INTERNATIONAL STANDARD

ISO 11296-1

Second edition
2018-02

Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks —

Part 1: General

Systèmes de canalisations en plastique pour la rénovation des réseaux de branchements et de collecteurs d'assainissement enterrés sans pression —

Partie 1: Généralités

Reference number
ISO 11296-1:2018(E)

© ISO 2018



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Symbols and abbreviated terms **7**
4.1 Symbols 7
4.2 Abbreviated terms 7

5 Pipes at the "M" stage **8**
5.1 Materials 8
5.2 General characteristics 8
5.3 Material characteristics 8
5.4 Geometric characteristics 8
5.5 Mechanical characteristics 8
5.6 Physical characteristics 8
5.7 Jointing 8
5.8 Marking 8

6 Fittings at the "M" stage **9**
6.1 Materials 9
6.2 General characteristics 9
6.3 Material characteristics 9
6.4 Geometric characteristics 9
6.5 Mechanical characteristics 9
6.6 Physical characteristics 9
6.7 Jointing 9
6.8 Marking 9

7 Ancillary components **10**

8 Fitness for purpose of the installed lining system at the "I" stage **10**
8.1 Materials 10
8.2 General characteristics 10
8.3 Material characteristics 10
8.4 Geometric characteristics 10
8.5 Mechanical characteristics 10
8.6 Physical characteristics 11
8.7 Additional characteristics 11
8.8 Sampling 11
8.9 Regional requirements for the installed lining system 11

9 Installation practice **11**
9.1 Preparatory work 11
9.2 Storage, handling and transport of pipes and fittings 11
9.3 Equipment 11
9.3.1 General 11
9.3.2 Inspection equipment 12
9.3.3 Lifting equipment 12
9.4 Installation 12
9.4.1 General 12
9.4.2 Safety precautions 12
9.4.3 Simulated installations 12
9.5 Process-related inspection and testing 13
9.6 Lining termination 13
9.7 Reconnection to the existing pipeline system 13

© ISO 2018 – All rights reserved

9.8 Final inspection and testing 13
9.9 Documentation 13
Bibliography **14**

© ISO 2018 – 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 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.

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.*

This second edition cancels and replaces the first edition (ISO 11296-1:2009), which has been technically revised. The main changes are in Clauses 2, 3.1, 3.2, 3.3, 4.2, and 8.3, and Figures 1 and 2.

A list of all parts in the ISO 11296 series, can be found on the ISO website.

© ISO 2018 – All rights reserved

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* (this document);

— ISO 11297: *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*;

— 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* (this document)

and all applicable renovation technique family-related parts, which for non-pressure drainage and sewerage 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*;

— *Part 5: Lining with discrete pipes*;

— *Part 7: Lining with spirally-wound pipes*;

— *Part 8: Lining with pipe segments*;

— *Part 9: Lining with a rigidly anchored plastics inner layer*;

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

The requirements for any given renovation technique family are specified in Part 1, applied in conjunction with the relevant other part. For example, this document and ISO 11296-3 specify the requirements relating to lining with close-fit 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 11296, in order to facilitate direct comparisons across renovation technique families.

Figure 1 shows the common part and clause structure and the relationship between ISO 11296 and the System Standards for other application areas.

