- *Part 6: Lining with adhesive-backed hoses;*
- *Part 10: Lining with sprayed polymeric materials;*
- *Part 11: Inserted hoses.*

The requirements for any given renovation technique family are given in Part 1, applied in conjunction with the relevant other part. For example, this document and ISO 11298-1 together specify the requirements relating to lining with continuous 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 ISO 11298 (all parts), in order to facilitate direct comparisons across renovation technique families.

[Figure 1](#) shows the common part and clause structure and the relationship between ISO 11298 (all parts) and the system standards for other application areas.

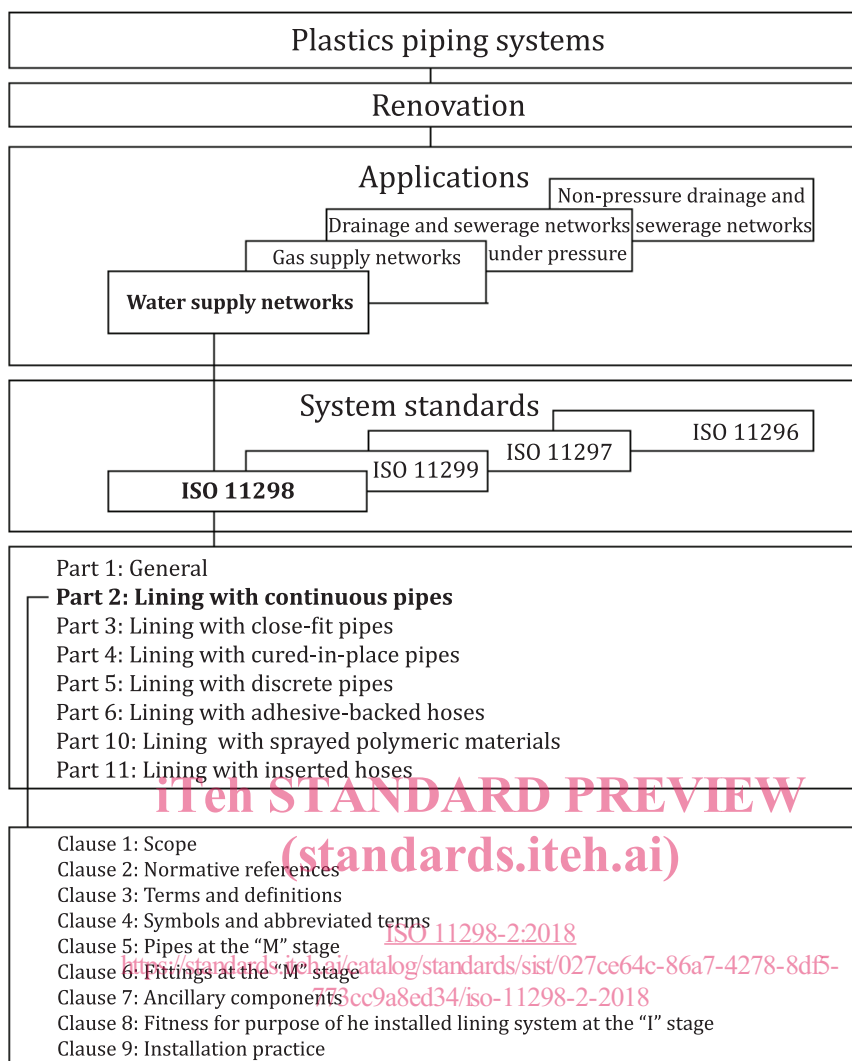


Figure 1 — Format of the renovation system standards

# Plastics piping systems for renovation of underground water supply networks —

## Part 2: Lining with continuous pipes

### 1 Scope

This document, read in conjunction with ISO 11298-1, specifies requirements and test methods for pipes and fittings which are part of plastics piping systems installed as continuous pipes in the renovation of underground water supply networks. It is applicable to PE pipes of three different types:

- PE solid wall single layered pipes (nominal outside diameter,  $d_n$ ), including any identification stripes;
- PE pipes with co-extruded layers on either or both the outside and inside of the pipe (total outside diameter,  $d_n$ ), as specified in [Annex A](#), where all layers have the same MRS rating;
- PE coated pipes (outside diameter,  $d_n$ ) having a peelable, contiguous, thermoplastics additional layer on the outside of the pipe (“coated pipe”); see [Annex A](#).

