DRAFT AMENDMENT

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ISO/TC **138**/SC **8**

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

Part 4:
Lining with cured-in-place pipes

AMENDMENT 1: Updated definitions, marking requirements and procedure for alternative expression of flexural test results

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

Partie 4: Tubage continu par tubes polymérisés sur place

AMENDEMENT 1: Actualisation des définitions, des exigences de marquage, et de la procédure d'autre expression des propriétés de flexion

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This document was prepared by Technical Committee ISO/TC 138, Subcommittee SC 8, *Rehabilitation of pipeline systems.*

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

Part 4: Lining with cured-in-place pipes

AMENDMENT 1: Updated definitions, marking requirements and procedure for alternative expression of flexural test results

2 Normative references

Replace the references to ISO 178:2010+A1:2013, ISO 10467:–[1)], ISO 10468 and ISO 14125:1998+A1:2011 with the following:

ISO 178:2019, *Plastics — Determination of flexural properties*

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

ISO 14125:1998, *Fibre-reinforced plastic composites — Determination of flexural properties*

Delete ISO 7684 from the list. Delete footnote 1.

3 Terms and definitions

Replace 3.1.2, 3.1.3, 3.1.4, 3.1.12 and 3.1.15 with the following:

3.1.2
carrier material
porous component of the *lining tube* (3.1.11), which carries the liquid *resin system* (3.1.16) during insertion into the pipe being renovated and forms part of the installed lining system once the resin has been cured

3.1.3
CIPP product
cured-in-place pipe of a particular design, produced from a *lining tube* (3.1.11) 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* (3.1.16) and installed by a specific process

3.1.4
CIPP unit
specific cured-in-place pipe produced from a continuous *lining tube* (3.1.11), which has been impregnated in one process and installed as a single length

3.1.12
nominal CIPP wall thickness ("M" stage)
one of a range of discrete *lining tube* (3.1.11) wall thicknesses dictated by the sum of the thicknesses of the individual layers of materials used for tube construction at the "M" stage, excluding any internal or external membranes

3.1.15
reinforcement
fibres incorporated in the *lining tube* (3.1.11) which enhance the dimensional stability of the lining tube and/or the structural properties of the cured *composite* (3.1.6)

Note 1 to entry The reinforcement can be incorporated in the *carrier material* (3.1.1), constitute the carrier material, or can be a separate layer

Add the following new term and definition:

3.1.13
nominal CIPP wall thickness ("I" stage)
one of a range of discrete *CIPP product* (3.1.3) wall thicknesses at the "I" stage, dictated by the sum of the thicknesses of the individual layers of materials used for *lining tube* (3.1.11) construction, excluding any internal or external membranes

Renumber subsequent terms and definitions in 3.1.

4.1 Symbols

Add the following new symbols:

EI	section bending stiffness per unit length of the pipe wall
EI_c	apparent section bending stiffness of a curved 3-point test piece before correction for curvature
M	section moment capacity per unit length of the pipe wall
M_c	apparent section moment capacity of a curved 3-point test piece before correction for curvature

4.2 Abbreviated terms

Replace the description of PPTA with:

PPTA Poly(p-phenylene terephthalamide)

Add the following new abbreviated term:

PP Polypropylene

5.1, Table 1

In the row "Carrier material/reinforcement" replace the term "PPTA" with "PPTA aramid".

5.4 Geometric characteristics

Replace the entire text of the subclause with the following:

Where the manufacturer elects to mark the lining tube with nominal CIPP wall thickness ("M" stage), see 5.8, the thickness of the lining tube shall be measured by a method documented in the manufacturer's quality plan. The thicknesses of any membranes shall be deducted.

The total nominal CIPP wall thickness ("M" stage) may be determined as the sum of the similarly measured thicknesses of individual layers of material.

NOTE 1 Such measurement is possible only where the lining tube is marked before impregnation with the resin system.

NOTE 2 The "I" stage wall thickness achieved (see 8.4.3) will depend not only on the "M" stage thickness, but also on the volume, rheology and curing characteristics of the resin system used, the internal dimensions and condition of the pipe to be lined, and details of the installation process applied.

Where the manufacturer elects to mark the lining tube with nominal CIPP wall thickness ("I" stage), see 5.8, this thickness shall represent the minimum value of the mean thickness, $e_{c,m}$, of the composite achieved when the lining tube is installed by a prescribed process in a circular pipe of internal diameter equal to the declared nominal outside diameter, d_n, of the lining tube.

In all cases the perimeter of the lining tube should be dimensioned such that when installed, it forms a close fit to the existing sewer wall or as otherwise required by the design. The manufactured length and thickness of the lining tube should include allowances for any longitudinal and circumferential stretch during installation.

5.8 Marking

Replace the third paragraph with the following:

For compliance with ISO 11296-1:2018, 5.8 d), the dimension marked shall be either the nominal CIPP wall thickness ("M" stage) or nominal CIPP wall thickness ("I" stage), making clear which is intended.

6.8 Marking

Replace the second and third paragraphs with the following:

For compliance with ISO 11296-1:2018, 6.8 c), the dimensions marked shall be the nominal inside diameter of the lateral pipe, and, where applicable, also of the main pipe that the lateral connection collar is designed to fit.

For compliance with ISO 11296-1:2018, 6.8 d), the dimension marked shall be either the nominal CIPP wall thickness ("M" stage) or nominal CIPP wall thickness ("I" stage), making clear which is intended.

In the fourth paragraph, replace the opening words "As specified in…" with "For compliance with…".

8.1, final paragraph

Delete "+A1:2011" after "ISO 14125:1998".

8.5.2, Table 6

In the final column of the first row, replace "ISO 7684 with extrapolation according to ISO 10468" with "ISO 10468".

9.4.2, Installation procedures

In the NOTE, replace "pre-liner" with "preliner".

Annex B

Throughout this Annex, replace all instances of "ISO 178:2010+A1:2013" with "ISO 178:2019", and all instances of "ISO 14125:1998+A1:2011" with "ISO 14125:1998". The cited clause and table numbers remain valid for these replacement dated references.

B.5.5 Alternative expression of flexural properties

Replace the entire text of the subclause with the following:

Where the mean composite thickness $e_{c,m}$ cannot easily be determined, e.g. due to uncertainty about thickness of membranes or any excess neat resin layer, or where, as in the case of structured-wall reinforced liners, the apparent flexural modulus E_f is itself a function of wall thickness, the flexural characteristics of the liner pipe wall may alternatively or additionally be expressed as section bending stiffness, *EI*, and section moment capacity, *M*, per unit length of the wall.

For flat test pieces, section moment capacity and section bending stiffness are independent of thickness and given simply by Formulae (B.12) and (B.13):

$$M = \frac{(F/b)\cdot L}{4} \tag{B.12}$$

$$EI = \frac{(F/s)\cdot L^3}{48\cdot b} \tag{B.13}$$

The relevant value of (*F*/*s*) to be used in Formula (B.13) is the steepest slope of the initial load-deflection curve.