© ISO 2018 – All rights reserved

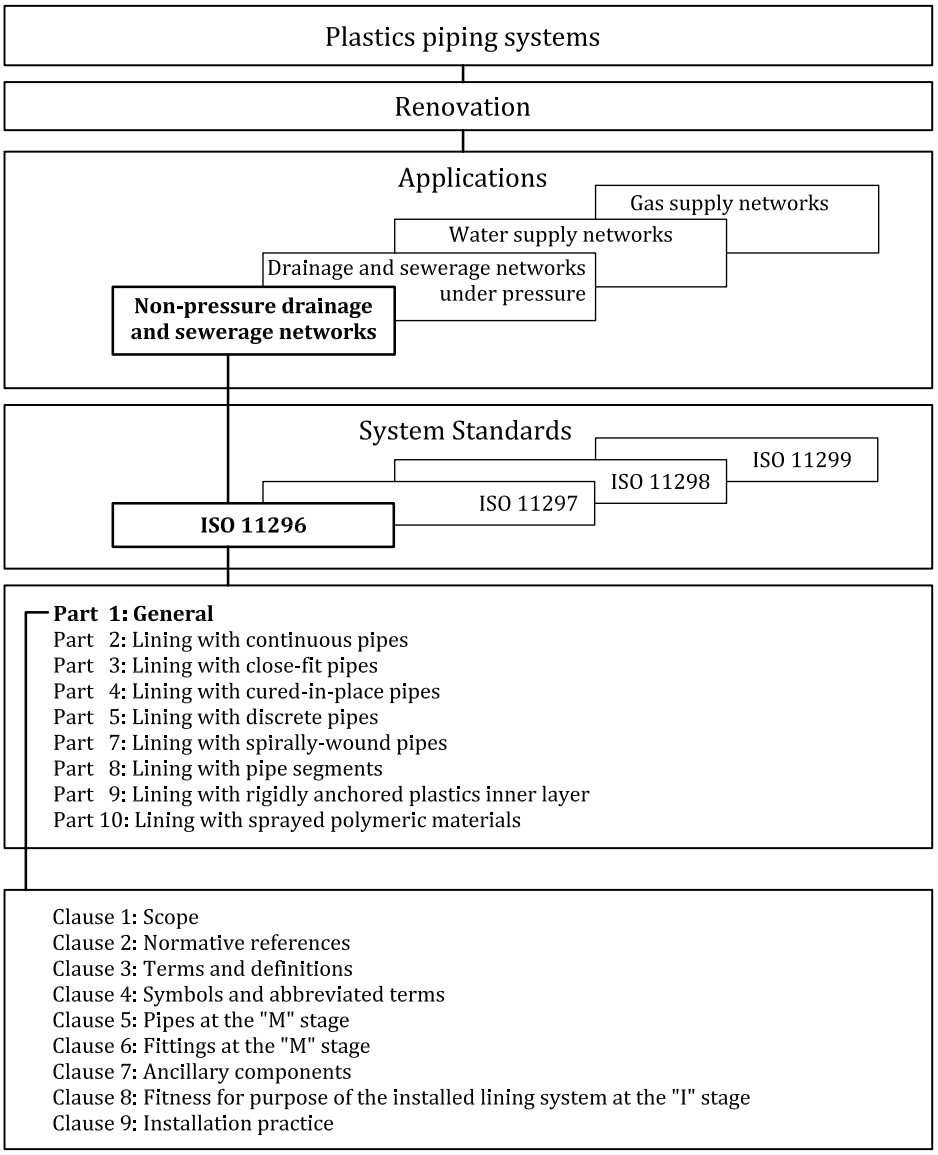


Figure 1 — Format of the renovation system standards

© ISO 2018 – All rights reserved

Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks —

Part 1: General

1 Scope

This document specifies the requirements and test methods for plastics piping systems intended to be used for the renovation of underground non-pressure drainage and sewerage networks, which are operated as gravity systems and subjected to a maximum surcharge pressure of 0,5 bar[1)]. It is applicable to pipes and fittings, as manufactured, as well as to the installed lining system. It is not applicable to the existing pipeline or any non-structural sprayed coatings or annular filler.

This document gives the general requirements common to all relevant renovation techniques.

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 4633, *Rubber seals — Joint rings for water supply, drainage and sewerage pipelines — Specification for materials*

EN 681-1, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

EN 681-2, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers*

EN 681-3, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 3: Cellular materials of vulcanized rubber*

EN 681-4, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 4: Cast polyurethane sealing elements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 General

1) 1 bar = 0,1 MPa = 0,1 N/mm^2 = 10^5 N/m^2.

