
**Classification and information on design
of plastics piping systems used for
renovation**

*Classification et informations relatives à la conception des systèmes
de canalisations en plastique destinés à la rénovation*

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 11295 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*.

This first edition of ISO 11295 cancels and replaces ISO/TR 11295:1992.

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Introduction

This International Standard classifies the techniques used for the renovation of existing pipelines and gives information on the design of plastics piping systems used for such renovation.

Over the past 25 years, the rehabilitation of pipeline systems has become increasingly important.

Pipeline systems are continuously required to satisfy physical, chemical, biochemical and biological demands. These demands depend on planning, material, construction, type and period of use.

When pipeline systems become operational, proper system management has to be put in place. In addition to inspection and cleaning, rehabilitation of the pipeline can be required. Rehabilitation is carried out when there is need for restoration or upgrading of the pipeline system in terms of its performance. Rehabilitation can consist of repair, renovation or replacement.

To coincide with the publication of ISO product standards for various families of renovation techniques in three different application areas, the need to upgrade ISO/TR 11295 to a full International Standard was recognized, and, at the same time, focus on renovation.

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Classification and information on design of plastics piping systems used for renovation

1 Scope

This International Standard defines and describes families of techniques for the renovation of non-pressure and pressure pipelines through the use of plastics pipes, fittings and ancillary components. For each technique family, it identifies areas of application from the range covered by existing renovation product standards, which include underground drainage and sewerage, and underground water and gas supply networks.

This International Standard provides information on the principles of, but not the detailed methodologies for, the design of plastics piping systems applied as linings to existing pipelines, covering:

- existing pipeline and site conditions;
- lining system functions;
- structural performance;
- hydraulic performance;
- other factors affecting lining system selection.

It does not cover the calculation methods used to determine, for each viable technique, the required amount of lining material needed to secure the desired performance of the renovated pipeline.

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 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1043-1 and the following apply.

NOTE For ease of reference, see Clause 5 for definitions of the following individual technique families reproduced from other International Standards:

- lining with continuous pipes;
- lining with close-fit pipes;
- lining with cured-in-place pipes;

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- lining with discrete pipes;
- lining with adhesive-backed hoses;
- lining with spirally-wound pipes.

3.1

lining pipe

pipe inserted for renovation purposes

3.2

liner

lining pipe after installation

3.3

lining system

lining pipe and all relevant fittings inserted into an existing pipeline for the purposes of renovation

3.4

maintenance

keeping an existing pipeline system operational without the installation of additional fabric

3.5

rehabilitation

all measures for restoring or upgrading the performance of an existing pipeline system

3.6

renovation

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

3.7

repair

rectification of local damage

3.8

replacement

rehabilitation of an existing pipeline system by the installation of a new pipeline system, without incorporating the original fabric

3.9

technique family

grouping of renovation techniques which are considered to have common characteristics for standardization purposes

3.10

independent pressure pipe liner

liner capable on its own of resisting without failure all applicable internal loads throughout its design life

3.11

interactive pressure pipe liner

liner which relies on the existing pipeline for some measure of radial support in order to resist without failure all applicable internal loads throughout its design life

3.12

fully structural rehabilitation

renovation using an independent pressure pipe liner

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3.13**semi-structural rehabilitation**

renovation using an interactive pressure pipe liner which is capable of long-term hole and gap spanning at operational pressure

4 Abbreviated terms

EP	Epoxy resin
GRP	Glass-reinforced thermosetting plastics
PA	Polyamide
PAN	Polyacrylonitrile
PE	Polyethylene
PE-X	Cross-linked polyethylene
PEN	Poly(ethylene naphthate)
PET	Poly(ethylene terephthalate)
PP	Polypropylene
PRP	Polyester-reinforced PE
PUR	Polyurethane
PVC-U	Unplasticized poly(vinyl chloride)
UP	Unsaturated polyester resin
VE	Vinyl ester resin