In addition, it covers

- jointing of pipe lengths by means of butt fusion, and
- fabricated and injection-moulded fittings made of PE.

It is applicable to PE pipes, fittings and assemblies intended to be used at an operating temperature of 20 °C as the reference temperature.

NOTE For applications operating at constant temperatures greater than 20 °C and up to 40 °C, see ISO 4427-1:2007, Annex A.

### 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 4427-1:2007, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 1: General*

ISO 4427-2, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 2: Pipes*

ISO 4427-3, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 3: Fittings*

ISO 4427-5, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 5: Fitness for purpose of the system*

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

ISO 12176-1, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 1: Butt fusion*

## ISO 11298-2:2018(E)

ISO 12176-2, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 2: Electrofusion*

EN 12201-1, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 1: General*

EN 12201-2, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 2: Pipes*

EN 12201-3, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 3: Fittings*

EN 12201-5, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 5: Fitness for purpose of the system*

### 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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1 compound formulation

clearly defined homogenous mixture of base polymer with additives, e.g. antioxidants, pigments, stabilizers and others, at a dosage level necessary for the processing and intended use of the final product

#### 3.2 coated pipe

pipe with a peelable, contiguous thermoplastic additional layer on the outside of the pipe

#### 3.3 solid wall single layered pipe

pipe with smooth internal and external surface, extruded from the same *compound formulation* (3.1) throughout the wall

#### 3.4 pipe with co-extruded layers

pipe with smooth internal and external surface, having co-extruded layers on either or both the outside and inside of the pipe, where all layers have the same MRS rating

#### 3.5 out-of-roundness

difference between the measured maximum and the measured minimum outside diameter in the same cross-sectional plane of the pipe

### 4 Symbols and abbreviated terms

#### 4.1 Symbols

- $d_n$  nominal outside diameter
- $e_{\text{coating}}$  nominal thickness of the coating



## 4.2 Abbreviated terms

MFR	melt mass-flow rate
CCTV	closed-circuit television
MRS	minimum required strength
OIT	oxidation induction time
PE	polyethylene

## 5 Pipes at the “M” stage

### 5.1 Material

Pipes shall be of PE conforming to the requirements of ISO 4427-1.

### 5.2 General characteristics

General characteristics of pipes shall conform to the requirements of ISO 4427-2.

### 5.3 Material characteristics

Material characteristics shall conform to the requirements of ISO 4427-2.

### 5.4 Geometrical characteristics

Geometrical characteristics of pipes shall conform to the requirements of ISO 4427-2. In addition, any combination of nominal diameter and wall thickness shall be permitted, provided this is validated by design calculations that take account of both installation and operational loadings on the pipe for a specific application.

### 5.5 Mechanical characteristics

The mechanical characteristics of pipes shall conform to the requirements of ISO 4427-2.

### 5.6 Physical characteristics

The physical characteristics of pipes shall conform to the requirements of ISO 4427-2.

### 5.7 Jointing

When pipes are assembled to each other or to components, the joints shall conform to ISO 4427-2, ISO 4427-3 and ISO 4427-5. All butt fusions shall be externally debanded and if required by the client, internally debanded.

### 5.8 Marking

All pipes shall be marked either in accordance with ISO 11298-1 or in accordance with ISO 4427-2. Where the pipe is coated (see A.3), the coating shall be marked so as to clearly distinguish the pipe from non-coated pipe in service (e.g. by broad colour bands).