© ISO 2018 – All rights reserved

3.1.1
pipeline system
interconnecting pipe network for the conveyance of fluids

3.1.2
rehabilitation
measures for restoring or upgrading the performance of existing systems, including renovation, repair and replacement

3.1.3
renovation
work incorporating all or part of the original fabric of the pipeline, by means of which its current performance is improved

3.1.4
replacement
construction of a new pipeline, on or off the line of an existing pipeline, where the function of the new pipeline system incorporates that of the old

3.1.5
maintenance
routine work undertaken to ensure the existing performance of an asset

3.1.6
repair
rectification of local damage

3.1.7
lining pipe
pipe inserted for renovation purposes

3.1.8
liner
lining pipe after installation

3.1.9
lining system
lining pipe and all relevant fittings for insertion into an existing pipeline for the purposes of renovation

3.1.10
renovated pipeline system
existing pipeline system plus the installed lining system used to renovate it, as well as any grout or other annular filling material used

3.1.11
characteristic
property, dimension or other feature of a material or component

3.1.12
declared value
limiting value of a characteristic declared in advance by the lining system supplier, which becomes the requirement for the purposes of assessment of conformity

3.1.13
annular filler
material for grouting annular space between existing pipeline and lining system

3.1.14
grouting
process of filling voids around the lining system

© ISO 2018 – All rights reserved

3.1.15
system test pressure
STP
hydrostatic and/or air pressure applied to the installed pipeline system in order to ensure its integrity and leaktightness

3.1.16
simulated installation
installation of a lining system into a simulated host pipeline, using representative equipment and processes, to provide samples for testing which are representative of an actual installation

3.1.17
simulated host pipeline
section of pipeline, which is not part of an operational network, but which replicates the environment of an operational network

3.1.18
technique family
group of renovation techniques which are considered to have common characteristics for standardization purposes

3.1.19
type testing
testing performed to prove that a material, component, joint or assembly is capable of conforming to the requirements given in the applicable standard

3.1.20
CCTV
system comprised of cameras, recorders, interconnections and displays that are used to inspect pipelines

3.2 Techniques

The various techniques for renovation of underground non-pressure drainage and sewerage networks, within the scope of pipeline rehabilitation techniques generally, are shown schematically in Figure 2. For definitions of standardized renovation techniques shown in Figure 2, but outside the scope of this document, see ISO 11295.

3.2.1
lining with continuous pipes
lining with pipe made continuous prior to insertion, where the diameter of the lining pipe remains unchanged

