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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

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Submission of Comments

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 11300-4

Piping systems for rehabilitation of underground drains, sewers and water supply networks —

Part 4: Thermoplastic composite materials

*Systèmes de canalisations pour la réhabilitation des
branchements, des collecteurs d'assainissement et des réseaux
d'alimentation en eau enterrés —*

Partie 4: Matériaux composites thermoplastiques

ICS: 23.040.05; 93.025; 93.030

This document is circulated as received from the committee secretariat.

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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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 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*, 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).

This first edition of ISO 11300-4:2025, along with ISO 11301-1:2025, ISO 11300-2:2025 and ISO 11300-3:2025 cancels and replaces ISO 11296-1:2018, ISO 11296-7:2019, ISO 11296-9:2017, which have been technically revised.

The main changes are as follows:

For piping systems made from thermoplastic composite materials, this document replaces the related content, including requirements, of the documents listed above.

A list of all parts in the ISO 11300 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.

Introduction

This document is a part of a series of International Standards concerning piping systems of various materials used for the rehabilitation of existing pipelines in a specified application area. System Standards for rehabilitation deal with the following applications:

- ISO 11300 series: *Piping systems for rehabilitation of underground drains, sewers and water supply networks*; (this standard)
- ISO 11301 series: *Piping systems for rehabilitation of underground gas supply networks*.

The ISO 11300 series and the ISO 11301 series are subdivided into parts covering a specific material per pipe system.

The ISO 11300 series is subdivided in four parts:

- *Part 1: Polyethylene (PE) material*
- *Part 2: Thermoset composite materials*;
- *Part 3: PVC-U material*;
- *Part 4: Thermoplastic composite materials* (this document).

Parts 3 and 4 are applicable for non-pressure drains and sewers networks only.

These documents cover various techniques for renovation and trenchless replacement. Furthermore, they 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 piping system components “as manufactured”.

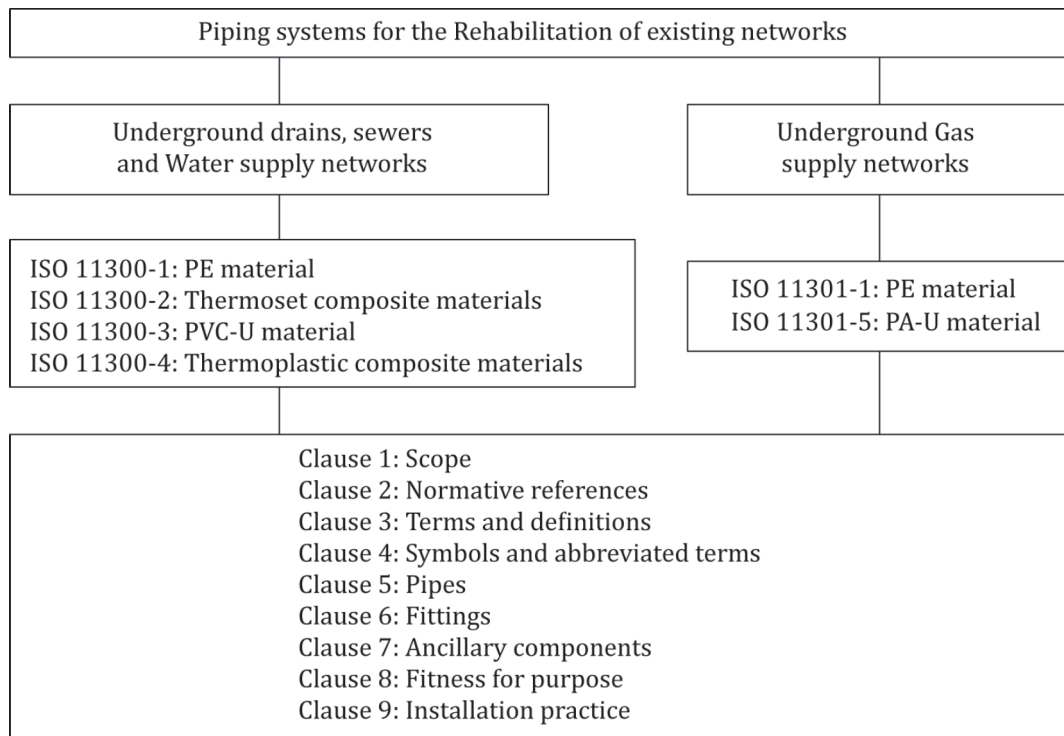
A consistent structure of clause headings has been adopted for all parts of the ISO 11300 series and the ISO 11301 series, in order to facilitate direct comparisons across renovation technique families.

