



SLOVENSKI STANDARD
SIST EN 638:1997

01-februar-1997

Cevni sistemi iz polimernih materialov - Plastomerne cevi - Določanje nateznih lastnosti

Plastics piping and ducting systems - Thermoplastics pipes - Determination of tensile properties

Kunststoff-Rohrleitungs- und Schutzrohrsysteme - Rohre aus Thermoplasten - Bestimmung der Eigenschaften im Zugversuch

Systemes de canalisations et de gaines plastiques - Tubes thermoplastiques - Détermination des propriétés en traction

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Ta slovenski standard je istoveten z: EN 638:1994

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23.040.20 Cevi iz polimernih materialov Plastics pipes

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EUROPEAN STANDARD

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NORME EUROPÉENNE

EUROPÄISCHE NORM

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Descriptors: Pipelines, plastic tubes, tension tests, determination, characteristics, tensile stress, elongation at break

English version

**Plastics piping and ducting systems -
Thermoplastics pipes - Determination of tensile
properties**

Systèmes de canalisations et de gaines
plastiques - Tubes thermoplastiques -
Détermination des propriétés en traction

Kunststoff-Rohrleitungs- und Schutzrohrsysteme
- Rohre aus Thermoplasten - Bestimmung der
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This European Standard was approved by CEN on 1994-04-11. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This standard was prepared by CEN/TC 155 "Plastics piping systems and ducting systems".

This standard is based on the text for ISO/DIS 6259-1 "Thermoplastics pipes - Tensile properties - Determination and basic specifications - Part 1: General test method", prepared by the International Organization for Standardization (ISO). It is a modification of the text for ISO/DIS 6259-1 for reasons of alignment with texts of other standards on test methods.

The modifications are:

- test parameters, except those common to all thermoplastics, are omitted;
- no material-dependent or performance requirements are given;
- editorial changes have been introduced.

Annex A, which is informative, gives guidance on machining equipment and conditions.

The material-dependent parameters and/or performance requirements are incorporated in the System Standard(s) concerned

No existing European Standard is superseded by this standard.

This standard is one of a series of standards on test methods which support System Standards for plastics piping systems and ducting systems.

This European Standard shall be given the status of a National Standard, either by publication of an identical text or by endorsement, at the latest by October 1994, and conflicting national standards shall be withdrawn at the latest by October 1994.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.



1 Scope

This standard specifies a method for determining the short-term tensile properties in the longitudinal direction and, in particular,

- the tensile stress at yield and/or at maximum load, and
- elongation at break

of thermoplastics pipes and ducts.

This standard is applicable to all types of thermoplastics pipes, regardless of their intended use.

NOTE: The tests of tensile properties are intended to be regarded as tests of material in the form of pipe and not as tests of the pipe itself. The values obtained by this test should not be used as design values for the pipe.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter.

For dated references, subsequent amendments to, or revisions of, any of these publications apply to this European Standard only when incorporated in it by amendment or revision.

For undated references the latest edition of the publication referred to applies.

- ISO/DIS 527-2.3 *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics*
- ISO 5893:1985 *Rubber and plastics test equipment - Tensile, flexural and compression types (constant rate of traverse) - Description*

3 Principle

Test pieces of specified shape and dimensions are taken from a thermoplastics pipe, in the longitudinal direction, by punch cutting or machining, depending upon the size and the material of the pipe.

The tensile properties are determined using a tensile testing machine under specified short-term conditions.

NOTE: It is assumed that the following test parameters are set by the standard making reference to this standard:

- a) the rate of movement of the driven grip (the speed of testing) (see 4.1 and 8.4);
- b) the test piece shape and dimensions (see 5.1);
- c) the number of test pieces to be tested (see 5.2.1.2 and 5.2.1.3);
- d) the method for obtaining test pieces (see 5.2.2);
- e) if necessary, treatment (e.g. heating) of strips from which test pieces are to be cut (see 5.2.2.2);
- f) the initial gauge length (initial distance between reference marks) of the test piece (see 5.2.3) and the applicable extensometer grade in accordance with ISO 5893:1985 (see 4.4);
- g) if necessary, the need to calculate standard deviations (see 9.3).

4 Apparatus

4.1 Tensile testing machine, conforming to ISO 5893:1985 for the specified rate of movement of the driven grip.

4.2 Grips, for holding the test piece, conforming to ISO 5893:1985, which shall be fixed to the machine in such a way that they move freely into alignment as soon as any force is applied, so that the longitudinal axis of the test piece coincides with the direction of the force along the centreline of the grip assembly.

4.3 Force indicator, capable of showing or recording with an accuracy conforming to grade A of ISO 5893:1985 the total tensile force to which the test piece held in the grips is subjected when tested at the speed specified.

4.4 Extensometer, constructed and attached in conformity to ISO 5893:1985 for the specified gauge length and extensometer grade.

NOTE: It is desirable, but not essential, for this instrument to record this length (or any variation of it) automatically as a function of the stress in the test piece.

4.5 Micrometer or equivalent, giving readings to 0,01 mm or smaller, for measuring the thickness and width of the test pieces.

4.6 Punch cutting die, with a specified profile (see 5.1) and clean, sharp cutting edges free from notches.

4.7 Milling machine plus cutter(s), capable of preparing the specified test pieces (see 5.1 and 5.2.2.3).

5 Test pieces

5.1 Shape

The test piece shall comprise a dumb-bell having a plan shape specified by the referring standard (see clause 3) and selected, if applicable, from the types of test specimen given in ISO/DIS 527-2.3. The thickness of the test piece shall be the full wall thickness of the pipe from which it is taken.

