International Standard

ISO 25780

Second edition
2026-11

Plastics piping systems for pressure and non-pressure water supply, drainage or sewerage — Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin — Pipes with flexible joints intended to be installed using jacking techniques

Systèmes de canalisations en matières plastiques pour l'alimentation en eau, les branchements ou les collecteurs d'assainissement avec ou sans pression — Systèmes en matières plastiques thermodurcissables renforcés de verre (PRV) à base de résine de polyester non saturé (UP) — Tubes avec assemblages flexibles destinés à être installés par les techniques de poussée

Sample Document
Content fully licensed from standards.iteh.ai

Reference number
ISO 25780:2026(en)

© ISO 2026

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

Sample Document

get full document from standards.iteh.ai



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

All rights reserved.

This ISO publication is protected by copyright and is owned by ISO and/or its licensors.

The content of this ISO publication is provided under licence, not sold. Use is subject to the applicable licence terms issued by ISO, an ISO member body, or an authorized third-party distributor.

Except as required for implementation or expressly permitted by a separate licence, no part of this ISO publication may be reproduced, distributed, modified, used, or made available in any form or by any means – electronic or mechanical, including photocopying, scanning, recording, or posting on internal or external digital platforms.

Any use beyond the scope of the granted rights is prohibited and may result in legal action.

ISO copyright office
CP 401 • CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

Contents

Page

Foreword ..... **v**
Introduction ..... **vii**
1 Scope **1**
2 Normative references **1**
3 Terms, definitions, symbols and abbreviated terms **2**
3.1 Terms related to design values declared by the manufacturer 2
3.2 Terms related to measured values 4
3.3 General terms 5
3.4 Symbols and abbreviated terms 11
4 Requirements **13**
4.1 Pipe properties 13
4.1.1 Manufacturer's declared diameters 13
4.1.2 Design jacking load for closed joint 13
4.1.3 Nominal stiffness 13
4.1.4 Nominal pressure 13
4.1.5 Appearance 13
4.2 Materials 14
4.2.1 General 14
4.2.2 Reinforcement 14
4.2.3 Resin 14
4.2.4 Aggregates and fillers 14
4.2.5 Thermoplastics liners 14
4.2.6 Elastomers 14
4.2.7 Metals 15
4.3 Pipe wall construction 15
4.3.1 Inner layer 15
4.3.2 Structural layer 15
4.3.3 Outer layer 15
4.4 Reference conditions for testing 15
4.4.1 Temperature 15
4.4.2 Properties of water for testing 15
4.4.3 Loading conditions 16
4.4.4 Preconditioning 16
4.4.5 Measurement of dimensions 16
4.5 Elapsed time, *x*, for determination of long-term properties 16
4.6 Joint properties 16
4.6.1 Types of joint 16
4.6.2 Flexibility of the jointing system 17
4.6.3 Sealing ring 18
4.6.4 Effect on water quality 18
4.7 Assessment of conformity 18
5 Pipes **19**
5.1 Geometrical characteristics 19
5.1.1 Wall thickness 19
5.1.2 Nominal length, *L* 19
5.1.3 Straightness 19
5.1.4 Squareness of end faces 19
5.2 Mechanical characteristics 21
5.2.1 Initial ring stiffness 21
5.2.2 Long-term creep stiffness 21
5.2.3 Initial resistance to failure in a deflected condition 21
5.3 Resistance to strain corrosion 21
5.4 Longitudinal compressive strength 21

Sample Document
Get document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

5.4.1 General 21
5.4.2 Initial longitudinal compressive stress at break (prism test pieces) 22
5.4.3 Initial longitudinal compressive stress at break (spool test pieces) 22
5.4.4 Requirements 22
5.5 Design loads 22
5.5.1 Design longitudinal load 22
5.5.2 Design jacking load 22
5.6 Longitudinal compressive modulus 22
5.6.1 Initial longitudinal compressive modulus (prism test pieces) 22
5.6.2 Initial longitudinal compressive modulus (spool test pieces) 22
5.6.3 Declared value 23
5.7 Resistance of pressure pipes to internal pressure 23
5.8 Marking 23

6 Joints 23
6.1 General requirements 23
6.2 Performance requirements 24
6.3 Geometrical characteristics 24
6.4 Interchangeability 25
6.5 Marking 25

Annex A (normative) **Determination of the longitudinal compressive properties of a pipe, using a sample of prism test pieces cut from a ring from the pipe 26**

Annex B (normative) **Determination of the longitudinal compressive properties of pipes, using spool test pieces 32**

Annex C (normative) **Procedure for the calculation of the design jacking load on a GRP (UP) pipe, $F_{j,d}$ 38**

Bibliography 43

Sample Document
get full document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

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.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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.