[Figure 1](#) shows the clause structure and the relationship between the ISO 11300 series and the ISO 11301 series.

For complementary information, see ISO 11295.

For assessment of conformity to the requirements of this document, see ISO/TS 23818-4 (in preparation).

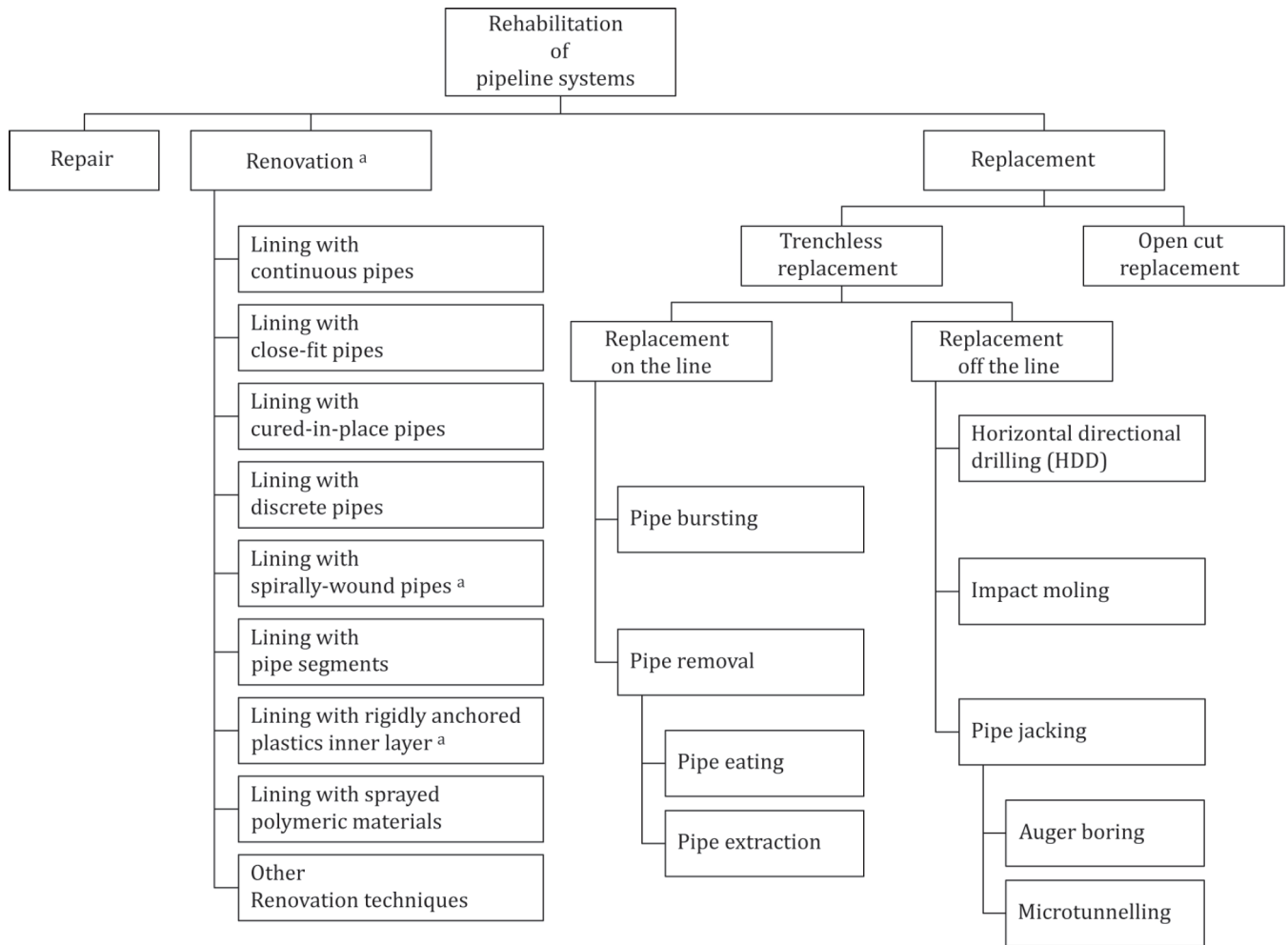
ISO/DIS 11300-4:2025(en)



^a In preparation.