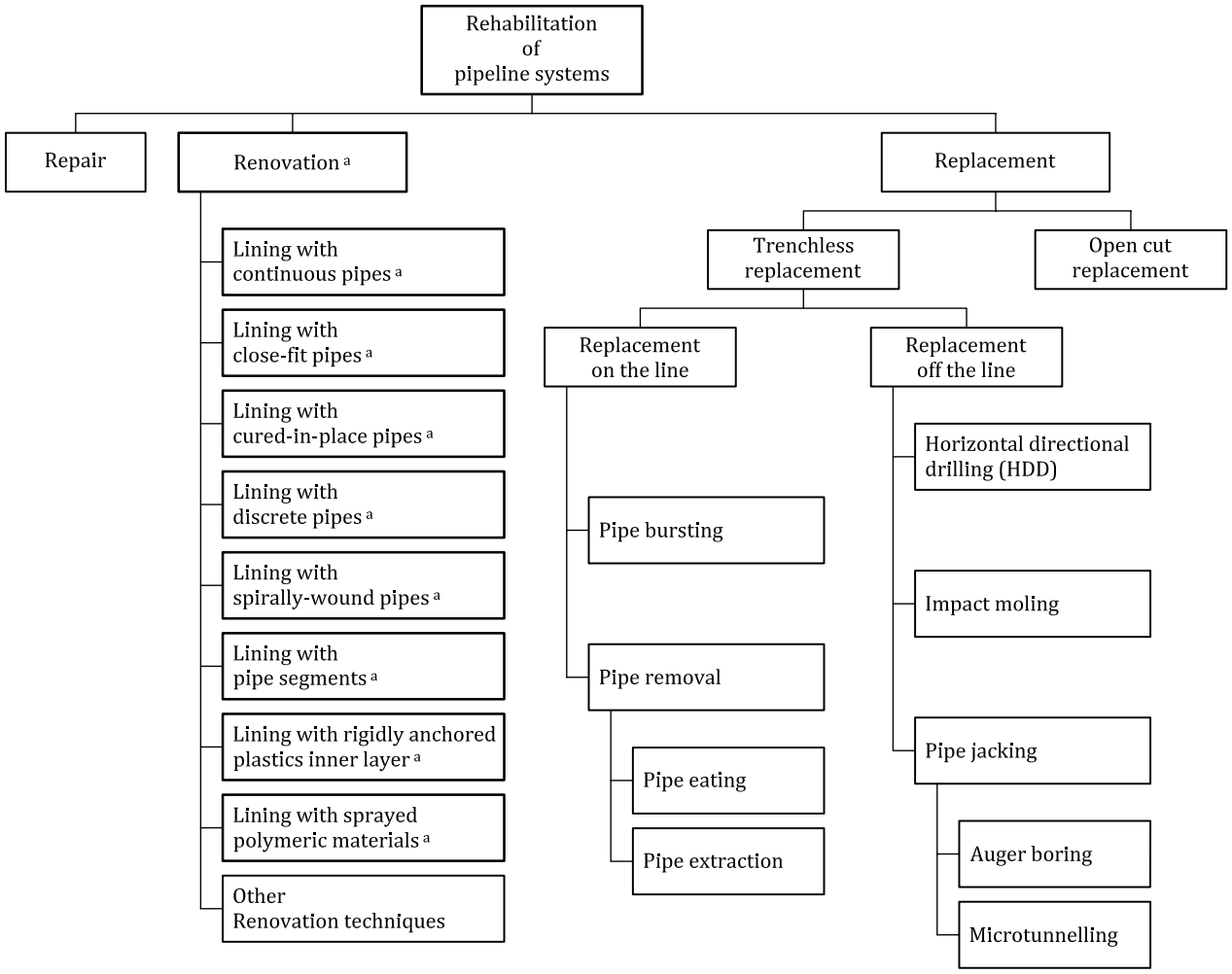
3.2.2
lining with close-fit pipes
lining with a continuous pipe, of which the cross-section is reduced to facilitate installation and reverted after installation to provide a close fit to the existing pipe

Note 1 to entry: For the reduction in cross-section, the following are the two options:

— reduction in the pipe manufacturing plant: the pipe is usually supplied coiled on a reel, from which it is directly inserted;

— reduction on site: the pipe is usually fed through the reduction equipment and simultaneously inserted in one continuous string.

© ISO 2018 – All rights reserved



a This document is applicable.

Figure 2 — Technique families for renovation of underground non-pressure drainage and sewerage networks using plastics pipes, within the scope of pipeline rehabilitation techniques

3.2.3
lining with cured-in-place pipes
lining with a flexible tube impregnated with a thermosetting resin, which produces a pipe after resin cure

3.2.4
lining with discrete pipes
lining with pipes shorter than the section to be renovated, which are jointed to form a continuous pipe only during insertion, the cross-section of the lining pipe remaining unchanged

3.2.5
lining with spirally-wound pipes
lining with a profiled strip, spirally wound to form a continuous pipe after installation

3.2.6
lining with pipe segments
lining with prefabricated segments bonded to the existing pipe, which either have longitudinal joints and cover the whole of the pipe circumference, or cover only part of the circumference

© ISO 2018 – All rights reserved

3.2.7
lining with a rigidly anchored plastics inner layer
lining with a single rigid annulus of structural cementitious grout formed between a plastics layer and the existing pipe where the plastics layer is permanently anchored in the grout

3.2.8
lining with sprayed polymeric materials
lining with a sprayed two-part polymeric resin material that forms a continuous pipe after resin cure

3.3 Characteristics

3.3.1
nominal size
DN
numerical designation of the size of a component, which is a convenient round number approximately equal to the inside or outside diameter in millimetres

3.3.2
nominal size DN/OD
DN/OD
nominal size, related to the outside diameter

[SOURCE: ISO 4427-1:2007, 3.1.1.2, modified to include abbreviation in term to distinguish it from term defined by 3.3.1.]

3.3.3
nominal outside diameter
d_n
specified outside diameter, in millimetres, assigned to a nominal size DN/OD

Note 1 to entry: For thermoplastics solid-wall components, the value of nominal outside diameter is identical to the minimum mean outside diameter, $d_{em,min}$, defined in 3.3.5.