Sample Document

This document was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 6, *Reinforced plastics pipes and fittings for all applications*.

This second edition cancels and replaces the first edition (ISO 25780:2011), which has been technically revised.

get full document from standards.iteh.ai

The main changes are as follows:

— Clause 3 has been restructured to distinguish measured values and declared values (see 3.1 and 3.2).

— An overview of symbols and abbreviated terms has been introduced (see 3.4).

— The limit state concept used in conjunction with a partial factor method has been introduced.

— The nominal pressure classes have been reduced (see Table 1).

— Type “R” and type “E-CR” have been added as additional reinforcement types (see 4.2.2).

— Requirements for thermoplastic liners have been introduced (see 4.2.5).

— Requirements for the assessment of conformity have been introduced (see 4.7).

— The parameters “jacking diameter” and “laying length” have been deleted.

— The requirements on longitudinal compressive strength as well as design loads have been completely revised (see 5.4 and 5.5).

— The determination of the initial longitudinal compressive modulus by testing has been introduced.

— Clause 6 on joints has been restructured.

— Annexes A to C have been completely updated.

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.

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

Sample Document

get full document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

Introduction

A jacking technique is a trenchless construction method which installs a pipeline by inserting pipes one by one under the ground by pressing with one or more hydraulic jacks, while the excavated ground is simultaneously evacuated.

In this document, the requirements for design jacking load on glass-reinforced thermosetting plastics (GRP) pipes are based on the general principle for the reliability of structures detailed in ISO 2394 and in EN 1990. These reference documents provide procedures for the harmonization of design practices and address the probability of failure, as well as possible consequences of failures. The design practices are based on a partial safety factor concept, as well as on risk management engineering.

Sample Document

get full document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

Sample Document

get full document from standards.iteh.ai

Plastics piping systems for pressure and non-pressure water supply, drainage or sewerage — Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin — Pipes with flexible joints intended to be installed using jacking techniques

1 Scope

This document specifies the properties of the piping system and its components made from glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester (UP) resin. It is suited for all types of water supply, drainage and sewerage with or without pressure. Types of water supply include, but are not limited to, raw water, irrigation, cooling water, potable water, salt water, sea water, penstocks in power plants, processing plants and other water-based applications.

This document is applicable to GRP-UP piping systems, with flexible joints, intended to be installed using jacking techniques. It specifies the characteristics of pipes made from GRP-UP, with or without aggregates or fillers. It also specifies the test parameters for the test methods referred to in this document.

This document is applicable to circular pipes and joints with a size range from DN 100 to DN 4 000 at normal service conditions.

Sample Document

This document covers requirements to demonstrate the adequacy of the design of the joint and specifies type test performance requirements for the joints as a function of the declared nominal pressure rating of the pipeline system and the required joint deflection capability of the system.

get full document from standards.iteh.ai

The determination of longitudinal compressive properties of a pipe are given in Annex A and Annex B.

The procedure for the calculation of the design jacking load on a GRP (UP) pipe is given in Annex C.

Requirements for GRP-fittings, used between pipe systems covered by this document, are given in ISO 23856.

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 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 604:2002, *Plastics — Determination of compressive properties*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

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

ISO 7685, *Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial ring stiffness*

ISO 8639, *Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods for leaktightness and proof of structural design of flexible joints*

ISO 10466, *Glass-reinforced thermosetting plastics (GRP) pipes — Test method to prove the resistance to initial ring deflection*

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

ISO 10468, *Glass-reinforced thermosetting plastics (GRP) pipes — Determination of the ring creep properties under wet or dry conditions*

ISO 10952, *Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Determination of the resistance to chemical attack for the inside of a section in a deflected condition*

ISO 23856, *Plastics piping systems for pressure and non-pressure water supply, drainage or sewerage — Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin*

CEN/TS 14632, *Plastics piping systems for drainage, sewerage and water supply, pressure and non-pressure — Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) — Guidance for the assessment of conformity*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the following terms and definitions, symbols and abbreviated terms 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 Terms related to design values declared by the manufacturer

3.1.1
pipe outside diameter
jacking diameter
d_{OD}
manufacturer's declared value for the maximum external diameter of the pipe barrel

Note 1 to entry: The pipe outside diameter is expressed in millimetres (mm).