Figure 1 — Clause structure of the ISO 11300 series and the ISO 11301 series

The various techniques for rehabilitation of underground drains, sewers and water supply 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.



^a This document is applicable.

Figure 2 — Technique families for rehabilitation of underground non-pressure drains, sewers and water supply networks using thermoplastic composite pipes, within the scope of pipeline rehabilitation techniques

Piping systems for rehabilitation of underground drains, sewers and water supply networks —

Part 4: Thermoplastic composite materials

1 Scope

This document specifies requirements and test methods for pipes and fittings which are part of piping systems for the rehabilitation, by means of renovation and trenchless replacement, of underground non-pressure drains and sewers networks.

It is applicable to pipes, fittings and assemblies, made from thermoplastic composite materials, as manufactured and as installed. It is not applicable to the existing pipeline.

It is applicable to the following technique families for renovation:

- lining with spirally-wound (SWO) pipes;
- lining with a rigidly anchored plastic inner layer (RAPL).

and intended to be used at a service temperature not exceeding 45 °C according to material as follows:

- PE: 20 °C as reference temperature;
- PVC-U: 23 °C as reference temperature;

in both cases with re-rating factors on mechanical characteristics for service temperatures in excess of 35 °C determined by dedicated type testing.

In the case of lining with SWO pipes, where the pipes, are formed on site, to a fixed or variable diameter, by spirally winding and jointing a pre-manufactured profiled plastics strip, this document applies to, strips made of unplasticized poly(vinyl chloride) (PVC U), or of polyethylene (PE), with or without steel stiffening elements, and installed with or without integral locking mechanism.

In the case of lining with RAPL, where a single rigid annulus of structural cementitious grout is formed behind a plastics inner layer serving as permanent formwork anchored to the grout. This document applies to integrally joined profiled plastics strips of PVC-U or PE or studded sheets of PE, and grout systems with or without steel reinforcement. It does not apply to the structural design of the lining system.

NOTE Systems with multiple annuli are available, but these are controlled by patent rights and not covered by this document.

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 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 48-4, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 4: Indentation hardness by durometer method (Shore hardness)*

- ISO 75-2:2013, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*
- ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test*
- ISO 306, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*
- ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*
- ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*
- ISO 630-1, *Structural steels — Part 1: General technical delivery conditions for hot-rolled products*
- ISO 630-2, *Structural steels — Part 2: Technical delivery conditions for structural steels for general purposes*
- ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*
- ISO 1133-2, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 2: Method for materials sensitive to time-temperature history and/or moisture*
- ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*
- ISO 4427-3, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 3: Fittings*
- ISO 4435, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U)*
- ISO 4624:2016, *Paints and varnishes — Pull-off test for adhesion*
- ISO 4948-2, *Steels — Classification — Part 2: Classification of unalloyed and alloy steels according to main quality classes and main property or application characteristics*
- ISO 6259-1, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method*
- ISO 6935 (all parts), — *Steel for the reinforcement of concrete*
- ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*
- ISO 9967, *Thermoplastics pipes — Determination of creep ratio*
- ISO 9969, *Thermoplastics pipes — Determination of ring stiffness*
- ISO 10467:2018, *Plastics piping systems for pressure and non-pressure drainage and sewerage — Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin*
- ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*
- ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification, designation and design coefficient*
- ISO 13262, *Thermoplastics piping systems for non-pressure underground drainage and sewerage — Thermoplastics spirally-formed structured-wall pipes — Determination of the tensile strength of a seam*
- ISO 18373-1:2007, *Rigid PVC pipes — Differential scanning calorimetry (DSC) method — Part 1: Measurement of the processing temperature*
- EN 196-1, *Methods of testing cement — Part 1: Determination of strength*
- EN 445:2007, *Grout for prestressing tendons — Test methods*

EN 1015-3, *Methods of test for mortar for masonry — Part 3: Determination of consistence of fresh mortar (by flow table)*

EN 1015-6, *Methods of test for mortar for masonry — Part 6: Determination of bulk density of fresh mortar*

EN 1107-2, *Flexible sheets for waterproofing — Determination of dimensional stability — Part 2: Plastic and rubber sheets for roof waterproofing*

