



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

Part 4: Lining with cured-in-places pipes

Systèmes de canalisations en matières plastiques pour la rénovation des réseaux d'assainissement gravitaires enterrés —

Partie 4: Tubage continu par tubes polymérisés sur place

ICS 23.040.20; 23.040.45; 91.140.80; 93.030

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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.

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ISO 11296-4 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Working Group WG 12, *Rehabilitation of pipeline systems*.

ISO 11296 consists of the following parts, under the general title *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks*:

- Part 1: *General*
- Part 2: *Lining with continuous pipes*
- Part 3: *Lining with close-fit pipes*
- Part 4: *Lining with cured-in-place pipes (this standard)*
- Part 5: *Lining with discrete pipes*
- Part 7: *Lining with spirally-wound pipes*

Introduction

This standard 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 in preparation:

Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks (this application);

Plastics piping systems for renovation of underground drainage and sewerage networks under pressure;

Plastics piping systems for renovation of underground water supply networks;

Plastics piping systems for renovation of underground gas supply networks;

These system standards are distinguished from system standards 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 verification of characteristics of plastics piping systems as manufactured.

The system standard ISO/DIS 11296 comprises six parts, as follows:

Part 1: General

Part 2: Lining with continuous pipes

Part 3: Lining with close-fit pipes

Part 4: Lining with cured-in-place pipes (this standard)

Part 5: Lining with discrete pipes

Part 7: Lining with spirally wound pipes

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

The requirements for any given renovation technique family are covered by Part 1: General, used in conjunction with the relevant other Part. For example, for the requirements relating to *Lining with cured-in-place pipes*, it is necessary to refer to both Parts 1 and 4. Complementary information is contained in ISO 11295 [1], listed in the bibliography.

Figure 1 shows the common Part and clause structure and the relationship between ISO 11296 and system standards for other applications.

Annex A is informative. Annexes B and C are normative.

This document includes a bibliography.