Note 2 to entry: See Figure 1.

3.1.2
maximum spigot inside diameter
$d_{i,max}$
manufacturer's declared value for the maximum internal diameter of the pipe spigot, at the groove location where applicable

Note 1 to entry: See Figure 1.

3.1.3
minimum spigot or groove diameter
$d_{g,min}$
manufacturer's declared value for the minimum external diameter of the spigot (see Figure 1 a) diameter), or in the groove of the spigot (see Figure 1 b) diameter, if applicable)

Note 1 to entry: Spigot or groove diameter is expressed in millimetres (mm).

Note 2 to entry: See Figure 1.

3.1.4
minimum wall thickness
e_{min}
manufacturer's declared value for the minimum wall thickness of the pipe barrel

Note 1 to entry: The minimum wall thickness is expressed in millimetres (mm).

Note 2 to entry: See Figure 1.

Sample Document
Get full document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

3.1.5
cross-sectional area at the spigot
A_s
minimum area of the cross-section of the pipe at the spigot, or in the groove of the spigot, if applicable

Note 1 to entry: Minimum cross-sectional area at the spigot is derived using the following formula and is expressed in square millimetres (mm^2):

$$A_s = \pi\left[\left(0,5d_{g,min}\right)^2 - \left(0,5d_{i,max}\right)^2\right].$$

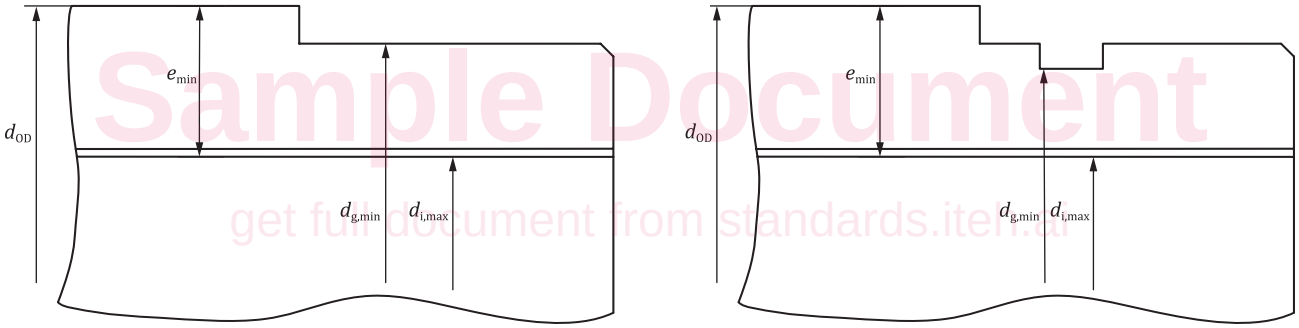
Note 2 to entry: See Figure 1.

3.1.6
cross-sectional area at the barrel
A_b
area of the cross-section of the pipe barrel

Note 1 to entry: The cross-sectional area at the pipe barrel is derived using the following formula and is expressed in square millimetres (mm^2):

$$A_b = \pi\left[\left(0,5d_{OD}\right)^2 - \left(0,5d_{i,max}\right)^2\right].$$

Note 2 to entry: See Figure 1.



a) Section through a rebated un-grooved spigot **b) Section through a rebated grooved spigot**

Key

d_{OD}	pipe outside diameter, in mm
$d_{i,max}$	maximum spigot inside diameter, in mm
$d_{g,min}$	minimum spigot or groove diameter, in mm
e_{min}	minimum wall thickness of pipe, in mm

Figure 1 — Diameters declared by the manufacturer

3.1.7
declared initial longitudinal compressive stress at break
σ_b
manufacturer's declared minimum value, derived from tests, for the initial longitudinal compressive stress at break of the pipe

Note 1 to entry: When tested in accordance with Annex B, the minimum initial longitudinal compressive stress at break is expressed in megapascals (MPa).