CEN/TS 1401-2, *Plastics piping systems for non-pressure underground drainage and sewerage – Unplasticized poly(vinyl chloride) (PVC-U) – Part 2: Guidance for the assessment of conformity*

CEN/ENV 1401-3, *Plastics piping systems for non-pressure underground drainage and sewerage – Unplasticized poly(vinyl chloride) (PVC-U) – Part 3: Guidance for installation*

EN 1542:1999, *Products and systems for the protection and repair of concrete structures — Test methods — Measurement of bond strength by pull-off*

EN 1610:2015, *Construction and testing of drains and sewers*

EN 1916:2002, *Concrete pipes and fittings, unreinforced, steel fibre and reinforced*

EN 10025-1, *Hot rolled products of structural steels — Part 1: General technical delivery conditions*

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 12814-2, *Testing of welded joints of thermoplastics semi-finished products — Part 2: Tensile test*

EN 12814-8, *Testing of welded joints of thermoplastics semi-finished products — Part 8: Requirements*

EN 13067, *Plastics welding personnel - Qualification testing of welders — Thermoplastics welded assemblies*

EN 13100-4, *Non-destructive testing of welded joints of thermoplastics semi-finished products — Part 4: High voltage testing*

EN 13412:2006, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of modulus of elasticity in compression*

EN 14117, *Products systems for the protection and repair of concrete structures — Test methods — Determination of time of efflux of cementitious injection products*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11295 and the following apply.

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

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

3.1 General

3.1.1

characteristic

property, dimension or other feature of a material or component

[SOURCE: 11300-1:2025, 3.1.1]

3.1.2

declared value

limiting value of a characteristic declared in advance by the *rehabilitation system supplier* (3.1.4), which becomes the requirement for the purposes of assessment of conformity

[SOURCE: 11300-1:2025, 3.1.2]

3.1.3

grouting

process of filling voids around the lining system

3.1.4

rehabilitation system supplier

entity that specifies the field and range of application and brings together the components of a rehabilitation system to meet the requirements of the product standard at the “*M*” stage (3.4.1), so that when installed in accordance with the installation manual they meet the requirements of the product standard at the “*I*” stage (3.4.2)

[SOURCE: 11300-1:2025, 3.1.5]

3.1.5

system installer

entity that prepares the host pipe, takes the rehabilitation system at the “*M*” stage (3.4.1) and installs it so that it is at the “*I*” stage (3.4.2)

[SOURCE: 11300-1:2025, 3.1.6]

3.1.6

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

[SOURCE: 11300-1:2025, 3.1.7]

3.2 Terms related to techniques

3.2.1

lining with spirally-wound pipes

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

[SOURCE: ISO 11295:2025, 3.2.10]

3.2.2

lining with a rigidly anchored plastics inner layer

lining with pipe comprising a single rigid annulus of structural cementitious grout and a plastics inner layer anchored to the grout

3.2.3

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

[SOURCE: ISO 11295:2025, 3.2.26]

3.2.4

close-fit spirally-wound pipe

continuous lining pipe wound from a profiled plastics strip, with or without steel reinforcement, expanded or wound in place to achieve a close fit to the existing pipeline

3.2.5

spirally-wound pipe

pipe formed by continuously winding and joining a profiled plastics strip, or a profiled plastics strip and integral locking joiner strip

3.2.6

anchored plastics inner layer

layer with integral anchors which forms the inside surface of the pipe after installation

3.2.7

profiled plastics strip

extruded profile of unplasticized poly(vinyl chloride) (PVC-U) or polyethylene (PE), with integral or separate *seam* ([3.2.9](#)) locking mechanism, used to form the waterway wall of a pipe liner

3.2.8

joiner strip

extruded profile of PVC-U or PE used to connect adjacent profiled plastic strips

3.2.9

seam

joint between adjacent profiled plastics strips formed by an integral locking mechanism and/or seam sealant

3.2.10

integral locking mechanism

mechanical interlock achieved by suitable design of the edges of the extruded profile

3.2.11

seam sealant

thermoplastic or adhesive material added to the *integral locking mechanism* ([3.2.10](#)), *joiner strip* ([3.2.8](#)) or *profiled plastics strip* ([3.2.7](#)) surface to make the *seam* ([3.2.9](#)) leaktight