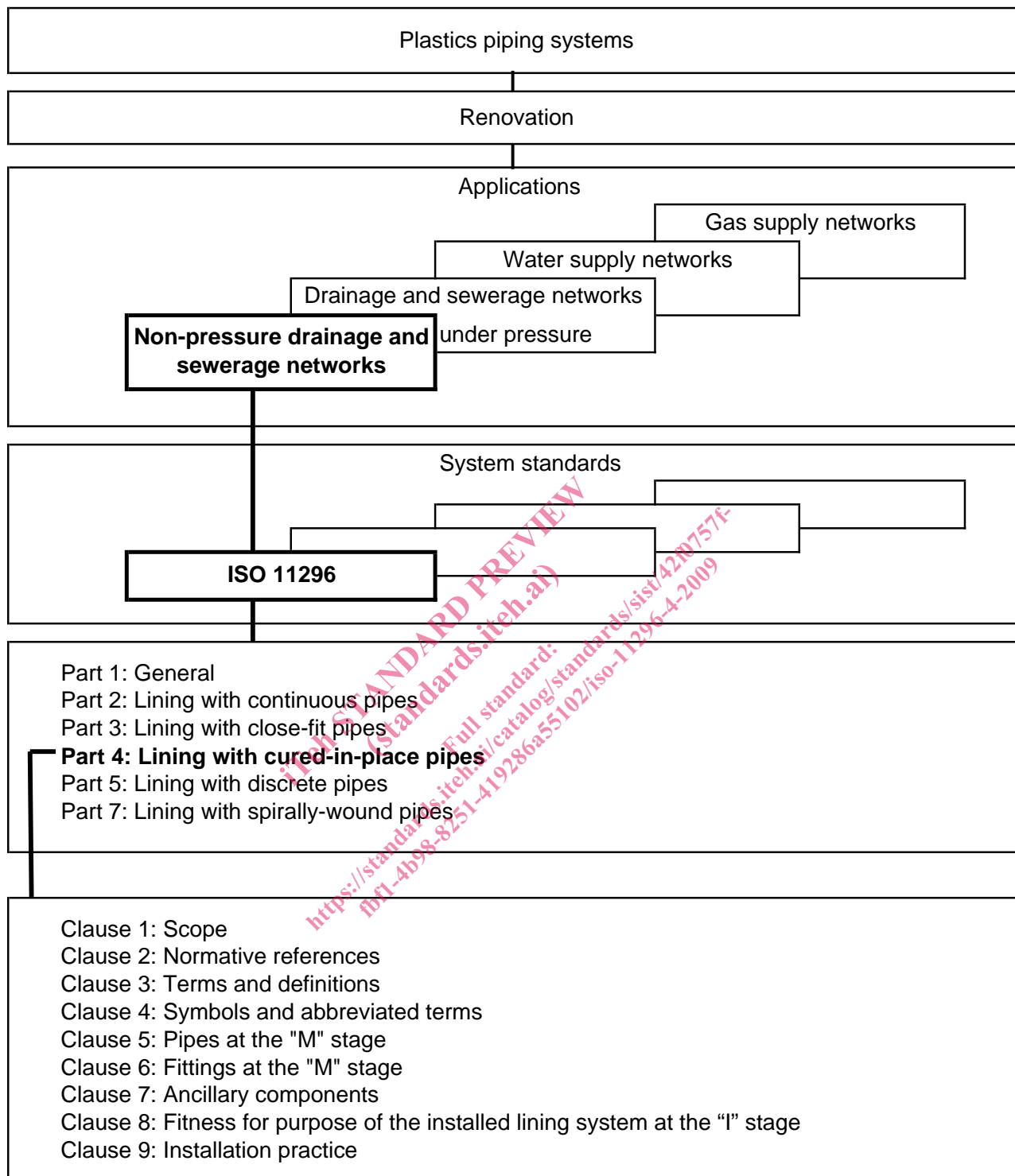


Figure 1 — Format of the renovation system standards

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

Part 4: Lining with cured-in-places pipes

1 Scope

This Part 4 of ISO 11296, in conjunction with Part 1, specifies requirements and test methods for cured-in-place pipes and fittings used for renovation of underground non-pressure drainage and sewerage networks.

It covers the use of various thermosetting resin systems in combination with compatible fibrous carrier materials and other process-related plastics components as defined in 5.1.

2 Normative references

The following referenced documents are indispensable for the application 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 75-2:2004, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 178:2001, *Plastics — Determination of flexural properties*

ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

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

ISO 3126, *Plastics piping systems — Plastics piping components — Measurement and determination of dimensions* Terms and definitions, symbols and abbreviations

ISO 4435, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: Specifications for pipes, fittings and the system.*

ISO 7684, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of the creep factor under dry conditions.*

ISO 7685, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial specific ring stiffness.*

ISO 8513, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial longitudinal tensile properties.*

ISO 8773, *Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene (PP) — Part 1: Specifications for pipes, fittings and the system.*

ISO 10928.2:—¹⁾ , *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Methods for regression analysis and their use.*

ISO 10952:—²⁾ , *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Determination of the resistance to chemical attack from the inside of a section in a deflected condition.*

ISO 11296-1:—³⁾ , *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 1: General.*

ISO 25780:—⁴⁾ , *Plastics piping systems for pressure or non-pressure water supply, irrigation or drainage and sewerage — Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) — Components intended to be installed using trenchless construction techniques*

EN 14364:2006, *Plastics piping systems for drainage and sewerage with or without pressure — Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) — Specification for pipes, fittings and joints.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11296-1 and the following apply.

3.1 General terms

3.1.1

carrier material

porous component of the liner which carries the liquid resin system during insertion into the pipe being renovated, and forms part of the installed lining system once the resin has cured

3.1.2

CIPP product

cured-in-place pipe of a particular design, produced from a liner 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 and installed by a specific process

3.1.3

CIPP unit

specific cured-in-place pipe produced from a continuous liner which has been impregnated in one process and installed as a single length

3.1.4

close-fit

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

3.1.5

composite

combination of cured resin system, carrier material and/or reinforcement, excluding any internal or external membranes, or non-structural resin-rich layers

1) To be published.

2) To be published.

3) To be published.

4) To be published.

3.1.6**first break**

elastic limit or first major discontinuity of the stress-strain curve associated with local failure of the resin matrix or reinforcing fibres

3.1.7**curing**

process of resin polymerisation, which may be initiated or accelerated by the use of heat or exposure to light

3.1.8**design thickness**

required wall thickness of the composite as determined by structural design

3.1.9**internal membrane**

membrane which forms the inside surface of the pipe after installation

3.1.10**external membrane**

membrane which forms the outside surface of the pipe after installation

3.1.11**lateral connection collar**

fitting for reconnecting a lined main pipe to an existing or renovated lateral pipe

3.1.12**lining tube**

flexible tube, consisting of carrier material, resin system, and any membranes and/or reinforcement, as combined prior to insertion in the pipe to be lined

3.1.13**nominal thickness**

one of a range of discrete liner wall thicknesses dictated by the materials used for liner construction, and chosen so as to result in a finished wall thickness of the composite not less than the design thickness

3.1.14**preliner**

external membrane which is installed separately and before the resin-impregnated liner

3.1.15**reinforcement**

fibres incorporated in the liner which enhance the dimensional stability of the liner and/or the structural properties of the cured composite. The reinforcement may be incorporated in the carrier material, may constitute the carrier material, or be a separate layer

3.1.16**resin system**

thermosetting resin including the curing agent(s) and any fillers or other additives, in specified proportions

3.2 Techniques**3.2.1****inversion**

process of turning a flexible tube or hose inside out by the use of fluid (water or air) pressure

3.2.2**inverted-in-place insertion**

method whereby the impregnated liner is introduced by inversion to achieve simultaneous insertion and inflation