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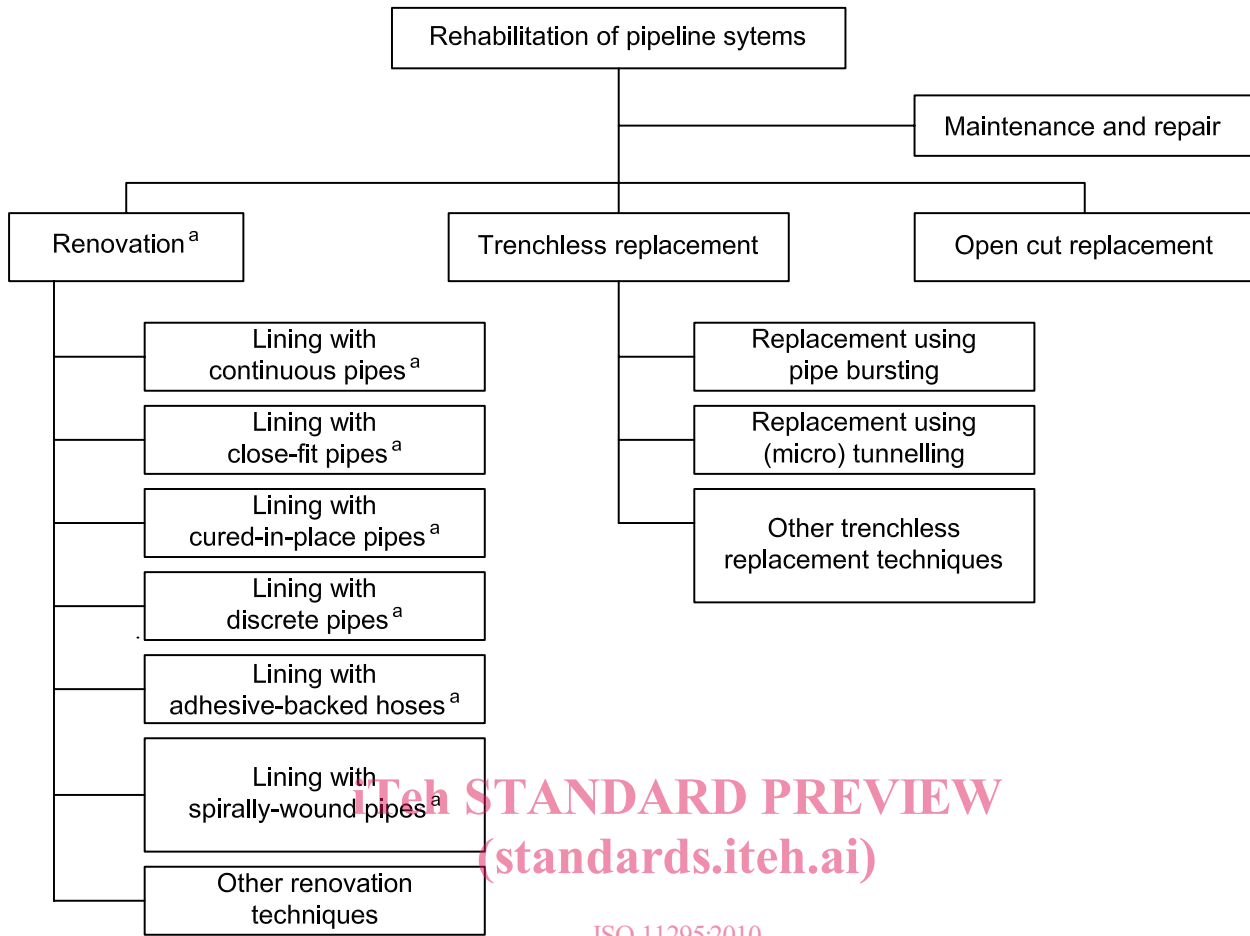
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5 Classification of renovation techniques**5.1 General**

This clause establishes a classification of the techniques used for the renovation of continuous lengths of existing pipeline usually between two or more access points.

Renovation techniques within the scope of this International Standard are classified in Figure 1.



^a This International Standard is applicable. <https://standards.iteh.ai/catalog/standards/sist/f74894c3-1ef8-4861-9b69-991814a39c16/iso-11295-2010>

Figure 1 — Renovation technique families using plastics pipes defined in the overall context of rehabilitation of pipeline systems

In 5.2 to 5.7, the different renovation technique families are defined and associated materials and areas of application, which are the subject of existing or foreseen product standards, are identified. In addition, certain general characteristics of each renovation technique family are described.

NOTE 1 The pipe materials listed in 5.2 to 5.7 reflect the state-of-the-art in the technique families on the date of publication of this International Standard. Not all technique families/material-combinations are covered by a renovation product standard. The Bibliography gives relevant available standards.

NOTE 2 The application areas covered by existing renovation product standards include underground drainage and sewerage, and underground water and gas supply networks. This International Standard is not applicable to other possible areas of application of the technique families described.

5.2 Lining with continuous pipes

Lining with continuous pipes is defined as lining with pipes made continuous prior to insertion; the cross-section of the lining pipe remains unchanged (see Figure 2).

NOTE This is often referred to as sliplining.