Sample Document
get full document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

3.1.8
declared initial longitudinal compressive modulus
E_c
manufacturer's declared value, derived from tests, for the initial longitudinal compressive modulus

Note 1 to entry: When tested in accordance with Annex A or Annex B, the declared initial longitudinal compressive modulus is expressed in megapascals (MPa).

3.2 Terms related to measured values

3.2.1
mean diameter
d_m
diameter of the circle corresponding to the middle of the pipe wall cross-section and given by the following formula:

$$d_m = d_e - e$$

where

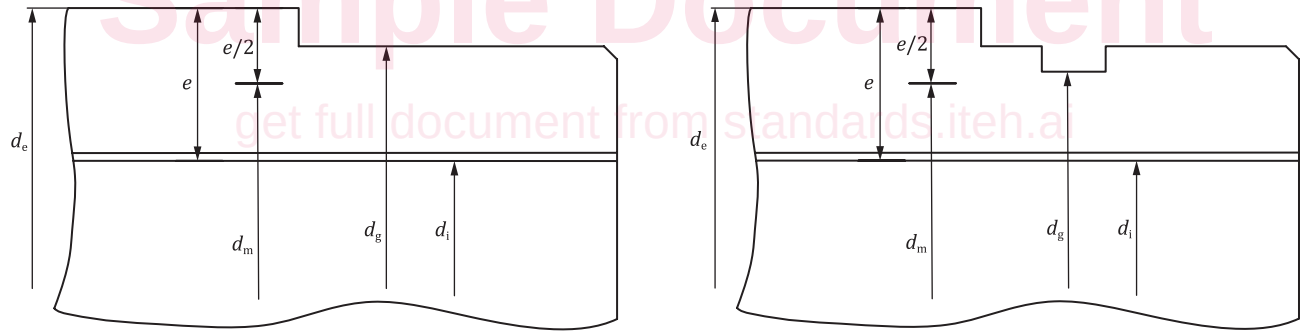
d_e is the measured external diameter, in mm;
e is the measured wall thickness of the pipe, in mm

Note 1 to entry: The mean diameter is expressed in millimetres (mm).

Note 2 to entry: If measured values are not available (e.g. for design purposes) declared values may be used.

Note 3 to entry: See Figure 2.

Sample Document
get full document from standards.iteh.ai



a) Section through a rebated un-grooved spigot **b) Section through a rebated grooved spigot**

Key
d_e measured external diameter, in mm
d_i measured spigot inside diameter, in mm
d_g measured spigot or groove diameter, in mm
d_m mean diameter, in mm
e measured wall thickness of pipe, in mm

Figure 2 — Measured diameters

[SOURCE: ISO 23856:2021, 3.3, modified — the first formula has been removed and Notes 2 and 3 to entry have been added.]

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

3.3 General terms

3.3.1
jacking
trenchless construction method which installs a pipeline by inserting pipes one by one under the ground by pressing with one or more hydraulic jacks, while the excavated ground is simultaneously evacuated from the cutting head

3.3.2
nominal length
pipe length without tolerance

Note 1 to entry: The nominal length is expressed in metres (m).

3.3.3
initial longitudinal compressive modulus (prism test piece)
$E_{c,p}$
ratio of the applied stress to the resulting strain below the elastic limit, both measured concurrently during a short-term compression test with prism

Note 1 to entry: When tested in accordance with Annex A, the initial longitudinal compressive modulus is expressed in megapascals (MPa).

3.3.4
initial longitudinal compressive modulus (spool test piece)
$E_{c,s}$
ratio of the applied stress to the resulting strain below the elastic limit, both measured concurrently during a short-term compression test with spool

Note 1 to entry: When tested in accordance with Annex B, the initial longitudinal compressive modulus is expressed in megapascals (MPa).

Sample Document
get full document from standards.iteh.ai

3.3.5
design longitudinal load
F_d
design value of the concentric longitudinal load that the pipe withstands, taking into account the material partial factor

Note 1 to entry: The ultimate longitudinal load is determined using the following formula and is expressed in kilonewtons (kN):

$$F_d = \sigma_b \cdot A_s \cdot \frac{1}{1\,000} \cdot \frac{1}{\gamma_M}$$

where

σ_b is the declared minimum initial compressive stress at break, in MPa;
A_s is the pipe cross-sectional area at the spigot, in mm^2;
γ_M is the material partial factor, γ_M = 1,37; see also Table C.1.