3.2.12

studded PE sheet

polyethylene sheet with integral anchoring studs

3.2.13

lateral connection collar

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

3.2.14

annular space

gap between the plastics inner layer and either the host pipe or the external layer where present

3.2.15

reinforcement

steel bars incorporated in the grout or steel stiffening elements placed alongside or encapsulated within the plastics inner layer

3.2.16

grout system

cement-based grout including any fillers, *reinforcement* ([3.2.15](#)) or other additives or admixtures, in specified proportions

3.2.17

spacer

block of material compatible with *grout system* ([3.2.16](#)) used to maintain minimum thickness of *annular space* ([3.2.14](#)) and prevent flotation of inner plastics layer during filling with grout

3.3 Terms related to characteristics

3.3.1

nominal size

DN

numerical designation of the size of a component related to the inside or outside diameter

Note 1 to entry: It is a convenient round number approximately equal to the manufacturing dimension in millimetres (mm). It is not applicable to components designated by thread size.

[SOURCE: ISO 4427-1:2019, 3.1.1, modified to include inside diameter as option]

3.3.2

nominal size

DN/OD

nominal size, related to the outside diameter

[SOURCE: ISO 4427-1:2019, 3.1.1]

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 4427-1:2019, 3.1.2, 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 the pipe or spigot end of a fitting in any cross-section divided by π ($\approx 3,142$) and rounded to the next greater 0,1 mm

[SOURCE: ISO 4427-1:2019, 3.1.4]

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 4427-1:2019, 3.1.5]

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, including the measure minimum and the maximum measured values of the wall thickness in that cross-section

[SOURCE: ISO 4427-1:2019, 3.1.12]

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 4427-1:2019, 3.1.10]

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 (mm)

Note 1 to entry: For thermoplastics components conforming to ISO 4435 or the different parts of the ISO 4427 series, the value of nominal wall thickness, e_n , is identical to the specified minimum wall thickness at any point, $e_{\min}$.

[SOURCE: ISO 4427-1:2019, 3.1.8, with modified Note 1 to entry]

3.3.10

standard dimension ratio

SDR

numerical designation of a pipe series, which is a convenient round number, approximately equal to the dimension ratio of the nominal outside diameter, d_n , and the nominal wall thickness, e_n

[SOURCE: ISO 4427-1:2019, 3.1.14]

3.3.11

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.

[SOURCE: ISO 11300-1:2025, 3.3.12]

3.3.12

integral joint

joint at the pipe end, either by means of a socket at one pipe end (single-socket pipe) or matching joint parts integrated in the pipe wall at either end of the pipe (rubber ring joints or screwed joints).

[SOURCE: ISO 11300-1:2025, 3.7.5]

3.4 Terms related to product stages

3.4.1

“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.

[SOURCE: ISO 11300-1:2025, 3.4.1]

3.4.2

“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](#).

[SOURCE: ISO 11300-1:2025, 3.4.2]

3.5 Terms related to materials

3.5.1

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

[SOURCE: ISO 11300-1:2025, 3.5.1]

3.5.2

own reprocessable material

material prepared from clean, rejected and unused pipes, fittings, or valves, including trimmings from the production of pipes, fittings or valves, that is reprocessed in a manufacturer's plant after having previously been processed by the same manufacture in the production of a component by, for example, injection moulding or extrusion

[SOURCE: ISO 4427-1:2019, 3.2.2]

3.5.3

recyclable material

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

[SOURCE: ISO 11300-1:2025, 3.5.4]

4 Symbols and abbreviated terms

4.1 Symbols

A_w	unit cross-sectional area of the profiled plastics strip
b_c	width of air test channel
D	mean diameter of the dolly
d_e	outside diameter
$d_{e,max}$	maximum outside diameter of inner plastics layer in circular pipes
$d_{e,min}$	minimum outside diameter of inner plastics layer in circular pipes
d_{em}	mean outside diameter
$d_{em,min}$	minimum mean outside diameter
d_{manuf}	original circular outside diameter of the pipe (before processing for insertion)
d_n	nominal outside diameter
e	wall thickness
e_a	height of neutral axis of the strip above its base
e_g	thickness of grout above height of anchors
$e_{g,min}$	minimum thickness of grout above height of anchors
e_m	mean wall thickness
e_{min}	minimum wall thickness at any point