[SOURCE: ISO 4427-1:2007, 3.1.1.3, modified by addition of Note 1 to entry.]

3.3.4
mean outside diameter
d_{em}
value of the measurement of the outer circumference of a pipe or spigot end of a fitting in any cross-section, divided by π (= 3,142) and rounded to the next greater 0,1 mm

[SOURCE: ISO 4427-1:2007, 3.1.1.5]

3.3.5
minimum mean outside diameter
$d_{em,min}$
minimum value of the mean outside diameter as specified for a given nominal size

[SOURCE: ISO 4427-1:2007, 3.1.1.6]

3.3.6
wall thickness
e
value of the measurement of the wall thickness at any point around the circumference of a component

3.3.7
mean wall thickness
e_m
arithmetic mean of a number of measurements of the wall thickness regularly spaced around the circumference and in the same cross-section of a component

© ISO 2018 – All rights reserved

3.3.8
minimum wall thickness at any point
e_{min}
minimum value of the wall thickness at any point around the circumference of a component as specified

[SOURCE: ISO 4427-1:2007, 3.1.1.11]

3.3.9
nominal wall thickness
e_n
numerical designation of the wall thickness of a component which is a convenient round number, approximately equal to the manufacturing dimension in millimetres

Note 1 to entry: For thermoplastics solid-wall components, the value of nominal wall thickness, e_n, is identical to the specified minimum wall thickness at any point, e_{min}.

[SOURCE: ISO 4427-1:2007, 3.1.1.9, modified by addition of Note 1 to entry.]

3.3.10
standard dimension ratio
SDR
ratio of the nominal outside diameter, d_n, to its nominal wall thickness, e_n

[SOURCE: ISO 4427-1:2007, 3.1.1.15]

3.3.11
internal pressure resistance
capability to withstand internal pressurization by water or gas

3.3.12
ring stiffness
resistance of a pipe to diametric deflection in response to external loading applied along one longitudinal diametric plane

Note 1 to entry: This definition applies to both long and short-term values.

3.4 Materials

3.4.1
virgin material
material in a form such as granules, powder or liquid, which has not been subjected to use or processing other than that required for its manufacture and to which no reprocessable or recyclable material has been added

3.4.2
own reprocessable material
material prepared from unused pipes and fittings, including trimmings from the production of pipes and fittings, which will be reprocessed in a manufacturer's plant after having previously been processed by the same manufacturer by a process such as moulding or extrusion and for which the complete formulation is known

3.4.3
external reprocessable material
material from unused products or trimmings which will be reprocessed and which were originally processed by another manufacturer

Note 1 to entry: If a manufacturer has a production of products other than pipes and fittings, reprocessable material from that production is considered as external reprocessable material when used for pipes or fittings production.

© ISO 2018 – All rights reserved

3.4.4
recyclable material
material prepared from used products which have been cleaned and crushed or ground

3.5 Product stages

The characteristics of components used for renovation and the materials from which they are made can be considered at two distinct stages as follows.

3.5.1
"M" stage
stage as manufactured, before any subsequent site processing of components associated with the particular renovation technique

Note 1 to entry: For pipes and fittings at the "M" stage, see Clauses 5 and 6, respectively.

3.5.2
"I" stage
stage as installed, i.e. in final configuration after any site processing of components associated with the particular renovation technique

Note 1 to entry: For pipes and fittings at the "I" stage, see Clause 8.

3.6 Service conditions

No general service conditions apply.

4 Symbols and abbreviated terms

4.1 Symbols

d_{em}	mean outside diameter
$d_{em,min}$	minimum mean outside diameter
d_n	nominal outside diameter
e	wall thickness
e_m	mean wall thickness
e_{min}	minimum wall thickness at any point
e_n	nominal wall thickness

4.2 Abbreviated terms

CCTV	closed circuit television
DN	nominal size
DN/OD	nominal size, related to the outside diameter
"I"	as installed
"M"	as manufactured
SDR	standard dimension ratio

© ISO 2018 – All rights reserved