3.3.6
design jacking load
$F_{j,d}$
longitudinal compressive load that a pipe can withstand during a jacking operation, taking into account the installation partial factor and the stress eccentricity dependence factor

Note 1 to entry: The design jacking load is determined using the following formula and is expressed in kilonewtons (kN):

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

$$F_{j,d} = \frac{F_d}{S_\sigma \cdot \gamma_i}$$

where

F_d is the design longitudinal load, in kN;
S_σ is the stress eccentricity dependence factor, with $S_\sigma \geq 2$;
γ_i is the installation partial factor, see Table C.1.

Note 2 to entry: For the design jacking load for closed joint (considering full contact between the spigots) the stress eccentricity dependence factor $S_\sigma = 2$.

Note 3 to entry: For the design jacking load for open joint (considering incomplete contact between the spigots) the stress eccentricity dependence factor $S_\sigma > 2$. For the determination of S_σ, see C.2.5.1.

3.3.7
nominal stiffness
SN
alphanumerical designation for stiffness classification purposes, which has the same numerical value as the minimum initial value required, when expressed in newtons per square metre (N/m^2)

Note 1 to entry: The designation for reference or marking purposes consists of the letters SN plus a number.

[SOURCE: ISO 23856:2021, 3.8, modified — Note 1 to entry has been removed.]

3.3.8
ring stiffness
S
physical characteristic of the pipe which is a measure of the resistance to ring deflection per metre length under external load

Sample Document
get full document from standards.iteh.ai

Note 1 to entry: Ring stiffness is determined using the following formula and is expressed in newtons per square metre (N/m^2):

$$S = \frac{E \cdot I}{d_m^3}$$

where

E is the apparent modulus of elasticity, which can be derived from the result of the ring stiffness test, i.e. ISO 7685, in N/m^2;
d_m is the mean diameter, in m;
I is the second moment of area in the longitudinal direction per metre length, in m^4/m;

$$I = \frac{e^3}{12}$$

where e is the measured wall thickness of pipe, in m.

3.3.9
initial ring stiffness
S_0
value of ring stiffness, S, obtained when tested according to ISO 7685

Note 1 to entry: The initial stiffness is computed by:

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026

$$S_0 = \frac{\left\{1\,860 + \left(2\,500\,\frac{y}{d_m}\right)\right\} \cdot 10^{-5}}{\frac{L_R \cdot y}{F_R} - 0,392\,7 \cdot \frac{k \cdot d_m}{G \cdot e}}$$

where

y is the measured deflection, in m;

d_m is the mean diameter, in m;

L_R is the length of the specimen, in m;

F_R is the measured load, in N;

k is a shape factor for the wall cross-section, which can be assumed to be equal to 1,2, dimensionless;

G is the shear modulus, in N/m^2.

Note 2 to entry: The shear modulus to be used in the calculation can be determined through calibration between measured and computed values on various products, or other suitable means.

Note 3 to entry: Initial ring stiffness is expressed in newtons per square metre (N/m^2).

Note 4 to entry: The test shall be performed at relative deflection, y/d_m calculated by:

$$y/d_m\ (\%) = \frac{65}{\sqrt[3]{SN}}$$

3.3.10
calculated long-term ring creep stiffness
S_x
calculated value of ring creep stiffness, S, at x years

Note 1 to entry: Long-term ring creep stiffness is obtained using the following formula:

$$S_x = S_{0,1} \cdot \alpha_{x,creep}$$

where

x is the elapsed time as specified in this document (see 4.5), in years;

$\alpha_{x,creep}$ is the creep factor at x years, determined according to ISO 10468 under wet conditions;

$S_{0,1}$ is the ring stiffness at position 1 at 0,1 h.

3.3.11
pressure pipe
pipe having a *nominal pressure* (3.3.13) (PN) classification greater than 1 bar and which is intended to be used with the internal pressure equal to or less than its nominal pressure when expressed in bars

Note 1 to entry: 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

3.3.12
non-pressure pipe
pipe subjected to an internal pressure not greater than 1 bar

Note 1 to entry: 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

Sample Document
get full document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 25780:2026 • https://standards.iteh.ai/catalog/standards/iso/eaa3c668-e409-44c5-9989-9b2fe6cdd812/iso-25780-2026