5.2 Preparation

5.2.1 Obtaining sample strips from a pipe

5.2.1.1 General

Cut strips, in accordance with 5.2.1.2 or 5.2.1.3 as follows, from the pipe as supplied, i.e. without prior heating or flattening, so that the longitudinal axis of each strip is parallel to the axis of the pipe.

For pipes classified by nominal outside diameters 5.2.1.2 and 5.2.1.3 apply.

For pipes classified otherwise, to apply 5.2.1.2 or 5.2.1.3, read 'minimum permissible outside diameter' in place of 'nominal outside diameter'.

5.2.1.2 Pipes having a nominal outside diameter of less than 75 mm

Unless otherwise specified (see clause 3), obtain at least five strips each approximately 150 mm long by cutting the strips from the minimum number of corresponding lengths of pipe necessary for the longitudinal axes of the strips to be uniformly distributed around the pipe.

5.2.1.3 Pipes having a nominal outside diameter of 75 mm or greater

Use a length of pipe of approximately 150 mm.

If the number of test pieces is specified (see clause 3), for each test piece required cut one strip from the length in such a way that the strips are equally distributed along the circumference of the pipe, e.g. as shown in figure 1, and, if necessary, using additional length(s) of pipe.

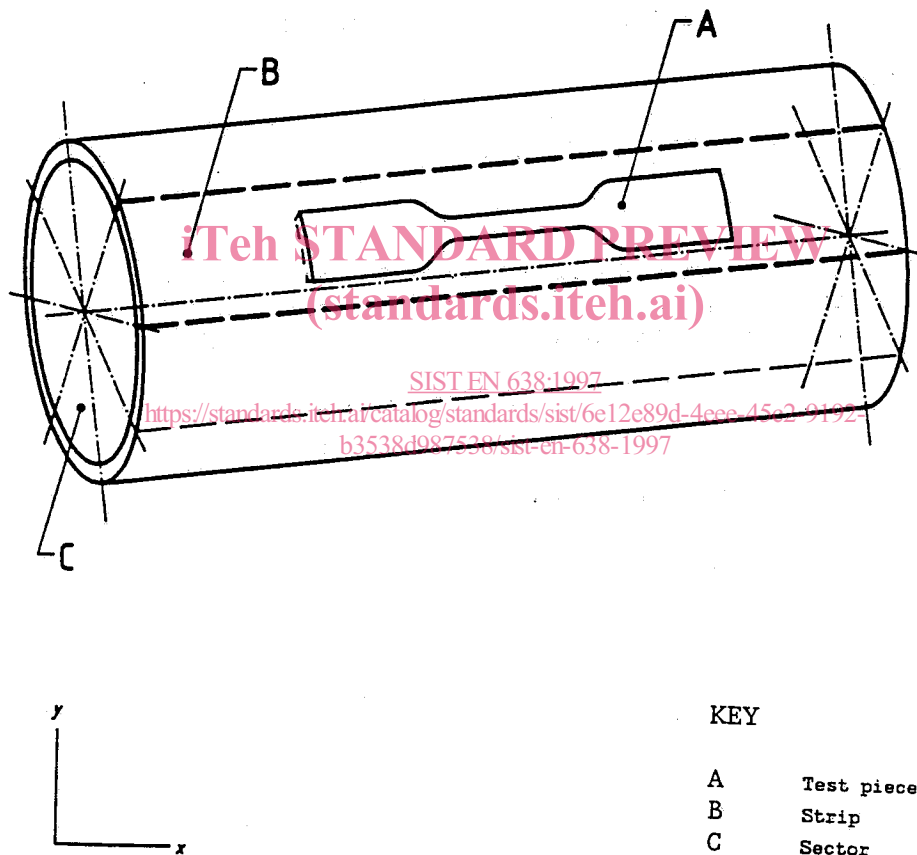


Figure 1: Obtaining test pieces

Otherwise, divide the circumference of the pipe length into a number of sectors, depending on the outside diameter of the pipe as given in table 1, and cut one strip from each sector.

Table 1: Number of sectors or strips related to nominal outside diameter

Nominal outside diameter mm	≥ 75 and < 280	≥ 280 and < 450	≥ 450 and < 710	≥ 710 and ≤ 1000
Number of sectors or strips	5	7	10	16

5.2.2 Obtaining test pieces from strips**5.2.2.1 General**

Cut one test piece from the centre of each strip taken from the length of pipe (see 5.2.1) either by punch cutting in accordance with 5.2.2.2 or by machining in accordance with 5.2.2.3, as specified.

5.2.2.2 Punch cutting method

If applicable, precondition the strip immediately before using the punch cutting die (see 4.6) so that the punch is applied to the inner pipe wall surface of the strip with sufficient uniform pressure to pass right through the wall thickness in a single stroke.

NOTE: For some materials, preheating of the strip may be specified by the referring standard.

5.2.2.3 Machining method

Produce the test piece by milling, where necessary using a milling jig.

The shape of the milling cutter and the machining conditions (speed of rotation and advance) are at the discretion of the operator, provided they are chosen so as to avoid any heating of the test piece and/or damage to its surface, such as cracks, scratches or other visible flaws, to an extent that would affect the tensile properties to be measured. Reject therefore any test pieces with such faults.

NOTE: Attention is drawn to ISO 2818 ¹⁾ for guidance on the machining procedure and to additional guidance in annex A, which is informative.

5.2.3 Gauge marks

Using devices or materials which do not scratch, imprint or otherwise affect the characteristics of the tensile properties of the material concerned, establish two gauge marks or positions equidistant from the ends of the calibrated length of the test piece [see item f) of the note to clause 3].

¹⁾ ISO 2818:1980 *Plastics - Preparation of test specimens by machining.*