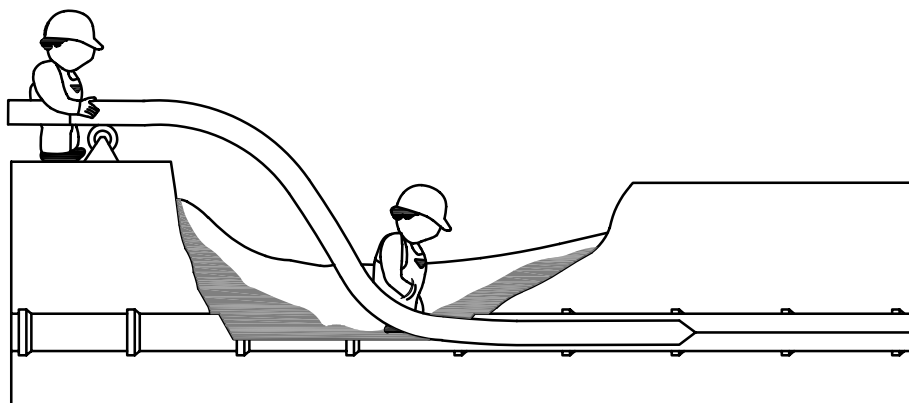


Figure 2 — Schematic representation of lining with continuous pipes

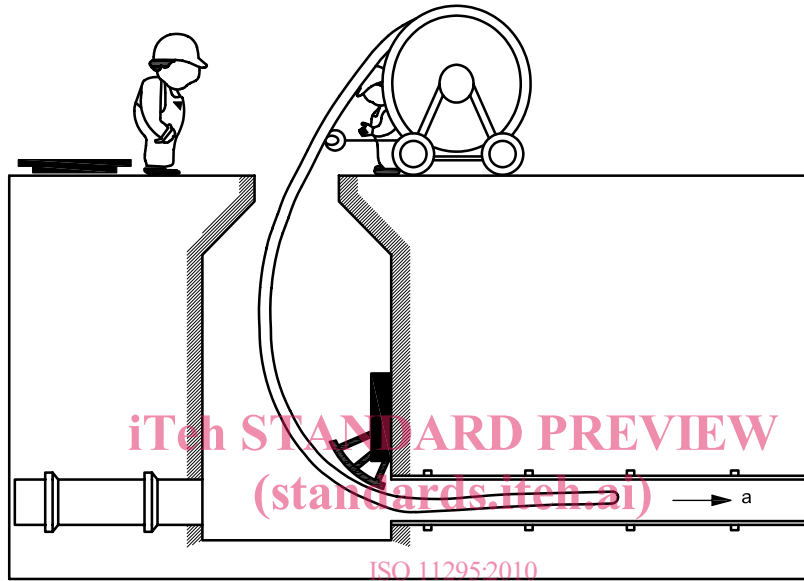
- Relevant existing International Standard(s):
- ISO 11296-1 and EN 13566-2;
 - ISO 11298-1;
 - ISO 11299-1.
- Materials:
- PE, PE-X and PP.
- Applications:
- Pressure pipes and non-pressure pipes (applicable to all areas).
- Geometric capabilities:
- typical minimum size: 100 mm;
 - typical maximum size: 2 000 mm;
 - typical maximum length: 300 m;
 - capability of accommodating bends, depending on technique.
- Performance:
- reduction in hydraulic capacity significant;
 - fully structural rehabilitation is possible.
- Installation characteristics:
- pipes manufactured or prior assembled into the continuous length required;
 - insertion possible by pushing and/or pulling;
 - surface working space
 - small diameters: can be supplied on coils, small space, and
 - larger diameters: supplied in straight lengths requiring greater storage and working space;
 - access to the existing pipeline: generally requires local excavation;
 - technique does not rely on adhesion to host pipe;
 - flow diversion is typically required for installation and grouting;
 - the annular space may be grouted, at least in non-pressure applications, to fix line and level and/or prevent subsequent movement;
 - live insertion is possible (but drinking water applications excluded for hygiene reasons);
 - reconnection of laterals/services: generally requires excavation.

5.3 Lining with close-fit pipes

Lining with close-fit pipes is defined as lining with a continuous pipe for which the cross-section is reduced to facilitate installation and reverted after installation to provide a close fit to the existing pipe (see Figure 3).

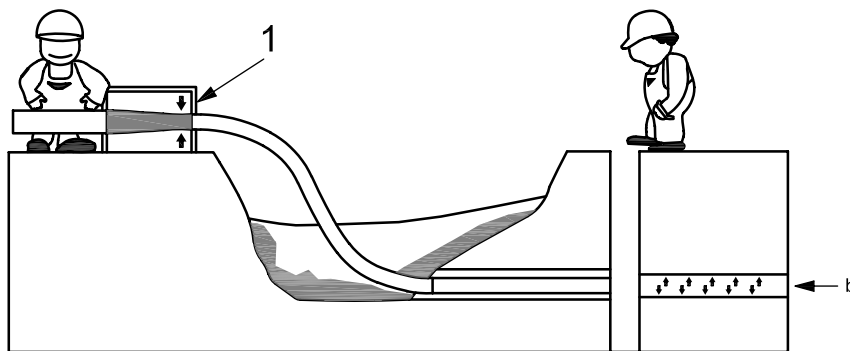
NOTE For the reduction in cross-section, the following are the two options:

- a) reduction in the pipe manufacturing plant: the pipe is usually supplied coiled on a reel from which it is directly inserted;
- b) reduction on site: the pipe is usually fed through the reduction equipment and simultaneously inserted in one continuous string.



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a) Installation of a pipe reduced in cross-section in the pipe manufacturing plant



b) Installation of a pipe reduced in cross-section on site

Key

- 1 device for reducing cross-section
- a Direction of feed (by pulling) of lining pipe into the host pipe.
- b Pressure applied for reversion.

Figure 3 — Schematic representations of lining with close-fit pipes